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Searle Center on Law, Regulation, and Economic Growth

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# The Market for Standard-Essential Patents

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# Transfers of Standard-Essential Patents

- Large transactions have attracted significant public attention
  - Sale of Nortel portfolio of SEPs to a consortium including Apple, Ericsson, Microsoft and Sony for 4.5 bn USD
  - Purchase by Google of Motorola for 12.5 bn USD, resold (without patent portfolio) for 2.91 bn USD two years later
- Policy concerns regarding licensing of SEPs on fair, reasonable and non-discriminatory (FRAND) terms
  - Antitrust investigation of SEP transfers raising the prospect of circumventing the original owner's licensing obligations (Bosch to IPcom, National Semiconductor to N-Data)
  - Significant proportion of SEP litigation initiated by patent assertion entities and other entities who purchased already established SEPs (Contreras, 2016)

# The Market for Patents

- Facilitating the transfer of technologies is a core function of the patent system (Spulber, 2015)
- The re-sale market for patents is a part of the market for technologies
  - Significant potential for welfare gains from re-allocation of ideas (Serrano, 2011; Akcigit and Kerr, 2015)
  - Market for technologies comprises licensing, cross-licensing, transfer of ownership (Arora et al., 2004; Gambardella et al., 2007, Arque-Castells and Spulber, 2017)
  - Transfer of knowledge from inventor to innovator (Figueroa et al., 2013)
- The market for patents is also a market for the right to assert (Galasso et al., 2013, Gaessler, 2016)

# Specificities of SEPs

- Standardization partly overcomes potential for misallocation of ideas
  - Technology standards should be fully open to implementers, and provide all necessary technical information
- SEPs are generally subject to FRAND licensing obligations
  - Can't be used to exclude rivals from using the technology
  - Obligations “travel” with the SEP in case of transfer
- Standards are often subject to multiple SEPs owned by different firms
  - SEPs don't confer an exclusive right over the standardized technology
  - Freedom to operate and assertion efficiencies as motives for SEP transfers?

## Possible reasons for SEP transfers

- **Enforcement:** Majority of SEP infringement litigation brought by assertion specialists (Contreras, 2016)
- **Freedom to operate:** Defensive acquisitions by implementers and aggregators (Cosandier et al., 2014)
- **Aggregation:** vertical integration is the textbook solution to royalty stacking and transaction costs resulting from fragmentation
- **Privateering:** e.g. Ericsson to Unwired Planet; attenuate FRAND limitations and potential repercussions on business relationships from aggressive enforcement
- **Vertical specialization:** a limited number of firms (“standardization insiders”) account for majority of contributions to SSOs
  - May acquire patents for introduction into standards, and sell once essential

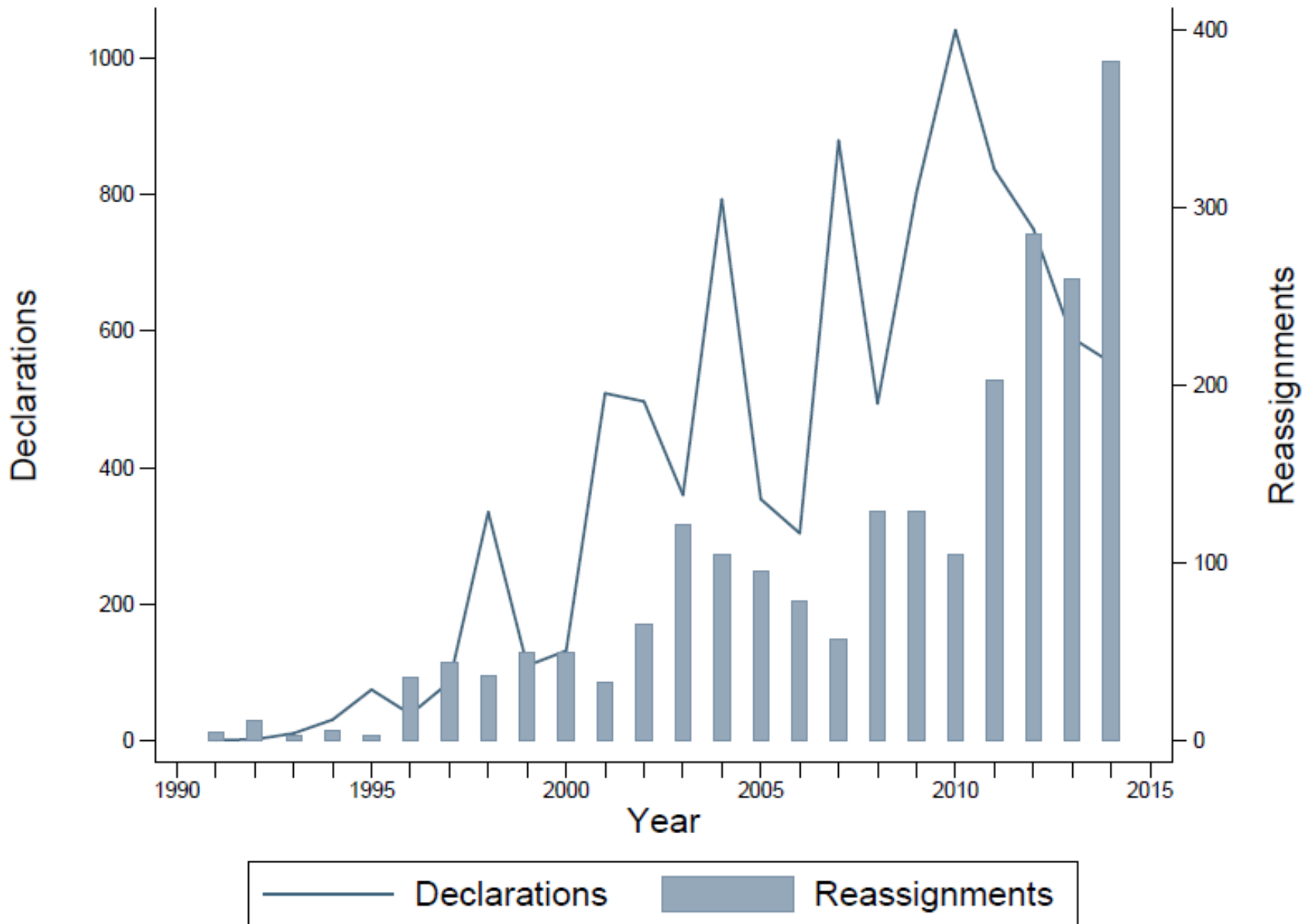
# Empirical contributions of our paper

- We compare assignee and assignor characteristics:
  - **SEP Portfolio size:** we test whether re-assignments reduce or increase concentration of SEP ownership
  - **SSO membership & contributions:** Standardization “insiders” and “outsiders”
  - **Standard-compliant products:** implementers vs. non-practicing entities
- We compare characteristics of firms participating in the “ex ante” and “ex post” market
  - **Ex ante:** transfers of patents before declaration as SEP
  - **Ex post:** transfers of declared SEPs

