An analysis of dividend enhanced convertible stocks

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Abstract

Dividend enhanced convertible stocks (DECS) represent redeemable convertible preferred stocks mandated to convert in four years. DECS are designed to meet the needs of income-oriented investors, who give up some upside capital appreciation potential over four years in exchange for enhanced preferred dividends. A simple contingent claims pricing model for the valuation of DECS is presented in this article. The application of the model to Masco Tech Inc. has shown that, on average, its DECS issue was slightly overpriced during the sample period. © 1999 Elsevier Science Inc. All rights reserved.

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1. Introduction

Over the past decade, financial engineers have created a great variety of synthetic equity products, arguably representing the most dynamic area in the banking and finance industry, to meet the specific needs of clients. The spectrum of synthetic equity products extends from equity-linked securities, equity swaps, to virtually any other exotic option structure. These financially-engineered products, embodying different instruments, are used by corporations for hedging purposes and as financing vehicles to tap new sources of capital and/or lower funding levels.

In the past few years, equity-linked convertibles have been one of the most popular
synthetic equity products. For instance, PERCS (Preferred Equity Redemption Cumulative Stock), first issued in 1988, are redeemable convertible preferred stocks designed to provide the holders with an enhanced dividend rate in exchange for a limited potential for capital appreciation, usually in the 30-40% range. During the early 1990s, PERCS were used to rescue more than a dozen of companies that attempted to restructure their balance sheets in the wake of junk bond market crash.

However, demand for PERCS has tailed off since 1993 because certain PERCS investors, notably in growth and income funds, do not like the total cap on the upside. To plug a gap in the convertibles market, Salomon Brothers designed another equity-like convertible security called DECS (Dividend Enhanced Convertible Stock) in 1993. DECS are like PERCS as both are redeemable convertible preferred stocks. But unlike PERCS that cap their upside at 30-40%, DECS offer an upside capital appreciation potential when the underlying common stock rises above the conversion price.

Since 1993, several DECS variations have been developed. But rather than use a generic name, each investment bank has invented its own acronym: ACES (Automatically Convertible Equity Securities) by Goldman Sachs; PRIDES (Preferred Redeemable Increased-Dividend Equity Securities); STRYPES (STRuctured Yield Product Exchangeable for Stock) by Merrill Lynch; and SAILS (Stock Appreciation Income-Linked Securities) by Credit Suisse. The common characteristics of the above acronyms are as follows: (1) they are high-income exchangeable securities which convert into common stock, either in the issuing company or its subsidiary; (2) conversion is mandatory at maturity (three to five years), with each instrument held usually converting into a minimum of around 0.8 and a maximum of one share; and (3) they pay higher yields than the underlying, normally between 6 and 9% and have a 2 to 3% yield advantage over comparable convertible preferred stock. Nicholls (1996) reported that there had been 35 issues since the introduction of the instruments in 1993, representing around 25% of U.S. domestic convertible issuance.

Currently, convertibles are no longer considered the financing tool of last resort and, in fact, they have become far more complicated by being associated with a myriad of specially structured products labeled with an alphabet soup of acronyms. Following the remarkable success of the aforementioned equity-like convertible securities, the purpose of this article is to examine the first DECS issued by Masco Tech Inc. in 1993, which was later cloned by ACES, PRIDES, SAILS, and STRYPES. The remainder of the article is organized as follows: the characteristics of DECS and the theoretical valuation of DECS are discussed in Section 2; the empirical test results on the DECS pricing model are presented in Section 3; and a brief summary is provided in Section 4.

2. Valuation of DECS

On July 1, 1993, Masco Tech Inc. issue 10 million shares of DECS to the public at $20 per share, which is the closing price of the Masco Tech common stock on June 30, 1993. The holders of DECS are entitled to receive enhanced preferential dividends
payable quarterly at the annual rate of $1.2 per share versus the current annual rate of $0.08 per share of common stock.

