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The Selling of Put Derivatives by Firms for Shareholder Wealth and Information Signaling Enhancement

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Abstract

We define a Synthetic Repurchase Program (SRP) as an open market share repurchase program enhanced with sales of put derivatives on the firm's stock. Firms implementing SRPs receive tax-free cash flows. SRPs are shown to be an attractive mechanism for value creation that also create, as a byproduct when the transactions are disclosed, a separating equilibrium between firms with positive future prospects and the rest of the firms. We develop a mathematical model that shows the effectiveness of this unique signaling mechanism. Using data on 53 firms we find that SRPs enhance the market's response to repurchase announcements. In addition, firms implementing SRPs report increases in assets and R&D investments relative to a control sample. Overall the evidence of our research shows that SRPs are effective signals of firm quality and perceived as such by the market.

I. Introduction

Firms have been using put options to enhance their stock repurchase programs since the early 1990s. We define a synthetic repurchase program (SRP) as an open market share repurchase program enhanced with sales of put derivatives on the firm's own stock. Financial practitioners have exhibited a significant interest in these transactions. Paul Mazzilli at Morgan Stanley & Co. reports that "a large portion of the firms that do [share repurchase] programs with me have been introduced to [selling put derivatives], and use the strategy."[2] Angel, Gastineau and Weber (1997) estimate that more than 10% of all American Stock Exchange firms that have repurchase programs use put derivatives in combination with them. In this paper we investigate why firms sell put options on their own stock and do so in combination with stock repurchases in a synthetic repurchase program.

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[2] Tom Pratt (1994)

A synthetic repurchase program enables management to take greater advantage of favorable inside information concerning the firm's future prospects. When they know that the firm's stock is undervalued, managers can exploit their information advantage and benefit shareholders who continue to hold shares by repurchasing shares of the firm's stock. Managers can take still greater advantage of such private information by buying call options and/or selling put options on the firm's stock. As highly levered transactions, they would significantly magnify the profits accruing to shareholders. Moreover, unlike share repurchases, by engaging in option transactions, managers are not exploiting their inside information at the expense of existing shareholders. Assuming shareholder wealth maximizing behavior on the part of managers, we should observe firms buying and selling options on their firm's stock to a greater extent than they repurchase stock. But, stock repurchases are far more common than option transactions.

Boards of directors, shareholders, and financial analysts take a dim view of option trading by firms for other than hedging purposes.[3] Speculative trading is perceived as unnecessarily risky and outside of the core competencies of managers. These negative perceptions held by important constituents can inhibit managers from using derivatives to fully exploit their inside information. However put options nested within a stock repurchase program in a synthetic arrangement can mitigate these objections. Synthetic repurchase programs are viewed as a natural continuation and desirable enhancement of a plain vanilla stock repurchase program.

In a stock repurchase program, the firm determines a share price below which stock repurchases are profitable and purchases triggered. Put options can be sold in conjunction with this program where the exercise price of the puts are set at or below the stock repurchase trigger price. Consequently, repurchases of stock obligated by the exercising of puts are purchases that would have occurred in the absence of the put option, or so it can be argued. As the puts are placed in the perspective of the repurchase program, the problem of their perceived riskiness is

[3] GAAP states that firms should prove that they use their derivatives for hedging otherwise they should be classified as derivatives used for speculations.

mitigated. And because managers set exercise prices that conform to their inside information, firm issued put options almost always expire unexercised. The sales of the options are said to enhance a stock repurchase program as the premiums from the sales are used to repurchase stock in the program. Consequently a SRP also provides a convenient mechanism by which cash flows generated by the put sales can be disgorged to shareholders.

We examine the proposition that managers have incentive to increase the acceptability by corporate constituents of their derivative transactions by demonstrating that the selling of put options on the firm's stock has significant value creation potential. We demonstrate this value creation potential with a case study showing how Microsoft generated considerable profits in the 1990 decade with synthetic repurchase transactions. In 1994, Microsoft first sold put derivatives on its own stock as part of a synthetic repurchase program and received $49 million in premiums. Over a seven year period in which its SPR was in place, Microsoft's total premiums from its sales of puts exceeded two billion dollars. As the premiums are treated as retained earnings, they are a tax-free cash flow credited to equity and were used to repurchase shares of Microsoft stock in an ongoing stock repurchase program. Recently, in response to the prolonged bear market that began in 2000, firms have settled their outstanding puts, at less cost than expected, and placed synthetic repurchase programs on hold (Atanoasov, Gyoshev, Szewczyk, Tsetsekos (2001)).

We also propose that managers have an information signaling motive to combine the selling of puts with repurchases of stock in a synthetic repurchase program. Sales of puts on the firm's stock can convey favorable information about the firm's future prospects to outside investors (Gyoshev (2001) and Gibson, Povel, and Singh (2004)). However, firm-issued puts are usually privately placed with financial intermediaries, such as investment banks, rendering the transactions unobservable by outside parties. Moreover, the firm is not obligated to disclose the transactions by existing Financial Accounting Standard Board accounting rules or required to do so by the Securities and Exchange Commission. Atanasov, Gyoshev, Szewczyk, and Tsetsekos

(2001) find that, for a sample of firms selling put options on their own stock in the period 1994 to 1999, the average elapsed time from the date of the put transaction to its disclosure to the public is six months.[4] Such time intervals imply that the put sales themselves did not function as a timely disclosure of information. However, they were sold in the context of a SRP as the put premiums received from the sales are said by the firms (in 10Q and 10K statements) were used to repurchase common stock of the issuing firms.

In this paper, we present a model in which managers of financially strong firms create a separating equilibrium through sales of puts on the firm's stock which allows outsiders to distinguish their firms from financially weak firms. Firms exploit this separating equilibrium in a SRP as the firm's stock repurchases convey conditional signals conditioned on the establishment of a SRP. Information conveyed by a stock repurchase can be ambiguous to the extent that uninformed investors are unable to distinguish between share repurchases of undervalued shares and share repurchases that disgorge excess operating cash flow. Such situations are likely to exist when firms makes consecutive stock repurchases in an ongoing stock repurchase program. This ambiguity is mitigated when the repurchases are made in the context of a SRP as the firm has certified its quality – only high value firms will establish synthetic repurchase programs. [5]

We provide evidence of the separating equilibrium using financial profiles of firms with SRPs and financial profiles of matched control firms with plain vanilla repurchase programs, and matched control firms with no stock repurchase programs. Control firms are matched with SRP firms by industry and size. Relative to the control firms, firms that initiate SRP's have higher market-book ratios, higher earnings and operating cash flows, display significant increases in

[4] Rational outside investors would never purchase put options from an informed issuing firm. According to Atanasov, Gyoshev, Szewczyk, and Tsetsekos (2001) put sales to investment banks involve an implied agreement in which banks purchase inside information conveyed by the willingness of firms to sell puts and firms agree to withhold announcing the transaction.

[5] An interesting feature of this signaling mechanism is that it transmits the signal without wasteful spending activity like dividend increases, discussed by John and Williams (1985), or inefficient investments and the passing up of positive NPV projects, discussed by Krasker (1986).

total assets, and make greater investments in research and development. These finding are consistent with the proposition that higher quality firms initiate synthetic repurchase programs.

We also test the proposition that managers use the separating equilibrium to enhance the information content of the firm's stock repurchases. We show that signals conveyed by stock repurchases conditional on a SRP are associated with larger positive abnormal returns that are stock repurchases made outside a SRP.

The paper is organized as follows. Part 2 demonstrates the value creation potential of SRPs with a Microsoft case study showing the huge profits made with synthetic repurchase transactions. Part 3 explains the motives for synthetic repurchases. Part 4 explains the market reaction to synthetic repurchase programs and Part 5 concludes.

II. The profitability of synthetic repurchase programs: the case of Microsoft Corporation.

Table 1 presents Microsoft Corporation's experience with its synthetic stock repurchase program over the period 1993 through 2002. During this period, Microsoft became one of the world's largest firms and realized the highest net income in the world. The first mention of Microsoft's stock repurchase program is found in its October 1, 1993 10–K statement: "The exercise of stock options by employees provides additional cash. Funds received have been used to repurchase the Company's common stock on the open market, to provide shares for stock option and stock purchase plans. This practice is expected to continue in 1994." In 1993, the firm repurchased 7 million shares for $250 million. This dollar amount is equal to 26% of net income reported for the year.

<Insert Table 1 approximately here>

Microsoft initiated its synthetic repurchase program in 1995. As stated in the firm's June 30, 1995 10-Q filing: "In connection with the Company's stock repurchase program, put warrants were sold to independent third parties during 1995. The put warrants entitle the holders to sell shares of Microsoft common stock to the Company at specified prices. On June 30, 1995, 8.0 million warrants were outstanding with a strike price of $69.75 per share. The warrants expire at various dates between February 1996 and November 1996, are exercisable only at maturity, and are settleable in cash at Microsoft's option.[6] The maximum potential repurchase obligation of $405 million has been reclassified from stockholders' equity to put warrants as of June 30, 1995. There was no impact on earnings per share in 1995."

The program began modestly with $49 million of premiums received from the sale of puts representing 7% of the dollar repurchase of stock in 1995 and 3% of net income. Over the next 5 years, Microsoft aggressively exploited the strategy. In 1998 put premiums received were almost equal to 12% of the year's reported net income. Put premiums totaled $766 billion and contributed more than 25% of the funds used to repurchase stock in 1999. At the same time, the maximum potential repurchase obligation of outstanding put warrants also aggressively increased. In 1999, the maximum potential repurchase obligation is estimated at over $10 billion, which is equal to 130% of that year's net income. However, all options maturing before 2001 expired unexercised.

Microsoft's synthetic stock repurchase program was no longer a viable strategy during the prolonged bear market that began in 2000. In 2001, Microsoft repurchased all unexpired put warrants for $1.3 billion dollars. The firm's overall experience with synthetic stock repurchases was positive. Microsoft started modestly as they experimented with the SRP and learned the mechanics and then aggressively exploited the strategy for the last 3 years of the bull market. Microsoft was able to timely conclude the strategy by retiring unexercised put warrants at a cost

[6] Atanasov, Gyoshev, Szewczyk, and Tsetsekos (2001) elaborate why the firms are allowed by the Financial Intermediaries to settle before the expiration.

far less than their maximum potential obligation. The firm realized a net gain from the strategy of $677 billion over seven years.

