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ARTICLE INFO

ABSTRACT

G23
G34
O31

1. Introduction

1980s

(R&D)

2017

20151080451

/10.1016/ .2018.06.012

0304-405 / 2018 E B.V. A

(S , 1988, 1989). t. T 2015 L - F , t CEO B R , t , $t $t t $t , t t $t $t t $$ t $ $ t $ t $ t t t t . [1]

B t 1994 2007, t t 1,800 - t $t t $t , $ $$ $t , . B - t $t $, t U.S. t t - t$, 5% t 7% $ t $t $t t t $t $ t t $t $ t t . M , t t $ t, t t t $t t t t t t. [2] t, $ t t t t t t t $. A$ t, t $ t t $ $$ $ t$ t t t t$ t t $t $t $ t t $. [3]

O $ t t t $ t t t $t t t t t t t $ t, t $ t t $t $ t t t t t $ t t t t $ t t t t $ t t t t t t t

(M , 2011; B t ., 2014)

[6]

31 t 45

O

O

M

- 2.8( )]TJ /F2 1 T 6.3761 0 0 6.3761 308.2973 099.91 T 0 T ( )

2. Data and sample overview

2.1.

2.1.1.

2.1.2.

1994 2007, B t ., (2008), S 13D (SEC) (EDGAR). 5% 2% 5% ($1).

P A T 1 1994 2007.

1991 2006. (USPTO) NBER 2010.[9]

H B S (HBS) [10] 1991 2010, (L t ., (2014)).

USPTO G P ts.[11] (USPTO HBS S (2010), A t ., (2016), M (2017), [12]

[7] R&D R&D .

[8] A t 2013 t

Table 1

[illegible] (Panel A) [illegible] (Panel B). [illegible] 13D [illegible] SEC [illegible] 5% [illegible] 2% [illegible] 5% [illegible] $1 [illegible] R&D [illegible] R&D [illegible]. Panel A [illegible] 1994 [illegible] 2007, [illegible]. Panel B [illegible] F[illegible]-F[illegible] 12 [illegible].

Panel A: [illegible]

[illegible]	(1) # of Events	(2) % of [illegible]	(3) # of [illegible] ([illegible])	(4) % of [illegible] −3 to −1	(5) # of [illegible] ([illegible])
1994	8	37.50	138	37.50	138
1995	28	46.43	2	35.71	2
1996	82	36.59	12	30.49	15
1997	178	22.47	11	19.10	12.5
1998	140	30.71	12	25.00	18
1999	99	20.20	18	16.16	26
2000	98	21.43	19	19.39	19
2001	85	29.41	18	24.71	20
2002	119	32.77	10	27.73	13.5
2003	112	36.61	14	29.46	17
2004	133	34.59	7	27.82	10
2005	203	30.05	13	22.17	20
2006	235	34.47	24	24.26	50
2007	250	36.00	21	23.20	36
F[illegible]	1,770	31.24	16	24.07	24

Panel B: [illegible]

[illegible]	# of Events	% of [illegible]	% of [illegible]	% of [illegible] −3 to −1	% of [illegible]
C[illegible] N[illegible]	94	36.17	6.15	21.28	4.70
C[illegible] D[illegible]	47	61.70	5.24	59.57	6.57
M[illegible]	166	59.04	17.72	46.39	18.08
E[illegible]	64	9.38	1.09	3.13	0.47
C[illegible] A[illegible] P[illegible]	33	60.61	3.62	48.48	3.76
[illegible]	346	51.45	32.19	41.04	33.33
T[illegible] C[illegible]	73	12.33	1.63	9.59	1.64
Ut[illegible]	29	6.90	0.36	3.45	0.23
[illegible]	225	9.33	3.80	5.78	3.05
[illegible], M[illegible] E[illegible], [illegible] D[illegible]	192	53.13	18.45	46.35	20.89
F[illegible]	238	5.04	2.17	2.10	1.17
Ot[illegible]	263	15.97	7.60	9.89	6.11
F[illegible]	1,770	31.24	100	24.07	100

[illegible] R&D [illegible] (−3 to −1) [illegible] R&D. Table 1, Panel A [illegible] 31% [illegible] (2 [illegible] 3) [illegible] 24% [illegible] (4 [illegible] 5). O[illegible] 20 [illegible]. Panel B [illegible] Table 1 [illegible] F[illegible]-F[illegible] 12 [illegible].[13] N[illegible] (32% [illegible]), [illegible] (18% [illegible]), [illegible] (18% [illegible]) [illegible].