# Empirical methodology

- We use data on SEP declarations from Baron and Pohlmann (2017)
  - SSO policies require or encourage declaration, based on personal knowledge, no 3<sup>rd</sup> party evaluation
  - 9,155 unique US patents declared essential to various SSOs
- We use USPTO reassignment data to study patent transfers
  - Widely used in the literature (Serrano, 2010, 2011; Galasso et al., 2013; Figueroa et al., 2014; Akcigit and Kerr, 2015; Ciaramella, 2017; Arque-Castells and Spulber, 2017)
  - 1,629 SEPs involved in 2,580 transfers (excluding intra-firm and multiple transfers in single year)
- SSO contributions and membership from Searle Center Database (Baron and Gupta, 2017; Baron and Spulber, 2017)





## Declared SEPs in sample, by SSO

SDO	# total	# transferred
ANSI	158	47
Broadband Forum	5	1
CEN	3	0
ETSI	4,227	870
IEC	16	2
IEEE	454	172
IETF	933	126
ISO	198	73
ITUR	117	25
ITUT	471	166
OASIS	24	11
OMA	46	15
TIA	12	3

Note: Patents can belong to several SDOs. A patent can be transferred several times. Patent pools are not included.

## Evolution of Firms' SEP Portfolio

- Do patent reassignments contribute to increase (aggregation) or reduce (privateering) concentration of SEP portfolios?

- We define a firm's SEP portfolio as

- $$S_{i,t} = S_{i,t-1} + D_{i,t} - E_{i,t} + P_{i,t} - V_{i,t}$$

where  $D$  is the number of declarations,  $E$  the number of elapsed and expired SEPs, and  $P$  and  $V$  respectively the number of SEPs acquired and sold

