

CAPITAL STRUCTURE – BANKRUPTCY COST

BANKRUPTCY COSTS : costs associated with financial distress
⇒ difference in the value of the assets
before and after bankruptcy

FINANCIAL DISTRESS : a firm is in financial distress if its
cash flows are insufficient to pay its
debt payments

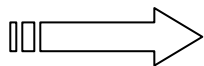
◆ Financial distress \Rightarrow

Firm is not economically viable –
no matter how good a firm is, high
enough debt level will lead to
financial distress

- ◆ Financial distress \Rightarrow Likely to be associated with economic distress

CONSEQUENCES OF FINANCIAL DISTRESS

- A formal bankruptcy liquidation under chapter 7 of the bankruptcy code (US)
- A formal bankruptcy reorganisation under chapter 11 of the bankruptcy code
- Informal workout negotiations between the creditor(s), the shareholders and the management
- Piecemeal liquidation of the assets or liquidation as a going concern
 - ⇒ Proceeds are paid out to creditors



Regardless of the avenue chosen bankruptcy is a costly process

BANKRUPTCY COSTS

1. DIRECT BANKRUPTCY COSTS

- legal and accountants fees
- Trustee fees
- Administrative costs – time devoted by management

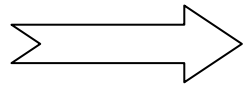
2. INDIRECT BANKRUPTCY COST

- Lost business due to fear of potential customers from discontinuity of services – airlines, durable goods
- Production inefficiencies because of trustee influence (in chapter 7)
- Lost investment opportunities due to conflict of interests between different parties
- Loss of important players of the organisation – moveable personal

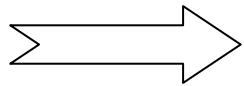
LEVERAGE AND BANKRUPTCY

- The likelihood of incurring these dead-weight bankruptcy costs increases with leverage
- The expected bankruptcy costs increases with leverage
- Expected bankruptcy cost are to be subtracted from the firm's value

$$V_L = V_U + PV(TS) - PV(EBC)$$



Trade-off the increased tax benefit against the increased expected bankruptcy cost



Evidence points to relative insignificant direct bankruptcy cost : various studies estimate these costs between 1 % to 20% of the value of the firm at the bankruptcy

WHAT SHOULD AND WHAT SHOULD NOT BE ACCOUNTED FOR AS BANKRUPTCY COSTS

Bankruptcy costs should be limited to the lesser of



Direct and indirect cost of a formal bankruptcy proceeding in courts : chapter 7 or 11 proceedings.

Direct and indirect cost of informal workout that resolves the financial distress.

AGENCY COSTS OF DEBT

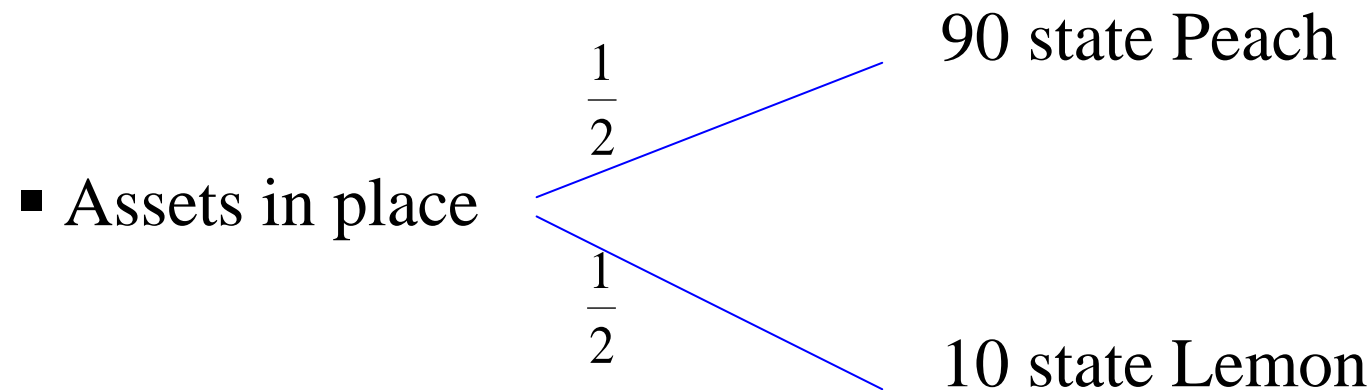
- Shareholders and debtholders may have conflict of interests
 - ⇒ costs associated with this conflict is called the agency cost of debt.
- 4 Types of suboptimal actions
 - which can be taken at the expense
 - of existing debt holders

1. Underinvestment \Rightarrow reject positive NPV project : debtholders value is increased by more than the project's NPV

