MN50324: MSc Corporate Finance 2008: Part 2.

- Section 7: Payout Decisions: Dividends and Repurchases
- Section 8: Efficient Markets/ Corporate News
- Section 9: Venture Capital/private equity
- Section 10: Behavioural Finance.

Section 7: **PAYOUT DECISIONS:**

a) Dividends.

b) Share Repurchases.

Dividend Policy

- Miller-Modigliani Irrelevance.
- Gordon Growth (trade-off).
- Signalling Models.
- Agency Models.
- Gordon Growth (trade-off).
- Lintner Smoothing.
- Dividends versus share repurchases.

Early Approach.

- Three Schools of Thought-
- Dividends are irrelevant.
- Dividends => increase in stock prices.
- Dividends => decrease in Stock Prices.

A. <u>Dividend Irrelevance.</u>

Assume All equity firm.

Value of Firm = Value of Equity = discounted value of future cashflows available to equity holders = discounted value of dividends (if all available cashflow is paid out).

$$V_0 = \sum_{t=0}^{\infty} \frac{Div_t}{(1+\rho)^t}$$

If everything not reinvested is paid out as dividends, then

$$V_0 = \sum_{t=0}^{\infty} \frac{NCF_t - I_t}{(1+\rho)^t}$$

Miller Modigliani's Dividend Irrelevance.

MM used a **source and application of funds** argument to show that Dividend Policy is irrelevant:

Source of Funds = Application of Funds

$$NCF_t + NS_t = I_t + Div_t$$

$$\Rightarrow NCF_t - I_t = Div_t - NS_t$$

$$\Rightarrow V_0 = \sum_{t=1}^{\infty} \frac{Div_t - NS_t}{(1+\rho)^t} = \sum_{t=1}^{\infty} \frac{NCF_t - I_t}{(1+\rho)^t}$$

$$V_0 = \sum_{t=1}^{\infty} \frac{NCF_t - I_t}{(1+\rho)^t}$$

-Dividends do not appear in the equation.

-If the firm pays out too much dividend, it issues new equity to be able to reinvest. If it pays out too little dividend, it can use the balance to repurchase shares.

-Hence, dividend policy irrelevant.

-Key is the availability of finance in the capital market.

Example of Dividend Irrelevance using Source and Application of Funds.

Firm invests in project giving it NCF = 100 every year, and it needs to re-invest, I =50 every year.

Cashflow available to shareholders = NCF – I = 50.

Now, NCF – I = Div – NS = 50.

If firm pays dividend of 50, NS = 0 (ie it pays out exactly the cashflow available – no new shares bought or sold).

If firm pays dividend of 80, NS = -30 (ie it sells new shares of 30 to cover dividend).

If firm pays dividend of 20, NS = 30 (ie it uses cashflow not paid out as dividend to buy new shares).

In each case, Div – NS = 50.

B. Gordon Growth Model.

Where does growth come from?- retaining cashflow to re-invest.

Constant fraction, K, of earnings retained for reinvestment.

Rest paid out as dividend.

Average rate of return on equity = r.

Growth rate in cashflows (and dividends) is g = Kr.

$$V_0 = \frac{Div_1}{\rho - g} = \frac{NCF_1(1-K)}{\rho - Kr}.$$

Example of Gordon Growth Model.

£K	19x5	19x6	19x7	19x8	19x9		Average
Profits After Tax (NCF)	2500	2760	2635	2900	3100		
Retained Profit (NCF.K)	1550	1775	1600	1800	1900		
Dividend (NCF(1-K))	950	985	1035	1100	1200		
Share Capital + retentions							
B/F	30000	31550	33325	34925	36725		
C/F (= BF + Retained Profit)	31550	33325	34925	36725	38625		
Retention Rate K	0.62	0.64	0.61	0.62	0.61		0.62
r on opening capital	0.083	0.087	0.079	0.083	0.084		0.083
g = Kr = 0.05.							

How do we use this past data for valuation?

Gordon Growth Model (Infinite Constant Growth Model).

Let $\rho = 12\%$

$$V_0 = \frac{Div_0(1+g)}{\rho - g} = \frac{Div_1}{\rho - g} = \frac{1200(1.05)}{\rho - g} = \frac{1260}{0.12 - 0.05}$$

$$= 18000$$

Finite Supernormal Growth.

-Rate of return on Investment > market required return for T years.

-After that, Rate of Return on Investment = Market required return.

$$V_0 = \frac{NCF_1}{\rho} + K.NCF_1.T \frac{(r-\rho)}{\rho(1+\rho)}$$

If T = 0, V = Value of assets in place (re-investment at zero NPV).

Same if r = ρ.

Examples of Finite Supernormal Growth.

$$NCF_1 = 100.$$

$$\rho = 10\%.$$ T = 10 years. K = 0.1.

A. **Rate of return, r = 12% for 10 years,then 10% thereafter.**

$$V_0 = \frac{100}{0.1} + 0.1.(100).10\frac{(0.12 - 0.1)}{0.1(1 + 0.1)} = 1018$$

B. Rate of return, r = 5% for 10 years,then 10% thereafter.

$$V_0 = \frac{100}{0.1} + 0.1.(100).10\frac{(0.05 - 0.1)}{0.1(1 + 0.1)} = 955$$

Are Dividends Irrelevant?

- Evidence: higher dividends => higher value.

- Dividend irrelevance : freely available capital for reinvestment. - If too much dividend, firm issued new shares.

- If capital not freely available, dividend policy may matter.

C. Dividend Signalling - Miller and Rock (1985).

NCF + NS = I + DIV: Source = Uses.

DIV - NS = NCF - I.

Right hand side = retained earnings. Left hand side - higher dividends can be covered by new shares.

$$\text{Div - NS - E (Div - NS)} = \text{NCF - I - E (NCF - I)}$$

$$= \text{NCF - E (NCF)}.$$

Unexpected dividend increase - favourable signal of NCF.

	Prob	0.5	0.5		
		Firm A	Firm B		E(V)
NCF		400	1400		900
New Investment		600	600		600
Dividend		0	800		400
New share		200	0		100

E(Div - NS) = E(NCF - I) = 300.

Date 1 Realisation: Firm B: Div - NS - E (Div - NS) = 500 = NCF - E (NCF).

Firm A : Div - NS - E (Div - NS) = -500 = NCF - E (NCF).

Dividend Signalling Models.

- Bhattacharya (1979)
- John and Williams (1985)
- Miller and Rock (1985)
- Ofer and Thakor (1987)
- Fuller and Thakor (2002).
- Fairchild (2008).
- Divs credible costly signals: Taxes or borrowing costs.