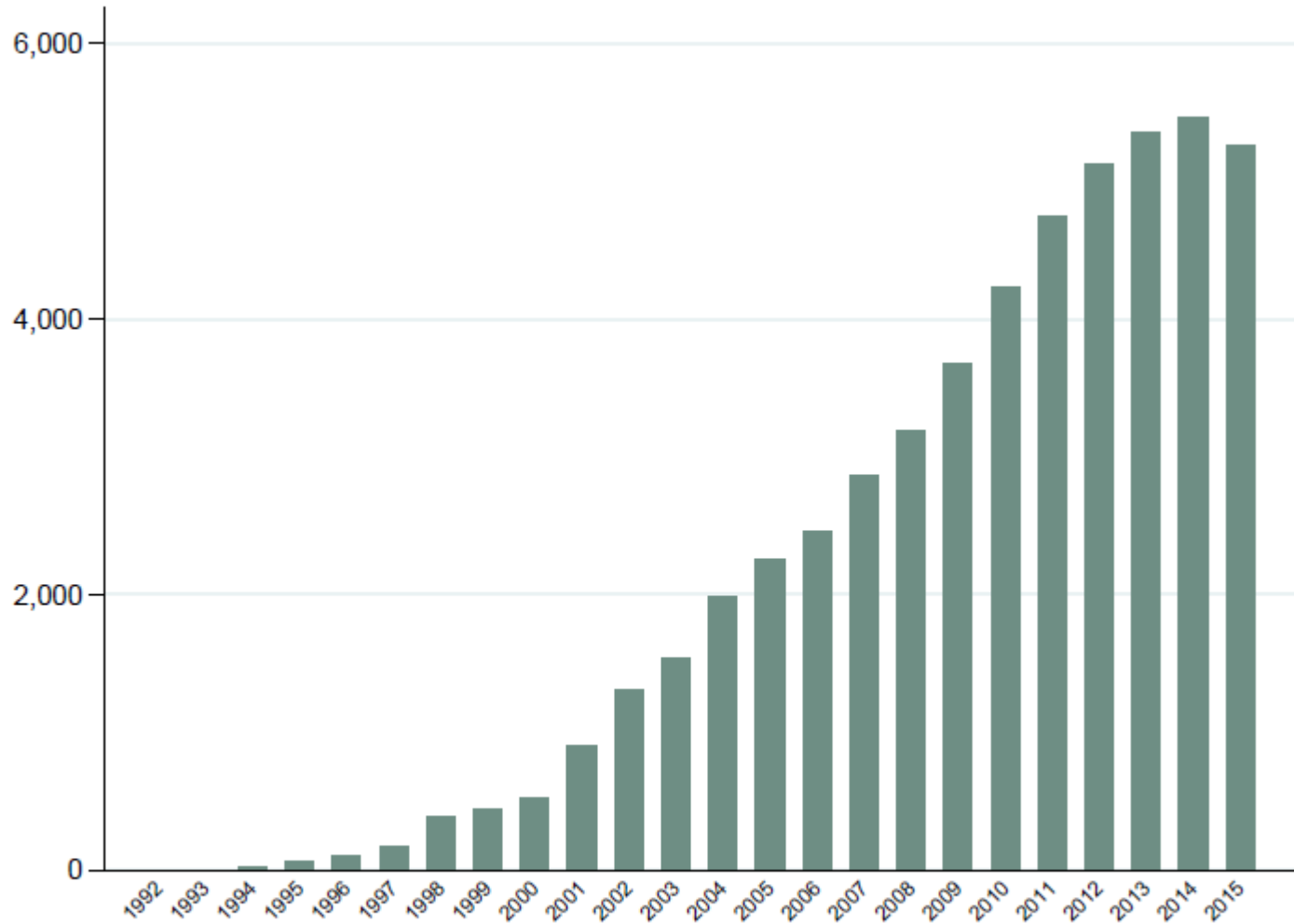
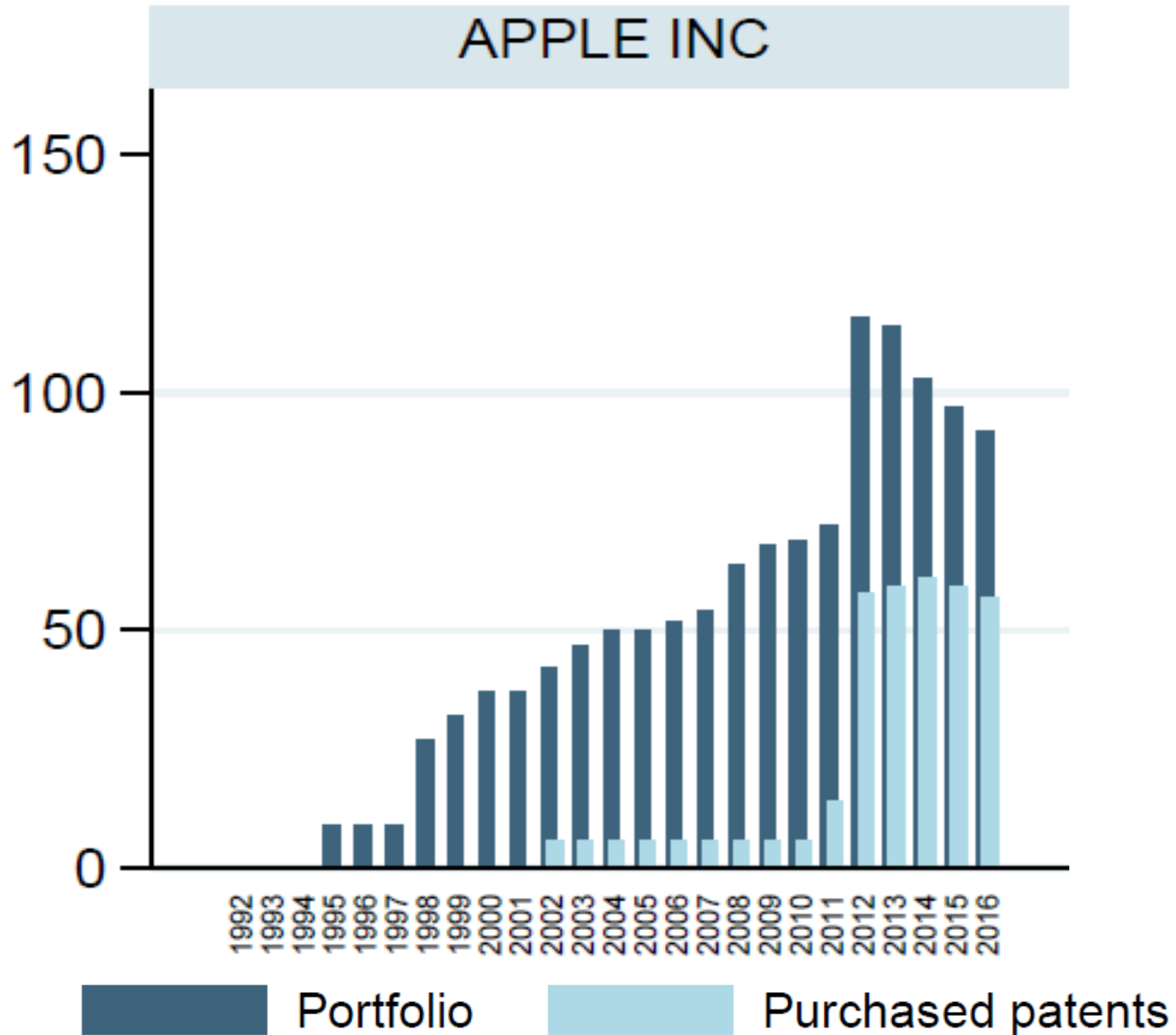
