Debt vs. equity: analysis using shelf offerings under universal shelf registrations

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Abstract

The goal of this paper is to examine the factors that determine choice of security offerings under universal shelf registrations. We find that the key factors of common stock vs. straight debt dilemma are firm size and stock performance prior security issue. We find that larger firms are likely to issue debt. If stock price appreciates for a certain period, firms prefer equity to debt. The results are consistent with three main theories of security issuance and capital structure: market timing, trade-off, and pecking order. The analysis of hybrid security's choice is limited by small sample size.

Key words: capital structure, shelf registration.

JEL classification: G32.

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1 Introduction

Capital structure is one of the most important issues in corporate finance. Several theories provide the explanations why and when firms issue equity or debt. Dozens of empirical studies find support for some theories and reject others. Several early studies (see Martin and Scott, 1974; Taub, 1975; Marsh, 1982) find that certain firm characteristics such as profitability, size, leverage, and others, are important factors for long-term financing decision. Hovakimian et al. (2001) reports that firms choose the amounts of new debt and equity so that debt ratio is close to the target. Baker and Wurgler (2002) argue that optimal capital structure does not exist, and suggests that firm's capital structure is mostly determined by timing the equity market. Hovakimian et al. (2004) analyzes the corporate financing behavior of firms that issue both equity and debt in the same fiscal year, and find some support for trade-off theory and market timing hypothesis. Lemmon et al. (2008) shows that firm capital structure features strong persistence over time. It provides some support for trade-off theory; however, it is inconsistent with pecking order hypothesis.

The common feature of all prior studies is that they do not consider how firms choose the type of security. The studies assume that firms decided internally three important issues: *a*) when to issue; *b*) what type of security to issue; *c*) and how many securities to sell. If a firm uses a traditional procedure to issue debt or equity, it is likely that management has *a priori* decided that this is the best choice for a firm and has not considered market opportunities that might arise due to market imperfectness or due to unexpected changes in market conditions. Recently shelf registrations have become the key method to offer primary equity in US market (see Autore et al., 2008; Bortolotti et al., 2008). Universal shelves became popular among firms due to flexibility to issue new securities when needed or when market conditions are favorable. In addition, the announcement of shelf registration has industry-

wide implications (Karpavicius and Suchard, 2009). It affects stock price of an announcing firm and rival counterparts around the announcement date, and might indicate the importance of timing. Shelf registration allows firms to let market influence the type of security. When a firm makes a universal shelf registration, it spreads to the market information that it would like to issue equity, debt, or hybrid securities. Then market participants (i.e. investment banks) can send the bids to the firm to buy a certain amount of any registered securities at a certain price. Assuming that firm's management acts in the interest of incumbent shareholders, management chooses the type and amount of securities that maximize the wealth of existing shareholders. Thus, a firm issues equity, debt, or hybrid securities when the investment bank's bid exceeds the true value of a certain security. The type of security and amount of proceeds are likely be determined by market conditions, firm's characteristics, and needs. To our knowledge, all the previous studies pool offerings made under all flotation methods. Aggregation might cause that some important factors related to a certain flotation method are washed out.

This paper re-examines debt-equity dilemma using the sample of shelf offerings made under universal shelf registrations. We find that the key factors of common stock vs. straight debt dilemma are firm size and stock performance prior security issue. Larger firms have better access to capital market, their costs of debt are lower; therefore, larger firms might choose to issue debt securities. It supports trade-off theory to some extent. If stock price appreciates for a certain period, firms prefer equity to debt. It is possible that the increase in stock price is not determined by fundamental factors, but by speculative ones. Then the stock is overvalued; and firm's management that maximizes the wealth of existing shareholders might issue common shares. This finding supports market timing hypothesis, pecking order theory, and previous research, but is inconsistent with trade-off theory. Market timing and pecking order hypothesis predict that a firm will issue equity when the stock price is *high*. Trade-off theory implies that firms

tend to keep their capital structure in the optimal level. Thus, if stock price goes up, the financial leverage decreases, thus firm should issue debt securities (Dittmar and Thakor, 2007). The analysis of hybrid security's choice is limited by small sample size. Our findings show that, regarding security choice problem, hybrid securities are distinct from debt but not very different from common stock. After controlling for other variables, firms with smaller assets than common stock issuers but larger assets than debt issuers are likely to issue hybrid securities.

The rest of the paper is structured as follows. Section 2 describes briefly the shelf registrations and offerings. Section 3 summarizes main theories of security issuance and capital structure. Section 4 describes the data sample. The methodology is presented in Section 5. Obtained results are detailed in Section 6. Finally, Section 7 concludes.

2 Institutional background

In 1983, the U.S. Securities and Exchange Commission (SEC) adopted Rule 415 providing for shelf registration offerings. Through a shelf registration, issuers could sell securities (i.e. make shelf offers) on a continuous or delayed basis within a two-year time period. Since October 1992 firms are allowed to register universal shelves that might contain not only equity but also debt securities. Due to additional flexibility, the universal shelf registrations became more popular than equity shelf registrations (see Eckbo et al., 2007). In 2005, SEC imposed new rules, under which the shelf registration can be used for three years. Moreover, the unsold securities and filing fees can be transfered to the new shelf registration statement. The whole capital raising process via shelf registration can be summarized as follows. A firm registers a prospectus with SEC. The prospectus contains maximum number of securities the firm can offer *from time to time* and maximum aggregate

offering price that is used to calculate the registration fee. After SEC reviews the prospectus and declares that it is effective, the firm can start making "off-the-shelf" offerings. The effective shelf registration is not an obligation to the firm to offer all the securities registered. If the firm wants to conduct the shelf offering, it must provide SEC with the prospectus supplement with the number of securities offered and offer price.

This method provides firms with flexibility to issue new securities when needed or when market conditions are favorable. Therefore, an announcement of shelf registration might convey industry-wide news. After a firm makes a shelf registration, it receives bids from the investment banks to buy the securities at a certain price (see Denis, 1991; Jensen and Hudson, 1995). Therefore, this flotation method is effectively the auction (Bortolotti et al., 2008). Since the management of the firm has a superior information regarding the true value of the firm, it is likely that only bids above this value are accepted.

3 Theories of security issuance

The oldest and main theory of security issuance and capital structure is trade-off theory. It is developed by Modigliani and Miller (1963) and Kraus and Litzenberger (1973). The theory implies that company's capital structure reflects the trade-off between bankruptcy costs and tax saving benefits of debt. Recent studies that support the theory include Hovakimian et al. (2001), Hovakimian et al. (2004), and Harford et al. (2008). They imply that certain firm characteristics are related to leverage ratios. For example, smaller firms, less profitable firms as well as firms with larger market-to-book and debt ratios are likely to issue equity but not debt.

Pecking order theory developed by Myers and Majluf (1984) and Myers (1984) predicts that if stock is fairly priced, a firm will issue equity only

if there are no internal sources, and if a firm is unable to issue risky debt. In addition, pecking order theory emphasizes the importance of asymmetric information and adverse selection. Following the theory, the management knows the true value of the firm, but investors do not. Thus, an equity issue is understood by market participants as firm's stock is overvalued. Empirical studies show that firms announcing common stock shelf offerings experience an abnormal returns of approximately –3 percent over the 2-day or 3-day event windows (Autore et al., 2008; Bethel and Krigman, 2005; Karpavicius and Suchard, 2009).

The third theory that tries to explain capital structure is market timing hypothesis developed by Baker and Wurgler (2002). It motivates the practice of issuing shares when firm's stock is overvalued, and repurchasing shares when firm's stock is undervalued. The theory is well supported in practice. Graham and Harvey (2001) find that two thirds of CFOs agree that "timing" is an important factor that affects the decision to issue common stock. In a recent study, Dittmar and Thakor (2007) provides the similar explanation, "time-varying adverse selection". According to the authors, it is a dynamic version of the pecking order theory developed by Myers and Majluf (1984) and Myers (1984). According to the hypothesis of time-varying adverse selection, a firm issues common stock if two conditions are fulfilled: stock price is overpriced, and adverse selection costs are low. The last condition implies that investors and management have similar expectations about project payoffs.

