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Dividend-protected convertible bonds and the disappearance of call delay

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Abstract

Firms have not historically called their convertible bonds as soon as they could force conversion. Various explanations for the delay rely on the size of the dividends that bondholders forgo so long as they do not convert. We investigate an important change in convertible security design, namely that more than 95 percent of recent convertible bond issues are dividend-protected. Dividend protection means that the conversion value of the shares into which a bond is convertible is unaffected by dividend payments and dividend-related rationales for call delay become moot. We document that dividend-protected convertibles are called as soon as conversion can be forced.

JEL classification: G2, G32

Keywords: Call policy, Dividend protection, Convertible securities, Security design

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Ingersoll (1977a) and Brennan and Schwartz (1977) establish that when forced conversion of a convertible bond is simply a wealth redistribution from convertible bondholders to stockholders, stockholders will prefer to call and force conversion as soon as the conversion value exceeds the call price. Ingersoll (1977b) documents that a substantial number of firms delay calling relative to this policy, reporting that on average firms wait until the conversion value exceeds the call price by 43.9%. Various rationales for observed call delay rely crucially on the bondholders forgoing sizeable dividends so long as they do not convert. In testing these rationales, prior work has required attempts to control for current and future changes in dividend policy.[1] We document that beginning in 2001 the design of convertible securities changed such that more recent convertible issues are dividend-protected. This change has nullified the dividend-related set of reasons for delay and provides the perfect control for current and future dividend policy. We document that call delay is virtually nonexistent for dividend-protected convertibles thus vindicating the original prediction of Ingersoll and of Brennan and Schwartz.

Dividends can lead to call delay for a number of reasons. Ingersoll (1977a) recognizes that if there are bondholders who should be converting because of large common dividends but are not doing so, then management should not call and wake these "sleeping investors". Constantinides and Grundy (1986) argue that dividends lead to call delay when firms prefer voluntary conversion over the forced conversion of a call. Harris and Raviv (1985) consider an asymmetric information setting. In such a world, call delay

[1] Some rationales also require controls for current and future corporate tax rates. Further, empirical work should control for the value of the insurance the convertible bondholder retains as long as she does not convert.

can signal high future dividends since only more pessimistic firms unable to rely on dividend-induced voluntary conversion will find it optimal to call. Mikkelson (1981, 1985), Asquith and Mullins (1991) and Asquith (1995) consider the corporate tax deduction associated with the coupon payments on a convertible. Call delay will then be optimal when firms enjoy an advantage of paying less in after-tax interest than the dividends they would pay were the bond converted.

Most convertible bonds issued after 2002 are dividend-protected. The protection is such that the value of the shares into which the bond is convertible is immune to all but a liquidating dividend payment. Dividend protection means that (absent a liquidating dividend) there is no incentive to voluntarily convert for fear of missing a dividend and the Constantinides and Grundy (1986) rationale for delay, as well as its sleeping investor variant, cannot apply. Similarly, dividend-induced voluntary conversion in an extended Harris and Raviv (1985) signaling model cannot provide the rational for delay. And since the tax deduction associated with coupon payments cannot exceed the coupon itself, dividend protection such that the bondholders receive the benefit of the dividend whether they have converted or not obviates the Asquith and Mullins (1991) tax wedge between dividends and coupons as a potential rationale for call delay.

We examine the call decisions until 1-1-2011 for 432 callable convertible bonds issued in the period 2000 through 2006. Dividend protection for convertible bonds has increased in popularity over time: there are no dividend-protected convertible bonds in 2000, while 62 percent of the convertible bonds in our sample issued in 2003 are dividend-protected. In 2005, this percentage increases to 100 percent.

We find that the average call delay is substantial (66 days) for the non-dividend-protected convertible bonds in our sample that are called prior to 1-1-2011, in line with findings of Asquith (1995) (170 days) and King and Mauer (2012) (118 days). For the dividend-protected convertibles in our sample that are called, the average call delay is just three days. When we focus on only the bonds issued in 2003, the year in which both designs are well represented, we confirm that the average call delay is significantly shorter for dividend-protected convertibles than for non-dividend-protected convertibles—three days versus 68 days.

We also examine called convertible bonds in which the expected dividend to be received upon conversion exceeds the after-tax coupon. This is the subsample where, but for dividend protection, a (tax-wedge) rationale for delay might be invoked. The average delay for non-dividend-protected convertible bonds is 161 days in this subsample, whereas there is zero call delay for dividend-protected convertible bonds, in line with the original Ingersoll (1977a) and Brennan and Schwartz (1977) prediction.

We conclude that call delay has virtually disappeared now that convertible bonds are dividend-protected. These findings highlight the importance of dividend-related rationales and the Ingersoll (1977a) and Brennan and Schwartz (1977) predictions on call delay. Asquith and Mullins (1991) observe that studies on call delay are important as a failure to empirically confirm clear predictions of finance theory call into question the usefulness and validity of our financial models. Our results show that finance theory can in fact be highly useful in understanding managerial behavior.

The observed absence of call delay for dividend-protected convertible bonds also has implications for call delay rationales that do not depend on the firm's dividend policy.

These rationales are built around (i) a desire to signal insiders' belief of a high likelihood of voluntary conversion at maturity as in Harris and Raviv (1985), (ii) the required call notice period (Ingersoll, 1977b; Butler, 2002; Altintig and Butler, 2005), (iii) a safety premium and the costs of a failed call (Ingersoll, 1977b; Jaffee and Shleifer, 1990; Ederington, Caton, and Campbell, 1997; King and Mauer, 2012), and (iv) the recognition that conversion can cause a wealth transfer from stockholders to the holders of straight bonds and that this transfer can be avoided through call delay (Bühler and Koziol, 2004). The results of our study suggest that these rationales are not of first order importance in understanding call policy.

We are the first to document the dividend protection of recent convertible bond issues. Such a sweeping design change between 2000 and 2006, whereby the fraction of callable convertibles that are dividend-protected has changed from virtually none to virtually all, raises the interesting "Why?" question. Brown, Grundy, Lewis, and Verwijmeren (2012) document that hedge funds, which combine long positions in convertible bonds with short positions in the issuer's common stock, became the principal purchasers of new convertible bond issues during this period. They conclude that hedge fund buyers have a preference for non-callable convertibles as a non-predictable call policy makes perfect hedging by shorting stock more difficult. But including a call feature can have real benefits, as call features can for example reduce hold-up problems in the event of a merger.[2] Therefore, when a call feature is to be included, it is optimal from the point of view of a hedge fund buyer if any purely

[2] Another reason to include call features is to simplify refinancing in the future (Dong, Dutordoir, and Veld, 2012).

redistributive calls are a predictable function of the issuing firm's stock price.[3] When a convertible is dividend-protected, the call policy that maximizes stockholder wealth is simply to call the convertible bond as soon as conversion can be forced, making purely redistributive calls a predictable function of the stock price and allowing hedge funds to more successfully hedge their convertible bond positions. In line with this reasoning, we find that hedge funds are significantly more involved in dividend-protected convertibles than in convertibles without dividend protection. On average, in our sample, hedge funds purchase 76.6% of the dividend-protected convertible bonds and 68.6% of convertible issues without dividend protection.

Besides its effect on call policy, the recent change in security design also has important implications for the correct calculation of convertible bond values and in turn the measurement of any underpricing at the time of issue. The algorithms used in a wide number of recent papers on convertible bond issuance need to be adjusted for dividend protection, or the theoretical value of a bond will be underestimated.[4] A failure to take dividend protection into account will also lead to a misestimation of the delta of a convertible and the size of delta-neutral positions.[5]

The remainder of this paper is organized as follows. Section I discusses the implications of dividend protection for call policy. Section II describes our data set and provides information on the proportion of convertible securities that are dividend-

[3] When a convertible is not dividend-protected, the call policy that maximizes the wealth of stockholders will depend on the likelihood of future dividend changes and calls will not be perfectly predictable.

[4] Prior studies that use these algorithms include Chan and Chen (2007), Loncarski, ter Horst, and Veld (2009), Zabolotnyuk, Jones, and Veld (2010), and De Jong, Dutordoir, and Verwijmeren (2011).

[5] The delta of a convertible is the convertible's dollar sensitivity to small changes in the value of the underlying. See Lewis, Rogalski, and Seward (1999, 2003), Choi, Getmansky, and Tookes (2009) and De Jong, Dutordoir, and Verwijmeren (2011) on hedge funds' determination of delta-neutral hedge ratios.

protected. Section III presents our empirical tests on call policy for convertibles with and without dividend protection. Section IV contains our conclusions.