III. Why firms sell put derivatives in share repurchase programs

As evident from the Microsoft case, synthetic repurchase programs enable managers to take advantage of their superior information of the firm's future prospects and collect substantial tax-free put premiums.[7] The premiums enhance stock repurchase programs as they are distributed to shareholders through the repurchase of shares. On the other hand, the vast majority of issued put options expire unexercised, and the buyers of these options, predominantly investment banks in private placement transactions with the issuing firm, lose money. Atanasov, Gyoshev, Szewczyk, and Tsetsekos (2001) propose a model that provides a rationale why an uninformed investment bank will trade in put options with an informed issuing firm, given the expected profits from the trade are negative for the bank. In their model, trading with an informed party can be profitable because the bank can acquire valuable information in a private placement purchase of puts and afterwards earn abnormal returns on trades in other securities of the issuing firm. This requires the firm to maintain a "decent interval" in which information regarding the transaction is withheld from the public so to allow the bank to make its profitable trades. The firm does so in order to continue its profitable transacting in puts with the investment bank. [8]

Given that firms receive substantial cash receipts from put sales and that issued put options expire unexercised, the primary motivation for selling puts is quite clear – these

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[7] Grullon and Ikenberry's (2000) claim that the reason firms use put options is that "in the US the premium is not taxable and falls directly to the bottom line"

[8] Firms are limited in their ability to profit from their information advantage by selling puts on organized exchanges as Rule 10b-18 restricts the amount of puts a firm can issue. Moreover, rational outside investors will never purchase put options from an informed issuing firm. According to Atanasov, Gyoshev, Szewczyk, and Tsetsekos (2001) put sales to investment banks involve an implied agreement in which banks purchase inside information conveyed by the willingness of firms to sell puts and firms agree to withhold announcing the transaction. As the transactions are off-market, the firm is not restricted in the number of puts it can sell, nor is it obligated to disclose the transactions by existing accounting rules.

transactions increase shareholders' wealth. However, a consequential byproduct of issuing puts is that a separating equilibrium is created that allows investors to separate the issuing firms from those of lower value. But, the circumstances in which firms sell puts whereby the puts are privately placed and announced months after the sale, indicate that put sales are not used by firms to directly signal information. Yet firms can still take advantage of the resulting separating equilibrium associated with put sales. By establishing an integrated program of put sales and stock repurchases, a condition is created in which the separating equilibrium increases the effectiveness of signals conveyed by stock repurchases made within a synthetic repurchase program.

We present a model in which a high-value firm uses the inverse relation between the put payoff and the underlying firm stock effectively signal and certify its quality.[9] Put derivatives issued by a high-value firm at a fair price with respect to the publicly available information will be overpriced, and put derivatives issued by low-value firms at a fair price with respect to the publicly available information will be underpriced. The difference in the "fair" intrinsic value, based on insider information, establishes a separating equilibrium between the high-value and the low-value firms. By extension, only high-value firms initiate synthetic repurchase programs, and stock repurchases within the program are conditional signals of quality. We graphically present the model in the next section. We provide a rigorous proof in the appendix.

IV. Graphical Presentation of the Model

Without loss of generality, we assume that firms issuing puts will be offered the fair-market put premium based on publicly available information. However, prior to initiating a synthetic repurchase program, only managers know whether their firm is financially strong or

[9] Nachman and Noe (1994) show that if there is not a inverse relation between the securities issued, i.e., a firm is limited to issuing securities with non-decreasing payoffs, then there cannot not be a separating equilibrium between good and bad firms. That is, a firm can always mimic the security issuing behavior of a good firm without negative impact on the bad firm shareholders value.

financially weak. Uninformed investors will assume that all firms have the same probability distribution of stock prices at put expiration. Without loss of generality, we assume that put options are traded only in firms for which non-performance is not expected at put expiration.

We can also assume without loss of generality that at the moment the put option is written there are three stochastically dominant distributions that will represent the probability function of the stock price at put option expiration. These three distributions are the distribution of financially strong firms, the distribution of financially weak firms, and the expected distribution of the stock price at put expiration from the uninformed investors' perspective. The normal distribution is a subset of the stochastic dominance distributions. But, without loss of generality we can assume for this example that the three distributions of the stock price at put expiration are normal distributions with different means and have the same standard deviation which, given the assumption that non-performance is not expected at expiration, are smaller that the smallest mean, as shown on Figure 2.

<Insert Figure 2 approximately here>

<Insert Figure 3 approximately here>

The difference between an exchange-traded put option and a put option written by a firm is the default risk of the underlying firm. As shown in Figure 3, in the case of an exchange-traded put option, when the stock price of the firm falls, the put option goes deeper into the money (the X line), and the exchange guarantees payment through its clearing house, i.e., provides "insurance" in case of default of the firm. But when a put option is written by a firm, there is a risk of default (P line). If the stock price of the firm drops, there is a point at which the total value of the firm will be paid to the put holder as a settlement payment. Below this point, (under $30

dollars per share in Figure 3) the firm will default, and the put holders will not be properly compensated, unlike the holders of exchange-traded puts (represented by Line X).

Now, consider this from the perspective of the stockholders (S line). There is a point under which the claim of the stockholders has zero value, and the firm will go bankrupt (under $30 dollars per share in Figure 3). When the stock price is between this point and the put option exercise price, some of the value of the firm will accrue to stockholders and some to the put-holders (between $30 and $60 dollars per share in Figure 3). Finally, when the stock price is above the put option strike price (above $60 dollars in Figure 3), shareholders keep the entire value of the firm for themselves. And, for comparison, if there is no (SRP) sale of put options, shareholders keep everything for themselves independently of the stock price distribution (T line).

To assess the signaling effect of the issue of a put option (SRP) by a financially weak or financially strong firm, we have to find the put premiums: for financially strong and financially weak firms and for firms from the uniformed investor perspective. The difference between the integrals of stockholder value at put expiration with the put option sold (Line S) and without the put option sold (Line T) give the expected put value at expiration for the firm that chooses to sell put options. To find these three put premiums, we integrate the difference between the stockholder value at put expiration with the put option sold (S line from Figure 3) and the stockholder value at put expiration without the put option sold (T line from Figure 3) over the 3 three stochastic dominance distributions presented in Figure 2: the distribution at put expiration for financially strong firms (S line in Figure 2), the distribution at put expiration for financially weak firms (W line in Figure 2), and the distribution at put expiration for average firms from the uninformed investor perspective (A line in Figure 2).

<Insert Figure 4 approximately here>

The values of the six integrals are presented graphically in Figure 4. The value is the area below the curve. So, the values of the put option premiums are the areas between the two corresponding curves. For the average firm, i.e., for any firm from an uninformed investor perspective, the put premium paid should be equal to the area between the two lines, the line received by integrating the value of the firm without put options sold (T line from Figure 3) over the stochastic dominance distribution of stock prices at put expiration for the average firm (A line from Figure 2) and the line received by integrating the value of the firm with put options sold (S line from Figure 3) over the stochastic dominance distribution of stock prices at put expiration for the average firm (A line from Figure 2). This is the area between the lines A and AP in Figure 4. This is the put premium that exactly compensates the average firms for selling put options.[10] The put premiums for financially strong firms and financially weak firms are computed in exactly the same way using correspondingly: the stochastic dominance distribution of stock prices at put expiration for the financially strong firm (S line from Figure 2), and the stochastic dominance distribution of stock prices at put expiration for the financially weak firm (W line from Figure 2).

There is almost no difference between the value of a good firm, that has sold put options and a good firm that has not sold a put option and the area between this two curves representing the fair value of the put premium (lines S and SP in Figure 4). This value is only known to the management of the firm before the introduction of the SRP with the sale of puts. Furthermore, the option premium received form the company which is the put premium for average firms is much greater than the difference between the expected values for financially strong firm at put expiration. Therefore, it is advantageous for good firms to sell overvalued put options to investment banks.

[10] Furthermore, there is a small additional tax-benefit for the firm, because taxes due are figured into the valuation of the put, but the put premium is, in fact, tax-free. So there is small tax-advantage for an average firm to issue put options.

There is a huge difference between the expected value of a financially weak firm that has sold put options to falsely certify its quality and a financially week firm that has chosen not to mimic the certifying behavior of good firms (lines W and WP in Figure 4). The put premium received is much smaller and could not compensate the firm for the risk involved.

A simpler way of computing the put premiums for the three companies (financially weak, average firm and financially strong) is to integrate what the put holder is going to get at put expiration (P line in Figure 3) [11] over the three statistic dominance distributions.

<Insert Figure 5 approximately here>

The large difference between the three put premiums of financially strong firms, average firms and financially weak firms creates a separating equilibrium between the financially strong and financially weak firms. Financially strong firms are rewarded for selling put options and certifying their quality, while financially weak firms will choose not to participate, because of the large expected financial penalties for them. This is a unique way of signaling. On one side, the signaling firm is communicating its strong financial future and at the same time is receiving tax-free cash-flows for certifying its quality. On the other side it is extremely expensive to mimic for the financially weak firm.

V. The Separating Equilibrium and Synthetic Repurchase Programs

In practice, puts are sold privately by firms to institutional investors and are not publicly reported until months later in the firm's 10-Q and 10-K reports. Put sales are not intended as timely signals of quality. But when reported, the resulting separating equilibrium will endure

[11] take into account that the put option is written by a firm so there is default risk

through the expiration date of the puts. The separation equilibrium confers an additional benefit as firms having new favorable information can signal this information conditioned on the quality certification from their put sales. We posit that firms initiate synthetic repurchase programs to take advantage of the separating equilibrium from their sales of puts.