One might think that a universal shelf registration contradicts with trade-off theory since the latter implies that a firm should issue either equity or debt; therefore, a firm should register allocated shelf registration (common stock shelf or debt shelf). However, it does not. A universal shelf registration is consistent with trade-off theory, as it allows a firm to adjust its capital structure accordingly to its market value of equity. When stock price appreciates, leverage ratio becomes lower, thus a firm should issue debt (and

vice versa). Therefore, a universal shelf registration can be seen as a useful instrument that helps a firm keep its capital structure at the optimum. Pecking order hypothesis and market timing theory both support the use of universal shelf registrations as it this flotation method allows firms to issue all kinds of securities (if they are registered) and allows firms to response to altering market conditions.

In this context, we re-examine debt-equity dilemma using the sample of shelf offerings made under universal shelf registrations. We do not expect that our results will be consistent with the single hypothesis and will reject others. It is likely that our findings will support two or all three theories as it is common in the existing literature (see, for example, Graham and Harvey, 2001).

4 Data

The initial sample consists of shelf registrations and shelf offerings registered with SEC during the period October 1992 through December 2007, and is obtained from SDC Platinum database. The sample includes only firms that have the required data on COMPUSTAT database, and that stocks was traded on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) or the National Association of Securities Dealers Automatic Quotation system (NASDAQ) at the time of offering filing. We match shelf registrations and related shelf offerings by company name and filing date. We manually check each of the observations to determine the type of shelf registration and the type of shelf offering by searching the SEC filings in SEC EDGAR database. From our sample we exclude non-universal shelf registrations as well as shelf offerings that are not made under universal

Table 1: The sample of shelf registrations and related shelf offerings

This table presents the composition of the final sample. The final sample consists of universal shelf registrations and related shelf offerings registered with SEC during the period October 1992 through December 2007. "Debt" is straight debt. "Com" stands for common stock. "Pref" is preferred stock. Abbreviation "CVT" means convertible.

Shelf offering of ...	Shelf registration of ...				Total
	Debt, Com	Debt, Com, Pref	Com, Pref	Debt, Pref	
Common stock	94	527	28		649
Preferred stock		8	0	9	17
CVT preferred stock		20	2	2	24
Straight debt	162	904		135	1201
CVT debt	10	38		0	48
Total	266	1497	30	146	1939

shelves.[1] We eliminate the secondary, but keep combined primary-secondary security offerings. In order to have a consistent sample, we eliminate all offerings (i.e., debt, equity, and hybrid securities) made by the firms: *a*) that issued American depositary receipts (ADRs) or American depositary shares (ADSs); *b*) which are partnerships or limited life companies (LLCs); *c*) that issued beneficial interests; *d*) that are financial firms (with Standard Industrial Classification (SIC) codes 6000-6999) and public utility firms (with SIC codes 4900-4999); as these organizations might have ex ante preference of long-term financing type or belong to the regulated industries. Then we eliminate the offerings of different types of securities (for example, debt and equity) that are made on the same day. The same type offerings made by the same firm on the same day are aggregated to the single observation in our sample. We also exclude the same firm's offerings made less than 90 days after another offering of different type of security. From the remaining sample of observations we exclude single rights offering and single offering of trust preferred securities.

[1] In this paper, we define a universal shelf registration as shelf registration that permits the issuance of at least two types of securities out of common stock, straight (or convertible) debt, and (convertible) preferred stock.

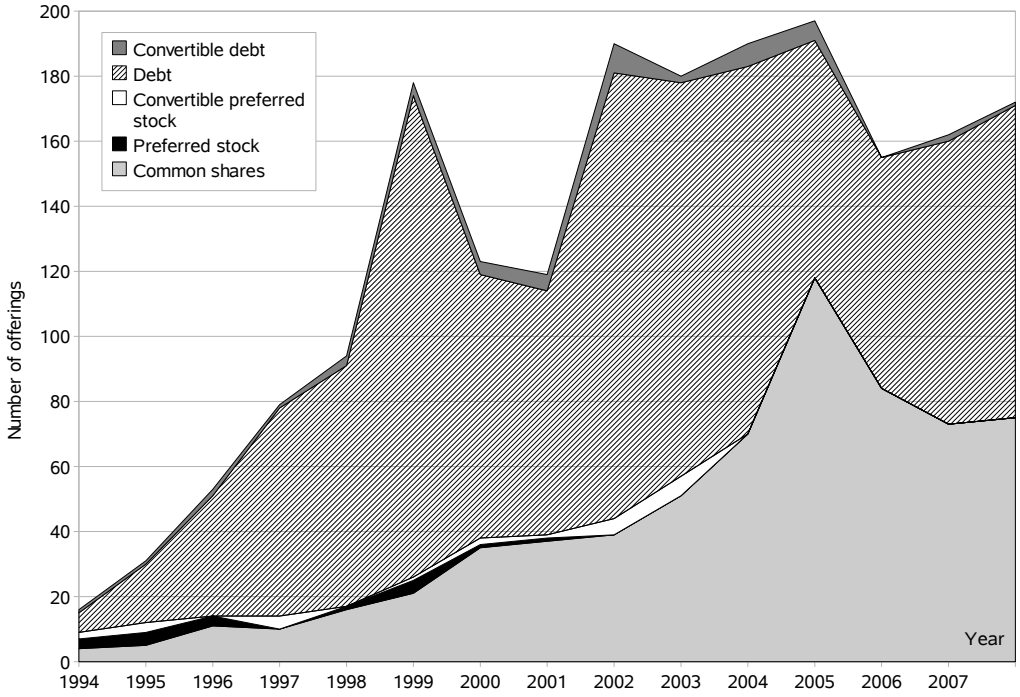

Figure 1: This distribution of shelf offerings over time

The final sample of shelf registrations and related shelf offerings is presented in Table 1. Our sample contains a total of 649 common stock issues, 1,201 straight debt issues, and the smaller number of offerings of other securities. The main shelf registrations in our sample are those that allow firms to issue debt, equity, and preferred stock. We assume that if firm registered debt securities (preferred shares), it can also issue convertible debt securities (convertible preferred shares).

Figure 1 displays the distribution of shelf offerings over time. The number of shelf offerings increases during the period 1993 through 1998. Afterwards, it stabilizes and fluctuates around 170 offerings per calendar year. The maximum number of offerings (190) is made in year 2001. The percentage of common stock offerings increases from approximately 0.19 (1993-1999) till

Table 2: Descriptive statistics of the sample of offerings made under common stock and debt securities shelf registrations

This table presents the descriptive statistics of the sample. Return on equity (ROE) is calculated as operating income before depreciation over market value of equity. Return on assets (ROA) is calculated as operating income before depreciation over book value of assets. "COGS" is cost of goods sold. "CAPEX" is capital expenditure. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "Net PP&E" is net property, plant & equipment. "P/E" is price-to-earnings ratio. F-test is the probability that both sets could have come from the same total population (whether the two data sets are different in their variance). t-test is the probability associated with two samples Student's t-test (two-tailed).