[13] [illegible] K[illegible] F[illegible] D[illegible] L[illegible]: http://[illegible]

2.2.

2.2.1.

(G ... ., 1987).

H ..., J ..., T ... (2001, 2005)

2010).

NBER

H ..., J ..., T ... (2001)

K ... N ... (2015)

K ... ., (2017)

2.2.2.

S ... St ... (2000)

C ... ., (2018)

M ... (2011)

A ... ., (2013) C ...

., (2018)

80% ... 80%

A ... ., (2016)

(2017)

2.3.

Table 2

[illegible] (2-digit SIC) … (ROA) … −1, … ROA … −3 … −1. … 25th, 50th, … 75th … ***, **, … * … 1%, 5%, … 10% …

	Targets (N=553)					Non-targets (N=553)					Difference	
	Mean	S.D.	25	50	75	Mean	S.D.	25	50	75	Target–Non-targets	t-Stat
Ln (Firm assets)	5.48	1.61	4.21	5.47	6.74	5.41	1.64	4.25	5.36	6.68	0.08	(0.76)
Ln (MV)	5.42	1.59	4.17	5.41	6.73	5.51	1.54	4.44	5.55	6.74	−0.09	(−0.88)
Firm assets	721.54	1049.17	67.30	237.49	849.32	704.06	1059.63	70.07	212.78	792.90	17.48	(0.27)
MV	631.88	862.10	63.29	222.16	814.13	627.49	848.92	80.15	234.42	807.43	4.39	(0.08)
Firm ROA	0.01	0.15	−0.06	0.05	0.11	0.02	0.16	−0.05	0.07	0.13	−0.01	(−0.88)
Firm R&D/Assets	0.07	0.08	0.00	0.03	0.13	0.07	0.07	0.00	0.04	0.11	0.00	(0.77)
Leverage	0.20	0.20	0.01	0.16	0.31	0.17	0.18	0.01	0.12	0.28	0.03*	(2.28)
Firm market-to-book	1.52	0.97	0.84	1.23	1.83	1.60	0.98	0.88	1.28	2.05	−0.08	(−1.39)
Ln (1+Number of patents)	0.50	0.72	0.00	0.00	1.10	0.53	0.74	0.00	0.00	1.10	−0.02	(−0.49)
Ln (1+Adj. citations)	0.55	0.98	0.00	0.00	0.00	0.55	0.98	0.00	0.00	0.53	0.00	(−0.03)
Number of patents	1.27	2.11	0.00	0.00	2.00	1.37	2.22	0.00	0.00	2.00	−0.10	(−0.73)
Adj. citations per patent	2.22	4.27	0.00	0.00	0.00	2.20	4.19	0.00	0.00	0.70	0.02	(0.09)
Firm patent …	0.58	0.24	0.48	0.63	0.76	0.59	0.24	0.44	0.63	0.78	−0.01	(−0.26)
Firm patent …	0.53	0.27	0.33	0.57	0.70	0.54	0.29	0.35	0.60	0.73	−0.01	(−0.35)
Firm patent …	0.18	0.34	0.00	0.00	0.20	0.19	0.34	0.00	0.00	0.33	−0.01	(−0.38)
Firm patent …	0.29	0.42	0.00	0.00	0.75	0.29	0.42	0.00	0.00	0.75	−0.01	(−0.22)

