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Perpetual securities and stock prices: Korean evidence

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ABSTRACT

Perpetual securities are classified as equity under the International Financial Reporting Standards, but various contract terms embedded in the securities create additional debt- and equity-like characteristics. This study examines whether stock market investors differentiate between diverse contract attributes. Using quarterly data on listed non-financial firms in the Korea Exchange that issued perpetual securities during 2012–2020, we document the following findings. First, perpetual securities are positively associated with stock prices. Second, the positive association is driven by perpetual securities convertible to stocks rather than non-convertible ones. Third, when further decomposing convertible perpetual securities based on whether the conversion price is fixed or floating, only fixed-priced convertibles show a positive association with stock prices. Overall, our findings suggest that equity investors consider the detailed contract attributes important for financial instruments.

Introduction

The choice of financing through debt or equity has been one of the most important decisions in corporate finance since Modigliani and Miller (1958). Given the simple structure of traditional financial instruments (i.e., either bonds that pay interests and repay the principal amount according to a pre-determined schedule or stocks that pay dividends flexibly), the classification between debt and equity was considered given and undisputed in the finance literature. However, significant variations in the structure of financial instruments developed in the recent capital market challenge such studies that assume a simple dichotomy of debt versus equity. Financial instruments have become complex, and many of them are hybrid securities that are structured to have characteristics of both debt and equity. Fitting these hybrid securities into the dichotomy of debt and equity in the financial statements has become a daunting task (Schmidt 2013; Fargher et al. 2019). In this study, we examine how perpetual securities, an example of such hybrid securities, are valued by investors to provide implications on whether investors understand the detailed debt- and equity-like characteristics of hybrid securities.

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Perpetual securities (or "perps") are financial instruments that have a face value and a stated interest rate but do not have a fixed maturity. Firms can structure financial instruments as perpetual securities by issuing corporate bonds that include an issuers' option to extend the maturity perpetually.[1] Perpetual securities often include an option to delay the payment of interest rates at the issuers' discretion, an issuers' call option, and a provision to increase the interest rate after a period of time following the issuance date (the "step-up" feature). The legal form of having a face value and an interest rate and the high probability of repayment caused by the call option and the interest step-up feature make perpetual securities similar to debt securities. However, the absence of an obligation for the issuer to repay the principal amount and the option to delay interest payments make perpetual securities closer to equity. In addition, perpetual securities often embed a conversion option that allows the investors to convert the securities into common shares of the issuer. If the conversion price, i.e., the exchange rate between securities and shares upon the exercise of the conversion option, is fixed at the time of issuance ("fixed-priced convertibles" hereafter), the securities gain an additional equity-like characteristic. By contrast, if the conversion price is reset as the market price of common stock fluctuates ("floating-priced convertibles" hereafter), the convertible becomes closer to debt. Collectively, depending on the detailed contract terms of the securities, perpetual securities have characteristics that lie on the spectrum of debt and equity.

In Korea, a largely publicized dispute over the classification of perpetual securities arose in the Korean market around the adoption of the International Financial Reporting Standards (IFRS). In 2012, Doosan Infracore, a leading company in the manufacturing industry for construction and utility equipment in Korea issued the very first perpetual security by a non-financial firm in the Korean market. Before finalizing the contract terms of the security, the firm confirmed with the Financial Supervisory Service (FSS, corresponding to the U.S. Public Company Accounting Oversight Board) that the security could be classified as equity under the IFRS.,[2][3] However, the Financial Services Commission (corresponding to the U.S. Securities and Exchange Commission), an agency superior to the FSS, challenged the accounting treatment and opined that the security should be classified as debt due to the issuer's call option and an interest rate step-up provision embedded in the security. The dispute over the classification of the perpetual security was resolved only after the International Accounting Standards Board (IASB) Interpretation Committee answered to the inquiry of the Korean Accounting Standards Board (KASB) that the security should be classified as equity (Korean Accounting Standards Board, 2013). After this uncertainty regarding the classification of securities was resolved, many public non-financial companies started to issue similar perpetual securities, presenting the securities as equity in their financial statements.

Although this particular event occurred uniquely in Korea, the issue of classifying complex financial instruments into debt or equity in the financial statements is a general issue concerning firms in other countries as well. Various types of complex financial instruments are being developed and issued in capital markets around the world. Many of these financial instruments have characteristics that lie on the spectrum of debt and equity. Moreover, financial instruments with similar host contracts include various types of opinions having debt- or equity-like characteristics. Accounting standards are being revised continuously to fit these complex financial instruments into financial statements, but the process has not been an easy one. The popularity of hybrid instruments created demand by interested parties to amend the International Accounting Standards (IAS) No. 32 that governs the classification of financial instruments (Schmidt, 2013), and the International Accounting Standards Board (IASB) (2019) is currently in process of making clarifying amendments to IAS 32.[4] Thus, the issue of classifying financial instruments is an ongoing important issue in the capital market around the world. This study examines how investors react to a firm's use of perpetual securities, one of the representative examples of complex financial instruments, to understand investors' perception about the debt- and equity-like characteristics of financial instruments.

Korea provides a setting adequate for testing the shareholders' response to the issuance of perpetual securities for two main reasons. First, a dispute on the classification of perpetual securities has been largely publicized in Korea, thereby increasing the awareness of stock market investors on this issue. Disagreement among regulatory bodies in the early years of IFRS adoption have induced firms and investors to be attentive to perpetual securities and related issues. Second, Korean firms prepare their financial statements according to the IFRS, and thus the financial impact of perpetual securities is comparable to many other countries that adopt the IFRS. Prior studies have mostly investigated the implications of financial instruments, such as preferred stocks and put warrants, issued in the U.S. that comply with the U.S. Generally Accepted Accounting Principles (U.S. GAAP) (Kimmel and Warfield, 1995; Terando et al., 2007; Linsmeier et al., 2022), which limits the generalizability of the results to a vast number of other countries that use principle-based standards unlike the U.S. We overcome the limitation in prior U.S. studies with Korean data and provide implications on investors' perception of hybrid contracts in countries adopting the IFRS.

[1] In some countries, firms can directly issue bonds without a fixed maturity. In Korea, firms issue bonds with a fixed maturity and add options to extend the maturity. This approach allows firms to structure financial instruments that are equivalent to perpetual securities when the issuing bonds without a maturity was not allowed by the Korean corporate law. In this study, we refer to both types of securities as perpetual securities.

[2] Korea adopted the IFRS in 2011. The official translated version of IFRS is called the Korean IFRS (K-IFRS). Since Korea fully adopts the IFRS and K-IFRS is identical to the IFRS, we refer to the standards as IFRS throughout the paper.

[3] Note that the previous accounting standard, the Korean Generally Accepted Accounting Principles (K-GAAP), classified the securities as debt according to its legal form.

[4] In 2018, the IASB (2018) had issued a discussion paper that suggested to make major changes to the debt–equity classification of financial instruments. Later in 2019, the IASB (2019) decided to make clarifying amendments to the existing standards, rather than changing the classification criteria fundamentally, and to emphasize enhanced disclosure of the contract attributes related to debt- and equity-like characteristics of the financial instruments.

This study uses quarterly accounting data of firms listed in the Korea Exchange (KRX) that issued perpetual securities from 2012 to 2020. Using an empirical version of Ohlson's (1995) model, we decompose a firm's book value of equity into perpetual securities and the other equity components and examine how the two components, together with earnings, explain variation in stock prices. Next, we distinguish perpetual securities according to the contract terms. Specifically, we examine whether stock prices are associated differently with perpetual securities that need to be settled in cash ("non-convertible perpetual securities") and those that can be converted to common stock ("convertible perpetual securities") . In addition, we further decompose convertible perpetual securities depending on whether the conversion price is fixed or floating.