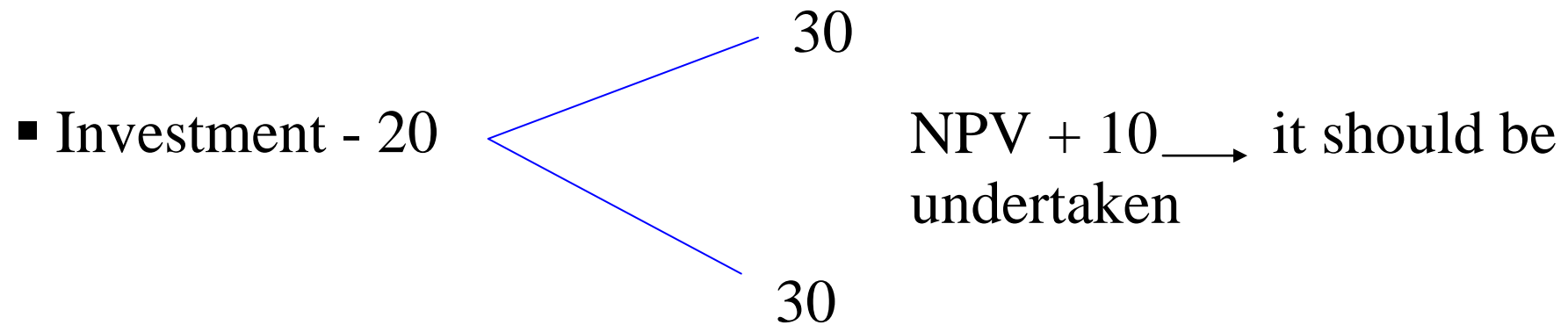
2. Asset substitution \Rightarrow Share holders \uparrow the riskiness of the assets because the debtholders bear the downside risk and shareholders receive the upside potential \Rightarrow overinvestment

3. Claim dilution \Rightarrow Share holders extract value from debt holders by issuing new senior debt
 \rightarrow payoff to the existing debtholders is reduced in some states of the world
 $\rightarrow \uparrow$ value to shareholders
4. Dividend pay out \Rightarrow Large dividend reduces the assets
 $\rightarrow \downarrow$ value to debtholders \rightarrow liquidating dividend : extreme case = empty shell

UNDER INVESTMENT



- Outstanding debt : face value = 40 (zero coupon) riskless interest rate is 0%



- Assume that share holders have to contribute the 20 investment lost

➡ Are they going to contribute ?

UNDERINVESTMENT AND THE SENIORITY OF DEBT

- It is possible that they would take the project if they did not have contribute their own funds :

If the debt is subordinated
Or junior to the existing debt
⇒ share holders will not go
for it.

If the new debt has equal
seniority or it is senior to the
existing debt ⇒ depends on
the specific situation.

INVESTMENT SUPPORTED BY SHARE HOLDERS

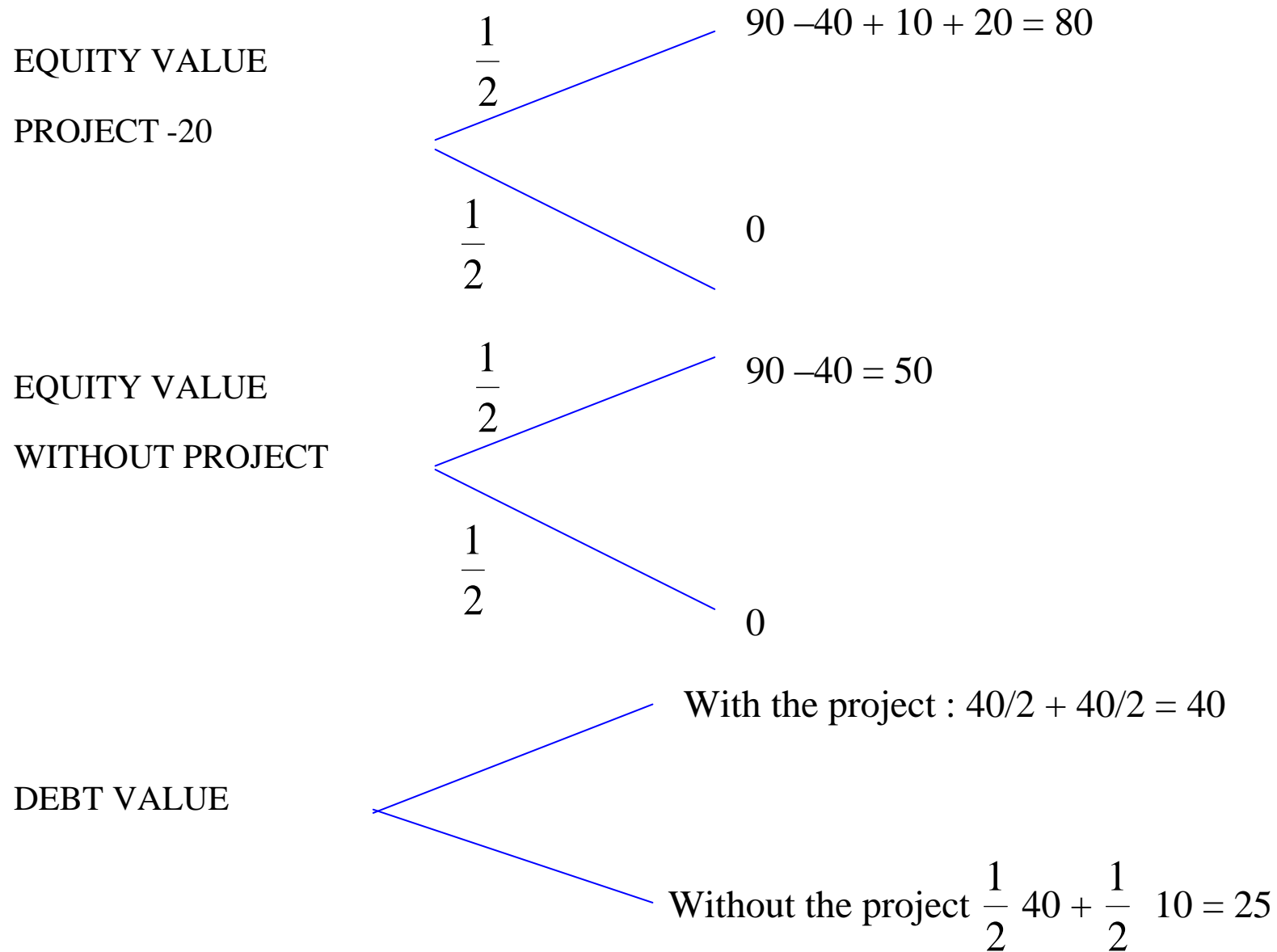
Peach P	ASSETS	LIABILITIES	
uncertain Assets	90	40	Debt
Investment	20	80	Equity
NPV	10		
Total	120	120	

