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Patent Trolls or Patent Elves?

Evidence from Publicly-Traded Patent Assertion Entities

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Patent assertion entities

Patent assertion entities (PAEs) purchase intellectual property from third parties and then license the inventions to others to market.

Two views of PAEs

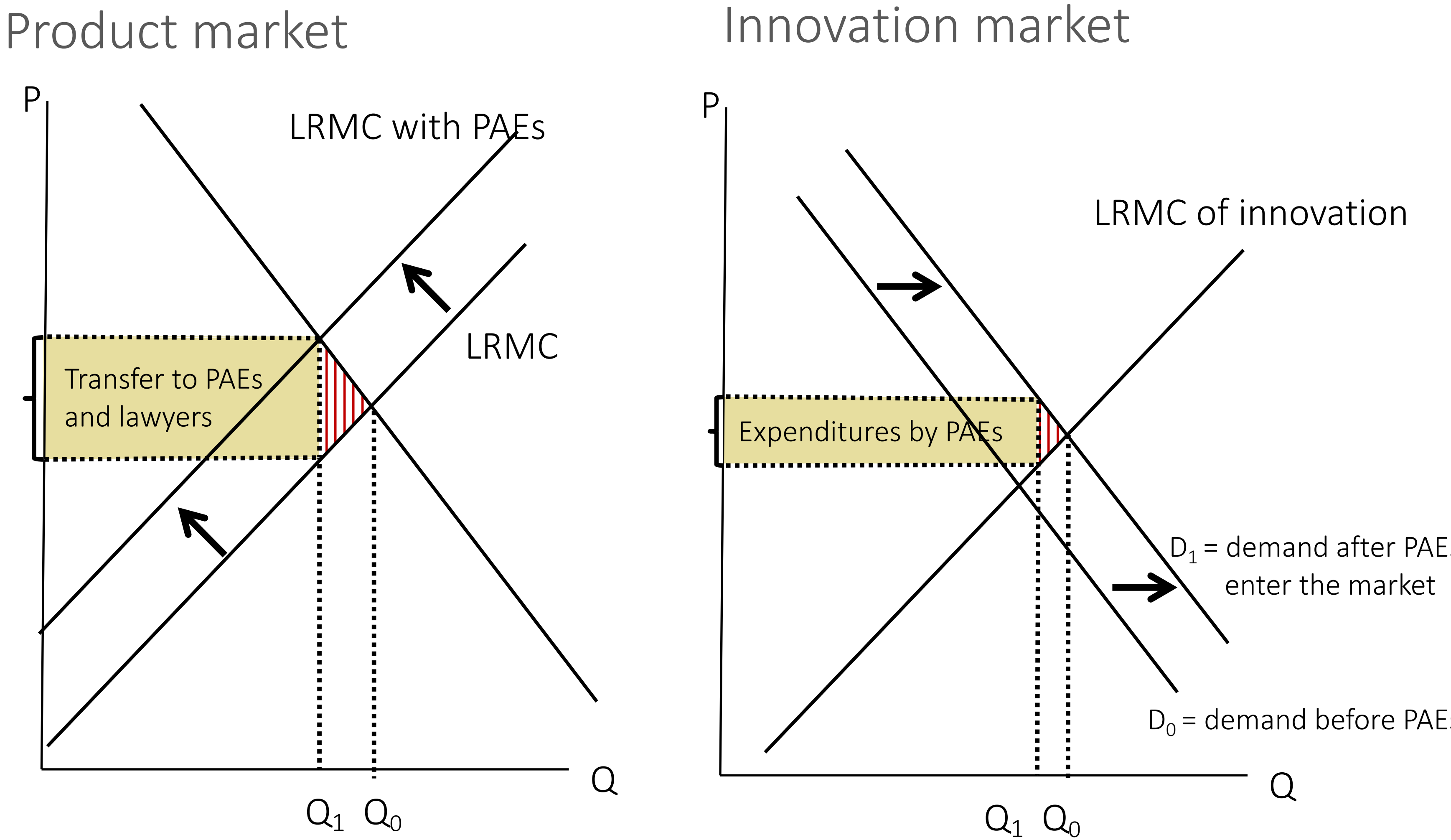
1. PAEs purchase specious intellectual property in order to extort revenues from operating companies via the threat of litigation:
   a) Patents held by PAEs have little or no value;
   b) The revenues earned by PAEs are a pure transfer;
   c) PAEs produce a deadweight loss to the U.S. economy by discouraging operating companies from creating new products

2. PAEs provide value by serving as intermediaries in the market for invention:
   a) PAE's provide insurance and liquidity to small and mid-sized technology development firms;
   b) Inventors shift risk to intermediaries with deeper pockets that specialize in licensing and litigation

Trolls or elves?