[illegible] Table 2 … 1% … Section 2.1.2, … Table 2 … 25th, 50th, … 75th … t-stat … ROA, … 7% … R&D … 1.27 (1.37) … 2.22 (2.20) …

3. Corporate innovation prior to and post hedge fund activism

O…

… 1991 to 2010, … (DiD) …

$$= \alpha + \alpha + \beta_1 \cdot (\ldots) \times (\ldots) + \beta_2 \cdot (\ldots) + \gamma \cdot C + \varepsilon \quad (1)$$

In Eq. (1), … Section 2. … $[+1, +5]$ … α … α … C … β_1, … $(\ldots) \times (\ldots)$ … Table 3 … (1). … Columns 1 … 2 … Table 3, Panel A … R&D … R&D …

Table 3

$$, = \alpha + \alpha + \beta_1 \cdot ( ) \times (,) + \beta_2 \cdot (,) + \gamma \cdot C , + \varepsilon , .$$

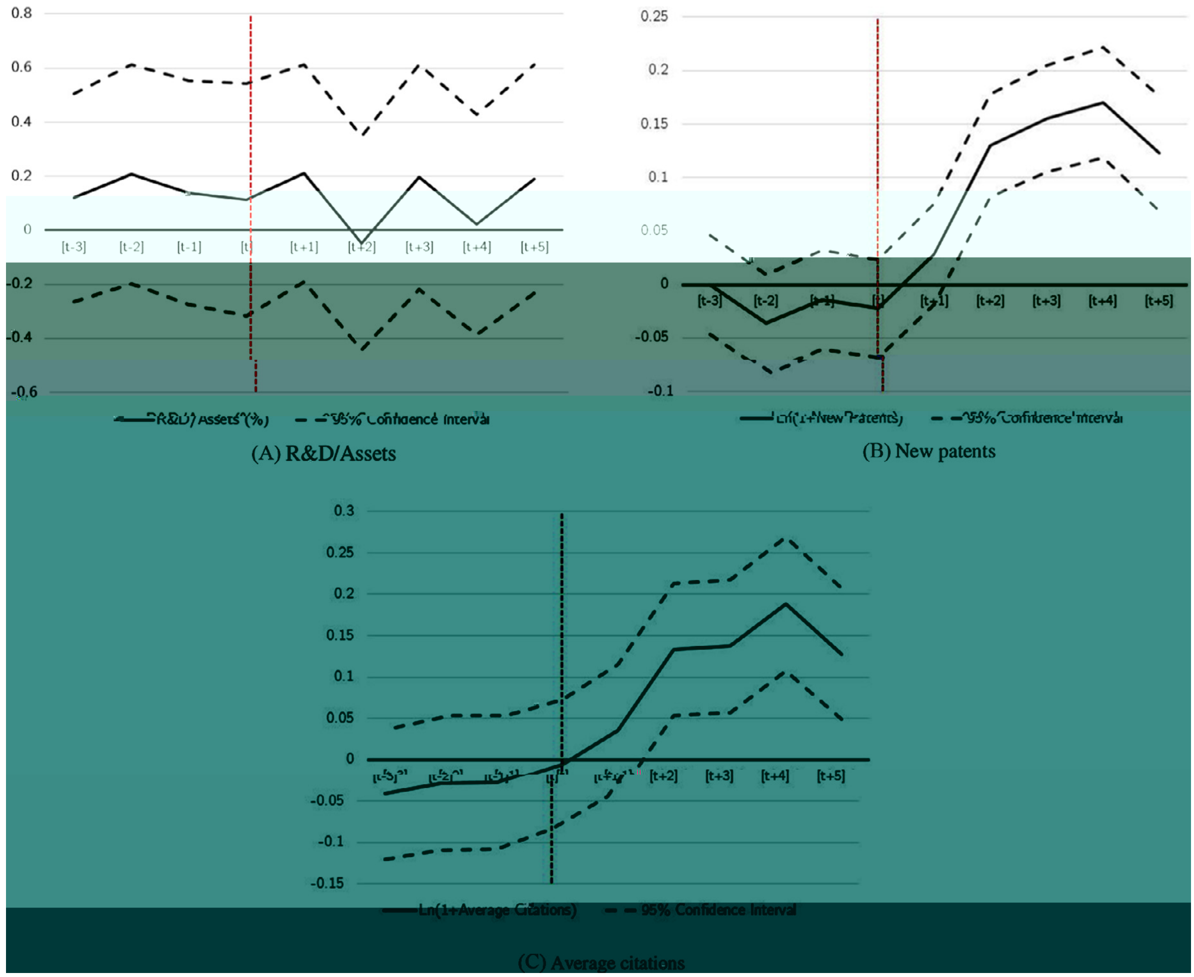


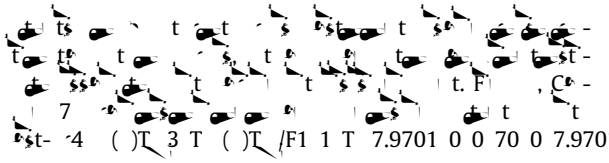
Fig. 1. [illegible] R&D [illegible] 95% [illegible]

$$v = \sum_{=-3}^{+5} \lambda \; +] + \sum_{=-3}^{+5} \beta \{ +] \times ( )\} + \gamma \cdot C + \alpha + \alpha + \varepsilon$$

[illegible] β [illegible] P A R&D [illegible] P B [illegible] P C [illegible] St [illegible]

[illegible] (+1) 0.50 (Table 2). [illegible] P A [illegible]

I C 4, [illegible] 770185.662 [illegible]



t. F , C -
7
t- 4 ( )T 3 T ( )T /F1 1 T 7.9701 0 0 70 0 7.9701 73.4922 670.239 T .0001 T (t)10.5( )-10.7.9(70100017( )-2

