4. Strategic Commitment & Competition

Philips' decision in 1982:

- to build a CD plant in the U.S., or
- to delay its decision, to learn the appeal of the new recording medium.

Building first might discourage others from investing in their own capacity, which might avert overcapacity and possibly brutal price competition.

A MES plant (minimum *AC*) would cost $25m, and be virtually sunk cost — no alternative uses.

Strategic commitments: decisions that —

- have long-term impacts and
- are difficult to reverse.

Examples: investments in new capacity, or introductions of new products.

Can have important influence on nature of competition in an industry.

Expanding capacity could deter new entrants, but intensify pricing competition among incumbents.

Firms should *look forward and reason backwards* to anticipate the consequences of their commitments on competition.

Tactical decisions: decisions that —

- have short-term impacts only and
- are easy to reverse, or adapt to current market situation.

Examples: what price to charge or how much output to produce in a given quarter.

The details of market competition can have an important influence on the kinds and levels of commitment that firms make.

When successful, commitments can shape rivals' expectations and alter rivals' behaviour to the committing firm's advantage.

But risky: lead to loss of flexibility, which may be costly if rivals behave differently.

A classic example is Cortés' order on arriving in Mexico that all but one of his ships be burnt or disabled. Destroying his ships gave Cortés two advantages:

- knowing that desertion or even retreat was impossible, his own soldiers were united in fighting to the end, and
- the opposition understood this commitment, having observed the burning — they chose to retreat rather than fight such a determined opponent.

To be effective, commitments must be credibly communicated to one's rivals.

4.1 Why Commitment Is Important

Two firms, Able and Bravo, are competing in an oligopolistic industry.

Able, the dominant firm, is contemplating its capacity strategy, with two options:

- "aggressive," a large and rapid increase in capacity aimed at increasing its market share, and
- "soft," no change in the firm's capacity.

Bravo, a smaller competitor, faces a similar choice.

The table shows the NPV (net present value) associated with each combination of strategies:

		Bravo	
		Aggressive	Soft
Able	Aggressive	12.5, 4.5	16.5, 5
	Soft	15, 6.5	18, 6

Simultaneous Payoffs (Able, Bravo)

From Lecture 1-37, there is a unique Nash equilibrium: Able chooses Soft and Bravo chooses Aggressive, to give a payoff to Able of 15.

But from Able's point of view, this combination is not as good as if both Able and Bravo chose Soft → Able's payoff of 18.

Without Bravo's cooperation, this outcome will not be reached.

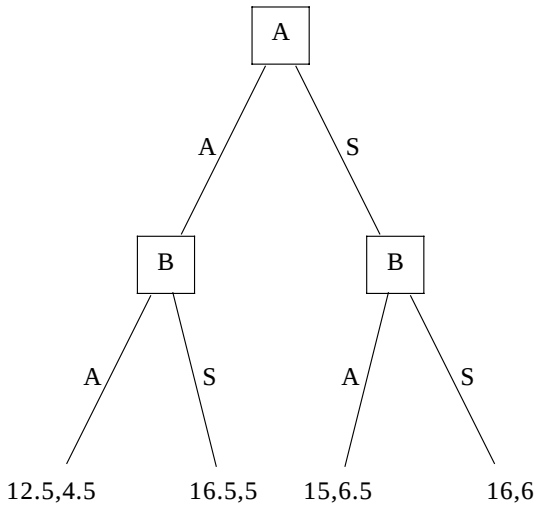
What if Able committed to choose Aggressive whatever Bravo chose? If this were credible, then Bravo would choose Soft (for a higher payoff of 5, over 4.5), which in turn would give Able a payoff of 16.5.

How to commit to Aggressive on Able's part?

It's not enough to announce it or even to promise[1] it: not a *credible* move, since Bravo knows that Soft is a *dominant strategy* for Able: no matter what Bravo does, Able's payoff is higher if it's Soft.

