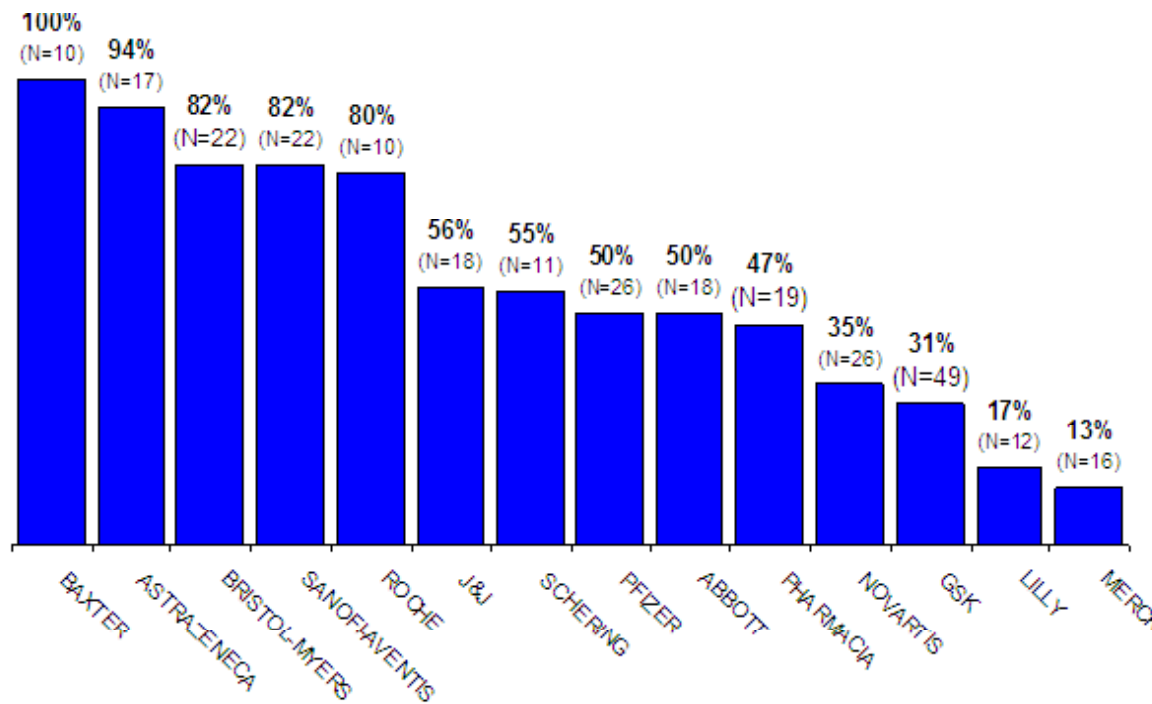# Patent Portfolio Valuation: What is research saying

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M4T: Not just IT

Figure 1. Widespread use of technology markets in the pharmaceutical industry

Percent of new approved drugs based on externally-derived technology, 1989-2004

Companies with more than 10 approved New Drug Applications

Ceccagnoli, et al (2008)

Patent valuation: Generally

- Moving the valuation exercise from the level of the patent to the level of the innovation, project, or firm (portfolio)
  - *Many of the same metrics are useful*
    - *Citations, claims, families*
  - *The firm's value itself can offer a window into valuation*
  - *Problems of aggregation*

(Some) methods for valuing portfolios

- FMV (to a purchaser), e.g. M&A
  - *Issues: complementary assets; thin markets*
- NPV of stream of future revenue, e.g. licensing deals
  - *Issues: having a measurable and stable stream of royalties*
- "Real option," e.g. start-ups
  - *Issues: complementary assets*
- Contribution to firm's market value, e.g. public firms
  - *Issues: assumptions about information and effects*