Our analyses reveal the following. First, perpetual securities are positively associated with stock prices. Second, convertible perpetual securities have greater positive effects on stock prices than perpetual securities that are not convertible. Such findings suggest that the presence of a conversion option affects investors' perception of perpetual securities, despite the irrelevance of the conversion option in deciding the accounting treatment of the instruments. Third, only fixed-priced convertibles, but not floating-priced convertibles, are positively associated with stock prices. Our result provide evidence that investors additionally differentiate between detailed contract terms of the convertibles. Collectively, our results suggest that stock market investors distinguish between perpetual securities with different contract terms and react differently to different types of perpetual securities.

This study contributes to the literature on hybrid securities in the following aspects. First, this study is the first to capture investors' perception of hybrid contracts that are presented in financial statements according to the IFRS. Few studies that examine investors' perceptions to hybrid contracts have focused on the market reaction to the securities issued by U.S. firms that prepare their financial statements according to the U.S. GAAP (Fargher et al., 2019; Kimmel and Warfield, 1995; Terando et al., 2007; Linsmeier et al., 2022). Given that investors' understanding of financial instruments are affected by the related disclosure and presentation, prior studies conducted with U.S. data may not be generalizable to a vast number of other countries that adopt principle-based accounting standards. Thus, our study extends prior studies to a more generalized setting of IFRS users.

Second, this study provides evidence that stock market valuation differs depending on contract details, i.e., the presence of a conversion option and the detailed terms of conversion prices. Given that perpetual securities are classified as equity in the financial statements of Korean firms, we highlight that investors consider economic substance more important than the accounting presentation of financial instruments. In this sense, we extend Dimitrov and Jain's (2008) findings that financial leverage is negatively associated with stock prices to show that the detailed contract attributes of financial instruments are important for investors. Thus, our findings extend prior studies, such as Kimmel and Warfield (1995), Hopkins (1996), Terando et al. (2007), and Clor-Proell et al. (2016), which highlight the importance of contract attributes on share prices.[5] More importantly, our study provides support for the International Accounting Standards Board (IASB)'s (2019) recent decision to enhance the disclosure of detailed attributes related to the debt- or equity-like characteristics of the instruments.

This paper proceeds as follows. Section 2 illustrates the contractual characteristics of perpetual securities. Section 3 reviews prior literature and develops the hypotheses. Section 4 describes the research design, and Section 5 presents the empirical results. The last section summarizes the paper.

Contract terms of perpetual securities

Perpetual securities are a type of financial instrument that have a face value and stated interest rate simlar to bonds, but do not have the obligation to repay the face value similar to equity. An option to delay interest payments perpetually is often embedded in the securities and adds an equity-like feature to the securities. In addition, many perpetual securities include an issuers' call option and an interest rate step-up provision to increase the likelihood that the issuer will repay the securities, further adding a debt-like feature.[6] The instruments have characteristics of both debt and equity and are thus called hybrid instruments (for being a mixture of debt and equity) or capital instruments (for having equity capital-like characteristics but in the form of bonds). Perpetual securities were first introduced in the banking industry for compliance with the Basel framework, the international regulation governing banks. To ensure the solvency of banks, the Basel framework requires banks to have a high capital ratio and defines specifically what types of financial instruments can be accepted as capital under the regulations. Perpetual securities were thus issued by banks that wished to comply with the regulations but avoid the high costs of equity. Korean banks started to issue perpetual securities in 2002 to comply with the amended Basel regulations.

In contrast to banks that had incentives to issue perpetual securities for regulatory purposes, non-financial firms, especially those in Korea, did not have incentives to issue these securities in the same period because the perpetual securities

[5] Hopkins (1996) finds that analysts predict stock prices to be lower when hybrid securities are presented as equity than as debt, which may seem inconsistent with our results that perpetual securities that are presented as equity induce a positive stock price response. The results of Hopkins (1996) and this study are not directly comparable due to three main aspects. Hopkins (1996) uses a laboratory setting, examines stock prices predicted by financial analysts, and tests the effects of redeemable preference shares (equity instruments that have debt-like characteristics). By contrast, we use empirical data, examine actual stock prices in the equity market, and test the effects of perpetual securities (debt instruments that have equity-like characteristics). However, the two studies provide similar implications that contract attributes are important for investors.

[6] Collectively, there exists four contractual terms that are commonly embedded in perpetual securities included. By definition, all perpetual securities include an issuers' option to repay the debt. The latter three contractual terms, i.e., issuers' option to delay interest payments, an interest rate step-up feature, and issuers' call option, are included more than 90% of the observations in our sample.

were classified as debt under the K-GAAP. The long maturity of perpetual securities and the corresponding high interest rates made the securities unattractive compared with simple corporate bonds. However, the adoption of IFRS in 2011 created incentives for Korean non-financial firms to issue perpetual securities because perpetual securities could be classified as equity rather than debt under the IFRS.

Perpetual securities provide large benefits to the issuer.[7] First, perpetual securities allow firms to issue capital that are classified as equity in the financial statements with no dilution of existing shares. Thus, perpetual securities have an advantage over equity to the issuer in terms of share dilution. Second, interest payments of perpetual securities are tax deductible, because securities are legally issued in the form of bonds. Accordingly, firms can save taxes without having the contractual obligation to pay cash flows, thereby creating an additional advantage of perpetual securities over equity for issuers. Lastly, the classification of perpetual securities into equity in the financial statements under IFRS enables issuers to report a lower debt-equity ratio and thus creates an advantage of the securities over general corporate bonds. The presentation of perpetual securities as equity further benefits the issuers' accounting profitability because the interest payments are treated as dividends and are thus not deducted from net income as expenses.

Recently, perpetual securities often include a conversion option that allows investors to convert securities into a certain number of common shares of the issuer (convertible perpetual securities) at a pre-specified price (conversion price).[8] This conversion feature further affects the debt- and equity-like nature of perpetual securities. Convertible perpetual securities can have either a fixed or a floating (variable) conversion price. First, the conversion price may be set at a fixed price upon the issuance of perpetual securities (fixed-priced), such that the number of shares that need to be issued at the option exercise date is pre-determined. These convertible perpetual securities are closer to equity because security investors are exposed to similar risks as are common shareholders who have a fixed ownership share. Second, the conversion price may also be variable (floating-priced), such that it is adjusted downward when the stock price of the issuer declines below the current conversion price, allowing a greater number of shares to be issued upon the exercise of the option.[9] The downward adjustment in conversion prices is intended to insure the security holders from potential losses stemming from a lower value of converted common shares, enlarging the economic benefits that investors of perpetual securities enjoy relative to shareholders. A floating-priced convertible option makes perpetual securities less equity-like, because the holders become insured against any future drop in stock prices.

Adding a conversion option alters some of the benefits of perpetual securities. First, it allows the issuer to save cash outflows in case the option is exercised, creating benefits to the issuing firm. Second, the conversion option causes existing share ownership to be diluted when perpetual securities are converted to equity, reducing the existing benefits of (non-convertible) perpetual securities. This dilution effect is more severe for floating-priced convertibles than for fixed-priced convertibles, because a downward adjustment of the conversion price increases the number of shares to be issued when the conversion option is exercised.

The convertible option may also change the accounting presentation of the securities. A fixed-priced convertible is classified as equity, whereas a floating-priced convertible may be classified as debt depending on the detailed contract terms under the IFRS.[10] This classification is due to the fact that a floating conversion price makes the economic characteristics of the security become different from pure residual claims on the firm. Currently, most Korean firms present floating-priced convertible perpetual bonds as equity in the financial statements, but there exists debate about the extent to which a floating-priced convertible should be classified as debt.

