

Relating course concept together

Strategy

Type of advantage: Cost/quality advantage | Strategic advantage (should be sustainable) -> to explain whether or not action.

Strategy: the study of how to generate **persistent productivity differences (PPDs)** in order to increase long-run profit.

Persistent: can continue even if others know what your strategy is/can copy or react

Productivity differences: strategy lets you earn higher profit by increasing revenue per unit cost.

Tradeoffs as a source of persistent productivity differences (PPDs)

(operational effectiveness)

- Just improving quality, or lowering costs, or innovating will not be enough
- Because if any of these strategies is efficient, other firms can do it and will replicate what you're doing. Competition will be fierce!
- This cannot be a source of sustainable strategic advantage / PPDs.
- Tradeoffs in strategic position can be useful if they make it hard to replicate your firm!
- They help make an advantage sustainable. (you willing to make the tradeoff, while others may not)

Competitive advantage <-> sustainable strategic advantage

What is the source of PPDs?

- There are often only **few** competitors (otherwise less market share)
- A clever firm can organize itself in a way that these finite rivals **do not want to replicate them** exactly, leaving potential for profit (create a **niche** for themselves, others have their niche. E.g. Air Canada focus on international, long flights, while west jet focus on cross-country flight)
- **Tradeoffs** is one way to generate PPDs which are not immediately replicated.
- Other ways: **scale effects** (the more you are able to produce at a single point, the less fixed cost), **learning curves** (the more cumulative you produce, the better you get), **differentiation** (locate, create niche), **linked systems, firm mergers, innovation, better contracts** (formal, relational)

Value Capture theory

Willingness to Pay (WTP): Highest value at which consumer is willing to transact (the utility one gets from a product)

Outside Option (OO): • The value of the "next best option" for the member of the market outside of its current market • Every player in a market must earn at least their outside option (the maximum added value they have to any other market)

Value created: WTP minus the cost of all resources used to make the good(s)

Added value of firm to its market is **upper bound** on profits: • Competition against you; • No player earns more than their added value

Lower Bound is the largest of:

- (1) The remaining value when all other players receive their added value
- (2) Their outside option; (competition for your firm from other markets)
- (3) The profit they can guarantee themselves by credibly threatening to leave with some subgroup (competition for your firm from participants within your market who want to work with you can drive up the minimum profits you can earn, e.g. wtp to you is higher)

Bargaining/negotiation skill affects where in that range you wind up
Essential to create the value (necessary) -> high power -> all have added value = total value

five ways a firm can increase their profit

- Generate more added value. [upper bound]
 - Competition against you means you can at most capture your added value.
 - Decrease the added value of other firms. [lower bound]
 - Increase value to outside markets (outside option) [lower bound]
 - Increase the "competition" for the firm, that is, increase the value of subgroups of players the firm is a member of. [lower bound]
- Competition for you (to work with you) means you capture more if other players need you to create value
- Increase the bargaining power of the firm

Competition through negotiation: extra-economic bargaining
A salesperson creates no added value but can improve profits by improving your ability to bargain a higher share of your range of potential profits.

Differentiation

Horiz. or vert. differentiation can increase WTP by lessening competition

Horizontal differentiation - Differentiated products where some consumers prefer A and some prefer B if products are same price
Different tastes, different location, bundled goods
Marketing driven

Horizontal differentiation - Differentiated products where all consumers prefer A to B if both are at the same price
Luxury vs low cost, downtown hotels, bundled freebies (w/ meal)

Principle of minimum differentiation: firms all want to move toward the center of demand

Principle of maximum differentiation: price competition so severe when firms near each other that they locate at edges
Differentiation, moving away from rivals, and nondifferentiation, crowding toward "center of demand", both lower the total economic surplus created!

Increase added value, but at cost of lowering total value created
you change some aspects of your product -> increase the willingness-to-pay of buyers.