- The question cannot be adjudicated on the basis of the intensity of the opposition to them by operating companies; No one likes to be sued.
- The scientific method does allow us to adjudicate the question. The claim that PAEs are trolls responsible for large deadweight losses to the U.S. economy implies two null hypotheses:
  (1) PAEs do not cause large deadweight losses;
  (2) PAEs are not trolls (e.g., they are elves).

The costs and benefits of PAEs



For deadweight losses to be significant, the following must be true:

1) The transfers from operating companies to the PAEs must be large relative to the size of the market,

   OR

2) The costs of defending against PAE infringement claims must be large relative to the size of the market,

   AND

3) PAEs must spend relatively little on developing or purchasing technology. Transfers to them and litigation costs imposed by them have to be a pure tax on innovation.

These three conditions would not matter if …

… markets for technology-intensive goods were characterized by highly elastic supply and demand.

Technology-intensive good markets are in fact characterized by :

(1) Intensive use of intellectual property;
(2) Strong branding;
(3) Network externalities;
(4) Supply constraints;
(5) Capital intensive production techniques.

These create barriers to entry. It is therefore unlikely that such markets are characterized by high demand and supply elasticities.

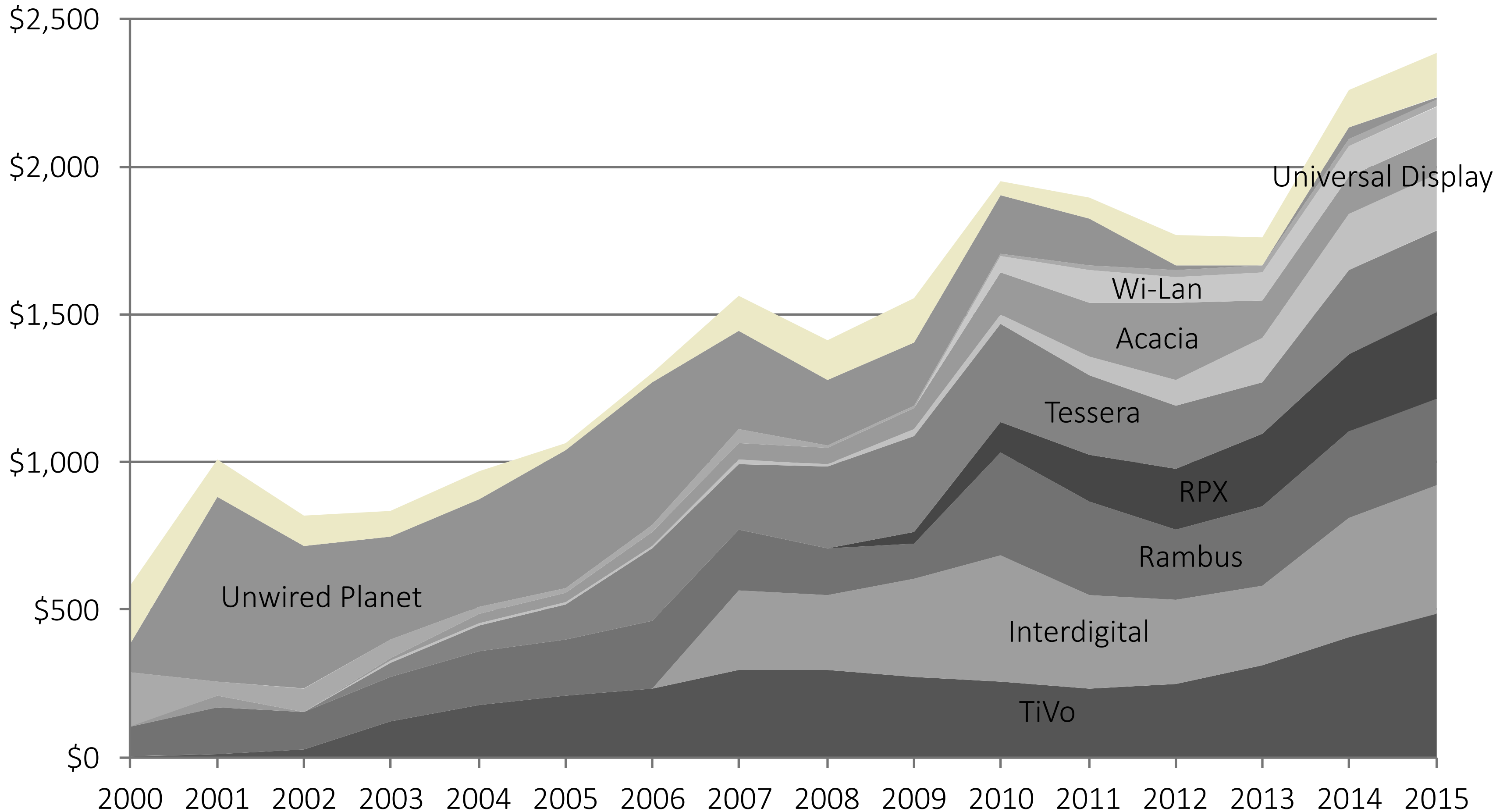
To recap: for PAEs to pose a public problem, one of three things should be true:

1) Transfers from operating companies to the PAEs should be large relative to the size of the market;
2) The costs of defending against PAE infringement claims should be large relative to the size of the market;
3) PAEs should spend relatively little on developing or purchasing technology.
   - Implication of (3): If PAEs use specious IP to extract rents from operating companies, then they should show evidence of rent-extraction, i.e., they should be high-return low-risk enterprises

Data from 30 publicly-traded PAEs

1. Acacia (ACTG),
2. Asure Software (ASUR),
3. AxoGen (AXGN),
4. Crossroads Systems (CRDS),
5. Document Security Systems (DSS),
6. Endeavor IP (ENIP),
7. Finjan (FNJN),
8. Interdigital (IDCC),
9. Inventergy Global (INVT),
10. ITUS (ITUS),
11. Marathon Patent Group (MARA),
12. Opti (OPTI),
13. Parkervision (PRKR),
14. Patent Properties (PPRO),
15. Patriot Scientific (PTSC)
16. Pendrell (PCO),
17. Quest Patent Research (QRPC),
18. Rambus (RMBS),
19. Revolutionary Concepts (REVO),
20. RPX Corporation (RPXC),
21. SITO Mobile (SITO),
22. Spherix (SPEX),
23. Tessera (TSRA),
24. TiVo (TIVO),
25. Universal Display Corporation (OLED),
26. Unwired Planet (UPIP),
27. VirnetX (VHC),
28. Vringo (VRNG),
29. Wi-Lan (WILN),
30. Worlds (WDDD).

The size of the transfer: PAE revenues (2015 $m)



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Estimating an upper-bound for privately-held PAEs

Intellectual Ventures (IV), founded in 2000 by Nathan Myhrvold:

(1) In 2009, the Seattle Times reported that the company had earned $1 billion since its inception; $100m per year;
(2) In 2010, Myhrvold reported that the company earned $700 million in licensing revenue that year. (These estimates are consistent with reports that the firm received $120 million from Intuit and $350 million from Verizon in various licensing deals);
(3) The firm's website as of this writing reports that it has earned "cumulative licensing revenues exceeding $3 billion"

Assuming that "exceeding $3 billion" actually means $3.9 billion, the implication is that IV earned a total of $2.2 billion from 2011 through 2015, which is to say an average of $440 million per year.

($3.9bn 2015) – ($700m in 2010) – ($1bn through 2009) = $2.2bn in 2011-15.

We therefore assume that there are four additional, unobserved I.V.-sized PAEs lurking in the market, even though no one has actually observed them.