Firms may repurchase shares that its managers know are undervalued by the market. Firms may also repurchase shares to disgorge excess operating cash flow resulting from a dearth of investment opportunities. Announcements of stock repurchases are ambiguous signals to the extent that investors cannot distinguish between the two situations. This may especially be the case when the firm makes consecutive stock repurchases as in a stock repurchase program. This ambiguity is reduced when the repurchases are made in the context of a SRP as the firm has certified its quality as a high quality firm and such firms are less likely to have excess cash flow because of a lack of valuable growth opportunities. Firms reinforce the connection between put sales and stock repurchases in a synthetic repurchase program by conspicuously repurchasing shares with cash raised from the put premiums. Moreover, investors may also find it noteworthy that a significant volume of the firm's share repurchases are being financed with funds from the firm's put sales and not with operating cash flow.

III.B. Empirical tests

In the case example of Microsoft, we show that the generation of tax-free put premiums from sales of put derivatives is a wealth creating opportunity. Consequently, managers have incentive to make their put sales more acceptable to corporate constituencies such as to the firm's board of directors. Put sales made in the context of synthetic repurchase programs are viewed by these constituencies as a natural continuation and desirable enhancement of an existing stock repurchase program. We also propose that managers have an information enhancement motive for creating synthetic repurchase programs as they allow investors to differentiate between firms that

are repurchasing undervalued shares and firms that are disgorging excess cash via share repurchases.

To test this proposition, we first demonstrate that sales of puts create a separating equilibrium that separates high quality firms from those of lower quality. We examine financial profiles of firms with synthetic repurchase programs to determine whether such firms differ in their future prospects from control samples consisting of firms with plain vanilla repurchase programs and firms with no repurchase programs. We then test whether synthetic repurchase programs, by creating a signal conditioned on the separating equilibrium, enhance the information efficiency of consecutive stock repurchases made in an ongoing repurchase program. We compare announcement period stock price reactions to consecutive stock repurchases made outside and within a firm's synthetic repurchase program.

IV.A. Data

We identify firms that sold put options on their own stock over the period from January 1988 through December 1999 by searching 10-K and 10-Q statements available on the Lexis®-Nexis® database and on the SEC EDGAR filings database.[12] We found 53 firms that used their own stock as the underlying asset in the issue of put derivatives. In all cases, the put sales were made in connection with an ongoing stock repurchase program. These 53 firms operate in 34 industries as indicated by their four-digit SIC codes. We use the SDC Platinum database to collect a sample of open market stock repurchases made by the 53 firms. We attempted to find all repurchase announcements made since the initiations of the firms' stock repurchase programs through December 1999. They include the initial repurchase announcements and all subsequent

[12] The period encompasses the years over which firms are actively selling puts on their own stocks. We terminate our search period in 1999 for two reasons. First, the financial profiles we examine are constructed for five years following the initial announcement of a synthetic repurchase program. Second, firms suspended their programs with the development of the prolong bear market beginning in 2000 (see Atanasov, Gyoshev, Szewczyk and Tsetsekos (2001)).

repurchase announcements made before and during the upgrade of these programs to synthetic repurchase programs as well as announcements made after the termination of a program. We find a total of 189 stock repurchase announcements made by these firms.

IV.B. Financial Profiles

We examine the financial profiles of firms with synthetic repurchase programs in comparison with two sets of industry/size matched control firms. These control sets consists of firms with plain-vanilla stock repurchase programs and firms without stock repurchase programs. For each of the 53 firms with synthetic repurchase programs, using COMPUSTAT, we construct a list of firms having the same 4-digit SIC code as the synthetic repurchase firm. Firm size is measured as the market value of equity. The market values of the firms are calculated using data obtained from CRSP for the end of the quarter before the synthetic repurchase firm begins to sell put options on its own stock.

Firms with ongoing share repurchase programs are identified using SDC Platinum. For each synthetic repurchase firm, we find the three firms with plain-vanilla repurchase programs within the 4-digit SIC group having size closest to that of the synthetic repurchase firm. Likewise, we also find the 3 firms closest by size to the synthetic repurchase firm that have no repurchase programs. This procedure gives a control set consisting of 122 industry-and-size-matched firms that have ongoing stock repurchase programs and another control set with 122 industry-and-size-matched firms with no stock repurchase programs.[13] Financial profiles of the firms are developed using accounting data found in COMPUTSTAT. Year 0 is defined as the year in which the synthetic repurchase firms begin selling puts in support or their stock repurchase programs. Synthetic repurchase firms and control firms are matched by size at Year 0 and the three

[13] The number of control firms is less than 159 because several of the synthetic repurchase firms share matched firms in common as they fall in the same 4-digit SIC industry and are similar in size. It is possible that some OMRP firms may have non-disclosed SRPs. If so, this would reduce the statistical significance of our reported results.

portfolios have the same average firm size in Year 0. Therefore, we do not adjust reported means for a Year 0 size benchmark. [14]

Table 2 reports mean earnings before interest & taxes (EBIT) for the three sets of firms. We calculate mean EBIT for each year over a 11-year period centered on Year 0. We test the statistical significance of the difference in means between the sets of firms. For each set, we also test the difference between the mean EBIT reported for Year –5 and Year 0 and between the difference reported between Year 0 and Year 5.

<Insert Table 2 approximately here>

As shown in Table 2, the differences in the means of earnings between synthetic repurchase firms and plain-vanilla repurchase firms are not significantly different at the 0.05 level for the years preceding Year 0. However, synthetic repurchase firms have significantly higher earnings following their initiation of their synthetic repurchase programs. Increases in earnings between Year –5 and Year 0 and between Year 0 and Year 5 are statistically significant for the synthetic repurchase firms. Interestingly, they are not statistically significant for plain-vanilla repurchase firms or for firms without repurchase programs. The results in Table 2 indicate that firms with synthetic repurchase programs are associated with increasing earnings over time and higher levels of earnings relative to firms with plain-vanilla repurchase programs.

<Insert Table 3 approximately here>

Table 3 reports mean total assets for each of the years surrounding Year 0. As shown in the table, the mean total assets for each of the three sets of firms are statistically the same for

Year 0, and no significant differences in mean total assets are reported between the sets for the years preceding Year 0. Moreover, all three sets of firms show no significant increase in their total assets between Year –5 and Year 0. However, synthetic repurchase firms significantly increase their assets after initiating sales of puts and show significantly higher levels of assets relative to the control firms over Years 1 through 5. We checked COMPUSTAT to determine whether increases in cash and cash equivalents are primarily responsible for the higher levels of total assets reported for the synthetic repurchase firms. We found no evidence that the increases in mean total assets can be explained by increases in cash and cash equivalents.

<Insert Table 4 approximately here>

Table 4 reports mean research and development (R&D) expenses for the three sets of sample firms. Synthetic repurchase firms show no statistically significant differences in R&D expenditures relative to plain-vanilla repurchase firms over years –5 through –2 (but significantly greater than matched firms without repurchase programs) at the 0.05 level. However, in the years 0 through 5, synthetic repurchase firms have significantly higher levers of R&D expenditures than do both sets of matched control firms.

The evidence in Tables 3 and 4 indicate that firms having synthetic repurchase programs make significant investments after initiating the selling of puts. The higher level of R&D expenditures compared to control firms suggest that these firms make investments in growth opportunities. Moreover, the highly uncertain outcomes of R&D can make them difficult for outside investors to value and thereby increase the information content of put sales. Synthetic repurchase firms also report higher earnings, in general, than do firms with plain vanilla repurchase programs subsequent to their selling puts. The results enhance the Nohel and Tarhan

[14] Adjusting for subsequent years' size would understate the performance measures for high performing firms and overstate the performance measures for low performing firms.

(1998) findings that show that operating performance following synthetic repurchase improves in high-growth firms. We find plain vanilla repurchase firms report no significant increases in earning and in total assets, on average, over the period in which the synthetic repurchase firms are selling puts. These finding are consistent with the argument that synthetic repurchase programs enable investors to distinguish between firms that are repurchasing undervalued shares and firms that are distributing excess cash through share repurchases.

IV.C. Stock Price Reactions to Repurchase Announcements: Event Period Abnormal Returns

To test whether synthetic repurchase programs increase the information efficiency of stock repurchases, we examine stock returns in four different event windows into which we assign the stock repurchase announcements made by firms with synthetic repurchase programs.[15] The first event window is the Initial Repurchase Announcement Prior to the Synthetic Window, which represents the first announcement of a "plain vanilla" open market repurchase program by firms that, at a later time, subsequently initiated a synthetic repurchase program.

The second event window - Subsequent Repurchase Announcements Prior to the Synthetic Repurchase Window – contains an aggregation of all "plain vanilla" open market repurchase announcements after the firm's initial repurchase announcement but prior to the initiation of the synthetic repurchase program.

The third window - Repurchase Announcements during Synthetic Repurchase Window - represents repurchase announcements made over the duration of synthetic repurchase program.

The fourth window - Repurchase Announcements Subsequent to Synthetic Repurchase Window - represents repurchase announcements made after the termination of a synthetic repurchase program.

[15] No press releases or Wall Street Journal announcements can be found for the start of the synthetic repurchase programs. Moreover, sales of puts are revealed much later after they are completed, usually in

On average, there is a five-year interval between the first stock repurchase announcement in the repurchase program and the initial sale of puts that initiates the synthetic repurchase program. We found 38 initial stock repurchase announcements and 35 subsequent repurchase announcements prior to the start of the synthetic repurchase program. Twenty-two firms terminated their synthetic repurchase programs over the time period examined. The average time period between the initial sale of puts and the termination of the program for these firms is 2 years. We found 108 repurchase announcements over the time when the firms have an on-going synthetic repurchase program and 8 announcements made after the termination of a synthetic program.

We use a standard market model event study methodology to measure abnormal returns to announcements of stock repurchases. Announcement period abnormal returns are measured over a 2-day window encompassing days 0 to 1 in event time, where day 0 is the initial announcement of the repurchase reported in the SDC Platinum database. The market model is estimated over a 120 trading-day estimation period beginning on Day –120 and ending on Day -1. The CRSP Equally Weighted Index is used to proxy the market portfolio.