Prior literature and hypothesis development

Prior literature

This study examines whether stock market investors react positively or negatively to hybrid contracts. Only few prior studies have examined this issue. Kimmel and Warfield (1995) examine the association between redeemable preferred stocks (RPSs) and systematic risk (market beta) for U.S. firms for the period of 1979–1989. RPSs have characteristics of both debt and equity: the obligation to pay the principal amount comprise a debt-like feature, and the option to delay the payment of dividends and principal amount comprise an equity-like feature. They document that the market beta increased for

[7] By contrast, given that the interest rates of perpetual securities tend to be higher than other types of corporate bonds, perpetual securities incur greater cost of capital to the issuers. To avoid the high interest burden, most issuers exercise the call option before the step-up provision is triggered (Shin 2019).

[8] Convertible perpetual securities in our study include convertible bonds, bonds with warrants, and exchange bonds. Most observations in our sample are convertible bonds with a few bonds with warrants and exchangeable bonds.

[9] The adjustments to conversion prices made in floating-priced convertibles in Korea are asymmetric: they are adjusted downward for stock price drops but are not adjusted upward for stock price rises. Thus, floating-priced convertibles provide strictly larger economic benefits to the perpetual securities investors than to the existing shareholders (Yoon 2020). The option to downward-adjust the conversion price after issuance is referred to as a death spiral in the U.S. (Kim et al. 2013).

[10] Financial instruments that can be settled in a firm's own equity instrument generate various challenges in determining the accounting treatment. IASB (2018) discusses some examples of the challenges. First, IFRS defines a liability as an obligation to deliver any of its economic resources, but equity instruments issued by an entity is not considered economic resources of the entity in the IFRS. Second, the accounting standards governing share-based compensation (IAS 2) and financial statements settled with equity are not consistent with each other. Third, for financial instruments without explicit guidance in the IFRS, firms apply varying accounting treatments in practice.

RPSs only when the holders of RPSs were endowed with voting or conversion rights. The findings suggest that investors understand the economic substance of the financial instruments and respond to the specific attributes of RPSs.

Terando et al. (2007) examine how stock prices are associated with put warrants of U.S. firms in 1991–2003 by comparing put warrants that can be settled in cash to those that can be converted to common shares. Under the U.S. GAAP, put warrants are classified as debt regardless of the settlement vehicle. Empirical results suggest that cash-settled put warrants are negatively associated with stock prices, whereas convertible put warrants are positively associated with stock prices. In addition, the negative association of cash-settled put warrants and stock prices disappeared when the put options were out-of-the-money, whereas the positive association of convertible put warrants and stock prices was observed for both in-the-money and out-of-the-money puts. The findings suggest that the equity investors' perception of financial instruments depend on the settlement methods.

Linsmeier et al. (2022) examine how the association between preferred stocks and stock prices depends on the financial stability of the issuers. For U.S. firms with outstanding preferred stocks in 1996–2015, preferred stocks are negatively associated with stock prices for issuers with high financial distress costs and positively associated with stock prices for issuers with low financial distress costs. Thus, they provide evidence that the issuers' financial status affects investors' perception of financial instruments. However, they do no find evidence of detailed contract attributes affecting the investors' perception of preferred stocks. In a related manner, Barth et al. (2013) examine the characteristics of employee stock options. They examine the association between employee stock options, risks, and returns based on financial theory. They find that employee stock options are negatively associated with risk and returns, and conclude that investors perceive stock options positively.

In a Korean study, Shin (2019) reviews the contract terms of perpetual securities issued by non-financial firms from 2012 to 2018. He reports that perpetual securities in Korea include both convertible and non-convertible ones and that convertible perpetual securities have become more popular in recent years. In addition, he documents that although convertible perpetual securities with a floating conversion price should be classified as debt according to IFRS, all firms classify perpetual securities as equity regardless of the details of the conversion option. Using annual financial statement data, he examines the association between perpetual securities and stock prices and finds an insignificant association.[11] Extending Shin (2019), this study delves into how different contract attributes affect the association between stock prices and perpetual securities.

Hypothesis development

We first examine the association between stock prices and perpetual securities. Shareholders may respond favorably to the use of perpetual securities because the securities enable the issuing firm to save cash outflows. As mentioned in Section 2, perpetual securities do not have a pre-defined maturity that oblige issuers to repay the face value and often include the option to delay interest payments. These two features allow firms to save cash outflows from the securities. In addition, issuing firms benefit from the equity classification of perpetual securities. The debt-equity ratio reduces due to the increased equity, and the accounting profitability enhances because the interest payments are treated as dividends that are not deducted from net income, rather than interest expense that is deducted from net income. Thus, issuing firms can better avoid debt covenant violations and reduce future cost of capital. Accordingly, shareholders may respond positively to the use of perpetual securities.

By contrast, shareholders may respond negatively to the use of perpetual securities. While the perpetual maturity and the interest deferral option make it possible for issuers not to pay interests and face value, the issuers' call option and the interest-rate step-up feature increase the likelihood that the issuers will voluntarily repay the securities. The issuers' call option allows the issuers to repay the securities at any given time. The interest step-up feature prescribes that the interest rate would increase after a certain time and, thus, increases the probability that issuers exercise the call option and repay the debt before the interest rate increases to save cash outflows. To the extent that shareholders consider these two features reduces the relative benefits of perpetual securities over bonds, they may respond negatively to the use of perpetual securities. Given the two opposing characteristics, we set our first hypothesis in null form as follows.

H1. The association between stock prices and perpetual securities is neither positive nor negative.

We next examine how the association between stock prices and perpetual securities varies with the existence of the conversion option. Perpetual securities can include an option for the holder to convert the securities into the issuers' equity. In the early years of introduction, perpetual securities in Korea were mostly issued without a conversion option. Recently, convertible perpetual securities have become popular. Shareholders may prefer convertible perpetual securities over non-convertible perpetual securities, because the former allows issuing firms to redeem the securities without cash outflows. However, shareholders may be skeptical to the use of convertible perpetual securities due to the potential dilution of ownership and thus respond negatively. Taken together, predicting shareholders' reaction to the presence of a conversion option in perpetual securities *ex ante* is difficult. Accordingly, we set our second hypothesis in null form as follows.

[11] Note that Shin (2019) provides descriptive statistics for the contract attributes distinguishing fixed- and floating-priced convertibles but does not empirically examine the effects of the attributes on stock prices.

H2. The association between stock prices and perpetual securities does not differ for convertible and non-convertible perpetual securities.

We further investigate how the detailed terms of convertible perpetual securities affect the association between stock prices and perpetual securities. Convertible perpetual securities can be further differentiated based on whether the conversion price can be adjusted after the issuance of perpetual securities. Fixed-priced convertibles have a conversion price that is pre-determined at a certain level at the issuance date. The holders of these perpetual securities are endowed with a fixed number of shares and are thus exposed to similar levels of risks as are common shareholders. By contrast, floating-priced convertibles have a conversion price that is downward-adjusted if the stock price of the issuer declines. The holders of these perpetual securities are insured against any future drop in stock prices, and existing shareholders may suffer from greater share dilution in case the conversion price is downward-adjusted.[12] If shareholders understand the economic implications of different conversion price setting terms, then they will perceive floating-priced convertible perpetual securities more negatively due to their potential dilution effect. However, most firms present all types of perpetual securities as equity in their financial statements. If investors base their valuations solely on the presentation in the financial statements, they may not differentiate between the two types of securities. On the basis of these contradicting expectations, we present our third hypothesis in null form as follows.

H3. The association between stock prices and perpetual securities does not differ for fixed- and floating-priced convertibles.

