The Dilemma of Defensive Patenting

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Patents for defense: Microsoft

"At Microsoft, we used to pay little attention to patents. . . One of these big companies could dig through their patent portfolio, find something close to what we had done, then sue us, and we would have to go through an elaborate defense and possibly lose. So Microsoft did what most big companies do, which is start to build what is called a 'defensive' patent portfolio. So if a big company tried to sue us, we could find something in our portfolio they were afoul of, and countersue. In the cold war days, this strategy was called 'mutual assured destruction,' . . . since it was intolerable for all parties to engage, it resulted in a state called 'détente', or 'standoff'. This is what you see today for the most part in lots of industries." (Chris Pratley, manager at Microsoft, 2004)

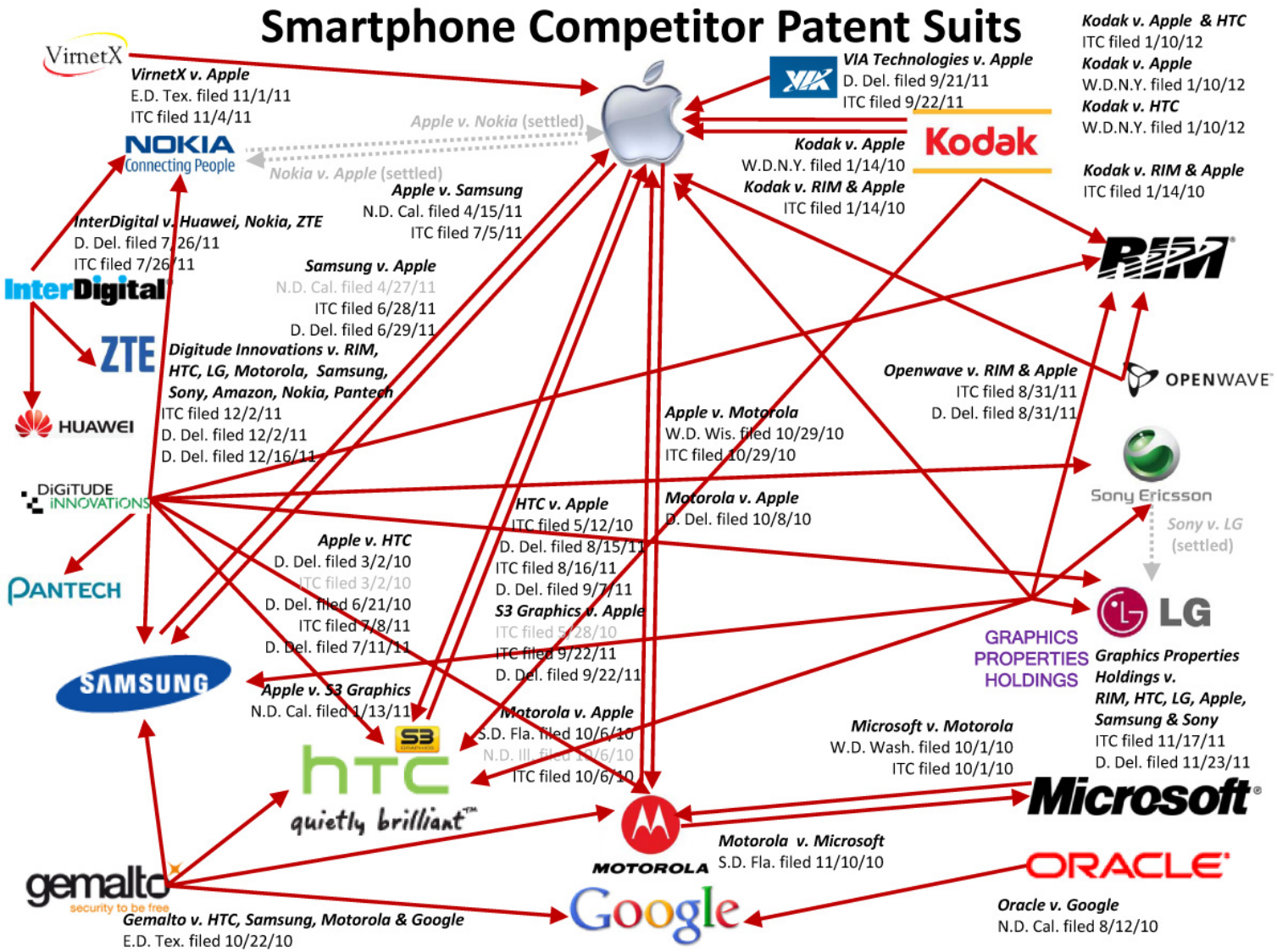
Power of counter-suits: Semi-conductor industry