Differentiate to avoid fierce price competition

But differentiation may move your product away from the mass of demand

Differentiation yourself means moving away from the mass of demand, but also lowering the extent of price competition from your rival

This is a **tradeoff**: differentiation moves you away from competitive pressure but may also move you away from the center of demand. Whether you want to differentiate or not depends on whether the benefit from less price competition is greater or less than the cost of not having the "optimal" product from the view of consumers.

Moving first can allow you to secure "good" market position

the order of movement in differentiated industries matters, and it may be particularly important in these industries to "stake out" the most profitable positions before others do.

Flooding market with different goods can prevent entry from rivals

Given that possibility, a firm which worries about future entry may prefer to stake out multiple good positions so that there is no profitable location or product type left for rivals to enter in the future. This is sometimes referred to as "flooding the market".

Flood market with varieties/locations only if it can deter entry from rivals and if cost of flooding market is cheaper than cost of lower profits when facing future rivalry

Pricing strategy

Restrict industry capacity: Capacity choice: Strategic use to prevent entry (if I am at capacity, you can enter and there is no way I will respond by cutting price; not true if I have excess capacity, which I can credibly threaten to cut price if you enter)

Obscure prices: Making it hard to figure out prices makes it hard for customers to compare prices, and hence acts like a "transportation cost" (in our differentiation model) if you want to switch firms

when one of us cuts price by a penny, not all customers switch, decreasing incentive to cut price, causing prices to remain high.

Loyalty program: Getting rewards if you keep spending there

Price match guarantee: You will match whatever the lowest price, you never go below them

Enter in weak market: Price as you wish, price advantage over product

Bundle different goods: (sometimes) Can extract higher profits when the willingness to pay each good is imperfectly correlated

Predatory pricing (rarely): You lower yourself to a point where you at loss -> others exit

Product life cycle – industry

Early stage:

- There is an incredible amount of **entry** early on
- Industry growth rates in revenue/total production are **initially slow** and **then very fast** (this is often called the "S-curve")
- S-curve: growth initially slow, then rapid, then tapers off. Why? Consumer learning, improvements in product scope, fall in price (with suppliers better contract -> taper off: cannot be more efficient; cannot acquire more consumers)
- There are **many important product innovations** (meaning qualitatively different product designs being invented) **early on**
- Stylized fact: new product introductions per dollar of R&D much higher in **new industries** than old ones. (no one knows what works and what doesn't -> higher cost vs. small improvements in older industry)
- Product invention:** new product.

Process invention: something that reduces cost or improves quality of product, like an improvement in the assembly line (be in the any stage of the process from raw material -> end customers. E.g. shipping, stuff more efficient in selling, inventory time..)

Intermediate stage

- A "dominant design" begins to develop

Dominant design: a standardized product. For autos, this is 4 doors, internal combustion engine, similar shape, similar materials, steering wheel on right, standard brake placement, sales by independent auto dealers, etc. (design the industry follows)

Mature

- With dominant design in hand, remaining firms **focus on reducing costs** on that design (this is the only thing customer want)
- Shift to process R&D because scale of production high + product relatively undifferentiated + trying to heavily differentiate becomes impossible due to regulation, complements, habit formation, etc.
- An industry "**shakeout**" greatly **decreases the number of firms** remaining in the industry once a dominant design takes hold
- The firms that **survive** the shakeout are almost always firms that were **already large well** before the shakeout
- Empirical fact that size is positively correlated with growth rate and survival in early/intermediate stage of industries, especially low-tech/standardized industries (large firm have the lower costs, economic of scale, process R&D)
- In the absence of a major technological shock, **industry structure can be very stable** with little entry at this point
- Shock needed: increase in product quality so great that you can overcome very low unit production cost of dominant design (e.g., Michelin radial tire, Japanese small autos, low cost carriers in airlines)
- link to entrepreneurship <-> technological shock**

Strategy for each stage

1. If you have new ideas for a **mature** industry, should you sell your idea to existing firms or try to develop capabilities yourself?
-> Consider differentiation: as industry matures, dominant design develops, hence more specialized laws/suppliers/complements make it more difficult to differentiate product.

