

Convertible security design and contract innovation

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Convertible securities

- A **convertible security** is a bond, preferred stock, or debenture that is exchangeable at the option of the holder for common stock of the issuing corporation (Investorwords.com)



This paper

- How are recent convertible securities designed?
- What drives these designs?
- Can we incorporate the most important convertible features in one model?



Who do firms issue convertibles?

- Stein (1992): backdoor equity financing
- Green (1984), Brennan and Kraus (1987), Brennan and Schwartz (1988): sweetened debt financing
- Mayers (1998): sequential financing



Some empirical evidence

- Lewis, Rogalski, Seward (1999): some issuers design convertible securities to substitute for debt, while others design them to substitute for equity



Data

- Convertible issues in SDC for the U.S. during 2000-2007
- We require the prospectus to be available on the SEC's Edgar database
- No utilities, financial institutions, exchangeable securities
- Final sample of 819 convertible securities



Convertible design features

- Conversion characteristics
- Fixed income claim
- Method of payment

- The interaction among these choices determines whether particular designs are effective at mitigating external financing costs



Conversion characteristics

- Conversion ratio / price / premium
- Maturity date
- Time to first call

- Determines how closely a convertible security resembles debt or equity

Conversion characteristics: debt-like or equity-like?

- Delta: the sensitivity of the convertible to changes in the stock price

$$\Delta = e^{-\delta T} N(d_1) = e^{-\delta T} N \left\{ \frac{\ln\left(\frac{S}{X}\right) + \left(r - \delta + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \right\}$$

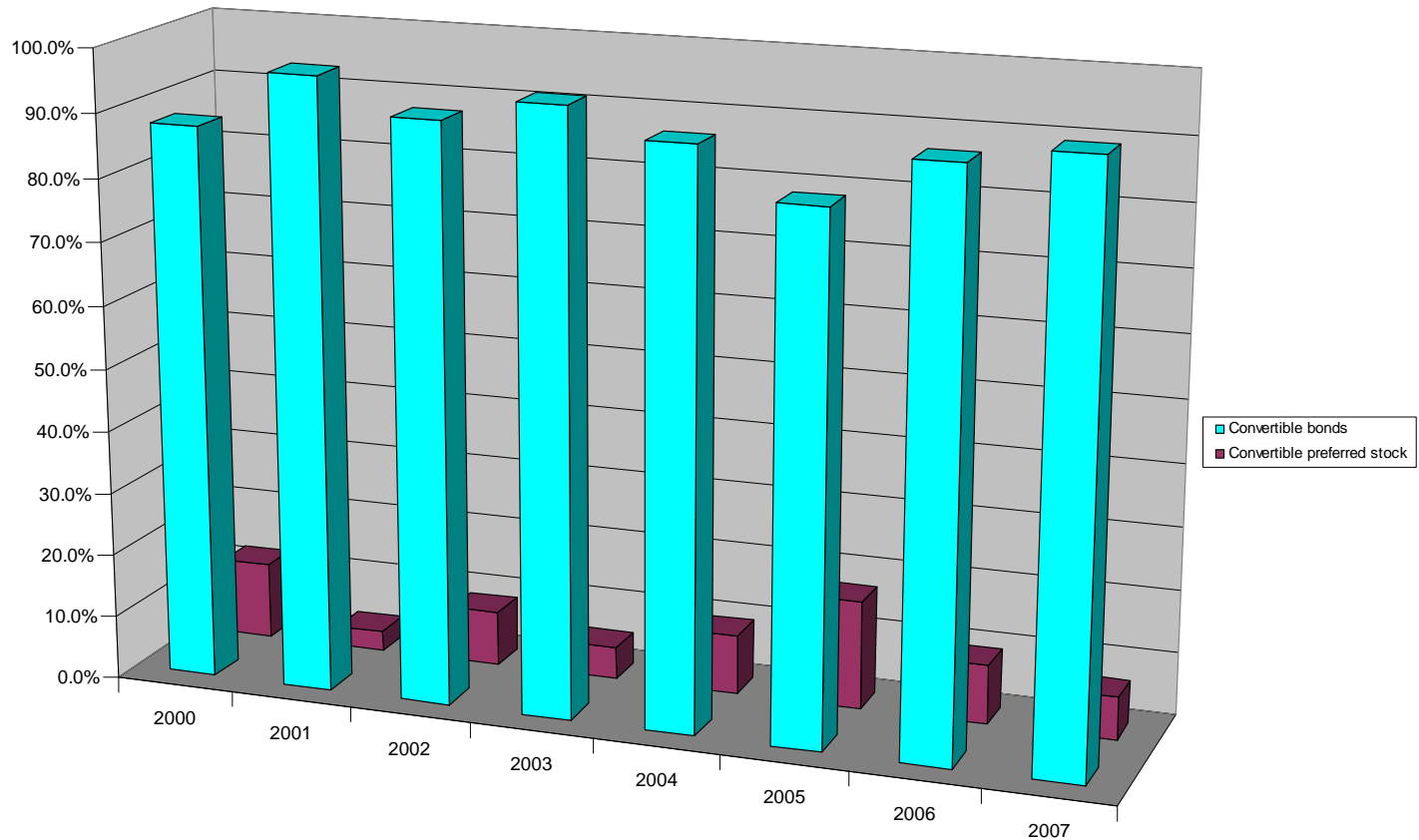
- Over the period 2000-2007: only very few convertibles have deltas below 0.5