Research design and sample selection

Research design

We test the association between stock prices and perpetual securities by empirically applying Ohlson's (1995) model. The model regresses the stock price on the book value of equity and earnings, as shown as follows[13]:

$$PRICE_{i,q} = \gamma_0 + \gamma_1 BV_{i,q} + \gamma_2 E_{i,q} + \varepsilon_{i,q} \quad (1)$$

For firm *i* in quarter *q, PRICE* is the quarter-end stock price;[14] *BV* is the book value of equity divided by outstanding shares; and *E* is net income divided by outstanding shares.

To test H1, we decompose the book value of equity into the book value of perpetual securities and others and estimate Eq. (2).

$$PRICE_{i,q} = \gamma_0 + \gamma_1 (BV\_PERPS_{i,q}) + \gamma_2 PERPS_{i,q} + \gamma_3 E_{i,q} + \varepsilon_{i,q} \quad (2)$$

For firm *i* in quarter *q*, *BV_PERPS* is the book value of equity less book value of perpetual securities divided by the number of common shares outstanding, and *PERPS* is the book value of perpetual securities divided by outstanding shares. The variable of interest is *PERPS*. If investors view perpetual securities positively, then $\gamma_2 > 0$, and if they view the securities negatively, then $\gamma_2 < 0$.

To test H2, we further decompose the book value of perpetual securities (*PERPS*) into non-convertible perpetual securities (*NP*) and convertible ones (*CP*), and estimate Eq. (3).

$$PRICE_{i,q} = \gamma_0 + \gamma_1 (BV\_PERPS_{i,q}) + \gamma_2 NP_{i,q} + \gamma_3 CP_{i,q} + \gamma_4 E_{i,q} + \varepsilon_{i,q} \quad (3)$$

For firm *i* in quarter *q*, *NP* is the book value of non-convertible perpetual securities divided by outstanding shares, and *CP* is the book value of convertible perpetual securities divided by outstanding shares. Our variables of interest are *CP* and *NP*. If investors differentiate between convertible and non-convertible perpetual securities, the coefficients on *CP* and *NP* would differ, i.e., $\gamma_2 \neq \gamma_3$, and if not, the coefficients would not differ, i.e., $\gamma_2 = \gamma_3$.

To test H3, we decompose convertible perpetual securities (*CP*) into fixed-priced convertibles (*CP_Fixed*) and floating-priced convertibles (*CP_Floating*) and estimate Eq. (4).

[12] IAS 32 states that a financial instrument is classified as debt when the issuer is obliged to deliver a variable number of the entity's own equity instruments. Floating-priced convertible financial instruments are classified as debt under IFRS according to this criterion.

[13] We analyze stock prices rather than stock returns for two reasons. First, we are interested in *whether* stock market responds to the information, rather than *when*. Specifically, while stock prices and returns specifications provide evidence on how the equity market responds to accounting information, stock return tests additionally require that the information is reflected in the stock market over a specific period (Barth et al. 2001). Second, there exists only a small variation when we measure our test variables in changes, which is required for testing stock returns. Perpetual securities are classified as equity; thus, the book value of perpetual securities does not change considerably after the initial recognition. Accordingly, the change in the book value of perpetual securities has a value of 0 for a significant portion of our observations. Nevertheless, we perform additional analysis using quarterly stock returns and change specifications and find insignificant coefficients on our test variables (untabulated). We interpret it as evidence that that investors respond to information about the issuance of perpetual securities but not necessarily in a timely manner (Barth et al. 2001; Easton et al. 1993). However, the insufficient variation in the test variables may have caused the results to be insignificant.

[14] Our results are robust to measuring stock prices three months after the quarter end to allow for the time lag between the fiscal quarter end and the disclosure of financial information.

$$PRICE_{i,q} = \gamma_0 + \gamma_1 (BV\_PERPS_{i,q}) + \gamma_2 NP_{i,q} + \gamma_3 CP\_Fixed_{i,q} + \gamma_4 CP\_Floating_{i,q} + \gamma_5 E_{i,q} + \varepsilon_{i,q} \quad (4)$$

For firm i in quarter q, *CP_Fixed* is the book value of fixed-priced convertible perpetual securities divided by outstanding shares, and *CP_Floating* is the book value of floating-priced convertible perpetual securities divided by outstanding shares. Our variable of interest is *CP_Fixed* and *CP_Floating*. If investors differentiate between fixed- and floating-priced convertibles, the coefficients on *CP_Fixed* and *CP_Floating* would differ, i.e., $\gamma_3 \neq \gamma_4$, and if not, the coefficients would not differ, i.e., $\gamma_3 = \gamma_4$.

We deflate all independent variables with outstanding shares at the end of the quarter to mitigate size effects (Barth and Clinch 2009; Song et al. 2010). We winsorize all variables at the top and bottom 1 % to minimize the effects of outliers.

Sample selection and data

This study uses a sample of non-financial Korean firms listed in the KRX that issued perpetual securities from 2012 to 2020. We hand-collect the detailed contract terms of perpetual securities from the annual reports, audit reports, and security issuance disclosure available in the FSS's Data Analysis, Retrieval and Transfer System (DART). We obtain quarterly financial information and stock price from DataGuide. Our final sample includes 594 firm–quarter observations, with 87 distinct perpetual security issuances of 41 firms.

Sample distribution

Table 1 presents the frequency and amount of perpetual security issuances by year and the presence of a conversion option, and Fig. 1 depicts the same information graphically. As presented in Panel A of Table 1, there exist 87 cases with a total amount of KRW 15,565 trillion (around USD 14 trillion) perpetual securities issued from 2012 to 2020. The number of issuances were smallest in 2012, with only 2 cases, and largest in 2019, with 22 cases. In terms of amounts, the total issuance amount was smallest in 2012 with KRW 528 billion (around USD 480 million) issued and largest in 2019 with KRW 3,211 billion (around USD 2,919 million). As presented in Panel A of Fig. 1, we observe that perpetual securities have become more popular in recent years although the number and amount of perpetual securities fluctuate by year.

We further divide perpetual securities depending on the existence of a conversion option: non-convertible perpetual securities (*NP*) and convertible perpetual securities (*CP*). We report the frequency and amount of issuance for each type of perpetual securities in Panel B of Table 1. Among the total of 87 perpetual securities issued, 42 are non-convertible to shares and 45 are convertible. The issuances of non-convertible perpetual securities were stable across years, whereas convertible perpetual securities have gained greater popularity in recent years, especially since 2016. The recent increases in the relative frequency and amount of convertible perpetual securities over non-convertible perpetual securities are observed in Panel B of Fig. 1.

Descriptive statistics

Table 2 reports the descriptive statistics of the variables used in our regressions. Panel A presents the descriptive statistics of variables for the 594 firm–quarter observations. The average stock price per share (*PRICE*) is 80.667. The mean value of the book value of equity per share (*BV*) is 114.198, which comprises an average perpetual securities per share (*PERPS*) of 6.631 and other equity (*BV_PERPS*) of 107.607 on a per share basis. The average earnings per share is 0.892. The mean [median] leverage ratio (*LEV*) is 0.650 [0.655]. The average book value of perpetual securities per share (*PERPS*) of 6.631 comprises 4.212 of non-convertible perpetual securities (*NP*) and 2.423 of convertible perpetual securities (*CP*). The average book value of convertible perpetual securities (*CP*) consist of 0.071 floating-priced convertibles (*CP_Floating*) and 2.353 fixed-priced convertibles (*CP_Fixed*).