Specifically, DECS are redeemable convertible preferred stocks. On July 1, 1997, the mandatory conversion date, each of the outstanding DECS automatically converts into one share of Masco Tech common stock. However, prior to the mandatory conversion date, the holders of DECS may elect to convert into 0.806 of a share of common stock for each DECS. The equivalent conversion price is $24.81 with a 24.05% conversion premium above the initial offering price. DECS are also redeemable at the option of Masco Tech on or after July 1, 1996, the initial redemption date, for fractions of common shares having a market value equal to $20 plus all accrued and unpaid dividends.³

To simplify the analysis, we first assume that the initial redemption date coincides with the mandatory conversion date. The payoff for a DECS at maturity can be expressed as follows:

\[
V_T = \begin{cases} 
F(S_T - X_2) + X_1 & \text{if } S_T > X_2; \\
X_1 & \text{if } X_1 \leq S_T \leq X_2 \\
S_T & \text{if } S_T < X_1. 
\end{cases}
\] (1)

where

- \( V_T \) = payoff for a DECS at maturity \( T \);
- \( F = 0.806 \);
- \( S_T \) = the prevailing stock price at maturity;
- \( X_1 \) = exercise price of $20.00; and
- \( X_2 \) = exercise price of $24.81.

Eq. (1) can be interpreted as follows. At maturity, if Masco Tech’s common stock price exceeds the equivalent conversion price of $24.81, the DECS holder may elect to convert into 0.806 of a share of common stock, or \( F S_T \), for each DECS. It can be shown easily that \( F S_T = F(S_T - X_2) + X_1 \) because \( X_2 = X_1 / F \). If the stock price drops below the DECS’ initial offering price of $20, Masco Tech neither will redeem the outstanding DECS early, nor will the DECS holders exercise their conversion option. Consequently, DECS will automatically convert on the mandatory conversion date into one share of common stock per DECS share. However, if the stock price falls between $20.00 and $24.81, it is optimal for Masco Tech to redeem DECS and each DECS holder will receive a fraction of a share between 0.806 and 1.0 worth $20.

The theoretical payoff for a DECS is also presented in Table 1. Column 5 shows the payoff for a bull call spread, that is, buying a call option on Masco Tech common stock with exercise price equal to \( X_1 \) and simultaneously selling \( F \) call options on the same stock with exercise price equal to \( X_2 \). Column 6 presents the payoff for holding a covered bull call spread, that is, holding a long position in Masco Tech common stock and a short position in a bull call spread. As shown, the payoff in column 6 is identical to that of holding a DECS presented in column 7. Thus, Eq. (1) can be further rearranged as follows:
Table 1
Payoff for holding a DECS at maturity

<table>
<thead>
<tr>
<th>Stock Price $S_T$</th>
<th>(2) Long Stock</th>
<th>(3) Long $C(X_1)$</th>
<th>(4) Short $F^*(C(X_2))$</th>
<th>Bull Call Spread $= (5) = (3) + (4)$</th>
<th>(6) = (2) - (5)</th>
<th>Long DECS $V_T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_T &lt; X_1$</td>
<td>$S_T$</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$S_T$</td>
<td>$S_T$</td>
</tr>
<tr>
<td>$X_1$</td>
<td>$S_T = X_1$</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$X_1$</td>
<td>$X_1$</td>
</tr>
<tr>
<td>$X_1 &lt; S_T &lt; X_2$</td>
<td>$S_T$</td>
<td>$S_T - X_1$</td>
<td>0</td>
<td>$S_T - X_1$</td>
<td>$X_1$</td>
<td>$X_1$</td>
</tr>
<tr>
<td>$X_2$</td>
<td>$S_T = X_2$</td>
<td>$X_2 - X_1$</td>
<td>0</td>
<td>$X_2 - X_1$</td>
<td>$X_1$</td>
<td>$X_1$</td>
</tr>
<tr>
<td>$S_T &lt; X_2$</td>
<td>$S_T$</td>
<td>$S_T - X_1$</td>
<td>$-F(S_T - X_2)$</td>
<td>$S_T - X_1 - F(S_T - X_2)$</td>
<td>$X_1 + F(S_T - X_2)$</td>
<td>$X_1 + F(S_T - X_2)$</td>
</tr>
</tbody>
</table>

$V_T$ = payoff for a DECS; $X_i$ = exercise price of $20.00$; $X_2$ = exercise price of $24.81$; $F = 0.806$; and $C(.)$ = call option.
Fig. 1. Maturity payoffs for long stock and short bull call spread (a). Maturity payoff for holding a DECS (b).

\[ V_T = S_T - \text{Bull Call Spread} = S_T - \{\text{Max}[0, S_T - X_1] - F^* \text{Max}[0, S_T - X_2]\}. \]  (2)

