



NATIONAL DEFENSE RESEARCH INSTITUTE

# Trends in the DoD Industrial Base

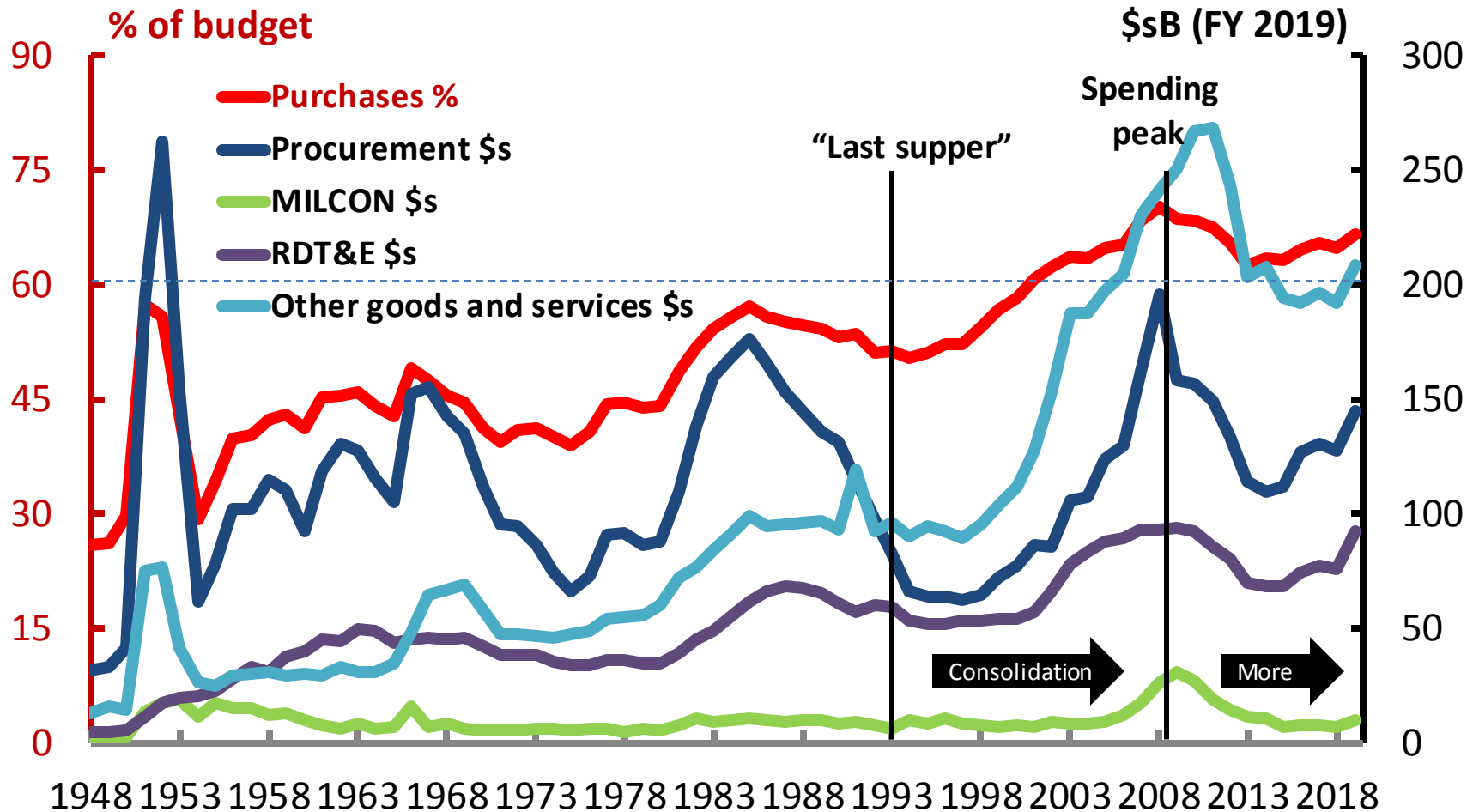
Nancy Young Moore, Clifford A. Grammich, and  
Judith D. Mele

15<sup>th</sup> Annual Acquisition Research Symposium  
May 9, 2018

# What Constitutes DoD's Industrial Base?

- Forward looking
  - Industries supported by Procurement dollars primarily for new weapons and modifications → Aerospace and Defense (A&D) industry
  - Industries supported by Research, Development, Test, and Evaluation (RDT&E) dollars focused on advanced technology acquisition → Technology industry + A&D
- Backward looking
  - Industries supported by Operations and Maintenance dollars for Sustainment → Aerospace and Defense industry

# DoD Purchases Have Been Increasing Relative to Personnel Costs while Procurement and RDT&E Funding Has Varied



Sources: OUSD(Comptroller), National Defense Budget Estimates for FY 2019, March 2018, Table 6-1, 6-2, [http://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19\\_Green\\_Book.pdf](http://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19_Green_Book.pdf).