Contribution to market value

- **Methods**
  - CARs (cumulative abnormal returns, from "news")
    - Better for individual patents; which "news?"
  - Tobins-Q (market value / asset value)
    - Contribution of patents (or certain types of patents), and patent information

$$\log Q_{it} = \log q_t + \log[1 + \gamma_1(RD_{it}/A_{it}) + \gamma_2(P_{it}/RD_{it}) + \gamma_3(SP_{it}/RD_{it})] + \varepsilon_{it}$$

Hall and MacGarvie (2006)

Proud list valuations: Assumptions

- The standard assumption about the value of patents says that patent value "lives in the tail" of the distribution
  - < 2% are litigated (and only 5% of these go through trail)
  - 30-50% are allowed to lapse for non-payment

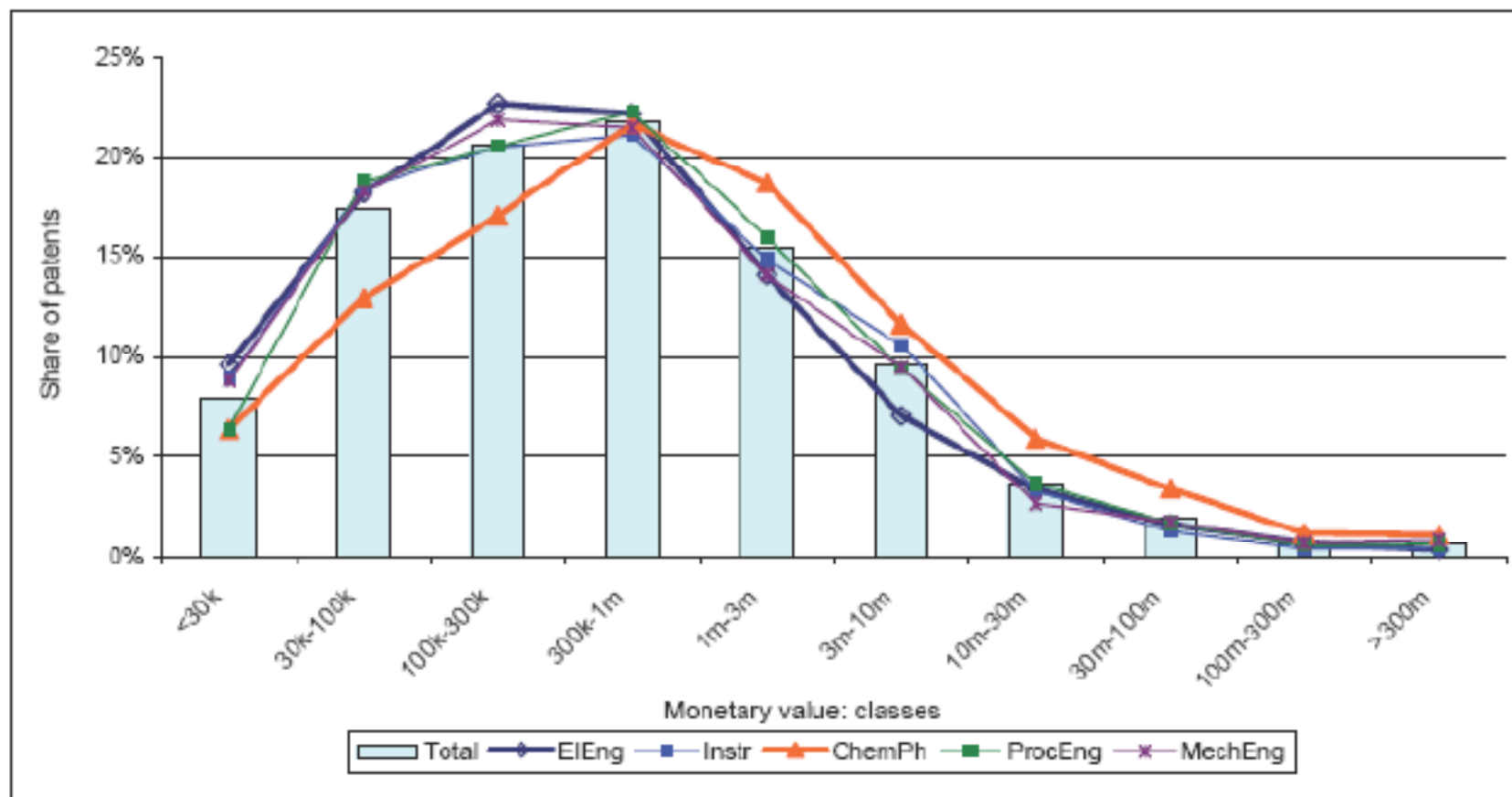- Something like the exponential distribution, with Lambda << 1
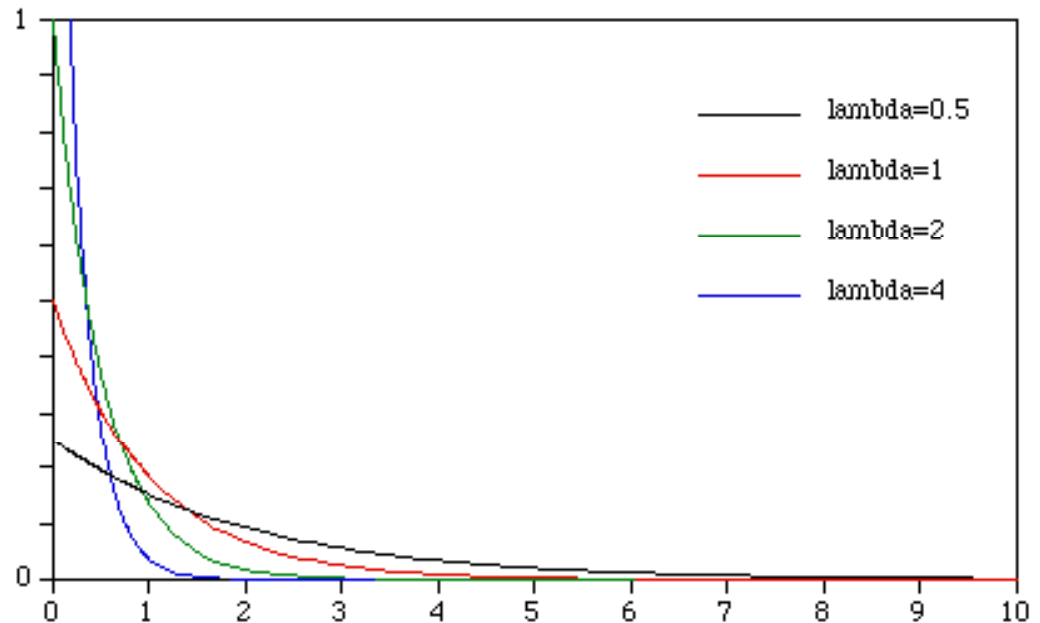
Evidence is contradicting