The graphical counterpart of Table 1 is depicted in Fig. 1. The maturity payoff for a long position in common stock and a short position in a bull call spread is shown at the top of Fig. 1, and the maturity payoff for holding a DECS is shown at the bottom of Fig. 1. As shown in Fig. 1, the opportunity for equity appreciation by holding a DECS is not capped on the upside as PERCS, but it is less substantial than the opportunity for equity appreciation afforded by an investment in the common stock. This is because Masco Tech may, at its discretion, redeem the DECS if the market price of common stock exceeds the conversion price, thus lowering the potential equity
appreciation. In such event, the DECS holder will receive less than one (0.806) share of common stock for each DECS. The dotted area at the bottom of Fig. 1, therefore, represents the lost opportunity for equity appreciation. To compensate for the foregone partial equity appreciation potential, the DECS holder will receive for four years a higher annual preferred dividend rate of $1.20 per share as opposed to the current annual dividend rate of $0.08 on common stock.

Finally, the value of a DECS at time zero is simply the sum of the present value of Eq. (2) and the present value of the incremental dividend stream:

$$V = S - \{C[S,X_1 = 20,T] - F^*C[S,X_2 = 24.81,T]\} + I,$$

(3)

where

- $V =$ current DECS value;
- $S =$ current common stock price;
- $C(.) =$ call option;
- $X =$ exercise price;
- $T =$ time to maturity; and
- $I =$ present value of the incremental dividend stream.

The expression in Eq. (3) shows that a DECS can be decomposed into a package analogous to: (1) a long position in Masco Tech common stock; (2) a short position in a bull call spread; and (3) the incremental dividend stream. Specifically, the DECS holder writes a four-year bull call spread and sells it to Masco Tech in exchange for a stream of enhanced dividend rate.

Valuation of a DECS is further complicated since dilution in stock price upon DECS conversion or redemption is inevitable. Given that each DECS will be converted into a fraction of a share of common stock between 0.806 and 1.0, the outstanding shares of common stock upon conversion or redemption will increase between 16.26% and 20.18%. Thus, the call options embedded in DECS are unequivocally warrants in nature and the conventional Black and Scholes (1973) option pricing model cannot be directly employed here without some adjustments for the impact of dilution as follows:

$$W = \frac{N}{(N/Q + M)}[[S - \Sigma e^{-rT}D + (M/N)W]N(d_1) - e^{-rT}XN(d_2)],$$

(4)

where

- $W =$ current warrant price;
- $N =$ the number of outstanding shares of common stock;
- $Q =$ the number of shares that can be purchased by each warrant;
- $M =$ the number of warrants;
- $D =$ the dollar amount of dividend per share;
- $X =$ exercise price;
- $d_1 = \frac{[\ln(S - \Sigma e^{-rT}D + (M/N)W/X] + (r + \frac{1}{2}\sigma^2)T)]/\sigma(T)^{1/2};$;
- $d_2 = d_1 - \sigma(T)^{1/2};$
- $\sigma =$ the standard deviation of the return of $S + (M/N)W$ per unit time; and
- $N(.) =$ cumulative normal density function.
As shown in Eq. (4), three modifications to the conventional Black and Scholes option pricing model are necessary. First, $S + (M/N)W$ must be substituted for the stock price, which represents the equity per share of stock. Second, the standard deviation used in Eq. (4) is the standard deviation of equity, i.e., $S + (M/N)W$, rather than the stock volatility. Finally, the entire conventional Black and Scholes model is multiplied by $N/(N/Q + M)$. Furthermore, a direct solution in Eq. (4) for the warrant price is not possible as $W$ appears on both sides of the equation. Hence, the solution must be solved through an iterative process.

Substituting the dilution-adjusted Black and Scholes option pricing model in Eq. (4) into Eq. (3) for $C$ yields:

$$V = S - [W[S,Q_1 = 1,X_1 = 20,T] - F^*W[S,Q_2 = 0.806,X_2 = 24.81,T]] + I,$$  \hspace{1cm} (5)

Where $W[.]$ = current warrant price as a function of current stock price, the number of shares that can be purchased by each warrant, exercise price, and time to maturity. Furthermore, since DECS are also redeemable at the discretion of Masco Tech on or after July 1, 1996, we follow Finnerty (1993) in handling early redemption and conversion issues. Specifically, each DECS share is valued using Eq. (5) based on six alternative redemption dates, i.e., the initial redemption date, the four dates when the redemption price steps down, and the maturity date. Since Masco Tech controls the optional redemption provision and will rationally choose the exercise date that minimizes the value of the outstanding DECS, the lower of the six estimated values outlined above is used as the predicted DECS value.

