Dis 4: Property Law (Cont'd) [†]

1 Problem on Extensive Form Games from Last Week

1. (Adapted from Pedro Guinsburg's Fall 2016 handout)

   Gary owns the only bar in a village, and he makes about $2000 a month. One of his workers, Amy, is not happy with her $300 wage, and is thinking about leaving and opening her own bar.

   If Amy stays, Gary has two choices:

   - Give her a $200 raise, or
   - Pay her the same

   On the other hand, if Amy decides to leave, Gary can choose between:

   - Fight: compete with Amy and lower prices, in this case Gary will get $600, and Amy gets $200.
   - Share: share the market with Amy, in this case Gary will get $1200, and Amy gets $1000.

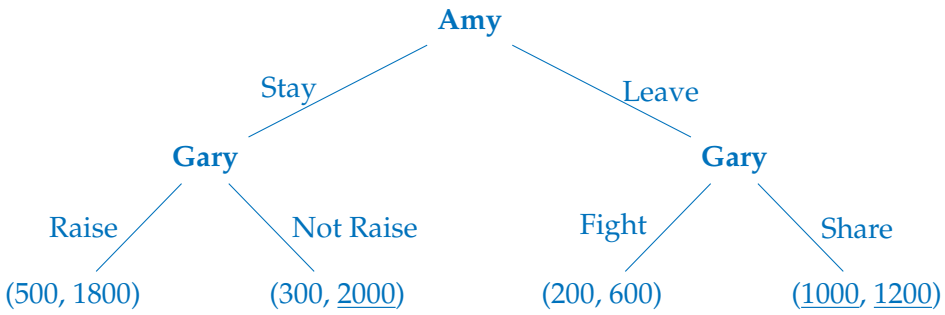
   (a) Find all (pure strategy) Nash equilibria.

   Let Amy be player 1, Gary be player 2. Amy has two pure strategies (stay, leave). Gary has four pure strategies (raise-fight, raise-share, not raise-fight, not raise-share)

	Raise-Fight	Raise-Share	Not Raise-Fight	Not Raise-Share
Stay	(500,1800)	(500,1800)	(300,2000)	(300,2000)
Leave	(200,600)	(1000,1200)	(200,600)	(1000,1200)

   So there are three equilibria: (Stay, Not raise-fight), (Leave, Raise-share), (Leave, Not Raise-share).

   (b) Find all (pure strategy) Subgame-Perfect Equilibria.



   Use backward induction, we see that

   - Gary will raise Amy's wage if Amy stays ($2000 > 1800$)
   - Gary will share the market if Amy leaves ($1200 > 600$)
   - Going back one more level, Amy knows that if she stays, she will get a payoff of 300; if she leaves, she will get a payoff of 1000. So she will choose to leave.

   Thus, the unique SPE is (Leave, Not Raise-Share).

[†] Adapted from Jonathan Becker's Fall 2018 handout

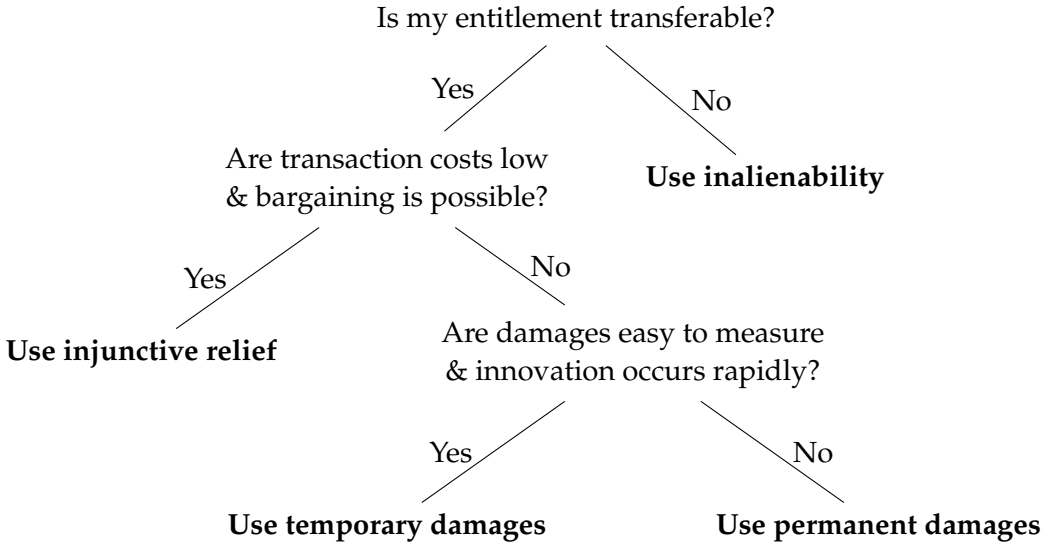
2 Review: Property Law Concepts

- More on remedies for violation of entitlement:

  For **liability rule / damages**, we can divide compensatory damages into these two types:

  - **Temporary damages:** Compensate for harms that have already occurred.
    - Require victim to keep returning to court if harm continues.
      $\Rightarrow$ Create an incentive to reduce harm in the future when technology changes.
    - Efficient when damages are easy to measure, and innovation occurs rapidly.
  - **Permanent damages:** Covers present value of anticipated future harm.
    - One-time, permanent fix.
      $\Rightarrow$ No incentive to reduce harm as technology evolves, since damages is already paid.
    - Efficient when damages are costly to measure and innovation occurs slowly.