Variable	Common stock offerings			Straight debt offerings			F-test	t-test
	mean	median	st. dev.	mean	median	st. dev.		
Sales	3053.85	704.58	13871.53	10927.06	2530.17	20150.41	0.000	0.000
Book value of assets	9320.03	914.48	66696.24	16025.49	4663.50	70527.28	0.558	0.455
Market value of assets	13506.42	1575.78	90885.86	26097.49	6025.03	96839.9	0.505	0.306
ROE	0.11	0.12	0.17	0.17	0.17	0.08	0.000	0.002
ROA	0.04	0.1	0.22	0.14	0.13	0.06	0.000	0.000
Profit margin	–19.57	0.02	152.13	0.05	0.02	0.09	0.000	0.214
COGS/Sales	21.19	0.7	158.05	0.66	0.69	0.15	0.000	0.211
Cash/Market value of assets	0.08	0.03	0.11	0.02	0.01	0.03	0.000	0.000
Tobin's q	2.16	1.48	1.61	1.64	1.47	0.65	0.000	0.004
Debt/Market value of assets	0.20	0.20	0.15	0.24	0.21	0.14	0.315	0.026
Marginal tax rate	0.23	0.29	0.32	0.36	0.37	0.38	0.088	0.005
Marginal interest rate	0.08	0.06	0.13	0.07	0.07	0.04	0.000	0.437
Dividend yield	0.01	0.00	0.02	0.02	0.01	0.02	0.001	0.213
Interest expense/gross profit	0.39	0.06	2.79	0.13	0.08	0.11	0.000	0.375
Depr. & amort./gross profit	0.36	0.16	1.71	0.21	0.15	0.15	0.000	0.388
Intangibles/Book value of assets	0.11	0.02	0.16	0.13	0.09	0.15	0.240	0.410
Net PP&E/Book value of assets	0.37	0.30	0.27	0.45	0.42	0.26	0.546	0.020
P/E	18.78	16.67	32.35	9.02	17.38	43.08	0.003	0.041
CAPEX/Sales	0.39	0.09	1.39	0.15	0.10	0.31	0.000	0.108
Proceeds/Market value of assets	0.13	0.08	0.20	0.05	0.03	0.06	0.000	0.000
Number of observations	94			162				

Table 3: Descriptive statistics of the sample of offerings made under common stock, preferred stock, and debt securities shelf registrations

This table presents the descriptive statistics of the sample. Return on equity (ROE) is calculated as operating income before depreciation over market value of equity. Return on assets (ROA) is calculated as operating income before depreciation over book value of assets. "COGS" is cost of goods sold. "CAPEX" is capital expenditure. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "Net PP&E" is net property, plant & equipment. "P/E" is price-to-earnings ratio. F-test is the probability that both sets could have come from the same total population (whether the two data sets are different in their variance). t-test is the probability associated with two samples Student's t-test (two-tailed).

Variable	Common stock offerings			Straight debt offerings			F-test	t-test
	mean	median	st. dev.	mean	median	st. dev.		
Sales	2156.83	413.45	5621.5	16922.16	7288.08	25368.25	0.000	0.000
Book value of assets	3487.85	825.51	7205.17	22151.34	10196	37346.61	0.000	0.000
Market value of assets	5123.78	1347.05	10362.34	37254.77	16282.3	59946.24	0.000	0.000
ROE	0.11	0.11	0.30	0.19	0.16	0.13	0.000	0.000
ROA	0.03	0.09	0.20	0.13	0.13	0.06	0.000	0.000
Profit margin	–4.69	0.00	38.71	0.04	0.02	0.07	0.000	0.005
COGS/Sales	2.68	0.67	14.23	0.66	0.70	0.17	0.000	0.001
Cash/Market value of assets	0.08	0.03	0.10	0.03	0.02	0.04	0.000	0.000
Tobin's q	2.15	1.53	1.67	1.62	1.42	0.65	0.000	0.000
Debt/Market value of assets	0.24	0.23	0.17	0.24	0.22	0.13	0.000	0.955
Marginal tax rate	0.14	0.26	1.00	0.24	0.36	2.08	0.000	0.266
Marginal interest rate	0.11	0.06	0.54	0.07	0.07	0.07	0.000	0.061
Dividend yield	0.01	0.00	0.02	0.02	0.01	0.02	0.000	0.000
Interest expense/gross profit	0.60	0.12	7.40	0.14	0.10	0.17	0.000	0.149
Depr. & amort./gross profit	0.42	0.23	2.97	0.23	0.18	0.29	0.000	0.147
Intangibles/Book value of assets	0.11	0.03	0.17	0.13	0.06	0.17	0.427	0.039
Net PP&E/Book value of assets	0.44	0.43	0.30	0.38	0.35	0.25	0.000	0.000
P/E	22.37	11.85	308.83	25.59	17.41	143.26	0.000	0.822
CAPEX/Sales	2.27	0.11	25.48	0.13	0.07	0.21	0.000	0.055
Proceeds/Market value of assets	0.11	0.08	0.12	0.04	0.02	0.05	0.000	0.000
Number of observations	527			904				

0.40 (2000-2007). It shows the growing importance of this flotation method to offer primary equity in the US market, and it is consistent with existing research (see Autore et al., 2008). One can also observe that number of debt offerings is more deviate than number of common stock offerings. This might indicate that firms tend to issue debt securities when market conditions are favorable. In our sample, shelf offerings of preferred and convertible proffered shares vanish respectively in 2000 and 2002; however, offerings of convertible debt securities are issued each year during the period 1993 through 2007 (except year 2005).

Table 2 presents the descriptive statistics of the sample of offerings made under common stock and debt securities shelf registrations, and Table 3 presents the descriptive statistics of the sample of offerings made under common stock, preferred stock, and debt securities shelf registrations. The statistical tests imply that firms that issue equity are smaller and less profitable. The analysis of structure of assets on the balance sheet shows that these firms hold proportionally more cash and short-term investments; the results regarding intangible assets and leverage (debt over market value of assets) are contradictory. Higher Tobin's q indicates that firms that issue equity might have better growth opportunities. F-test infers that majority of variables are statistically significantly different for the two groups beyond at 0.01 level. Thus, it is likely that firms that issue equity and firms that issue debt come from different populations. In both subsamples, the proceeds from issuance of common stock exceed the proceeds from issuance of debt securities. In untabulated analysis, we find that firm size is highly negatively correlated with proceeds-to-assets ratio. Thus, we cannot include this variable into regressions due to multicollinearity. In spite of this issue, we can make three conclusions about our sample: *a*) large firms issue debt; *b*) proceeds-to-assets ratio is smaller for debt issuers; *c*) smaller firms have higher proceeds-to-assets ratio.

Tables 4 and 5 provide summary statistics for stock price performance for

Table 4: The abnormal returns for the sample of offerings made under common stock and debt securities shelf registrations

This table presents the abnormal returns for the sample of offerings made under common stock and debt securities shelf registrations. 0 is the filing date of shelf offering with SEC. βs are calculated using daily returns over the period (–230, 30). F-test is the probability that both sets could have come from the same total population (whether the two data sets are different in their variance). t-test is the probability associated with two samples Student's t-test (two-tailed).

Event window	Equity		Debt		F-test	t-test
	mean	median	mean	median		
Panel A. Market adjusted returns, CRSP equally weighted index						
(–150, –10)	0.215	0.119	–0.035	–0.014	0.000	0.000
(–90,–10)	0.155	0.084	–0.014	0.002	0.000	0.000
(–60, –10)	0.102	0.041	–0.002	0.008	0.000	0.000
(–30, –10)	0.039	0.016	–0.002	–0.003	0.000	0.008
(10, 60)	–0.032	–0.030	–0.040	–0.036	0.000	0.782
(10, 90)	–0.052	–0.021	–0.059	–0.048	0.000	0.848
Panel B. Unadjusted raw returns						
(–150, –10)	0.346	0.242	0.099	0.127	0.000	0.000
(–90, –10)	0.241	0.181	0.057	0.073	0.000	0.000
(–60, –10)	0.156	0.107	0.050	0.041	0.000	0.000
(–30, –10)	0.065	0.046	0.028	0.021	0.000	0.016
(10, 60)	0.010	0.015	–0.014	–0.012	0.000	0.389
(10, 90)	0.018	0.054	–0.020	0.013	0.000	0.302
Panel C. Market model, CRSP equally weighted index						
β	1.500	1.240	0.898	0.835	0.000	0.000
(–20, 20)	–0.059	–0.033	0.000	–0.001	0.000	0.036
(–10, 10)	–0.037	–0.035	0.006	0.009	0.000	0.018
(–5, 5)	–0.041	–0.033	–0.001	0.007	0.000	0.001
(–2, 2)	–0.026	–0.021	0.003	0.001	0.000	0.001
(–1, 1)	–0.021	–0.019	0.000	0.002	0.000	0.004
Panel D. Market model, CRSP value weighted index						
β	1.158	1.050	0.779	0.715	0.000	0.000
(–20, 20)	–0.055	–0.023	0.006	0.006	0.000	0.017
(–10, 10)	–0.035	–0.034	0.009	0.013	0.000	0.012
(–5, 5)	–0.040	–0.028	0.000	0.002	0.000	0.001
(–2, 2)	–0.026	–0.019	0.003	0.001	0.000	0.001
(–1, 1)	–0.021	–0.016	0.000	0.001	0.000	0.004
Number of observations	93		156			

equity and debt issuers.[2] Panels A and B show that firms that issue equity

[2]In Tables 4 and 5, the sample is smaller than in the previous tables since stock price

Table 5: The abnormal returns for the sample of offerings made under common stock, preferred stock, and debt securities shelf registrations

This table presents the abnormal returns for the sample of offerings made under common stock, preferred stock, and debt securities shelf registrations. 0 is the filing date of shelf offering with SEC. βs are calculated using daily returns over the period (–230, 30). F-test is the probability that both sets could have come from the same total population (whether the two data sets are different in their variance). t-test is the probability associated with two samples Student's t-test (two-tailed).