Panel B of Table 2 compares the descriptive statistics of the variables for firm–quarters with non-convertible and convertible perpetual securities. Note that 33 firm–quarters have both non-convertible and convertible perpetual securities. Accordingly, the total number of observations reported in Panel B of Table 2 (627 = 330 non-convertible and 297 convertible perpetual security issuers) is greater than the full sample size of 594 reported in Panel A of Table 2. The mean [median] value of *PRICE* for firms with non-convertible perpetual securities (118.20 [83.95]) is significantly higher than that for firms with convertible perpetual securities (32.96 [15.50]), suggesting that the stock price of the former group tends to be higher than that of the latter group. The mean [median] value of *PERPS* for firms with non-convertible perpetual securities (8.17 [5.64]) is also significantly larger than that for firms with convertible perpetual securities (4.98 [2.19]), implying that non-convertible perpetual securities tend to be issued in larger amounts than are convertible ones. We also find that firms with non-convertible perpetual securities tend to have higher net assets per share (*BV*), higher earnings per share (*E*), and lower leverage (*LEV*), relative to firms with convertible perpetual securities.

Table 1
Distribution of Perpetual Security Issuance.

Panel A. Perpetual Security Issuance by Year

Year	Frequency	Issuance Amount (KRW billion)
2012	2	528
2013	8	1,957
2014	3	738
2015	11	1,196
2016	3	1,380
2017	7	2,308
2018	17	2,278
2019	22	3,211
2020	14	1,967
Total	87	15,565

Panel B. Perpetual Security Issuance by Year and the Presence of Conversion Option

	Non-convertible Perpetual Securities (*NP*)		Convertible Perpetual Securities (*CP*)	
Year	Frequency	Issuance Amount (KRW billion)	Frequency	Issuance Amount (KRW billion)
2012	2	528	–	–
2013	7	1,887	1	70
2014	2	430	1	308
2015	6	1,021	5	176
2016	2	380	1	1,000
2017	2	383	5	1,924
2018	6	975	11	1,303
2019	9	1,551	13	1,660
2020	6	393	8	1,574
Total	42	7,549	45	8,016

Notes: This table presents the distribution of perpetual security issuance. Panel A presents the frequency and issuance amount of perpetual securities by year. Panel B presents the frequency and issuance amount of perpetual securities by year and the presence of a conversion option.

Table 3 presents the Pearson correlations for the main variables used in our analyses. Consistent with value relevance research, net assets per share (*BV*) and earnings per share (*E*) are positively correlated with stock price (*PRICE*). Our variable of interest, the book value of perpetual securities per share (*PERPS*), is positively correlated with stock price (*PRICE*). Among perpetual securities, only non-convertible perpetual securities (*NP*), but not convertible securities (*CP*), are significantly positively associated with *PRICE*. Furthermore, floating-price convertibles (*CP_Floating*) are negatively correlated with *PRICE*, whereas fixed-priced convertibles (*CP_Fixed*) are not significantly correlated with *PRICE*.

Empirical results

Perpetual securities and stock prices (H1)

Table 4 presents the empirical results of testing the association between stock prices and perpetual securities. Column (1) of Table 4 reports the baseline results of estimating Eq. (1). The coefficients on the book value of equity (*BV*) and earnings (*E*) are significantly positive, confirming the positive stock market valuation of accounting information, as reported in prior studies.

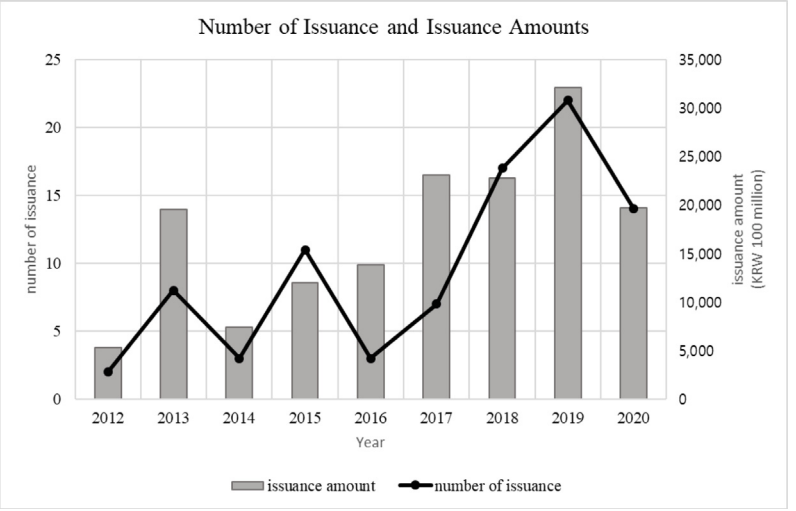
To test H1, we decompose the book value of equity into perpetual securities (*PERPS*) and other equity (*BV_PERPS*) and estimate Eq. (2). The estimation results are reported in Column (2) of Table 4. The coefficient on *PERPS* is positive and significant (coefficient = 1.758; *t*-statistic = 6.39), providing evidence that investors view perpetual securities positively.,[15][16] The coefficient is>1, which indicates that investors value perpetual securities even more than at the book value potentially due to its perceived usefulness in overcoming financial difficulties of the issuing firm.[17]

[15] This result directly contrasts those of Shin (2019). We reconcile our results with his by matching the dataset and research design with his study. We download the annual and quarterly data from the KIS value, an alternative database for Korean firms' financial information. Using annual data, we confirm Shin's findings, i.e., insignificant coefficients on *PERPS* (untabulated). However, when we use quarterly data, we find the results to be consistent with ours, i.e., significantly positive coefficients on *PERPS* (untabulated). Thus, we believe that the increased explanatory power from higher-frequency data enables us to find a significant association between stock prices and perpetual securities.

[16] The adjusted R-squared of the model in Table 4 is 0.766–0.775. The high explanatory power of the model is comparable to Shin's (2019) of 0.81 (reported in Table 12 of his study).

[17] We investigate the possibility that the issuance of perpetual securities indicates the financial distress of the issuing firm and is thus perceived negatively to shareholders. We perform cross-sectional analysis depending on the financial distress of the firm. In untabulated tests, we find that the positive association between stock price and perpetual securities are more pronounced for financially distressed firms, i.e., firms with high leverage, low return on assets, and losses. Thus, we find no evidence that shareholders view perpetual securities as indicative of financial distress.

Panel A. Issuance of Perpetual Securities



Panel B. Issuance of Non-convertible and Convertible Perpetual Securities

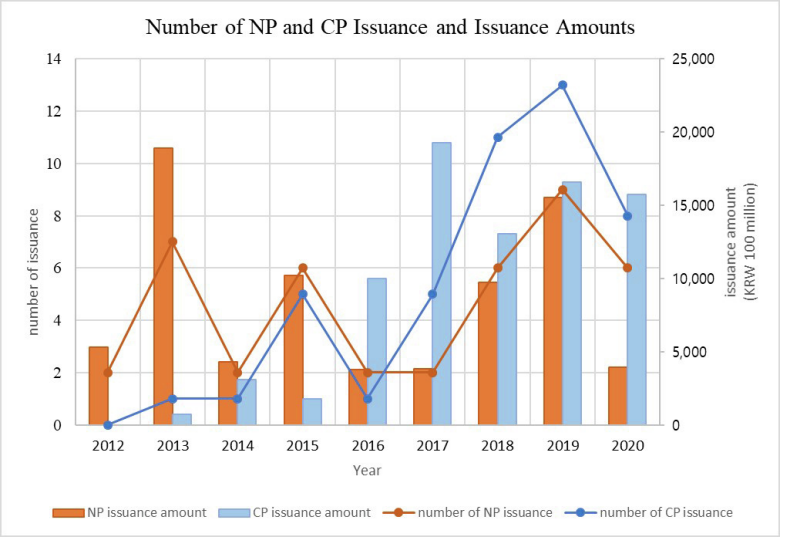


Fig. 1. Trends in Perpetual Security Issuance.
Notes: This figure presents the frequency and amount of perpetual securities issued over the period of 2012–2020. Panel A presents the annual frequency and issuance amounts of all perpetual securities. Panel B presents the annual frequency and issuance amounts of non-convertible (*NP*) and convertible (*CP*) perpetual securities separately.