# Global Industry Consolidation Continues

- Industries tend to consolidate over time - faster in recent years<sup>1</sup>
- Global Merger and Acquisition (M&A) activity in 2017 = \$3.59 trillion<sup>2</sup>
  - North America = \$1.82 trillion, > 50% of global
  - Aerospace and Defense M&A was relatively small ~ \$57.5 billion in 2015 (1.6%) and \$17.5 billion in 2016 (0.5%)<sup>3</sup>
  - Technology M&A was 10X or more higher ~ \$593 billion in 2015 (16.5%) and \$717 billion in 2016 (20.0%)<sup>4</sup>

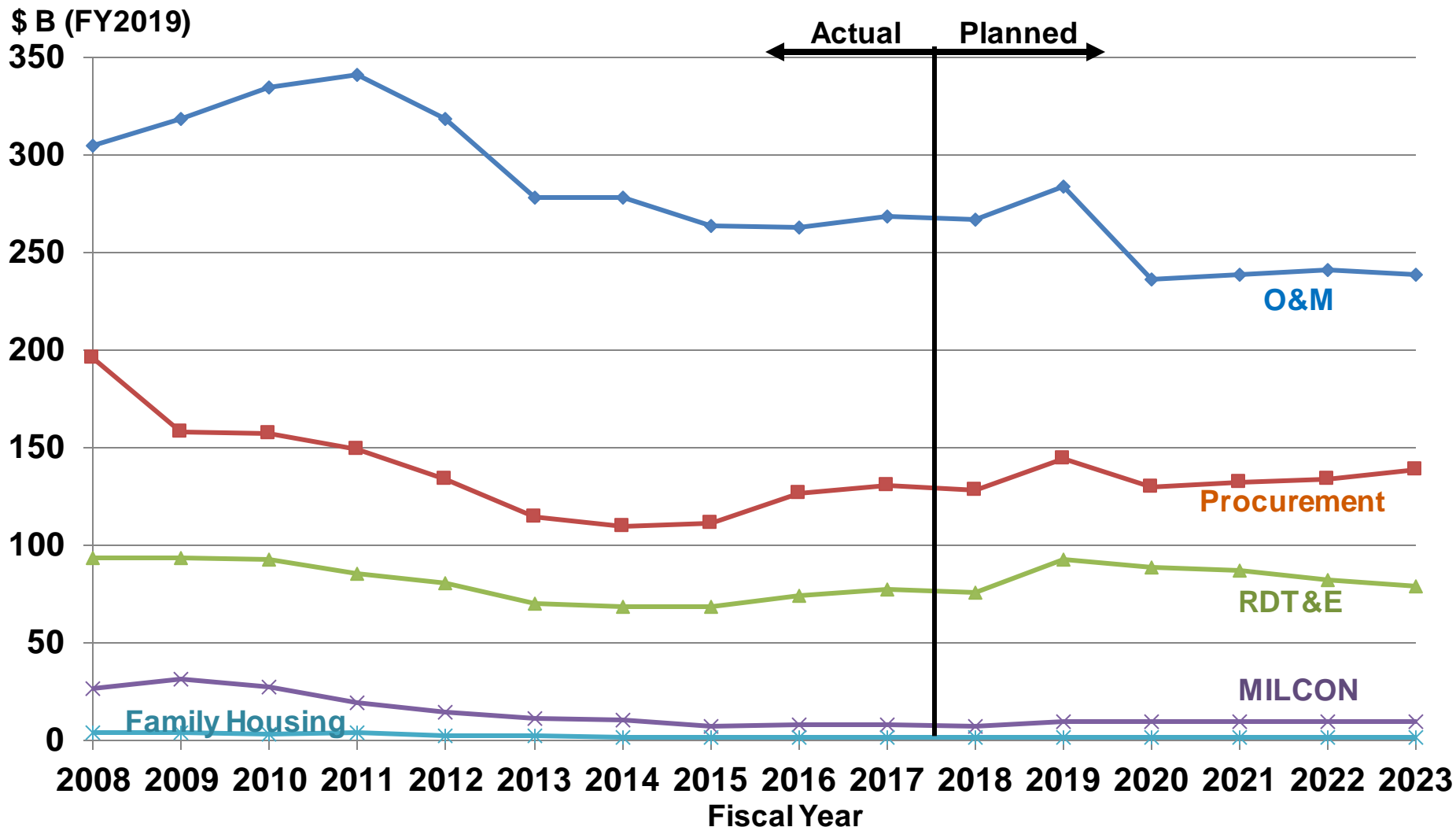
<sup>1</sup>Deans, Graeme K., Kroeger, Fritz, and Zeisel, Stefan, "The Consolidation Curve," *Harvard Business Review*, December 2002.