3. Application of DECS

The sample period covers approximately twelve months after issuance, spanning from July 2, 1993 to June 30, 1994. As indicated in Eq. (5), in addition to the number of outstanding common stock shares and warrants, exercise price, and dilution factor, the theoretical DECS value is determined by five other factors: (1) Masco Tech’s common stock price, $S$; (2) the time to maturity of the DECS, $T$; (3) the risk-free rate, $r$; (4) the volatility of the equity of Masco Tech, $\sigma$; and (5) the discount rate for incremental dividend payments.

Among the aforementioned five factors, the last three factors must be estimated. First, the risk-free rate, $r$, is proxied by the annualized yield to maturity for the Treasury note with a maturity date closest to that of the DECS. Second, following Finnerty (1993), the present value of the incremental dividend stream is calculated by discounting incremental dividend payments at the quarterly yield to maturity for preferred stock instruments as reported in the Standard & Poor’s Security Price Index Record. The Standard & Poor’s preferred stock yield index is calculated from the yields at which ten high-grade preferred stock issues are trading. Finally, because the equity volatility cannot be directly observed, we have to estimate the equity volatility implied by the warrant (i.e., DECS) price observed in the market. Specifically, for a given sample date (one day before pricing), the implied standard deviation (ISD) of
equity is computed using Eq. (5), the closing DECS price, and values of other inputs. This value is then used for the next day to price the DECS.

Fig. 2 depicts a time-series plot for the ISD estimates for the Masco Tech DECS. For comparison purposes, the historical standard deviation (HSD) of common stock estimates, based on the standard deviation of the logs of the previous (prior to valuation) 100 trading days' percentage changes in Masco Tech's stock prices, are also depicted in Fig. 2. As shown, the ISDs (the equity volatilities) appear large relative to the HSDs (the stock volatilities) over the entire sample period, and this finding reinforces that equity volatilities, not stock volatilities, should be used to price warrants.

Table 2 presents a comparison between the market prices and the theoretical values for the Masco Tech DECS using the ISD measure in Eq. (5). To allow comparisons of prices across various dollar levels, the statistics are computed on a percentage, rather than absolute, basis. The sample period is further subdivided into two six-month intervals to examine the stationarity of the sample statistics. As shown in Table 2, the mean pricing errors are positive and statistically significant at the 1% level for all three periods, ranging from 0.77% to 1.30%. The mean pricing error in the first subperiod is slightly smaller than its counterpart in the second subperiod.

Overall, the above results indicate that, on average, the Masco Tech DECS issue had been slightly overpriced during the sample period. The magnitude of the overpricing reported here is very similar to the first few PERCS issues as documented by Finnerty.
Table 2
Statistical results of comparisons between market and theoretical prices for Masco Tech’s DECS

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/2/93–6/30/94</td>
<td>7/2/93–12/31/93</td>
<td>1/1/93–6/30/94</td>
</tr>
<tr>
<td>(N = 249)</td>
<td>(N = 124)</td>
<td>(N = 125)</td>
</tr>
<tr>
<td>Masco Tech stock price</td>
<td>$21.55</td>
<td>$22.02</td>
</tr>
<tr>
<td>SD = 3.35</td>
<td>2.03</td>
<td>4.23</td>
</tr>
<tr>
<td>DECS market price</td>
<td>$20.76</td>
<td>$21.22</td>
</tr>
<tr>
<td>SD = 2.51</td>
<td>1.29</td>
<td>3.24</td>
</tr>
<tr>
<td>Theoretical DECS price using ISD</td>
<td>$20.55</td>
<td>$21.05</td>
</tr>
<tr>
<td>a. Bull call spread value</td>
<td>$3.51</td>
<td>$3.70</td>
</tr>
<tr>
<td>SD = 2.47</td>
<td>0.68</td>
<td>1.23</td>
</tr>
<tr>
<td>Differenceb (2 and 3)</td>
<td>1.03%</td>
<td>0.77%</td>
</tr>
<tr>
<td>(10.52)*c</td>
<td>(7.88)*</td>
<td>(7.75)*</td>
</tr>
<tr>
<td>ISD</td>
<td>44.64%</td>
<td>45.41%</td>
</tr>
<tr>
<td>HSD</td>
<td>35.43%</td>
<td>30.75%</td>
</tr>
<tr>
<td>Present value of incremental dividendsd</td>
<td>$2.51</td>
<td>$2.73</td>
</tr>
<tr>
<td>SD = $0.26</td>
<td>$0.13</td>
<td>$0.13</td>
</tr>
</tbody>
</table>

*a SD = standard deviation.
*b Difference = (Market Price – Theoretical Price)/Market Price.
*c Numbers in parentheses are t-values.
*d Up to either redemption date or maturity date whichever is applied in the empirical test.
* Significant at the 0.01 level.