How to include call features?

- Call features reduce the effective maturity
- We use Monte Carlo simulation to calculate the actual probability of conversion (APC)
- APC: number of price paths that result in conversion divided by total number of price paths
- Based on: optimal call policy, expected return stock, volatility stock, time to first call; 60,000 stock price paths
- We still find very few (5) debt-like convertibles ($APC < 0.5$) for the period 2000-2007

Fixed income claim

■ Bond versus Preferred stock

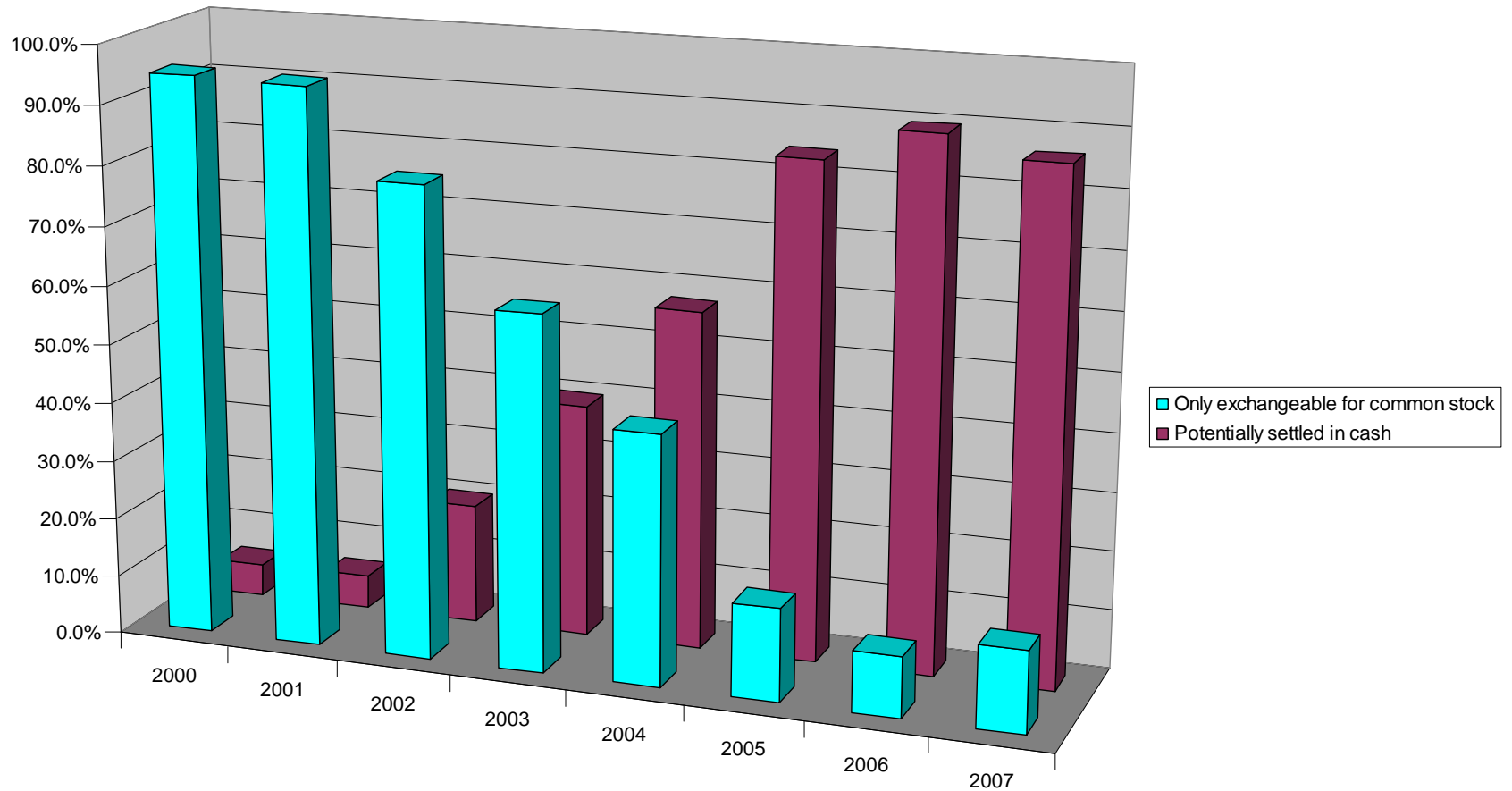




Method of payment

- Choice between converting and receiving payment of the principal
- No choice between converting and receiving payment of the principal: mandatory conversion
- Settled in stock
- Potentially settled in cash
- Settled in both cash and stock

Exchangeable for common stock?