One way is for Able to make a preemptive move, by accelerating its decision process and aggressively expanding its capacity before Bravo decides what to do: turns a *simultaneous* interaction into a *sequential* game:

1. Talk is cheap ... because supply exceeds demand.



Sequential Payoffs (Able, Bravo)

Lecture 1-40: {Able: Soft, Bravo: Aggressive} is a subgame perfect Nash equilibrium of the sequential game.

Able may be able to credibly commit by demonstrating that it was rewarding its managers on market share rather than the NPV profit of the payoffs: more profitable for the managers to go for capacity aggressively, even if the company's payoff appears lower.

Paradoxically, Able's position is strengthened if it can reduce its options and tie itself to Aggressive.

Inflexibility can have value: strategic commitments that limit choices can actual improve one's position.

How?

By altering one's rivals' expectations of about how one will compete, and so altering their decisions.

Here, by committing to what seems an inferior decision (Aggression), Able alters Bravo's expectations and its action, to Able's advantage.

Commitments must be credible and communicated and understandable to be of value.

- By their nature, strategic commitments (threats or promises) are intended to change others' expectations and behaviour; others must wonder whether the committed player mightn't fall back on the uncommitted best action: it's nothing but a bluff.
- The movie *Dr Strangelove* describes a Russian commitment — The Doomsday Machine — to respond to any incursion into Soviet airspace with an attack of nuclear missiles on the U.S. Unfortunately, the Russian have overlooked telling the Americans about it ...
- The rivals' managers must understand the implications for their own firms' payoffs of Able's ability to price low with its excess capacity.

To be truly credible, the commitment must be *irreversible*: very costly to stop or reverse.

4.1.1 The Eight-Fold Path to Credibility[2]

Consider the following statements from the media:

- "Continental Airlines said yesterday that it would raise airfares on about two-thirds of its routes ... to take effect September 5."
  New York Times, August 29, 1992.
- "Continental Airlines has dropped its plan to raise domestic airfares by 5%."
  USA-Today, 1992.
- "Microsoft officials won't confirm or deny that its commitment to ACE with OS/2 3.0 was a bluff, but the [previous] announcement bought them about six months."
  UnixWorld, February 1992.
- "On January 5, Boeing, the world's top aircraft maker, announced it was building a plane with 600 to 800 seats, the biggest and most expensive airliner ever. Some in the industry suggest Boeing's move is a bluff to preempt Airbus from forging ahead with a similar plane."
  Business Week, 1993.

2. From Avinash Dixit and Barry Nalebuff's *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life* (NY: Norton, 1991).

All strategic moves suffer from *credibility*.

— If it is not in your interest to carry out a strategic move (unconditional move, threat, or promise), then your opponents will look forward and reason back to realise that you have *no incentive* to follow through.

— If your strategic move is not a credible commitment, then it will ineffective in altering your opponents' behaviour by changing their expectations about your responses to their actions.

Are you engaging in *tactical bluffing*?

If the opposition decides you are, then your efforts to convince otherwise will be in vain.

Eight ways of establishing credible commitment:

4.1.1.1 Reputation:

- In a once-in-a-lifetime situation, reputation may not matter (tourists, beware!)
- but, in a repeated interaction with one player or parallel games with several players, reputation may be valuable.
- Sometimes *destroying* your reputation can create the possibility for a commitment, by committing you *not* to take actions in the future that you can predict will not be in your best interests.
- Despite a commitment never to negotiate with hijackers, what if the government reaches a negotiated settlement and then breaks this new commitment by attacking the hijackers?

— with this action the government denies itself the ability to negotiate with hijackers in the future: how could hijackers ever be able to believe the government's future promises?

- The destruction of the credibility of a promise makes credible the threat never to negotiate.
- The player cultivates a reputation with the aim of creating credibility for her future unconditional commitments, threats, and promises.
- Pride in our word, our promises, is taught as an end in itself, but it also improve the credibility of our daily commitments.
- *Irrationality* may make credible the player's threats, however outrageous — Ghaddafi, Saddam Hossein, the Ayatolah Khomeini — what wouldn't an irrational player do if he were convinced in his own cause.

So, it may be rational to be irrational!