Peach SA	ASSETS	LIABILITIES	
uncertain Assets	90	40	Debt
Investment	0	50	Equity
NPV	0		
Total	90	90	

Lemon P	ASSETS	LIABILITIES	
uncertain Assets	10	40	Debt
Investment	20	0	Equity
NPV	10		
Total	40	40	

Lemon SA	ASSETS	LIABILITIES	
uncertain Assets	10	10	Debt
Investment	0	0	Equity
NPV	0		
Total	10	10	

- Build the Balance Sheet in each case :
 - 2 states of the world : Peach and Lemon;
 - 2 investments decisions : Project (P) and Stand-alone (SA).
- Hereby hypothesis are :
 - Investment is financed by 20 of Equity in case of Project
 - As Debt has priority on Equity, if there is bankruptcy ($ASSETS < Debt$), Debt holders can at least cash in the amount of the ASSETS in place, whereas Equity is zero



Peach	P	SA
Debt	40	40
Equity	80	50

Lemon	P	SA
Debt	40	10
Equity	0	0

Expectations	P	SA	Value Added
E[Debt]	40	25	15
E[Equity]	40	25	15
E[V]	80	50	30

⇒ Shareholders reject the project because it increases the value of debt by 15 which is more than the NPV of the project :

⇒ $NPV(\text{Shareholders}) = -20 + 15 = -5$

⇒ $NPV(\text{Debtholders}) = 0$ because $E[\text{Debt}] = \text{face value of debt}$

Even if the shareholders hold the risk, they give the full NPV to debt holders plus a part of their investment !

Added value = Inv + NPV

⇒ all-equity firm would have taken this project ⇒ risky debt ⇒ loss in firm value ⇒ cost of debt

UNDERINVESTMENT WITH JUNIOR DEBT

Peach P	ASSETS	LIABILITIES		junior	Peach SA	ASSETS	LIABILITIES	
uncertain Assets	90	40	Senior Debt		uncertain Assets	90	40	Senior Debt
Investment	20	20	Junior Debt		Investment	0	0	Junior Debt
NPV	10	60	Equity		NPV	0	50	Equity
Total	120	120			Total	90	90	
Lemon P	ASSETS	LIABILITIES			Lemon SA	ASSETS	LIABILITIES	
uncertain Assets	10	40	Senior Debt		uncertain Assets	10	10	Senior Debt
Investment	20	0	Junior Debt		Investment	0	0	Junior Debt
NPV	10	0	Equity		NPV	0	0	Equity
Total	40	40			Total	10	10	

Hereby hypothesis are :

- Investment is financed by 20 of Junior Debt in case of Project;
- As Senior Debt has priority on Senior Debt, if there is bankruptcy ($ASSETS < Senior\ Debt$), Debt holders can at least cash in the amount of the ASSETS in place;
- What remains has to be split between Junior Debt and Equity with the same order of priority (Junior Debt “>” Equity)

P	Peach	Lemon	E[X]
Senior Debt	40	40	40
Junior Debt	20	0	10
Equity	60	0	30

SA	Peach	Lemon	E[X]
Senior Debt	40	10	25
Junior Debt	0	0	0
Equity	50	0	25

First calculate the face value of the new junior debt, F (it exists only in case P for the 2 states):

$$F = 10 = \frac{1}{2} * (20+0)$$

Next calculate the equity values :

$$E(\text{with project}) = 30 = (60+0)/2$$

$$E(\text{without project}) = 25 = (50+0)/2$$

Expectations	P	SA	Value Added
E[Senior Debt]	40	25	15
E[Junior Debt]	10	0	10
E[Equity]	30	25	5
E[V]	80	50	30

⇒ Shareholders do not reject the project, they get a part of NPV without financing (and thus without holding a risk).