A significant positive average abnormal return is expected for the initial repurchase announcements. As previous research demonstrated, the first repurchase announcement in a series of stock repurchases constituting the firm's repurchase program significantly reduces the asymmetric information between the management of the firm and market participants.

Less significant to zero average abnormal returns are expected for repurchase announcements following the initial repurchase but made before the synthetic repurchase program initiation. The reason is that the main positive signal of the repurchase program has been transmitted to the market by the initial repurchase announcement. Moreover, the subsequent stock repurchase made periodically in the ongoing repurchase program can be ambiguous signals

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10-Q or 10-K statements; For these reason, an event study on the initiation of synthetic purchase programs and on the sale of puts could not be performed.

as some repurchases could be timed trades and others may disgorge excess cash due to a dearth of investment opportunities.

To the extent that upgrading an open market repurchase program to a synthetic repurchase programs enables investors to better identify firms that are timing repurchases of undervalued shares, a significant positive average abnormal return is expected for repurchase announcements made during the duration of a synthetic repurchase program. ~~If synthetic repurchase programs are strongly associated with firms with good future prospects, the termination of the program can inform investors of an unfavorable reassessment of the firm's future growth opportunities.~~ There are two possible expected market responses to subsequent repurchase announcements. The market response may revert to the less significant to zero average abnormal returns expected for repurchase announcements following the firm's initial repurchase. On the other hand, the termination of the synthetic repurchase program may negatively alter how the market views repurchases made by the firm. Subsequent stock repurchases may be considered disgorging of excess cash and provide additional unfavorable information regarding the firm's future prospects. Consequently, a negative to zero average abnormal return is expected for repurchase announcements made after the termination of the synthetic repurchase program.

The results of the event tests are summarized in Table 5 and displayed graphically in Figure 1. The pattern across event windows is as predicted. As expected, a statistically significant positive average abnormal return of 1.94% is reported for initial repurchase announcements (z-statistic = 2.34). The average abnormal return for subsequent announcements made prior to the sale of puts are positive but not statistically significant (0.603%, z-statistic = 1.47). These findings are consistent with the argument that the first repurchase announcement in a series of stock repurchases is the principal signal that significantly reduces the asymmetric information between management of the firm and market participants.

<Insert Table 5 approximately here>

<Insert Figure 1 approximately here>

A strong positive average abnormal return of 1.23% which is positive at the 0.01 level (z-statistic = 3.87) is found for announcements of stock repurchases made as part of an ongoing synthetic repurchase program. These results are consistent with the argument that synthetic repurchase programs enhance the informational efficiency of repurchase announcements made by firms with good future prospects. On the other hand, a negative but statistically insignificant average abnormal return (-1.496%, z-statistic = 0.01) is recorded for repurchase announcements made after termination of synthetic repurchase programs. These results are consistent with the argument that synthetic repurchase programs affect the way the market reacts to stock repurchases.

V. Conclusions

A considerable amount of attention and concern is given to the use of derivatives by firms. In this paper, we examine why firms sell put options on their own stock and do so in conjunction with an ongoing stock repurchase program in an arrangement we define as a synthetic repurchase program. We demonstrate the wealth creation potential of synthetic repurchase programs through the example of Microsoft Corporation, which collected over $2 billion in tax-exempt premiums from the sale of puts over a seven year period. These premiums were used to enhance Microsoft's stock repurchase program as the cash were used to repurchase shares and are thus distributed to shareholders. Managers have considerable incentive to exploit the potential of put transactions. We believe that value creation is the primary motivation for SRPs but we find that there is a secondary consequence in which a separating equilibrium is established if the transactions of puts are disclosed.

Disclosures of put transactions in synthetic repurchase programs allow investors to identify firms with good future prospects. We provide a model in which synthetic repurchase programs create a separating equilibrium between firms with good future prospect and firms without good future prospect. We empirically demonstrate that firms that have initiated synthetic repurchase programs experience significantly higher earnings than control firms that have repurchase programs not enhanced by sales of puts and firms that have no repurchase programs. Firms with synthetic repurchase programs also make greater investments in R&D. And they significantly increase their total assets after initiating their synthetic repurchase programs.

We present evidence that synthetic repurchase programs alter the market's reaction to stock repurchase announcements. Abnormal returns following stock repurchase announcements are more strongly favorable and significant subsequent to the initiation of a synthetic repurchase program. Moreover, repurchase announcements made after the termination of a SRP are negative but not statistically significant. These finding suggest that by certifying the future prospects of the firm, SRP can be an effective signaling mechanism.

VI. Appendix: Model of the separating equilibrium achieved through SRP: Stochastic Dominance Distribution of Good and Bad Firms Allowing Separating Equilibrium through Put Derivatives

VI.A. Mathematical Prove of the Model: Payoffs to financially strong and financially weak firms from engaging in SRP

Both financially strong and financially weak firms will get 0 if they don't initiate SRP (i.e. don't sell put options). Therefore, the firms will sell put options only if the premium they will get is larger than the value of the put option computed given their private information. We denote this condition as condition (A).

We denote the function of cash settlement for put options sold on organized exchange (no incorporated credit risk) at put expirations with h(price):

$$\mathbf{h\ (price) =}\quad \begin{cases} \mathbf{X - S_p} & \mathbf{for\ S_p < X} \\ \mathbf{0} & \mathbf{for\ S_p > X} \end{cases} \qquad \text{(A1)}$$

where X is the strike price of the put and Sp is the stock price at put expiration. We denote the function of cash settlement for existing underlying firm sold put option (with incorporated credit risk) at put expirations with g(price).

$$\mathbf{g\ (price) =}\quad \begin{cases} \mathbf{Total\ Firm\ Value} & \mathbf{for\ S_p < Y} \\ \mathbf{X - S_p} & \mathbf{for\ Y < S_p < X} \\ \mathbf{0} & \mathbf{for\ S_p > X} \end{cases} \qquad \text{(A2)}$$

where X is the strike price of the put, Sp is the stock price at put expiration and Y is the break even price at which all firm assets will be submitted to the put holder as settlement for the put. For Sp = Y the firm will declare bankruptcy. This will be done when the total assets of the firm are equal to B = X – Y. The put premium for financially strong firms is equal to:

$$Put\_\mathrm{Pr}emium_{FS} = \int_0^{\infty} f_{FS}(price) * g(price) d(price), \qquad (3)$$

where f_{FS}(price) is the probability distribution functions (pdf) of the prices of financially strong firm. The put premium for financially weak firms is equal to:

$$Put\_\Pr emium_{FW} = \int_0^{\infty} f_{FW}(price)g(price)d(price), \quad (4)$$

where f_{FW}(price) is the probability distribution functions (pdf) of the prices of financially weak firm. And the put premium for the average firm, i.e., for any firm from an uninformed investor perspective, is equal to:

$$Put\_\Pr emium_{A} = \int_0^{\infty} f_{A}(price)g(price)d(price), \quad (5)$$

where f_A(price) is the probability distribution functions (pdf) of the prices of average firm, i.e., for any firm from an uninformed investor perspective i.e. the unconditional pdf of the price of the average firm, given that the public cannot distinguish firm types.

Without loss of generality we could assume that put options are going to be traded only for firms which have $Y < E(S_p)$ i.e. for which Y, the breakeven point, is smaller than the Expected Stock price at put expiration, i.e. firms which are not expected to be bankrupt at put expiration. We denote this condition as condition (B). Also, without loss of generality, for simplification of the computations presented here, we can assume that the three stochastic dominance distributions have increasing means and the same standard deviations that are smaller than the minimal of the means. We denote this condition as condition (C).

$$0 < \mu_{FW} < \mu_A < \mu_{FS} \quad (6)$$

$$0 < \sigma_{FW} = \sigma_A = \sigma_{FS} < \mu_{FW} \quad (7)$$

We denoted by P_{FS} the payoff from SRP (the sale of put options) for financially strong firms and we denote P_{FW} the payoff from SRP (the sale of put options) for financially weak firms. Therefore, taking into account condition (A) the payoffs for the financially strong firms and correspondingly for financially weak firms will be.

$$P_{FS} = \max [0, \text{Put\_Premium}_{A} - (\text{Value}_{put} \mid \text{Type} = FS)] \quad (8)$$

$$P_{FW} = \max [0, \text{Put\_Premium}_{A} - (\text{Value}_{put} \mid \text{Type} = FW)] \quad (9)$$

i.e. the firms management will initiate SRP (i.e. sell put options) only if they are expecting positive expected net present value (NPV) of the put sale cash flows (CF). If there is a negative expected NPV CF they company will chose not to participate.

VI.A.1. Necessary conditions for a separating equilibrium

In order for a separating equilibrium to exist and be unique, the following sets of individual rationality (IR) and incentive compatibility (IC) constraints have to be satisfied for both firm types:

$$IR(FS): P_{FS} \geq 0 \quad (10)$$

$$IR(FW): P_{FW} \geq 0 \quad (11)$$

$$IC(FS): P_{FS} \geq \text{The payoff for a financially strong firm if it pretends to be financially weak firm} \quad (12)$$

$$IC(B): P_{FW} \geq \text{The payoff for a financially weak firm if it pretends to be financially weak firm} \quad (13)$$

VI.A.2. Resulting equilibrium

Without loss of generality we could assume that every firm that has a highly liquid market in derivatives could sell European-style out-of-the money put options with a long maturity for a put premium that is equal to put premium for the average firm i.e. to (5). The interpretation of equation (5) is that the company receives a fair price for the put options given the public information that all market participants have about the future distribution of stock prices.

Applying conditions (B) and (C) of function f(price) to the shape of function g(price) we get that the following condition about firm type is true for any price > 0:

$$\int_0^{\infty} f_{FW}(p)g(p)dp > \int_0^{\infty} f_A(p)g(p)dp > \int_0^{\infty} f_{FS}(p)g(p)dp \qquad (14)$$

The interpretation of this condition is that the financially strong firms are with better than average prospects and it is more likely for them to have higher stock prices at put expiration in the future than the average firms. And also, the average firms are with better prospects than financially weak firms and it is more likely for them to have higher stock prices in the future than the financially weak firms. The type of the firm is private information of the management of the firms. The investors have an unconditional cumulative distribution of the future stock price of the average firm that in a stochastic sense is dominated by the distribution of the financially strong firms, and dominates the distribution of financially weak firms.