-> Better to sell ideas to existing firms than try to develop these capabilities yourself (Can not overcome process R&D-driven cost advantage in production of existing manufacturers)

2. What can a firm do to ensure it is particularly profitable as industries move into mature parts of the product life cycle (before the convergence of dominant design)?

- Remain flexible to adapt product toward dominant design to take advantage of complementary goods/inputs.
- Do not commit by investing heavily in process R&D unique to one idea.
- Gather other firms to help coordinate industry on a dominant design where your firm has some advantage.
- Try to use power over suppliers and legal developments to drive dominant design toward a product where your strategy has particularly large PPDs as discussed in Class 2 (make sure you think hard about how you might do this!)

Theory of the firm

Common ownership -> integration -> acquire -> boundary of firm.

Diversification (horizontal/vertical) -> integration

horizontal: ... same level value

Vertical: Upstream/downstream. Supplier, customers

Choose one of the three theories.

The Williamson Extension:

What **transaction costs** matter (all of the three -> better integrate)

1) There must be **appropriate quasi-rents**

(AQR: benefit I derive from us working together – the benefit that I might derive by working with someone else; AQR is the difference in profits generated from my firm working with your firm, versus the joint profits generated when we end of relationship and work with our next best option)

Larger Quasi-Rents; how big are the AQRs (easy to substitute? Specific?)

2) **Incomplete contracts** so we sometimes need to renegotiate (unprogrammed adaptation – an event that occurs that is not written in the formal contract)

More Frequent Unprogrammed Adaptation • how often are contracts incomplete (cover all scenarios? unusual situation?)

3) Cheaper to renegotiate within the firm (讨价还价 **haggling cost** must be high, e.g. when covid, need renegotiate -> haggling cost)

More Expensive Renegotiating/Haggling cost (complicate to renegotiate?)

Property Rights Theory ("Residual Control Rights")

If it is really important for one party to invest in something where there is **high likelihood of unprogrammed adaptation**, they should own that asset (ex-ante incentives vs ex-post)

BECAUSE **bargaining power depends on asset ownership**

1) **Appropriate quasi-rents** -> High quasi-rents (specific relationship?)

2) **Incomplete contracts** so negotiation -> Frequent unprogrammed adaptation

3) Who owns what asset affects **bargaining power** so affects **expected value of relationship** so affects 事前激励 **ex-ante incentive to invest in assets** that help both parties -> We can foresee and get our "disagreement payoff", where bargaining power related to our next best option with assets (I have more to loss). (who own -> incentive) (Can investment in assets affect the bargaining power?)

Who should own the asset?

- **High AQR:** I care about this specific relationship, "firm-specific knowledge", next best option for you, for firm
- **Unprogrammed adaption:** contracts don't cover all, so we will have to renegotiate at some point (things contract not cover)

- When we renegotiate: Our **bargaining power** depends on what we own; if I own important tools, then I have a good future option to use them doing something else, hence I have bargaining power; if you own the tools, I have less bargaining power.
- Therefore ex-ante: if we make non-contractible investments that affect the value of our relationship, I may worry those investments are pointless if we will soon have to renegotiate, and you have bargaining power. By selling the assets to me, my bargaining power increases, hence the share of any value I create with my investment increases, hence I am more willing to invest.

Owner should be person whose noncontractible investment is most sensitive to bargaining power following unprogrammed adaptation (who has more to loss). the bargaining power argument means your "incentive to invest in the noncontractible parts of relationship" is more important.

Relational contract: • If the next best option for your partner's asset varies widely over time, they will often be tempted to break the relational contract when price is high. -> merge to avoid the temptation.
• A high discount rate means that it will be harder to sustain a relational contract. You may need to merge to avoid the temptation.