The positive NPV of project is share among Shareholders and Senior Bankers.

Note that Junior Banker get a negative NPV of -10 whereas Senior Bankers get a positive NPV of $+15$ (with $+5$ in the project and $+10$ from the Junior Bankers on which they have priority)

⇒ Intuitively, the junior debtholders are paid only after existing debt holders are paid in full.

Old debtholders still fully benefit from the higher cash flow in the low state. Their position is the same because they have the first order priority on Junior Debt and Equity.

P	Peach	Lemon	E[X]
Senior Debt	40	40	40
Junior Debt	20	0	10
Equity	60	0	30

SA	Peach	Lemon	E[X]
Senior Debt	40	10	25
Junior Debt	0	0	0
Equity	50	0	25

UNDERINVESTMENT WITH SENIOR DEBT

Peach P	ASSETS	LIABILITIES	
uncertain Assets	90	60	Debt
Investment	20	60	Equity
NPV	10		
Total	120	120	

Peach SA	ASSETS	LIABILITIES	
uncertain Assets	90	40	Debt
Investment	0	50	Equity
NPV	0		
Total	90	90	

Lemon P	ASSETS	LIABILITIES	
uncertain Assets	10	40	Debt
Investment	20	0	Equity
NPV	10		
Total	40	40	

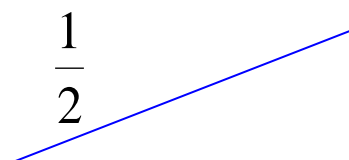
Lemon SA	ASSETS	LIABILITIES	
uncertain Assets	10	10	Debt
Investment	0	0	Equity
NPV	0		
Total	10	10	

- Same kind of hypothesis:
 - Investment is financed by 20 of Senior Debt in case of Project
 - As Debt has priority on Equity, if there is bankruptcy ($ASSETS < Debt$), Debt holders can at least cash in the amount of the ASSETS in place, whereas Equity is zero

P	Peach	Lemon	E[X]
Debt	60	40	50
Equity	60	0	30

SA	Peach	Lemon	E[X]
Debt	40	10	25
Equity	50	0	25

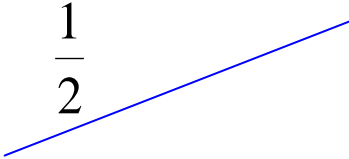
EQUITY VALUE
PROJECT



$\frac{1}{2}$ $90 + 10 + 20 - (40 + 20) = 60$

$\frac{1}{2}$ $10 + 10 + 20 - 40 = 0$

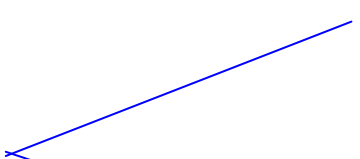
EQUITY VALUE
WITHOUT PROJECT



$\frac{1}{2}$ $90 - 40 = 50$

$\frac{1}{2}$ 0

DEBT VALUE



With the project : $60/2 + 40/2 = 50$

Without the project $\frac{1}{2} 40 + \frac{1}{2} 10 = 25$

Expectations	P	SA	Value Added
E[Debt]	50	25	25
E[Equity]	30	25	5
E[V]	80	50	30

- The existing debt holders benefit from the higher cash flow in the high state, by contributing 20 to the project, they get an expected return of 25 (so a +5 NPV). **Still the expected payoffs do not match the face value of debt**
- The share holders agree with the project as it brings them +5 in added Value, without any contribution in Equity but the debt holders get the main part of NPV

Peach	P	SA	Value Added
Debt	60	40	20
Equity	60	50	10

Lemon	P	SA	Value Added
Debt	40	10	30
Equity	0	0	0

Note : the same distribution between Debt holders and Share holders as in “Junior Debt” (if Junior debt was to be gathered with senior debt)

ASSET SUBSTITUTION OVERINVESTMENT

- risky debt \longrightarrow asset substitution
- share holders “go for broke” \longrightarrow limited liabilities \longrightarrow debtholders face the loss when the $CF < \text{debt obligation}$.

\longrightarrow share holders :

get the benefits in the good states when the $CF > \text{debt obligation}$

- \downarrow
- all else being equal share holders prefer risky projects

- \downarrow
- tend to substitute safe assets like cash with risky projects

\downarrow

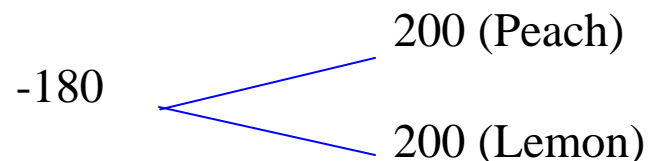
over investment : risky < 0 NPV projects

ASSET SUBSTITUTION

Let us consider a firm with an initial structure (Stand-Alone SA) :

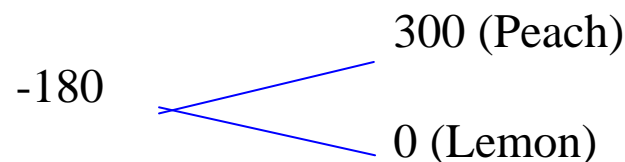
SA	ASSETS	LIABILITIES	
uncertain Assets	50		Debt
Investment		50	Equity
NPV			
Total	50	50	