VI.A.3. Solution:

Given the stochastic dominance condition (14), it turns out that:

(I). The individual rationality constraint for financially strong firm coincides with the incentive compatibility constraint for financially strong firm, and both reduce to the following inequality:

$$Put\_\Pr imium_A = \int_0^{\infty} f_A(p) * g(p)d(p) > \int_0^{\infty} f_{FS}(p) * g(p)d(p) = Put\_\Pr emium_{FS} \qquad (15)$$

This condition directly follows from equations (3), (5) and (14).

(II). The individual rationality constraint for financially weak firm coincides with the incentive compatibility constraint for financially weak firm, and both reduce to the following inequality:

$$Put\_\Pr imium_A = \int_0^{\infty} f_A(p) * g(p)d(p) < \int_0^{\infty} f_{FW}(p) * g(p)d(p) = Put\_\Pr emium_{FW} \qquad (16)$$

Similar to (I) this condition directly follows from equations (4), (5) and (14).

When we combine conditions (15) and (16) we receive that:

$$\text{Put\_Premium}_{FS} < \text{Put\_Premium}_{A} < \text{Put\_Premium}_{FW} \qquad (17)$$

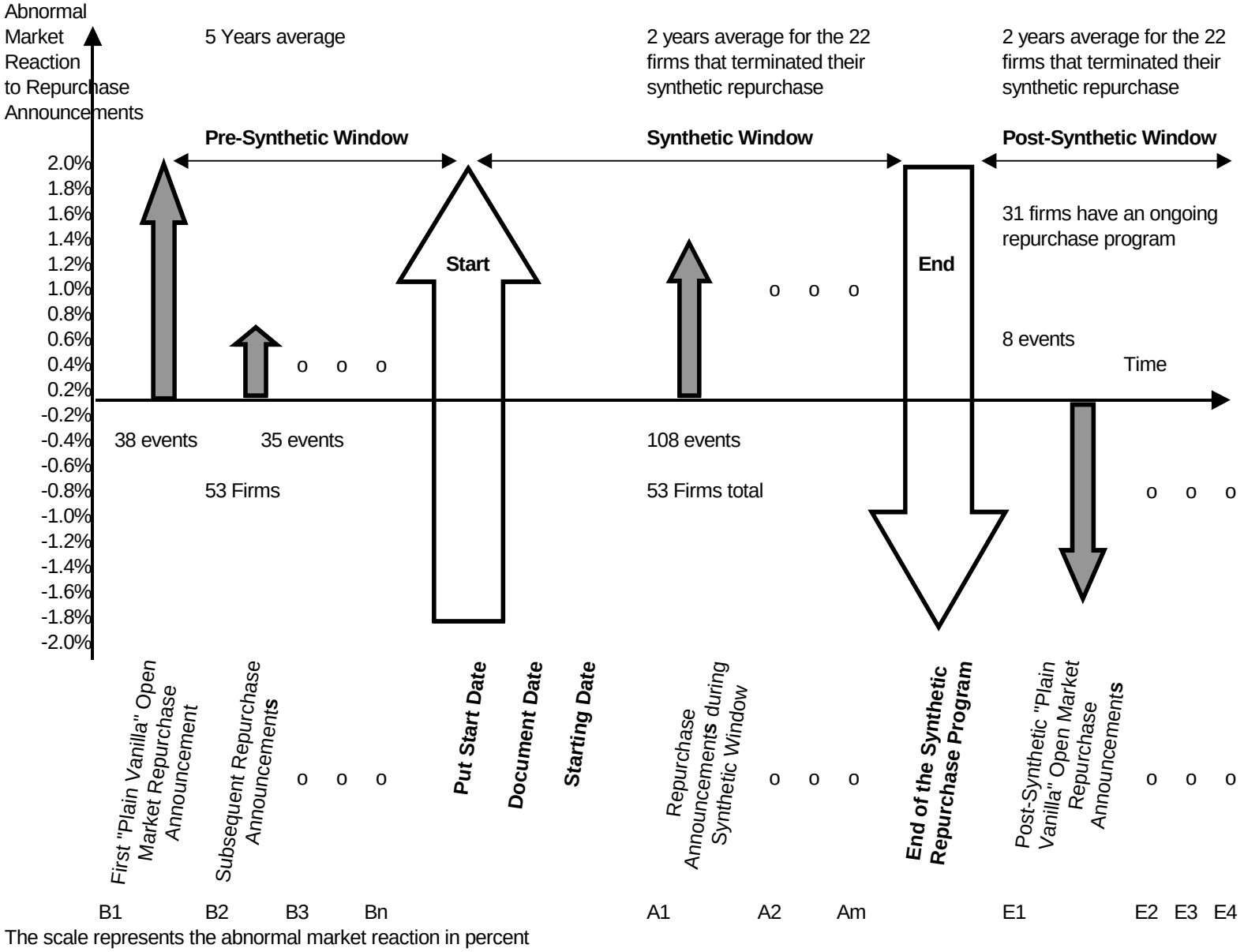
This assures that only firms of type A will sell put options. Financially strong firms have positive private information about their future performance. The true value of the put options computed using their private information is lower than the market value without private management information. Therefore, financially strong firms will sell overvalued puts and earn positive profits. On the other hand, financially weak firms have private information that their performance will be less than average. The value of the put option computed using their private information will be higher than the premium computed using only publicly known information. As a consequence, there exists a unique separating equilibrium.

Figure 1: A summary of the market model event study findings

Synthetic Repurchase Firms is the set of 53 firms that have reported synthetic repurchase programs;

Windows Examined represent several event windows in which we assign the open market repurchase announcement to examine SRP; **Initial Repurchase Announcement Prior to the Synthetic Window** represents the first announcement of an "plain vanilla" open market repurchase program by firms that subsequently were involved in a synthetic program; **Subsequent Repurchase Announcements Prior to the Synthetic Repurchase Window** represents all subsequent repurchase announcements that firms have made prior to the synthetic window. This is an aggregation of all "plain vanilla" open market repurchase announcements before the initiation of the synthetic repurchase program through put derivatives. This are new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs from firms that have already done a repurchase; **Repurchase Announcements During Synthetic Repurchase Window** represents all new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs for the duration of synthetic repurchase program through put derivatives; **Repurchase Announcements Subsequent to Synthetic Repurchase Window** represents new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs after the termination of a SRP.
# of observations is the number of observations for each event window; **Average Abnormal Return** is the market-model risk-adjusted average abnormal return; **Median Abnormal Return** is the market-model risk-adjusted median abnormal return;

Note: the scale represents the abnormal market reaction in percent



The scale represents the abnormal market reaction in percent

Figure 2: Expected distribution of financially strong and financially weak firms at put expiration

Expected Stock Price at Put Expiration: is how much is the probability that particular stock price will realize at put expiration; **S -- Financially Strong Firm**: is firm for which the management knows that their firm is going to have more than expected positive future prospects; **W— Financially Weak Firm**: are firms for which the management knows that their firm is not going to have less than expected positive future prospects; **A -- Stock Price Distribution From Uninformed Investor Prospective**: Investors will assume that all firms have the same probability distribution of stock prices at put expiration; **PDF** is the probability distribution functions (pdf) of the stock price distributions at put expiration;