"Firm A's corporate patent department will wait to be notified by attorneys from firm B that it is suspected that A's activities are infringing B's patents.. . . Because possibly germane patents and their associated claims are so numerous, it is in practice usually impossible for firm A — or firm B — to evaluate firm B's claims on their merits. Firm A therefore responds — and this is the true defensive value of patents in the industry — by sending firm B copies of 'a pound or two' of its possible germane patents with the suggestion that, although it is quite sure it is not infringing B, its examination shows that B is in fact probably infringing A. The usual result is cross-licensing . . ." (von Hippel, 1988)

The best defense is a good offense

- Patents help defense: Taylor and Silberston (1973), von Hippel (1988), Cohen *et al.* (2000), Hall and Ziedonis (2001)
  - ✓ bargaining chips at cross-licensing, deterrence of litigation
  - ✓ freedom of operation ⇒ easier to develop products, further R&D
- But why stop at defense?
  - ✓ Microsoft *vs.* the Android camp, both Google and manufacturers

Landscape of patent litigation: Smartphones



How to commit to "defense-only" litigations?

- Twitter: "*not use the patents from employees inventions in offensive litigation without their permission.*"
- Defensive Patent License (DPL, Schultz and Urban, 2012): peace among members of the "truce alliance"
- Defensive patent aggregation (DPA): licensing patent portfolio only for defensive purpose
  - ✓ commitment also covers non-licensees
- Hybrid: Open Invention Network
  - ✓ specific to Linux
  - ✓ royalty-free as long as you agree not to sue *all* Linux developers

$\leftrightarrow$ Can defend against "patent trolls"?

A dilemma

- Defense by countersuing for infringement is effective only against operating patent-holders
- But non-practicing entities (NPEs) have nothing to infringe
  - ✓ bigger firms better prey

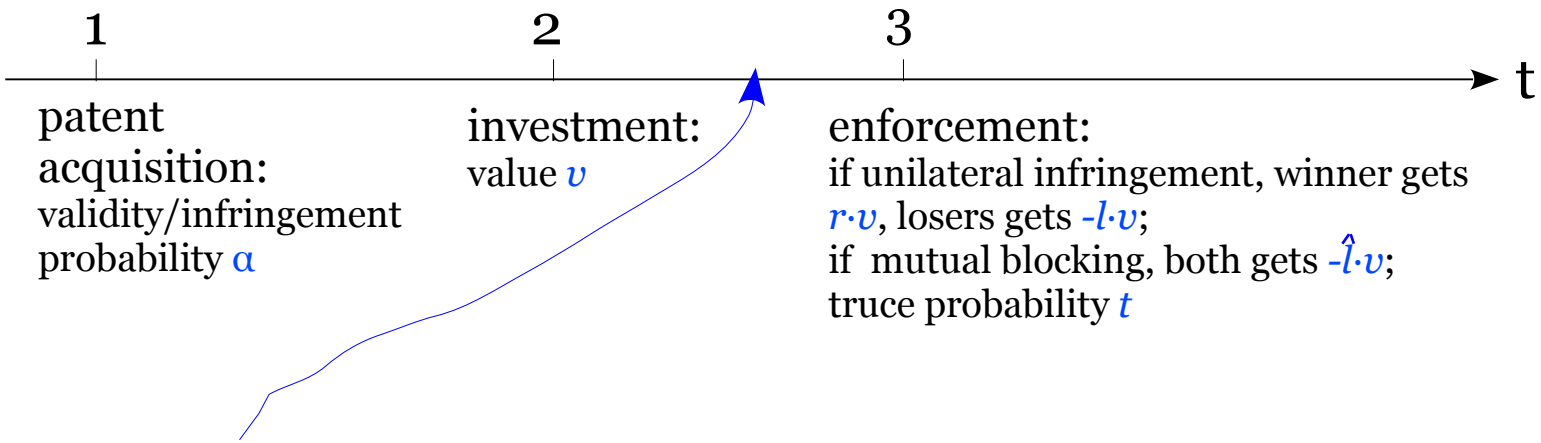
$\Rightarrow$ Effective defensive patenting (*vis-à-vis* operating firms)
$\Rightarrow$ higher investments
$\Rightarrow$ more (purely) offensive patenting

