The Market for Standard Essential Patents

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  - Standards (e.g., UMTS or Blu-Ray) incorporate hundreds of different SEPs
  - Technology sponsors hold and license several SEPs as a bundle
- Recent evidence of SEPs trading activities
  - Nortel (5,000 patents), Motorola Mobility (17,000 patents)
  - Privateering (Core Wireless, Unwired Planet, IPcom)
  - Pooling (Vringo, Sisvel)

The paper

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- The incentives of SEP owners to buy and sell SEPs.
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Related literature

- Lerner-Tirole (2004, 2014): competition and demand margins
- Baron et al. (2013): incentives to increase the size of SEP portfolio

The model

A product market where the technological standard embodies k Standard Essential Patents (SEPs), owned by $n \leq k$ patent holders:

- Each patent holder i has a portfolio of k_i SEPs, with $\sum_i k_i = k$
- FRAND royalty program: per-unit royalty r_i for using the SEP porfolio
- Patent holders not involved in the product market
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Product market:

- Free entry
- Large number of downstream producers, which are identical and offer each a fixed quantity $\bar{q}$ of a homogeneous good
- Demand function in the downstream market: $Q = D(p)$
- The producers that enter the market compete in prices

The timing

1. The SEP owners set simultaneously FRAND licensing terms for producers.
2. Manufacturers enter the market; each manufacturer decides whether to take a license from SEP owner i or not.
3. Manufacturers compete in prices.
4. SEP owner i can decide to enforce its patent rights in courts against the manufacturers that did not take a license.

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Enforcement requires critical portfolio size:

- The threat of enforcement is credible if only if $w(k_i)d\overline{q} \geq L$
- That is, iff $k_i \geq \overline{k}$, where $\overline{k} = L/(d\overline{q})$ is the critical portfolio size

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If enforcement is credible, the owner and the producer reach a settlement agreement $\rightarrow$ the manufacturer then agrees to pays $w(k_i)d$ per unit of output

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- If $r_i > dw(k_i)$, the manufacturer prefers to pay damages (via the settlement procedure) than royalties $\rightarrow$ it does not take the license

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$\Rightarrow$ maximum royalty $\bar{r}(k_i) = dw(k_i)$ for owner i, increasing in portfolio size k_i

Enforcement and demand margins

At the beginning of the licensing game, each owner i sets its royalty r_i, taking as given the total royalties set by the other owners, R_{-i} (simultaneous moves):

$$\max_{r_i} r_i D(R), \text{ s.t. } r_i \leq \bar{r}(k_i)$$

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If $\widehat{r} \leq \bar{r}(k_i)$, the demand margin is binding $\rightarrow$ the SEP holder charges a demand bound royalty $\widehat{r}$.

