The value of flexibility

Corporate Finance

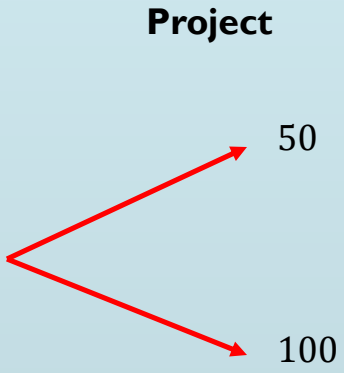
Optionality matters

- Most corporate decisions come with a lot of flexibility, i.e. the option to adjust as more information arises
- Most investment projects have option-like aspects: develop (call), expand (call), upgrade (call), contract (put), abandon (put)…
- These real options account for a significant part of value
- In well functioning markets where NPVs on activated projects should not be too far from zero, investments only make sense if and when the value of those options is properly measured

Example

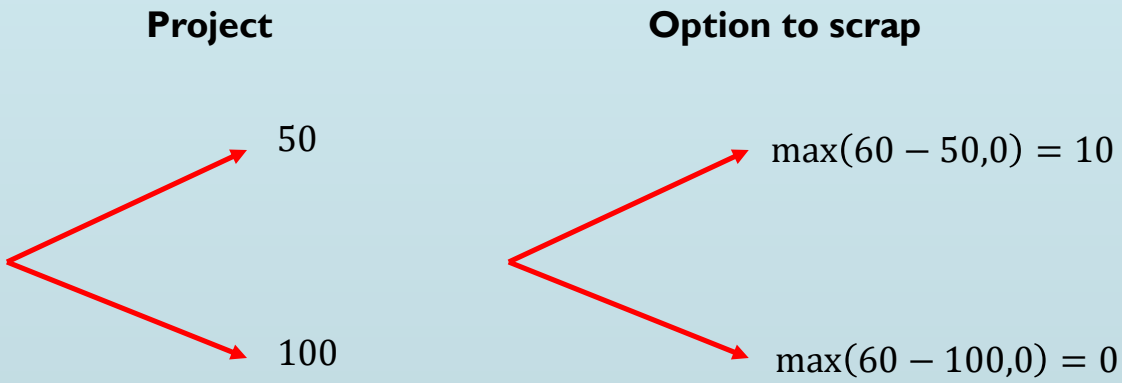
- Consider an investment project whose continuation value at date 1 is either $100M$ or $50M$
- It can be activated in two distinct locations
- In location 1, there is no exit strategy and you are stuck with the project
- In location 2, the project can be scrapped for $60M$ (instead of begin continued and upon discovering continuation value)
- Project 2= Project 1 project + option to scrap
- NPV(project 2)= NPV(project 1) + value of option to scrap
- Assume the market value of the location 1 project is $70M$
- Risk-free rate is 5%
- What is the value of the option to scrap? What is the value of location 2 project?

Replication



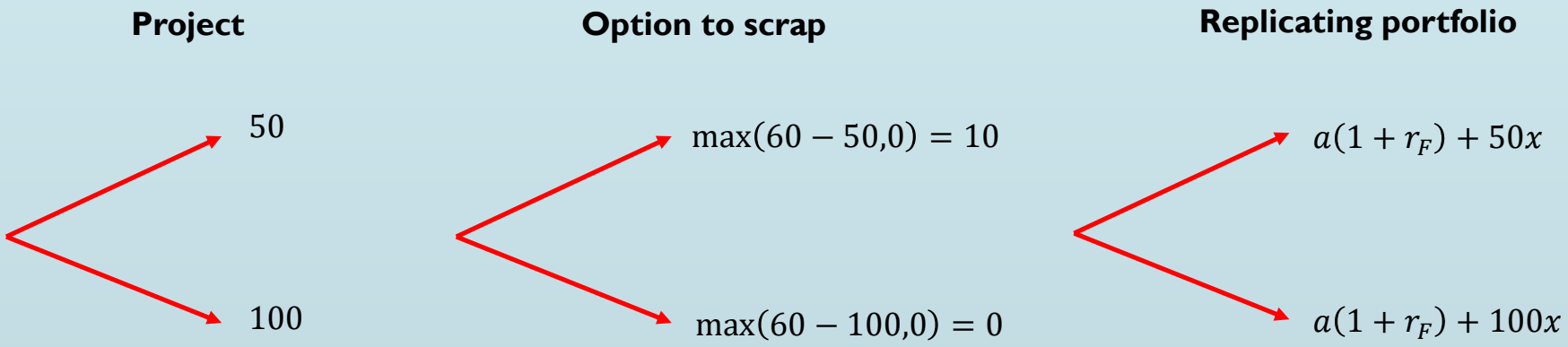
1. Invest $\$a$ at risk free rate and buy fraction x of project 1
2. Set a and x so that option to scrap and replicating portfolio have the same payoff
3. Value of option is $a + 70x$, by the law of one price

Replication



1. Invest $\$a$ at risk free rate and buy fraction x of project 1
2. Set a and x so that option to scrap and replicating portfolio have the same payoff
3. Value of option is $a + 70x$, by the law of one price

Replication



1. Invest $\$a$ at risk free rate and buy fraction x of project 1
2. Set a and x so that option to scrap and replicating portfolio have the same payoff
3. Value of option is $a + 70x$, by the law of one price

Example 2: the option to delay refinancing

- Return to the refi problem from chapter 1
- A corporation has the option to prepay (*call*) a bond with 5 years to maturity, $\$100M$ in remaining principal, a 10% yearly rate, fixed and monthly payments
- It can replace it with a 5 year bond with the same payment structure but a 9% yearly rate
- Prepayment penalties are 2% of outstanding principal
- "Tomorrow," rates will be either 8.5% or 9.5%
- Should Risk free rate between today and tomorrow is 0.005%
- Should the company wait to refinance?

Why not do both?

- If you refi today, refinancing again tomorrow to go from 9% to 8.5% will not make sense because the increment won't justify bearing the cost
- Exercising the option today, kills the option to exercise it tomorrow
- That is a cost (an opportunity cost)
- So we should exercise only if PV(refi) exceeds refi cost plus the value of the option we killed