Resource view

Firms themselves can have resources that are **immobile** (not held by one person) and **not imitable** (because they are hard to state or understand, or hard to replicate given path dependence (- in order to replicate that specific path, you have to put in a lot of resources or have a very specific relationship that you don't have or work in a country that you don't currently work in) -> you need to acquire them

"Knowledge Based" firm extension of Resource View

Firms are problem-solving machines whose rituals and routines allow them to solve problems in future similar to those they solved in the past. (save order time, to other things like prepare order) -> acquire the firm to get their specific knowledge (or **part of the company <-> acquire the pattern right**)
Being able to diagnose and solve complex problems in your area = source of added value = source of strategic advantage. So what should you not outsource/buy in the market?

Incentives

Extrinsic Motivation: Do something for a reward

Intrinsic Motivation: Do something because of internal motivation

Incentive Pay

High powered incentives–pay conditional on doing things the firm likes rather than straight wages. (incentivizing workers with money.)

Properly aligning incentives between the firm, its workers, and its suppliers, or between a government and its citizens, can be miraculous.

When can incentive pay be tough to implement?

- **Moral Hazard:** is about being unable to observe how much effort a worker or supplier provides, or being unable to observe exactly what task they are working on. - I can't precisely observe what you do, or how hard you work. If I can't observe what you do, how can I give a bonus based on that?

- **Adverse Selection:** is about not knowing the worker or supplier's type: what wage they are willing to work at, what their costs are, how efficient they can work if they actually worked hard all day - I don't know what type of person or supplier you are. Optimally, I may want to vary the contract depending on, say, the maximal output you could produce given your skills or the supplier's cost of production, but I do not necessarily know that information.

-> it is difficult to write the optimal contract for a worker, where optimal means what the firm would do if it had perfect information about the worker's type and effort

- **Risk Aversion:** If moral hazard, then the contract must be conditional on the output, not on the worker's action. If the output is a function of the worker's action but also randomness (luck), it is hard to incentivize the risk-averse workers.

Multitasking Problem

- Often, only some of the things we care about are observable. Be wary of paying for A when you actually want B.
- in the absence of high powered incentives, people will do something (e.g., a teacher will teach some math, do some mentoring, teach some English). With high powered incentives on observable things, they will shift effort away from unobservable things

Fix: 1. Limit tasks so no preferred options to shirk with

2. If you are using strong incentives for hard to observe tasks, only do so if there exists observable tasks, which are highly correlated (e.g. piece rate pay -> no time for lobbying)

Team Incentives

If production is based on output of whole team, and we can't observe what every team member contributes (moral hazard), then there is a strong incentive for everyone to shirk.

Or The difficulty is identifying which team member made that important contribution.

Fix: 1. Keep teams together so they can monitor and punish each other. (cost: you do not have optimal team members for any given project) 2. Pay a middle manager to monitor teams. (cost: the middle manager's salary)

The Ratchet Effect

Workers will hesitate to show their type or other private information if you will change their work conditions on the basis of that information in the future.

Fix: Commit to contract which limits ability to use information from today to change needed incentives tomorrow

Risk Sharing

Strong incentives + moral hazard = incentive based on partially random output
The salary variance is out of control of risk averse workers. So no incentives at all?

Fix: "High powered" incentives when output is stochastic can only be used for workers who are not very risk averse. Ex. It is more common for senior managers to have bonuses as large part of their pay.

Efficiency Wages

I can't use strong incentives for workers, perhaps because of ratchet effect, or multitasking, or whatever. Does no incentives mean it is impossible to incentivize a worker? No!

You pay worker more than their outside option. This means you can punish the worker for bad outcomes without having them quit to find a new job. You can motivate the worker even without having high powered incentives.

Limits to incentives

Incentives aren't magic: they don't work if agents do not know how to achieve the goal of the incentive!

Monetary incentives can crowd out prosocial incentives. (social responsibility, moral)

Why not performance-based pay?

Measuring individual contribution to profit is hard!