Event window	Equity		Debt		F-test	t-test
	mean	median	mean	median		
Panel A. Market adjusted returns, CRSP equally weighted index						
(–150, –10)	0.180	0.141	–0.007	–0.020	0.000	0.000
(–90, –10)	0.122	0.106	–0.006	–0.006	0.000	0.000
(–60, –10)	0.095	0.064	–0.003	–0.003	0.000	0.000
(–30, –10)	0.048	0.031	0.000	–0.001	0.000	0.000
(10, 60)	–0.011	–0.004	–0.008	–0.003	0.000	0.740
(10, 90)	–0.028	–0.006	–0.016	–0.016	0.000	0.363
Panel B. Unadjusted raw returns						
(–150,–10)	0.320	0.268	0.114	0.106	0.000	0.000
(–90,–10)	0.203	0.166	0.062	0.055	0.000	0.000
(–60,–10)	0.147	0.118	0.042	0.043	0.000	0.000
(–30,–10)	0.070	0.051	0.027	0.021	0.000	0.000
(10, 60)	0.024	0.035	0.032	0.039	0.000	0.447
(10, 90)	0.023	0.057	0.045	0.049	0.000	0.113
Panel C. Market model, CRSP equally weighted index						
β	1.458	1.350	1.080	1.040	0.000	0.000
(–20, 20)	–0.019	–0.018	–0.003	–0.006	0.000	0.137
(–10, 10)	–0.018	–0.013	–0.001	–0.001	0.000	0.020
(–5, 5)	–0.020	–0.018	–0.002	–0.002	0.000	0.001
(–2, 2)	–0.015	–0.015	–0.002	0.000	0.000	0.000
(–1, 1)	–0.016	–0.016	0.000	0.000	0.000	0.000
Panel D. Market model, CRSP value weighted index						
β	1.149	1.075	0.928	0.930	0.000	0.000
(–20, 20)	–0.021	–0.023	0.000	–0.002	0.000	0.041
(–10, 10)	–0.020	–0.013	0.000	0.000	0.000	0.007
(–5, 5)	–0.020	–0.014	–0.001	–0.001	0.000	0.000
(–2, 2)	–0.016	–0.014	–0.002	–0.002	0.000	0.000
(–1, 1)	–0.015	–0.017	0.000	–0.001	0.000	0.000
Number of observations	504		886			

information for some firms is not available in the Center for Research in Security Prices

have significantly higher market adjusted returns (MARs) and unadjusted raw returns (URRs) before security issuances. It is consistent with the model of market timing, time-varying adverse selection (see Dittmar and Thakor, 2007), and pecking order theory, but the results are not related with trade-off theory.[3] Market timing and pecking order hypothesis predict that a firm will issue equity when the stock price is *high*. Trade-off theory implies that firms tend to keep their capital structure in the optimal level. Thus, if stock price goes up, the financial leverage decreases, thus firm should issue debt securities. In addition, Tables 4 and 5 report the performance of firms after they issue securities. Two samples t-test implies that stock price performance of firms that issue equity and firms that issue debt are not significantly different from each other.

Panels C and D (see Tables 4 and 5) show the abnormal returns around the security issue date. Consistent with the hypothesis of asymmetric information and pecking order theory (see Myers and Majluf, 1984), firms that issue equity experiences the stock price decrease. Stocks of debt issuers are unaffected. In addition, Panels C and D (see Tables 4 and 5) report βs that are calculated using daily returns and either CRSP equally weighted index or CRSP value weighted index over the period (–230, 30) when 0 is the filing date of shelf offering with SEC. Firms that issue equity have significantly higher βs. This indicate that these firms are riskier than debt issuers.

To conclude, the results presented in Tables 2 and 3 as well as in Tables 4 and 5 might indicate that firms that issue equity and firms that issue debt come from different populations regarding descriptive statistics and stock price performance. Therefore, it is likely that employment of discrete choice

(CRSP) database.

[3]Dittmar and Thakor (2007) states that it is inconsistent with pecking theory as it suggests that equity is the last financing resort for firms. The authors motivate that it is hardly possible that firm which stock price outperforms the market index would not be able to issue debt securities. However, we relate higher MARs and URRs of issuers with Myers-Majluf asymmetric information model that supports market timing idea.

models in the further analysis will be successful.

5 Methodology

As our main tool in the analysis we choose logit regressions. This method is the key instrument in the literature of security choice (see, for example, Dittmar and Thakor, 2007). Before logit models became popular among researchers, discriminant analysis was employed (see, for instant, Martin and Scott, 1974). Logit regression has several advantages over discriminant analysis, for example, it does not assume homogeneity of variance. A good starting point of choosing independent variables is previously discussed descriptive statistics and the existing literature (see Martin and Scott, 1974; Marsh, 1982; Dittmar and Thakor, 2007; Hovakimian et al., 2004, and many other studies). The main explanatory variables used in this paper fall into six groups.

Firm size. Larger firms are likely to have lower costs of debt because they have better access to capital market (Dittmar and Thakor, 2007). In addition, large firms might be more leveraged as they have lower costs of financial distress (Rajan and Zingales, 1995). In this paper, the measures of firm size are book value of assets, market value of assets, and sales. We define market value of assets as the sum of book value of debt and market value of equity. In our analysis, we expect to find that larger (smaller) firms will be associated with debt (equity) issues.

Asset composition. Marsh (1982) reports that leverage as well as security choice depends on asset composition. In our paper, we include the most common explanatory variables used in the previous empirical studies such as cash-to-assets ratio (defined as cash and short-term investments over market value of assets), property, plant, and equipment (PP&E) over book value of assets, and intangibles-to-assets ratio (intangibles divided by market value of

assets). Cash-to-assets ratio is the measurement of financial slack. Pecking order theory implies that firms with higher financial constrains (lower slack) are likely to issue equity. However, we cannot neglect the possibility that a firm might issue debt in order to cover cash shortage as descriptive statistics imply that debt issues are significantly smaller than equity offerings (scaled by market value of assets). PP&E-to-assets ratio and intangibles-to-assets ratio are control variables that might reflect asset composition specific to certain industries.

Financial leverage. Following trade-off theory, firms tend to have capital structure that reflect the trade-off between costs and benefits of debt. It is expected that firms with lower leverage would tend to issue debt rather than equity. We use book value of debt over market value of assets as a proxy for financial leverage.

Profitability. Pecking order hypothesis and signaling theory imply that profitable firms are likely to issue debt. Ross (1977) presents a model in which debt could be used as a costly signal to separate good firms from bad ones. We measure profitability by two measures: profit margin and price-to-earnings (P/E) ratio. Profit margin is defined as net income over sales. P/E is share price to earning per share ratio. It might be anticipated that firms with lower profitability sell debt.

Growth opportunity. Following other studies, we control for growth opportunities by introducing appropriate variables. The measures are CAPEX-to-sales ratio and Tobin's q. Following Masulis et al. (2007), we define Tobin's q as the ratio of a firm's market value of assets over its book value of assets, where market value of assets is the sum of book value of assets and difference between market value of common equity and book value of common equity.

