Midterm Content

1. Lecture Materials a. Market Structures b. Market Failues c. Growth d. Routinization of R&D e. Inter-firm Collaboration

2. trends for patenting

3. Merging markets

4. questions from homework

5.
    1. Additional Readings a. b. c. See slides d. VERY important - spells out CD e. How CD works and small firms can come along and displace existing incumbents f.

Midterm Review

MC

According to disruptive technologies, firms that want to say atop their industry should critically assess possible disruptive technologies to better understand where their markets will be in the future

Which one of the following best describes Schumpters idea of creative destruction: b. Captialism is unstable because the economy revolutionizes itself

1 2 3 b

Short Essay

According to Nakamura,.... Developed countries are so far ahead in R&D and Universities and assets are so far ahead that the gap is increasing

Review Questions - Economic Models

- Traditionally, how has tech been treated in economic models?
- How do market structure models differ?
    - Perfect Competition
        - No barriers to entry: Equal access to inputs and technology (i.e. patents)
        - Identical goods
        - Perfect information: All market participants know prices (input prices, output prices, etc.
        - Many buyers and sellers
        - No uncertainty
        - Firms are price takers (its actions cannot impact market price)

        - Horizontal demand curve
    - MC = MR = Price, therefore profit = 0
    - Transactions are costless
    - Efficient outcome
    - Many small firms
  - Oligopolies
    - Few Firms
    - Products can be heterogeneous or homogeneous
    - High Barriers to Entry and Exit
    - Downward sloping demand curve
    - Price Setters
    - Profit > = zero
    - Marginal Revenue = MC
    - Strategic competition
    - incomplete knowledge
    - semi-efficient
    - Interdependence of firms
  - Monopolies
    - one firm
    - Barriers to entry
      - patents
      - economies of scale
    - Downward sloping demand curve
    - Price setters, profit > zero
    - MR = MC
    - inefficient
    - no competition
    - proprietary knowledge
  - Contestable Markets

    -
- How is innovation related to market structure?
  - what was the example of corn framer showing?
    - (Perfect Competition) There was no period of appropriablility therefore he doesn't have a reason to innovate
    - if there is a period then he can recoup the costs of innovation
    - note that society benefits if the farmer innovates
  - Perfectly competitive
    - Supply increases, knowledge is shared (perfect knowledge)
    - price drops, profit drops back to zero
    - The farmer incurred the cost of innovation
    - Therefore no incentive to innovate in a perfectly competitive market
  - Monopoly
    - little incentive to innovate
    - positive profits
    - they are able to recoup their R&D costs and so sometimes engage in R&D
  - Oligopolies

        - Fertile ground for innovation
        - If they don't innovate, they DIE
        - When they don't innovate, their future profits go to zero and they get behind other firms
- How do these Markets (private/public) differ
    - Not enough incentive for the private market
        - risk
        - positive externalities
        - this is why we have patents

    -
- What are the problems with using static Supply & Demand models for modeling innovation?
    - There is no need for the firm to spend money on R&D because they only optimize over one period (i.e. one quarter)
    - The benefits of R&D comes in the future but the costs occur today
    - innovation is dynamic
    - cannot tell the difference right now
    - A static model cannot show for why a firm would innovate
- Why has capitalism been so successful at fostering innovation?
    - *new* consumers' goods
    - *new* methods of production or transportation
    - *new* markets
    - *new* forms of industrial organization
    - to succeed at capitalism, innovation must take place
    - Because it has the following attributes
        - Oligopolistic competition
        - Routinization of innovation
            - Engineers are expected to improve technologies
        - Productive entrepreneurship
        - the rule of law
            - property rights
            - magna carta
        - Technology selling & trading
            - Market economy

- What are the inefficiencies of capitalism in regard to innovation and economic growth?

    - Consumers are driving firms, and may not necessarily chose the best product
    - R&D is sometimes duplicated
    - Not enough R&D is done

- What is Creative Destruction (CD)?

    - incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one
- What are the drawbacks for an economy with CD?
    - SKIP
- What role does risk play in innovation?
    - Makes firms diversify

- Introduces collaboration to share the risk with others and joint ventures
- Risk leads to underinvestment

- In the face of uncertainty, how can a firm decide on whether or not to proceed with an innovation project?
  - Compute Rate Of Return

    delta V / V_i
  - V_i is the investment in an R&D project
  - V_f is expected gross payoff
  - However since innovation is uncertain, we do not know V*f so we need to use expected value (E(V*f))

    E(V*f)* - *V*i / V*i* = *EVProject / V*i
- Why routinize innovation?
  - Product improvement
    - most innovates are not ground breaking
    - innovation is the main competitive weapon of high-tech firms
  - increased reliability
  - enhanced user-friendliness
  - search for new uses
  - Routine R&D reduces the firms risk of innovating
- What role do sunk costs play?
  - Sunk costs create a barrier to entry that allows the possibility of positive profits to the industry
  - Minor sunk costs force profits to zero (Perfect Competition)
  - Major sunk costs equal barriers to exit and high risk of entry
  - Impact decision making
- How does the idea of routinization of innovation conflict with the Schumpertian view?
  - routine innovation tends to limit the resulting profits, which contrasts with Schump's idea of extraordinary profits.
- What is the arms-race model?
  - Profit maximizing firm will adopt the quantity of R&D at which marginal profit yield is zero
  - Magnitude of profit depends on the behavior or industry firms (level of competition)
  - no firm wants to fall behind
  - temporary equilibriums in R&D expenditures
  - and then sudden increases
  - Short term decrease in R&D allows for high profits but in the long term you will go out of business
  - If one business increases their R&D then other businesses will have to increase as well.
  - It benefits society for businesses to increase R&D spending.
- How does technical change influence GDP?