As reported in Table 1 and Fig. 1, perpetual securities have become more popular in recent years. To examine whether the popularity of the securities affected investors' response to the use of perpetual securities, we also perform year-by-year regressions. In the untabulated tests, we confirm that the significantly positive coefficient on *PERPS* is retained throughout most years, i.e., 2014–2019, except for the insignificant result for 2013 and a significantly negative coefficient for 2020.

Effects of conversion option and conversion price on the association between perpetual securities and stock prices (H2 and H3)

To test whether the investors' perception of perpetual securities differs depending on the presence of a conversion option, as discussed in H2, we decompose perpetual securities into non-convertible (*NP*) and convertible (*CP*) perpetual securities and estimate Eq. (3). Column (1) of Table 5 reports the estimation results. We find that the coefficients on *NP* (coefficient = 1.046; *t*-statistic = 3.09) and *CP* (coefficient = 2.666; *t*-statistic = 7.33) are significantly positive, indicating that both non-convertible and convertible perpetual securities are perceived positively by investors. Comparison of the coeffi-

Table 2
Descriptive Statistics.

Panel A. Perpetual Security Issuers (N = 594)

	Mean	Std. Dev.	Q1	Median	Q3
PRICE	80.667	96.477	8.820	32.125	140.000
BV	114.198	174.869	8.488	27.597	149.571
BV_PERPS	107.607	170.872	6.575	18.368	128.443
PERPS	6.631	8.026	0.949	3.462	9.176
E	0.892	3.711	−0.230	0.112	1.806
LEV	0.650	0.158	0.541	0.655	0.751
NP	4.212	7.435	0.000	0.130	5.665
CP	2.423	5.346	0.000	0.023	2.190
CP_Floating	0.071	0.325	0.000	0.000	0.000
CP_Fixed	2.353	5.367	0.000	0.000	1.913

Panel B. Non-convertible and Convertible Perpetual Security Issuers

	Non-convertible Perpetual Securities (N = 330)		Convertible Perpetual Securities (N = 297)		*t*-test for Mean Difference		Wilcoxon Signed Rank Test	
	Mean	Median	Mean	Median	Diff.	*t*-stat	Diff.	*z*-stat
PRICE	118.20	83.95	32.96	15.50	85.24	12.48	68.45	10.82
BV	179.56	48.84	30.78	12.13	148.78	12.01	36.71	9.94
BV_PERPS	171.47	40.24	25.80	10.14	145.67	12.03	30.11	10.06
PERPS	8.17	5.64	4.98	2.19	3.19	5.13	3.45	6.76
E	1.46	0.36	0.13	0.03	1.33	4.66	0.33	4.87
LEV	0.65	0.62	0.67	0.69	−0.03	−2.25	−0.07	−3.68

Notes: This table presents the descriptive statistics for the sample over the period of 2012–2020. Panel A reports the mean, standard deviation, median, and the first and third quartile values of the variables in the full sample. Panel B compares the descriptive statistics between non-convertible (*NP*) and convertible (*CP*) perpetual securities. The *t*-statistics (*z*-statistics) are reported based on *t*-tests (Wilcoxon signed rank test) of a difference in means (medians). Variable definitions are provided in the Appendix.

Table 3
Pearson Correlations.

	PRICE	*BV*	*BV_ PERPS*	*PERPS*	*E*	*LEV*	*NP*	*CP*	*CP_Floating*	*CP_Fixed*
PRICE	1.000									
BV	0.862	1.000								
	(0.000)									
BV_PERPS	0.858	0.999	1.000							
	(0.000)	(0.000)								
PERPS	0.538	0.529	0.495	1.000						
	(0.000)	(0.000)	(0.000)							
E	0.468	0.388	0.385	0.259	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)						
LEV	−0.467	−0.424	−0.430	−0.100	−0.301	1.000				
	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)					
NP	0.575	0.663	0.644	0.762	0.281	−0.202	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
CP	0.009	−0.127	−0.150	0.441	−0.008	0.129	−0.245	1.000		
	(0.821)	(0.002)	(0.000)	(0.000)	(0.852)	(0.002)	(0.000)			
CP_Floating	−0.165	−0.137	−0.134	−0.138	−0.087	−0.008	−0.124	−0.035	1.000	
	(0.000)	(0.001)	(0.001)	(0.001)	(0.034)	(0.853)	(0.003)	(0.394)		
CP_Fixed	0.019	−0.118	−0.142	0.448	−0.002	0.129	−0.237	0.998	−0.096	1.000
	(0.639)	(0.004)	(0.001)	(0.000)	(0.955)	(0.002)	(0.000)	(0.000)	(0.020)	

Notes: This table reports the Pearson correlations between the main variables used in our analyses. Figures in parentheses represent *p*-values. Variable definitions are provided in the Appendix.

cients on the two variables indicate that the magnitude and significance of the coefficient on *CP* is about twice as large as that on *NP* with the difference being statistically significant at the 1 % level (difference = 1.620; *F*-statistic = 13.42). We interpret this as evidence of investors perceiving convertible perpetual securities more favorably than non-convertible perpetual securities.

We next test whether the investors' perception of convertible securities differs depending on the terms of conversion price, as discussed in H3. To do so, we further decompose convertible perpetual securities into fixed-priced convertibles (*CP_Fixed*) and floating-priced convertibles (*CP_Floating*) and estimate Eq. (4). Our sample includes 242 (55) firm–quarter observations with fixed-priced (floating-priced) convertibles that correspond to 21 (5) firms. Column (2) of Table 5 reports

Table 4
Perpetual Securities and Stock Prices (H1).

Dependent Variable =	*PRICE*	
	(1) Model 1	(2) Model 2
BV	0.444***	
	(36.05)	
BV_PERPS		0.412***
		(30.05)
PERPS		1.758***
		(6.39)
E	3.958***	3.786***
	(6.99)	(6.80)
Constant	18.877	16.975
	(0.57)	(0.52)
Year fixed effects	Included	Included
Observations	594	594
Adjusted R^2	0.766	0.775

Notes: This table reports the results of testing the association between perpetual securities and stock prices using the following equations estimated with ordinary least squares:
Model 1: $PRICE_{i,q} = \alpha + \beta_1 BV_{i,q} + \beta_2 E_{i,q} + \varepsilon_{i,q}$,
Model 2: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 PERPS_{i,q} + \beta_3 E_{i,q} + \varepsilon_{i,q}$.
The results of Models 1 and 2 are reported in Columns (1) and (2), respectively. Figures in parentheses represent *t*-statistics. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. Variable definitions are provided in the Appendix.

Table 5
Effects of Conversion Option and Conversion Price on the Association between Perpetual Securities and Stock Prices (H2 and H3).