I. Forced conversion and dividend protection

Although convertible bonds issued in the 20th century were protected against stock dividends, stock splits, and extraordinary cash dividends (typically defined in the prospectuses as dividends exceeding 10% or 15% of the stock price), the bonds' conversion rates were not adjusted for regular cash dividends. Constantinides and Grundy (1986) posit that call delay can then be optimal when the dividends to be received upon conversion are, or are expected to be, sufficiently large that convertible holders have an incentive to voluntarily convert. Voluntary conversion avoids the costs of a formal call and further, as Ingersoll (1977a) recognized, if there are bondholders who should be converting because of large common dividends but are not doing so, then management should not call and wake these "sleeping investors". Waking these convertible bondholders would only hurt the common stock owners who benefit from the convertible owners' mistake.[6]

Harris and Raviv (1985) consider an asymmetric information setting and show that call delay can serve as a credible signal of good private information. Insiders who expect their firms to do well will believe that there is little to be gained by forcing conversion early since the bondholders will elect to convert at maturity. Pessimistic insiders will

[6] Constantinides and Grundy (1986) document that in many instances stockholders have been better off by letting sleeping bondholders lie and redistributing wealth away from widows and orphans whose portfolios are managed by less than diligent trustees. For convertible preferred stock, Dunn and Eades (1989) show that convertible preferred stockholders fail to convert despite much higher dividends to be received upon conversion into common stock than are received on the preferred stock.

consider that delay is costly, since a failure to call today will leave the bondholders with a valuable option not to convert later. A natural extension of the Harris and Raviv (1985) model considers private information concerning dividend growth and the future incentive for voluntary conversion. Call delay can effectively signal high future dividends since only more pessimistic firms unable to rely on dividend-induced voluntary conversion will find it optimal to call.[7]

The corporate tax wedge between coupons and dividends can potentially explain call delays for a larger set of firms than can be explained by the Constantinides and Grundy (1986) or the extended Harris and Raviv (1985) analyses. Mikkelson (1981, 1985), Asquith and Mullins (1991) and Asquith (1995) consider the corporate tax deduction associated with the coupon payments on a convertible. This deduction can not only exceed any excess of the bond's coupon over the dividends to be received upon conversion, but can also offset the insurance provided by the bondholders' option not to convert. In such a case a firm will optimally not call and force conversion. And provided the coupon does exceed the dividends to be received upon conversion, the bondholders will not voluntarily convert. Note that this third explanation of call delay also depends on the firm's dividends being sufficiently large—if, for example, dividends were zero, equity holders would always prefer calling since the tax saving associated with the coupon could not exceed the coupon payment itself.

The first convertible bond issue with full dividend protection of which we are aware is a *Vector Group* issue in 2001. The second, by *Cubist Pharmaceuticals*, also occurs in

[7] Ofer and Natarajan (1987), Acharya (1988), Campbell, Ederington and Vankudre (1991), Ederington, Caton and Campbell (1997) and King and Mauer (2012) empirically investigate signaling models of call delay.

2001. Most prospectuses of dividend-protected convertibles have a sentence describing a conversion rate adjustment of the form "*Subject to the terms of the indenture, we will adjust the conversion rate for cash dividends or other cash distributions to all or substantially all holders of our common stock."* The typical formula for the adjustment is:

$$CR_1 = CR_0 \times \frac{S^{cum\ div}}{S^{cum\ div} - d} \ , \tag{1}$$

where CR_1 is the conversion rate in effect after the payment of a dividend of d per share; CR_0 is the conversion rate in effect prior to the dividend payment; and $S^{cum\ div}$ is the cum-dividend stock price.[8]

Theorem 11 of Merton (1973) demonstrates that when a call option's price is homogeneous of degree one in the value of the underlying asset and the exercise price, then the call's value will be unaffected by dividend payments provided that the number of shares received upon exercise of the option is increased by a factor of $\frac{S^{cum\ div}}{S^{cum\ div} - d}$. The adjustment to the conversion terms of a dividend-protected convertible bond given in (1) is analogous to the call option dividend protection of Merton's Theorem 11. But just as Black and Scholes (1973) observed that no adjustment can protect a call option from a liquidating dividend, a liquidating dividend will similarly render a convertible bond valueless.

[8] When the stock price drop on the ex-dividend date is smaller than one (see for example Campbell and Beranek, 1955; Elton and Gruber, 1970; Bali and Hite, 1998), the holders of convertible bonds with dividend protection are actually (slightly) better off when a dividend is paid. This observation increases incentives to force conversion and does not alter our prediction of zero call delay for dividend-protected convertible bonds.

Theorem 1: Suppose a bond is "dividend-protected" in that the conversion rate increases by a factor of $\frac{S^{cum\ div}}{S^{cum\ div} - d}$ in the event of a promised dividend per share of *d*. Bondholders will not voluntarily convert unless the dividend is so large that if all bondholders did convert prior to the dividend payment, the dividend would liquidate the firm.

Proof: Suppose a firm has *n* shares, a dividend-protected convertible bond, and assets worth V. Suppose the firm announces a dividend of *d* per share. If the convertible holder does not convert in response to the dividend distribution, then the firm will have assets of $V - nd$ ex-dividend and the maximum ex-dividend value of the convertible is firm value; i.e., $V - nd$. If the bond is converted prior to the dividend payment, the bondholder will have an equity claim on the firm worth $\left(\frac{CR_0}{n + CR_0}\right)V$. Thus a sufficient condition for the convertible bondholder to prefer to convert early is that the firm announces a value for *d* such that $\left(\frac{CR_0}{n + CR_0}\right)V > V - nd$. The inequality can be rewritten as $d\left(n + CR_0\right) > V$; i.e., the dividend per share is so large that if the convertible holder converts early, the attempt to pay the promised dividend to all $n + CR_0$ shareholders would liquidate the firm. In that event the dividend per share actually distributed will equal $\frac{V}{n + CR_0}$ and the cum-dividend share price will also be $\frac{V}{n + CR_0}$. Thus the denominator of the multiplicative factor in relation (1) will be zero when the denominator is measured as $\left(S^{cum\ div} - \text{actual}\ d\right)$ and CR_1 will be undefined.

But when $d\left(n+CR_0\right)<V$, the dividend protection is such that the bondholder will prefer to delay conversion. By converting early the bondholder receives $CR_0 \times S^{cum\ div}$. If the bondholder does delay conversion, the convertible must be worth at least its ex-dividend conversion value of $CR_1 \times \left(S^{cum\ div}-d\right)$. This can be rewritten as

$$CR_1 \times \left(S^{cum\ div}-d\right) = CR_0\left(\frac{S^{cum\ div}}{S^{cum\ div}-d}\right)\times\left(S^{cum\ div}-d\right) = CR_0 \times S^{cum\ div}.$$

Thus whenever the announced dividend per share is not so large that its payment would lead to liquidation of the firm, the protection afforded by the adjustment to the conversion terms given by (1) is sufficient to guarantee that the bondholder will not convert early. **QED**

The importance of dividend-protection for call policy is that future dividend payments cannot provide a rationale for delaying the call of a dividend-protected convertible. The Constantinides-Grundy argument that high dividends can induce voluntary conversion and thereby avoid the costs of a formal call is not applicable when dividend protection guarantees that the bondholders will not voluntarily convert. An extended variant of the Harris-Raviv model in which call delay signals that future dividends are likely to be so high that the bonds will be voluntarily converted is also not applicable. Further, Ingersoll's "sleeping investor" hypothesis cannot be invoked. Theorem 1 shows that bondholders will not voluntarily convert because their unconverted bonds are more valuable than the shares they would receive by converting. Since these are the same shares they would receive if forced to convert, whether they do not convert because not converting is rationally optimal (as in Theorem 1) or because they are simply

asleep is irrelevant. Either way the firm's equityholders would be better off calling and forcing conversion.

The Asquith-Mullins tax wedge argument also does not provide a rational for delaying the call of a dividend-protected convertible. Suppose that over a coming interval the firm will pay coupons on the bond of *c* in total and a dividend per share of *d*. If the firm does not call at the beginning of the period, the bondholders will receive the coupons with an after-tax cost of $(1-\tau)c$ and will obtain a claim on the firm worth at least $CR_1 \times \left(S^{cum\ div} - d\right)$. The cost of not calling is then at least

$$(1-\tau)c + CR_1 \times \left(S^{cum\ div} - d\right) = (1-\tau)c + CR_0\left(\frac{S^{cum\ div}}{S^{cum\ div} - d}\right) \times \left(S^{cum\ div} - d\right) = (1-\tau)c + CR_0 \times S^{cum\ div}.$$

If the firm calls and forces conversion at the beginning of the period, the bondholders claim on the firm is reduced to $CR_0 S^{cum\ div}$. Even though there is a tax wedge, the equityholders strictly prefer calling.

Note that Theorem 1 does not imply that dividend protection means that the convertible's value is unaffected by the dividend, only that non-liquidating dividends will not coerce convertible holders into converting early. To see that the bond's value may not be fully protected, we first recognize that the protected convertible can be viewed as having the same payoffs as a package of a straight bond plus a European conversion option to give up the straight bond's payoff at maturity and instead receive a number of shares at maturity. That number of shares is determined by the adjusted conversion rate at maturity. Even if Merton's Theorem 11 conditions are satisfied and the value of the

conversion option is protected against dividends, dividend payments will reduce the security for, and hence the value of, the straight bond component of the convertible.