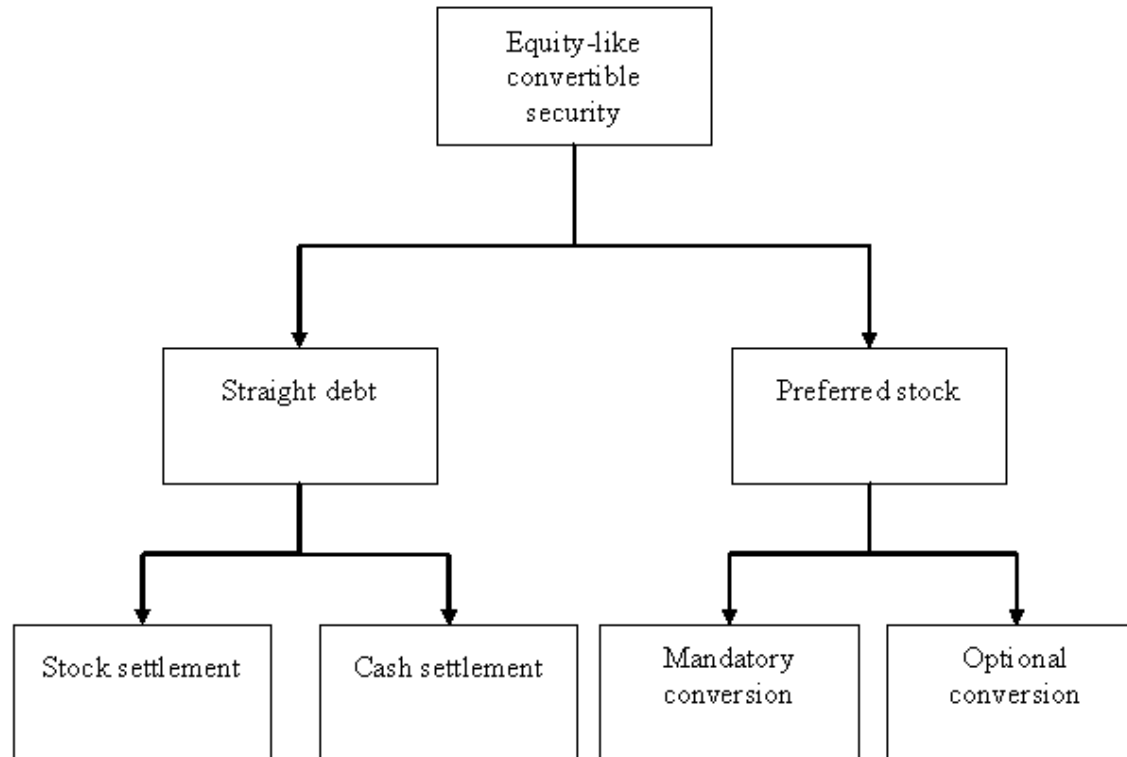




Method of payment

- No convertible bond has mandatory features
- Only four convertible preferred stock issues have cash settlement features

Nested model





Nested logit model

- Modeling joint decisions
- Based on Cronqvist and Nilsson (JFE, 2005)
- When deciding on the upper level, firms take into account the expected value from a particular choice made at the next lower level
- In our case (robustness test): Simple multinomial logit model gives qualitatively similar results



Which factors play a role in convertible security design?

- Taxes
- Financial distress
- Costs of refinancing
- Managerial discretion
- Staged investment
- Earnings management



Fixed income claim

- Taxes: interest payments generate a tax shield
- Financial distress costs: convertible bonds have a fixed maturity date that might require repayment of the principal
- Costs of refinancing: avoid repaying the principal when costs of refinancing are high
- Managerial discretion: payment of the principal reduces probability of overinvestment by managers



Cash or stock settlement

- Financial distress costs: avoid cash settlement
- Managerial discretion: cash settlement reduces cash when firms are performing well
- Staged investment: create debt capacity by converting to common stock
- Earnings management: with potential cash settlement, the decrease in diluted earnings per share is less severe



Mandatory choice

- Financial distress costs: mandatory conversion has low probability of bankruptcy
- Staged investment: mandatory conversion creates additional debt capacity

Results nested logit model

Fixed income choice (bond = 1) Settlement choice (stock = 1) Mandatory conversion (mandatory = 1)

	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>
Constant	-0.189	0.920	1.670	0.018	-4.659	0.337
Log(market value)	-0.012	0.948	0.074	0.420	1.975	0.052