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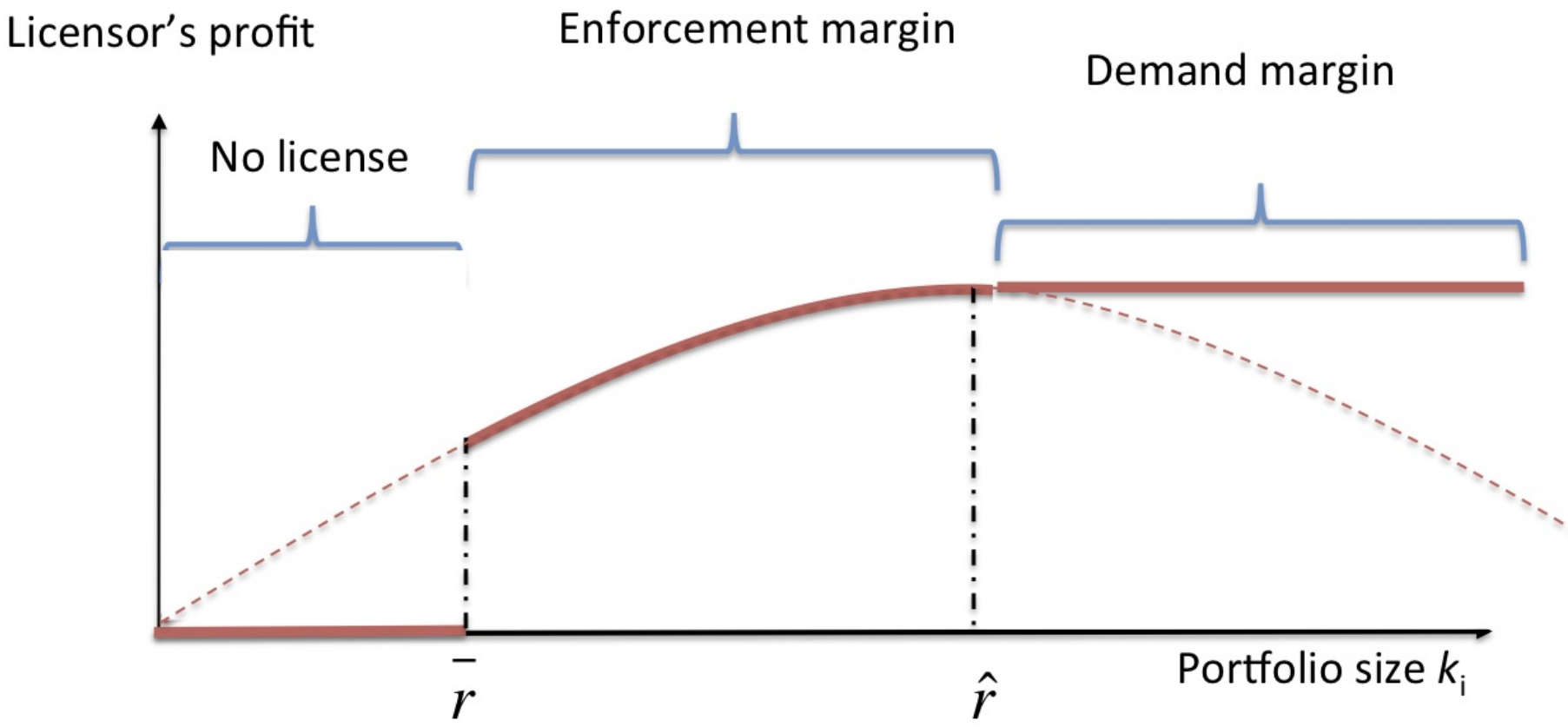

Royalty stacking and double marginalization

Assume that there is:

- a group S of n_s strong SEP owners (demand-bounded)
- a group E of n_e SEP owners of medium strength (enforcement-bounded)

Total royalties: $R = \overline{R} + \widehat{R}$, with $\overline{R} = d \sum_{i \in E} w(k_i)$ and $\widehat{R} = n_s \widehat{r}$.

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Assume strategic substituability between licensors' royalties:

- Double marginalization $\rightarrow$ elasticity of $\widehat{R}$ to $n_s = \varepsilon \in (0, 1)$
- Substitution between royalty stacking and double marginalization: $\partial \widehat{R} / \partial \overline{R} = \varepsilon - 1 \in (-1, 0)$.

SEP trading: Direct and indirect effects

Assume a trade of 1 SEP between two enforcement-bounded holders i and j:

- $r_i(k_i) = dw(k_i)$ and $r_j(k_j) = dw(k_j)$
- $k_i \rightarrow k_i - 1$
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- negative for the seller: $r_i(k_i)$ decreases
- positive for the buyer: $r_j(k_j)$ increases
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Indirect effects due to royalty stacking (higher cumulative royalties $\rightarrow$ lower demand):

- if $k_i > k_j$, negative for both: $D(R)$ decreases
- if $k_i < k_j$, positive for both: $D(R)$ increases
- same (external) effect on other SEP holders

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- $n_S = 0$: condition from a trade from the strong to the weak : $\widehat{r} > r_i(k_i) + r_j(k_j)$; otherwise trade from the weak to the strong

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Intuition:

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- But benefit lower with other strong owners (benefit is shared + strategic reaction of other strong owners)

Extensions

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Trading SEP portfolios: same qualitative results

