Agenda

1. Almost everything you always wanted to know about IP in about 20 minutes or less

2. Law and economics of IP: the conventional approach

3. Law and economics of IP: new approaches

4. Q&A
Part I: Everything About IP (Almost)

• IP Universe

• Paradigm Problems
  – The Departing Employee
  – The Pitch
  – The Make/Buy Decision
  – The Patent Thicket
IP Universe

• Patents
• Trade Secret
• Copyright
• TM

• Contract (in interaction with IP)
Common Characteristics of IP Rights

1. Subject matter: What’s covered?

2. Novelty: what’s new?

3. Formalities: what are the fees and paperwork?

4. Scope: how broad?

5. Duration: how long?

6. Remedies: what can I get in court?
   - Injunctions
   - Damages
## Overview of Trade Secrets and Patents

<table>
<thead>
<tr>
<th></th>
<th>Trade Secret</th>
<th>Patent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formalities</strong></td>
<td>None</td>
<td>A lot – patent prosecution costs est. $10-20K on average.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Perpetual, until information is disclosed or otherwise becomes publicly available</td>
<td>20 years from date of application, subject to payment of mtc fees</td>
</tr>
<tr>
<td><strong>Rev. engineering; indep. invention</strong></td>
<td>Permitted</td>
<td>Prohibited (but technology must be substantially disclosed)</td>
</tr>
<tr>
<td><strong>Subject matter</strong></td>
<td>Broadly defined as non-public information, subject to satisfaction of required secrecy precautions</td>
<td>Broadly defined, excludes abstract ideas and natural phenomena</td>
</tr>
<tr>
<td><strong>Novelty</strong></td>
<td>Must not be public knowledge in the relevant industry</td>
<td>Must be novel and “nonobvious” relative to existing “prior art”</td>
</tr>
<tr>
<td><strong>Remedies</strong></td>
<td>Injunctive relief; compensatory damages; supercompensatory damages</td>
<td>Injunctive relief; compensatory damages; supercompensatory damages</td>
</tr>
</tbody>
</table>
Patents v. Trade Secret

• Why not just patent everything?
  – Costly and uncertain to obtain, maintain and enforce.
  – Discloses info to competitors.
  – Time-limited (20 years from filing).

• Why not just keep everything secret?
  – Sometimes you can’t. Trade secret law does not block reverse engineering.
  – Hard to transact. With some exceptions, disclosure kills trade secrets.
## Overview of Copyright and TM

<table>
<thead>
<tr>
<th></th>
<th>Copyright</th>
<th>Trademark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formalities</strong></td>
<td>Minimal.</td>
<td>Minimal.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Life of author + 70 years. Corporate author: 95 years.</td>
<td>Perpetual, based on continued use by trademark holder.</td>
</tr>
<tr>
<td><strong>Subject matter</strong></td>
<td>Broadly defined to cover all forms of expression, including software. Excludes facts, ideas, generic &amp; functional elements.</td>
<td>Broadly defined to include words, phrases, images, forms, shapes, colors</td>
</tr>
<tr>
<td><strong>Novelty; Priority</strong></td>
<td>Nominal originality requirement</td>
<td>First use (incl. constructive use)</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Limited to protected work, but extended by derivative right; limited by fair use</td>
<td>Limited to product class, but extended under confusion rationales; limited by fair use</td>
</tr>
<tr>
<td><strong>Remedy</strong></td>
<td>Injunctive relief; lost profits or statutory damages</td>
<td>Injunctive relief; disgorgement of D’s profits and damages to P.</td>
</tr>
</tbody>
</table>
Barbie v. Bratz: The Departing Employee Problem
The “Bratz” case

• 2000: Bryant is employed by Mattel pursuant to contract, which provides: “I agree to communicate to the Company as promptly and fully as practicable all inventions conceived or reduced to practice by me . . . at any time during my employment by the Company. I hereby assign to the Company . . . all my right, title and interest in such inventions . . . .”

• 2000: In his spare time, Bryant develops idea for Bratz dolls and pitches it (with a rough sketch) to MGA. MGA offers him a consulting agreement and he resigns from Mattel.

• 2001-04: Bratz line of products achieves great success, capturing 40% of Barbie/Bratz market and reaching $1B in annual revenues for MGA.

• 2004: Mattel sues Bryant and MGA for breach of contract, TS infringement and copyright infringement.
The $1B Clause

“I [Employee] agree to communicate to the Company as promptly and fully as practicable all inventions conceived or reduced to practice by me . . . at any time during my employment by the Company. I hereby assign to the Company . . . all my right, title and interest in such inventions . . . .”
The Problem of the Pitch

• The “information paradox” (Arrow 1962)

• Possible solutions:
  – NDAs?
  – Idea contracts?
  – Patents, copyright
  – Know-how + Reputation
The Make/Buy Problem

• Making money in tech requires invention plus commercialization. Which typically costs more?