Project 1 (P1)



$$NPV_1 = -180 + 200 = 20 \text{ (in both states Peach and Lemon, P1 Cashes 200 in)}$$

Project 2 (P2)



$$NPV_2 = -180 + (300 + 0)/2 = -180 + 150 = -30$$

Debt issue = 180 to finance P1 or P2

Debt Project 1

$$\begin{aligned} & \text{Min (250 ; 180) = 180} \\ & \text{Min (250 ; 180) = 180} \end{aligned}$$

$$V_D = 180$$

Peach P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Lemon P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Equity Project 1

$$\begin{aligned} & 50 + 200 - \text{Min (250 ; 180)} = 70 \\ & 50 + 200 - \text{Min (250 ; 180)} = 70 \end{aligned}$$

$$V_E = 70$$

$$V_D = 180$$

$$V = 250$$

Debt Project 2

$$\begin{aligned} & \text{Min } (350 ; 180) = 180 \\ & \text{Min } (50 ; 180) = 50 \end{aligned}$$

$$V_D = 115$$

Peach P2	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	170	Equity
NPV	120		
Total	350	350	

Lemon P2	ASSETS	LIABILITIES	
uncertain Assets	50	50	Debt
Investment	180	0	Equity
NPV	-180		
Total	50	50	

Equity Project 2

$$\begin{aligned} & 50 + 300 - \text{Min } (350 ; 180) = 170 \\ & 50 - \text{Min } (50 ; 180) = 0 \end{aligned}$$

$$V_E = 85$$

$$V_E = 85$$

$$V_D = 115$$

$$V = 200$$

Peach P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Lemon P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Peach	P1	P2	Value Added
Debt	180	180	0
Equity	70	170	100

Expectations	P1	P2	Value Added
E[Debt]	180	115	-65
E[Equity]	70	85	15
E[V]	250	200	-50

Peach P2	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	170	Equity
NPV	120		
Total	350	350	

Lemon P2	ASSETS	LIABILITIES	
uncertain Assets	50	50	Debt
Investment	180	0	Equity
NPV	-180		
Total	50	50	

Lemon	P1	P2	Value Added
Debt	180	50	-130
Equity	70	0	-70

By analogy with the Peach/Lemon case, we find that :

- $E[X]$, Equity increases by +15 with Project 2 compare to Project 1 (while debt -65);
- Share holders go for broke, they undertake the Project 2 because they benefit (+100) in the upside scenario whereas debt holders lose (-130) in the downside scenario (option of limited liability of share holders).

RATIONAL EXPECTATIONS

- If debt holders have information \Rightarrow they will not contribute 180 for a promised debt payment in Project 2

\Rightarrow they will ask for a higher face value of debt

- To get expected payoff of 180 ($E[\text{debt}] = 180$) require face value F :

$$0,5 * F + 0,5 * 50 = 180$$

$$F = 310$$

Peach P2	ASSETS	LIABILITIES		P2	Peach	Lemon
uncertain Assets	50	F	Debt	Debt	F	50
Investment	180	= 350 - F	Equity	Probability	0,5	0,5
NPV	120			E[Debt]	= 0,5*F + 0,5*50	
Total	350	350				
Lemon P2	ASSETS	LIABILITIES				
uncertain Assets	50	50	Debt			
Investment	180	0	Equity			
NPV	-180					
Total	50	50				

Let us compute this new Debt value ($F = 310$) in the Balance-Sheet :

- Debt holders do no longer bear the downside risk alone and gain the higher Cash Flow in high state.
- Their expected loss is reduced to zero and all the expected losses in both states are born by share holders

Peach P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Lemon P1	ASSETS	LIABILITIES	
uncertain Assets	50	180	Debt
Investment	180	70	Equity
NPV	20		
Total	250	250	

Peach	P1	P2	Value Added
Debt	180	310	130
Equity	70	40	-30

Expectations	P1	P2	Value Added
E[Debt]	180	180	0
E[Equity]	70	20	-50
E[V]	250	200	-50

Peach P2	ASSETS	LIABILITIES	
uncertain Assets	50	310	Debt
Investment	180	40	Equity
NPV	120		
Total	350	350	

Lemon P2	ASSETS	LIABILITIES	
uncertain Assets	50	50	Debt
Investment	180	0	Equity
NPV	-180		
Total	50	50	

Lemon	P1	P2	Value Added
Debt	180	50	-130
Equity	70	0	-70

Share holders will no longer prefer Project 2 but choose Project 1 :

- Share holders get all the positive NPV from project 1 (+20) ;
- With the new face value of Debt F, thank to which Debt holders are fully covered, Share holders would have get all the negative NPV from project 2;

SA	ASSETS	LIABILITIES	
uncertain Assets	50		Debt
Investment		50	Equity
NPV			
Total	50	50	