- Team problem means it is often hard to observe individual contribution.
- Risk aversion of workers means they often do not like strong incentives (or will need a higher expected wage if they are given strong incentives)
- Firms maximize profits not worker wages so if you can get efficient work at lower wage no need to provide a high one. (efficiency wage)
- Consider motivating salespeople: • You need to know baseline/normal sales for a particular product in a particular region to know who is a "high performer" and who just has an easy job. • ...if you want to actually give earnings proportional to success!

Learning curve

Relational Contract

We cooperate today in a personally costly way because we credibly believe that if we do so, our counterpart will continue to cooperate tomorrow to our benefit. • That is, we are motivated by the shadow of the future rather than a formal legal contract with direct financial bonuses. **credibly believe**

- Relational contracts are not intrinsic effort. - You do not cooperate because you like your counterpart
- Relational contracts are not a gift exchange. - You do not cooperate because you want your counterpart to feel (morally)obligated to reward you.

Examples: worker career; Supplier motivation - a supplier modifies a part even if they are not directly compensated because they believe you will offer them a reasonable cut of profit in the future; **internal hiring, promotion, mission statement & internal communication, just one supplier**

Properties:

- Incentive to cheat is higher is discount rate is high, or benefit of cooperating is low
- Structure relational contracts so that benefit of cheating is minimal (weekly bonus)
- Relational contract breaks down when it is most tempting for one side or the other to renege. An highly variable environment can be problematic for these contracts. • The firm need to be careful to manage the extremes in that case: If the benefit of cheating varies over time, people cheat when benefit is high, and since we know one of us will cheat in the future, neither of us will cooperate today
- Asymmetric information about payoff-relevant information makes relational contracts harder to sustain: If my action in the relational contract depends on my private knowledge, you don't know when I am cheating vs. you are unlucky, hence you have to punish me sometimes, hence private knowledge makes relational contracts harder to sustain
- If you can use formal complete contracts, use them. If you can't write a formal complete contract, you may be able to incentivize cooperation among players with a relational contract instead! (high punishment stated)
- Since infinitely repeated games have multiple equilibria, **communications important** for helping ensure we both understand and play the "right" equilibrium

Requirement of relational contracts

- **Clarity:** who shall do what under which circumstances (what is fair or desired)

- **Credibility:** are either of us better off cheating on the relational contract today?

Summary

- Relational contracts incentivize by gains from credible future cooperation

Relational contracts are credible promises where we "reward" our counterparty tomorrow in exchange for cooperation today.

- Parties to relational contract renege if short-term gain exceeds benefit of future cooperation

formal contracts can induce effort by using arbitrary punishments.

Formal contracts must be based on things that are observable and verifiable by an outside party who will enforce the contract.

Many things we care about, like teamwork, are not so clearly observable. -> use relational contract

Incomplete contract -> use relational -> too much desire to deviate -> integration -> relational contract to motivate.

- Variability in benefits of cheating on partner make relational contracts fail
- Relational contracts can only incentivize me to cooperate today if I credibly believe you will cooperate as well, both today and in the future.**

Variation in the outside environment made it harder to sustain the relational contract.

- Relational contracts are common, and appear when formal contracts are hard to use

There may be limits to our foresight, or ability to see what we need to write in a contract, and limits to enforceability, since we can only write formal contracts covering things a court will enforce.

Steep learning curve -> easy to replace

Economies of scale - scale

Average cost per unit vs. Units sold in current period of time

Why are there scale economies?

- Spread out fixed costs (R&D, ads, capital, etc.)
- "Division of labor limited by extent of market"
- Team production
- Use more advanced technology
- e.g. network, reputation

Learning curve - experience

Unit cost falls as manufacturing experience increases

As cumulative quantity ever produced rises, unit costs fall

How?

- Workers' dexterity 灵巧程度
- Workers' use of IT and capital
- Management gets better
- Learn about demand and adjust product
- Adjust mix of capital and labor
- e.g. how to incentivize workers, what seasonal demand

Why is it hard to take advantage of learning curves?