Dividends as signals of expected cashflows: Bhattacharya 1979.

- Asymmetric Info about cashflows.
- Investors invest over short horizons.
- Dividends taxed at higher rate than capital gains.
- => signalling equilibria.
- Shorter horizon => higher dividends.

Bhattacharya 79 (continued)

- Existing Shareholders informed.
- Outside investors not informed.
- All-equity.
- Universal Risk-neutrality.
- Existing shareholders maximise liquidation value of firm.

Bhattacharya 79 Continued.

- New project: Uncertain cash flow X
- Firm announces a committed dividend D
- If $X \geq D,$ dividend D is paid.
- Current shareholders receive αD after tax.
- Outside financing required for reinvestment reduced by $X - D.$

Bhattacharya 79 Continued.

- If $X < D$, D still paid.
- Shortfall $D - X$ made up by external finance or curtailing new investments.
- Cost to current shareholders: $(1+\beta)(D-X)$.

Bhattacharya 79 Continued.

- X Uniformly distributed between 0 and t, with mean $t/2.$
- Choose D to maximise

$$E(D) = \frac{1}{(1+r)}[\frac{t}{2} + V(D) - (1-\alpha)D - \beta\frac{D^2}{2t}]$$

- FOC:

$$V'(D^*) - (1-\alpha) - \beta\frac{D^*}{t} = 0.$$

Bhattacharya 79 Continued.

- Equilibrium: $D^* = \dfrac{Kt}{(K+1)(1-\alpha)}$,
- Where $K = 1/r$.
- D is increasing in the tax rate.
- D is a decreasing function of r.
- D is increasing in t.
- Also, see Bhattacharya 1980, and Talmor 1981.

Hakansson 1982.

- Dividend signalling in a pure exchange economy.
- Bayesian updating.
- Conditions when dividends are good, bad or when investors are indifferent.

Signalling, FCF, and Dividends.

Fuller and Thakor (2002)

- Empirical Contest between Signalling and FCF hypotheses.
- Divs' costly signals: signalling plus FCF.
- If dividend too low: FCF problem (cf Jensen 1986).
- If dividend too high: costly borrowing.

Fuller and Thakor (continued).

- 2 types of firm: good and bad.
- Good firm's future $CF \in \{H, L\}$.
- Bad firm's future $CF \in \{L, 0\}$.

$$\Pr(x = H / G) = \Pr(x = L / B) = q$$

$$\Pr(x = L / G) = \Pr(x = 0 / B) = 1 - q$$

Fuller and Thakor (continued)

- At date 1, outsiders observe signal $S \in \{0, L, H\}$
- If firm G, $S \in \{L, H\}$
- If firm B, $S \in \{0, L\}$
- Thus, if $S = H$ or $S = 0,$ mkt knows firm type. Divs used to eliminate FCF.
- If $S = L,$ mkt cannot identify type. Thus, divs used to signal type *and* eliminate FCF.

Fuller and Thakor (continued)

- Firms' dividend announcement trades-off costly borrowing versus FCF problem.
- Bayesian updating.

$$S = H \Rightarrow medium.div$$

$$S = 0 \Rightarrow low.div$$

$$S = L, goodfirm \Rightarrow High.div$$

$$S = L, badfirm \Rightarrow low.div$$

Dividend Signalling: Current Income/future Investment:

Fairchild (2008). Re-write slides.

- Conflicts:
- High/low dividends signal high/low income
- But high/low dividends affect ability to re-invest (cf Gordon Growth)
- If –ve NPV: FCF: High divs good.
- But if +ve NPV: high div bad => signal jamming: ambiguous.

Fairchild (2002): continued.

- 2 all-equity firms; manager $i \in \{g, b\}$.
- Date 0: Project investment.
- Date 1: Net income, N_i, with $N_g > N_b$.
- Revealed to the manager, but not to investors.
- Mkt becomes aware of a new project P2, with return on equity $\rho \geq 0, \rho < 0$.
- Manager commits to a dividend D_i

Fairchild (2002) continued

- Date 1.5: Mgr pays announced dividend
- P2 requires investment $I \in (N_b, N_g]$.
- Mgr b cannot take new project.
- Date 2, If P2 taken, achieves net income. Mgr has private benefits $b > 0$.

Fairchild (2002) continued

- Mgr maximises $M = \alpha V_1 + B.$
- Bayesian Updating.
- Adverse selection: $N_g - I < N_b.$
- Mgr g can either signal current income (but no re-investment),
- or re-invest (without signaling current income).

Fairchild (2002) continued

- Signalling (of current income) Equilibria:
- A) Efficient re-investment: Pooling:

$$D_g \in [0, N_g - I], D_b \in [0, N_g - I].$$

- B) Inefficient Non re-investment, or
- C) Efficient Non re-investment: separating:

$$D_g \in [N_b, N_g], D_b \in [0, N_b].$$

Fairchild 2002 (continued)

- Case 2: Moral Hazard:
- Mgr can provide credible signal of type
- Effective communication (Wooldridge and Ghosh)
- Now, use divs only due to FCF.
- Efficient re-investment.
- Inefficient re-investment.
- Efficient non re-investment.

Fairchild 2002: Summary

- Case 1: Adverse selection: inefficiency when mgr refuses to cut dividend to take +ve NPV project.
- Case 2: Moral hazard: mgr reduces dividend to take –ve NPV project.

- Integrated approach: Effective mgrl communication/ increase mgr's equity stake.

Agency Models.

- Jensen's Free Cash Flow (1986).
- Stultz's Free Cash Flow Model (1990).
- Easterbrook.
- Fairchild (2002): Signalling + moral hazard.

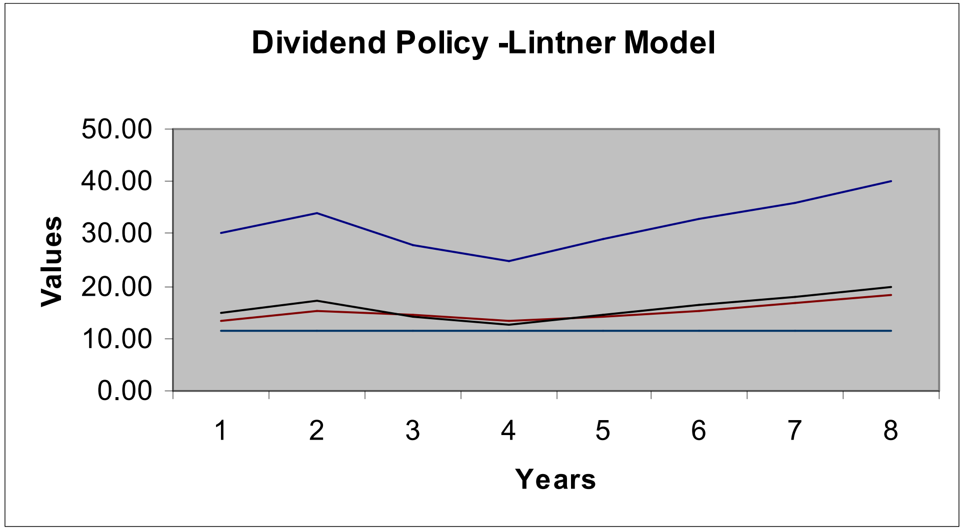
D. Lintner Model.