    - These things magnify the contribution of technical change to GDP
        - creative knowledge cumulation
        - spillovers
        - steady R&D spending -> GDP growth
        - increases in R&D spending -> faster rate of GDP growth
    - Eventually, diminishing returns to R&D might halt technical change contribution to GDP growth
- What role can the entrepreneur play in technological growth?
    - *The entrepreneur is the independent innovator*
    - they can be innovative but not productive for society (i.e. money laundering, drug cartels)
    - Most economic theory ignores entrepreneurs (they're hard to model)
    - they are vital for economic growth
- What factors influence the entrepreneur's activities?
    - Mores - attitudes about "acceptable" behavior
    - Good institutions
        - transparent government
        - checks and balances
        - They make it less risky to innovate!
    - set of laws and rule of law
        - private property
        - enforceable contracts
        - They make it less risky to innovate!
    - Security
- Why is capitalist growth seen as evolutionary?
    - prior to the industrial revolutions, world-wide growth was stagnant
    - capitalism brought about constant growth
    - COME BACK TO

- How was innovation and growth in Ancient Greece, Rome, the Middle Ages, China?

    - Ancient Greece (slavery)
        - Slavery
        - Chasm between classes
        - low opinion of productive work
        - social position dictated by things such as ethnicity
    - Rome (Violence)
        - Sought wealth through rent seeking and destructive enterprise
        - novelty was discouraged, imitation was preferred
    - Medieval China (corruption)
        - monarch could claim any property
        - entrepreneurship wanted to gain government positions
        - no competitive market
    - Servile England (taxation)
        - 80% of labor force in agriculture
        - high taxes by the nobility class
        - nobility thought innovation would curve their powers

- What factors led to the Industrial Revolution?
    - First Industrial Revolution (1760 - 1830)
        - new emphasis on knowledge
        - improved institutions
        - increased productivity of textbooks
        - *Did not run into diminishing returns*
    - Second Industrial Revolution (1860 -)
        - R&D emerges, less experimental, more directed
        - Access to knowledge
            - cheaper, faster, international
        - larger epistemic base increased likelihood of major inventions
        - British capital market
            - supplied capital for R&D
- What role does knowledge play for growth?
    - Epistemic Base
        - Def: Level of understanding
        - Two types
            - Propositional
                - What knowledge
                - right/wrong
                - discoveries
                - not patentable
                - example: Formula for calculating area of circle
            - Prescriptive
                - How-to knowledge
                - successful/unsuccessful
                - inventions
                - patentable
                - example: How to make steel
        - Increases economic returns but is subject to diminishing returns to scale
        - Each innovation/technique requires a minimum epistemic base, and requires widening for continued progress
- What is the Contestable Markets Model?
- How does this model differ from the Perfect competition model?

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Contestable market      Perfect Competition
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Many or few Firms       Large number of firms


Economies of Scale      No economies of scale


No Barriers             None
to entry or exit
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    - In contestable markets there are some small firms that can take a segment of the market away

from big firms.
    - *NOTE* we use the contestable market model for high technology firms

- What drives the competition in this[Contestable Market] model?
    - The idea that anyone can enter, which causes incumbent firms to continue innovating to stay in the industry
    - Forces firms to be competitive
- What encourages entry into a contestable market?
    - Excessive optimism
        - promising new product
        - new tech?
    - Special advantage
        - talented employees
- What are the policy implications?
    - COME BACK TO
- Why would firms want to collaborate?
    - lowers risk
    - the larger the R&D, the more likely the firm is to collaborate
- What types of firms collaborate?
    - The larger the R&D firm the more likely for collaboration
    - more budget
    - combine with firms of similar size
    - small firm doesn't have as much patents
    - small firm has more risk
    - large firm can steal the small firm technology, and litigate/crush small firms
- What can these collaborations look like?
    - With competitors
        - horizontal
    - With Suppliers
        - vertical
    - With Customers
        - vertical
    - With Universities and Research Centers
        - institutional
- Why would firms voluntarily pass proprietary technology to another firm?
    - Technology Licensing
        - More likely with small firms that dont have the supply chain, captial raising, and marketing capabilities of larger firms
    - Technology Sharing Consortiums
        -
    - They choose the most profitable option (possibly both)
- What circumstances would lead to this?
    - See above
- Why do some firms form consortiums?
    - Advantage for participants by sharing R&D

    - Strong incentives to comply with agreements
    - Membership gives incentive to invest in R&D
    - Result is a contribution to social welfare
    - Anti-trust must not interfere with tech consortium
    - *NOTE* they stay out of consortia to maintain superior profit from customer loyalty (e.g., Apple)
    - if innovations are perfect substitutes then there would be no incentive, I.E. innovations are heterogeneous, small improvements, that complement each other
- What is the Technology-Consortium Model?
    - Heterogeneous innovations
    - Inventions of separate firms are different from one another and complementary
    - Sharing firms can expect a positive net benefit from the information it obtains from other consortium members
    - â€œFriendly transferâ€ faster than non-friendly information transfer
    - Innovation reduces cost of production only
    - There are costs to technology transfer for the receiving firm, the process of imitation is not free
- What effect does this inter-firm cooperation have on social welfare?
    - It helps

Review Questions - Capitalism and Innovation

1. Capitalism
2. Inefficiencies 3. 4.

Review Questions

1.
    1. 3.
2. Barrier to entry
3. tricky, routinization of innovation makes profits go down, schumperter said that oligopolies make a lot of profits
4. arms-race model - not ask to draw graph, but recognize it , regognize equations
   7.

Review Questions

1.
    1. Mokerter reading 3.
2. How come growth didnt come off.. keypoints ---
3.
    1. Mokyr talks about two types of knowledge and the epistemic base

Review Questions