  Updated flowchart to determine when remedies efficient (as a general rule of thumb):



- Intellectual Property: Property rights applying to ideas or information.
  - **Patents:** Private monopolies on products or commercial processes.
    - TC: Expected to be high, due to uncertainties about the validity of a patent, about research outcome, and the high number of parties that might be involved.
    - Efficiency: Solves one inefficiency (underinvestment in R&D) by introducing another (DWL from giving patentholders monopoly control over their product).
  - **Copyrights:** Property rights over original expressions.
    - Efficiency: Solving one inefficiency (underprovision of original expressions since they are non-excludable and non-rivalrous) by introducing another (lasting 70 years after creator's death – significantly hinders the creation of derivative works).
  - **Trademarks:** Property rights over brand names or distinctive images/symbols.
  - **Trade Secrets:** information "used in one's business" that gives its owner "an opportunity to obtain an advantage over competitors who do not know or use it."

3 Review: Limitations to Property Rights

3.1 Why we want to impose certain limitations on property rights?

- Limitations might result in **more efficient use of the property** (ex. Adverse possession, private necessity, eminent domain).
- Without said limitations, the efficient allocation might **never be achieved due to high TC when negotiating** (ex. Private necessity, unbundling restrictions, eminent domain)
- Limitations might lead to **the most efficient outcome we can get when facing certain tradeoffs** (ex. Regulation)

3.2 Types of Limitation

- **Adverse possession ("Squatter's Rights"):** If someone occupies another person's property for long enough, that person becomes the legal owner, provided the following conditions are met:
  1. Adversarial Use: The occupation was adverse to the owner's interests.
  2. Open Use: The occupation was not concealed or conducted in secret.
  3. Uncontested Use: The owner did not object or take legal action.

  Efficiency implication:
  - Allow the land to be put into more efficient use, while clearing up uncertainty over time to lower TC for future bargaining
  - On the down side, adverse possession incurs monitoring costs for property right owners so that they can protect their property
- **Private necessity:** In case of emergency, the law need not enforce property rights via injunctive relief.
  - Principles in Calabresi and Melamed (i.e. Use injunctive relief when TC are low; use damages when TC are high) still apply in here – during emergency, many of the standard bargaining costs are amplified, so it's much more efficient to have the rights violated & pay damages instead.
- **Unbundling restrictions:** Restrictions on how a property right can be subdivided.
  - Pro: Unbundling might increase TC, as it increases uncertainty about rights and may increase number of parties involved in future transactions.
  - Con: Less usage of property compared with Maximum Liberty $\rightarrow$ inefficiency.
- **Eminent domain (Government takings):** The right of the government to seize property for public use, at fair market value.
  - Pro: Address inefficiency when high TC lead to government undersupplying public goods.
  - Con: Exercise of eminent domain isn't always efficient (homeowners often value their home more than fair market value; government corruption might lead to overuse of eminent domain)

  Eminent domain should only be used when high TC preclude purchasing the necessary property through voluntary negotiation.
- **Regulations:** Exercising public control by imposing usage restrictions (ex. Zoning Laws).

  Middle ground between *open access* (overutilization of public resource) and *unanimous consent* (underutilization of public resources).

4 Problems

1. In 2015, the Wisconsin Alumni Research Foundation (WARF) claimed that Apple's A-series chips infringed on its patent for a method of boosting the efficiency of integrated circuits, and claimed damages of $862M. WARF was initially granted a damages payment less than what it has claimed, but the case was thrown out by the U.S. Federal Circuit Court of Appeals in Washington, D.C., and the U.S. Supreme Court declined to hear the case further in 2019, thereby upholding the Federal Circuit Court's decision.

   During this process, Apple responded to the initial claim by saying its processor "worked differently than how WARF's patent did." And commenting on the decision by the U.S. Supreme Court, WARF spokesperson indicated the group's pursuit against Apple is "far from over." *

   (a) Does the Coase theorem apply in here? Why?

   No, Coase theorem does not apply in this case, since there are significant bargaining costs between the two sides based on their comments (ex. the pursuit against Apple is "far from over"), so TC will be high. When TC are high, one of the three conditions in Coase theorem has failed, so Coase theorem does not apply.

   The patent held by WARF was developed by a UW-Madison Computer Sciences Professor back in 1998. Suppose that Apple using the patented intellectual property in its A-series chip design has greatly improved their phone performance, and hence generated a total of $100M surplus to everyone who has used the newly improved phone.

   (b) When the patent was granted in 1998, the U.S. was using the "first-to-invent" patent system (a patent is awarded to the person who first had the idea). Starting in 2013, the U.S. has been using the "first-to-file" patent system (a patent is awarded to the first person to file for a patent).