Managers do not like big changes in dividend (signalling).

They smooth them - slow adjustment towards target payout rate.

$$Div_t = Div_{t-1} + K.(T.eps_t - Div_{t-1})$$

K is the adjustment rate. T is the target payout rate.



	FIRM	A	B	C
	K	0.5	0	1
YEAR	EPS	DIV	DIV	DIV
1	30.00	13.25	11.50	15.00
2	34.00	15.13	11.50	17.00
3	28.00	14.56	11.50	14.00
4	25.00	13.53	11.50	12.50
5	29.00	14.02	11.50	14.50
6	33.00	15.26	11.50	16.50
7	36.00	16.63	11.50	18.00
8	40.00	18.31	11.50	20.00

Using Dividend Data to analyse Lintner Model.

$$Div_t = (1-K)Div_{t-1} + K.T.eps_t.$$

In Excel, run the following regression;

$$Div_t = a + bDiv_{t-1} + cEps_t$$

The parameters give us the following information,

a = 0, K = 1 – b, T = c/ (1 – b).

Dividends and earnings.

- Relationship between dividends, past, current and future earnings.
- Regression analysis/categorical analysis.

Dividend Smoothing V optimal re-investment (Fairchild 2003)

- Method:-
- GG Model: derive optimal retention/payout ratio
- => deterministic time path for dividends, Net income, firm values.
- Compare with stochastic time path to determine smoothing policy.

Deterministic Dividend Policy.

- Recall $V_0 = \dfrac{Div_1}{\rho - g} = \dfrac{N_0(1-K)(1+Kr)}{\rho - Kr}.$
-
- Solving $\dfrac{\partial V_0}{\partial K} = 0,$
- We obtain optimal retention ratio
-

$$K^* = \frac{\rho \pm \sqrt{(\rho - r)(\rho + 1)}}{r}.$$

Analysis of K^*

- If $r \in [0, \frac{\rho}{1+\rho}]$, $K^* < 0$.
- If $r \in [0, \frac{\rho}{1+\rho}], K^* \in [0,1]$, with $\frac{\partial K^*}{\partial r} > 0$.
- Constant r over time => Constant K* over time.

Deterministic Case (Continued).

- Recursive solution:

$$D_t = N_0(1 - K^*)(1 + K^* r)^t$$

$$V_t = \frac{N_0(1 - K^*)(1 + K^* r)^{t+1}}{\rho - K^* r}.$$

When r is constant over time, K* is constant. Net Income, Dividends, and firm value evolve deterministically.

Stochastic dividend policy.

- Future returns on equity normally and independently distributed, mean r.
- Each period, K* is as given previously.
- Dividends volatile.
- But signalling concerns: smooth dividends.
- => “buffer” from retained earnings.

Dividends V Share Repurchases.

- Both are payout methods.
- If both provide similar signals, mkt reaction should be same.
- => mgrs should be indifferent between dividends and repurchases.

Evidence.

- Mgrs think divs reveal more info than repurchases.
- Mgrs smooth dividends/repurchases are volatile.
- Dividends paid out of permanent cashflow/repurchases out of temporary cashflow.

Motives for repurchases (Wansley et al, FM: 1989).

- Dividend substitution hypothesis.
- Tax motives.
- Capital structure motives.
- Free cash flow hypothesis.
- Signalling/price support.
- Timing.
- Catering.

Repurchase signalling.

- Price Support hypothesis: Repurchases signal undervaluation (as in dividends).
- But do repurchases provide the same signals as dividends?

Repurchase signalling:

(Chowdhury and Nanda Model: RFS 1994)

- Free-cash flow => distribution as commitment.
- Dividends have tax disadvantage.
- Repurchases lead to large price increase.
- So, firms use repurchases only when sufficient undervaluation.

Open market Stock Repurchase Signalling:

McNally, 1999

- Signalling Model of OM repurchases.
- Effect on insiders' utility.
- If do not repurchase, RA insiders exposed to more risk.
- => Repurchase signals:
- a) Higher earnings and higher risk,
- b) Higher equity stake => higher earnings.

Repurchase Signalling :

Isagawa FR 2000

- Asymmetric information over mgr's private benefits.
- Repurchase announcement reveals this info when project is –ve NPV.
- Repurchase announcement is a credible signal, even though not a commitment.

Costless Versus Costly Signalling:

Bhattacharya and Dittmar 2003

- Repurchase announcement is not commitment.
- Costly signal: Actual repurchase: separation of good and bad firm.
- Costless (cheap-talk): Announcement without repurchasing. Draws analysts' attention.
- Only good firm will want this: s

Repurchase timing

- Evidence: repurchase timing (buying shares cheaply.
- But market must be inefficient, or investors irrational.
- Isagawa.
- Fairchild and Zhang.

Repurchases and irrational investors.

Isagawa 2002

- Timing (wealth-transfer) model.
- Unable to time market in efficient market with rational investors.
- Assumes irrational investors => market does not fully react.
- Incentive to time market.
- Predicts long-run abnormal returns post-announcement.

Repurchase Catering.

- Baker and Wurgler: dividend catering
- Fairchild and Zhang: dividend/repurchase catering, or re-investment in positive NPV project.

Section 8: Efficient Markets/Corporate News.

- Slides to follow.

III “NEW” RESEARCH:

a) Venture Capitalist/Entrepreneur Contracting and Performance.

b) Private Equity

c) Introduction to Behavioral Corporate Finance: see research frontiers course.

Section 9: Venture Capital/private equity

- Venture capitalists typically supply start-up finance for new entrepreneurs.
- VC's objective; help to develop the venture over 5 – 7 years, take the firm to IPO, and make large capital gains on their investment.

Private Equity.

- PE firms generally buy poorly performing publically listed firms.
- Take them private
- Improve them (turn them around).
- Hope to float them again for large gains
- Our main focus in this course is venture capital;
- But will look briefly at PE later.