[16]

T O A - . F t, t t t t, t O A - t t t t - T A5 t t t t

Table 4

[illegible] T[illegible] 2. I[illegible] P[illegible] A [illegible]:

$$= \alpha + \alpha + (\quad \nu) \cdot \beta_1 \cdot (\quad) \times (\quad) + \beta_2 \cdot (\quad)] + (\quad \nu) \cdot \beta_3 \cdot (\quad) \times (\quad) + \beta_4 \cdot (\quad)] + \gamma \cdot C \quad + \varepsilon .$$

[illegible] +1, +5] [illegible] A [illegible] A), [illegible] −1. I[illegible] C[illegible] 1 [illegible] 2 [illegible] F[illegible] β_1, [illegible] β_2, [illegible] C[illegible] 1, [illegible] β_3, [illegible] β_4, [illegible] C[illegible] 2. T[illegible] ( )×( ) [illegible] C[illegible] 3. I[illegible] C[illegible] 4 [illegible] 6 [illegible]. T[illegible] P[illegible] B [illegible]:

$$= \alpha + \alpha + \beta_1 \cdot (\quad) \times (\quad) + \beta_2 \cdot (\quad) + \gamma \cdot C \quad + \varepsilon .$$

[illegible] T[illegible] I[illegible] C[illegible] 1 [illegible] 2 [illegible] C[illegible] 3 [illegible] 4 [illegible] A [illegible] A [illegible] C[illegible] 5 [illegible] 8 [illegible] 1 [illegible] 4 [illegible] A [illegible] T[illegible] ***, **, [illegible] * [illegible] 1%, 5%, [illegible] 10% [illegible].