Most dividend-protected convertibles have protection in the form of the adjustment to the conversion terms given by (1) for all cash dividends, regardless of the size of the dividend. However, an interesting subset of issues does not give full dividend protection, but only provides protection if the cash dividend exceeds a specified dollar amount or a specified dividend yield. The specified levels are typically relatively low and are called a "dividend threshold". For example, the prospectus for a 2004 Reebok International issue states "the conversion rate will be adjusted if we make regular cash dividends to all or substantially all holders of our common stock in excess of $0.15 per share in any semi-annual period". Reebok paid a semi-annual dividend of exactly $0.15 per share in 2004 and 2005 (before being acquired by Adidas) and the conversion rate was not adjusted in these years.

We only classify issues as having dividend protection when the dividend threshold multiplied by the conversion rate is smaller than the after-tax coupon. Only if the dividend threshold multiplied by the conversion rate were greater than the after-tax coupon could a firm justify not calling by paying the threshold dividend and invoking the Asquith and Mullins tax wedge argument.[9]

Our sample of 432 convertible bonds, which we describe in Section II, contains 33 convertible bonds with a minimum threshold amount expressed in dollar terms and 26 convertible bonds with a minimum threshold dividend yield. For 30 of the 33 convertible

[9] Delay could not be justified by either the Constantinides and Grundy argument or the extended Harris and Raviv argument unless the dividend threshold multiplied by the conversion rate was greater than the coupon itself.

bonds with a minimum dollar threshold amount the conversion rate multiplied by the threshold dividend amount per share is less than the after-tax coupon and we classify these bonds as protected.[10] For the other three bonds the partial protection might potentially be used to justify not calling and hence we classify these three bonds as unprotected.

The 26 bonds in our sample with relatively low threshold dividend yields have threshold yields of 1%, 1.25%, 1.4%, 2%, 2.5% and 3.75%. For 12 of the 26 convertible bonds the conversion rate times the threshold dividend yield times the stock price at the time of the convertible's issuance is less than the after-tax coupon. We classify these convertible bonds as dividend-protected and classify the remaining 14 bonds with threshold yields as unprotected. In a robustness test in Section III we exclude convertibles with minimum threshold amounts and yields from our analysis.

II. Data

We collect U.S. convertible issuances from the Securities Data Company (SDC) for the period January 2000 to December 2006. We require that the issuing firms have an offering prospectus available on the SEC's Edgar database and that the convertibles have call features.[11] We delete issues by financial institutions (SIC 6000-6999) and utilities

[10] To estimate the marginal tax rate, we use Graham's simulated tax database, which can be downloaded from his website - http://faculty.fuqua.duke.edu/~jgraham/taxform.html. We multiply the annual coupon payment by one minus the firm's marginal corporate tax rate in the year of offering. In a robustness test, we have used a marginal tax rate of 35% for all our observations. This changes only one of our classifications and leaves our conclusions unchanged.

[11] We originally also collected convertibles issued from 2007 until 2010 with call features and an offering prospectus available on the SEC's Edgar database, but all but two of these convertibles are still in their call

(SIC 4900-4999).[12] We further exclude convertible preferred stock, exchangeable securities, equity units, purchase contracts, and floating rate convertibles. This leaves 432 plain vanilla convertible bond issues that have call features and for which we have detailed information on their design characteristics. Panel A of Table I sets out descriptive statistics for the convertible bonds in our sample.

[insert Table I here]

The average issue size of the convertible bonds in our sample is $256 million, and the average conversion premium is 33 percent. The average time to maturity when first issued is 15.56 years.[13] The average time to first call is 4.33 years, meaning that on average a convertible bond is call-protected for more than 4 years. We find that 23 percent of the convertibles in our sample have a provisional redemption feature. Provisional redemption features specify that the firm is only allowed to call the bond when the stock price exceeds the conversion price by a specified percentage for a specified number of trading days within a given time period. This percentage is typically 30, 40, or 50 percent and the number of trading days is typically 20 in a 30 day period.[14]

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protection period at 1-1-2011 (the conversion option of these two convertibles are still out-of-the-money at 1-1-2011), and are thus not informative on call delay.

[12] Financial institutions represent 17.6% of the convertible issues over our sample period, whereas utilities represent 4.6%.

[13] We find that 69 convertibles are issued with five years to maturity, 84 with seven years, six with eight years, 15 with 10 years, one with 11 years, two with 12 years, one with 15 years, 207 with 20 years, one with 21 years, and 46 with 30 years to maturity.

[14] Provisional redemption features are also referred to as soft call protection features (Korkeamaki and Moore, 2004).

In most cases a provisional redemption feature expires a few years after issuance, after which an optional redemption feature comes into effect. Optional redemption features typically include a call schedule, indicating, for example, that the call price is 102 percent in the third year after issue, 101 percent in the fourth year after issue, and 100 percent thereafter. Approximately half of the convertibles (53%) include a right for the convertible holder to put the convertible bond back to the issuer on specified dates at a specified price.

We find that 57 percent of the convertible bonds in our sample are protected against regular cash dividends. Panel B shows the percentage of convertible bonds in our sample with dividend protection segregated by year of issue. Overall, we find a relatively high number of convertible issues in 2001, 2003 and 2004, which is consistent with observations in Choi, Getmansky and Tookes (2009) and Lewis and Verwijmeren (2011). Before 2003, the vast majority of convertible bonds are not dividend-protected, while after 2003 the large majority is dividend-protected. Both designs (with dividend protection and without dividend protection) are well represented in 2003.

Table II shows whether and how the convertible bonds in our sample are retired. One way of retiring a convertible bond issue is to call (redeem) the bonds. We search for information on call announcements in Factiva, the FISD Mergent database, and the annual reports of firms. In Factiva we also search whether the convertible issues are retired in other ways, namely through a merger, bankruptcy, an exchange of the convertible bonds for other securities, full repurchase of the bonds, a full exercise of a put feature by the convertible bondholders, or a full voluntary conversion of the bond by the convertible bondholders. Information on mergers and bankruptcies is also obtained from

delisting classifications in CRSP. Information on exchanges, full repurchases, exercised put features, and full voluntary conversion is also obtained from the annual reports. We search all databases until 1-1-2011. There are no bonds with sinking funds in our sample, meaning that there are no fixed schemes that require the firm to periodically retire the convertible bond.

[insert Table II here]

We find that 85 convertible bonds are retired because of a merger. It is common for convertible bonds to have poison put features that allow the holder to put the convertibles back to the firm in the event of a merger.[15] An additional feature of some convertible bonds is a make-whole provision. In virtually all recent deals, a make-whole provision is included that states that the conversion price is decreased in the event of certain fundamental corporate changes, such as an acquisition by a private company or a delisting of the underlying stock. This feature compensates investors for transactions or events that take away the value of the option imbedded in the convertible bond.[16] The

[15] These features state that "In the event of a change in control, each holder will have the right subject to the terms and conditions of the indenture, to require us to purchase for cash all or any portion of the holder's debentures, in integral multiples of $1,000 principal amount. The purchase price for such debenture will equal the aggregate principal amount of such debenture plus the accrued interest."

[16] A cash-out merger is one such transaction – the bonds become convertible solely into the merger consideration (which is all cash in this example) and the bondholders lose any future upside potential and the related imbedded option value of the convert is lost. Another example is a delisting of the underlying stock, an event that decreases the option value significantly, since it impairs the liquidity of the underlying stock. Investors are compensated for this loss in option value by a reduction in the conversion price of the bonds. An example of a make-whole provision is as follows: "If a change in control occurs and all of the consideration for the common stock in the transaction or transactions constituting the change in control

preferred choice for holders of in-the-money convertibles at a time of a merger could be to simply convert the bond into shares. In some cases the merged company takes over the convertible bond. We find that none of the 85 convertibles that expired because of a merger can provide information on call delay: 60 convertibles are out-of-the-money at the time of the merger, while 25 are in-the-money but still call-protected.

We further find that 26 convertible bonds are retired because of the issuer's bankruptcy, while ten convertible bonds are exchanged in capital restructurings. An additional nine firms repurchased the complete offering before maturity. Six convertibles are completely put back to the firm (i.e. a 100 percent of investors exercise the convertible's put option). We observe that no convertible issue that is retired because of a merger, bankruptcy, exchange, full repurchase, or put feature exhibits a delay in calling, as all convertibles that are retired because of these reasons are out-of-the-money upon retirement or are still in their call protection period upon retirement.

We find that 135 of the remaining 296 convertible bonds have been called. We examine these 135 convertible bond calls in the beginning of Section III. The remaining 161 convertible bonds are not called. For 57 of these bonds the call protection period had not expired on 1-1-2011. The remaining 104 convertible bonds matured, are still

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consists of cash, which we will refer to as a "cash buy-out," we will pay a make-whole premium to the holders of the notes in addition to the purchase price of the notes on the date of purchase. The make-whole premium will also be paid to holders of the notes who convert their notes into common stock. The make-whole premium per note will equal (a) the average of the closing trading prices of a note for the five trading days immediately prior to our public announcement of the cash buy-out, less (b) the greater of (i) $1,000 or (ii) the product of (x) average closing prices of our common stock for the five trading days immediately prior to our public announcement of the cash buy-out and (y) the applicable conversion rate; and will be payable in cash or common stock at our option. The make-whole premium, if any, will not be less than zero."

outstanding, or are fully voluntary converted. We examine these 104 convertible bonds at the end of Section III as it could have been optimal for firms to call these bonds.