- If learning is embodied in individual worker, can my firm benefit -> no, worker now has added value compared to the next best person you could hire, hence their bargaining power may matter
- If learning is industry-wide (learning spills over to competitors; costs fall because suppliers learn as my cumulative Q up), do I benefit? -> no, if all firms benefit from my cumulative Q in the past, I have less added value and therefore less ability to raise prices above my costs.
- All are very relevant to knowing whether you should lose money now in exchange for gaining experience in production! hard to estimate: 1) Future Demand 2) Steepness of cost reduction 3) Price that will prevail in the future

- If learning AND forgetting, may want to keep workers on doing "busy work" so they don't forget whatever skill has steep LC
- there still be a cost to learning curves as a strategy

If you are small, be aware: "Big firms" can have low cost due to learning curves and economies of scale

Entrepreneurship

why some of them succeed? why sometimes incumbents lose their sales to entrepreneurs; i.e., are "disrupted"

First, a very boring form of disruption:

Incumbents sometimes fail when new tech arrives simply because the industry they are in goes away and they have no advantage in other industries (e.g. Britannica -> Wikipedia)

Demand-side disruption:

They might not see growth potential until it's too late

Successful firms get disrupted when they ignore competing product because it is initially lower quality and customers don't want it (Incumbent technology (dominant design = lots of process R&D already done = slow growth in performance) e.g. blockbuster -> netflix)

Christensen's solution: Keep aware of new technologies (perhaps with a skunkworks) "disrupt yourself" before you get disrupted.

("Skunkworks" is a research lab in an isolated location where R&D workers can focus on which technologies have "steep slope" in their performance; by isolating scientists, they don't have to worry about managers and their day-to-day profit concerns.)

Problem -- It is often costly to "disrupt yourself":

- Change how business operates (e.g. resign all the apps to accommodate; hard and costly; engineer; sales)
- Cannibalize existing sales ("replacement effect")

So wait to see which potential disruptions actually are becoming important, and only when you have to, buy them and replace your existing product -> then you buy it or design new (-> link to knowledge based theory: a. try to acquire the knowledge b. to acquire the firm)

Best response for an incumbent to a "demand-side disruption":

let entrepreneurs try it out and prove it matters, don't "disrupt yourself" every time there is a potential threat, use your other **competitive advantages** to profitably buy or steal **technology** once you know it will matter
Alternatively: **wait until the performance of disruptive invention is the same as incumbent technology, if disruptive tech is actually better, then buy**
disrupting firm: remember the constancy of industry leaders from **our class on the product life cycle**

So let's modify Christensen's "demand side" disruption idea: **Only if you know a new tech is really going to be important to your industry, then you need to "disrupt yourself"**

Skunkworks/other research teams can help you do this

Rebecca Henderson's architectural/supply-side disruption:

They may be structured in a way that it is difficult to take advantage.

- Firms have PPDs because of a specific "architecture" of the firm
- This is hard to change, so...

But! This is rarely the hardest problem!

"Architecture" are things like a firm's promotion policy, its supplier relationships, its current differentiated products, its brand equity, its formal communications within the firm, its mission statement and other aspects of existing relational contracts, its fixed investments, and so on. It a technology doesn't require changing the "architecture", no problem (e.g., if people want only oranges and not apples from WalMart, they just change the product and otherwise keep all the advantages that lead them to have PPDs in the grocery industry). But if the new technology/service/method of production requires a **change in architecture** to be implemented, incumbents are in trouble! **Link to learning curve ..**

-> avoids "architectural disruption" because it begins making its architecture more "flexible" -- including how promotions, relational contracts, branding

Two ways for existing firms to survive in entrepreneurial markets:

- Buy successful disruptors and take advantage of your existing strategic advantages in terms of supplier relationships, size, etc; this works as long as disruption **does not require change of firm architecture!**
- If your industry often has "disruptive waves", **avoid the "limit of the learning curve"**: structure firm so architecture (meaning incentives, hierarchies, etc.) is not locked in to one tech at expense of others in future (don't tie to specific product, easily able to pivot to a new product every time, adapt to changing market)

What if you are the entrepreneur?