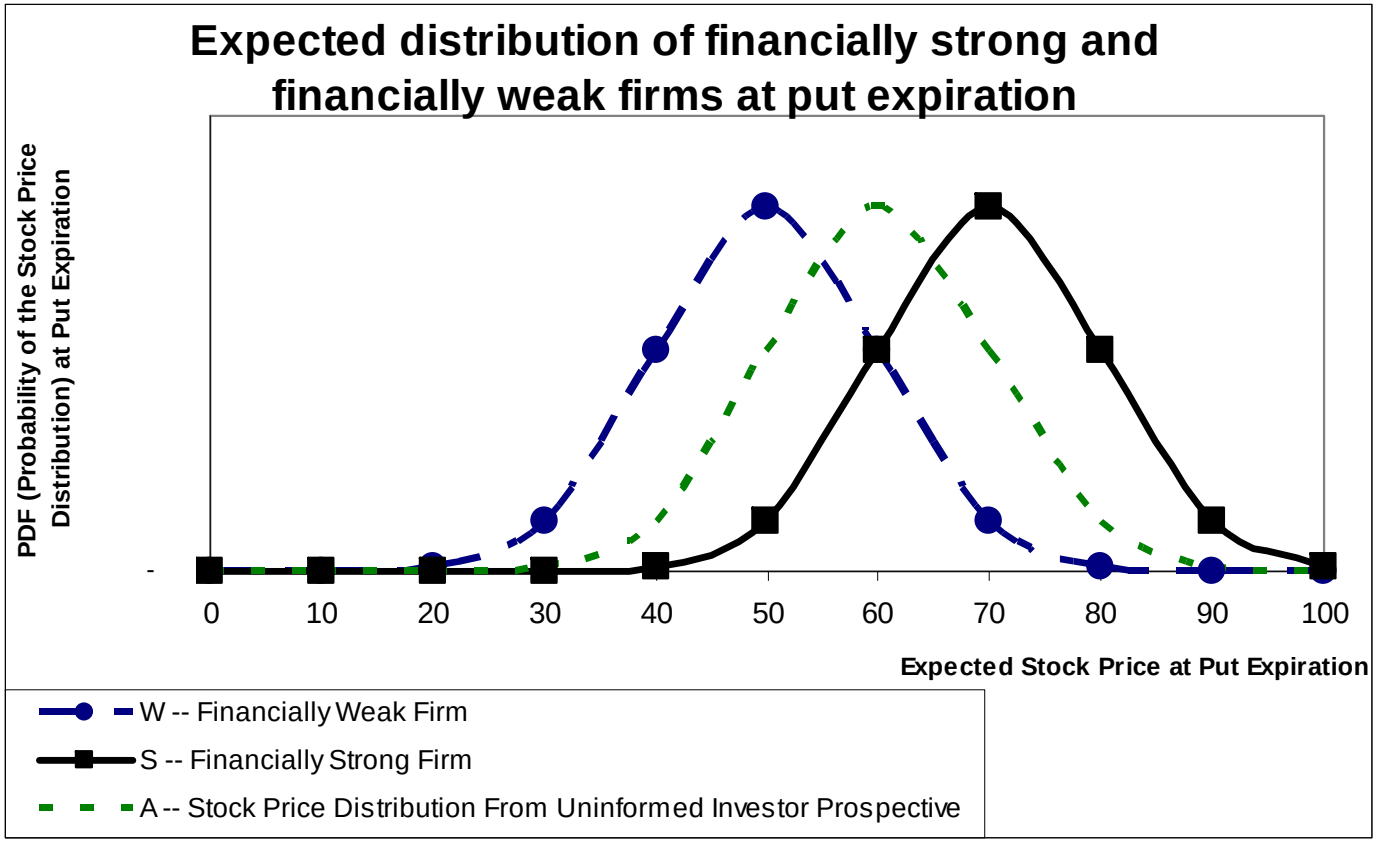


Figure 3: Stakeholder value at put expiration

Expected Stock Price at Put Expiration is how much is the probability that particular stock price will realize at put expiration; **Claimholder Value at Put Expiration** is how much the different claimholders will get at put expiration; **T -- Total Firm Value** is how much a stockholder will get if the company does not sell put options; **X -- Exchange Traded Put Profile** is how much a holder of an exchange traded put will get at put expiration (this put does not have a credit risk); **P -- Put holder Pie** is how much a holder of firm issued put will get at put expiration (the credit risk of the issuing firm is implied in the prices); **S -- Stockholder Pie** is the amount left for a stockholder of firm which have sold put options on their stock.

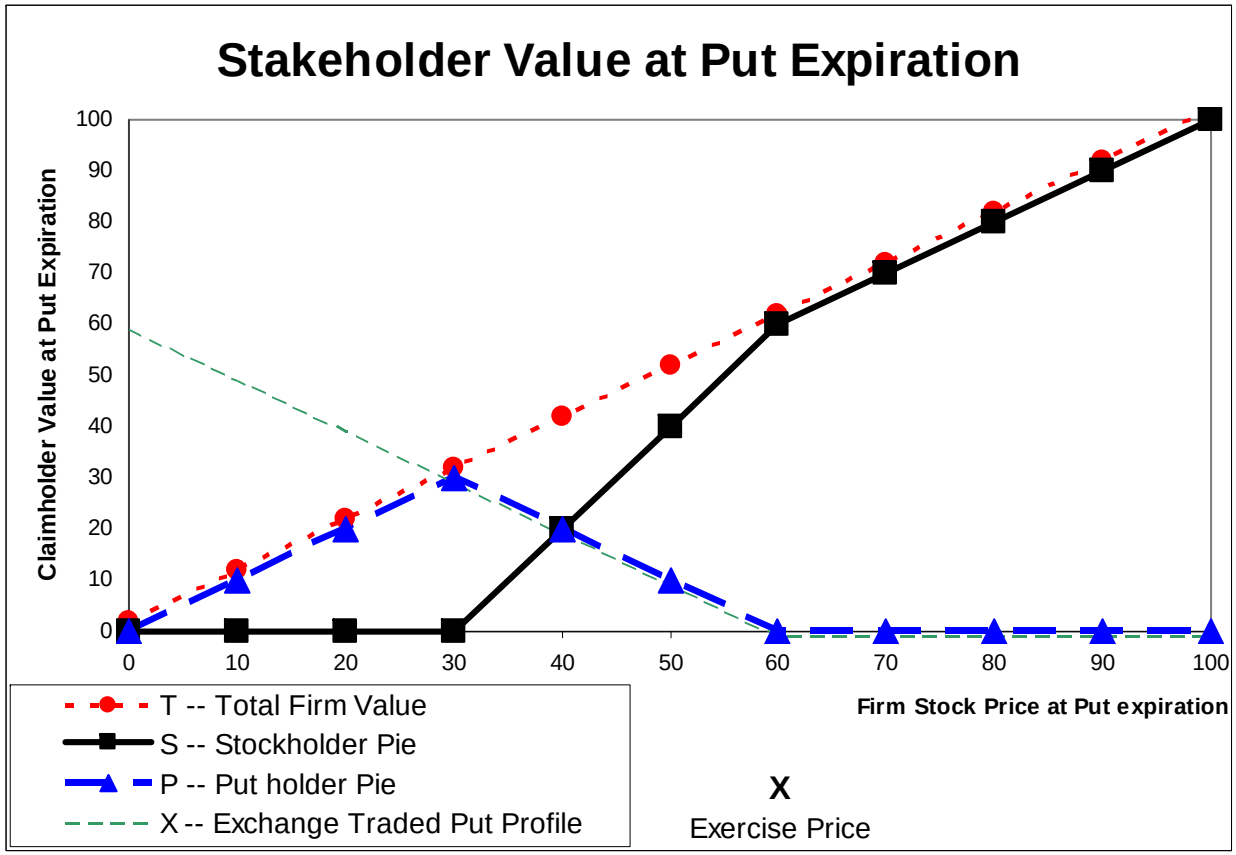


Figure 4: Expected firm value at put expiration

Firms Stock Price at Put Expiration: is how much is the stock price at put expiration; **S -- Financially Strong Firm**: is firm for which the management knows that their firm is going to have more than expected positive future prospects and the firm has sold a put option on their stock; **W—Financially Weak Firm**: are firms for which the management knows that their firm is not going to have less than expected positive future prospects and the firm has sold a put option on their stock; **A -- Stock Price Distribution From Uninformed Investor Prospective**: Investors will assume that all firms have the same probability distribution of stock prices at put expiration and the firm has sold a put option on their stock; **SP -- Financially Strong Firm w/o the Put**: is firm for which the management knows that their firm is going to have more than expected positive future prospects and the firm has not sold a put option on their stock; **WP -- Financially Weak Firm w/o the Put**: are firms for which the management knows that their firm is not going to have less than expected positive future prospects and the firm has not sold a put option on their stock; **AP -- Stock Price Distribution From Uninformed Investor Prospective w/o the Put**: Investors will assume that all firms have the same probability distribution of stock prices at put expiration and the firm has not sold a put option on their stock;

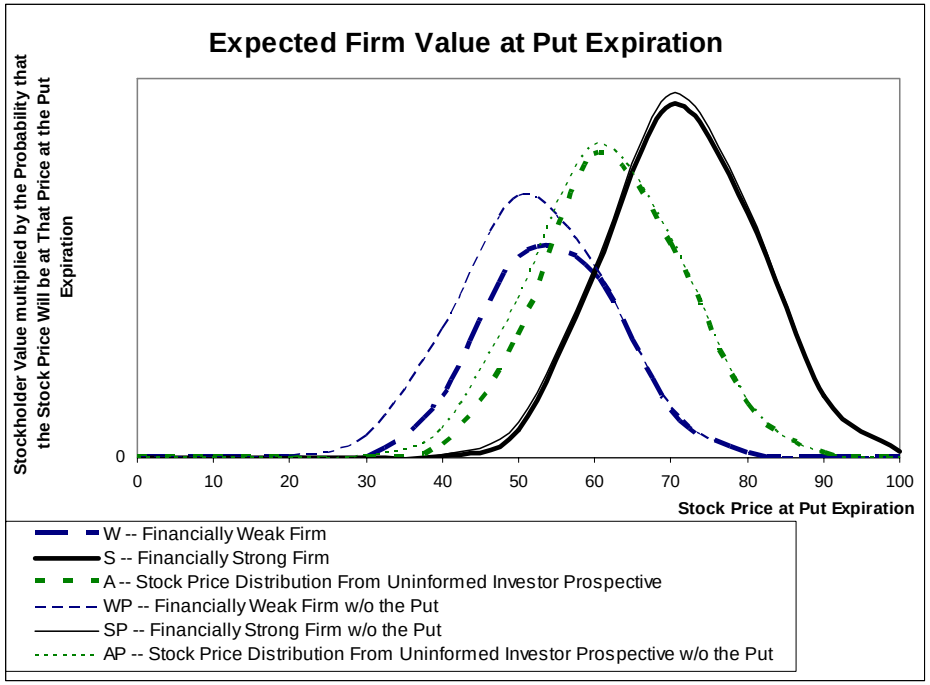


Figure 5: Expected put value at put expiration

Stock Price at Put Expiration: is how much is the stock price at put expiration; **S -- Financially Strong Firm**: is firm for which the management knows that their firm is going to have more than expected positive future prospects; **W—Financially Weak Firm**: are firms for which the management knows that their firm is not going to have less than expected positive future prospects; **A -- Stock Price Distribution From Uninformed Investor Prospective**: Investors will assume that all firms have the same probability distribution of stock prices at put expiration;