P[illegible] A: [illegible]

	(1) High [illegible]	(2) Low [illegible]	(3) [illegible] test	(4) High [illegible]	(5) Low [illegible]	(6) [illegible] test
	(1 + # [illegible])			(1 + A[illegible])		
I(T[illegible]) × I(P[illegible])	0.232***	0.062	5.57**	0.218***	0.092	2.01
	(4.817)	(1.201)	(1.90%)	(3.559)	(1.628)	(15.78%)
I(P[illegible])	−0.077**	−0.042		−0.008	0.018	
	(−2.152)	(−0.828)		(−0.177)	(0.351)	
[illegible] (MV)	0.047***			0.048***		
	(4.772)			(3.733)		
[illegible] (A[illegible])	−0.016			−0.065		
	(−0.464)			(−1.397)		
O[illegible]	9,817			9,817		
[illegible]	0.669			0.595		
[illegible] FE	[illegible]			[illegible]		
F[illegible] FE	[illegible]			[illegible]		

P[illegible] B: E[illegible]

	K[illegible] (1) (1 + # [illegible])	(2) (1 + A[illegible])	(3) E[illegible]	(4) E[illegible]	N[illegible] (5) (1 + # [illegible])	(6) (1 + A[illegible])	(7) E[illegible]	(8) E[illegible]
I(T[illegible]) × I(P[illegible])	0.194***	0.182***	0.040***	−0.045	−0.028	0.027	−0.028	0.016
	(4.469)	(3.444)	(2.671)	(−0.751)	(−0.525)	(0.503)	(−0.401)	(0.267)
I(P[illegible])	−0.055	−0.031	−0.027	0.035	−0.016	−0.032	−0.014	0.031
	(−0.756)	(−0.726)	(−0.829)	(0.603)	(−0.455)	(−0.747)	(−0.241)	(0.555)
[illegible] (MV)	0.053***	0.038**	0.009*	−0.010	0.046***	0.039**	−0.010	−0.006
	(6.011)	(2.344)	(1.943)	(−0.540)	(3.440)	(2.379)	(−0.429)	(−0.321)
[illegible] (A[illegible])	−0.010	−0.114**	−0.022	−0.092**	0.117**	−0.115**	−0.087*	−0.089**
	(−0.211)	(−2.218)	(−1.203)	(−2.060)	(2.199)	(−2.215)	(−1.652)	(−2.022)
O[illegible]	9,817	9,817	3,218	3,218	9,817	9,817	3,218	3,218
[illegible]	0.587	0.473	0.553	0.520	0.646	0.476	0.565	0.520
[illegible] FE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F[illegible] FE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

T[illegible] $\beta_1, \beta_2\}$ [illegible] $\beta_3, \beta_4\}$ [illegible] T[illegible] 4. O[illegible]: $\beta_1 - \beta_3 = 0$, [illegible].

[illegible] C[illegible] 1 [illegible] 2 [illegible] P[illegible] A [illegible] β_1 [illegible] β_3, [illegible] β_1 ([illegible]) [illegible] β_1 [illegible] 0.232, [illegible] β_3 ([illegible]), [illegible] C[illegible] 3 [illegible]. T[illegible] (C[illegible] 4 [illegible] 5). T[illegible]. T[illegible] P[illegible] A [illegible]

4.2.

Table 5
P t t t t .
T t P t t t t , P t t t , P A, t t :

$$. = \alpha + \alpha$$

$$C = \sum_{=-3}^{+3} \beta \cdot + \,] + \gamma \cdot C \qquad (4)$$

Table 6

$$C \quad . = \sum_{=-3}^{+3} \beta \cdot \quad + \ ] . + \gamma \cdot C \quad . + \quad + \quad + \quad .$$