4.1.1.2 Contracts:

- Agreeing to punishment if you fail to follow through will make your commitments credible.
- But beware, contracts can be **re**negotiated,
- *so for the contracting approach to be successful, the party who enforces the action or collects the penalty must have some independent incentive to do so.*
- If breaking a contract produces damages, then renegotiating the contract is a less attractive option mutually, and may no longer be mutually attractive at all.
- Possible to write contracts with neutral parties as enforcers, who must be made to care about whether the commitment is kept.
- Contracts alone cannot overcome the credibility problem.
- See "the most favoured customer clause" (MFCC) in Lecture 5. This is a credible commitment *not* to compete on price, because any discount must be offered to all its customers.

4.1.1.3 Cutting Off Communication

- Can make a decision truly irreversible.
  - — Extreme form: last will and testament.
  - — Posting a letter/receiving a letter.
  - — Other examples?
- Problem: absence may reduce enforceability of the contract: trustees.

4.1.1.4 Burning Your Bridges (or Sinking Your Ships)

- Figuratively burning one's bridges with a particular group may increase one's credibility with other groups.
- Pulling down the Berlin Wall as a burnt bridge for Eastern Germany's reformist government.
- Any relationship-specific investments, which are largely sunk costs, have high commitment value, such as Philips' CD-pressing plant.
- Other examples?

4.1.1.5 Leaving the Outcome beyond Your Control

- Dr Strangelove's doomsday device;
  - — its automatic trigger was essential;
  - — it made a good deterrent because it made aggressive action tantamount to suicide.
  - — But a cost: what if the aggression is based on a mistake?
  - — Cannot turn off the doomsday device's automatic retaliation.
- Want a threat no stronger than necessary to deter the rival.
- Schelling's *brinkmanship*:
  - — establish a *risk*, but not a certainty, that retaliation will occur.
  - — A risk cannot be ignored, even if it seems very unlikely. (U.S. versus the USSR in Europe, Cuban missile crisis.)

4.1.1.6 Moving in Steps

- Break the threat or promise into many, small pieces, and then each is dealt with separately, one after the other.
- Establishment of trust? Convert a once-off into a repeated game, in which reputation is important.
- End-game strategies?

4.1.1.7 Teamwork

- Peer pressure in AA. Pride and self-respect are lost when commitments are broken — enough to drive one to drink?
- As well as social pressure, the army uses coercive desertion penalties as well as inculcation of love of country and loyalty to one's mates to induce commitment.
- Honour code at Stanford makes not only cheating an offence but also failing to report others who you know to have cheated; exams are not monitored.

4.1.1.8 Mandated Negotiating Agents

- One's bargaining situation can be improved if one has an agent to negotiate on one's behalf.
- Buying a new car — "I'm on your side and I want the sale, let me ask the boss about the trade-in price".
- A union leader may be less flexible because of his reputation. Or an agent may not have authority to compromise
- Should voluntary commitments subsequently abandoned be more severely regarded than abandonment of externally imposed commitments by the agent?

Three underlying principles:

I. to *change the payoffs* of the game (Items 1, 2, 6 above) — to make it in your interest to follow through on your commitment:

— turn a threat ➟ a warning,

— turn a promise ➟ an assurance.

II. to *limit your ability* to back out of a commitment (3, 4, 5, 6) — three possibilities: deny yourself any opportunity to back down,

— by cutting yourself off from the situation, or

— by destroying any avenues of retreat, or even

— by removing yourself from the decision-making position and leaving the outcome to chance.

III. to *use others to help you maintain commitment* (7, 8) — a team may achieve credibility more easily than an individual.

Case: Commitment & Irreversibility in the Airline Industry

Survey of airline executives and industry analysts: to study the degree of irreversibility in various competitive moves in the airlines business.

Highest perceived irreversibility:

- Mergers & acquisitions: requires cooperation of other airlines, investment bankers, regulators; significant unrecoverable negotiation costs; significant transaction-specific changes to operating procedures and systems.
- Hub creation: requires transaction-specific assets (e.g. maintenance facilities).
- Feeder alliances with commuter airlines: hard to reverse because employees and unions would oppose.