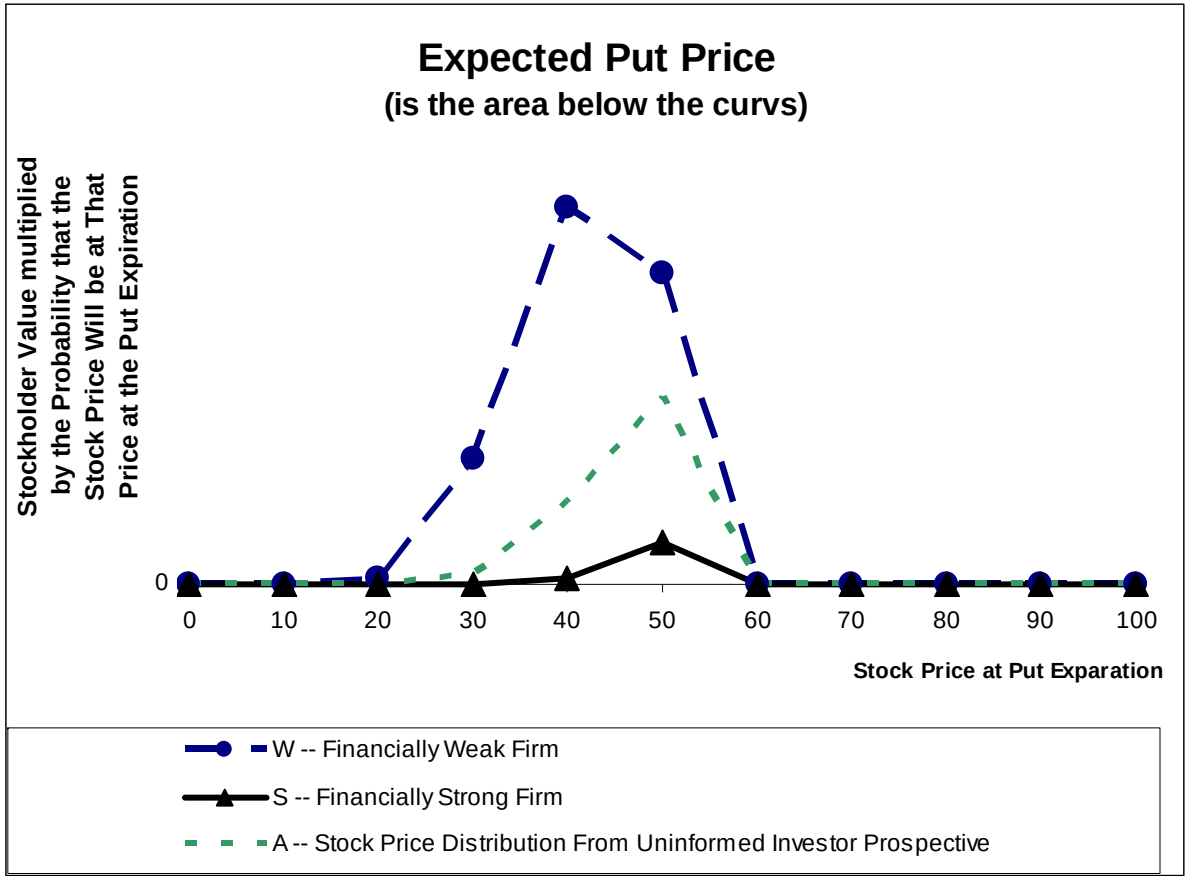


Table 1: Example of the Profitability of the Synthetic Repurchase Programs: The Case of Microsoft in the 1990s

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Net Income	$953	$1,146	$1,453	$2,195	$3,454	$4,490	$7,785	$9,421	$7,346	$7,829
Common stock repurchased (# of shares)	(7)	(17)	(30)	(41)	(91)	(165)	(64)	(210)	(394)	(676)
Common stock repurchased (dollars amount)	($250)	($331)	($698)	($1,385)	($3,101)	($2,468)	($2,950)	($4,896)	($6,074)	($6,069)
Common stock repurchased as a percentage of Net Income	26.23%	28.88%	48.04%	63.10%	89.78%	54.97%	37.89%	51.97%	82.68%	77.52%
Put premiums received for the corresponding year			$49	$124	$95	$538	$766	$472	($1,367)	
Put premiums as a percentage of Net Income			3.37%	5.65%	2.75%	11.98%	9.84%	5.01%	-18.61%	
Put premiums as a percentage of common stock repurchased			7.02%	8.95%	3.06%	21.80%	25.97%	9.64%	-22.51%	
Potential repurchase obligation end of year (computed as average)[a]			$558[b]	$1,294[b]	$315	$4,470	$10,106	$11,618		
Potential repurchase obligation end of year (# of shares)			8	13	3	60	163	157		
Min strike price			$69.75	$95.00	$105.00	$72.00	$59.00	$70.00		
Max strike price			$69.75	$104.00	$105.00	$77.00	$65.00	$78.00		
R&D expense	($470)	($610)	($860)	($1,432)	($1,925)	($2,601)	($2,970)	($3,772)	($4,379)	($4,307)

This Table presents Microsoft Corporations experience with its synthetic stock repurchase program over the period 1993 through 2002. It is created by using information from the 10-Q and 10-K statements. All information except strike prices is in Millions. All data is annual.

[a] Potential Repurchase obligation is computed as the average strike price multiplied by number of shares in the potential repurchase obligation
[b] Potential Repurchase obligation was self reported at 10-K from Microsoft only for 1995 and 1996 correspondingly as $405 and $635 million, this two amounts differ form the computed from as $558 and $1,294

Table 2: Earnings Before Interest & Taxes (EBIT) and the t-values for comparison within and between the SRP set and matching samples

Average (Earnings Before Interest & Taxes) is the mean of corresponding annual Earnings Before Interest & Taxes for parallel relative year for particular set; **RY** is relative year to the firm started synthetic repurchase; **Synthetic Repurchase Firms** is the set of 53 firms that have reported synthetic repurchase programs; **Matched Firms with Repurchase** is the comparison set of 122 industry-and-size-matched firms with stock repurchase program; (The number of control firms is less than 159 because several of the synthetic repurchase firms share matched firms in common as they fall in the same 4-digit SIC industry and are very similar in size); **Matched Firms without Repurchase** is the comparison set of 122 industry-and-size-matched firms without stock repurchase program; **p-value** is the computed p-value for the parallel relative year between the corresponding two portfolios; **p-value (-5,5)** is the computed p-value for the relative years – 5 and 5 for corresponding set; **p-value (-5,0)** is the computed p-value for the relative years – 5 and 0 for corresponding set; **p-value (0,5)** is the computed p-value for the relative years 0 and 5 for corresponding set;

RY	Average (EBIT)			Difference Between Portfolios		
	Synthetic Repurchase Firms	Matched Firms with Repurchase	Matched Firms without Repurchase	Synthetic Repurchase Firms & Matched Firms with Repurchase	Synthetic Repurchase Firm & Matched Firms without Repurchase	Matched Firms without Repurchase & Matched Firms with Repurchase
-5	$164	$158	$92	$5	$72	$66
-4	$217	$181	$91	$35	$126 **	$90 *
-3	$249	$198	$116	$51	$134 **	$82
-2	$298	$214	$128	$85	$171 **	$86
-1	$381	$218	$127	$163 **	$255 ***	$91 *
	$471	$235	$128	$236 ***	$343 ***	$107 *
1	$539	$214	$88	$325 ***	$451 ***	$126 **
2	$641	$222	$44	$419 ***	$597 ***	$178 ***
3	$942	$214	$68	$727 ***	$874 ***	$146 **
4	$1,350	$317	$102	$1,033 ***	$1,247 ***	$214 **
5	$1,358	$361	$81	$997 **	$1,277 **	$280 **
(-5,5)	$1,194 ***	$202 **	-$11	} Test of Equality of Averages Across Years		
(-5,0)	$307 **	$77	$36			
(0,5)	$887 **	$125	-$48			

*** the p-value is statistically significant at the 0.01 level
** the p-value is statistically significant at the 0.05 level
* the p-value is statistically significant at the 0.10 level

Notes: a. Synthetic repurchase firms and control firms are matched by size at Year 0 and the three portfolios have the same average firm size in Year 0. Therefore, we do not adjust reported means for a Year 0 size benchmark. Adjusting for subsequent years' size would understate the performance measures for high performing firms and overstate the performance measures for low performing firms.

b. The calculations performed with the accounting variables normalized by total assets yield very similar results.

Table 3: Total Assets and the p-values for comparison within and between the SRP firms set and matching samples

Average (Assets-Total) is the mean annual total assets for parallel relative year for corresponding set; **RY** is relative year to the firm started synthetic repurchase; **Synthetic Repurchase Firms** is the set of 53 firms that have reported synthetic repurchase programs; **Matched Firms with Repurchase** is the comparison set of 122 industry-and-size-matched firms with stock repurchase program; (The number of control firms is less than 159 because several of the synthetic repurchase firms share matched firms in common as they fall in the same 4-digit SIC industry and are very similar in size); **Matched Firms without Repurchase** is the comparison set of 122 industry-and-size-matched firms without stock repurchase program; **p-value** is the computed p-value for the parallel relative year between the corresponding two portfolios; **p-value (-5,5)** is the computed p-value for the relative years – 5 and 5 for corresponding set; **p-value (-5,0)** is the computed p-value for the relative years – 5 and 0 for corresponding set; **p-value (0,5)** is the computed p-value for the relative years 0 and 5 for corresponding set;

RY	Average (Total Assets)			Difference Between Portfolios		
	Synthetic Repurchase Firms	Matched Firms with Repurchase	Matched Firms without Repurchase	Synthetic Repurchase Firms & Matched Firms with Repurchase	Synthetic Repurchase Firm & Matched Firms without Repurchase	Matched Firms without Repurchase & Matched Firms with Repurchase
-5	$2,017	$3,128	$2,954	-$1,111	-$937	$174
-4	$2,139	$3,328	$2,859	-$1,190	-$721	$469
-3	$2,275	$3,449	$3,074	-$1,173	-$798	$375
-2	$2,678	$3,343	$3,201	-$665	-$523	$142
-1	$3,085	$3,542	$3,467	-$457	-$381	$75
0	$3,967	$3,947	$3,780	$20	$187	$167
1	$4,370	$2,231	$2,752	$2,139**	$1,618	-$521
2	$4,077	$2,192	$641	$1,885*	$3,436***	$1,551***
3	$5,716	$2,073	$964	$3,643***	$4,751***	$1,109
4	$7,863	$1,839	$652	$6,024***	$7,211***	$1,187**
5	$9,322	$2,382	$698	$6,940***	$8,624***	$1,684**
(-5,5)	$7,305***	-$746	-$2,256	Test of Equality of Averages Across Years		
(-5,0)	$1,950*	$819	$826			
(0,5)	$5,355**	-$1,565	-$3,082			

*** the p-value is statistically significant at the 0.01 level
** the p-value is statistically significant at the 0.05 level
* the p-value is statistically significant at the 0.10 level

Notes: a. Synthetic repurchase firms and control firms are matched by size at Year 0 and the three portfolios have the same average firm size in Year 0. Therefore, we do not adjust reported means for a Year 0 size benchmark. Adjusting for subsequent years' size would understate the performance measures for high performing firms and overstate the performance measures for low performing firms.

b. The calculations performed with the accounting variables normalized by total assets yield very similar results.

c. We checked COMPUSTAT to determine whether increases in cash and cash equivalents are primarily responsible for the higher levels of total assets reported for the synthetic repurchase firms. We found no evidence that the increases in mean total assets can be explained by increases in cash and cash equivalents.