Dependent Variable =	*PRICE*	
	(1) Model 1	(2) Model 2
BV_PERPS	0.437***	0.435***
	(28.63)	(28.46)
NP	1.046***	1.006***
	(3.09)	(2.97)
CP	2.666***	
	(7.33)	
CP_Fixed		2.606***
		(7.15)
CP_Floating		−7.943
		(−1.34)
E	3.800***	3.756***
	(6.91)	(6.83)
Constant	17.839	17.880
	(0.56)	(0.56)
Test Statistic		
CP − NP	1.620***	
[*F*-statistic]	[13.42]	
CP_Fixed − CP_Floating		10.549*
[*F*-statistic]		[3.21]
Year fixed effects	Included	Included
Observations	594	594
Adjusted R^2	0.780	0.781

Notes: This table reports the results of testing the association between perpetual securities and stock prices depending on the contract terms using the following equations estimated with ordinary least squares:
Model 1: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 NP_{i,q} + \beta_3 CP_{i,q} + \beta_4 E_{i,q} + \varepsilon_{i,q}$,
Model 2: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 NP_{i,q} + \beta_3 CP\_Fixed_{i,q} + \beta_4 CP\_Floating_{i,q} + \beta_5 E_{i,q} + \varepsilon_{i,q}$.
The results of Models 1 and 2 are reported in Columns (1) and (2), respectively. Figures in parentheses (brackets) represent *t*-statistics (*F*-statistics). *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. Variable definitions are provided in the Appendix.

the results. The coefficient on *NP* remains to be significantly positive (coefficient = 1.006; *t*-statistic = 2.97). More importantly, the coefficient on *CP_Fixed* is positive and significant (coefficient = 2.606; *t*-statistic = 7.15), whereas that on *CP_Floating* is insignificant (coefficient = −7.943; *t*-statistic = −1.34). The difference between the two coefficients is statistically significant at the 10 % level (difference = 10.549; *F*-statistic = 3.21). Thus, the results suggest that investors perceive only fixed-priced convertible perpetual securities positively but not floating-priced ones due to the additional dilution effect of floating-priced convertibles.

Addressing endogeneity

Propensity score matching approach

The choice to issue certain types of financial instruments is endogenously determined. With respect to our three hypotheses, there may exist systematic differences in firm characteristics that (a) issue perpetual securities instead of other types of financial instruments; (b) choose convertible over non-convertible perpetual securities; and (c) choose fixed- over floating-priced convertible perpetual securities. To address these systematic differences in the characteristics of firms that issue different types of perpetual securities, we perform a propensity score matching analysis (Shipman et al. 2017). Although we acknowledge that all three endogenous choices deserve greater investigation, we do not perform additional analyses regarding the third choice (fixed- versus floating-priced convertibles) because only small number of observations have a floating-priced convertible option (n = 55).

To address the systematic difference in perpetual security issuers versus others in testing H1, we conduct a propensity score matching analysis that matches perpetual security issuers (at the issuance quarter) with two different control samples: all firms without perpetual securities and firms with seasoned equity offerings. The first control sample represents the universe of all public firms. The second control sample additionally controls for a firm's need for financing. That is, given a firm's choice to finance, we match firms who choose perpetual securities over common equity. Columns (1) and (2) of Panel A in Table 6 provide the results of estimating the probability of issuing perpetual securities with a logit estimation using all firms and firms with seasoned-equity offerings, respectively, as the control sample. The dependent variable is the probability of issuing perpetual securities. As reported in Column (1), we find that firms that are larger (*SIZE*), are more leveraged (*LEV*), have higher market valuation (Tobin's Q), and are less profitable (*ROA*) are more likely to issue perpetual securities than other public firms. Similarly, as reported in Column (2), among firms with financing needs, those that are larger (*SIZE*), are more leveraged (*LEV*), are less profitable (*ROA*), and have a greater portion of foreign investors (*FOREIGN*) are more likely to choose perpetual securities over equity financing.

Using the estimated results, we match firms that issue perpetual securities with those that do not. Specifically, using the estimated results in Column (1) [(2)], we successfully match 65 perpetual securities at the issuance quarter to the same number of other firms with the closest propensity score on a one-to-one basis without replacement within the caliper distance of 0.1 of the standard deviation of the logit of propensity scores. The difference in the average stock price between issuers and non-issuers is substantially reduced (the t-statistic of the mean difference is reduced from 4.15 to 1.63 [8.15 to 1.80]). For the regression, we augment the matched issuance quarter pairs with subsequent firm–quarter observations. The final matched sample includes 558 treatment and 717 [684] control firm–quarter observations for the matched sample of all public firms [seasoned equity offering firms].

To address the selection issue arising from the endogenous choice to issue non-convertible versus convertible perpetual securities for testing H2, we estimate the probability of choosing non-convertible perpetual securities over convertible ones with a logit estimation among the sample of firms that issue perpetual securities. The dependent variable is the probability of choosing non-convertible perpetual securities, i.e., Pr($NP > 0$). As reported in Column (3) of Panel A in Table 6, we find that firms that are larger (*SIZE*), are less leveraged (*LEV*), have higher market valuation (*Tobin's Q*), are less profitable (*ROA*), have greater portion of foreign investors (*FOREIGN*), and are older (*AGE*) are more likely to choose non-convertible over convertible perpetual securities. Thus, non-convertible perpetual security issuers tend to be more mature and stable, having greater negotiation power vis-à-vis the investors than convertible perpetual security issuers. Using the regression results, we successfully match 95 non-convertible perpetual security issuers to the same number of convertible perpetual security issuers via the propensity score matching approach as before. The difference in average stock price between the two groups of issuers is substantially reduced (the t-statistics of the mean difference is reduced from 12.13 to 1.81). We confirm that we successfully eliminate significant differences in all control variables between the two types of issuers through the propensity score matching approach.

Using the results of the above three matching procedures, we re-examine H1 and H2. Panel B of Table 6 provides the results of testing the hypotheses with the matched sample.[18] Columns (1)–(3) of Panel B use the sample matched using the estimated results of the same columns of Panel A. Columns (1) and (2) present the results of testing H1, and Column (3) presents the results of testing H2. In all columns, results are consistent with our previous results reported in Tables 4 and 5. Specifically, for H1, the coefficients on *PERPS* in Columns (1) and (2) are positive and statistically significant. For H2, the magnitude of the positive coefficient on *CP* is larger than that on *NP*, and the difference in the two coefficients is statistically significant at the 1 % level (difference = 1.555, F-statistic = 5.07), as reported in Column (3). Thus, we gain greater confidence that our results are not driven by the distinctiveness of the sample characteristics of perpetual security issuers.

Firm-fixed effects

To further control for differences in firm characteristics, we re-estimate our results by including firm-fixed effects. We focus on the research model without firm-fixed effects in the main analysis to examine variations across firms. The inclusion of firm-fixed effects in this section allows us to examine within-firm variations in the investors' response to perpetual secu-

[18] We use the same model specification as used in our main analysis to be consistent with Ohlson's (1995) framework. In the untabulated tests, we confirm that the results are robust to including all control variables of the first-stage regression in the second-stage regression, as suggested by Shipman et al. (2017).

Table 6
Propensity Score Matching Approach.

Panel A. First-Stage Regression			
Sample	All Public Firms	Firms that Issue Perpetual Securities or Undergo Seasoned Equity Offerings	Firms that Issue Perpetual Securities
	(1)	(2)	(3)
Dependent Variable =	Pr(*PERPS* > 0)	Pr(*PERPS* > 0)	Pr(*NP* > 0)
$SIZE_{t-1}$	0.422***	0.876***	0.347***
	(4.24)	(7.00)	(2.88)
LEV_{t-1}	4.279***	5.088***	−4.456***
	(5.09)	(5.05)	(−3.81)
$Tobin'sQ_{t-1}$	0.293*	0.241	2.102***
	(1.81)	(1.44)	(3.97)
ROA_{t-1}	−10.626***	−5.939**	−14.521***
	(−3.53)	(−2.03)	(−2.77)
$FOREIGN_{t-1}$	−0.017	0.037***	0.065***
	(−1.55)	(2.60)	(4.93)
$lnAGE_{t-1}$	0.058	−0.207	1.307***
	(0.36)	(−1.13)	(6.56)
Constant	−18.089***	−25.365***	−14.667***
	(−8.83)	(−9.22)	(−5.13)
Year fixed effects	Included	Included	Included
Observations	46,992	3,830	574
Pseudo R^2	0.186	0.407	0.494