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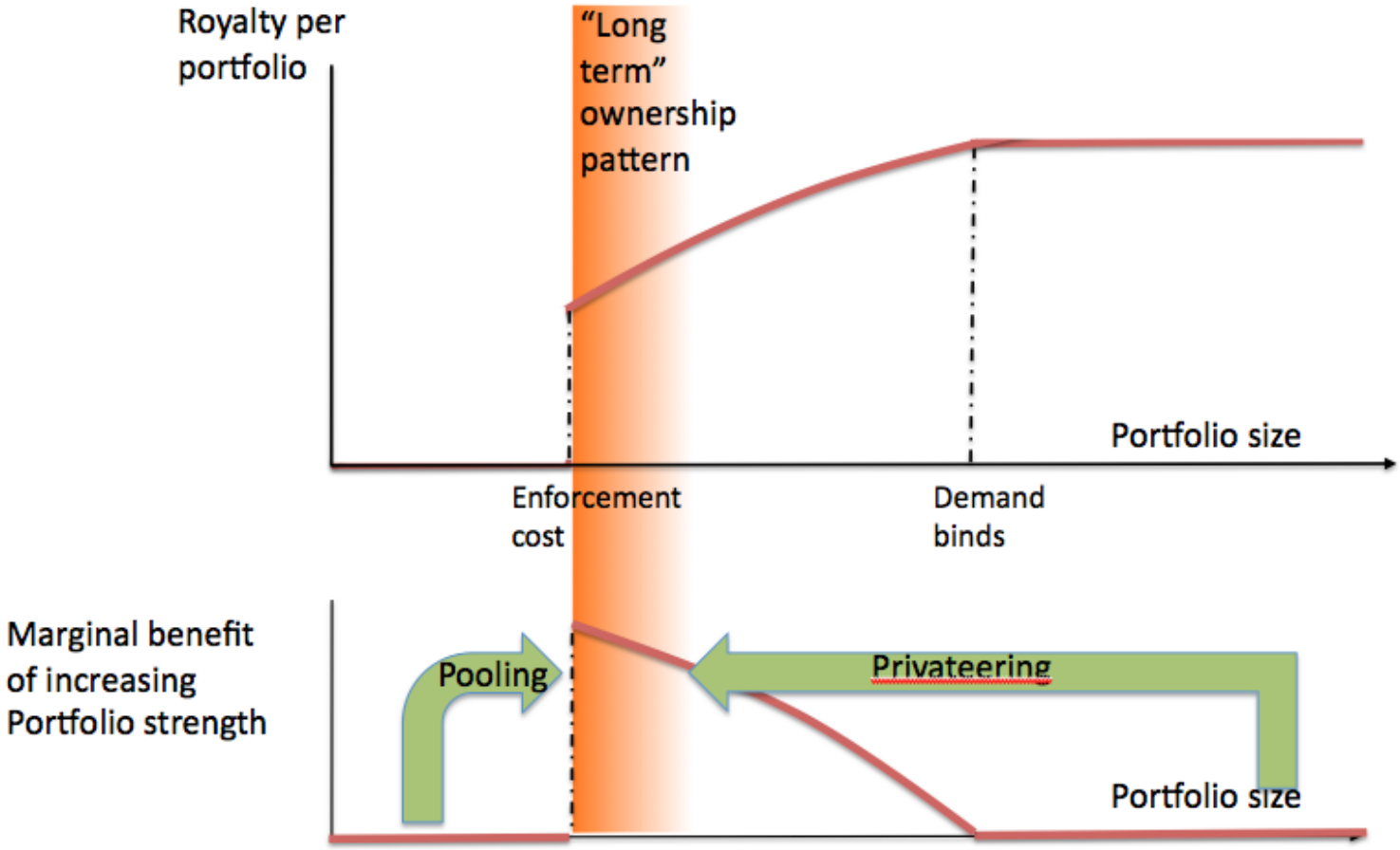
- Weak SEP holders have incentives to sell $\rightarrow$ pooling
- If $n_S > 1$, strong SEP holders have incentives to divest their portfolio $\rightarrow$ privateering

Pooling and privateering



Conclusion

- A simple model of FRAND licensing
  - Highlights different licensing regimes based on critical size of portfolio
  - Enables analysis of motives for SEP trading
- Two main patterns for SEP trading:
  - Enhances SEP concentration when there is one (single) dominant licensor (or an opportunity to create one such licensor)
  - Strengthens weak portfolios otherwise if (i) no strong licensor or (ii) too many of them
  - Explains observed privateering and pooling of small portfolios
- Limitations and extensions: cross-licensing
  - An obvious motive for buying SEPs
  - Equalizing portfolio sizes may then reduce royalty costs