- ✓ defensive patenting can breed patent trolls
- ✓ DPL and DPA are not immune to this dilemma

A simple model

- Two types of (atomless) firms: observable and binary decisions
  - ✓ type 1: only patenting decision, no investment opportunity, size T_1
    - ∗ trolls, individual inventors, universities
  - ✓ type 2: both patenting and investment decisions, size T_2
  - ✓ firm heterogeneity at the cost side
- Patenting stage: distributions of patenting cost i.i.d. $F_1(\cdot)$ and $F_2(\cdot)$
- Investment stage: distribution of type-2's investment cost i.i.d. $K(\cdot)$
  - ✓ NPEs, manufacturing firms, vertically integrated firms (VI)
- Litigation stage
  - ✓ unilateral infringement or mutual blocking

Summary of setting



	patent	no patent	
investment	vertically integrated firms (VIs)	pure manufacturing firms	operating firms
no investment	non-practicing entities (NPEs)		
	patent-holding firms		

Reduced-form patent enforcement

- No enforcement/litigation cost
  - ✓ always sue for infringement
- Identical infringement suits
  - ✓ all operating firms may infringe on all patents
  - ✓ common investment value v and patent infringement probability α
- Infringement remedy: licensing revenue, not forced exit
  - ✓ unilateral infringement: rv (for infringed party) *vs.* $-lv$ (for infringing party) $\Rightarrow R \equiv \alpha r v$ and $L \equiv \alpha l v$
  - ✓ between two VIs: "truce" with probability t
  - ✓ litigation war: mutual blocking $\Rightarrow -\hat{l}v$ for both
    $\Rightarrow W \equiv [\alpha^2 \hat{l} + \alpha(1-\alpha)(l-r) + (1-\alpha)^2 \cdot 0]v$