C. Venture Capital Financing

- Active Value-adding Investors.
- Double-sided Moral Hazard problem.
- Asymmetric Information.
- Negotiations over Cashflows and Control Rights.
- Staged Financing
- Remarkable variation in contracts.

Features of VC financing.

- Bargain with mgrs over financial contract (cash flow rights and control rights)
- VC’s active investors: provide value-added services.
- Reputation (VCs are repeat players).
- Double-sided moral hazard.
- Double-sided adverse selection.

Financial Contracts.

- Debt and equity.
- Extensive use of Convertibles.
- Staged Financing.
- Control rights (eg board control/voting rights).
- Exit strategies well-defined.

Fairchild (2004)

- Analyses effects of bargaining power, reputation, exit strategies and value-adding on financial contract and performance.
- 1 mgr and 2 types of VC.
- Success Probability depends on effort:

$$P = e_M + \gamma_i e_{VC}$$

where $\gamma_i \in \{0,1\}$, => VC's value-adding.

Fairchild's (2004) Timeline

- Date 0: Bidding Game: VC's bid to supply finance.
- Date 1: Bargaining game: VC/E bargain over financial contract (equity stakes).
- Date 2: Investment/effort level stage.
- Date 3: Renegotiation stage: hold-up problems
- Date 4: Payoffs occur.

Bargaining stage

- Ex ante Project Value

$$V = PR + (1 - P)R.$$

- Payoffs:

$$S_M = \alpha P(R - I) - \beta(R - I)\frac{e_m^{\ 2}}{2}.$$

$$S_{VC} = (1 - \alpha)P(R - I) + I - \beta(R - I)\frac{e_m^{\ 2}}{2} + \Pr(R - I).$$

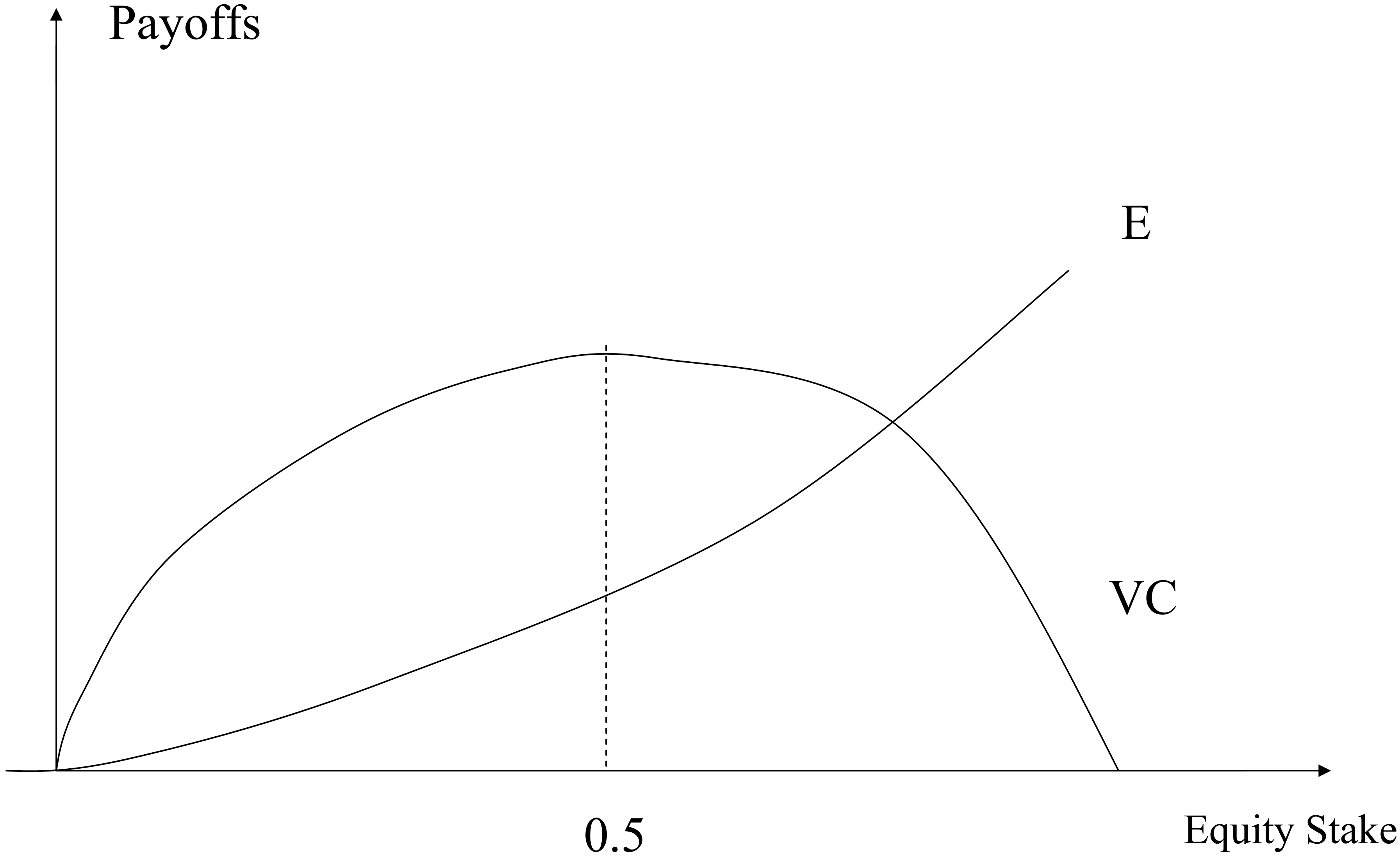
Optimal effort levels for given equity stake:

- $$e_m{}^* = \frac{\alpha}{\beta},$$

$$e_{VC}{}^* = \frac{\gamma(1 - \alpha + r)}{\beta}.$$

Optimal equity proposals.

- Found by substituting optimal efforts into payoffs and maximising.
- Depends on relative bargaining power, VC's value-adding ability, and reputation effect.
- Eg; E may take all of the equity.
- VC may take half of the equity.



Payoffs
E
VC
0.5
Equity Stake

Ex post hold-up threat

- VC power increases with time.
- Exit threat (moral hazard).
- Weakens entrepreneur incentives.
- Contractual commitment not to exit early.
- => put options.

Other Papers

- Casamatta: Joint effort: VC supplies investment and value-adding effort.
- Repullo and Suarez: Joint efforts: staged financing.
- Bascha: Joint efforts: use of convertibles: increased managerial incentives.

Complementary efforts (Repullo and Suarez).

- Lecture slides to follow…

Control Rights.