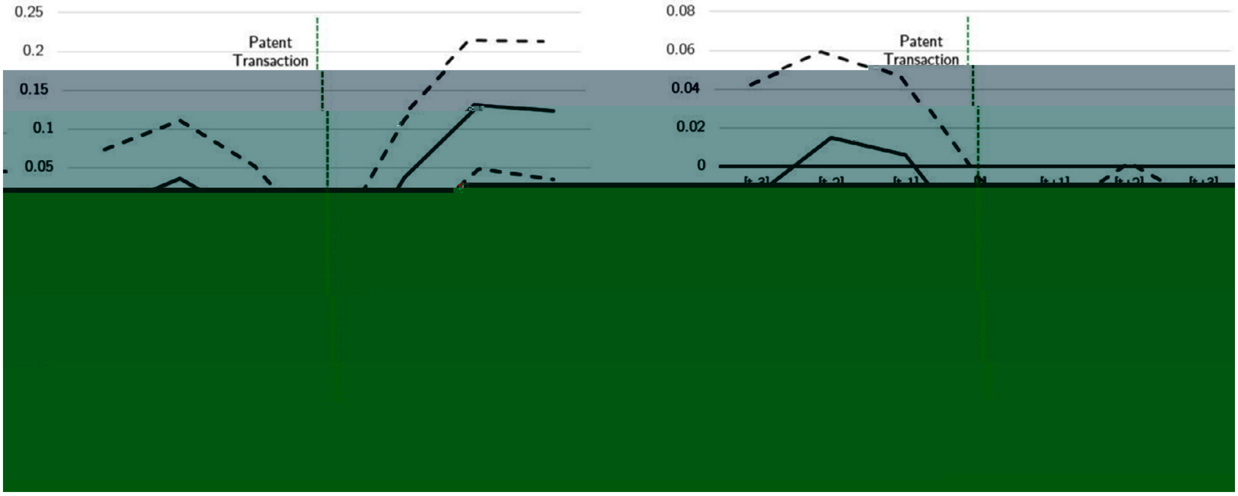


Fig. 2. [illegible]

$$C = \sum_{=-3}^{+3} \beta + \gamma \cdot A + \alpha + \alpha + \varepsilon$$

[illegible]

4.3.

[illegible] (2014; 2015). [illegible] (2015), [illegible] HBS [illegible]

[illegible] Eq. (1) [illegible] Table 7, Panel A. [illegible] 10% [illegible] 1% [illegible] 6.2% (8.6%) [illegible]

[illegible] Eq. (1) [illegible] Table 7, Panel B) [illegible]

[20] (2015) [illegible] HBS [illegible] R&D [illegible]

Table 7

4.4. , ,

Table 8

[illegible] CEO [illegible] R&D [illegible] SIC [illegible] (ROA) [illegible] −1 [illegible] ROA [illegible] −3 [illegible] −1. [illegible] Panel A, [illegible] CEO [illegible] Panel B, [illegible] CEOs [illegible] CEOs [illegible] CEOs [illegible] Panel C [illegible] CEOs [illegible] CEO [illegible] Panel D [illegible] HBS [illegible] SEC [illegible] 4 [illegible] "CEO [illegible] "CFO [illegible] ***, **, [illegible] * [illegible] 1%, 5%, [illegible] 10% [illegible]

	[illegible]	[illegible]	[illegible]
Panel A: [illegible]			
% [illegible] CEO [illegible] 3 [illegible]	22.33%	26.44%	−4.11%
% [illegible] CEO [illegible] 3 [illegible]	32.69%	20.25%	12.44***
[illegible]	10.36%***	−6.19%	16.55%***
Panel B: [illegible]			
[illegible] CEOs [illegible] 3 [illegible]	1693	1897	−204
[illegible] CEOs [illegible] 3 [illegible]	2076	1773	303*
[illegible]	383**	−124	507**
[illegible] CEOs [illegible] 3 [illegible]	2173	1928	245
Panel C: [illegible] CEOs			
[illegible] CEOs [illegible] 3 [illegible]	0.63%	0.64%	−0.01%
[illegible] CEOs [illegible] 3 [illegible]	0.78%	0.61%	0.17%*
[illegible]	0.15%*	−0.03%	0.18%*
Panel D: [illegible]			
[illegible] 3 [illegible]	0.12%	0.11%	0.01%
[illegible] 3 [illegible]	0.18%	0.11%	0.07%*
[illegible]	0.06%*	0%	0.06%*

[illegible]

5. Causality

[illegible]

[illegible] (G[illegible], 2013) [illegible]

5.1. [illegible]

[illegible]