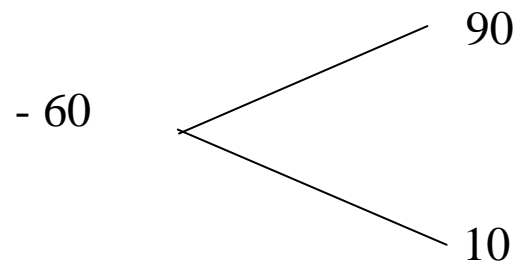
Expectations	SA	P1	Value Added
E[Debt]	0	180	180
E[Equity]	50	70	20
E[V]	50	250	200

Expectations	SA	P2	Value Added
E[Debt]	0	180	180
E[Equity]	50	20	-30
E[V]	50	200	150

OVERINVESTMENT

- Consider a firm
- asset which Yields = 50 next period
 - Retained earnings = 60
 - Debt outstanding = 110
 - $V_E = 0$, $V_D = 110$, $V = 110$

Project :



$$NPV = -60 + (90 + 10)/2 = -10$$

Peach P	ASSETS	LIABILITIES	
Assets	50	110	Debt
Investment	60	30	Equity
NPV	30		
Total	140	140	

Lemon P	ASSETS	LIABILITIES	
Assets	50	60	Debt
Investment	60	0	Equity
NPV	-50		
Total	60	60	

Peach SA	ASSETS	LIABILITIES	
Assets	50	110	Debt
Investment	60	0	Equity
NPV			
Total	110	110	

Lemon SA	ASSETS	LIABILITIES	
Assets	50	110	Debt
Investment	60	0	Equity
NPV			
Total	110	110	

Value of equity

$$\begin{array}{l} 50 + 90 - 110 = 30 \\ 0 \end{array}$$

$$V_E = 15$$

Value of debt

$$\begin{array}{l} 110 \\ 50 + 60 \end{array}$$

$$V_D = 85$$

$$V = 100$$

P	Peach	Lemon	E[X]
Debt	110	60	85
Equity	30	0	15

SA	Peach	Lemon	E[X]
Debt	110	110	110
Equity	0	0	0

INTEGRATION

- Shareholders go for broke.
- Limited liabilities  gamble with debtholders money.

Peach	P	SA	Value Added
Debt	110	110	0
Equity	30	0	30

Lemon	P	SA	Value Added
Debt	60	110	-50
Equity	0	0	0

Bad state : shareholders resort to their limited liabilities provision
debtholders lose $50 = 60 - 10$.

Good state : shareholders get the entire gain of $30 = 90 - 60$

Expectations	P	SA	Value Added
E[Debt]	85	110	-25
E[Equity]	15	0	15
E[V]	100	110	-10

- ⇒ debt value decreases by $\frac{1}{2} \times 50 = 25$
 ⇒ equity value increases by $\frac{1}{2} \times 30 = 15$
 ⇒ total firm value is reduced by the NPV = -10

What happens if debt holders want to be fully covered ? i.e they want to be sure to get 110 in return :

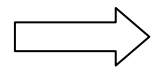
- If debt holders have information, they will not contribute 110 for a promised debt payment in Project

Peach P	ASSETS	LIABILITIES	
uncertain Assets	50	F	Debt
Investment	60	= 140 - F	Equity
NPV	30		
Total	140	140	

P2	Peach	Lemon
Debt	F	60
Probability	0,5	0,5
E[Debt]	= 0,5*F + 0,5*60	

Lemon P	ASSETS	LIABILITIES	
uncertain Assets	50	60	Debt
Investment	60	= 60 - F	Equity
NPV	-50		
Total	60	60	

$$0,5*F + 0,5*60 = 110$$



they will ask for a higher face value of debt to get expected payoff of 110
($E[\text{debt}] = 110$) require face value F :

$$E[\text{debt}] = 0,5 * F + 0,5 * 60 = 110$$

$$F = 160$$

Is this full coverage possible ?

The firm ability to give a fair value to the debt is limited even in the stand-alone case (the value of debt is less than its face value F)

Peach P	ASSETS	LIABILITIES	
Assets	50	140	Debt
Investment	60	0	Equity
NPV	30		
Total	140	140	

Lemon P	ASSETS	LIABILITIES	
Assets	50	60	Debt
Investment	60	0	Equity
NPV	-50		
Total	60	60	

Peach	P	SA	Value Added
Debt	140	110	30
Equity	0	0	0

Peach SA	ASSETS	LIABILITIES	
Assets	50	110	Debt
Investment	60	0	Equity
NPV			
Total	110	110	

Lemon SA	ASSETS	LIABILITIES	
Assets	50	110	Debt
Investment	60	0	Equity
NPV			
Total	110	110	

Lemon	P	SA	Value Added
Debt	60	110	-50
Equity	0	0	0

Thank to the pringing of debt :

- Debt Holders benefit the higher cash in good state (whereas all positive NPV was attributed to share holders in latter case)
- Debt Holders still bear all the negative effect of bad state (as in latter case)

Peach	P	SA	Value Added
Debt	140	110	30
Equity	0	0	0

Lemon	P	SA	Value Added
Debt	60	110	-50
Equity	0	0	0

P	Peach	Lemon	E[X]
Debt	140	60	100
Equity	0	0	0

SA	Peach	Lemon	E[X]
Debt	110	110	110
Equity	0	0	0

Expectations	P	SA	Value Added
E[Debt]	100	110	-10
E[Equity]	0	0	0
E[V]	100	110	-10

As a result, the expected flow does not reach 110 for debt holders but only 100 because of the limited capacity of the company. At least, debt holders would have get all positive NPV from share holders so as to dissuade they from undertaking the project

AGENCY COSTS OF DEBT AND FIRM VALUE

- Debtholders price project themselves and, therefore, shareholders bear the entire cost.
- Because debtholders get a zero NPV transaction, the agency costs of debt must be subtracted away from a firm's value.