(1993). This overpricing is in accordance with Tufano’s (1989) argument that mispricing tends to be more evident in the first few issues than it is in later issues, as a seasoning process will typically take place when an innovative security enters the market. Furthermore, although the magnitudes in overpricing resulted from using the equity volatility measure are statistically significant, they are, however, quantitatively small. Recognizing transaction costs and bid-ask spreads, the mispricing reported in Table 2 is unlikely to result in any profitable arbitrage.

In addition, the overpricing can be attributed to the following four factors. First, DECS are listed on the New York Stock Exchange and Salomon Brothers makes an active secondary market in DECS, thus providing liquidity for investors. Second, as in the primary market, most of the buyers were equity income funds. The high dividend rate that DECS provide attracts investors who would not be attracted by the lower yield on the underlying yet still want exposure to the common stock. Third, following Chen, Kensinger, and Pu’s (1994) argument, DECS provide “one-stop shopping” for a covered bull-call-spread strategy. This could theoretically save investors transaction costs and help reduce their hedging costs. Especially for the institutional investors, it will be difficult, if not impossible, for them to replicate the payoff for the DECS. Finally, dividends paid on the DECS will qualify for a 70% intercorporate dividends-received deduction subject to the minimum holding period (generally at least 46 days).

DECS also offer advantages to the issuer. First, the issuer benefits from effectively selling its common stock at the point that it issues the security. If its stock performs well, the conversion conditions insure that the company only issues a partial (0.806)
Table 3
Sensitivity of the DECS values to changes in the stock price and changes in the equity volatility, the risk-free rate, and the discount rate for the incremental dividend stream

Panel A. Sensitivity of the DECS values to changes in the equity volatility

<table>
<thead>
<tr>
<th>Stock price ($)</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>13.19</td>
<td>12.73</td>
<td>12.36</td>
<td>12.04</td>
<td>11.75</td>
</tr>
<tr>
<td>15.0</td>
<td>16.80</td>
<td>16.45</td>
<td>16.91</td>
<td>16.56</td>
<td>16.24</td>
</tr>
<tr>
<td>20.0</td>
<td>20.99</td>
<td>20.72</td>
<td>20.41</td>
<td>20.09</td>
<td>19.76</td>
</tr>
<tr>
<td>25.0</td>
<td>23.93</td>
<td>23.92</td>
<td>23.75</td>
<td>23.48</td>
<td>23.19</td>
</tr>
<tr>
<td>30.0</td>
<td>26.91</td>
<td>27.07</td>
<td>26.99</td>
<td>26.86</td>
<td>27.67</td>
</tr>
</tbody>
</table>

Panel B. Sensitivity of the DECS values to changes in the risk-free rate

<table>
<thead>
<tr>
<th>Risk-free rate (per year)</th>
<th>2.78%</th>
<th>3.78%</th>
<th>4.78%</th>
<th>5.78%</th>
<th>6.78%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>12.49</td>
<td>12.42</td>
<td>12.36</td>
<td>12.29</td>
<td>12.22</td>
</tr>
<tr>
<td>15.0</td>
<td>17.52</td>
<td>16.99</td>
<td>16.91</td>
<td>16.82</td>
<td>16.73</td>
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<tr>
<td>20.0</td>
<td>20.65</td>
<td>20.53</td>
<td>20.41</td>
<td>20.29</td>
<td>20.17</td>
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<tr>
<td>25.0</td>
<td>24.03</td>
<td>23.88</td>
<td>23.75</td>
<td>23.61</td>
<td>23.47</td>
</tr>
<tr>
<td>30.0</td>
<td>27.31</td>
<td>27.15</td>
<td>26.99</td>
<td>26.87</td>
<td>26.76</td>
</tr>
</tbody>
</table>

Panel C. Sensitivity of the DECS values to changes in the discount rate for the incremental dividend stream