Stock performance prior security issue. According to market timing hypothesis and pecking order theory, firms issue equity when it is overvalued. We employ two measures of stock performance: URR and MAR. Other things

being equal, we expect that a firm will issue equity when the stock price is *high*.

6 Empirical results

6.1 Straight debt vs. common stock

First of all, we examine firms' decision to issue straight debt vs. common stock. The results of logit regressions when independent variables are firms' financial data are shown in Table 6. The dependent variable equals one if the firm issues equity and zero if it issues debt. The estimated logit models correctly classify approximately 80 percent of observations. The estimated parameters' values confirm the univariate results presented in Tables 2 and 3. Larger firms (with higher market value of assets, book value of assets, or sales) are likely to issue straight debt. We find that the size proxy has high explanatory power. For example, the model with single independent variable natural algorithm of book value of assets correctly classifies 75 percent of observations in the sample of offerings made under common stock and debt securities shelf registrations and 80 percent of observations in the sample of offerings made under common stock, preferred stock, and debt securities shelf registrations. The higher Tobin's q and price-to-earnings (P/E) ratio are associated with common stock issues. Profitability measure, profit margin, shows that more profitable firms are likely to issue debt securities. The analysis implies that firms with larger cash holdings and intangibles are likely to issue equity. The results regarding financial leverage and property, plant, and equipment over book value of assets are mixed.[4] The negative sign of

[4]For the sample of shelf offerings made under shelf registrations of common stock, preferred stock, and debt we run logit regressions but instead of firm leverage we use difference between firm leverage and industry median leverage. The parameter estimates qualitatively are the same as in Table 6. For brevity, we do not report them. Since these

Table 6: The results of logit regressions when independent variables are firms' financial data

This table presents the results of logit regressions when independent variables are firms' financial data. The dependent variable equals one if the firm issues equity and zero if it issues debt. "MV" is market value, and "BV" means book value. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "P/E" is price-to-earnings ratio. "CAPEX" is capital expenditure. "PP&E" is net property, plant & equipment. "Intang." stands for intangibles. "D1993" - "D2006" are year dummy variables. "Par." is parameter estimate, and "p-val." is p-value.

Variable	Shelf registrations of common stock and debt				Shelf registrations of common and preferred stocks and debt			
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
ln(MV of assets)	–0.920	0.000			–0.969	0.000		
ln(BV of assets)			-0.908	0.000			–1.002	0.000
Tobin's q	0.768	0.011			0.957	0.000		
P/E	0.025	0.041	0.017	0.084			0.000	0.517
Profit margin					–3.215	0.000		
CAPEX/Sales					0.399	0.175	0.368	0.157
Debt/MV of assets	–0.097	0.960	–1.381	0.361	2.260	0.001	1.325	0.017
Cash/MV of assets	5.709	0.191	6.088	0.169	7.409	0.000	8.351	0.000
PP&E/BV of assets	–0.138	0.859	–0.128	0.867	1.950	0.000	1.485	0.000
Intang./MV of assets					2.597	0.001	2.108	0.003
Marginal tax rate	–0.864	0.078	–0.803	0.098	–0.022	0.622	–0.031	0.465
D1993					–1.682	0.256	–1.713	0.249
D1994	–0.306	0.782	–0.364	0.741	–2.376	0.090	–2.422	0.086
D1995	2.463	0.375	1.987	0.413	–3.103	0.025	–2.911	0.035
D1996	–1.124	0.324	–1.204	0.290	–3.095	0.023	–3.017	0.028
D1997	–2.861	0.031	–3.027	0.022	–3.317	0.014	–3.072	0.023
D1998	0.303	0.787	0.482	0.668	–2.901	0.032	–2.701	0.046
D1999	0.053	0.960	0.042	0.968	–2.783	0.039	–2.339	0.083
D2000	–1.093	0.339	–0.757	0.485	–2.689	0.045	–2.484	0.064
D2001	–0.527	0.625	–0.421	0.692	–1.716	0.198	–1.643	0.220
D2002	0.742	0.459	0.667	0.504	–2.008	0.132	–1.911	0.153
D2003	1.975	0.052	1.904	0.062	–0.938	0.481	–0.973	0.466
D2004	0.073	0.945	–0.037	0.972	–1.522	0.255	–1.502	0.263
D2005	1.241	0.219	1.113	0.266	–2.157	0.109	–2.244	0.096
D2006	1.117	0.263	0.953	0.336	–1.461	0.277	–1.536	0.254
Intercept	5.195	0.004	6.477	0.000	6.288	0.000	7.993	0.000
Number of observ.	256		256		1431		1431	
Pseudo R^2	0.398		0.386		0.447		0.420	
Correctly classified	0.805		0.793		0.840		0.835	

two variables are highly correlated, we cannot use them both in the same model.

Table 7: The results of logit regressions when independent variables are firms' financial data for different quartiles of market value of assets

This table presents the results of logit regressions when independent variables is independent variables are firms' financial data for different quartiles of market value of assets. "MV" is market value, and "BV" means book value. "PP&E" is net property, plant & equipment. "Par." is parameter estimate, and "p-val." is p-value.

Variable	1^{st} quartile		2^{nd} quartile		3^{rd} quartile		4^{th} quartile	
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Panel A. Shelf registrations of common stock and debt								
ln(MV of assets)	0.083	0.913	1.595	0.272	–0.305	0.774	0.456	0.462
Tobin's q	0.044	0.954	0.317	0.599	1.449	0.222	0.635	0.303
Profit margin	–0.070	0.963	–0.563	0.784	–2.449	0.677	3.146	0.570
Debt/MV of assets	–11.009	0.008	2.715	0.391	6.990	0.165	8.791	0.196
Cash/MV of assets	14.020	0.138	3.920	0.650	16.745	0.067	–177.324	0.076
PP&E/BV of assets	1.339	0.442	–1.272	0.330	1.761	0.292	–3.879	0.293
Marginal tax rate	0.047	0.961	–1.348	0.215	0.654	0.582	3.115	0.408
Intercept	1.937	0.695	–12.561	0.242	–4.357	0.642	–8.206	0.247
Number of observ.	65		63		64		64	
Pseudo R^2	0.429		0.115		0.173		0.250	
Correctly classified	0.800		0.667		0.813		0.875	
Panel B. Shelf registrations of common stock, preferred stock, and debt								
ln(MV of assets)	–1.383	0.000	–1.079	0.000	–0.786	0.077	–0.987	0.021
Tobin's q	0.860	0.069	0.976	0.000	0.946	0.000	0.910	0.000
Profit margin	–1.179	0.372	–1.103	0.329	–3.531	0.043	–6.432	0.122
Debt/MV of assets	–2.601	0.048	3.772	0.000	4.479	0.003	6.549	0.001
Cash/MV of assets	13.802	0.005	3.232	0.211	13.620	0.001	12.468	0.036
PP&E/BV of assets	1.410	0.009	0.859	0.047	3.571	0.000	2.108	0.074
Marginal tax rate	–0.645	0.066	–0.060	0.511	0.070	0.446	–0.026	0.722
Intercept	9.156	0.000	5.308	0.028	1.171	0.788	3.956	0.402
Number of observ.	362		356		353		360	
Pseudo R^2	0.326		0.153		0.169		0.209	
Correctly classified	0.859		0.683		0.841		0.928	

estimated parameter for marginal tax rate (calculated as income taxes over operating income after depreciation and amortization, and interest expense) indicates that firms with higher effective income tax rate are likely to issue debt. It supports trade-off theory to some extent.

It is likely that large firms tend to issue debt, and small firms tend to issue equity. In order to isolate the size effect, we divide the samples into quartiles

by natural logarithm of market value of assets. Then we run logit regressions again. Table 7 displays the results. The third and fourth quartiles of sample of shelf registrations of common stock and debt contain respectively 4 and 1 equity issues. Therefore, the regression's results for this subsample might be inconclusive. Due to larger sample, the results for subsample of shelf registrations of common stock, preferred stock, and debt should be more reliable. We find that smaller, less profitable firms are likely to issue common shares. The impact of financial leverage on security choice is not homogeneous. We find that small (the first quartile) firms with higher leverage are likely to issue straight debt. However, larger firms (the second, third, and fourth quartiles) are likely to issue common shares if their leverage is higher. For this sample we also run logit regressions but instead of firm leverage we use difference between firm leverage and industry median leverage. The parameter estimates qualitatively are the same as in Table 7. For brevity, we do not report them. Thus we can conclude that firms with higher leverage are likely to issue equity.