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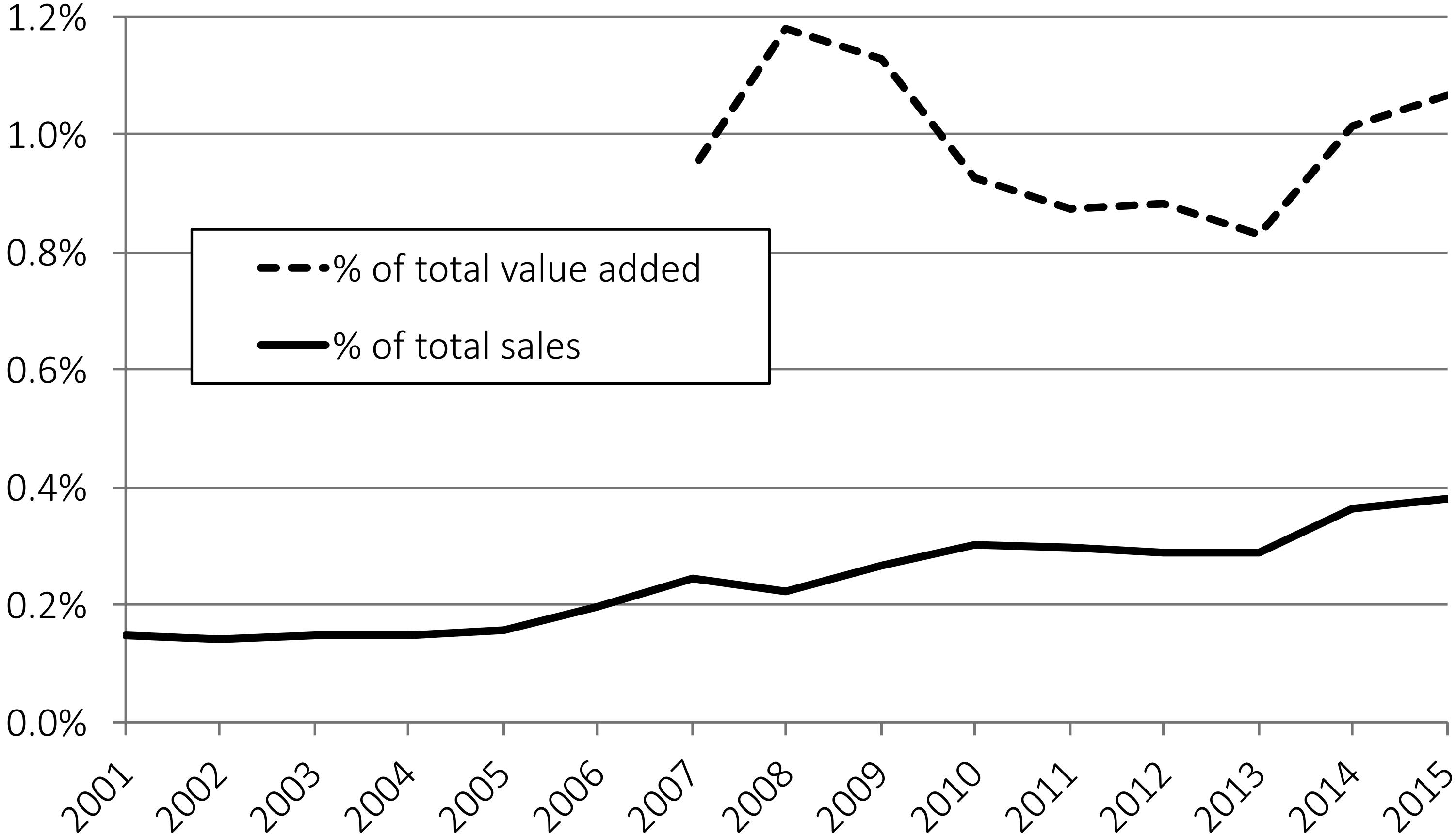
PAE revenues compared to what?

PAE revenues compared to technology industry (NAICS 334)



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How big are the direct defense costs?

- Acacia, Pendrell, Tessera and Vringo reported litigation costs: 25% of revenues between 2010 and 2015
- Interdigital, Universal Display, Unwired Planet, and VirnetX reported "patent licensing expenses": also 25% of revenues
- Gross revenues of the eight firms in the subsample made up 46% of the revenue earned by all PAEs in 2015.

We doubled our estimate of litigation costs to 50% of revenues for all PAEs.

As a cross-check we divided the gross annual numbers by 290 cases, for an average spending per case of $1.5 million in 2009 and $2.2 million in 2010:

$2.2 million > $1.4 million from Bessen and Meurer

For 2013-15 we divided our aggregate estimate by RPX's data on the number of new cases filed by publicly-traded PAEs:

$5.6 million > $1.4 million from Bessen and Meurer

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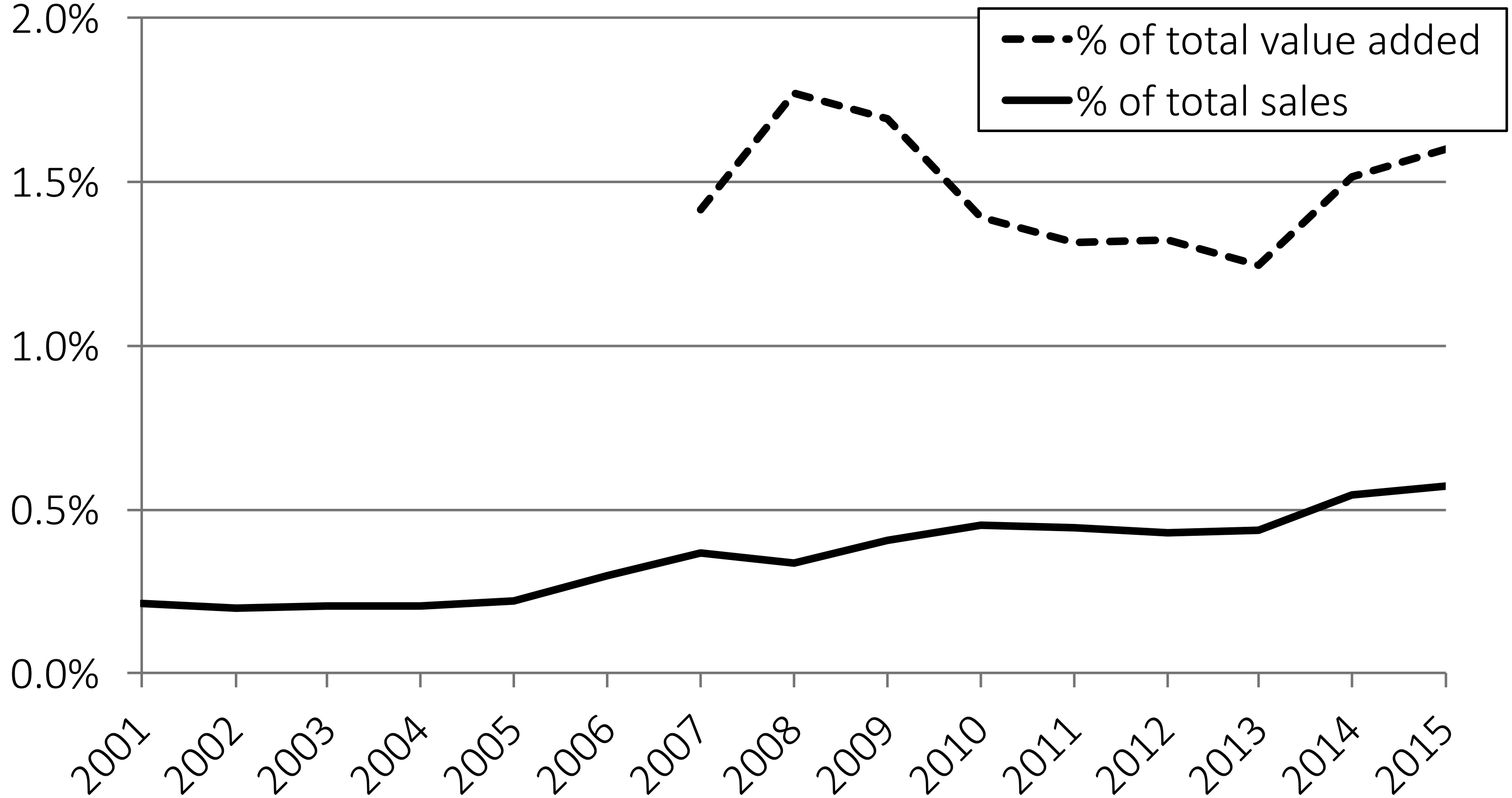
Including 50% premium for litigation costs



Rents and returns

If PAEs are trolls, then there should be some evidence that they are earning rents. They should also be relatively low-risk. (The elvish business model involves assuming risk from inventors; trolling does not.)

The null hypothesis that a PAE is not a troll (i.e., is an elf) can be rejected if we observe a high risk-adjusted return on assets.

If PAEs earn high risk-adjusted return and spend little on developing or acquiring outside technology, then they are trolls.