- Gebhardt.
- Lecture slides to follow

Asymmetric Information

- Houben.
- PCP paper.
- Tykvova (lock-in at IPO to signal quality).

E’s choice of financier

- VC or bank finance (Ueda, Bettignies and Brander).
- VC or Angel (Chemmanur and Chen, Fairchild).

Fairness Norms and Self-interest in VC/E Contracting: A Behavioral Game-theoretic Approach

- Existing VC/E Financial Contracting Models assume narrow self-interest.
- Double-sided Agency problems (both E and VC exert Value-adding Effort) (Casamatta JF 2003, Repullo and Suarez 2004, Fairchild JFR 2004).
- Procedural Justice Theory: Fairness and Trust important.
- No existing behavioral Game theoretic models of VC/E contracting.

My Model:

- VC/E Financial Contracting, combining double-sided Moral Hazard (VC and E shirking incentives) and fairness norms.
- 2 stages: VC and E negotiate financial contract.
- Then both exert value-adding efforts.

How to model fairness? Fairness Norms.

- r Fair VCs and Es in society.
- $1-r$ self-interested VCs and Es in society.
- Matching process: one E emerges with a business plan. Approaches one VC at random for finance.
- Players cannot observe each other's type.

Timeline

- Date 0: VC makes ultimatum offer of equity stake to E; $\alpha \in [0,1], 1-\alpha$
- Date 1: VC and E exert value-adding effort in running the business
- Date 2 Success Probability $P = \gamma_E e_E + \theta \gamma_E e_{VC}$
- => income R.
- Failure probability $1 - P$
- =>income zero

- Expected Value of Project

$$V = PR = (\gamma_E e_E + \theta \gamma_E e_{VC})R$$

$$\theta \in [0,1]$$

- Represents VCs relative ability (to E).

Fairness Norms

- Fair VC makes fair (payoff equalising) equity offer α_F
- Self-interested VC makes self-interested ultimatum offer $\alpha_U \neq \alpha_F$
- E observes equity offer. Fair E compares equity offer to social norm. Self-interested E does not, then exerts effort.

Expected Payoffs

- $\prod_E = \alpha_U PR - \beta e_E{}^2 - r(\alpha_F - \alpha_U)PR$

$$\prod_{VC} = r[(1-\alpha_U)P_S R] + (1-r)[(1-\alpha_U)P_F R] - \beta e_{VC}{}^2$$

If VC is fair, by definition, $\alpha_U = \alpha_F$

Solve by backward induction:

- If VC is fair;
- Since $\alpha_U = \alpha_F$
- $\prod_E = \alpha_F PR - \beta e_E{}^2$ for both E types.
- => $P_S = P_F$
- => $\prod_{VC} = (1 - \alpha_F) PR - \beta e_{VC}{}^2$

VC is fair; continued.

- Given $\alpha_U = \alpha_F$

Optimal Effort Levels:

$$e_E{}^* = \frac{\alpha_F \gamma_E R}{2\beta}, e_{VC}{}^* = \frac{(1-\alpha_F)\theta\gamma_E R}{2\beta}.$$

Fair VC's equity proposal (equity norm):

$$\alpha_F = \frac{1-2\theta^2 \pm \sqrt{1+\theta^4-\theta^2}}{3(1-\theta^2)}$$

VC is self-interested:

$$\alpha_U \neq \alpha_F => P_S \neq P_F$$

- From Equation (1), fair E's optimal effort;
- $$e_E{}^* = \frac{[\alpha_U - r(\alpha_F - \alpha_U)]\gamma_E R}{2\beta}.$$

Self-interested VC's optimal Equity proposal

- Substitute players' optimal efforts into V= PR, and then into (1) and (2). Then, optimal equity proposal maximises VC's indirect payoff =>

$$\alpha_U{}^* = \frac{1-\theta^2 + r^2(1+\alpha_F)}{2(1+r^2)-\theta^2}.$$

Examples;

- VC has no value-adding ability (dumb money) =>
- $\theta = 0$ => $\alpha_F = \frac{2}{3}$
-
- r =0 => $\alpha_U = \frac{1}{2}$.
- r => 1 , $\alpha_U \Rightarrow \alpha_F = \frac{2}{3}$.

Example 2

- VC has equal ability to E;

  $\theta = 1$ => $\alpha_F = \frac{1}{2}$

- r =0 => $\alpha_U = 0.$
- r => 1 , $\alpha_U \Rightarrow \alpha_F = \frac{1}{2}.$

- We show that $\forall \theta \in [0,1],$ $\alpha_U \Rightarrow \alpha_F$

  as r => 1

Table 1.

Graph

Table of venture performance

Graph of Venture Performance.

Future Research.

- Dynamic Fairness Game:ex post opportunism (Utset 2002).
- Complementary Efforts.
- Trust Games.
- Experiments.
- Control Rights.

Private Equity

- JCF paper: slides to follow…
- PE and leverage: slides to follow….

Section 10: Behavioural Corporate Finance.

- Standard Finance - agents are rational and self-interested.
- Behavioural finance: agents irrational (Psychological Biases).
- Irrational Investors – Overvaluing assets-internet bubble? Market Sentiment?
- Irrational Managers- effects on investment appraisal?
- Effects on capital structure?
- Herding.

Development of Behavioral Finance I.

- Standard Research in Finance: Assumption: Agents are rational self-interested utility maximisers.
- 1955: Herbert Simon: Bounded Rationality: Humans are not computer-like infinite information processors. Heuristics.
- Economics experiments: Humans are not totally self-interested.

Development of Behavioral Finance II.

- Anomalies: Efficient Capital Markets.
- Excessive volatility.
- Excessive trading.
- Over and under-reaction to news.
- 1980's: Werner DeBondt: coined the term Behavioral Finance.
- Prospect Theory: Kahnemann and Tversky 1980s.

Development III

- BF takes findings from psychology.
- Incorporates human biases into finance.
- Which psychological biases? Potentially infinite.
- Bounded rationality/bounded selfishness/bounded willpower.
- Bounded rationality/emotions/social factors.