Book leverage	-0.004	0.996	0.027	0.956	1.508	0.705
Market-to-book ratio	0.135	0.572	0.168	0.003	-8.207	0.006
EBIT	0.630	0.741	0.283	0.788	10.219	0.064
Free cash flow	5.341	0.000	-1.988	0.142	14.802	0.093
Stock price run-up	0.015	0.987	0.558	0.038	-8.136	0.050
Investment grade	0.099	0.876	0.299	0.240	-0.904	0.519
Interest coverage	0.134	0.004	0.027	0.282	-0.396	0.349
Slack	4.925	0.000	0.158	0.751		
Tax payments	8.212	0.203				
Tax loss carryforwards	-0.132	0.679				
Depreciation	-4.422	0.066				
Proceeds / market value	3.279	0.114				
Investment			-0.848	0.637	5.906	0.451
Probability of conversion			-2.955	0.000		
Decrease diluted earnings per share			-2.398	0.158		
Call spread overlay			-2.554	0.000		
Additional stock repurchase			-1.434	0.000		
Inclusive value	1.406	0.240				
N	814		768		46	
Pseudo R ²	0.233		0.206		0.439	

Taxes

	Fixed income choice (bond = 1)		Settlement choice (stock = 1)		Mandatory conversion (mandatory = 1)	
	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>
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Reduction of financial distress

	Fixed income choice (bond = 1)		Settlement choice (stock = 1)		Mandatory conversion (mandatory = 1)	
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Costs of refinancing

	Fixed income choice (bond = 1)		Settlement choice (stock = 1)		Mandatory conversion (mandatory = 1)		
	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>	
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Managerial discretion

	Fixed income choice (bond = 1)		Settlement choice (stock = 1)		Mandatory conversion (mandatory = 1)		
	<u>Coef.</u>	<u>p-value</u>		<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>
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Fixed income claim

- Both taxes, the costs of refinancing, and the costs of managerial discretion seem to have an effect on the decision for the fixed income claim.