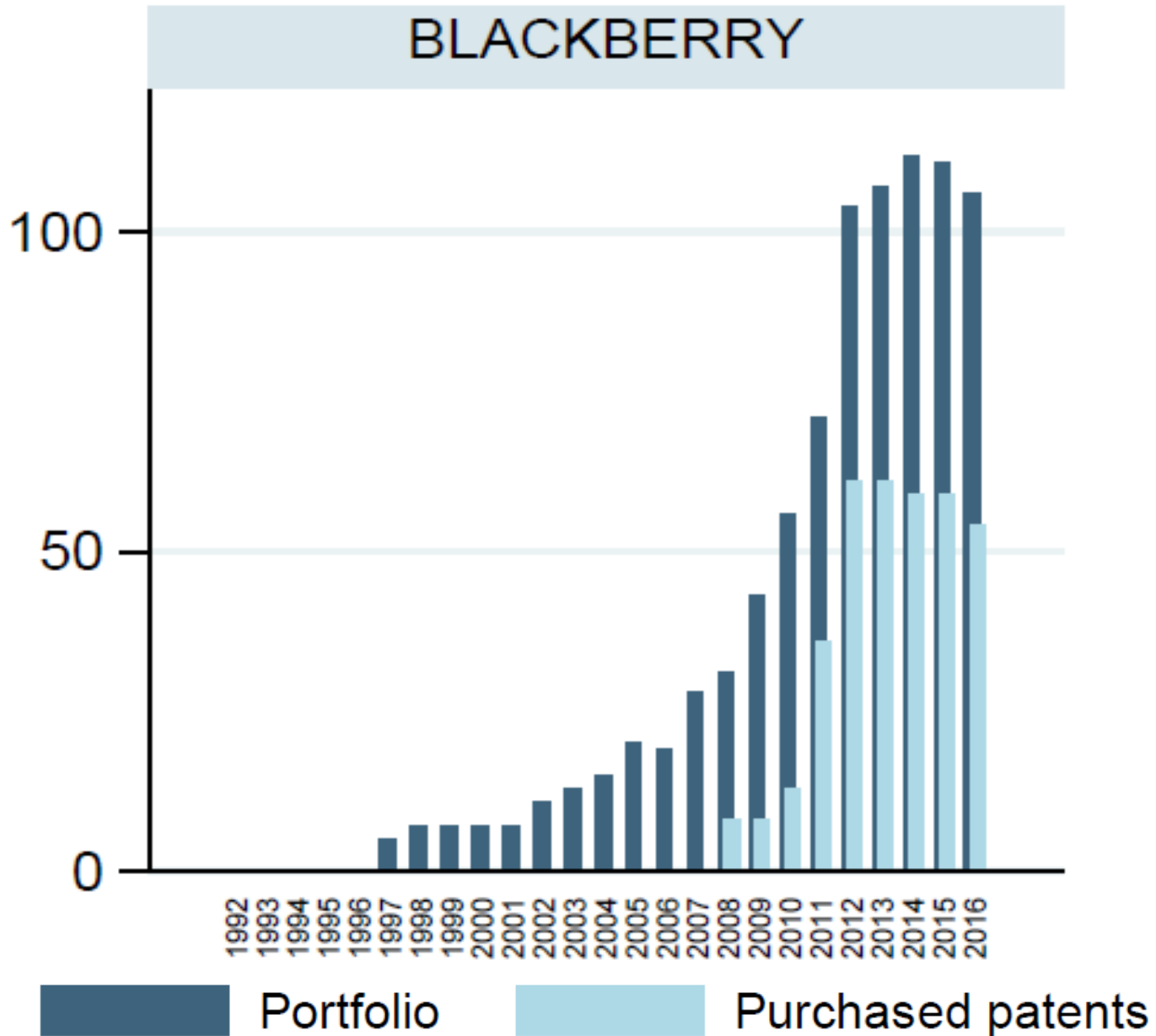