III. Empirical analysis

In this section we examine call policies for convertible bonds with and without dividend protection. We first focus on convertible bonds that have been called, and then analyze convertibles that have not been called.

A. Convertibles that have been called

To calculate call delay, we need to determine whether and when it was optimal for the firm to call each bond. We classify a convertible as "in-the-money" when finance theory indicates that it would be optimal for the firm to call. A convertible is in-the-money when the daily closing stock price times the conversion rate exceeds the call price plus accrued interest from the last coupon payment date. The call price is based on the call schedule. We adjust the conversion rate for stock dividends, stock splits, and extraordinary cash dividends. We obtain information on conversion rates and call schedules from the issue prospectuses and obtain information on stock prices, dividends, and stock splits from CRSP.

For dividend-protected convertible bonds we also adjust the conversion rate for regular cash dividends. When there is a minimum threshold amount or yield specified for regular cash dividends, we adjust the conversion rate only for those dividends that exceed this minimum threshold amount or yield.

We find that 48 calls pertain to convertible bonds that are called out-of-the-money. Like most prior studies on call policy, we do not focus on these observations.[17] However, an interesting observation is that in eight cases the call announcement occurs when the convertible is just out of-the-money.[18] For these eight cases, the stock price on calling multiplied by the conversion rate is on average 96.1% of the call price. Ingersoll (1977b) shows that the optimal call policy in the presence of a call notice period is to call when the bond is just out-of-the-money. We therefore classify these eight convertibles as if they were called in-the-money with a call delay of zero. This leaves 40 convertible bonds classified as called out-of-the-money.[19]

[insert Table III here]

We classify 95 convertible bonds as being called in-the-money. As shown in Table III, this sample includes 62 convertible bonds without dividend protection and 33 convertible bonds with dividend protection. Table IV reports issue characteristics of the

[17] An exception is King and Mauer (2012), who find that events like asset restructurings are important determinants of out-of-the-money calls.

[18] After a call announcement, convertible bondholders have a limited time period to decide whether they will convert their bonds into shares or redeem the bonds for the call price. This time period is known as the call notice period and is generally around 30 days.

[19] We find that all eight convertibles are in-the-money at the end of the call notice period. Seven of the eight convertibles that were called just out-of-the-money but were redeemed in-the-money have no dividend protection. If we exclude these issues, the average call delay for non-dividend-protected convertibles will be higher and our results on the difference between call delay on convertibles with and without dividend protection (which suggest that call delay is longer for convertibles without dividend protection) will be stronger. The results excluding these eight convertibles are reported in Panel B of Table V.

convertible bonds that are called in-the-money, segregated by whether the bond is dividend-protected.[20]

[please insert Table IV here]

On average, the issue proceeds of non-dividend-protected convertibles are 312 million dollars, whereas the issue proceeds are 233 million dollars for dividend-protected convertibles. In addition to issue characteristics, we examine issuers' stock return volatility and financial slack. We examine two measures of financial slack: cash and short-term investments scaled by total assets and cash and short-term investments scaled by the payment due in the event of a failed call. A call will fail to force conversion when the conversion value drops below the call price by the end of the notice period and convertible bondholders will tender their bonds for cash. Return volatility and financial slack are related to the probability and costs of a failed call and therefore could affect the decision on when to call a convertible bond (see Jaffee and Shleifer, 1990; King and Mauer, 2012). We find no significant difference between the stock return volatility and financial slack for convertibles with and without dividend protection. In fact, we find that no variable in Table IV shows a significant difference at the 5% level between the dividend-protected and non-dividend-protected convertible bonds in our sample.

Table V shows the call delay in trading days for convertibles that are called in-the-money, again distinguishing between convertibles with and without dividend protection.

[20] Veld and Zabolotnyuk (2012) study call policies for firms with multiple convertible bonds outstanding and the likelihood of a future call given a past call. Our sample of 95 convertibles is issued by 89 different firms. There are only six firms with more than one observation of an in-the-money call.

We focus on call delay rather than on the call premium since a call premium can be high due to the existence of a call protection period. Even when a convertible is redeemed on the first day after the call protection period expires, the conversion value can exceed the call price by a large percentage. Similarly, the call premium will be high if the convertible bond is called under a provisional redemption feature.

[please insert Table V here]

We measure the cumulative call delay as the total number of trading days prior to a call announcement on which the convertible is both in-the-money and callable. The average cumulative call delay is 66.45 days for non-dividend-protected convertible bonds and only 2.85 days for dividend-protected convertibles. We also report the continuous call delay, defined as the maximum number of trading days before a call announcement on which the convertible is continuously in-the-money and callable. We find that non-dividend-protected convertibles are on average continuously in-the-money for 46.19 days before being called, while dividend-protected convertibles are continuously in-the-money for an average of 2.85 days. The difference of means between the average call delay for dividend-protected and non-dividend-protected convertibles is statistically significant at the 1% level for both the cumulative and continuous call delay measures.[21]

[21] Our sample of convertibles that are classified as dividend-protected includes six convertibles with minimum threshold amounts or yields and our sample of convertibles that are classified as non-dividend-protected includes four convertibles with minimum threshold amounts or yields. When excluding these convertibles from our sample, we find an average cumulative and continuous call delay of 3.33 days for dividend-protected convertible bonds while non-dividend-protected convertible bonds have an average cumulative call delay of 64.66 days and an average continuous call delay of 43.16 days. These differences

Interestingly, the median call delay is zero: we observe that 37 of the 62 convertible bonds with no dividend protection and 24 of the 33 convertible bonds with dividend protection have zero call delay. The reported Wilcoxon rank-sum test statistics in Table V again lead to the conclusion that dividend-protected convertible bonds exhibit shorter call delay than non-dividend-protected convertible bonds.

The χ^2-statistic in Table V compares the categorical distribution of the observations with and without dividend protection. We use four call delay categories, consisting of convertibles with zero call delay, call delay between 1 and 25 days, call delay between 26 and 100 days, and call delay exceeding 100 days. The value of the χ^2-statistic is $X^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}$, where O_i is the observed frequency per category and E_i is the expected frequency if call delay were independent of dividend protection. The χ^2-statistic documents a significant difference in the two distributions at the 1% level. Figure 1 shows that the distribution of call delays for non-dividend-protected convertibles is right-skewed relative to the distribution for dividend-protected convertibles.

[please insert Figure 1 here]

In Table B of Table V we exclude the eight convertible bonds that are in-the-money at the end of the call notice period, but that were actually out-of-the-money at the time of the call. It can be seen that our results are robust to this exclusion. The average

between convertible bonds with and without dividend protection are statistically significant, with difference of means *t*-statistics of 2.559 for cumulative call delay and 2.983 for continuous call delay.

cumulative call delay is 75 days for non-dividend-protected convertible bonds and three days for dividend-protected convertible bonds.

While the average call delay for non-dividend-protected convertibles issued between 2000 and 2006 is higher than the call delay for dividend-protected convertibles in this period, the average is lower than the call delay reported in earlier studies. Asquith (1995) reports an average call delay of 170 days for a sample of convertible bonds issued between 1980 and 1982, and King and Mauer (2012) report an average 118 day delay for convertibles issued in the 1980 to 2002 period. Perhaps the same reason that underlies the reduction in call delay through time also explains the difference in the call delay for non-dividend-protected and dividend-protected convertibles. Most notably, call delay could have decreased over time as a result of a potential decrease in dividends through time. If a firm will pay only small or no dividends, then each of the Constantinides-Grundy, Asquith-Mullins and extended Harris-Raviv rationales for delay become moot. Thus we examine whether there is a difference in the call delay of dividend-protected and non-dividend-protected convertibles controlling for whether the underlying shares pay a dividend.

We find that 38 of the 95 convertible bonds that are called in-the-money were issued by dividend-paying firms. Panel A of Table VI reports the average call delay for the non-dividend-protected and dividend-protected convertibles in this set. We observe an average cumulative (continuous) call delay of 104.53 days (73.17 days) for non-dividend-protected convertible bonds and an average cumulative and continuous call delay of 0.13 days for dividend-protected convertible bonds. The average cumulative (continuous)

delay is significantly longer for non-dividend-protected convertibles than for dividend-protected convertibles at the 5% (1%) level.