- Value may be distributed Poisson, or even Normal

- It appears at the left of the distribution, there is substantial economic value

- But, what value of Lambda are we talking about?
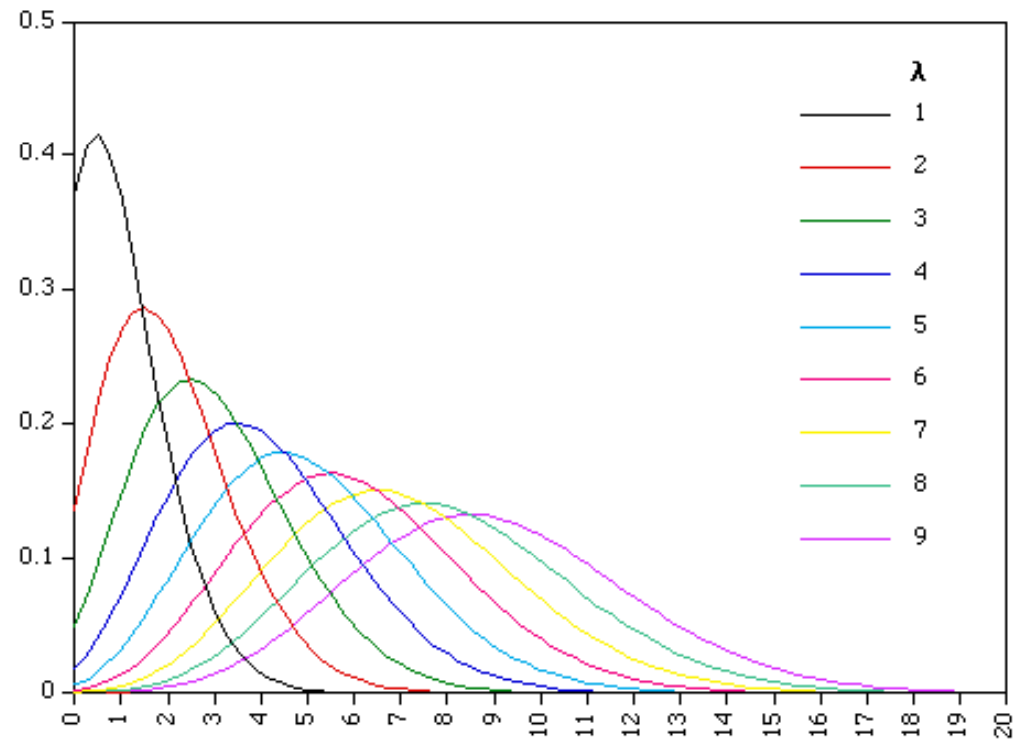
Value of EU Patents

Figure 4. The value of European patents across macro technological classes
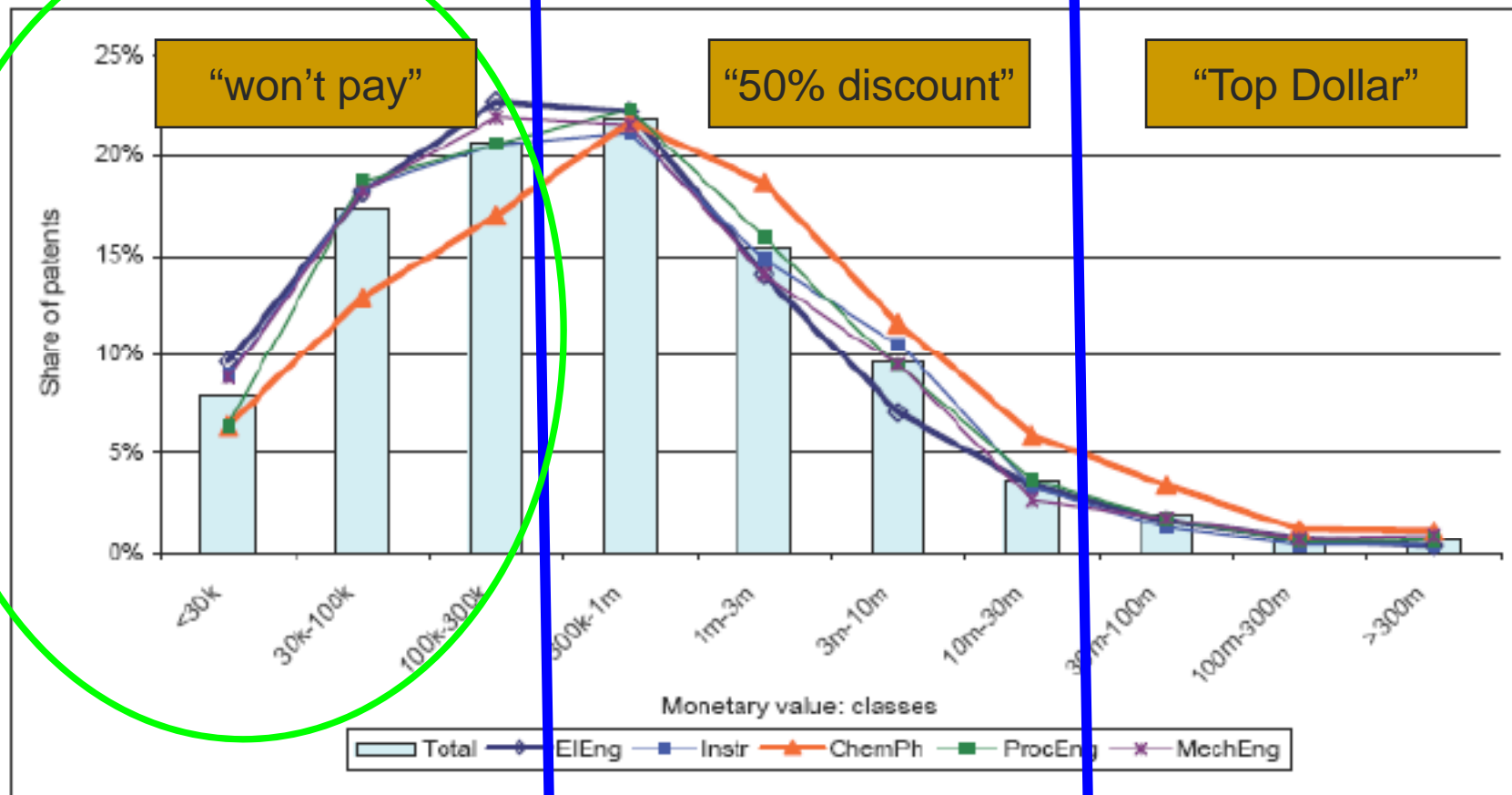