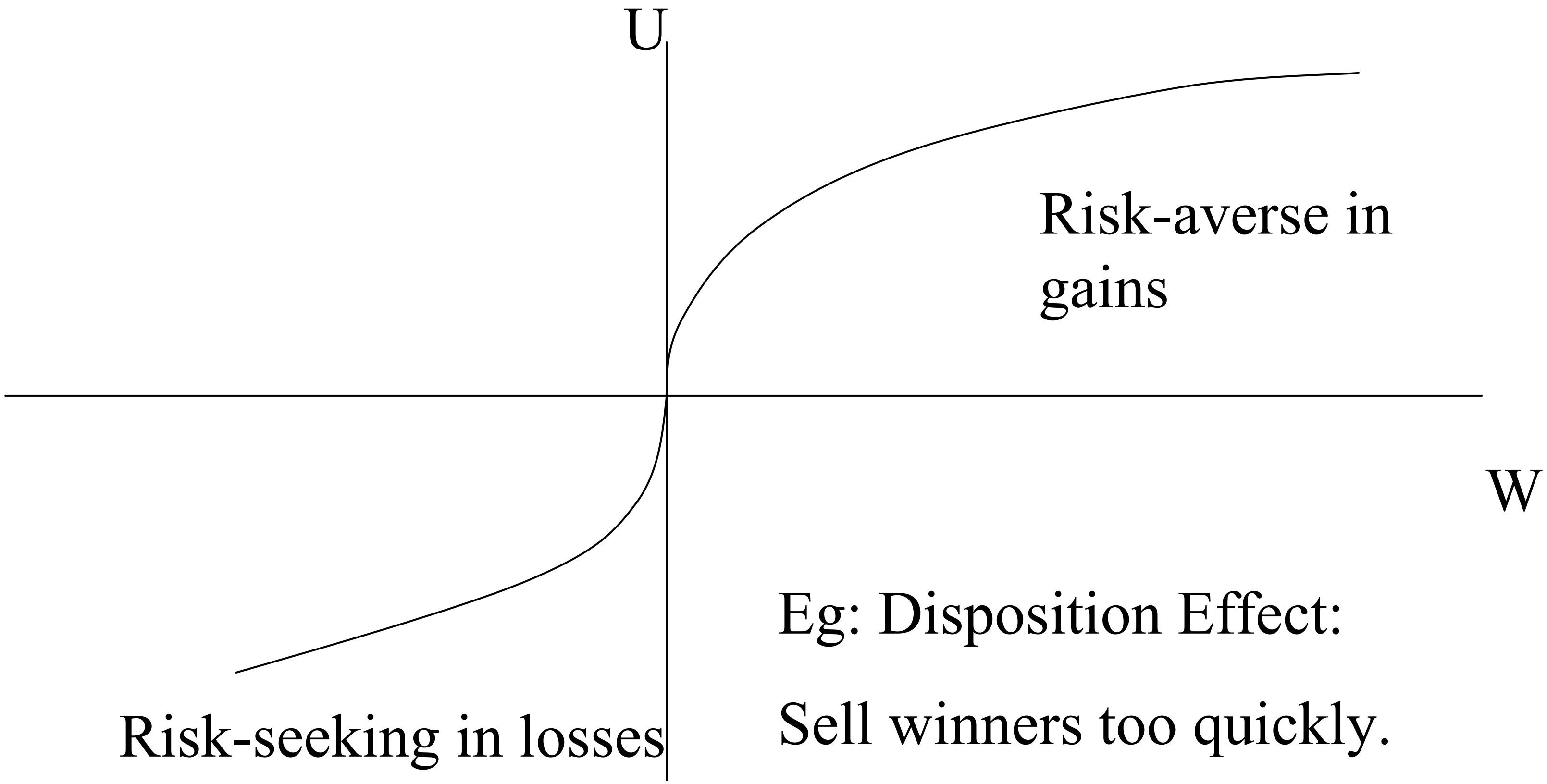
Potential biases.

- Overconfidence/optimism
- Regret.
- Prospect Theory/loss aversion.
- Representativeness.
- Anchoring.
- Gambler’s fallacy.
- Availability bias.
- Salience….. Etc, etc.

Focus in Literature

- Overconfidence/optimism
- Prospect Theory/loss aversion.
- Regret.

Prospect Theory.



Eg: Disposition Effect:

Sell winners too quickly.

Hold losers too long.

Overconfidence.

- Too much trading in capital markets.
- OC leads to losses?
- But : Kyle => OC traders out survive and outperform well-calibrated traders.

Behavioral Corporate Finance.

- Much behavioral research in Financial Markets.
- Not so much in Behavioral CF.
- Relatively new: Behavioral CF and Investment Appraisal/Capital Budgeting/Dividend decisions.

Forms of Irrationality.

a) Bounded Rationality (eg Mattson and Weibull 2002, Stein 1996).

- Limited information: Information processing has a cost of effort.

- Investors => internet bubble.

b) Behavioural effects of emotions:

-Prospect Theory (Kahneman and Tversky 1997).

- Regret Theory.
- Irrational Commitment to Bad Projects.
- Overconfidence.

C) Catering – investors like types of firms (eg high dividend).

<u>Bounded rationality</u> (Mattson and Weibull 2002).

-Manager cannot guarantee good outcome with probability of 1.

-Fully rational => can solve a maximisation problem.

-Bounded rationality => implementation mistakes.

-Cost of reducing mistakes.

-Optimal for manager to make some mistakes!

-CEO, does not carefully prepare meetings, motivate and monitor staff => sub-optimal actions by firm.

Regret theory and prospect theory (Harbaugh 2002).

-Risky decision involving skill and chance.

-manager's reputation.

Prospect theory: People tend to favour low success probability projects than high success probability projects.

-Low chance of success: failure is common but little reputational damage.

-High chance of success: failure is rare, but more embarrassing.

Regret theory: Failure to take as gamble that wins is as embarrassing as taking a gamble that fails.

=> Prospect + regret theory => attraction for low probability gambles.

Irrational Commitment to bad project.

-Standard economic theory – sunk costs should be ignored.

-Therefore- failing project – abandon.

-But: mgrs tend to keep project going- in hope that it will improve.

-Especially if manager controlled initial investment decision.

-More likely to abandon if someone else took initial decision.

Real Options and behavioral aspects of ability to revise (Joyce 2002).

-Real Options: Flexible project more valuable than an inflexible one.

-However, managers with an opportunity to revise were less satisfied than those with standard fixed NPV.

<u>Overconfidence and the Capital Structure</u> (Heaton 2002).

-Optimistic manager overestimates good state probability.

-Combines Jensen's free cashflow with Myers-Majluf Assymetric information.

-Jensen- free cashflow costly – mgrs take –ve NPV projects.

-Myers-Majluf- Free cashflow good – enables mgs to take +ve NPV projects.

-Heaton- Underinvestment-overinvestment trade-off without agency costs or asymmetric info.

Heaton (continued).

-Mgr optimism – believes that market undervalues equity = Myers-Majluf problem of not taking +ve NPV projects => free cash flow good.

-But : mgr optimism => mgr overvalues the firms investment opportunities => mistakenly taking –ve NPV project => free cash flow bad.