Staged investments

	Fixed income choice (bond = 1)		Settlement choice (stock = 1)		Mandatory conversion (mandatory = 1)			
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Mandatory conversion

- We do not find strong evidence for any of our hypotheses on mandatory conversion
- Mandatory conv. preferred stock have the lowest probability of default among all convertible security issues
- All mandatory conv. preferred stock issuers in our sample have credit ratings between BBB and B; 75% has a BB rating
- Non-mandatory conv. preferred stock issuers: 29% has a BB rating. Convertible bond issuers: 20% has a BB rating



Earnings management

- U.S. financial reporting: potentially dilutive shares should be included in diluted EPS calculations (if-converted method)
- In 2002, the FASB changes the regulations for most cash settlements: the if-converted method should not be used for these instruments
- Decrease EPS: the decrease in diluted EPS because of the convertible issue when the if-converted method would have applied



Earnings management: call spread overlays

- Buy call options on your own shares struck at the conversion price, and write call options at a higher strike price.
- The effect: lower reported interest expenses



Earnings management: stock repurchases

- About a third of convertible issuers in recent years combine their convertible issue with a stock repurchase (De Jong, Dutordoir, Verwijmeren, 2009)
- In most cases, this stock repurchase immediately increases reported earnings per share

Earnings management

Fixed income choice (bond = 1)

Settlement choice (stock = 1)

Mandatory conversion (mandatory = 1)

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Different types of cash settlements

- Instrument B: Upon conversion, the issuer may satisfy the entire obligation in either stock or cash equivalent to the conversion value
- Instrument C: Upon conversion, the issuer must satisfy the accreted value of the obligation in cash and may satisfy the conversion spread in either cash or stock
- Instrument X: The convertible can be settled in any combination of cash and stock at the option of the firm

Multinomial logit for different types of cash settlements

	Instrument B (N = 18)		Instrument C (N = 160)		Instrument X (N = 153)	
	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>	<u>Coef.</u>	<u>p-value</u>
Constant	-7.461	0.001	-6.179	0.000	-0.276	0.727
Log(market value)	0.537	0.016	0.326	0.006	-0.156	0.156
Book leverage	2.510	0.190	-0.054	0.937	0.246	0.628
Market-to-book ratio	-0.671	0.018	-0.118	0.147	-0.205	0.004
EBIT	3.730	0.186	1.005	0.412	-0.859	0.411
Interest coverage	0.020	0.785	0.036	0.256	-0.044	0.114
Investment	-5.568	0.225	-3.161	0.255	1.933	0.334
Slack	-0.152	0.906	-0.194	0.756	0.156	0.778
Free cash flow	-1.833	0.600	0.822	0.668	2.683	0.043
Stock price run-up	0.821	0.236	-1.777	0.000	-0.723	0.025
Decrease diluted EPS	5.552	0.109	8.658	0.000	-0.286	0.887
Investment grade	0.088	0.892	-1.399	0.000	0.086	0.775
Probability of conversion	0.489	0.764	3.784	0.000	1.463	0.016
N	768					
Pseudo R ²	0.138					

Conclusions

- There is strong innovation in convertible security design
- Convertible issues in the years 2000-2007 are often equity-like, and many have cash settlement features
- The fixed income choice is affected by taxes, refinancing costs, and managerial discretion costs
- Mandatory features seem to relate to firms' credit ratings
- Earnings management is an important consideration in the cash settlement decision

- The FASB has changed accounting regulations in 2008, due to the popularity of cash settlements. Will these instruments become extinct?