Number of observations = 7,752.

Source: Giuri, Mariani et al. (2007) Research Policy

Value of EU Patents (2)

Figure 4: The value of European patents across macro technological classes

"won't pay"   "50% discount"   "Top Dollar"

Zaretzki sale price estimates: $383k $12m

# Does "use" drive value?
- How firms are using portfolios

Table 7. Patent use. Distribution by inventors' employer

	Internal use	Licensing	Cross-licensing	Licensing & Use	Blocking Competitors	Sleeping Patents	Total
Large companies	50.0%	3.0%	3.0%	3.2%	21.7%	19.1%	100.0%
Medium sized companies	65.6%	5.4%	1.2%	3.6%	13.9%	10.3%	100.0%
Small companies	55.8%	15.0%	3.9%	6.9%	9.6%	8.8%	100.0%
Private Research Institutions	16.7%	35.4%	0.0%	6.2%	18.8%	22.9%	100.0%
Public Research Institutions	21.7%	23.2%	4.3%	5.8%	10.9%	34.1%	100.0%
Universities	26.2%	22.5%	5.0%	5.0%	13.8%	27.5%	100.0%
Other Govt. Institutions	41.7%	16.7%	0.0%	8.3%	8.3%	25.0%	100.0%
Other	34.0%	17.0%	4.3%	8.5%	12.8%	23.4%	100.0%
Total	50.5%	6.2%	3.1%	3.9%	18.8%	17.5%	100.0%