[please insert Table VI here]

We further examine the difference in the call delay of dividend-protected and non-dividend-protected convertibles when the dividend is at a level that might justify a call delay if the bond is not dividend-protected. The Asquith-Mullins tax wedge rationale justifies a delay so long as dividends are (expected) to exceed the after-tax coupon. We follow King and Mauer (2012) and take as the dividend the largest annual dividend per share on the common stock paid during the period when the convertible was callable multiplied by the conversion rate. To estimate the marginal tax rate, we use Graham's simulated tax database and multiply the annual coupon payment by one minus the firm's marginal corporate tax rate in the year that the convertible is callable and the conversion option first becomes in-the-money.[22]

For only 23 of the 95 called bonds was the dividend to be received upon conversion greater than the after-tax coupon. This is the interesting set where, but for dividend protection, a (tax-wedge) rational for delay might be invoked. We report the average call delay for convertibles satisfying the Asquith-Mullins condition for call delay in Panel B of Table VI. The average cumulative (continuous) call delay is 161 (109) days for non-dividend-protected convertible bonds. We find zero call delay for dividend-protected convertible bonds. Both the average cumulative and continuous delays are significantly

[22] If this year is 2010, we use the marginal tax rate of the firm in 2009. In a robustness test, we have used a marginal tax rate of 35% for all our observations and this does not change our conclusions.

longer at the 5% level for the 18 non-dividend-protected convertibles than for the five dividend-protected convertibles.

As a control for a possible change in call policy over time that is not caused by dividend protection features, we focus in Table VII on only those convertible bonds issued in 2003. In that year both dividend-protected and non-dividend-protected convertibles are well represented.

[please insert Table VII here]

It can be seen that average call delay is significantly shorter for dividend-protected convertible bonds issued in 2003 (average cumulative call delay of 3.00 days) than for non-dividend-protected convertibles issued in 2003 (average cumulative call delay of 68.35 days).

Table VIII reports an alternate control for any changes in call policy through time. For each year we report the average call delay for dividend-protected and non-dividend-protected convertibles that first became both in-the-money and callable in that year. The delay for non-dividend-protected convertibles is greater than that for dividend-protected convertibles in each of the seven years with called convertible bonds of both types. The probability of the observed pattern of delay when in any year each type was equally likely to exhibit the shorter call delay is only 0.5^7; i.e., less than 1%.

[please insert Table VIII here]

The results in Tables V, VI, VII and VIII suggest that the dividend protection of convertible bonds has a strong impact on call delay. The difference is not due to a difference in the dividends paid on the shares of companies whose convertibles are and are not dividend-protected. Nor is the difference due to the fact that dividend-protected convertible bonds tend to have been issued more recently than non-dividend-protected convertible bonds.

The virtual disappearance of call delay for dividend-protected convertible bonds suggests that the original Harris and Raviv (1985) signaling model in which call delay signals a high likelihood of conversion at maturity is not empirically descriptive. An extended Harris-Raviv model where delay signals a high likelihood of dividend-induced voluntary conversion prior to maturity is not ruled out. Our results also indicate that call delay rationales based on the notice period and a safety premium may not be of first order importance in explaining call delay. Still, it is interesting to note that even observations with zero call delay do not necessarily provide evidence against the potential relevance of a safety premium. Call protection and provisional redemption features can lead convertible bonds to trade substantially in-the-money before the firm has a first chance to call. Even before a call is feasible, the conversion value of these convertible bonds can be above 120% of the call price, which Asquith and Mullins (1991) assume as a typical safety premium. However, for 35 of the 95 convertibles classified as called in-the-money the conversion value does not exceed 120% of the call price on the day of the call announcement. Within the dividend-protected sample, for 11 of the 33 convertibles classified as called in-the-money the conversion value at the time of the call

announcement is less than 120% of the call price.[23] Moreover, strong evidence against the importance of the safety premium rationale is provided by the eight convertible bonds that are called when they were actually just out-of-the-money.

B. Dividend protection and hedge fund involvement

Brown, Grundy, Lewis and Verwijmeren (2012) show that hedge funds are the principal purchasers of convertible bond issues after 2000. They further show that hedge funds prefer convertible securities without call features as hedge funds combine their purchase of convertible bonds with short positions in the issuer's stock, and non-predictable call policy complicates this hedging strategy. Hedge funds' preference for predictable call policy thus suggests that there will be a positive relation between hedge fund involvement and dividend protection as the optimal call policy for dividend-protected convertible bonds is simply to call the convertible bond as soon as conversion can be forced. We follow Brown, Grundy, Lewis and Verwijmeren (2012) and obtain hedge fund involvement by downloading convertible registration statements from SEC Edgar. Many registration statements contain the names of the original purchasers of the convertible bonds and we classify these buyers as hedge funds and non-hedge funds.[24] We start with our sample of 95 convertible issues that are called while being in-the-

[23] Nine of the 33 dividend-protected convertibles and 23 of our sample of 95 convertibles are called with a safety premium not exceeding 10% of the call price.

[24] See Brown, Grundy, Lewis and Verwijmeren (2012) for a detailed description of this procedure. The registration statements only contain buyer information for convertibles that are privately placed, which is the large majority of recent convertible issues. Our sample of 95 convertible bonds that are called in-the-money contains 90 private placements.

money and we are able to obtain registration statements with buyer information for 85 of these issues.

[please insert Table IX here]

In Panel A of Table IX, we examine the fraction of convertible bond issues that are purchased by hedge funds. On average, hedge funds purchase 71.0% of the convertibles in our sample, which is relatively close to the finding of Brown, Grundy, Lewis and Verwijmeren (2012) that hedge funds purchase 73.4% of the convertible issues over the period 2000 – 2008. We find that hedge fund involvement is significantly larger for convertible issues with dividend protection: Hedge funds purchase on average 76.6% of convertible issues with dividend protection and 68.6% of convertible issues without dividend protection. We also examine the number of hedge funds involved in a convertible issue, divided by the total number of buyers of the convertible issue. We find that hedge funds represent 60.6% of the buyers of dividend-protected convertible issues and 49.3% of the buyers of convertible bonds without dividend protection.

Potentially, it could be that hedge fund involvement rather than dividend protection drives the difference in call delay between convertibles with and without dividend protection. We examine this possibility in Panels B and C of Table IX. Panel B considers the percentage of the issue purchased by hedge funds, and Panel C considers the percentage of the purchasers that are hedge funds. We report the mean cumulative and continuous call delays for three subsamples of the 85 issues defined as issues with low hedge fund involvement (28 observations), medium hedge fund involvement (29

observations), and high hedge fund involvement (28 observations).[25] In every pair-wise comparison the call delay for dividend-protected convertibles is significantly less than that for non-dividend-protected convertible bonds. Importantly, this is true regardless of whether hedge funds have low or high involvement in the issue. Thus the disappearance of call delay is associated with the appearance of dividend protection and not driven by the emergence of hedge funds as a major purchaser of convertible bonds.

C. Convertibles that have not been called

In this subsection we examine 104 convertible bonds issued during 2000 – 2006 that were at some stage prior to 1-1-2011 not protected against a call, and that either matured, are still outstanding at 1-1-2011, or are fully voluntary converted before 2011.

[please insert Table X here]

Table X shows that the large majority of these non-called convertible bonds (93 of the 104 convertible bonds) have simply never been in-the-money. Only 11 convertibles were both in-the-money and not call-protected for at least one trading day before 1-1-

[25] The bucket with low hedge fund involvement contains 4 dividend-protected convertible bonds when examining the fraction of proceeds purchased by hedge funds, and 5 dividend-protected convertible bonds when examining the fraction of purchasers that are hedge funds. The bucket with medium hedge fund involvement contains 9 dividend-protected convertible bonds when examining the fraction of proceeds purchased by hedge funds, and 7 dividend-protected convertible bonds when examining the fraction of purchasers that are hedge funds. The bucket with high hedge fund involvement contains 13 dividend-protected convertible bonds when examining the fraction of proceeds purchased by hedge funds, and 14 dividend-protected convertible bonds when examining the fraction of purchasers that are hedge funds.

2011, and yet were not called.[26] Four of these convertibles have dividend protection. This low number of observations shows how rare deviations from the optimal call policy of Ingersoll (1977a) and Brennan and Schwartz (1977) have become. Table XI reports the average number of trading days that the conversion option is in-the-money for this small number of observations.

[please insert Table XI here]

We observe an average cumulative call delay of 26 days for the four convertibles with dividend protection, meaning that these non-called convertibles have been in-the-money for 26 days before they matured, fell out-of-the-money, were voluntary converted, or before we reach 1-1-2011. The average cumulative call delay is 188 days for non-dividend-protected convertibles. Regarding continuous call delay, we obtain an average delay of 24 and 168 days for dividend-protected and non-dividend-protected convertible bonds, respectively. The maximum call delay for dividend-protected convertibles is 33 days, while it is 495 for the non-dividend-protected convertibles. These findings again highlight the virtual disappearance of long call delays now that the majority of convertibles have dividend protection.

IV. Conclusion

[26] One of these 11 bonds was eventually fully converted, three convertible bonds matured, and seven convertible bonds are still outstanding at 1-1-2011 (four of these dropped out-of-the-money again before 1-1-2011).

Prior studies find that a substantial number of firms do not immediately call a convertible bond when the bond's conversion value first exceeds its call price. A natural extension of Harris and Raviv (1985) as well as the analyses of Constantinides and Grundy (1986) and Asquith and Mullins (1991) all suggest that call delays can be optimal provided the dividends that bondholders forgo by not converting are sufficiently high relative to the (after-tax) coupon cost of the bond to the issuing firm.