Returns on assets

	2009	2010	2011	2012	2013	2014	2015	Average 2010-15
Acacia	-14%	0%	0%	10%	-10%	-12%	-46%	-10%
Asure	-62%	-19%	-5%	-8%	-5%	-1%	-5%	-7%
DSS	-59%	-23%	-26%	-30%	4%	-148%	-91%	-53%
Interdigital	10%	18%	9%	24%	3%	9%	8%	12%
Pendrell	645%	-6%	73%	11%	-16%	-17%	-65%	-3%
Rambus	-17%	23%	-4%	4%	-5%	4%	29%	9%
RPX		7%	7%	7%	7%	1%	1%	5%
Tessera	11%	8%	-3%	-6%	-38%	30%	22%	2%
TiVo	-8%	-30%	14%	-1%	21%	3%	2%	2%
Universal Display	-26%	-22%	1%	2%	16%	9%	2%	1%
Unwired Planet	-24%	-24%	15%	19%	-61%	0%	3%	-8%
VirnetX	-584%	51%	-23%	-68%	-70%	-22%	-132%	-44%
Vringo		-169%	-395%	-17%	-42%	-293%	-22%	-156%
Wi-Lan		4%	5%	-4%	-5%	7%	3%	2%
Unweighted average	**-151%**	**-203%**	**-143%**	**-379%**	**-220%**	**-54%**	**-47%**	**-174%**
Weighted average	**3%**	**10%**	**8%**	**3%**	**-1%**	**2%**	**2%**	**4%**

Share returns, 2006 = 1.00

	ACTG	ASUR	DSS	IDCC	OLED	PCO	PRKR	RMBS	RPXC	TIVO	TSRA	UPIP	VHC	VRNG	WILN	S&P
2006	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00
2007	0.67	1.00	0.60	0.69	1.42	0.71	1.39	1.09	0.00	1.64	1.03	0.28	1.00	0.00		1.04
2008	0.23	0.20	0.17	0.82	0.65	0.25	0.22	0.83	0.00	1.41	0.29	0.07	0.25	0.00		0.64
2009	0.68	0.38	0.23	0.79	0.85	0.24	0.16	1.27	0.00	2.00	0.58	0.25	0.50	0.00		0.79
2010	1.93	0.40	0.51	1.26	2.18	0.36	0.04	1.07	0.00	1.73	0.54	0.24	2.45	0.63		0.90
2011	2.73	0.83	0.23	1.29	2.51	0.58	0.08	0.39	0.50	1.77	0.42	0.17	4.25	0.28	0.70	0.89
2012	1.92	0.77	0.20	1.18	1.75	0.29	0.18	0.25	0.36	2.42	0.41	0.13	4.98	0.80	0.56	1.01
2013	1.09	0.73	0.19	0.89	2.35	0.45	0.40	0.49	0.67	2.58	0.49	0.15	3.30	0.83	0.41	1.30
2014	1.27	0.74	0.04	1.59	1.90	0.31	0.08	0.58	0.55	2.33	0.90	0.11	0.93	0.15	0.37	1.45
2015	**0.32**	**0.59**	**0.02**	**1.48**	**3.73**	**0.11**	**0.02**	**0.60**	**0.44**	**1.70**	**0.76**	**0.09**	**0.44**	**0.07**	**0.16**	**1.44**