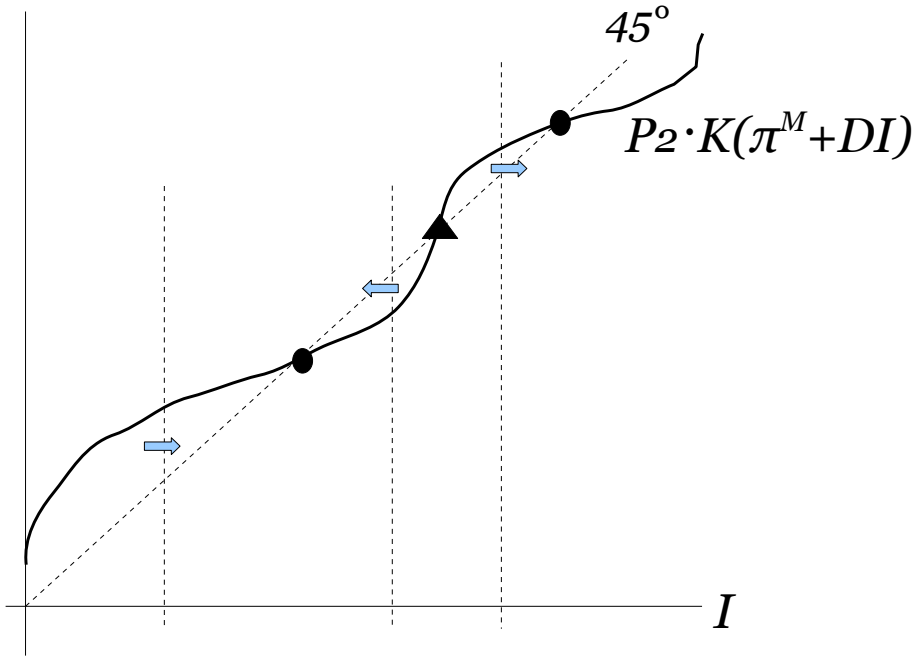
Investment

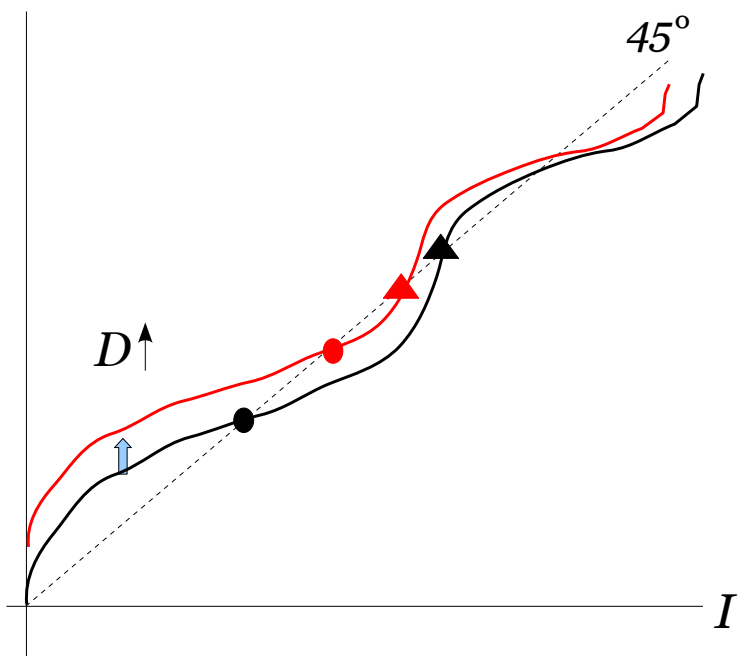
- Aggregate variables: total patents P_1 and P_2, total investment M and I
- W/o patent: a manufacturer, may infringe on $P_1 + P_2$ patents
  - ✓ investment return $\pi^M = v - (P_1 + P_2)L \Rightarrow M = (T_2 - P_2) \cdot K(\pi^M)$
- W/ patent: offense *vs.* defense
  - ✓ not invests $\Rightarrow$ NPE, with payoff $\pi^N = (M + I)R$
  - ✓ invests $\Rightarrow$ vertically integrated
    - vulnerable to NPEs: loss $(P_1 + P_2 - I)L$
    - offensive against manufacturers: gain $M \cdot R$
    - other VIs: loss $(1 - t)W$
    - $\Rightarrow$ investment revenue $\pi^I = \pi^M + \pi^N + ID$
    - defensive premium:

$$D \equiv L - R - (1 - t)W = [t(l - r) + \alpha(1 - t)(l - r - \hat{l})]\alpha v$$

  - ✓ invests if cost $< \pi^I - \pi^N = \pi^M + DI$
  - ✓ $D > 0 \Rightarrow$ strategic complementarity: $I = P_2 \cdot K(\pi^M + DI)$
    - stability: $P_2 D K' < 1$

Stability: $I = P_2 \cdot K(\pi^M + DI)$





Defensive patenting and investment

- Assume: positive defensive premium, $D > 0$
  - ✓ holding a patent raises investment incentives: $\pi^I - \pi^N > \pi^M$
  - ✓ NEC.: $l > r$

Proposition (Patents and investment)

For a stable investment equilibrium $(\hat{M}, \hat{I})$*: (i)* $\hat{M} \downarrow$ *in* P_1 *and* P_2*; (ii)* $\hat{I} \uparrow$ *in* D *and* $\downarrow$ *in* P_1*, but* $\uparrow\downarrow$ *in* P_2

$$\frac{d\hat{M}}{dP_2} = -K(\pi^M) - (T_2 - P_2)LK'(\pi^M) \text{ and } \frac{d\hat{I}}{dP_2} = \left.\frac{K(c) - P_2LK'(c)}{1 - P_2DK'(c)}\right|_{c=\pi^M + D\hat{I}}.$$

- $\hat{M} + \hat{I} \uparrow\downarrow$ in P_2: larger pool of potential VIs *vs.* lower π^M
- $D \uparrow$: $(1 - P_2DK') \downarrow$ if K' does not dominate
  - ✓ e.g. investment cost $\sim$ UNIF$[0, 1/\kappa]$