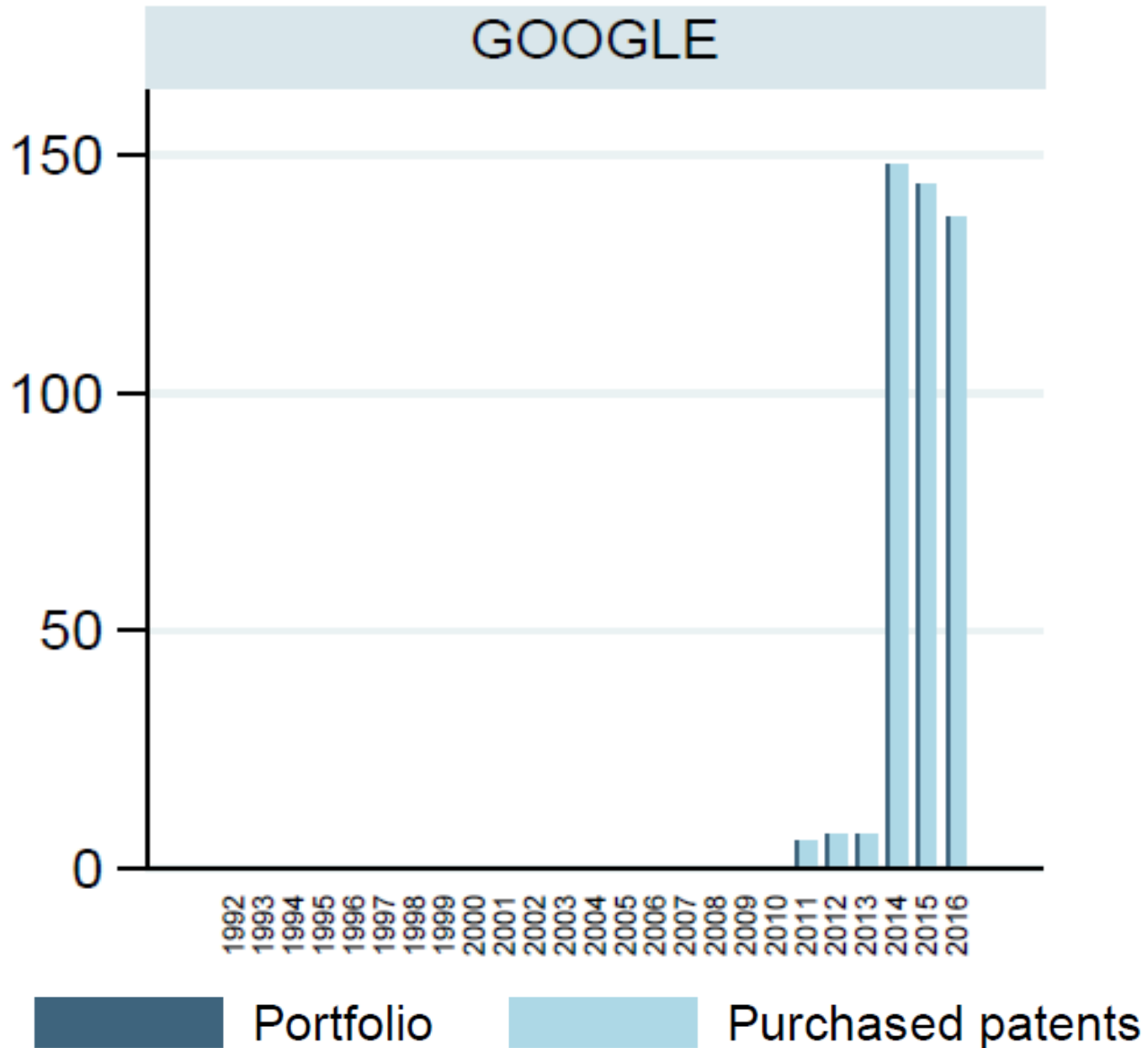
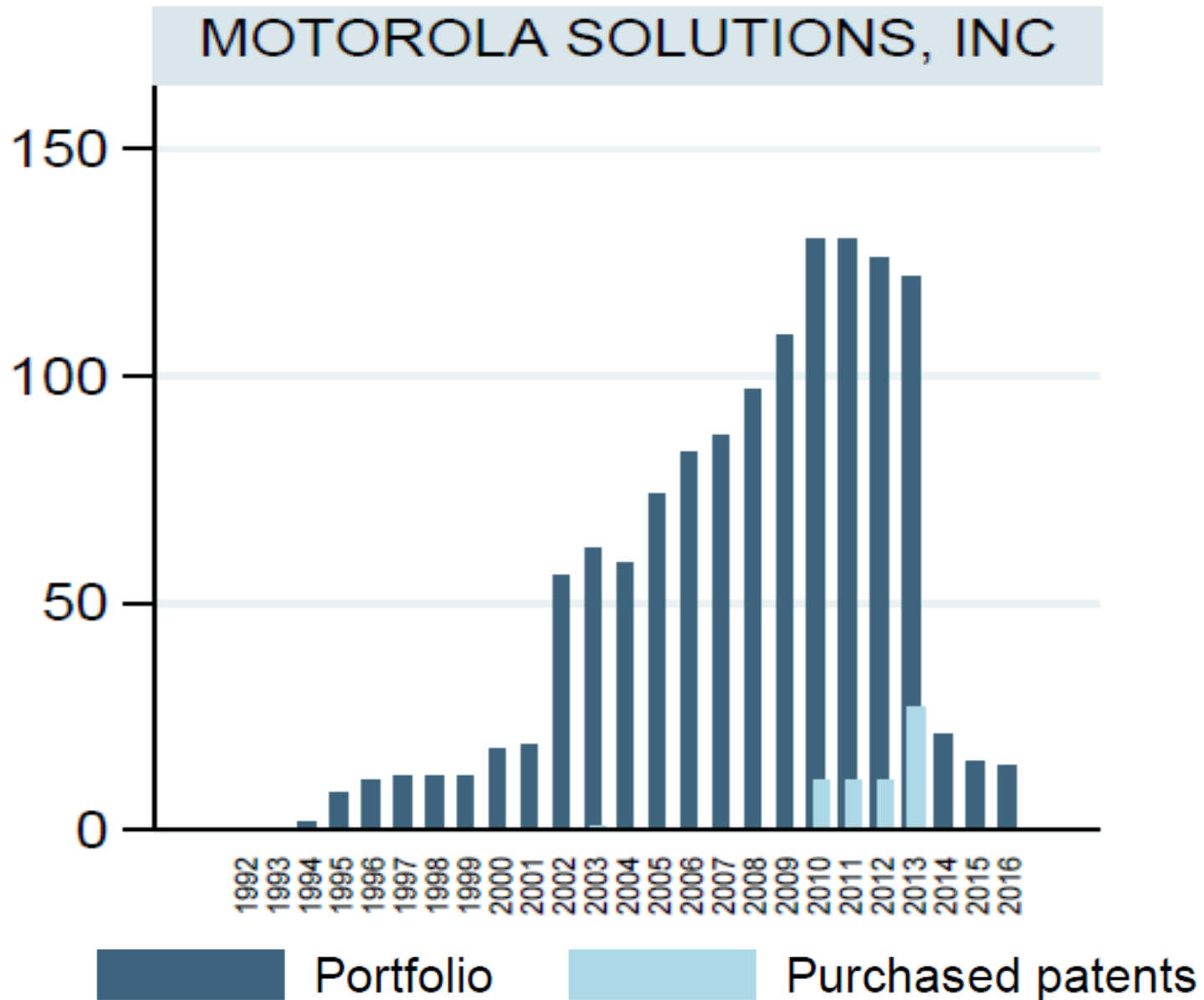