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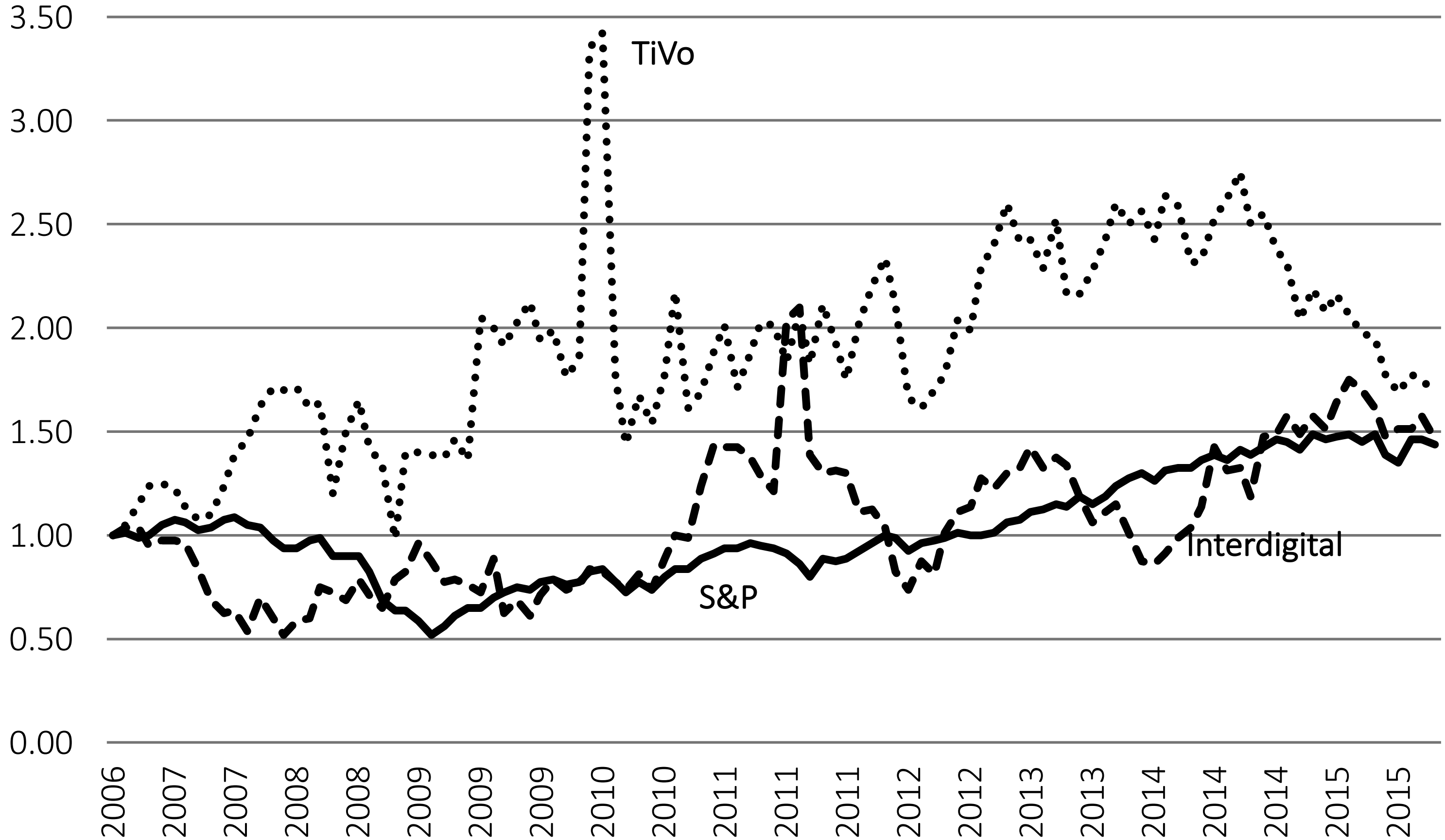
Two successful PAEs?



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Risks and returns

Risk-adjusted performance

	Total return	Average return	Risk-adjusted performance
Acacia	-10.8%	2.1%	0.6%
Asure	-9.0%	15.8%	3.3%
AxoGen	4.9%	36.5%	9.7%
DSS	-37.1%	-17.9%	-4.2%
Interdigital	5.4%	16.1%	5.3%
Universal Display	15.4%	36.5%	8.5%
Pendrell	-21.8%	6.9%	1.4%
Parkervision	-35.0%	-2.5%	-0.4%
Rambus	-5.3%	10.7%	3.0%
RPX	-10.2%	-12.9%	-5.5%
TiVo	6.0%	19.3%	5.7%
Tessera	-2.0%	9.2%	3.0%
Unwired Planet	-21.6%	-7.6%	-2.1%
VirnetX	-8.0%	36.5%	5.3%
Vringo	-22.7%	2.9%	0.5%
Wi-Lan	-16.5%	-22.9%	-9.0%
S&P500	4.1%	5.5%	5.5%

Return-risk ratios

	Alpha	Beta	Return-risk ratio	R^2
Acacia	-0.9%	0.91	-1.0%	0.06
Asure	1.2%	0.81	1.5%	0.04
AxoGen	2.4%	0.20	12.2%	0.00
DSS	-2.9%	1.21	-2.4%	0.05
Interdigital	0.6%	1.07	0.6%	0.09
Universal Display	2.9%	0.53	5.4%	0.01
Pendrell	-0.8%	1.24	-0.6%	0.07
Parkervision	0.4%	0.25	1.5%	0.00
Rambus	-1.3%	1.26	-1.1%	0.12
RPX	-1.2%	0.04	-30.9%	0.00
TiVo	-1.7%	2.31	-0.8%	0.35
Tessera	-0.6%	1.51	-0.4%	0.31
Unwired Planet	-1.2%	0.88	-1.4%	0.04
VirnetX	2.8%	0.20	13.7%	0.00
Vringo	0.6%	-0.28	-2.1%	0.00
Wi-Lan	-2.3%	0.09	-24.6%	0.00

$$M^2 = \frac{\overline{R_a - R_F}}{\sigma_{(R_a - R_F)}} \times \sigma_{R_{market} - R_F} + \overline{R_F}$$

Intellectual Ventures since 2007: −25% overall; −10% per year.

