

## Supplemental Tables

“DON’T FENCE ME IN: FRAGMENTED MARKETS FOR TECHNOLOGY  
AND THE PATENT ACQUISITION STRATEGIES OF FIRMS”

by

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## Contents

**Table A.1:** Entities Most Frequently Cited by Sample Firms, 1980-1995 (5-yr intervals)

**Table A.2:** Conditional Effects of Fragmented Rights on Propensity to Patent (with standard errors reported)

**Table A.3:** Supplemental Econometric Results

**Table A.1: Entities Most Frequently Cited by Sample Firms<sup>a</sup>**  
Five-year intervals, 1980-1995

1980				1985				1990				1995			
Rank	Entity	#cites	cum %	Rank	Entity	#cites	cum %	Rank	Entity	#cites	cum %	Rank	Entity	#cites	cum %
1	IBM	42	7%	1	IBM	96	7%	1	IBM	292	7%	1	IBM	829	6%
2	AT&T	25	11%	2	Motorola	49	10%	2	Motorola	158	10%	2	Motorola	635	10%
3	Motorola	21	15%	3	RCA Corp	45	13%	3	Hitachi	136	13%	3	Hitachi	458	13%
4	US Philips	17	17%	4	AT&T	44	16%	4	AT&T	131	16%	4	TI	442	16%
5	RCA Corp	15	20%	5	Hitachi	39	19%	5	RCA Corp	123	19%	5	Toshiba	432	19%
6	GE	13	22%	6	Honeywell	33	21%	6	Fujitsu	120	22%	6	NEC <sup>c</sup>	326	21%
7	Hitachi	13	24%	7	Tokyo Electric	28	23%	7	TI	102	24%	7	AT&T	321	23%
8	Fairchild	11	26%	8	US Philips	27	25%	8	Tokyo Electric	96	26%	8	Mitsubishi <sup>c</sup>	299	25%
9	GTE	11	28%	9	Burroughs <sup>b</sup>	27	27%	9	US Philips	95	29%	9	Fujitsu <sup>c</sup>	263	27%
10	Cincinnati Mila	10	29%	10	Siemens	27	29%	10	Toshiba	89	31%	10	US Philips	244	29%
11	Honeywell	10	31%	11	TI	25	31%	11	Siemens	85	33%	11	AMD <sup>c</sup>	236	31%
12	National	9	33%	12	Intel <sup>b</sup>	19	32%	12	US Govt	69	34%	12	National	189	32%
13	Sharp	9	34%	13	H-P <sup>b</sup>	18	33%	13	AMD <sup>b</sup>	66	36%	13	DEC <sup>b,c</sup>	182	33%
14	Siemens	9	35%	14	NCR Corp	18	35%	14	GE	64	37%	14	Actel <sup>b,c</sup>	156	34%
15	TRW	8	37%	15	Fairchild	17	36%	15	NEC <sup>b</sup>	62	38%	15	Intel <sup>c</sup>	155	35%
16	Matsushita	8	38%	16	Mostek <sup>b</sup>	17	37%	16	Fairchild	59	40%	16	GE	149	36%
17	TI	7	39%	17	Nippon Electric	17	38%	17	Honeywell	57	41%	17	Matsushita	145	37%
18	Nippon Electric	7	40%	18	Fujitsu <sup>b</sup>	16	39%	18	National	44	42%	18	H-P <sup>c</sup>	137	38%
19	Tokyo Electric	7	42%	19	National	15	40%	19	NCR Corp	42	43%	19	Honeywell	137	39%
20	Rockwell	6	43%	20	GTE	14	41%	20	Mitsubishi <sup>b</sup>	39	44%	20	Siemens	137	40%
21	Bendix Corp	5	43%	21	Raytheon <sup>b</sup>	14	42%	21	Harris <sup>b</sup>	38	45%	21	SGS Thoms <sup>c</sup>	131	41%
22	ITT Industries	5	44%	22	Rockwell	14	43%	22	Intel	37	46%	22	US Govt	130	42%
23	McD Douglas	5	45%	23	GE	13	44%	23	Monolithic Mem <sup>b</sup>	37	47%	23	RCA Corp	127	43%
24	NCR Corp	5	46%	24	US Govt <sup>b</sup>	12	45%	24	Westinghouse	34	47%	24	Micron <sup>b,c</sup>	109	43%
25	Westinghouse	5	47%	25	Sharp	12	46%	25	Xerox <sup>b</sup>	34	48%	25	NCR Corp	109	44%
Total patents cited		521				1,279				4,033				13,250	

<sup>a</sup> Based on references to prior art in patents issued to 67 dedicated US semiconductor firms, 1975-96, excluding self-citations.