We do not include any price variable in the previous models as some firms do not have appropriate data in the CRSP database. Table 8 presents the results of logit regressions when independent variable is MARs of issuers over different time period prior to the security issue.[5] In the models, we control for firm size. The dependent variable equals one if the firm issues equity and zero if it issues debt. The results implies that if stock price appreciates for a certain period, firms prefer equity to debt. We find that coefficients for size proxy and MARs over different time periods are highly significant. It holds for both samples, and indicates their importance for debt vs. equity dilemma.

Table 9 displays the results of logit regressions after we divide the sam-

[5]The results of logit regressions when independent variable is URRs of issuers over different time periods prior to the security issue are provided in Appendix A (see Table 13). The parameter estimates qualitatively are the same as in Table 8.

Table 8: The results of logit regressions when independent variable is firms' stock performance

This table presents the results of logit regressions when independent variable is firms' stock performance. The dependent variable equals one if the firm issues equity and zero if it issues debt. The price variable is indicated at the top of each column. "MAR30" is market adjusted return (MAR) for the period [–30, –10], "MAR60" is MAR for the period of [–60, –10], "MAR90" is MAR for the period of [–90, –10], and "MAR150" is MAR for the period of [–150, –10], when 0 is the issuance date. "MV" is market value. "Par." is parameter estimate, and "p-val." is p-value.

Variable	MAR30		MAR60		MAR90		MAR150	
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Panel A. Shelf registrations of common stock and debt								
Price variable	3.032	0.047	2.605	0.007	2.850	0.000	2.286	0.000
ln(MV of assets)	–0.725	0.000	–0.690	0.000	–0.674	0.000	–0.664	0.000
Intercept	5.324	0.000	4.988	0.000	4.824	0.000	4.747	0.000
Number of observ.	249		249		249		249	
Pseudo R^2	0.183		0.195		0.217		0.227	
Correctly classified	0.711		0.747		0.767		0.763	
Panel B. Shelf registrations of common stock, preferred stock, and debt								
Price variable	3.219	0.000	2.343	0.000	2.187	0.000	1.605	0.000
ln(MV of assets)	–0.993	0.000	–0.963	0.000	–0.965	0.000	–0.966	0.000
Intercept	7.815	0.000	7.544	0.000	7.552	0.000	7.549	0.000
Number of observ.	1390		1390		1390		1390	
Pseudo R^2	0.329		0.332		0.338		0.340	
Correctly classified	0.806		0.807		0.804		0.808	

ples into quartiles by natural logarithm of market value of assets. The first quartile of sample of shelf registrations of common stock and debt contains 1 debt issues. The third and fourth quartiles of sample of shelf registrations of common stock and debt contain respectively 1 and 0 equity issues. The parameter estimates for sample of shelf registrations of common stock and debt are mostly insignificant. On opposite, the parameter estimates for sample of shelf registrations of common stock, preferred stock, and debt are mostly significant. In this sample, the third and fourth quartiles do not contain any equity issue. The results imply that larger firms are likely to issue straight debt. In addition, firms that experience stock price increase prior to the securities issuance are likely to issue common shares. In untabulated tests,

Table 9: The results of logit regressions when independent variable is firms' stock performance for different quartiles of market value of assets

This table presents the results of logit regressions when independent variable is firms' stock performance for different quartiles of market value of assets. 'MAR90" is market adjusted return for the period of [–90, –10], when 0 is the issuance date. "MV" is market value. "Par." is parameter estimate, and "p-val." is p-value.

Variable	1^{st} quartile		2^{nd} quartile		3^{rd} quartile		4^{th} quartile	
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Panel A. Shelf registrations of common stock and debt								
MAR90	1.773	0.191	5.670	0.005	2.587	0.109	0.632	0.809
ln(MV of assets)	–0.677	0.195	1.553	0.201	0.280	0.760	0.239	0.542
Intercept	5.205	0.134	–12.355	0.185	–3.811	0.639	–4.610	0.275
Number of observ.	63		62		62		62	
Pseudo R^2	0.062		0.185		0.044		0.008	
Correctly classified	0.714		0.726		0.807		0.887	
Panel B. Shelf registrations of common stock, preferred stock, and debt								
MAR90	2.026	0.003	2.898	0.000	1.892	0.029	0.785	0.442
ln(MV of assets)	–1.641	0.000	–1.044	0.000	–1.012	0.012	–1.286	0.002
Intercept	12.276	0.000	7.971	0.000	8.012	0.035	11.415	0.009
Number of observ.	349		347		347		347	
Pseudo R^2	0.158		0.100		0.035		0.073	
Correctly classified	0.820		0.666		0.824		0.919	

we also run logit regressions without controlling for firm size. The parameter estimates for price variables and the proportions of correctly classified observations are qualitatively the same as presented in Tables 8 and 9.

In order to test the hypothesis that firm's choice depends on market conditions, we run logit regressions when independent variable is US corporate bond Moody's Baa annual yield, its monthly and quarterly changes. In this analysis, we use the sample of shelf offerings made under common stock, preferred stock, and debt securities shelf registrations. Table 10 presents the results (for brevity we do not report the parameter estimates for year dummy variables). We find that timing is important factor. It is likely that timing might explain to some extent why the number of debt offerings deviate over time (see Figure 1). The results imply that firms are likely to

Table 10: The results of logit regressions when independent variables are firms' financial data and market interest rate

This table presents the results of logit regressions when independent variables are firms' financial data and market interest rate. The dependent variable equals one if the firm issues equity and zero if it issues debt. Models include year dummy variables. The parameter estimates for year dummy variables for brevity are not reported. "Int. rate" is US corporate bond Moody's Baa annual interest rate (in percent). "Int. rate – L(1m.)" is monthly change in US corporate bond Moody's Baa annual interest rate (in percentage points). "Int. rate – L(3m.)" is 3-monthly change in US corporate bond Moody's Baa annual interest rate (in percentage points). "MV" is market value, and "BV" means book value. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "P/E" is price-to-earnings ratio. "CAPEX" is capital expenditure. "PP&E" is net property, plant & equipment. "Intang." stands for intangibles. "Par." is parameter estimate, and "p-val." is p-value.

Shelf registrations of common stock, preferred stock and debt						
Variable	Par.	p-val.	Par.	p-val.	Par.	p-val.
ln(MV of assets)	–0.973	0.000	–0.967	0.000	–0.963	0.000
Int. rate	0.736	0.018				
Int. rate – L(1m.)			0.732	0.044		
Int. rate – L(3m.)					0.585	0.018
Tobin's q	0.958	0.000	0.954	0.000	0.950	0.000
Profit margin	–3.338	0.000	–3.219	0.000	–3.243	0.000
CAPEX/Sales	0.415	0.159	0.397	0.178	0.390	0.184
Debt/MV of assets	2.183	0.002	2.199	0.002	2.185	0.002
Cash/MV of assets	7.506	0.000	7.350	0.000	7.420	0.000
PP&E/BV of assets	1.927	0.000	1.945	0.000	1.959	0.000
Intang./MV of assets	2.709	0.000	2.663	0.000	2.607	0.001
Marginal tax rate	–0.018	0.672	–0.011	0.799	–0.016	0.723
Intercept	0.727	0.793	6.319	0.000	6.366	0.000
Number of observ.	1431		1431		1431	
Pseudo R^2	0.450		0.449		0.450	
Correctly classified	0.840		0.835		0.837	

issue equity when interest rate increases and to sell debt when interest rate falls. Results are robust for all three measures of market interest rates. For robustness, we also run logit regressions without dummy variables. The parameter estimates qualitatively are the same as in Table 10. Importance of interest rate provides further support for trade-off theory and market timing hypothesis. According to trade-off theory, when interest rate increases, costs

of debt become larger, thus firms tend to issue common stock. Market timing hypothesis implies that when when interest rate increases, a firm can issue equity in order to repurchase its bonds.