   Consider the principle of establishing ownership, does the "first-to-invent" rule more closely resemble a first possession or a tied ownership rule? What about "first-to-file"?

   "First-to-invent" more closely resembles a tied ownership rule. It encourages people to efficiently use their time on invention, but it's more costly to administer (might be difficult to establish that you are the first to invent something).

   "First-to-file" more closely resembles a first possession rule, since the ownership right is established directly by the action of filing for patent. It also has the same downside as a first possession rule – it incentizes people to spend more time and energy to make sure their properties are the first to be filed instead of spending more time to invent more intellectual properties.

   (c) What's the efficient use of the intellectual property in this case?

   Let social surplus under the patent not infringed upon to be the baseline 0. Now, under the patent being infringed and the intellectual property used by Apple, social surplus is now $100M. Clearly, the more efficient outcome is to have Apple infringe on the patent and use the intellectual property.

   (Notice that it is possible that Apple, upon infringing the rights of WARF, will need to pay damages to compensate the harm done, but this is merely a transfer within the society, so this transfer does not affect the social surplus level. Thus, social surplus under patent infringement only changes by the $100M new value created.)

*See U.S. Supreme Court declines to hear UW-Madison's $506 million case against Apple

(d) If the court had issued a temporary damages, what would Apple be incentivized to do?

Issuing of any sort of damages means that the court ruled that WARF had the rights.

Temporary damages only cover the past harm done. If Apple keeps infringing on WARF's rights, then WARF can sue again in the future asking for more damages. Hence, Apple would have the incentive to stop infringing upon WARF's rights.

(e) If the court had issued a permanent damages instead, what would Apple be incentivized to do?

Permanent damages would cover both past and present value of future harm done. After paying permanent damages, the price to pay for Apple to continue infringing upon WARF's rights is 0, so Apple has no more incentive to not infringing on WARF's rights, and will keep the patented design in its chips.

(f) Does the principles of Calabresi and Melamed agree with the use of either temporary or permanent damages?

Yes. Calabresi and Melamed argued that if TC are high, damages should be used as the remedy.

2. (From sample exam questions)

   The government is interested in acquiring land to build a school. The school will be a public good, creating $\$5,000,000$ in total value. The land the government wants to build on is currently privately owned.

   (a) First, suppose the land is made up of 30 small plots, each one owned by a different owner. Each owner values his own land at $\$100,000$.

      i. Would transaction costs be high or low if the government tried to acquire the needed land through voluntary negotiations?
      I'd expect them to be high, due to the large number of parties involved.

      ii. Would the government's use of eminent domain to acquire the land be efficient or inefficient?
      Social surplus if no eminent domain is used can be normalized to 0 (baseline value).
      Social surplus under the use of eminent domain is baseline value plus the total change of surplus. Here, since the use of eminent domain requires the government to compensate homeowners at fair market value, no value was destroyed for the 30 owners. On the other side, building the school will create $\$5,000,000$ in value. So the social surplus after using eminent domain is $0 - 0 + \$5,000,000 = \$5,000,000$.
      Clearly, social surplus after using eminent domain is higher, so the use of eminent domain here is efficient.

   (b) Now instead, suppose the land is in one piece, and is currently owned by a wealthy retiree. The "fair market value" of the land is $\$2,000,000$, but the retiree has lived on the land his whole life and values it at $\$10,000,000$.

      i. Would transaction costs be high or low if the government tried to acquire the needed land through voluntary negotiations?
      I would expect them to be low, because it's a single owner; but one could perhaps argue they might be high if the current owner is irrational or unwilling to negotiate.

      ii. Would the government's use of eminent domain to acquire the land be efficient or inefficient?
      Social surplus if no eminent domain is used can be normalized to 0 (baseline value).
      Social surplus under the use of eminent domain is baseline value plus the total change of surplus. Notice that in this question, the current owner only gets the transfer of the "fair market value amount". So he will lose $\$8,000,000$ in his own surplus (i.e. $\$8,000,000$ surplus has been destroyed). So social surplus under the use of eminent domain is thus $0 - \$8,000,000 + \$5,000,000 = -\$3,000,000$.
      Clearly, the use of eminent domain here is inefficient.

   Conceptually, eminent domain is similar to using a liability rule (damages), rather than a property rule (injunctions), to protect ownership rights – the government is allowed to take your land and pay you for it, rather than negotiating to buy it from you.

   (c) Which type of rule, property or liability, is generally more efficient when transaction costs are high, and which is generally more efficient when transaction costs are low? Given this, is the use of eminent domain more likely to be efficient in the presence of high or low transaction costs? Does this agree with your answers to parts (a) and (b) above?

Liability rules (damages) are generally more efficient when transaction costs are high, and property rules are generally more efficient when TC are low.

Since eminent domain is similar to a liability rule, this suggests it's more likely to be efficient when TC are high. This agrees with the answers to (a) and (b).

(In part (a), high transaction costs would have prevented the efficient use of the land if eminent domain was not used.

In part (b), the land was already being used efficiently – it would have been valuations themselves, not transaction costs, that prevented the government from being able to buy the land through voluntary negotiations – and the use of eminent domain would have therefore led to an inefficient outcome.)