The dilemma

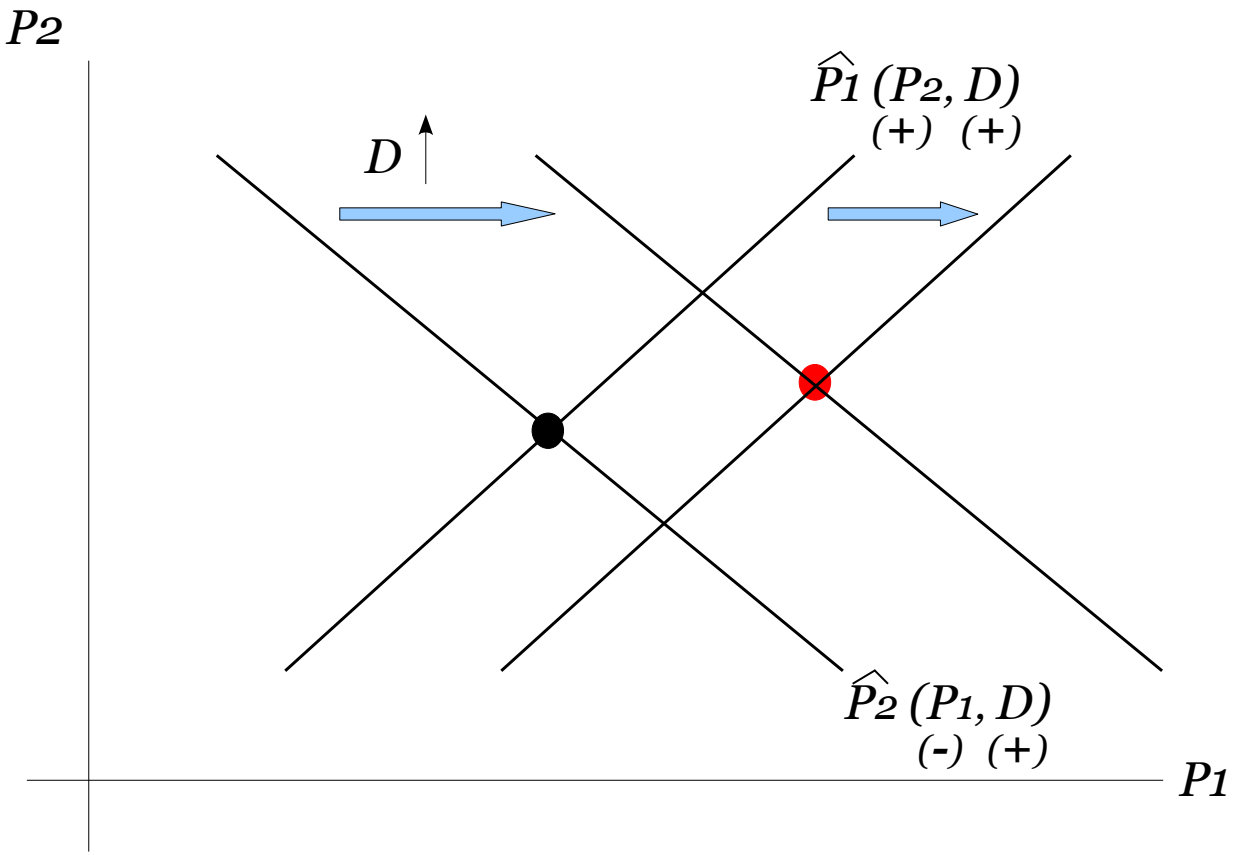
- Type-1: purely offensive patenting, $P_1 = T_1 \cdot F_1(\pi^N)$
- Type-2: an option value of patent
  - ✓ if not patents, then can only be a manufacturer later
  - ✓ if patents, then can decide between NPE or VI later
  - ✓ obtains a patent if the cost is smaller than
    $f = K(\pi^M)(\pi^N + D\hat{I}) + \int_{\pi^M}^{\pi^M + D\hat{I}} (\pi^I - c)dK + [1 - K(\pi^M + D\hat{I})]\pi^N$
  - ✓ $P_2 = T_2 \cdot F_2(f)$
- Strategic dependence between P_1 and P_2: via investment incentives
  - ✓ $P_1 \uparrow \Rightarrow \hat{M}$ and $\hat{I} \downarrow \Rightarrow P_2 \downarrow$
  - ✓ $P_2 \uparrow \Rightarrow (\hat{M} + \hat{I}) \uparrow\downarrow \Rightarrow P_1 \uparrow\downarrow$

Proposition (The dilemma of defensive patenting)

For a stable patenting equilibrium (P_1^*, P_2^*),

- $D \uparrow \Rightarrow P_1^*$ *or* $P_2^* \uparrow$, *or both*
- *when* $\hat{M} + \hat{I} \uparrow$ *in* P_2, *then* $P_1^* \uparrow$ *in* D

When $P_2 \uparrow \Rightarrow \hat{M} + \hat{I}$



DPL as a "truce alliance"