-Prediction: shareholders prefer:

-Cashflow retention when firm has both high optimism and good investments.

- cash flow payouts when firm has high optimism and bad investments.

Rational capital budgeting in an irrational world. (Stein 1996).

-Manager rational, investors over-optimistic.

- share price solely determined by investors.

-How to set hurdle rates for capital budgeting decisions?

- adaptation of CAPM, depending on managerial aims.

- manager may want to maximise time 0 stock price (short-term).

-May want to maximise PV of firm's future cash flows (long term rational view).

Effect of Managerial overconfidence, asymmetric Info, and moral hazard on Capital Structure Decisions.

Rational Corporate Finance.

-Capital Structure: moral hazard + asymmetric info.

-Debt reduces Moral Hazard Problems

-Debt signals quality.

Behavioral Corporate Finance.

-managerial biases: effects on investment and financing decisions

-Framing, regret theory, loss aversion, bounded rationality.

-OVERCONFIDENCE/OPTIMISM.

Overconfidence/optimism

- Optimism: upward bias in probability of good state.
- Overconfidence: underestimation of asset risk.
- My model =>
- Overconfidence: overestimation of ability.

Overconfidence: good or bad?

- Hackbarth (2002): debt decision: OC good.
- Goel and Thakor (2000): OC good: offsets mgr risk aversion.
- Gervais et al (2002), Heaton: investment appraisal, OC bad => negative NPV projects.
- Zacharakis: VC OC bad: wrong firms.

Overconfidence and Debt

- My model: OC => higher mgr's effort (good).
- But OC bad, leads to excessive debt (see Shefrin), higher financial distress.
- Trade-off.

Behavioral model of overconfidence.

$$\hat{p} > p, \hat{q} > q.$$

Both Managers issue debt:

$$M_g = \hat{p}R - \frac{2\hat{p}I}{p+q} - (1-\hat{p})b.$$

$$M_b = \hat{q}R - \frac{2\hat{q}I}{p+q} - (1-\hat{q})b.$$

Good mgr issues Debt, bad mgr issues equity.

$$M_g = \hat{p}R - \frac{\hat{p}}{p}I - (1-\hat{p})b.$$

$$M_b = \hat{q}R - \frac{\hat{q}}{q}I.$$

Both mgrs issue equity.

$$M_g = \hat{p}R - \frac{2\hat{p}}{p+q}I,$$

$$M_b = \hat{q}R - \frac{2\hat{q}}{p+q}I.$$

Proposition 1.

a) If $\dfrac{\hat{q}(p-q)}{q(p+q)} I \geq (1-\hat{q})b > (1-\hat{p})b,$ $\qquad \{S_g = S_b = D\}.$

b) $(1-\hat{q})b \geq \dfrac{\hat{q}(p-q)}{q(p+q)} I > (1-\hat{p})b,$ $\qquad \{S_g = D, S_b = E\}.$

c) $(1-\hat{q})b > (1-\hat{p})b \geq \dfrac{\hat{q}(p-q)}{q(p+q)} I,$ $\qquad \{S_g = S_b = E\}.$

Overconfidence leads to more debt issuance.

Overconfidence and Moral Hazard

- Firm's project: 2 possible outcomes.
- Good: income R. Bad: Income 0.
- Good state Prob: $P = (\lambda + \gamma)e \in (0,1].$
- True: $\gamma = 0.$
- Overconfidence: $\gamma > 0.$
- True success prob: $P = \lambda e.$

Manager's *Perceived* Payoffs

$$\hat{M}_D = \hat{P}(R - D) - (1 - \hat{P})b - \beta e^2 + PD - I.$$

$$\hat{M}_E = \alpha\hat{P}R - \beta e^2 + (1 - \alpha)PR - I.$$

Optimal effort levels

$$e_D{}^* = \frac{(\lambda + \gamma)(R - D + b)}{2\beta}$$

$$e_E{}^* = \frac{(\lambda + \gamma)(R - D)}{2\beta}$$

Effect of Overconfidence and security on mgr's effort

- Mgr's effort is increasing in OC.
- Debt forces higher effort due to FD.

Manager's perceived *Indirect* Payoffs

$$\hat{M}_D = \frac{(\lambda+\gamma)^2 (R-D+b)^2}{4\beta} + \frac{\lambda(\lambda+\gamma)(R-D+b)D}{2\beta} - I - b$$

$$\hat{M}_E = \frac{(\lambda+\gamma)^2 (R-D)^2}{4\beta} + \frac{\lambda(\lambda+\gamma)(R-D)D}{2\beta} - I$$

$$\Delta\hat{M}_D = \frac{(\lambda+\gamma)^2 (2b(R-D)+b^2)}{4\beta} + \frac{\lambda(\lambda+\gamma)bD}{2\beta} - b.$$

True Firm Value

$$V_D = P_D(R+b) - b = \frac{\lambda(\lambda+\gamma)(R-D+b)(R+b)}{2\beta} - b.$$

$$V_E = P_E R = \frac{\lambda(\lambda+\gamma)(R-D)R}{2\beta}.$$

Effect of OC on Security Choice

$$\Delta\hat{M}_D(\gamma = 0) = \frac{\lambda^2(2b(R-I)+b^2)}{4\beta} + \frac{\lambda^2 bD}{2\beta} - b < 0$$

=>

$$\frac{\partial \Delta\hat{M}_D}{\partial \gamma} > 0 \quad => \Delta\hat{M}_D(\gamma = \gamma_C) = 0.$$

$\gamma \in [0, \gamma_C],$ Manager issues Equity.

$\gamma > \gamma_C,$ Manager issues Debt.

Effect of OC on firm Values

$$V_E(\gamma = 0) = \frac{\lambda^2 (R - D) R}{2\beta}.$$

$$V_D(\gamma \geq \gamma_C) = \frac{\lambda(\lambda + \gamma)(R - D + b)(R + b)}{2\beta} - b.$$