Table 9

[illegible] 2000 to 2013, [illegible] ***, **, and * [illegible] 1%, 5%, and 10% [illegible]

	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	53.594	54.067	−0.473**	−2.049
[illegible]	0.089	0.103	−0.014	−1.613
[illegible]	0.518	0.515	0.002	0.145
(=1 = 0)				
[illegible]	0.535	0.489	0.045***	3.014
[illegible]	0.046	0.043	0.003	0.475
[illegible]	0.595	0.552	0.043***	2.866
[illegible]	0.841	0.830	0.011	0.947
[illegible]	0.664	0.636	0.027*	1.917
[illegible]	0.180	0.182	−0.002	−0.133
[illegible]	0.118	0.119	−0.001	−0.107
[illegible]				
[illegible]	0.952	0.852	0.100**	2.174
[illegible]	0.606	0.541	0.065	0.579
[illegible]	0.961	0.855	0.106***	2.746
[illegible]	0.704	0.663	0.041**	1.980
[illegible]	0.917	0.882	0.034	0.994
[illegible]	1.053	1.157	−0.104	−1.089
[illegible]	0.931	0.904	0.027	0.284

[illegible][23] [illegible] −1 [illegible] −3, [illegible]

[illegible] Table 3. [illegible] Column 3, [illegible] Column 4, [illegible]

[23] [illegible] $8 [illegible] 2015, [illegible] $5 [illegible]

Table 10

[illegible] Table 3 [illegible]

$$ = \alpha + \alpha + \beta_1 \cdot (\quad) \times (\quad) + \beta_2 \cdot (\quad) + \gamma \cdot C \quad + \varepsilon \, . $$

[illegible] [+1, +5] [illegible]. In Column 1 [illegible] R&D [illegible] Column 2 [illegible] R&D [illegible]. In Columns 3 and 4 [illegible]. In Columns 5 and 6 [illegible]. A [illegible] A. In Column 7 [illegible] Kogan et al. (2017). [illegible] ***, **, and * [illegible] 1%, 5%, and 10% [illegible].

	(1) R&D/Assets (%)	(2) R&D ($)	(3) (1 + # N[illegible])	(4) (1 + A[illegible])	(5) O[illegible]	(6) G[illegible]	(7) [illegible] ($M)
I(T[illegible]t) × I(P[illegible]t)	−0.135	−14.014*	0.148*	0.135*	0.018	0.009	14.997
	(−1.072)	(−1.930)	(1.686)	(1.718)	(1.015)	(0.579)	(1.533)
I(P[illegible]t)	0.318	1.005	−0.047	0.031	−0.028	−0.006	−1.841
	(1.345)	(0.117)	(−0.692)	(0.412)	(−1.305)	(−0.344)	(−0.227)
(MV)	−0.409***	6.680**	0.077***	0.086***	0.024***	0.016**	−0.483
	(−5.598)	(2.523)	(3.080)	(3.201)	(3.748)	(2.575)	(−0.095)
(A[illegible])	−0.085	−25.890***	0.057	0.050	0.032	0.027	15.449*
	(−0.357)	(−2.994)	(0.593)	(0.447)	(1.384)	(1.165)	(1.972)
O[illegible]	2,143	2,143	2,143	2,143	649	537	649
[illegible]	0.873	0.894	0.661	0.545	0.520	0.442	0.644
[illegible] FE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F[illegible] FE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] CEOs) [illegible] 23% [illegible] (21%). [illegible] Table 10. [illegible] Table 3, [illegible] R&D [illegible] 10% [illegible] 14.8% [illegible] 10%), [illegible] 13.5% [illegible] 10%) [illegible].