<table>
<thead>
<tr>
<th>Discount rate (per year)</th>
<th>6.92%</th>
<th>7.92%</th>
<th>8.92%</th>
<th>9.92%</th>
<th>10.92%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>12.50</td>
<td>12.43</td>
<td>12.36</td>
<td>12.29</td>
<td>12.22</td>
</tr>
<tr>
<td>15.0</td>
<td>17.05</td>
<td>16.98</td>
<td>16.91</td>
<td>16.84</td>
<td>16.77</td>
</tr>
<tr>
<td>20.0</td>
<td>20.55</td>
<td>20.48</td>
<td>20.41</td>
<td>20.34</td>
<td>20.28</td>
</tr>
<tr>
<td>25.0</td>
<td>23.88</td>
<td>23.81</td>
<td>23.75</td>
<td>23.68</td>
<td>23.61</td>
</tr>
<tr>
<td>30.0</td>
<td>27.13</td>
<td>27.06</td>
<td>26.99</td>
<td>26.92</td>
<td>26.86</td>
</tr>
</tbody>
</table>

The simulated DECS values in Panels A, B and C assume: (1) an annual incremental dividend payment of $1.12; (2) a maturity of four years; and (3) \( Q_1 = 1, X_1 = 20, Q_2 = 0.806, X_2 = 24.81 \).

Because the pricing results presented above may be affected by the magnitude of the variables required, it is instructive to examine the sensitivity of these results to changes in the input values. Table 3 presents the results of sensitivity tests for the impacts of changes in the stock price and volatility (Panel A), the risk-free rate (Panel B), and the discount rate for the incremental dividend stream (Panel C), respectively,
on DECS values. The simulated values in Panels A, B, and C of Table 3 assume a DECS with the following characteristics: (1) an annual incremental dividend payment of $1.12; (2) a maturity of four years; and (3) $Q_1 = 1, X_1 = 20, Q_2 = 0.806, X_2 = 24.81$. The base values for the three inputs are: (1) an equity volatility of 40% per year; (2) a risk-free rate of 4.78% per year; and (3) a discount rate for the incremental dividend stream of 8.92%. These three base input values approximate their initial levels at issuance.

As shown in Panel A, the DECS values are not sensitive to changes in equity volatility. When the stock price is $20, an increase of volatility from 40% to 50% (an increase of 25%) only decreases the value of the DECS from $20.41 to $20.09. This result is not surprising because there are long and short positions in call options with different exercise prices embedded in the DECS value. Thus, a counter movement in the short call option’s value largely offsets an increase in the long call option’s value due to an increase in the equity volatility. Panels B and C of Table 3 illustrate the sensitivity of the theoretical DECS values to changes in the risk-free rate and the discount rate for the incremental dividend stream. As anticipated, changes in both interest rates have a negligible impact on the DECS value.

4. Conclusions

DECS represent redeemable convertible preferred stocks mandated to convert in four years. DECS are designed to meet the needs of income-oriented investors, who give up some upside capital appreciation potential over four years in exchange for enhanced preferred dividends. A simple contingent claims pricing model for the valuation of DECS is presented in this paper. It is shown that a DECS is analogous to a covered bull spread on call options with different exercise prices. The application of the model to Masco Tech Inc. has shown that, on average, its DECS issue was slightly overpriced during the sample period.

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Notes

2. See Finnerty (1993), Chen, Kensinger, and Pu (1994), and Chen and Chen (1995), for further discussions on PERCS.
3. The redemption of DECS into common stock during the callable period is calculated as the call price divided by the current market price. The call price is the sum of (1) $20.30 on and after the initial redemption date through September 30, 1996, $20.225 on and after October 1, 1996 through December 31, 1996,
$20.15 on and after January 1, 1997 through March 31, 1997, $20.075 on and after April 1, 1997 through May 31, 1997 and $20.00 on and after June 1, 1997 until the mandatory conversion date plus (2) all accrued and unpaid dividends. The current market price is the lesser of (1) the average closing price of 15 consecutive days prior to and including the redemption date or (2) the closing sale price of the common stock on the redemption date.

4. According to the Prospectus (Masco Tech, Inc., 1993), Masco Tech decided to apply the net proceeds from the offering, $193,650,000, to repay its bank debt. The issuance of DECS and the immediate reduction of bank debt had lowered Masco Tech’s debt ratio from 82% to 72%, among which, the 6% convertible subordinated debentures due 2011 accounted for 9%. In this study, we ignore the dilution impact of these convertible subordinated debentures for two reasons: (1) no specific conversion information is available in the Prospectus and (2) they mature in 18 years as opposed to four years for the DECS.

5. See Black and Scholes (1973), Galai and Schneller (1978), Galai (1989), Lauterbach and Schultz (1990), and Hull (1997) for more discussions on adjustments for the impact of dilution.

References