Easiest moves to reverse:

- Promotions decisions to abandon a route, increases in commission rates for travel agents.

Not so easily reversed:

- Price cuts: cost of advertising the cut makes the airline maintain the cut for some time.
- Price cuts are visible to rivals (via computer) and → changes in airlines' profitability
  ∴ more provocative than other, more reversible, actions.

  Rivals less likely to match a hard-to-reverse move:

  - the more credible a firm's commitment to play Aggressive,
  - the more likely its rivals will play Soft,
  - so a preemptive takeover is less likely to provoke a matching response than
  - would a short-term promo or ad campaign.

4.2 Strategic Commitment & Competition

4.2.1 Strategic complements & strategic substitutes

Return to the two models of oligopolistic behaviour in Lecture 3: Cournot quantity competition and Bertrand price competition.

In the two-firm Cournot model, we derived each firm's reaction function: each firm's profit-maximising quantity as a function of the quantity chosen by its rival.

The two functions were (Lecture 3-29):

$$R_2: \; Q_2^* = \tfrac{1}{2}(9 - Q_1)$$

$$R_1: \; Q_1^* = \tfrac{1}{2}(9 - Q_2)$$

These two reaction functions are downwards-sloping: as one's rival's output increases, one's best response is a smaller quantity, as shown. See Figure below.

The firm's actions are *strategic substitutes*.

In the Bertrand price-competition model, with horizontally differentiated (Lecture 3-25, 3-34) products, the reaction functions are upwards sloping: as one's rival's price falls, one's best response is a price reduction of one's own. See Figure below.

The firm's actions are *strategic complements*.

Determining whether actions are strategic complements or substitutes involves careful consideration of the competitive interdependence among firms.

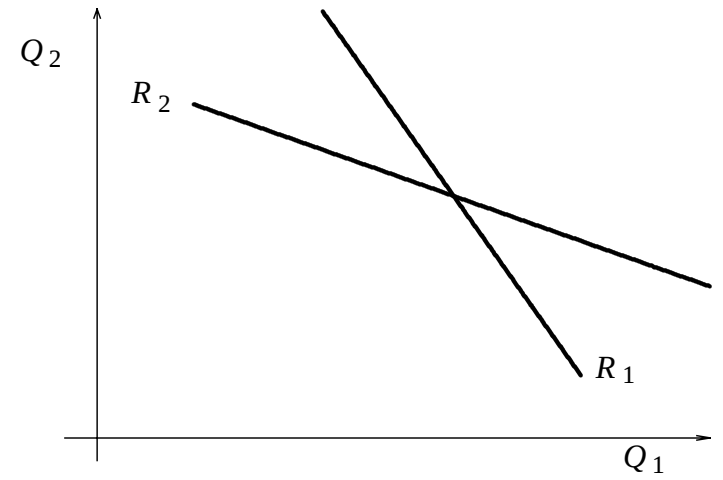
General rule of thumb: prices almost always strategic complements; quantity and capacity decisions are nearly always strategic substitutes.

When actions are strategic complements, one firm's aggressive behaviour leads its competitors to behave more aggressively as well.

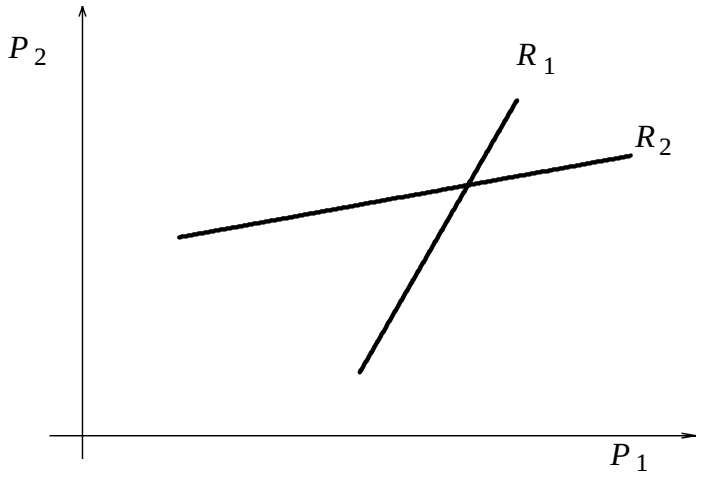
So a lowering a price (an aggressive move), its rival will also lower its price (an aggressive response) with a price reaction function that is upwards sloping.