We document that a recent change in convertible security design has had a significant impact on convertible call delay. The conversion rate of the majority of convertible bonds issued after 2002 is adjusted for cash dividend payments in such a way that voluntary conversion is no longer optimal. The convertibles are dividend-protected: The bondholder receives her coupons and in the event of a dividend on the common stock she receives an increase in the conversion value of her bonds such that the value of the shares into which the bond is convertible is not reduced when the stock goes ex-dividend. The Constantinides-Grundy, Asquith-Mullins and extended Harris-Raviv rationales for call delay then no longer apply. Dividend protection thus provides the perfect control for current and future dividend policy, which allows us to test the original prediction by Ingersoll (1977a) and Brennan and Schwartz (1977) that stockholders will prefer to force conversion as soon as the conversion value first exceeds the call price. We find that dividend-protected convertibles are indeed called almost immediately after their conversion value exceeds their call price, which shows that finance theory can be highly useful in understanding managerial behavior.

Our paper is the first to document the dividend protection of recent convertible bond issues. As we show in our paper, this innovation in convertible security design has

resulted in the virtual disappearance of convertible call delay. Dividend protection is also important for studies on convertible bond (under)pricing, as dividend protection affects the correct calculation of convertible bond values and thus the measurement of any underpricing at the time of issue. When the algorithms used to value a convertible bond are not adjusted for dividend protection, the theoretical value of a convertible bond will be underestimated. In addition, the delta of a convertible and the size of delta-neutral positions for convertible arbitrageurs will be misestimated when dividend protection is not taken into account.

References

Acharya, Sankarshan, 1988, A generalized econometric model and tests of a signaling hypothesis with two discrete signals, *Journal of Finance* 43, 413-429.

Altintig, Z. Ayca, and Alexander W. Butler, 2005, Are they still called late? The effect of notice period on calls of convertible bonds, *Journal of Corporate Finance* 11, 337-350.

Asquith, Paul, 1995, Convertible bonds are not called late, *Journal of Finance* 50, 1275-1289.

Asquith, Paul, and David W. Mullins, 1991, Convertible debt: Corporate call policy and voluntary conversion, *Journal of Finance* 46, 1273-1289.

Bali, Rakesh, and Gailen L. Hite, 1998, Ex dividend day stock price behavior: Discreteness or tax-induced clienteles? *Journal of Financial Economics* 47, 127-159.

Black, Fisher, and Myron Scholes, 1973, The pricing of options and corporate liabilities, *Journal of Political Economy* 83, 637-654.

Brennan, Michael J., and Eduardo Schwartz, 1977, Convertible bonds: Valuation and optimal strategies for call and conversion, *Journal of Finance* 32, 1699-1715.

Brown, Stephen J., Bruce D. Grundy, Craig M. Lewis and Patrick Verwijmeren, 2012, Convertibles and hedge funds as distributors of equity exposure, *Review of Financial Studies* forthcoming.

Bühler, Wolfgang and Christian Koziol, 2004, Calling convertible bonds too late can be rational, Working paper.

Butler, Alexander W., 2002, Revisiting optimal call policy for convertibles, *Financial Analysts Journal* 58, 50-55.

Campbell, James A., and William Beranek, 1955, Stock price behavior on ex-dividend dates, *Journal of Finance* 10, 425-429.

Campbell, Cynthia J., Louis H. Ederington and Prashant Vankudre, 1991, Tax shields, sample-selection bias, and the information content of conversion-forcing bond calls, *Journal of Finance* 46, 1291-1324.

Chan, Alex W.H., and Naifu Chen, 2007, Convertible bond underpricing: Renegotiable covenants, seasoning, and convergence, *Management Science* 53, 1793-1814.

Choi, Darwin, Mila Getmansky and Heather Tookes, 2009, Convertible bond arbitrage, liquidity externalities and stock prices, *Journal of Financial Economics* 91, 227-251.

Constantinides, George M., and Bruce D. Grundy, 1986, Call and conversion of convertible corporate bonds: Theory and evidence, Proceedings, *Seminar on the Analysis of Security Prices*, CRSP, Graduate School of Business, University of Chicago (November 1986), 35-69.

De Jong, Abe, Marie Dutordoir and Patrick Verwijmeren, 2011, Why do convertible issuers simultaneously repurchase stock? An arbitrage-based explanation, *Journal of Financial Economics* 100, 113-129.

Dong, Ming, Marie Dutordoir, and Chris Veld, 2012, Why do firms issue convertible bonds? Evidence from the field, Working paper.

Dunn, Kenneth B., and Kenneth M. Eades, 1989, Voluntary conversion of convertible securities and the optimal call strategy, *Journal of Financial Economics* 23, 273-301.

Ederington, Louis H., Gary L. Caton and Cynthia J. Campbell, 1997, To call or not to call convertible debt, *Financial Management* 26(1), 22-31.

Elton, Edwin J., and Martin J. Gruber, 1970, Marginal stockholder tax rates and the clientele effect, *Review of Economics and Statistics* 52, 68-74.

Harris, Milton and Artur Raviv, 1985, A sequential signaling model of convertible debt call policy, *Journal of Finance* 40, 1263-1282.

Ingersoll, Jonathan E., 1977a, A contingent-claims valuation of convertible securities, *Journal of Financial Economics* 4, 289-322.

Ingersoll, Jonathan E., 1977b, An examination of corporate call policy on convertible securities, *Journal of Finance* 32, 463-478.

Jaffee, Dwight and Andrei Shleifer, 1990, Costs of financial distress, delayed calls of convertible bonds, and the role of investment banks. *Journal of Business* 63, S107-S123.

King, Tao-Hsien D., and David C. Mauer, 2012, Determinants of corporate call policy for convertible bonds, Working paper.

Korkeamaki, Timo P., and William T. Moore, 2004, Convertible bond design and capital investment: The role of call provisions, *Journal of Finance* 59, 391-405.

Lewis, Craig M., Richard J. Rogalski and James K. Seward, 1999, Is convertible debt a substitute for straight debt or for common equity? *Financial Management* 28, 5-27.

Lewis, Craig M., Richard J. Rogalski and James K. Seward, 2003, Industry conditions, growth opportunities and market reactions to convertible debt financing decisions, *Journal of Banking and Finance* 27, 153-181.

Lewis, Craig M., and Patrick Verwijmeren, 2011, Convertible security design and contract innovation, *Journal of Corporate Finance* 17, 809-831.

Loncarski, Igor, Jenke ter Horst, and Chris Veld, 2009, The rise and demise of the convertible arbitrage strategy, *Financial Analysts Journal* 65, 35-50.

Merton, Robert C., 1973, Theory of rational option pricing, *The Bell Journal of Economics and Management Science* 4(1), 141-183.

Mikkelson, Wayne H., 1981, Convertible calls and security returns, *Journal of Financial Economics* 9, 237-264.

Mikkelson, Wayne H., 1985, Capital structure change and decreases in stockholder wealth: A cross sectional study of convertible security calls, in: B. Friedman, ed., *Corporate Capital Structures in the United States* (University of Chicago Press) 265-296.

Ofer, Aharon and Ashok Natarajan, 1987, Convertible call policies: An empirical analysis of an information-signaling hypothesis, *Journal of Financial Economics* 19, 91-108.

Veld, Chris and Yuriy Zabolotnyuk, 2012, The optimal call policy for convertible bonds: Is there a market memory effect? *Applied Economics Letters* 19, 661-664.

Zabolotnyuk, Yuriy, Robert Jones, and Chris Veld, 2010, An empirical comparison of convertible bond valuation models, *Financial Management* 39, 675-706.