<sup>2</sup><https://imaa-institute.org/mergers-and-acquisitions-statistics/#Largest-Mergers-Acquisitions-North-America>

<sup>3</sup><https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-aerospace-and-defense-trends.pdf>

<sup>4</sup><https://www.bcg.com/en-us/publications/2017/corporate-development-finance-technology-digital-2017-m-and-a-report-resurgent-high-tech-marketplace.aspx>

# Procurement and RDT&E Are Projected to Both Increase and Decrease Slightly in Future Budgets



Source: OUSD(Comptroller), National Defense Budget Estimates for FY 2019, March 2018, Table 6-1  
[http://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19\\_Green\\_Book.pdf](http://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19_Green_Book.pdf)

NOTE: Data in Constant FY2019 Dollars.

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# Top DoD Industries Ranked by 2012 Procurement Dollars

NAICS		Procure \$sB*		Total DoD \$sB		Total Industry \$Bs
Code	Name	2012	2016	2012	2016	2012
336411	Aircraft Manufacturing	23.6	24.2	46.7	44.8	113.0
336611	Ship Building and Repairing	11.8	10.4	16.6	15.0	24.9
336414	Missile & Space Veh. Mfg.	6.1	5.6	10.7	10.4	19.7
541330	Engineering Services	5.5	4.9	28.8	25.6	208.1
336413	Other Aircraft Pts./Equip. Mfg.	4.1	2.5	13.5	12.7	34.3
334511	Search Instrument Mfg.	3.9	4.1	9.1	10.8	47.0
336992	Armored Vehicle & Tank Mfg.	3.4	1.3	6.5	3.9	5.6
541710-2	R&D in Sciences	3.0	1.3	25.4	22.4	110.7
332993	Ammo. (not small-arms) Mfg.	2.2	3.0	2.8	3.7	3.6
336412	Acft. Engines & Engine Parts	2.1	2.4	5.3	6.2	37.1
334220	Radio/TV Broadcast Equip.	2.1	1.1	4.9	2.5	30.3
332410	Boiler and Heat Exch. Mfg.	1.2	1.4	1.2	1.4	7.1

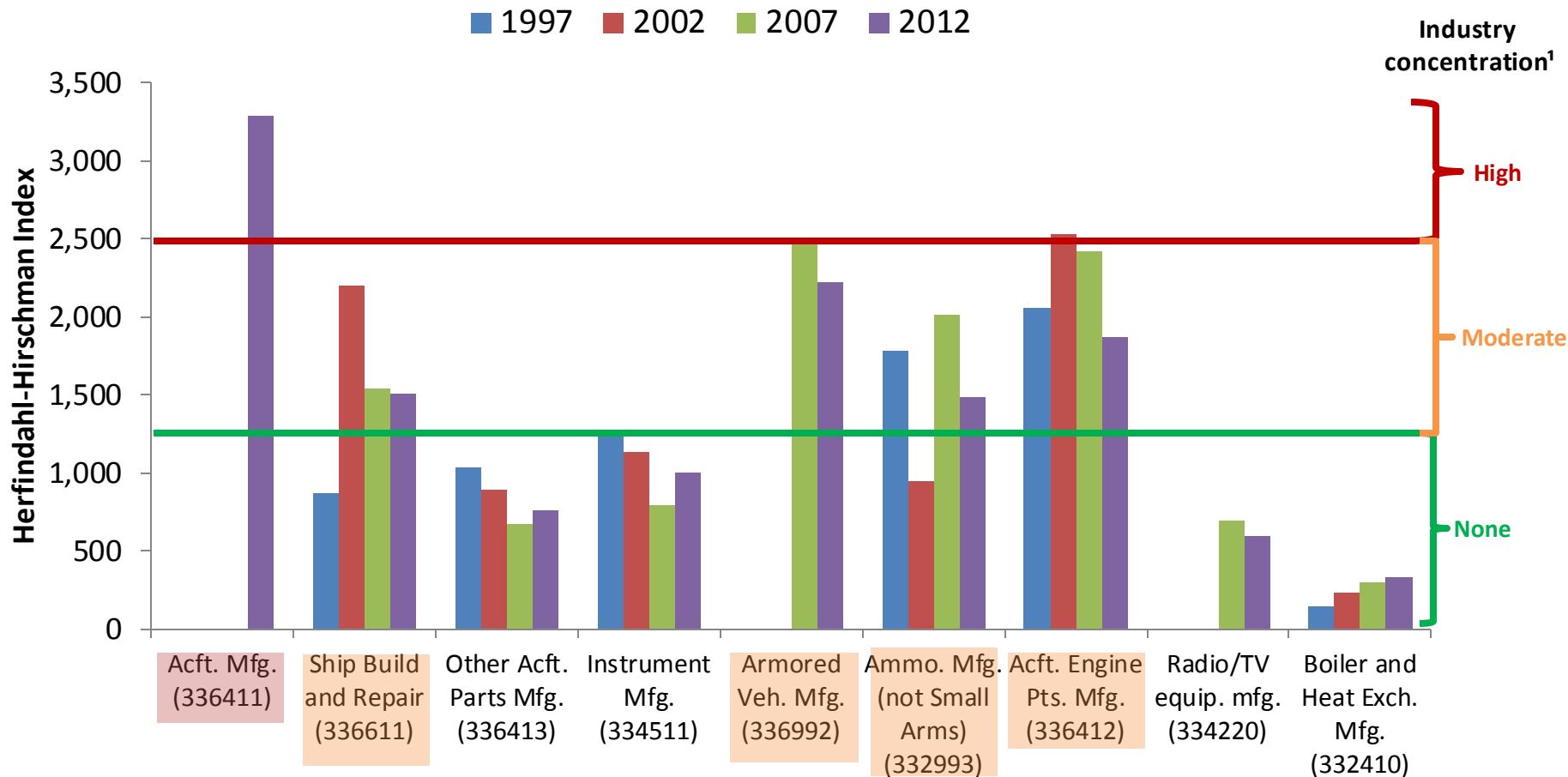
\* Treasury Account Symbols became optional on ICARS as of June 25, 2016