• Firms constantly face “make/buy” decisions in the commercialization process. This is standard market specialization.

• In IP-intensive markets, firms implement those make/buy decisions through a combination of IP rights plus licensing agreements.
Supply Chain Structures in IP Markets

Supply Chain Functions/Structures

- R&D
- Production
- Distribution
- Market

(i) B1 → B2 → C1 (user)
(ii) B1 → B2 → B3
(iii) B1 → B3

(i) license-based delivery of IP asset
(ii) direct delivery of IP asset

Source: Barnett (2017a)
Semiconductor Supply Chain Models

**Fabless (Disintegrated) Model**
- In-house
- Some IP in-licensed
- Some use of design services firms

**Function**
- Chip Design
- Prototyping
- Fabrication
- Assembly, Testing
- Sales, Distribution, Support
- OEM/Intermediate User

**Incumbent (Integrated) Model**
- In-house
- Some IP in-licensed
- Some use of foundries

- 3rd-party contractors
- In-house

Source: Barnett (2011)
The Patent Thicket Problem

• Thousands of patents can apply to one smartphone model. Those are held by many different companies.

• Yet the market basically seems to work well.

• How is this possible?
The Patent Pool Solution

- **X Corp.**
- **Y Corp.**
- **Z Corp.**

**Patent Holders/Licensors**

**POOL**

- **Transaction fee**
- **Royalty fees**
- **Patent rights**

**Licensees (OEMs)**

- **$**
- **PC**

**End-Users**

**Administrator**
Source: Barnett (2015)
The “Patent Plumbing” Behind Smartphones, Bluetooth, YouTube, DVD Players (and more)

Source: Barnett (2015)
Part II: Economics of IP – The Conventional Approach
Basic Framework

• **Agent:** Profit maximizing inventor or creator.

• **Problem:** Innovation is incompatible with perfect competition. Pricing at marginal cost does not enable recovery of fixed R&D costs.

• **Solution:** IP “monopoly” generates time-limited premium to support and incentivize innovation.

• **New Problem:** Any positive pricing of a “nonrivalrous” intangible asset is inefficient.
Perfectly Competitive Market (Uniform Pricing)

- Price: $5
- Quantity: 100
- Demand
- Marginal cost
- Consumer Surplus: $15
Non-Competitive Market (Uniform Pricing)

Pricing Options:
P*Q=R
$5*100 = $500
$10*60 = $600
$15*0 = $0

Price

$15

Pm = $10

Pc = $5

Profit (Producer Surplus)

Deadweight loss

Consumer surplus

Marginal cost

Demand

Qm= 60

Qc=100

Quantity
The Incentives-Access Tradeoff

• **Incentives-access tradeoff**: Conventional IPR policy is based on a tradeoff between static inefficiency (resulting in higher access costs) and dynamic efficiency (resulting in more innovation).

• **Policy objective**: Assuming perfect information, IPRs are calibrated to create smallest necessary “wedge” between zero marginal and positive fixed costs. This maximizes efficiency gains, net of “deadweight losses” and transaction costs borne by intermediate and end-users of IP-protected assets.

• Application: The incentives-access tradeoff can explain why IP rights often have more substantial limitations in time or “space” as compared to property rights in land or tangible assets. Exs.:
  – Time-limited duration of copyrights and patents
  – Debates over scope of the “derivative right” in copyright
  – “Fair use” defense to copyright infringement

References: Posner (2005); Landes and Posner (2003); Machlup (1958)
IP Agnosticicism

- Much of conventional economic analysis of IP is agnostic about the net welfare effects of formal IP rights (e.g., Machlup 1958). By contrast, economic analysis almost always concludes that real property rights have net positive welfare effects.

- This school of thought emphasizes the deadweight losses inherent to monopoly pricing and, in general, any positive pricing of a “nonrivalrous” IP asset. In this framework, “zero IP” is treated as the default option and IPRs should be introduced and extended with caution.

- **Caveat**: Many if not most “IP agnostics” recognize that the value of IP rights in pharmaceuticals is well-established empirically. Factors:
  - Massive absolute R&D, testing and marketing costs
  - Large difference between “invention” and imitation costs
  - Long time lag between product conception and market release

- The rest of IP: ?????????????
Prelude to Part III: Rethinking the Conventional Approach
The Automotive Patent Roadblock

• Conventional view: Aggressive patent infringement litigation by Selden against Ford (1903-1911) inhibited early development of automobiles.

• Some inconvenient facts:
  – Automotive production grew significantly during the litigation.
  – Ford’s production grew significantly during this period.
  – Automotive innovation advanced substantially. Most notably, Ford released the Model T in 1908.