Table 4: R&D Expense and the t-values for comparison within and between the SRP set and matching samples

Average (R&D Expense) is the annual mean research and development expense for parallel relative year and corresponding portfolio; **RY** is relative year to the firm started synthetic repurchase; **Synthetic Repurchase Firms** is the set of 53 firms that have reported synthetic repurchase programs; **Matched Firms with Repurchase** is the comparison set of 122 industry-and-size-matched firms with stock repurchase program; (The number of control firms is less than 159 because several of the synthetic repurchase firms share matched firms in common as they fall in the same 4-digit SIC industry and are very similar in size); **Matched Firms without Repurchase** is the comparison set of 122 industry-and-size-matched firms without stock repurchase program; **p-value** is the computed p-value for the parallel relative year between the corresponding two portfolios; **p-value (-5,5)** is the computed p-value for the relative years – 5 and 5 for corresponding set; **p-value (-5,0)** is the computed p-value for the relative years – 5 and 0 for corresponding set; **p-value (0,5)** is the computed p-value for the relative years 0 and 5 for corresponding set;

RY	Average (R&D Expense)			Difference Between Portfolios		
	Synthetic Repurchase Firms	Matched Firms with Repurchase	Matched Firms without Repurchase	Synthetic Repurchase Firms & Matched Firms with Repurchase	Synthetic Repurchase Firm & Matched Firms without Repurchase	Matched Firms without Repurchase & Matched Firms with Repurchase
-5	$101	$75	$16	$26	$85 **	$59 **
-4	$102	$74	$26	$28	$76 **	$47 *
-3	$113	$69	$28	$44	$86 **	$41
-2	$121	$67	$20	$54	$101 ***	$47 **
-1	$174	$71	$21	$103 **	$153 ***	$50 **
	$220	$76	$23	$143 **	$197 ***	$54 ***
1	$268	$119	$27	$149 **	$241 ***	$92 ***
2	$429	$187	$32	$242 **	$397 ***	$155 ***
3	$467	$120	$23	$347 ***	$445 ***	$98 **
4	$562	$101	$29	$460 ***	$532 ***	$72 **
5	$546	$138	$37	$408 **	$509 ***	$101 *
(-5,5)	$445 **	$63	$21			
(-5,0)	$119	$1	$7	Test of Equality of Averages Across Years		
(0,5)	$326	$61	$15			

*** the p-value is statistically significant at the 0.01 level
** the p-value is statistically significant at the 0.05 level
* the p-value is statistically significant at the 0.10 level

Notes: a. Synthetic repurchase firms and control firms are matched by size at Year 0 and the three portfolios have the same average firm size in Year 0. Therefore, we do not adjust reported means for a Year 0 size benchmark. Adjusting for subsequent years' size would understate the performance measures for high performing firms and overstate the performance measures for low performing firms.

b. The calculations performed with the accounting variables normalized by total assets yield very similar results.

Table 5: Market model event study for days (0,1) for SRP firms for four event windows

Synthetic Repurchase Firms is the set of 53 firms that have reported synthetic repurchase programs;
Windows Examined represent several event windows in which we assign the open market repurchase announcement to examine SRP; **Initial Repurchase Announcement Prior to the Synthetic Window** represents the first announcement of an "plain vanilla" open market repurchase program by firms that subsequently were involved in a synthetic program; **Subsequent Repurchase Announcements Prior to the Synthetic Repurchase Window** represents all subsequent repurchase announcements that firms have made prior to the synthetic window. This is an aggregation of all "plain vanilla" open market repurchase announcements before the initiation of the synthetic repurchase program through put derivatives. This are new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs from firms that have already done a repurchase; **Repurchase Announcements During Synthetic Repurchase Window** represents all new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs for the duration of synthetic repurchase program through put derivatives; **Repurchase Announcements Subsequent to Synthetic Repurchase Window** represents new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs after the termination of a SRP.
# of observations is the number of observations for each event window; **Average Abnormal Return** is the market-model risk-adjusted average abnormal return; **Median Abnormal Return** is the market-model risk-adjusted median abnormal return; **t-STAT** is the student t statistic measuring the difference from zero of the Average Abnormal Return; **P-VAL** is the corresponding P-value for the T-STAT; **Z-STAT** is the Z statistic measuring the difference from zero of the Average Abnormal Return; **P-VAL** is the corresponding P-value for the Z-STAT; **%NEG** is the percentage of analyst who are downgrading there Earnings Forecast Revisions; **%POS** is the percentage of analyst who are upgrading there Earnings Forecast Revisions; **WILCOXON T-STAT** is the student t-statistic measuring the difference of the percentage of analyst who are upgrading there Earnings Forecast Revisions from the percentage of analyst who are downgrading there Earnings Forecast Revisions; **WILCOXON P-VAL** is the corresponding P-value for the WILCOXON T-STAT;

Windows Examined	# of observations	Average Abnormal Return	Median Abnormal Return	T-STAT	(P-VAL)	Z-STAT	(P-VAL)	%NEG	%POS	WILCOXON T-STAT	WILCOXON (P-VAL)
Initial Repurchase Announcement Prior to the Synthetic Window	38	**1.946%**	1.502	2.34	(0.025)	3.57	**(0.000)**	32.4	67.6	2.24	**(0.013)**
Subsequent Repurchase Announcements Prior to the Synthetic Repurchase Window	35	**0.603%**	0.664	0.86	(0.398)	1.47	(0.143)	48.4	51.6	1.21	(0.112)
Repurchase Announcements During Synthetic Repurchase Window	108	**1.233%**	1.13	1.68	(0.096)	3.87	**(0.000)**	37.1	62.9	2.97	**(0.001)**
Repurchase Announcements Subsequent to Synthetic Repurchase Window	8	**-1.496%**	-0.797	-0.71	(0.500)	0.01	(0.992)	62.5	37.5	0.42	(0.337)

Windows Examined represents the for different event windows in which I assign the open market repurchase announcement to examine them; **Initial Repurchase Announcement Prior to the Synthetic Window** represents the first announcement of an "plain vanilla" open market repurchase program by firms that subsequently were involved in a synthetic program; **Subsequent Repurchase Announcements Prior to the Synthetic Repurchase Window** represents all subsequent repurchase announcements that firms have made prior to the synthetic window. This is an aggregation of all "plain

vanilla" open market repurchase announcements before the initiation of the synthetic repurchase program through put derivatives. This are new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs from firms that have already done a repurchase; **Repurchase Announcements During Synthetic Repurchase Window** represents all new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs for the duration of synthetic repurchase program through put derivatives; **Repurchase Announcements Subsequent to Synthetic Repurchase Window** represents new announcements of either continuation and enlargement of an ongoing open market repurchase program or announcements of a completely new open market repurchase programs after the termination of a synthetic repurchase program through put derivatives.

References

Angel, James J., Gary L. Gastineau and Clifford J. Weber. “Using Exchange-Traded Equity Flex Put Options in Corporate Stock Repurchase Programs.” *Journal of Applied Corporate Finance*, v10(1) (1997), 109-114.

Atanasov, Vladimir A., Stanley B. Gyoshev, Samuel Szewczyk, George Tsetsekos. “Why Large Financial Institutions Buy Long-Term Put Options from Companies.” *Social Science Research Network* (2001).

Brennan, Michael J. and Anjan V. Thakor. “Shareholder Preferences And Dividend Policy.” *Journal of Finance*, v45(4) (1990), 993-1019.

Grossman, Sanford. “The Informational Role Of Warranties And Private Disclosure About Product Quality.” *Journal of Law and Economics*, v24(3) (1981), 461-484.

Grullon, Gustavo and David L. Ikenberry. “What Do I Know About Stock Repurchases.” *Journal of Applied Corporate Finance*, v13(1) (2000), 31-51.

Ikenberry, David and Theo Vermaelen. “The Option to Repurchase Stock.” Financial Management, v25(4) (1996), 9-24.

Jensen, Michael C. “Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers.” *American Economic Review*, v76(2) (1986), 323-329.

John, Kose and Joseph Williams. “Dividends, Dilution, And Taxes: A Signaling Equilibrium, Journal of Finance.” v40(4) (1985), 1053-1070.

Kale, Jayant R., Thomas H. Noe and Gerald D. Gay. “Share Repurchase Through Transferable Put Rights: Theory and Case Study.” *Journal of Financial Economics*, v25 (1) (1989), 141-160.

Krasker, William S. “Stock Price Movements in Response to Stock Issues Under Asymmetric Information.” *Journal of Finance*, v41(1) (1986), 93-106.

Miller, Merton H. and Kevin Rock. “Dividend Policy Under Asymmetric Information.” *Journal of Finance*, v40(4) (1985), 1031-1051.

Nohel, Tom and Vefa Tarhan. “Share Repurchases and Firm Performance: New Evidence on the Agency Costs of Free Cash Flow.” *Journal of Financial Economics*, v49 (2,August) (1998), 187-222.

Pratt, Tom. “Put warrant sales surge in wake of stock slide: Enhancing share repurchases with derivatives.” *Investment Dealers' Digest’s Byline*, December 5, (1994), 10.

Guay, Wayne and Jarrad Harford. “The cash-flow permanence and information content of dividend increases versus repurchases.” *Journal of Financial Economics* 57 (2000), 385-415.

Jagannathan, Murali, Clifford P. Stephens and Michael S. Weisbach. “Financial flexibility and the choice between dividends and stock repurchases.” *Journal of Financial Economics* 57 (2000), 355-384.