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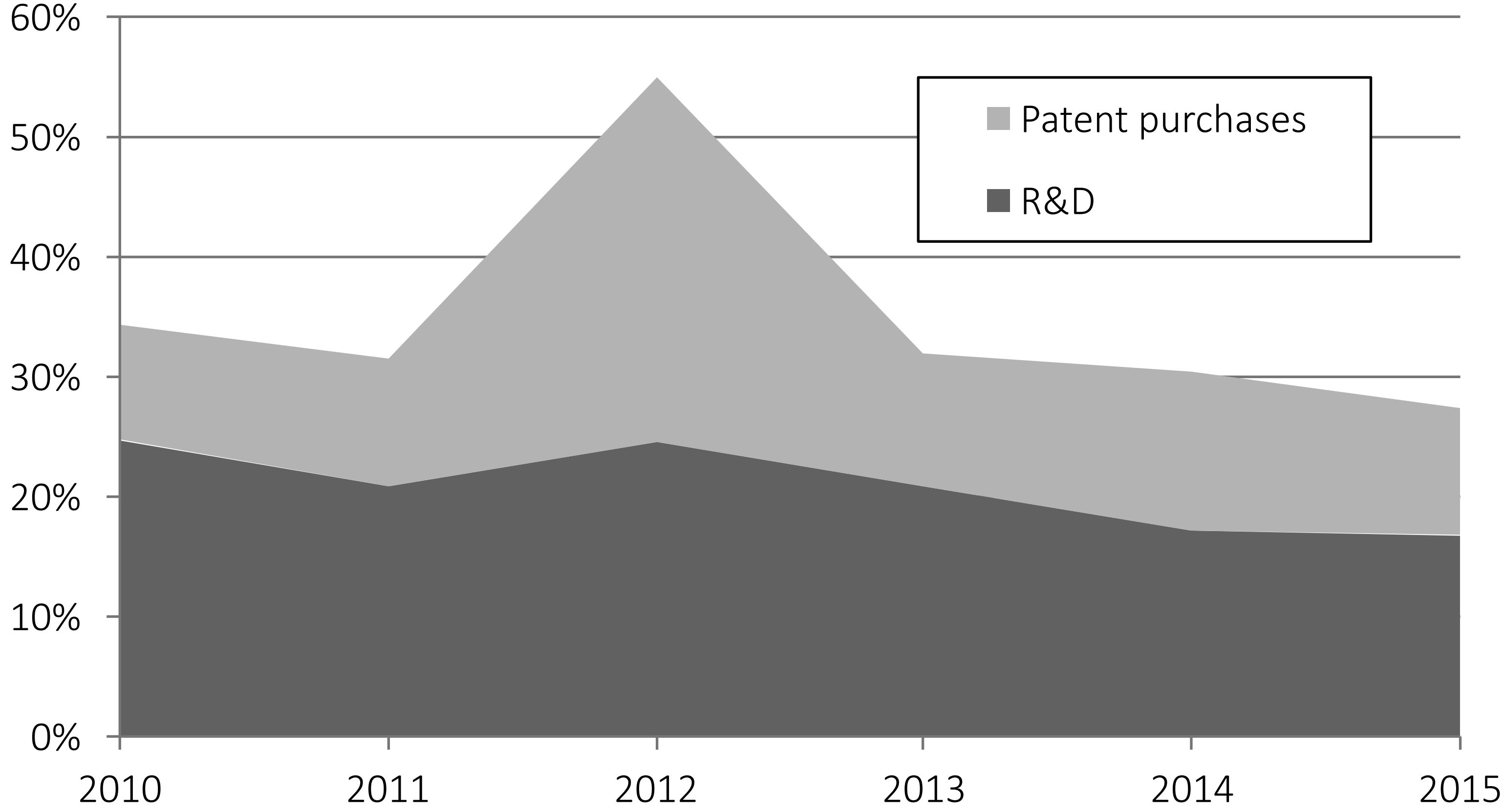
PAE expenditures on R&D and IP purchases



Conclusion

Patent assertion entities:

(1) Collect very little total revenue compared to the industries that use similar intellectual property;

(2) Impose small total litigation costs compared to the size of the technology sector;

(3) Generally lose money;
   - Only one firm significantly outperformed the S&P 500;
   - Profitable firms show little sign of earning rents

(4) Spend substantial amounts on internal R&D and external purchases of intellectual property.

We cannot rule out the null hypotheses. PAEs may be useful elves. Even if they are not elves, they are so small that they are patent lawn gnomes, not trolls.

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