When actions are strategic substitutes, one firm's aggressive behaviour leads its competitors to behave less aggressively.

So a increasing output or capacity (an aggressive move), its rival will lower its output or not increase its capacity (a soft response), with a quantity reaction function that is downwards sloping.



Reaction Functions of Strategic Substitutes: Cournot Quantity Competition



Reaction Functions of Strategic Complements: Bertrand Price Competition

Case: World Market for Memory Chips

From Lecture 3-33, Cournot quantity setting can be thought of as a market in which firms first choose capacities and then compete on price, suggesting that capacities are strategic substitutes, and that one firm's reduction in capacity would induce its rivals to expand their capacities.

Driven by burgeoning demand for computers and cellular phones and cars, the demand for memory chips has exploded. New chip factories cost US$1 billion, but they can be obsolete within three years: the timing of new investments in factories is critical.

Although they dominated, in 1984 leading U.S. chip makers postponed building new chip factories.

Japanese firms increased their investments in new capacity and by the late 1980s had captured 80% of the world market.

Then around 1990 the Japanese firms began delaying building new factories, and South Korean firms invested heavily in new capacity, and by 1994 they had 36% of the world market.

4.2.2 Strategic incentives to make commitments

Consider a market in which only two firms compete; Firm 1 is considering making a strategic commitment, which is credible, since it:

- is seen by its rival, and
- cannot be reversed.

The timing is: Firm 1 makes a strategic commitment and then:

a. both firms simultaneously choose quantities (Cournot), or

b. both firms simultaneously choose prices (Bertrand).

4.2.2.1 Direct effects & strategic effects

The commitment's impact can be separated into two effects:

- The *direct effect* is the impact on the PV of the firm's profits *assuming that the firm adjusts its own tactical decisions in light of this commitment,* ***but that its rival's behaviour doesn't change.***
- The *strategic effect* takes account of the competitive side-effects of the commitment: how does the commitment alter the tactical decisions of the rival, and so the equilibrium (Cournot quantity or Bertrand price)? This new equilibrium will also affect the firm's profits.

In making its commitment decision, the firm should consider not only the direct effects, but, *by looking forward and reasoning backwards*, the strategic effects on the ultimate equilibrium: the firm is searching for a subgame perfect Nash equilibrium (Lecture 1-40).

The process can be thought of as a two-stage game: in Stage 1 the commitment decision is made, and in Stage 2 both firms simultaneously choose quantities or prices.

4.2.2.2 If Stage 2 is Cournot quantity competition

The commitment could make Firm 1 either "tough" or "soft":

4.2.2.2.1 Commitment toughens the firm: Firm 1 commits to producing more output, no matter what level Firm 2 produces at.

The effect of this is to shift Firm 1's reaction function to the right.

$\therefore$ with downwards-sloping reaction functions, the Cournot equilibrium corresponds to Firm 2 producing less output, since outputs in this case are strategic substitutes.

So the strategic impact of the commitment is positive: the less the amount of output its rival produces, the greater the profit for Firm 1, since the price will be higher.

The positive strategic impact could outweigh any negative direct effects, such as the capital costs of the capacity increases.

The *top-dog* strategy, such as for the Korean chip makers.

4.2.2.2.2 Commitment softens the firm: Firm 1 commits to producing less output, no matter what level Firm 2 produces at.

The effect of this is to shift Firm 1's reaction function to the left.

Suppose the firm's production technology exhibits diseconomies of scale (Lecture 1-7, 2-16), with rising *MC* as the rate of output increases.

Suppose, too, that, as well as selling in the Cournot quantity-competition market, Firm 1 has the opportunity to sell its product as a monopolist in a second, separate, market.

Then a decision to enter the second market would be a "soft" commitment: it would increase Firm 1's *MC* and so would reduce the profit-maximising level in the Cournot market, for any level of Firm 2's production.