Figure 2: Stock of SEPs

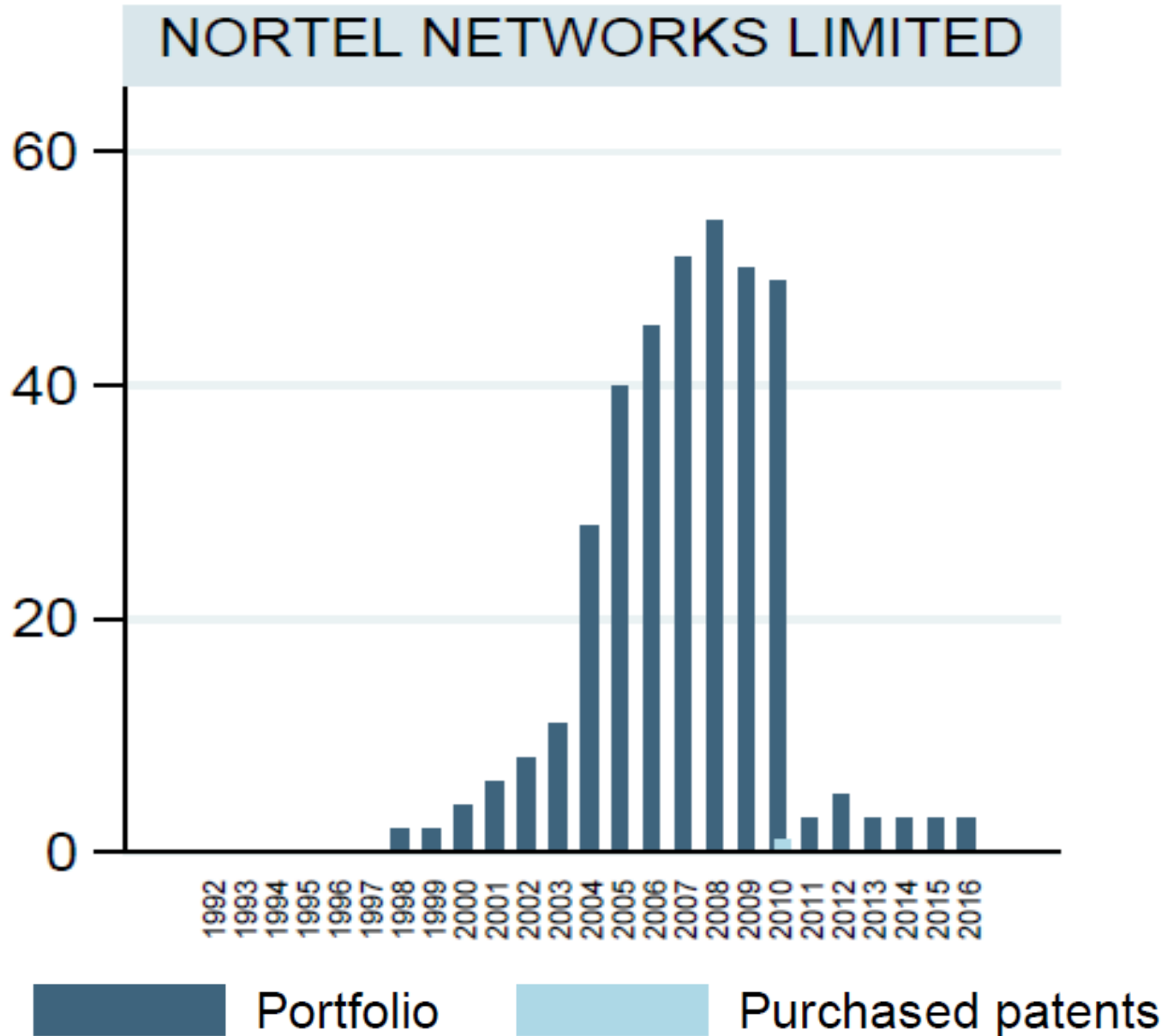


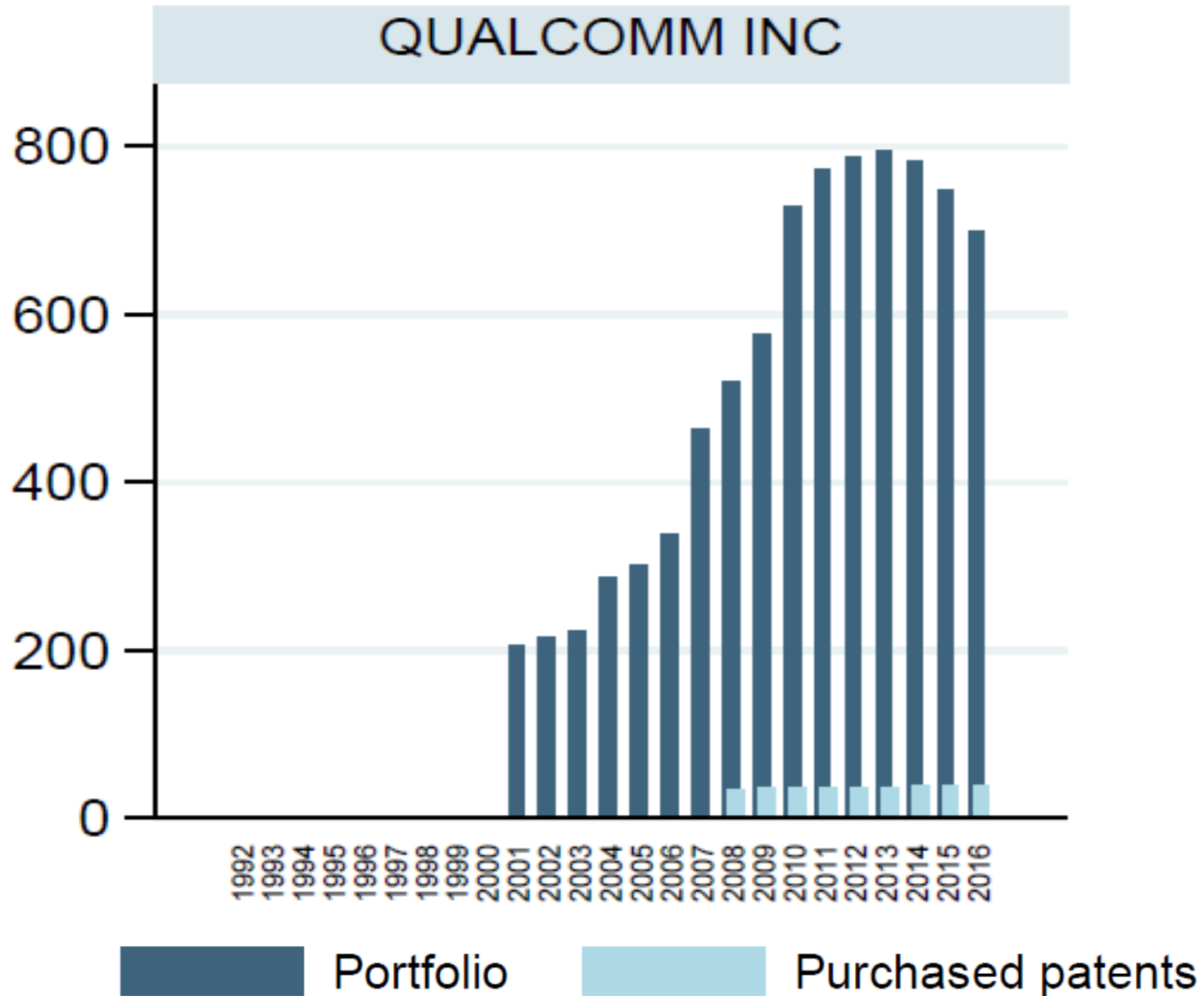










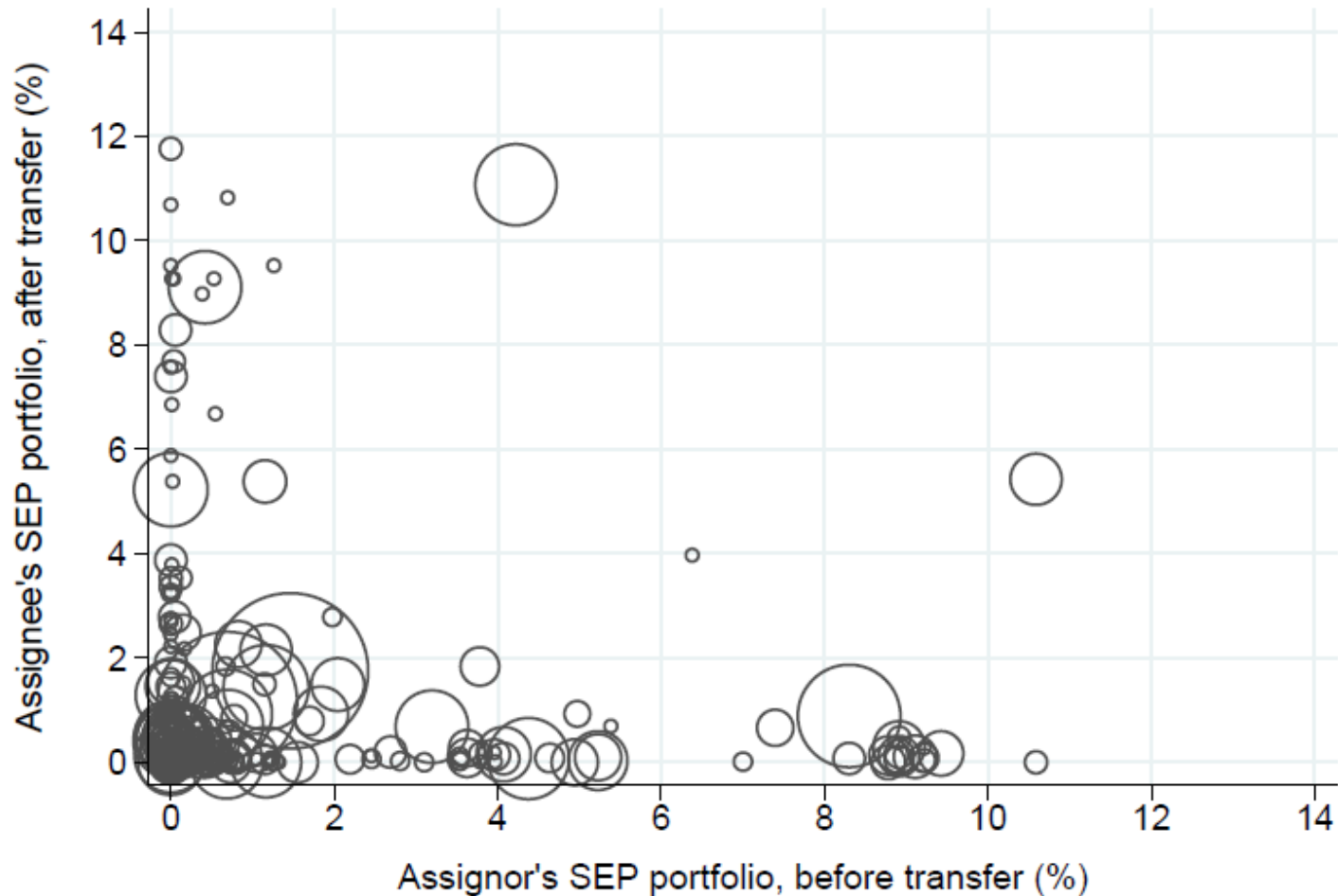


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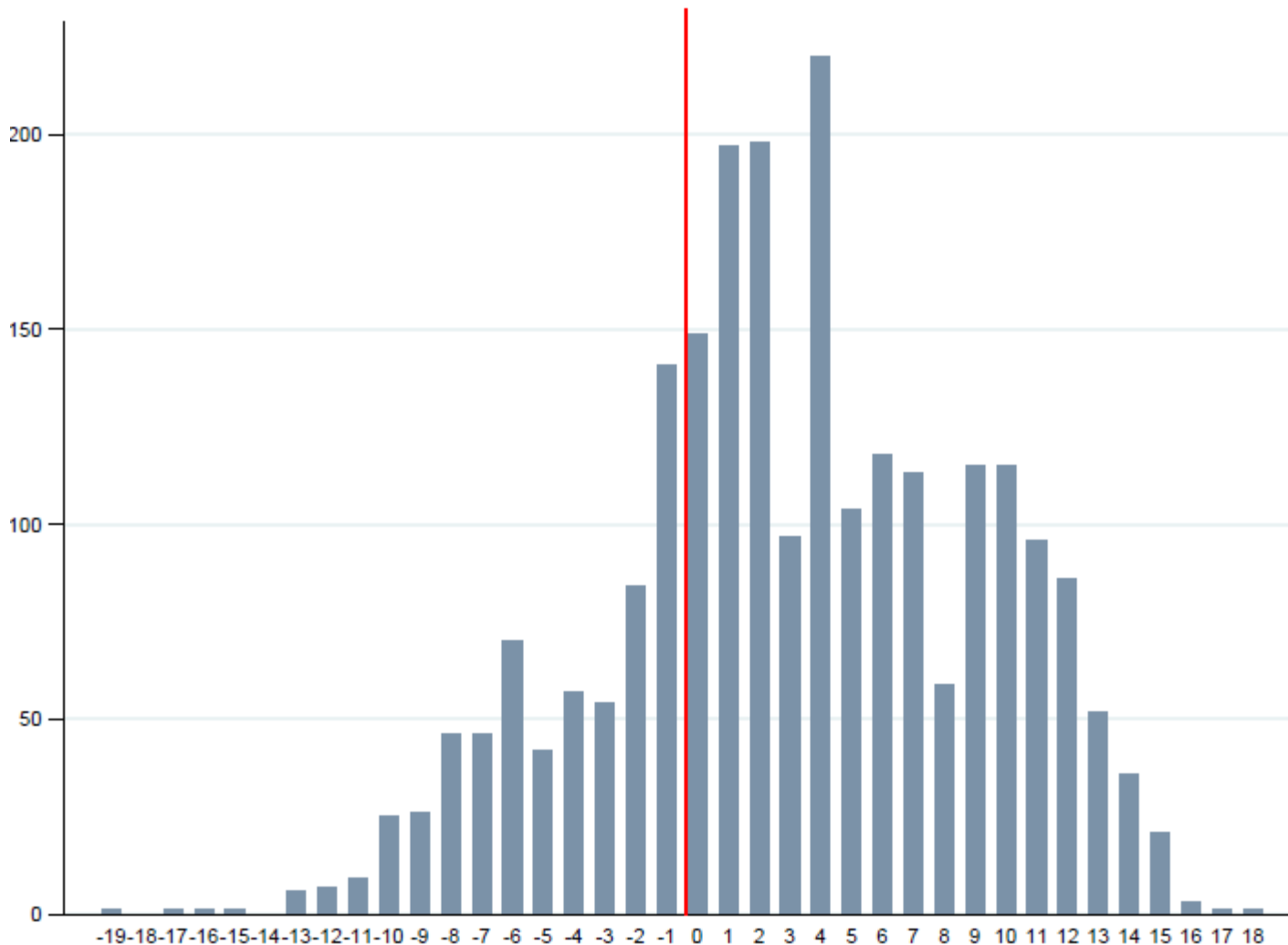
where  $D$  is the number of declarations,  $E$  the number of elapsed and expired SEPs, and  $P$  and  $V$  respectively the number of SEPs acquired and sold
- The SEPs enter the portfolio of the assignee and exit the portfolio of the assignor with the transfer; we thus compare the portfolio size of the assignor before with the size of the assignee's portfolio after the transfer