Panel B. Second-Stage Regression Results with the Matched Sample			
Dependent Variable =	*PRICE*		
Matching Criterion	Firms with vs without Perpetual Securities in the Full Public Firm Sample	Perpetual Security Issuers vs Seasoned Equity Offering Firms	Non-convertible vs Convertible Perpetual Security Issuers
	(1)	(2)	(3)
	Model 1	Model 1	Model 2
BV_PERPS	0.440***	0.408***	0.402***
	(35.94)	(40.90)	(14.14)
PERPS	1.438***	2.340***	
	(5.76)	(12.49)	
NP			2.401***
			(3.68)
CP			3.956***
			(9.15)
E	5.716***	4.029***	2.376***
	(10.54)	(9.64)	(2.64)
Constant	35.065	8.051	2.017
	(1.44)	(0.48)	(0.07)
Test Statistic			
CP − *NP*			1.555**
[*F*-statistic]			[5.07]
Year fixed effects	Included	Included	Included
Observations	1,275	1,242	190
Adjusted R^2	0.709	0.807	0.751

Notes: This table reports the results of a propensity score matching analysis. Panel A presents the results of estimating the propensity to issue certain types of perpetual securities. Column (1) [(2)] presents the results of estimating the propensity to issue perpetual securities within the sample of public firms [within the sample of perpetual security issuers and seasoned equity offering firms]. Column (3) presents the results of estimating the propensity to choose non-convertible over convertible perpetual securities within the sample of perpetual security issuers. Panel B tests the association between perpetual securities and stock prices using the following equations estimated with ordinary least squares with the propensity-matched sample:
Model 1: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 PERPS_{i,q} + \beta_3 E_{i,q} + \varepsilon_{i,q}$,
Model 2: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 NP_{i,q} + \beta_3 CP_{i,q} + \beta_4 E_{i,q} + \varepsilon_{i,q}$.
The results of Model 1 are reported in Columns (1) and (2), and the result of Model 2 is reported in Column (3). Figures in parentheses (brackets) represent *t*-statistics (*F*-statistics). *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. Variable definitions are provided in the Appendix.

rities. We report the results of testing our hypotheses with firm-fixed effects in Table 7. Specifically, the significantly positive coefficient on *PERPS* in Column (2) suggests that equity investors respond positively to the use of perpetual securities. The significantly larger positive coefficient on *CP* than that on *NP* in Column (3) (difference = 7.073, *F*-statistic = 152.29) suggests that equity investors prefer convertible perpetual securities over non-convertible ones for their potential to save cash outflows, despite its potential dilution effect. Lastly, the larger positive coefficient on *CP_Fixed* than on *CP_Floating* is consistent with the relative disadvantage for existing shareholders over perpetual security holders when the securities include a

Table 7
Firm-Fixed Effects.

Dependent Variable =	*PRICE*			
	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
BV	0.215***			
	(9.23)			
BV_PERPS		0.128***	0.181***	0.181***
		(5.09)	(8.01)	(7.98)
PERPS		2.828***		
		(7.92)		
NP			−0.474	−0.476
			(−1.15)	(−1.15)
CP			6.599***	
			(15.08)	
CP_Fixed				6.605***
				(15.08)
CP_Floating				2.200
				(0.31)
E	1.322***	1.281***	1.031***	1.025***
	(3.36)	(3.41)	(3.10)	(3.08)
Constant	152.319***	131.518***	168.955***	169.284***
	(6.47)	(5.81)	(8.36)	(8.37)
Test Statistic				
CP − NP			7.073***	
[*F*-statistic]			[152.29]	
CP_Fixed − CP_Floating				4.405
[*F*-statistic]				[0.38]
Year fixed effects	Included	Included	Included	Included
Firm fixed effects	Included	Included	Included	Included
Observations	594	594	594	594
Adjusted R^2	0.905	0.914	0.933	0.933

Notes: This table reports the results of testing the hypotheses with firm-fixed effects included in the estimation model.
Model 1: $PRICE_{i,q} = \alpha + \beta_1 BV + \beta_2 E_{i,q} + \varepsilon_{i,q}$.
Model 2: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 PERPS_{i,q} + \beta_3 E_{i,q} + \varepsilon_{i,q}$.
Model 3: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 NP_{i,q} + \beta_3 CP_{i,q} + \beta_4 E_{i,q} + \varepsilon_{i,q}$.
Model 4: $PRICE_{i,q} = \alpha + \beta_1 BV\_PERPS_{i,q} + \beta_2 NP_{i,q} + \beta_3 CP\_Fixed_{i,q} + \beta_4 CP\_Floating_{i,q} + \beta_5 E_{i,q} + \varepsilon_{i,q}$.
The results of Models 1 to 4 are reported in Columns (1) to (4), respectively. Figures in parentheses (brackets) represent *t*-statistics (*F*-statistics). *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. Variable definitions are provided in the Appendix.

floating-priced convertible, although the difference in coefficients is insignificant (difference = 4.405, *F*-statistic = 0.38). The results of the significant coefficients are consistent with those reported in Tables 4 and 5, except for the insignificant coefficients on *NP*.

Conclusion

With recent rapid developments in finance, accounting standards setters are struggling to decide upon accounting standards that will provide sufficient information about the economic substance of financial instruments having characteristics of both debt and equity (Botosan et al. 2005; Fargher et al. 2019). The classification of financial instruments involves profound levels of complicated judgements, such that even accounting experts in regulatory bodies experience difficulties in reaching a consensus. To set the related standards, it is imperative to understand how investors perceive the financial instruments and which contract attributes are considered important. This study examines the association between stock prices and perpetual securities, a capital instrument embedded with various contract terms creating both debt- and equity-like characteristics. This study documents that contract terms, such as the presence of a conversion option and a fixed or floating conversion price, affect investors' perception of perpetual securities and that some types of perpetual securities are viewed more favorably than others. The findings suggest that providing sufficient information about contract attributes is important to facilitate the information environment surrounding perpetual security issuers.

Note that we are not arguing that accounting standards should be catered to match investors' perceptions. Nevertheless, our study is useful considering that one of the most important objectives of financial reporting is to provide useful, value-relevant information to information users. Thus, the stock market valuation of different types of perpetual securities examined in this study should be of interest to accounting standards (Barth et al. 2001). Moreover, this study provides support for

[18] We use the same model specification as used in our main analysis to be consistent with Ohlson's (1995) framework. In the untabulated tests, we confirm that the results are robust to including all control variables of the first-stage regression in the second-stage regression, as suggested by Shipman et al. (2017).

the International Accounting Standards Board (IASB)'s (2019) recent decision to enhance the disclosure of financial instruments. We hope our study opens an avenue for future research on investors' perception of various hybrid financial instruments in IFRS-adopting countries, aiding relevant authorities in setting accounting standards.

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Data availability

The authors do not have permission to share data.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. Variable Definitions

Variable		Definition
PRICE	=	Stock price per share in thousands of KRW at the end of fiscal quarter q;
BV	=	Book value of equity in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
PERPS	=	Book value of perpetual securities in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
BV_PERPS	=	Book value of equity less book value of perpetual securities in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
E	=	Net income in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
NP	=	Book value of non-convertible perpetual securities in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
CP	=	Book value of convertible perpetual securities in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
CP_Fixed	=	Book value of convertible perpetual securities with a fixed conversion price in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
CP_Floating	=	Book value of convertible perpetual securities with a floating (variable) conversion price in thousands of KRW divided by the number of common shares outstanding at the end of fiscal quarter q;
SIZE	=	National logarithm of total assets at the end of fiscal quarter q;
LEV	=	Total liabilities divided by total assets at the end of fiscal quarter q;
Tobin's Q	=	The sum of market value of equity and total liabilities divided by total assets at the end of fiscal quarter q;
ROA	=	Net income divided by total assets at the end of fiscal quarter q;
FOREIGN	=	Percentage of foreign ownership at the end of fiscal quarter q;
lnAGE	=	Natural logarithm of the number of years since initial public offering.

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