The strategic effect would be negative: at the new Cournot equilibrium, Firm 2 would produce more output than if Firm 1 had not made the commitment.

If the direct effect is negative, zero, or even slightly positive on Firm 1's PV of profits, then the commitment is the wrong decision.

Refraining from making strategic commitments which would make the firm soft or weak keeps the firm *lean and hungry*, so that it appears tough or aggressive.

4.2.2.3 If Stage 2 is Bertrand price competition

Again, the commitment could make Firm 1 either "tough" or "soft":

4.2.2.3.1 Commitment toughens the firm: Firm 1 commits to charging a lower price, no matter what level Firm 2 prices at.

Example: Investment in new technology that reduces both *AVC* and *MC*.

The effect of this is to shift Firm 1's reaction function to the left on a diagram with P_1 and P_2 on the horizontal and vertical axes, resp.

$\therefore$ with upwards-sloping reaction functions, the Bertrand equilibrium corresponds to Firm 2 lowering its price too — since prices in this case are strategic complements — but not by as much as does Firm 1. Firm 2's price drop hurts Firm 1.

So the strategic impact of the commitment is negative for Firm 1, which could outweigh any positive direct effects, such as a positive NPV for the new plant, ignoring strategic reactions.

The firm may refrain from the investment. This is the *puppy-dog ploy*: remain small or weak to appear soft or non-aggressive, to avoid heating up price rivalry with one's competitors.

Note: an announcement that through its new technology Firm 1 intends to reduce its costs, *but not sell at lower prices* — to signal that the inventment will not sharpen price competition — lacks credibility: after the investment charging less will increase its profits. Firm 2 understands this, and will respond accordingly.

4.2.2.3.2 Commitment softens the firm: Firm 1 commits to charging a higher price, no matter what level Firm 2 charges at.

The effect of this is to shift Firm 1's reaction function to the right on the price diagram.

Example: the firm commits to moving its product further away from Firm 2's, either geographically or in product-attribute space. Such as: repositioning it in a niche not well served by Firm 2.

The new Bertrand equilibrium is higher prices for both, which may make the commitment worthwhile for Firm 1, even if its direct effect is negative.

Example: post-patent branded pharmaceuticals sold at *higher* prices, and only 50% of sales lost to lower-priced generics.

The *fat-cat effect*, which reduces price competition to both sellers' advantage.

4.2.3 A taxonomy of commitment strategies

To summarise: whether a firm should make a strategic investment depends on whether the commitment makes the firm tough or soft and whether ther tactical variables in the subsequent stage are strategic complements or substitutes.

Stage 2 tactical variables are ...	Commitment makes the firm ... Tough	Soft
Strategic Complements (e.g. prices)	*Puppy-Dog Ploy* Strategic effect is negative: commitment causes rival to behave more aggressively.	*Fat-Cat Effect* Strategic effect is positive: commitment causes rival to behave less aggressively.
Strategic Substitutes (e.g. quantities)	*Top-Dog Strategy* Strategic effect is positive: commitment causes rival to behave less aggressively.	*Lean & Hungry Look* Strategic effect is negative: commitment causes rival to behave more aggressively.

Two important implications for firms when considering hard-to-reverse investment decisions:

1. Consider not only the direct effects on the firm, but also how the decision will affect the evolution of market competition in the future.
2. Details of market rivalry can strongly influence firms' willingness to make commitments:

   A commitment that induces rivals or entrants to behave less aggressively — to refrain from price cutting, to postpone

capacity expansion, to reduce their advertising — likely to help the committing firm.

A commitment that encourages others to be more aggressive likely to hurt the committing firm.

The type of tactical rivalry in the market is important, since it determines whether, for instance, a commitment that cuts *MC*s will help (with quantity competition) or hurt (with price competition).