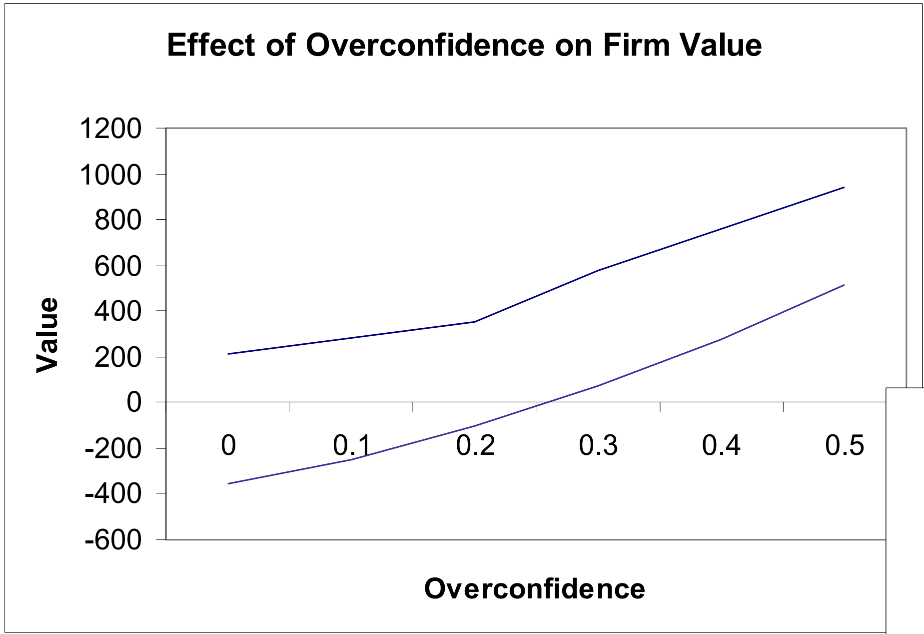
$$\Delta V_D = \frac{(\lambda^2 + \lambda\gamma)(2bR - Db + b^2) + \lambda\gamma R(R - D)}{2\beta} - b$$

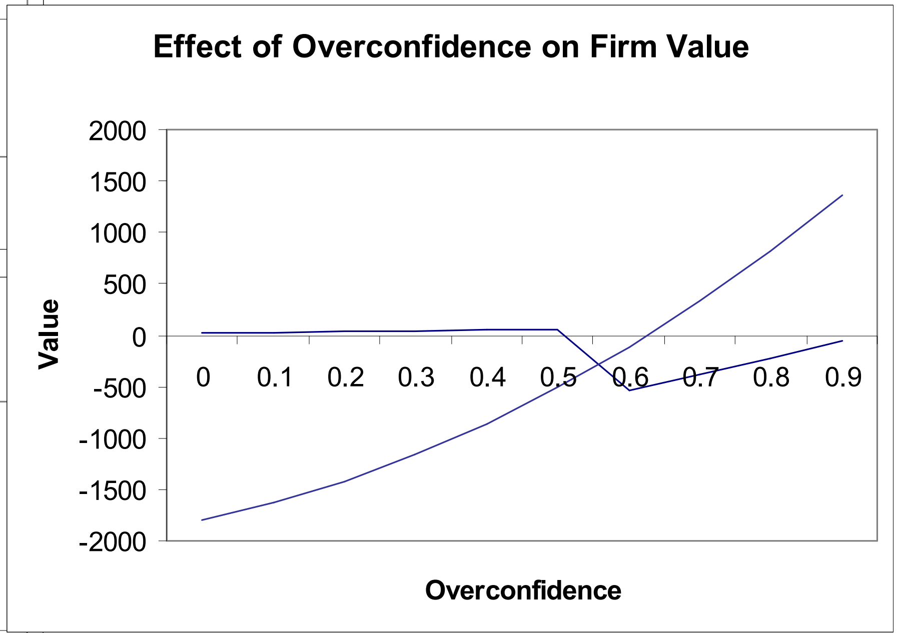
Results

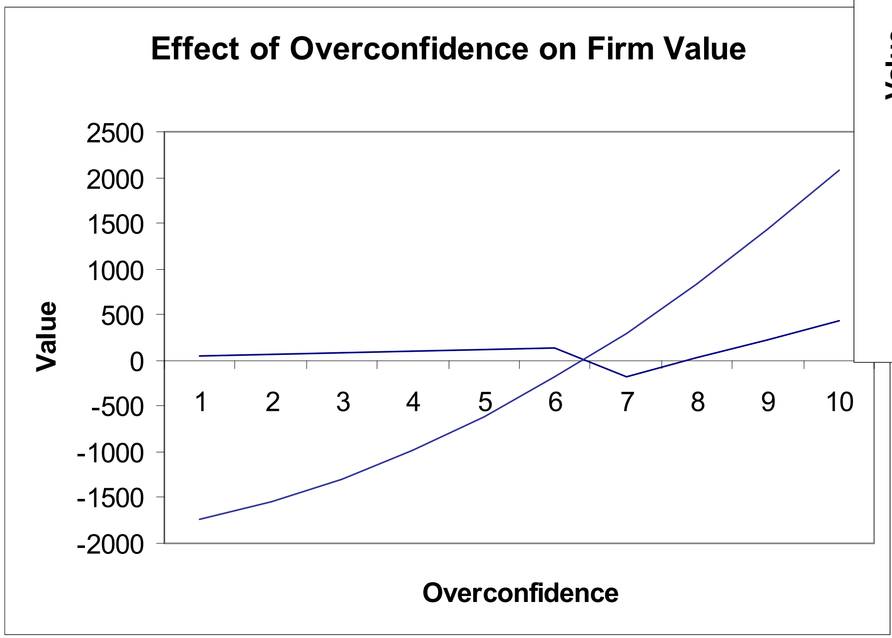
- For given security: firm value increasing in OC.
- If $\Delta V_D(\gamma = \gamma_C) > 0,$
- Firm value increasing for all OC: OC good.
- Optimal OC: $\gamma^* = \gamma_{\max}.$
- If $\Delta V_D(\gamma = \gamma_C) < 0,$
- Medium OC is bad. High OC is good.
- Or low good, high bad.

Results (continued).

- If $\Delta V_D(\gamma = \gamma_C) < 0,$
- 2 cases: Optimal OC: $\gamma^* = \gamma_{\max}.$
-
- Or Optimal OC: $\gamma^* = \gamma_C - \delta.$


Effect of Overconfidence on Firm Value
1200
1000
800
600
400
200
0
-200
-400
-600
Value
0
0.1
0.2
0.3
0.4
0.5
Overconfidence


Effect of Overconfidence on Firm Value
2000
1500
1000
500
0
-500
-1000
-1500
-2000
Value
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Overconfidence


Effect of Overconfidence on Firm Value
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
Value
1
2
3
4
5
6
7
8
9
10
Overconfidence

Conclusion.

- Overconfidence leads to higher effort level.
- Critical OC leads to debt: FD costs.
- Debt leads to higher effort level.
- Optimal OC depends on trade-off between higher effort and expected FD costs.

Future Research

- Optimal level of OC.
- Include Investment appraisal decision
- Other biases: eg Refusal to abandon.
- Regret.
- Emotions
- Hyperbolic discounting
- Is OC exogenous? Learning.