<sup>b</sup> Entities that were not among the 25 most frequently cited five years earlier, calculated for 1985, 1990, and 1995.

<sup>c</sup> Entities in 1995 that were not among the 25 most frequently cited in 1980.

**Table A.2: Conditional Effects of Fragmented Rights on Propensity to Patent**  
(at Different Levels of Capital-Intensity)

<b>Sample Range</b>	<b>Capital-Intensity (in logs)</b>	<b>Conditional Effect</b>	<b>Standard Error</b>
<b>Minimum</b>	-0.175	-4.73	1.802
<b>Low</b> (Mean-1 std. dev.)	2.505	0.228	0.824
<b>Average</b>	3.300	1.697*	0.716
<b>Median</b>	3.350	1.790*	0.715
<b>High</b> (Mean + 1 std. dev.)	4.095	3.167*	0.787
<b>Maximum</b>	5.110	5.042*	1.073

\*  $p < .05$ ; one-way test.

**Table A.3: Supplemental Results**  
**Determinants of Patenting, 67 US Semiconductor Firms, 1980-94**

Variable Name	Main Result	Alternative Specifications					
	Table 2, Column 4 (Pooled NB) (1)	Drop TI dummy (Pooled NB) (2)	Interact R*Frag (Pooled NB) (3)	R*Frag, Cap Int only (Pooled NB) (4)	PreSmpl Pats GEE(NB) (5)	Lagged Pats GEE(NB) (6)	PreSmpl & Lag Pats GEE(NB) (7)
<b>Intercept</b>	Year Dummies	Year Dummies	Year Dummies	Year Dummies	Year Dummies	Year Dummies	Year Dummies
<b>Frag * Ln Cap Intensity</b>	1.850*** (.463)	1.700*** (.472)	--	--	1.156*** (.269)	1.056*** (.258)	1.054*** (.256)
<b>Fragmentation Index</b>	-4.400** (1.728)	-4.025* (1.803)	.906 (.890)	8.394*** (2.427)	-3.003** (1.085)	-2.356* (1.012)	-2.343* (1.02)
<b>Dummy, Frag=missing</b>	-3.381*** (.901)	-3.405*** (.947)	-2.776*** (.885)	1.658 (2.577)	-3.313*** (.662)	-3.062*** (.632)	-3.064*** (.256)
<b>Ln firm size</b> (1000s employees)	.705*** (.057)	.800*** (.065)	.709*** (.054)	.724*** (.118)	.623*** (.088)	.538*** (.064)	.543*** (.064)
<b>Ln R&amp;D intensity</b> (\$M 1992 R&D/empl)	.286*** (.089)	.304*** (.092)	-.050 (.303)	.625 (.890)	.280*** (.077)	.284*** (.065)	.285*** (.063)
<b>Dummy, no R&amp;D reported</b>	.872 (.643)	1.021 (.682)	.665 (.685)	-14.837*** (3.209)	.792 (.552)	.535 (.527)	.539 (.529)
<b>Dummy, Texas Instruments</b>	1.073*** (.237)	--	1.040*** (.221)	.895** (.314)	--	--	--
<b>Ln Capital Intensity</b> (\$M 1992 PPE/empl)	-1.380*** (.410)	-1.344*** (.420)	.321* (.156)	.447** (.185)	-.707*** (.246)	-.721** (.231)	-.725** (.232)
<b>Tech Opportunity</b> (Ln # "impt" patents)	.678** (.245)	.683** (.257)	-.077 (.161)	-1.355*** (.409)	.464** (.163)	.393* (.152)	.394** (.153)
<b>Frag * Ln R&amp;D Intensity</b>			.358 (.316)	-.388 (.921)	--	--	--
<b>Presample Patents</b> (Sum 3 yrs prior to entry)					.003*** (.0009)	--	-.000 (.001)
<b>Lagged Patents</b> <sub>t-1</sub>						.007*** (.001)	.007** (.003)
<b>alpha</b>	.400 (.058)	.443 (.056)	.415 (.064)	.407 (.054)	na	na	na
<b>Log-Likelihood</b>	-1241.5	-1258.5	-1253.6	-899.5	na	na	na
<b># Observations</b>	667	667	667	334	667	667	667

\* p < .05; \*\* p < .01; \*\*\*p<.001

Notes:

1. Heteroskedastic-consistent ("robust") standard errors are shown in parentheses, adjusted for clustering on firm id.
2. In Column 4, the sample is restricted to highly capital-intensive firms (at median levels or above).
3. In Columns 5-7, the TI dummy is omitted since "within firm" effects are estimated by the model.