The models discussed above do not include appropriate measures of asymmetric information. We construct asymmetric information measures using analyst forecast for earnings per share (EPS) data downloaded from I/B/E/S. We use EPS forecasts that occurs just prior to the actual EPS disclosure (Dittmar and Thakor, 2007). "# of estimates" is number of estimates. "High–low" is the difference between the highest and lowest EPS forecasts divided by share price at the end of fiscal year. "Act. val. – mean est." is the difference between a firm's EPS and the mean analyst forecast of EPS divided by the actual EPS. "St. dev. / share price" is standard deviation of analysts' forecasts divided by share price at the end of fiscal year. Higher information asymmetry implies smaller number of estimates and larger remaining measures. Table 11 present the results for the sample of shelf offerings made under common stock, preferred stock, and debt securities shelf registrations (for brevity we do not report the parameter estimates for year dummy variables). Our results are not very robust as two measures out of four are statistically insignificant, but the signs of all four measures implies that if a firm has a higher information asymmetry, it is likely that a firm will issue equity.[6] This supports pecking order theory to some extent.

To conclude, the logit regressions are quite suitable instruments to model firm's choice to issue equity or debt. The logit models correctly classify approximately 70-80 percent of observations. The key factors that determine the choice include firm size and stock performance prior security issue. Larger firms have better access to capital market, their costs of debt are lower; therefore, larger firms might choose to issue debt securities. If stock price appreciates for a certain period, firms prefer equity to debt. It is possi-

[6]For robustness, we also run logit regressions without dummy variables. The parameter estimates qualitatively are the same as in Table 11.

Table 11: The results of logit regressions when independent variables are firms' financial data and asymmetric information measures

This table presents the results of logit regressions when independent variables are firms' financial data and asymmetric information measures. The dependent variable equals one if the firm issues equity and zero if it issues debt. Models include year dummy variables. The parameter estimates for year dummy variables for brevity are not reported. Asymmetric information measures are constructed using analyst forecast for earnings per share (EPS). "# of estimates" is number of estimates. "High–low" is the difference between the highest and lowest EPS forecasts divided by share price. "Act. val. – mean est." is the difference between a firm's EPS and the mean analyst forecast of EPS divided by the actual EPS. "St. dev. / share price" is standard deviation of analysts' forecasts divided by share price. The asymmetric information variable is indicated at the top of each column. "MV" is market value, and "BV" means book value. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "P/E" is price-to-earnings ratio. "CAPEX" is capital expenditure. "PP&E" is net property, plant & equipment. "Intang." stands for intangibles. "Par." is parameter estimate, and "p-val." is p-value.

Shelf registrations of common stock, preferred stock and debt								
Variable	# of estimates		High–low		Act. val. – mean est.		St. dev. / share price	
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
ln(MV of assets)	–0.813	0.000	–0.957	0.000	–0.939	0.000	–0.947	0.000
Assym. Information	–0.058	0.001	18.368	0.097	0.103	0.377	43.229	0.168
Tobin's q	0.975	0.000	0.943	0.000	0.943	0.000	0.909	0.000
Profit margin	–2.744	0.002	–2.916	0.001	–2.962	0.001	–2.948	0.001
CAPEX/Sales	0.686	0.046	0.501	0.125	0.485	0.137	0.445	0.177
Debt/MV of assets	1.870	0.012	2.138	0.004	2.406	0.001	2.122	0.006
Cash/MV of assets	8.358	0.000	6.287	0.003	7.484	0.000	6.424	0.002
PP&E/BV of assets	1.903	0.000	1.622	0.000	1.794	0.000	1.821	0.000
Intang./MV of assets	2.696	0.001	2.481	0.002	2.497	0.002	2.318	0.006
Intercept	5.798	0.000	6.311	0.000	6.104	0.000	6.223	0.000
Number of observ.	1331		1330		1322		1294	
Pseudo R^2	0.454		0.449		0.448		0.444	
Correctly classified	0.839		0.842		0.843		0.840	

ble that the increase in stock price is not determined by fundamental factors, but by speculative. Thus, the stock is overvalued. Then firm's management that maximizes the wealth of existing shareholders and knows the true value of the firm might exploit asymmetric information between management and investors and issue common shares. The mechanism of the asymmetric information model is documented in Myers and Majluf (1984).

6.2 Straight debt vs. common stock vs. hybrid securities

The number of offerings of preferred stock, convertible preferred stock, and convertible debt is relatively small, thus we aggregate these offerings into single group of hybrid securities. Table 12 presents the results of pooled multinomial logit regressions. We use the offerings made under all kinds of universal shelves (see Table 1). The dependent variable is security type: common stock, debt, or hybrid securities. Base outcome is the issue of common stock.[7] The first two models include year dummy variables. For brevity, we do not report parameter estimates for year dummy variables in Tables 12 and 14.

The results are consistent with the existing literature and previously discussed findings. The logit regressions show that observations of debt offerings are very different from observations of equity offerings. Almost all the parameter estimates (including unreported parameter estimates for dummy year variables) are highly significant. Pooling the observations and inclusion of MARs into models determine the only significant difference from the results presented in Table 6, i.e. the multinomial logit model implies that firms with larger financial leverage are likely to issue equity. It supports trade-off theory. Our findings show that, regarding security choice problem, hybrid securities are distinct from debt but not very different from common stock. After controlling for other variables, firms with smaller assets than common stock issuers but larger assets than debt issuers are likely to issue hybrid securities. In addition, these firms features high Tobin's q ratio and might have better growth opportunities.

The multinomial logit models correctly classify approximately 80 percent of all observations; however, due to small number of offerings of hybrid secu-

[7] Table 14 (see Appendix A) presents the results of multinomial logit regressions when the base outcome is the issue of hybrid securities.

Table 12: The results of multinomial logit regressions

This table presents the results of multinomial logit regressions. The dependent variable is security type: common stock, debt, or hybrid securities. Base outcome is the issue of common stock. For models with year dummy variables, the parameter estimates for year dummy variables for brevity are not reported. 'MAR90" is market adjusted return for the period of [–90, –10], when 0 is the issuance date. "MV" is market value, and "BV" means book value. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "CAPEX" is capital expenditure. "PP&E" is net property, plant & equipment. "Intang." stands for intangibles. "Par." is parameter estimate, and "p-val." is p-value.

Variable	Models with year dummies				Models without year dummies			
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Debt vs. equity								
MAR90			–1.958	0.000			–2.105	0.000
ln(MV of assets)	0.929	0.000	0.887	0.000	0.878	0.000	0.836	0.000
Tobin's q	–0.883	0.000	–0.838	0.000	–0.770	0.000	–0.712	0.000
Profit margin	3.535	0.000	3.162	0.000	2.318	0.000	2.043	0.001
CAPEX/Sales	–0.739	0.005	–0.766	0.006	–0.600	0.017	–0.649	0.015
Debt/MV of assets	–1.033	0.089	–1.341	0.040	–1.020	0.067	–1.342	0.025
Cash/MV of assets	–7.706	0.000	–7.751	0.000	–10.439	0.000	–10.808	0.000
PP&E/BV of assets	–1.296	0.000	–1.510	0.000	–1.436	0.000	–1.648	0.000
Intang./MV of assets	–2.620	0.000	–2.661	0.000	–3.252	0.000	–3.288	0.000
Marginal tax rate	–0.034	0.375	–0.050	0.199	–0.005	0.892	–0.022	0.563
Intercept	–4.217	0.000	–5.113	0.000	–3.850	0.000	–3.338	0.000
Hybrid securities vs. equity								
MAR90			–0.526	0.347			–0.809	0.147
ln(MV of assets)	0.613	0.000	0.586	0.000	0.556	0.000	0.544	0.000
Tobin's q	–0.308	0.044	–0.323	0.040	–0.287	0.042	–0.269	0.066
Profit margin	–0.005	0.196	–0.005	0.117	–0.002	0.354	–0.002	0.268
CAPEX/Sales	–0.008	0.789	–0.006	0.784	–0.004	0.655	–0.003	0.738
Debt/MV of assets	–0.214	0.836	–0.305	0.780	–0.054	0.953	0.144	0.883
Cash/MV of assets	2.628	0.123	3.321	0.062	–0.089	0.960	0.187	0.923
PP&E/BV of assets	–0.158	0.787	–0.073	0.903	–0.109	0.845	–0.225	0.694
Intang./MV of assets	–0.851	0.509	–0.635	0.638	–2.227	0.091	–1.879	0.170
Marginal tax rate	–0.099	0.048	–0.045	0.497	–0.068	0.142	–0.011	0.869
Intercept	–3.762	0.002	–4.994	0.000	–5.642	0.000	–5.631	0.000
Number of observ.	1939		1828		1939		1828	
Pseudo R^2	0.369		0.384		0.309		0.328	
Correctly classified	0.802		0.809		0.782		0.791	