Thus,

$$V_L = V_U + PV(TS) - PV(EBC) - PV(AC)$$

AGENCY COSTS AND FIRM VALUE

underinvestment project NPV = 10 = $-20 + (30 + 30)/2$

Project
 $\begin{array}{l} \nearrow 30 \text{ (Peach)} \\ \searrow 30 \text{ (Lemon)} \end{array}$

Assets in Place
 $\begin{array}{l} \nearrow 90 \text{ (Peach)} \\ \searrow 10 \text{ (Lemon)} \end{array}$

Equity
 $\begin{array}{l} \nearrow 80 = -40 + 90 + 30 \\ \searrow 0 = -40 + 10 + 30 \end{array}$

$$V_E = 40 = (80 + 0)/2$$

Peach P	ASSETS	LIABILITIES		equity	Peach SA	ASSETS	LIABILITIES	
uncertain Assets	90	40	Debt		uncertain Assets	90	40	Debt
Investment	20	80	Equity		Investment	0	50	Equity
NPV	10				NPV	0		
Total	120	120			Total	90	90	

Lemon P	ASSETS	LIABILITIES	
uncertain Assets	10	40	Debt
Investment	20	0	Equity
NPV	10		
Total	40	40	

P	Peach	Lemon	E[X]
Debt	40	40	40
Equity	80	0	40

Peach	P	SA	Value Added
Debt	40	40	0
Equity	80	50	30

Expectations	P	SA	Value Added
E[Senior Debt]	40	25	15
E[Equity]	40	25	15
E[V]	80	50	30

Lemon SA	ASSETS	LIABILITIES	
uncertain Assets	10	10	Debt
Investment	0	0	Equity
NPV	0		
Total	10	10	

SA	Peach	Lemon	E[X]
Debt	40	10	25
Equity	50	0	25

Lemon	P	SA	Value Added
Debt	40	10	30
Equity	0	0	0

⇒ debt holders understand shareholders' incentives and are willing to pay only the market value of debt if the project is rejected = 25

Peach P	ASSETS	LIABILITIES		equity	Peach SA	ASSETS	LIABILITIES	
uncertain Assets	90	40	Debt		uncertain Assets	90	25	Debt
Investment	20	80	Equity		Investment	0	65	Equity
NPV	10				NPV	0		
Total	120	120			Total	90	90	

Lemon P	ASSETS	LIABILITIES	
uncertain Assets	10	40	Debt
Investment	20	0	Equity
NPV	10		
Total	40	40	

P	Peach	Lemon	E[X]
Debt	40	40	40
Equity	80	0	40

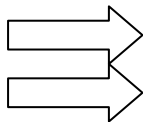
Peach	P	SA	Value Added
Debt	40	25	15
Equity	80	65	15
E[V]	120	90	30

Lemon	P	SA	Value Added
Debt	40	10	30
Equity	0	0	0
E[V]	40	10	30

Expectations	P	SA	Value Added
E[Senior Debt]	40	17,5	22,5
E[Equity]	40	32,5	7,5
E[V]	80	50	30

$$25 \begin{cases} 90 + 30 - D \\ 10 + 30 - D \end{cases}$$

$$D = 25$$



$V_E = 25$ $V_D = 25$ $V = 50$
 share holders bear the entire cost of 10 of rejecting the project

ASSET SUBSTITUTION

- Debtholders are willing to pay 110 when the debt is issued if they believe the bad project will be rejected.
 - ⇒ equity position is worthless
- Once debtholders realise that the firm will take the project they pay only 85 for the debt ⇒ combined with a equity position of 15.
 - ⇒ share holders are losing the value.
 - ⇒ notice that what seems at first as a way of ripping of the debtholders, turns to cost the equity holders.

shareholders have a strong incentive to commit not to exploit debt holders in the future

ALLEVIATE THE AGENCY COST OF DEBT

Monitoring : they will pay a third party like accountants to monitor their own manager.

Restrictive covenants: shareholders have the incentive to impose covenants that will prevent their manager from playing these games

⇒ It is not the debtholders who seek to include covenants in the debts contract : they are only interested in a fair deal – given the attached covenants if any.

RESTRICTIVE COVENANTS

1. dividend restrictions restrict cash distribution and other assets distribution \implies usually they becomes binding as debt becomes risky.
2. restrictions on debt issues these place limit on the amount on new debt and put restrictions on the seniority of such debt \implies limit on rental and lease agreement.