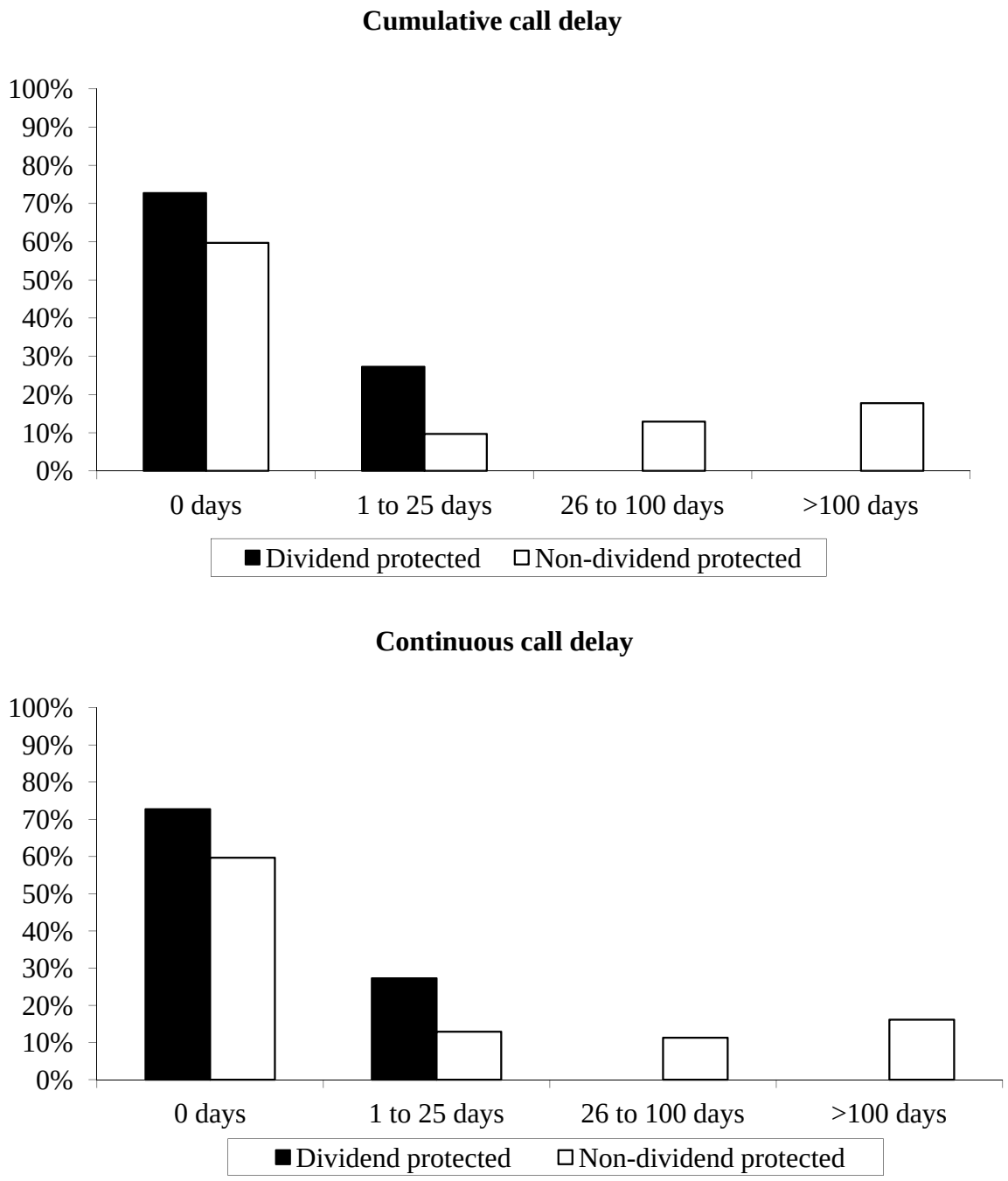

Figure 1. Call delay for convertibles with and without dividend protection

This figure shows the percentage of convertibles with zero call delay, call delay between 1 and 25 days, call delay between 26 and 100 days, and call delay exceeding 100 days. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days before the call announcement date that the convertible bond is in-the-money and callable. Continuous call delay is the number of trading days before the call announcement date that the convertible bond is continuously in-the-money and callable.

Table I. Summary statistics and distribution of dividend protection over time

Descriptive statistics for convertible issues during the years 2000 to 2006. Issue proceeds are the gross proceeds in millions of dollars, as reported in SDC. The coupon rate is the yearly coupon as a percentage of the principal. The conversion premium is the percentage difference between the conversion price and the stock price on the issue date. Time to maturity is the number of years between issue and maturity. Years to first call are the number of years that the bond is fully call-protected. Optional redemption is a dummy equal to one if the convertible includes a call feature (that does not put a requirement on the minimum stock price). Provisional redemption is a dummy equal to one if the convertible bond includes a feature specifying that the firm can call the bond provided the stock price exceeds the conversion price by a specified percentage for a specified number of trading days within a given period. Put rights is a dummy equal to one if the convertible bondholder can require the issuer to repurchase the convertible on specified dates at a specified price. Dividend protection is a dummy equal to one if the conversion rate for the convertible bond will be adjusted for regular cash dividends. All information except issue proceeds is obtained from the issue prospectuses. Panel B reports the number and percentage of convertible bond issued each year with dividend protection.

Panel A

	N	Mean	Median	St.dev.
Issue proceeds	432	256	150	316
Coupon rate	432	3.31	3.25	1.77
Conversion premium	432	32.97	30.33	14.08
Time to maturity	432	15.56	20.00	8.12
Years to first call	432	4.33	5.00	1.95
Optional redemption	432	0.92	1.00	0.27
Provisional redemption	432	0.23	0.00	0.42
Put rights	432	0.53	1.00	0.50
Dividend protection	432	0.57	1.00	0.50

Panel B

Issue year	N	Dividend protection	No dividend protection	% dividend protection
2000	39	0	39	0.0%
2001	69	8	61	11.6%
2002	36	0	36	0.0%
2003	123	76	47	61.8%
2004	103	100	3	97.1%
2005	36	36	0	100.0%
2006	26	25	1	96.2%

Table II. Convertible retirements

This table shows how the convertible bonds in our sample are retired. The sample consists of convertible bonds issued during 2000 – 2006 and we report their status as at January 1st, 2011. The classifications are based on information from Factiva, FISD Mergent, CRSP, and firms' annual reports. We obtain information on call protection and maturity dates from the issue prospectuses.

	Number of observations
Merger and acquisition	85
Bankruptcy	26
Exchange	10
Full repurchase	9
Full exercise of bondholders' right to put	6
Called	135
Full voluntary conversion	4
Matured	44
Outstanding and call-protected at 1-1-2011	57
Outstanding and callable at 1-1-2011	56
	432

Table III. Convertible bond calls

This table provides information on convertible bond calls. The sample consists of convertible bonds issued during 2000 – 2006 and we examine call announcements before January 1st, 2011. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. A convertible is in-the-money when the daily closing stock price times the conversion rate exceeds the call price plus accrued interest from the last coupon payment date. We adjust the conversion rate for stock dividends, stock splits, and extraordinary cash dividends. We obtain information on conversion rates and call schedules from the issue prospectuses, and obtain information on stock prices, dividends, and stock splits from CRSP.

	Number of observations
Called convertibles	135
Called out-of-the-money	40
Called in-the-money	95
Dividend protection	33
No dividend protection	62

Table IV. Dividend protection and other convertible design choices

This table reports descriptive statistics of our non-dividend-protected sample and our dividend-protected sample. The sample period is 2000 – 2006. We obtain the monthly stock return volatility in the year before the convertible first gets in-the-money by calculating the standard deviation of 12 months of monthly stock returns with data from CRSP. We use Compustat to obtain financial slack, which is the level of cash and short-term investments (Item CHE) divided by the size of total assets (AT). We also scale financial slack by the payment upon calling when convertible bondholders do not convert, which is the call price multiplied by the number of convertibles. The number of convertibles and the call price are obtained from the issue prospectuses. See Table I for a description of the other variables in this table. We do not assume equal variances when estimating difference of means *t*-statistics. * indicates statistical significance at the 10% level.

	No dividend protection (62 observations)	Dividend protection (33 observations)	Difference of means *t*-statistic
Issue proceeds	312	233	1.365
Coupon rate	3.61	3.41	0.560
Conversion premium	35.90	33.20	0.821
Time to maturity	14.58	16.79	–1.269
Years to first call	3.68	4.21	–1.481
Optional redemption	0.90	0.94	–0.638
Provisional redemption	0.18	0.27	–1.028
Put rights	0.45	0.64	–1.739*
Stock price volatility	0.09	0.11	–1.200
Total assets	6,987	4,600	1.343
Cash & short-term investments / total assets	0.21	0.21	0.085
Cash & short term investments / payment upon calling	2.95	2.94	0.015

Table V. Call delay for convertible bonds that are called in-the-money

This table reports call delay for convertibles that are called in-the-money. The sample consists of convertibles issued during 2000 – 2006 and we examine call announcements before January 1st, 2011. In Panel B we exclude eight observations that are in-the-money at the end of the call notice period, but that were actually out-of-the-money at the time of the call. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days before the call announcement date that the convertible bond is in-the-money and callable. Continuous call delay is the number of trading days before the call announcement date that the convertible bond is continuously in-the-money and callable. We do not assume equal variances when estimating difference of means *t*-statistics. The chi-square test compares the categorical distribution of the observations with and without dividend protection. We use call delay categories of 0 days, 1 to 25 days, 26 to 100 days, and greater than 100 days. *** and ** indicate statistical significance at the 1% and 5% level, respectively.