• Following conclusion of the litigation, the industry formed a patent pool, which lasted until 1957. Cross-licensing norms persisted thereafter.
The Patent “Explosion”

Sources: USPTO, U.S. Census Bureau
Some Inconvenient Facts

• Since establishment of the Federal Circuit in 1982 and an increase in the strength of patent protection, there has been no decline in national U.S. R&D intensity. Holds constant at approx. 2.5% through 2006, after which it has jumped to approx. 2.75%.

• In patent-intensive IT markets, output is up, innovation is constant, and quality-adjusted prices are down (Galetovic, Haber & Levine (2015)). In the patent-intensive smartphone market, sales increased approx. 900% from 2006-2012 and market concentration among device manufacturers has declined substantially (Mallinson 2016).

• None of this is determinative. But it raises doubts about the conventional wisdom concerning the “deadweight losses” and other social costs of strong IP, even outside the pharmaceutical industry.
Part III: Economics of IP – New Approaches
Limitations of the Conventional Approach

• Unrealistically assumes market power and zero enforcement costs in all cases. This inflates the social costs of IP.

• Provides a rationale for innovation incentive mechanisms (e.g., prizes, grants), rather than patents or copyrights specifically.

• Mostly ignores the pricing and allocative function of IPRs, akin to property rights in land and tangible assets.

• Focuses on the “zero-sum” exclusionary function of IP in the litigation context. Mostly ignores “positive-sum” financing, licensing, and commercialization activities in real-world technology and content markets.

• Often ignores the market’s ability to contract around IP-related transactional roadblocks (Merges 1996).
New Framework

- **Multiple agents**: Profit-maximizing inventors and commercializing entities on “path to market”.

- **Revised assumptions**: limited market power; positive enforcement costs.

- **Problem I**: fixed-cost recovery (as in conventional approach)
- **Problem II**: Information paradox (Arrow 1962). No reliable contractual solution.

- **Solutions**: IP + non-IP instruments, incl. scale and vertical integration (Teece 1986). Ease of access to non-IP instruments may differ across firm types (Barnett 2011).
Supply Chain Structures in IP Markets

Supply Chain Functions/Structures

- R&D
- Production
- Distribution
- Market

(i) R&D → B1 → B2 → B1 → C1 (user)

(ii) Direct delivery of IP asset

(iii) License-based delivery of IP asset

Symbols:
- = license-based delivery of IP asset
- = direct delivery of IP asset
Advantages of the New Approach

• Recognizes that IPRs do not typically confer market power. Recognizes positive enforcement costs.

• Addresses commercialization and licensing activities, so covers both litigation and transactional contexts.

• Recognizes that IPRs can reduce transaction costs and, for certain firms, lower entry barriers.

• Recognizes pricing function of the IP system. This provides an economic account of the IP system specifically.
IP and the Theory of the Firm

• Firm boundaries reflect efficient allocation of tasks between the market (by contract) and the firm, as a function of relative transaction costs (Coase 1937, Williamson 1985).

• IP-rich relationships involve a special transaction cost given the difficulty of contracting over informational assets.

• If patent system reduces costs of contracting over information, it enables markets to develop efficient transactional structures. In particular, it supports the formation of specialized R&D firms without downstream capacities (Arora & Merges (2004); Barnett (2011, 2016); Kieff (2005, 2006)).
Example 1: Biopharma Supply Chain

Supply Structures

UNIVERSITY

START-UP

Supply Functions/Inputs

IP transfer

Financing

Contract: venture capitalist

Contract: Large pharmaceutical firm

Additional R&D
Pre-clinical testing
Early-stage clinical testing
Late-stage clinical Testing
Production
Marketing; Distribution

Market Release
Example 2: Semiconductor Supply Chains

Fabless (Disintegrated) Model
- In-house
- Some IP in-licensed
- Some use of design services firms

Contract with foundry

3rd-party contractors

In-house

Function

Chip Design

Prototyping

Fabrication

Assembly, Testing

Sales, Distribution, Support

OEM/Intermediate User

Incumbent (Integrated) Model
- In-house
- Some IP in-licensed

Contract with foundry

3rd-party contractors

In-house

Source: Barnett (2011)
Example 3: IP and Foreign Direct Investment

Technology Transfer to a Foreign Jurisdiction

- **Home jurisdiction**
- **Foreign jurisdiction**

**Technology Holder**
- **Contract:** External transfer by contract to local partner.
- **Firm:** Internal transfer to local wholly-owned subsidiary or affiliate.
- **No transfer**

0 Expropriation risk

IP strength 0
International Semiconductor Supply Chain

Source: Barnett (2017b)
References


• Arrow, Kenneth. *Economic welfare and the allocation of resources for invention,* in The Rate and Direction of Inventive Activity (1962).


References (cont.)

• Williamson, Oliver. The Economic Institutions of Capitalism (1985).