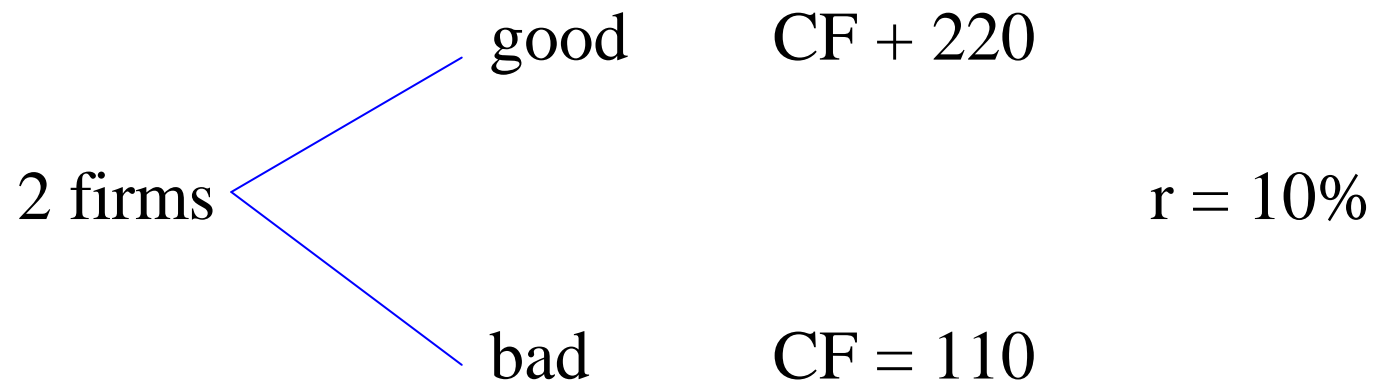
3. restrictions on investment policy these impose assets maintenance requirements, restrict the disposition of assets and the firm's ability to make investment in financial securities
⇒ restrictions on M&A

4. bonding and monitoring activities financial reporting requirements – insurance requirements and disclosure of accounting changes

5. Payoff pattern covenants These specify conditions affecting the pattern of CF in the form of sinking form requirements, conversion privileges, call provisions and maturity structure convertible bond : weaker incentive for asset substitution

CAPITAL STRUCTURE - SIGNALING

IDEA : privately informed managers of undervalued firms can signal their favourable information by taking on debt.



SYMETRIC INFORMATION

$$V_0 (G) = 200$$

$$V_0 (B) = 100$$

MM's world firm's structures are independent of their capital structure.

SYMETRIC INFORMATION

Managers know their type but capital markets assess equal probability that each firm is G or B

$$V_0 = \frac{1}{2} 200 + \frac{1}{2} 100 = 150$$



The G – manager : firm undervalued

The B – manager : firm overvalued

- ➡ The G – manager can hold a press conference and announce that his firm is undervalued \implies B – manager will do the same.
- ➡ Communication must be credible : “The manager must put his money where his mouth is”.

Costly to mimic

Costlier to the lower value firm than to the higher value firm.

DEBT SIGNALLING

- debt + right incentive scheme = credible communication device.
- compensation contract
 - rewards the managers if the firm is solvent.
 - penalises him when the firm defaults.
- if the market believes that higher debt signals higher value
⇒ both managers want to take debt because their reward increases with firm value that in turn increase with the level of debt
- ◇ manager of the inferior firm has higher cost from taking debt.

COMPENSATION CONTRACT

$$\begin{array}{ccc}
 \diamond & \begin{array}{c} 3\% \text{ value of} \\ \text{the firm} \\ \hline \text{beginning of} \\ \text{the period} \end{array} & \begin{array}{c} + \\ \\ \end{array} & \begin{array}{c} 7\% \text{ value of} \\ \text{the firm} \\ \hline \text{end of the} \\ \text{period} \end{array} \\
 & & & \underbrace{\hspace{10em}} \\
 & & & \text{if no default}
 \end{array}$$

◇ suppose G issues 120 = debt
 B nothing
 G \Rightarrow distribute 109 proceeds to the shareholders

◇ market increases value from 150 to 200

◇ manager gets $3\% \cdot 200 + 7\% \cdot \frac{220}{1.1} = 200$

◇ if he does not issue he is recognised as type B and gets $3\% \cdot 100 + 7\% \cdot 220 = 170$

- } he is better off issuing the debt.

COMPENSATION CONTRACT

◇ Question : if B mimics ?

- He gets $3 \% 100 + 7 \% \frac{110}{1.1} = 100$ If he does not issue debt
- He gets $3 \% 200 = 60$ If he does
 \Rightarrow He does not mimic.

COMPENSATION CONTRACT

◇ Benefit of mimicking is 3 % ($200 - 100$)

Cost is 7 % ($110 / 1.1$)

⇒ Costs > benefits

◇ Market beliefs are rational

- G issues 120

- B does not

⇒ Signalling is costless
If B mimics it is costly

IMPLICATIONS

1. Debt = signal of quality
2. \uparrow Debt \Rightarrow Good news
3. New capital structure : new beliefs about the firm
4. Informational effects of debt should be considered when you change capital structure otherwise it may backfire you.
 - \Rightarrow Unexpected increase in bankruptcy costs induce you to optimally reduce debt to avoid bankruptcy \rightarrow information