Number of observations = 7,556

Source: Giuri, Mariani et al. (2007)
Research Policy

To license or not to license?
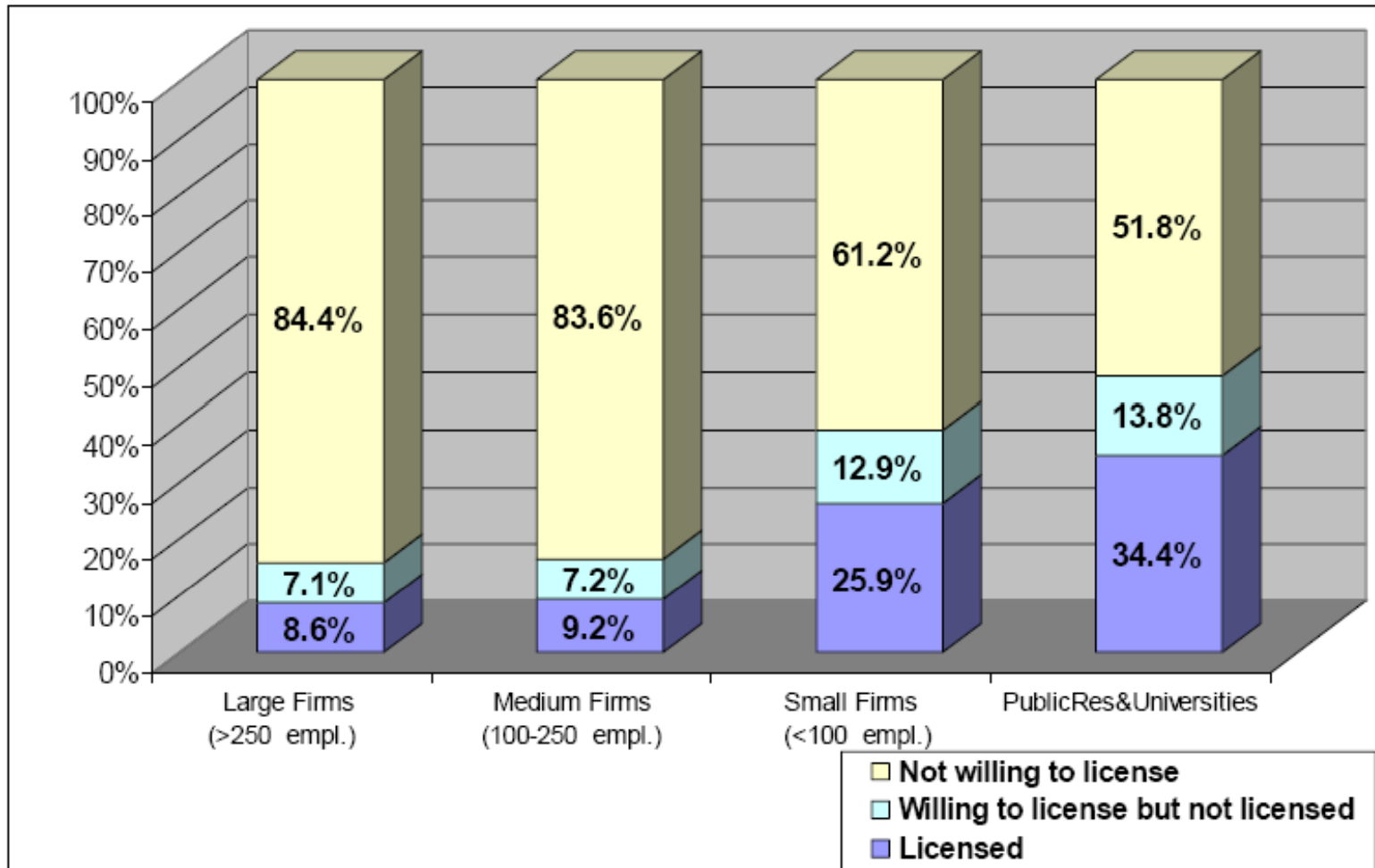
Gambardella et al (2007)

In Sum…

- These data give us a better picture into the value distribution in the aggregate
  - *But* what about at the particular firm?
    - Does the same distribution hold?
  - And, what about the issue of "complements"
    - Is the value of two patents offered together more than the value of the individual parts?
      - Or, conversely, what is the value of the 99 patents without the 100th?
    - What is the value of a patent disembodied from the firm, the routines, the processes, and the other assets that drive value?
      - And, what value does it, or would it (ala "real options") have when married up with a different set of routines, processes and assets elsewhere?
- *But… we have too little understanding about the drivers of patent value*
  - And too little transparency in the market
- Information, and from it, understanding, is a first step