- A club of patent-holders that promise no litigation among members, but free to sue outside the club
- NPEs will not participate
- VIs?
  - ✓ suppose a portion μ^I participate
  - ✓ litigation propensity ϕ^M and ϕ^I against non-members
  - $\leftrightarrow$ before: $\phi^M = 1$ and $\phi^I = 1 - t$
  - ✓ joins if $[\mu^I \phi^I + (1 - \mu^I)(1 - t - \phi^I)]IW > (1 - \phi^M)RM$, where $W > 0$
  - ✓ cannot be too lenient against non-members
- Let $\phi^M = 1$ and $\phi^I \geqslant 1 - t$
  - ✓ both $\mu^I = 0$ and $\mu^I = 1$ are equilibria
  - ✓ under $\mu^I = 1$, π^M the same, $\pi^I \uparrow$, as if $D \uparrow$
    $\Rightarrow$ if $\hat{M} + \hat{I} \uparrow$ in P_2, then DPL $\uparrow$ purely offensive patenting by type-1

DPA's defense-only commitment

- DPA: licenses patent portfolios in defense only, no offensive litigation against *all*, including non-clients
- Clients with size A: no patents, maintain full truce with (non-client) VIs
- Aggregate investments: $\widetilde{M}$, $\widetilde{I}$, I_A
  - ✓ π^M the same, $\widetilde{M} = (T_2 - P_2)K(\pi^M)$
  - ✓ offensive value $\widetilde{\pi}^N = R(\widetilde{M} + \widetilde{I} + I_A)$
  - ✓ payoff of VI: $\widetilde{\pi}^I = \pi^M + \widetilde{\pi}^N + D\widetilde{I} - RI_A$, $\downarrow$ in I_A!
  - ✓ DPA's commitment $\Rightarrow$ no need to defend against I_A $\Rightarrow$ offensive value $\uparrow$
  - ✓ clients: $\pi^A = \pi^M + L\widetilde{I}$

Proposition (DPA)

For a stable equilibrium, higher $A \Rightarrow \widetilde{I} \downarrow$; and, when total investment $(\widetilde{I} + I_A + \widetilde{M}) \uparrow$ in A, then purely offensive patenting by type-1 also $\uparrow$ in A.

Ex ante licensing

- Some NPEs, size $P_0 < T_1$, already own a patent portfolio and commit to licensing offer $l_0 < \alpha l$
  - ✓ let $L_0 \equiv l_0 \nu$
  - ✓ FRAND
  - ✓ no investment $\leftrightarrow$ litigation patterns among VIs
  - ✓ no patenting decisions $\leftrightarrow$ broader strategic concerns
- Modifications: $\pi_0^{\mathcal{M}} = \nu - (P_1^0 + P_2^0)L - P_0 L_0$, $P_1^0 = (T_1 - P_0)F_1((\hat{\mathcal{M}}_0 + \hat{I}_0)R)$
  - ✓ if $(\hat{\mathcal{M}}_0 + \hat{I}_0) \uparrow$ in P_2^0, then patenting equilibrium

$$P_1^0 = \underset{(+)}{\hat{P}_1^0}\underset{(+)}{(}\ P_2^0\ ,\underset{(-)}{P_0 L_0}) \quad \text{and} \quad P_2^0 = \underset{(-)}{\hat{P}_2^0}\underset{(-)}{(}\ P_1^0\ ,\underset{(-)}{P_0 L_0})$$

  - $\Rightarrow$ $P_0 L_0 \uparrow \Rightarrow P_1^0 \uparrow$
  - ✓ lower l_0 would generate the dilemma
  - ✓ preemptive acquisition ($P_0 \uparrow$) could alleviate the problem

Discussion

- Patents as weapons to drive out competitors
  - ✓ NPEs won't use it this way
  - ✓ VIs may want to shut down competing manufacturers ⇒ less M
  - ✓ but defensive patenting may still work among VIs ⇒ dilemma
- Supply of patents: here, only a matter of cost
  - ↔ if limited supply ⇒ bidding war
  - ✓ Nortel: Apple + Microsoft + RIM *vs.* Google ⇒ $4.5 billion for 6000+ patents
- DPA: preemptive acquisition
  - ✓ deeper pockets? free-riding from defense-only commitment
  - ✓ catch and release ⇒ delaying offensive litigation
  - ✓ a window for operating firms: to license or to invent around
    - ∗ invention around ⇒ free-riding!