The strategic effects of commitment on market evolution may depend on:

- industry conditions and characteristics of one's rivals: a commitment which lowers costs may lead to more aggressive pricing by incumbents, but so deter new entrants.
- capacity utilisation rates: when capacity utilisation rates are low, all firms may cut prices with the capacity to supply higher demand that follows;

  but when capacity rates are high, they may be unable to price aggressively, but the committing firm may be able to deter others' expansion investments.
- the degree of horizontal differentiation among rivals: with high differentiation, the strategic effect is small, but with closer products (less differentiation) the strategic effect is stronger.

Case: Commitment at Nucor & USX: thin slab casting

Nucor adopted, but USX did not adopt, thin slab steel casting, invented in the mid-1980s in Germany.

Nucor, the largest mini-mill, entered the flat-rolled sheet segment of the steel business by building a green-fields mill, at an investment of $340m, around 90% of the firm's net worth in 1987. By 1992 profitable.

USX was 60 times bigger, and the largest steel producer in the U.S.; invested $30m in developing a thin-casting technology, but declined to adopt it. Why not?

Well, for USX it was a non-drastic technology (i.e. did not render all rivals noncompetitive), in an industry with excess capacity which suggests Bertrand price competition so that USX would be making itself tougher, and it was not very risky.

So why not? If the entrant adopts new technology with a low MES scale, in effect a puppy-dog, and the incumbent has little incentive to adopt too. But Nucor, having bet the firm, had announced that it would expand the number of plants if successful

In fact: USX's prior organisational and strategic commitments constrained it: it was unionised, it had already modernised four of its five plants, some doubt over the attractiveness of the new steel to existing customers.

A firm should consider that prior commitments by others may constrain their potential responses: it should look forward and reason backwards, as Nucor did apparently.

Case: Financial structure & product market competition

This framework can be used to study the effects of the firm's financial structure on product market competition.

First, firms choose how much debt to issue to finance their investment. Then, they compete as Cournot quantity setters in a market in which, because demand is uncertain, bankruptcy is possible

The greater the amount of debt issued, the more aggressive the firm's behaviour (the greater the amount of output it will want to produce).

The text discusses why the logic of the top-dog strategy applies

The issuance of debt is a strategic commitment to behave more aggressively in the product market, to the issuing firm's advantage: the firm will issue more debt than it would have done had it ignored the strategic effect of debt.

But with Bertrand price competition in the product market, the firm will instead follow the puppy-dog ploy, and the strategic effect of debt would be unfavourable since by committing to a high level of debt a firm would expect a more aggressive response from its competitors.

4.3 Flexibility & Option Value

Strategic commitments depend on irreversibility to be credible, but, especially with uncertainty about market conditions, costs, or rivals' goals and resources, there is a value to keeping one's options open.

Flexibility gives the firm *option value*, which should be factored into the strategic investment decision.

Delay may reduce future uncertainty, but with a risk that investment may be preempted by rivals.

Case: Commitment v. Flexibility in the CD Market

Philips' decision on investing in a U.S. CD plant highlights the tension between the strategic effects of commitment and the option value of waiting: by building first Philips, in a top-dog strategy, would preempt its rivals, but would the plant be profitable?

A study has calculated that, had Philips faced no competition in the CD market, it would have been better off waiting and retaining flexibility if the probability of acceptance of the CD was 0.38 or lower: some option effect.

But with rivals who would learn of the market acceptance when it did, Philips should only wait if the acceptance probability was less than 0.006: a virtual green light.

Given that Philips, with its European experience, might learn about acceptance before its rivals did, the probability is estimated at 0.13.

Philips didn't invest in 1983; Sony did on 1984.

4.4 A Framework for Analyzing Commitments

Major strategic decisions almost always involve investment in physical assets, resources and capabilities that are *durable*, *specialised*, and *untradeable*.

Such commitment-intensive decisions require a deep examination. Ghemawat has suggested a four-step framework:

1. positioning analysis, or determination of the direct effects of the commitment.
2. sustainability analysis, or determination of the strategic effects,
3. flexibility analysis incorporates uncertainty into the first two, including the *learn-to-burn ratio*: the rate at which new information is received to the rate at which the firm is investing in sunk assets to support the strategy.
4. judgement analysis, or taking stock of organisational and managerial factors that might distort the firm's incentive to choose an optimal strategy.

CONTENTS