Panel A

	Mean	Median	St. dev.	Maximum
No dividend protection (62 observations)				
Cumulative call delay	66.45	0	179.58	1221
Continuous call delay	46.19	0	104.39	515
Dividend protection (33 observations)				
Cumulative call delay	2.85	0	6.81	24
Continuous call delay	2.85	0	6.81	24
Difference of means *t*-statistic				
Cumulative call delay	2.785***			
Continuous call delay	3.257***			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	2.010**			
Continuous call delay	1.975**			
Chi-square test χ^2-statistic				
Cumulative call delay	21.612***			
Continuous call delay	15.271***			

Panel B

	Mean	Median	St. dev.	Maximum
No dividend protection (55 observations)				
Cumulative call delay	74.91	0	189.17	1221
Continuous call delay	52.87	0	109.53	515
Dividend protection (32 observations)				
Cumulative call delay	2.94	0	6.90	24
Continuous call delay	2.94	0	6.90	24
Difference of means *t*-statistic				
Cumulative call delay	2.818***			
Continuous call delay	3.316***			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	2.396**			
Continuous call delay	2.336**			
Chi-square test χ^2-statistic				
Cumulative call delay	21.510***			
Continuous call delay	15.710***			

Table VI. Call delay for convertible bonds that are called in-the-money and issued by dividend-paying firms

This table reports call delay for convertibles that are issued during 2000 – 2006 and are called in-the-money. We examine call announcements before January 1st, 2011. The sample in Panel A consists of convertibles of firms that pay a cash dividend at least once during the life of the convertible. The sample in Panel B consists of firms in which dividends exceed the after-tax coupons. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days before the call announcement that the convertible bond is in-the-money and callable. Continuous call delay is the number of trading days before the call announcement that the convertible bond is continuously in-the-money and callable. We do not assume equal variances when estimating difference of means *t*-statistics. The chi-square test compares the categorical distribution of the observations with and without dividend protection. We use call delay categories of 0 days, 1 to 25 days, 26 to 100 days, and above 100 days. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A

	Mean	Median	St. dev.	Maximum
No dividend protection (30 observations)				
Cumulative call delay	104.53	0	244.11	1221
Continuous call delay	73.17	0	140.55	515
Dividend protection (8 observations)				
Cumulative call delay	0.13	0	0.35	1
Continuous call delay	0.13	0	0.35	1
Difference of means *t*-statistic				
Cumulative call delay	2.343**			
Continuous call delay	2.846***			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	1.801*			
Continuous call delay	1.801*			
Chi-square test χ^2-statistic				
Cumulative call delay	4.684			
Continuous call delay	3.746			

Panel B

	Mean	Median	St. dev.	Maximum
No dividend protection (18 observations)				
Cumulative call delay	160.78	11.50	303.21	1221
Continuous call delay	109.11	11.50	170.12	515
Dividend protection (5 observations)				
Cumulative call delay	0	0	0	0
Continuous call delay	0	0	0	0
Difference of means *t*-statistic				
Cumulative call delay	2.250**			
Continuous call delay	2.721**			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	1.905*			
Continuous call delay	1.905*			
Chi-square test χ^2-statistic				
Cumulative call delay	5.000			
Continuous call delay	5.000			

Table VII. Call delay for convertible bonds issued in 2003

This table reports call delay for convertible bonds that have been issued in 2003 and were subsequently called in-the-money prior to January 1st, 2011. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days before the call announcement that the convertible is both in-the-money and callable. Continuous call delay is the number of trading days before the call announcement that the convertible bond is continuously in-the-money and callable. We do not assume equal variances when estimating difference of means *t*-statistics. The chi-square test compares the categorical distribution of the observations with and without dividend protection. For this test we use call delay categories of 0 days, 1 to 25 days, 26 to 100 days, and above 100 days. *** and ** indicate statistical significance at the 1% and 5% level, respectively.

	Mean	Median	St. dev.	Maximum
No dividend protection (17 observations)				
Cumulative call delay	68.35	0	112.83	348
Continuous call delay	40.65	0	64.25	227
Dividend protection (14 observations)				
Cumulative call delay	3.00	0	6.39	23
Continuous call delay	3.00	0	6.39	23
Difference of means *t*-statistic				
Cumulative call delay	2.384**			
Continuous call delay	2.401**			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	0.819			
Continuous call delay	0.819			
Chi-square test χ^2-statistic				
Cumulative call delay	37.486***			
Continuous call delay	37.486***			

Table VIII. Call delay segregated by year

This table reports call delay for convertibles that are issued during 2000 – 2006 and first become both in-the-money and not call-protected during a particular year. We segregate by the year in which these two conditioning events occurred. We examine call announcements before January 1st, 2011. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days before the call announcement that the convertible is both in-the-money and callable. Continuous call delay is the number of trading days before the call announcement that the convertible bond is continuously in-the-money and callable.

Year	No dividend protection			Dividend protection		
	N	Cumulative call delay	Continuous call delay	N	Cumulative call delay	Continuous call delay
2010	2	48.00	48.00	9	3.56	3.56
2009	1	325.00	325.00	6	4.00	4.00
2008	11	70.36	30.27	9	2.89	2.89
2007	8	64.38	64.38	1	0.00	0.00
2006	10	56.70	50.40	2	2.50	2.50
2005	13	120.00	63.69	1	6.00	6.00
2004	12	17.92	16.25	5	0.20	0.20
2003	5	13.60	13.60	0		
	62			33		

Table IX. Dividend protection and hedge fund involvement

This table shows the relation between dividend protection, hedge fund involvement, and call delay for the 85 convertible bond issues in the 2000 – 2006 period with information on hedge fund involvement. We obtain hedge fund involvement by following Brown, Grundy, Lewis and Verwijmeren (2012). Panel A reports hedge fund involvement in our overall sample, our non-dividend-protected sample and our dividend-protected sample. Panels B and C report the mean call delays for three subsamples of the 85 issues defined as those with low hedge fund involvement (28 observations), medium hedge fund involvement (29 observations), and high hedge fund involvement (28 observations). Panel B considers the fraction of a convertible issue purchased by hedge funds, and Panel C considers the fraction of the purchasers involved in a convertible issue that can be classified as hedge funds. We do not assume equal variances when estimating difference of means *t*-statistics between convertibles with and without dividend protection. ** and * indicate statistical significance at the 5% and 10% level, respectively.

Panel A

	Overall (85 obs.)	No dividend protection (59 obs.)	Dividend protection (26 obs.)	Difference of means *t*-statistic
Fraction of proceeds purchased by hedge funds	0.710	0.686	0.766	–2.272**
Fraction of purchasers that are hedge funds	0.528	0.493	0.606	–2.458**

Panel B

	No dividend protection	Dividend protection	Difference of means *t*-statistic
Low fraction of proceeds purchased by hedge funds			
Cumulative call delay	25.54	1.00	2.238**
Continuous call delay	24.71	1.00	2.156**
Medium fraction of proceeds purchased by hedge funds			
Cumulative call delay	66.40	0.11	2.100**
Continuous call delay	53.35	0.11	1.798*
High fraction of proceeds purchased by hedge funds			
Cumulative call delay	145.27	1.54	1.779*
Continuous call delay	80.27	1.54	2.381**

Panel C

	No dividend protection	Dividend protection	Difference of means *t*-statistic
Low fraction of purchasers that are hedge funds			
Cumulative call delay	17.70	0.00	2.521**
Continuous call delay	15.78	0.00	2.329**
Medium fraction of purchasers that are hedge funds			
Cumulative call delay	58.73	0.00	2.298**
Continuous call delay	55.45	0.00	2.182**
High fraction of purchasers that are hedge funds			
Cumulative call delay	172.93	1.79	1.943*
Continuous call delay	91.50	1.79	2.268**

Table X. Convertible bonds that were never called yet at some stage were not call-protected

This table reports whether those convertibles not called prior to 1-1-2011 were ever previously in-the-money and not call-protected. The sample consists of convertibles issued during 2000 – 2006. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. For non-dividend-protected convertibles, a convertible is in-the-money when the daily closing stock price times the conversion rate exceeds the call price plus accrued interest from the last coupon payment date. We adjust the conversion rate for stock dividends, stock splits, and extraordinary cash dividends. For dividend-protected convertibles we also adjust the conversion rate for regular cash dividends. We obtain information on conversion rates and call schedules from the issue prospectuses, and obtain information on stock prices, dividends, and stock splits from CRSP.

	Number of observations	
Convertibles not called while not call-protected	104	
Never in-the-money and not call-protected	93	
Full voluntary conversion		3
Matured		41
Still outstanding at 1-1-2011		49
At some point in-the-money and not call-protected	11	
Dividend protection		4
No dividend protection		7

Table XI. Call delay for non-called convertible bonds

This table reports call delay for non-called convertible bonds that are both in-the-money and not call-protected at some time prior to 1-1-2011. The sample consists of convertibles issued during 2000 – 2006 and we examine call announcements before January 1st, 2011. Dividend protection indicates that the conversion rate for the convertible bond will be adjusted for regular cash dividends. Cumulative call delay is the number of trading days that the convertible bond is in-the-money and callable. Continuous call delay is the number of trading days that the convertible bond is continuously in-the-money and callable. We do not assume equal variances when estimating difference of means *t*-statistics. The chi-square test compares the categorical distribution of the observations with and without dividend protection. We use call delay categories of 1 to 25 days, 26 to 100 days, and above 100 days. *** and * indicate statistical significance at the 1% and 10% level, respectively.

	Mean	Median	St. dev.	Maximum
No dividend protection (7 observations)				
Cumulative call delay	188.43	102	203.47	495
Continuous call delay	167.86	38	199.14	495
Dividend protection (4 observations)				
Cumulative call delay	26.25	30	9.74	33
Continuous call delay	23.75	26	8.66	32
Difference of means *t*-statistic				
Cumulative call delay	2.105*			
Continuous call delay	1.911			
Wilcoxon rank-sum (Mann-Whitney) test *z*-statistic				
Cumulative call delay	0.756			
Continuous call delay	0.758			
Chi-square test χ^2-statistic				
Cumulative call delay	12.625***			
Continuous call delay	6.333*			