rities in the sample or other reasons, the models used in the analysis correctly classify only a small portion of hybrid securities issues. Notwithstanding this

shortcoming, we believe that our analysis is consistent. In untabulated results, we include proceeds-to-assets ratio in the regressions instead of natural logarithm of market value of assets. We find that it is always significant, but has an opposite sign than natural logarithm of market value of assets; therefore, consistent with univariate results, equity issuers receive relatively larger proceeds (scaled by market value of assets). It is possible that firms that do not need to raise significant funds issue debt, and firms that want to raise more money issue equity. This hypothesis is consistent with signaling theory that underperforming firms issue equity, and debt issuers signal the market that the firm is of superior type.

7 Conclusion

Recently shelf registrations have become the key method to offer primary equity in US market (see Autore et al., 2008; Bortolotti et al., 2008). Universal shelves became popular among firms due to flexibility to issue new securities when needed or when market conditions are favorable. This paper re-examines debt-equity dilemma using the sample of shelf offerings made under universal shelf registrations. We find that the key factors of common stock vs. straight debt dilemma are firm size and stock performance prior security issue. Larger firms have better access to capital market, their costs of debt are lower; therefore, larger firms might choose to issue debt securities. It supports trade-off theory. If stock price appreciates for a certain period, firms prefer equity to debt. It is possible that the increase in stock price is not determined by fundamental factors, but by speculative. Thus, the stock is overvalued. Then firm's management that maximizes the wealth of existing shareholders might issue common shares. This finding supports market timing hypothesis, pecking order theory, and previous research, but is inconsistent with trade-off theory. The analysis of hybrid security's choice is

limited by small sample size. The results show that, regarding security choice problem, hybrid securities are distinct from debt but not very different from common stock. After controlling for other variables, firms with smaller assets than common stock issuers but larger assets than debt issuers are likely to issue hybrid securities.

Univariate results imply equity issuers receive relatively larger proceeds (scaled by market value of assets). It is possible that firms that do not need to raise significant funds issue debt, and firms that want to raise more money issue equity. This hypothesis is consistent with signaling theory that underperforming firms issue equity, and debt issuers signal the market that the firm is of superior type. Analysis of this issue is left for future work.

A Additional tables

Table 13: The results of logit regressions when independent variable is firms' stock performance

This table presents the results of logit regressions when independent variable is firms' stock performance. The dependent variable equals one if the firm issues equity and zero if it issues debt. The price variable is indicated at the top of each column. "URR30" is unadjusted raw return (URR) for the period [–30, –10], "URR60" is URR for the period of [–60, –10], "URR90" is URR for the period of [–90, –10], and "URR150" is URR for the period of [–150, –10], when 0 is the issuance date. "MV" is market value. "Par." is parameter estimate, and "p-val." is p-value.

Variable	URR30		URR60		URR90		URR150	
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Panel A. Shelf registrations of common stock and debt								
Price variable	1.995	0.185	1.866	0.038	2.690	0.001	1.968	0.001
ln(MV of assets)	–0.723	0.000	–0.682	0.000	–0.646	0.000	–0.652	0.000
Intercept	5.263	0.000	4.849	0.000	4.375	0.000	4.393	0.000
Number of observ.	249		249		249		249	
Pseudo R^2	0.176		0.184		0.213		0.215	
Correctly classified	0.707		0.723		0.755		0.759	
Panel B. Shelf registrations of common stock, preferred stock, and debt								
Price variable	2.216	0.001	2.046	0.000	1.994	0.000	1.541	0.000
ln(MV of assets)	–0.990	0.000	–0.961	0.000	–0.960	0.000	–0.960	0.000
Intercept	7.750	0.000	7.435	0.000	7.364	0.000	7.300	0.000
Number of observ.	1390		1390		1390		1390	
Pseudo R^2	0.323		0.330		0.337		0.340	
Correctly classified	0.800		0.804		0.804		0.803	

Table 14: The results of multinomial logit regressions

This table presents the results of multinomial logit regressions. The dependent variable is security type: common stock, debt, or hybrid securities. Base outcome is the issue of hybrid securities. For models with year dummy variables, the parameter estimates for year dummy variables for brevity are not reported. 'MAR90" is market adjusted return for the period of [–90, –10], when 0 is the issuance date. "MV" is market value, and "BV" means book value. Tobin's q is the ratio of a firm's market value of assets over its book value of assets. "CAPEX" is capital expenditure. "PP&E" is net property, plant & equipment. "Intang." stands for intangibles. "Par." is parameter estimate, and "p-val." is p-value.

Variable	Models with year dummies				Models without year dummies			
	Par.	p-val.	Par.	p-val.	Par.	p-val.	Par.	p-val.
Equity vs. hybrid securities								
MAR90			0.526	0.347			0.809	0.147
ln(MV of assets)	-0.613	0.000	-0.586	0.000	-0.556	0.000	-0.544	0.000
Tobin's q	0.308	0.044	0.323	0.040	0.287	0.042	0.269	0.066
Profit margin	0.005	0.196	0.005	0.117	0.002	0.354	0.002	0.268
CAPEX/Sales	0.008	0.789	0.006	0.784	0.004	0.655	0.003	0.738
Debt/MV of assets	0.214	0.836	0.305	0.780	0.054	0.953	-0.144	0.883
Cash/MV of assets	-2.628	0.123	-3.321	0.062	0.089	0.960	-0.187	0.923
PP&E/BV of assets	0.158	0.787	0.073	0.903	0.109	0.845	0.225	0.694
Intang./MV of assets	0.851	0.509	0.635	0.638	2.227	0.091	1.879	0.170
Marginal tax rate	0.099	0.048	0.045	0.497	0.068	0.142	0.011	0.869
Intercept	3.762	0.002	4.994	0.000	5.642	0.000	5.631	0.000
Debt vs. hybrid securities								
MAR90			–1.432	0.011			–1.295	0.023
ln(MV of assets)	0.316	0.000	0.300	0.001	0.322	0.000	0.292	0.000
Tobin's q	–0.575	0.000	–0.515	0.002	–0.483	0.002	–0.443	0.006
Profit margin	3.540	0.000	3.168	0.000	2.319	0.000	2.045	0.001
CAPEX/Sales	–0.731	0.006	–0.760	0.006	–0.596	0.018	–0.646	0.015
Debt/MV of assets	–0.819	0.423	–1.036	0.339	–0.965	0.297	–1.486	0.135
Cash/MV of assets	–10.334	0.000	–11.073	0.000	–10.350	0.000	–10.994	0.000
PP&E/BV of assets	–1.138	0.048	–1.437	0.015	–1.327	0.017	–1.423	0.013
Intang./MV of assets	–1.770	0.150	–2.026	0.116	–1.025	0.419	–1.409	0.285
Marginal tax rate	0.065	0.067	–0.005	0.934	0.063	0.073	–0.011	0.868
Intercept	–0.455	0.705	–0.119	0.935	1.792	0.069	2.294	0.026
Number of observ.	1939		1828		1939		1828	
Pseudo R^2	0.369		0.384		0.309		0.328	
Correctly classified	0.802		0.809		0.782		0.791	

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