# Assignor and assignee portfolio size



Area of symbol proportional to the number of SEPs transferred between assignor and assignee in one year

# Timing of assignment wrt. declaratoion



# Insiders & outsiders, before & after declaration

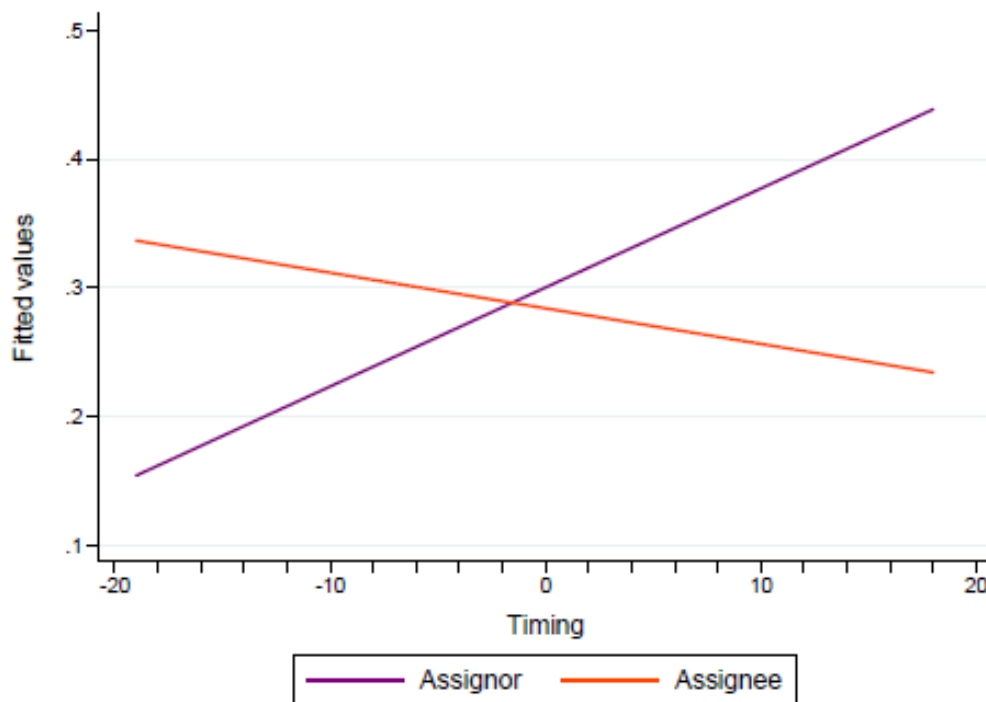


Figure 7: Firm member of the corresponding SDO

# Insiders & outsiders, before & after declaration

	# of SDO memberships				# of contributions				# of contributions (approved)			
	All	Before	After	Diff.	All	Before	After	Diff.	All	Before	After	Diff.
<i>N</i>	2,398	687	1,711		2,398	687	1,711		2,398	687	1,711	
Assignor	25.3 (0.7)	18.8 (1.1)	28.0 (0.9)	-9.2*** (1.5)	2,266 (104)	877 (131)	2,824 (134)	-1,947*** (228)	649 (32)	252 (41)	808 (42)	-556*** (71)
Assignee	19.0 (0.6)	17.3 (1.0)	19.7 (0.7)	-2.4* (1.3)	846 (65)	875 (135)	834 (73)	41 (143)	226 (19)	251 (41)	216 (21)	35 (42)
Diff.	6.3*** (0.8)	1.5 (1.5)	8.2*** (1.0)		1,420*** (112)	2 (173)	1,990*** (139)		423*** (35)	1 (54)	592*** (43)	

Note: For the timing, the SDO level is considered. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Econometric implementation

- We create a sample of patent-SSO-firm observations:
  - transferred patent  $i$  can be declared to multiple SSOs  $s$ ; and we observe each transferred patents-SSO observation for both the assignee and the assignor
- We estimate the following regression equation

$$Y_{i,s,t} = \beta_1 \text{Assignee}_{i,j,t} + \beta_2 \text{Before}_{j,s,t} + \beta_3 \text{Assignee} \times \text{Before}_{i,j,s,t} \\ + \beta_4 Z_{i,j,s,t} + \beta_5 X_t + \beta_6 W_s + \varepsilon_{i,j,s,t}$$

where  $Y$  is a vector of explained firm characteristics,  $Z$  is a vector of control variables,  $X$  and  $W$  respectively are vectors of year and SSO fixed effects.



	Producer	SDO member	# member ships	# contri- butions	SEP portfolio
Assignee	0.020 (0.05)	-0.084* (0.05)	-8.143* (4.03)	-1500*** (487)	11.88 (11.6)
Before	-0.096** (0.04)	0.015 (0.05)	-4.080 (2.58)	-543** (267)	12.28 (13.0)
Assignee x Before	0.022 (0.05)	0.056 (0.07)	5.178 (4.65)	1483** (481)	-5.16 (21.6)
Producer		0.778*** (0.03)	32.016*** (3.44)	2476*** (888)	27.60 (25.6)
SDO member			32.706*** (3.17)	-529 (453)	90.88*** (29.7)
# memberships				58** (11)	-0.87*** (0.2)
# contributions					0.01*** (0.0)
Grant lag	-0.000 (0.00)	0.000 (0.00)	-0.001 (0.00)	0.353*** (0.11)	0.002 (0.00)
Constant	-0.036 (0.11)	-0.028 (0.07)	8.853 (8.97)	-1926* (1067)	-18.963 (31.16)
N	4,796	4,796	4,796	4,796	4,796
r2	0.266	0.613	0.633	0.474	0.504

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

# Conclusion

- Patents are transferred from standardization “insiders” to “outsiders” after becoming standard-essential
  - This pattern is not confirmed for patents transferred before essentiality declaration
- Standard implementers participate more significantly in the market for already declared SEPs, but on both sides of the market
- SEP transfers neither reduce nor increase the extent of concentration of SEP ownership
- No evidence for either privateering or aggregation; but rather vertical specialization from invention to standardization and beyond