Three options: compete, cooperate, or compete and THEN cooperate/sell to incumbents

• Smart firm won't buy disruptor unless sure the technology will actually work out (it is costly to learn about whether tech works, whether this is demand, etc., and especially so for incumbent who has existing supplier relationships, relational contracts, products that may be cannibalized).

• Competing initially allows your entrepreneurial firm to prove to incumbents that your technology is actually improving and necessary for incumbent to buy.

- If architecture of incumbent is very hard for them to change, entrepreneur is in great shape competing since even if you are making money, incumbent won't be able to react!

• If product does not need to be "proven" and incumbent is too strong in terms of supplier relationships, production costs, brand equity, etc., then just cooperate. Think about what this means, e.g., for firms entering the self-drive auto industry.

Paradox for entrepreneurs is that you need to experiment to see what works and prove value to partners but experimentation leads to paths that **are hard to undo**, so choices must be made

So, a strategy must be chosen by entrepreneurs!

- How are you going to be the rare growth entrepreneur who is able to overcome the incredible advantage of incumbents? By cooperating, competing, or doing both?
- What does this mean for the type of customers you go after?
- The necessity of doing in-house production or not?
- Whether you should have IP?

But generally, incumbents have existing customers/relationships/resources, and by structuring themselves in a way that they can integrate new ideas into their existing architecture, they can avoid disruption simply by buying successful disruptors!

So, no surprise, most successful startups tend to come from older founders with deep industry experience and especially knowledge of what can be sold to incumbents or else what incumbents aren't doing because it requires changing their architecture

multi-sided market

A multi-sided market is a market in which distinct groups of users interact with each other through a platform

Innovation

Patents, trade secrets, first mover advantage, etc. all "protect" inventions invention costs money/effort,

But most firms do not patent most inventions!

- Patents are expensive and hard to use
- There are alternative, perhaps better, ways to protect an invention Win prizes, Use first mover advantage, Keep something a trade secret, Have unique access to certain resources, Keep hard-to-figure-out aspects of production secret while patenting easy-to-figure-out components
- Patents often unimportant in early stages of product life cycle ("collective invention")
- Patents can be hard to sell. This matters because of "Complementary assets"

Complementary assets are need if an invention is going to make money (e.g. trials and marketing, the US as a whole had much less understanding of light engines)

Where do inventions actually come from?

In many industries, most important inventions are generated by users
1. Users 2. Middlemen 3. Other firms you contract with 4. Other firms you steal from 5. Universities 6. Public sector labs

Absorptive capacity: In order to take advantage of ideas from outside the firm, I have to know they exist and are good. Hence one reason to have a research department is to be able to take advantage of spillovers/steal/poach

Firms keep scientists on staff to "absorb" these outside ideas

Basic research doesn't create products, but does lead to very informed staff scientists who can evaluate outside ideas and see which are useful for your firm to copy

Many firms allow their scientists to communicate publicly about their work, and to publish their findings.

Three big reasons:

1. So other scientists will communicate with them (absorptive capacity),
2. Scientists have career concerns and more publicity = higher pay in future = you can pay less now (relational contract)
3. Scientists care about the scientific process and so need to be paid more now if you don't let them publish (estimate in biology is that PhDs request 20% higher salary at less open firms)

learning curves <-> relational contracts: the more you're able to learn, the better, the more valuable you are to the firm, the more they should incentivize you through relational contracts because you have more firm, specific knowledge

- Link class concepts with one another
- Less is more, adequate explanation

Structured 1,2,3 manner (reason1, why is not work, agr is high because of a b c, contract are incomplete bc a, b, c. haggling cost are high bc a, b, c. therefore, ...)

xxxThat's the answer you don't need to give me. Okay. So there is a firm that needs to acquire another firm. And in order to figure out whether to acquire this firm or not, we need to figure out if the firm makes sense from the Williamson's extension. All that fun stuff.

- divide up time.