5.2. 13 [illegible]

[illegible] O [illegible]

[illegible] 5% [illegible] 20% [illegible] 13G [illegible] SEC [illegible] 13D [illegible] 13( ) [illegible] 13D-G). [illegible] 13G (13D) [illegible] 13G [illegible] 13D. [illegible] 13D [illegible] 13D.[24]

[illegible] "13G-t[illegible]-13D [illegible] 13G [illegible]

[24] [illegible] 13D [illegible] 1% [illegible] 13G, [illegible] 45 [illegible]

Table 11

$$= \alpha + \alpha + \beta_1 \cdot (13 \quad 1 \quad) \times (\quad) + \beta_2 \cdot (\quad) + \gamma \cdot C \quad + \varepsilon .$$

	(1) R&D/A t (%)	(2) (1 + # N t)	(3) (1 + A t)
I(13G t 13D)	−0.101	0.116*	0.174**
	(−0.215)	(1.946)	(1.968)
I(P t)	0.008	−0.014	−0.009
	(0.064)	(−0.713)	(−0.304)
C t			
O t	6,756	6,756	6,756
	0.899	0.631	0.573
FE			
FE			
F FE			

$$= \alpha + \alpha + \alpha + \beta_1 \cdot (\quad) \times (13 \quad 1 \quad) + \beta_2 \cdot (\quad) + \gamma \cdot C \quad + \varepsilon , \qquad (5)$$

Table 12

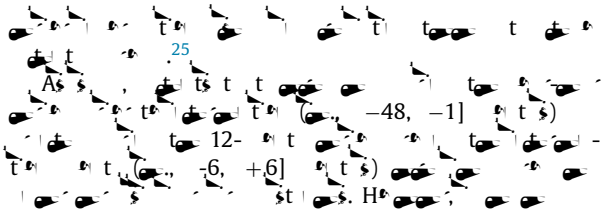
[illegible]

... Panel A ... Schedule 13D ... [−6, −1] ... Schedule 13D ... [0, +6] ... Schedule 13D ... [−48, −1] ... 48- ... Panel B ... [−1, +1] ... (=3,6 ...)

$$B\ A = \alpha + \alpha + \beta_1 \cdot (\ ) \times (\ ) + \beta_2 \cdot (\ ) + \gamma \cdot C + \varepsilon .$$

... CRSP ... 1 ... 2 ... 48- ... 12- ... Schedule 13D ... 3 ... 4 ... Schedule 13G ... Schedule 13D ... Schedule 13G ... Schedule 13D ... (13 ... 13G-to-13D ... Schedule 13G ... ***, **, * ... 1%, 5%, ... 10% ...

Panel A: [illegible]	T[illegible]	N[illegible]-t[illegible]
T[illegible] [−48, −1]		
% P[illegible] [−6, −1]	9.22%	9.83%
% P[illegible] [0, +6]	9.58%	9.77%
% P[illegible] [−3, −1]	4.63%	4.99%
% P[illegible] [0, +3]	5.07%	4.85%
L[illegible] ([illegible])		
M[illegible]	30	31
St[illegible]	17.83	18.40
A[illegible]		



Appendix A. Variable definition and description

V	D
R&D	(RD).
R&D	(RD) (AT).
N	N
A	A
O	O 2- NBER
C	O 2-
E	80%
E	80%
D	O 2- NBER
D (P)	T 5. A (2016)
I	A -3, -1], +1, +3]; H B S
I	A -3, -1], +1, +3]; H B S
P	N G P T D USPTO.
P	N G P T D USPTO.
A	N IPO, C
T	T (AT).
MV	M (CSHO)
ROA	E (OIBDP) (AT).
M/B	T (DLC), (DLTT), (PSTKL), (T DITC), (AT).
L	B (DLC) (DLTT)) (AT).

Appendix B. Additional considerations involving the patent data

T (2017) T 10). (2017)

1. T ? T O A S 3 1994 2002.
2. A (.,) ?

T O S 3 T 3, P B.

3. T (., C M) ? T

4. A (., t-t) ?

C 3.7( )B 7133.947 T 0 T ( )T /F

ROA -3 -1

5.

(1),

6.

H , J , T (2001). , 1994 2002,

7.

A15

8.

9.

USPTO

3.

10.

)?

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