# DoD Is the Dominant Buyer in Some of Its Top Procurement Dollars Industries

NAICS		Procure Share of DoD \$s*		DoD Share of Industry \$s
Code	Name	2012	2016	2012
336411	Aircraft Manufacturing	51	54	41
336611	Ship Building and Repairing	71	69	66
336414	Missile & Space Veh. Mfg.	58	54	54
541330	Engineering Services	19	19	14
336413	Other Aircraft Pts./Equip. Mfg.	30	20	39
334511	Search Instrument Mfg.	43	38	19
336992	Armored Vehicle & Tank Mfg.	52	35	117
541710-2	R&D in Sciences	12	6	23
332993	Ammo. (not small-arms) Mfg.	79	80	79
336412	Acft. Engines & Engine Pts.	40	40	14
334220	Radio/TV Broadcast Equip.	43	44	16
332410	Boiler and Heat Exch. Mfg.	99	99	18

\* Treasury Account Symbols became optional on ICARS as of June 25, 2016

# Herfindahl-Hirschman Index of Market Concentration by Industry, 1997-2012



<sup>1</sup>As defined U.S. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines, August 19, 2010, p. 19.

Source: Economic Census. Data not available for years not shown.

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# Number of Industry Firms Varies by Data Source

- Economic Census (EC)/Statistics of U.S. Businesses (SUSB)
  - Firms report revenue and employees by their *predominate industry/NAICS*
  - If they provide goods and services in other industries it can *undercount* in those industries
- System for Award Management (SAM) - formerly Central Contractor Register (CCR)
  - Firms register in *all industries/NAICS* in which they seek business in the federal government
  - They may have never done work in some of the industries and thus, can be an *overcount* of firms in those industries

# Number of Firms in Top DoD Industries Ranked by 2012 Procurement Dollars

NAICS		Number of Firms in 2012		CCR/SUSB
Code	Name	SUSB	CCR	
336411	Aircraft Manufacturing	226	2,030	8.98
336611	Ship Building and Repairing	604	1,807	2.99
336414	Missile & Space Veh. Mfg.	16	832	52.00
541330	Engineering Services	45,749	39,832	0.87
336413	Other Aircraft Pts./Equip. Mfg.	745	4,868	6.53
334511	Search Instrument Mfg.	453	3,740	8.26
336992	Armored Vehicle & Tank Mfg.	60	2,243	37.38
541712	R&D in Sciences	9,672	18,974	1.96
332993	Ammo. (not small-arms) Mfg.	45	486	10.80
336412	Acft. Engines & Engine Parts	355	2,196	6.19
334220	Radio/TV Broadcast Equip.	748	4,395	5.88
332410	Boiler and Heat Exch. Mfg.	266	618	2.32

# As Much as 50 to 80 percent of a Product's Costs Can Be in The Supply Base

- Many large product manufacturers have become assemblers which increases the percentage of the product's costs that are in the supply base
- Tracking product suppliers and their costs could provide insights in drivers of cost increases
- Federal collection of subaward data began in 2010

# 2016 Weapon Systems Contracts with Subawards Ranked by Prime Dollars

Weapon	Prime			Subawards			
	\$s M	Contracts	Contractors	\$s M	Contracts	Contractors	% prime \$s
F-35	5,789	34	16	113	111	63	20
Trident II	3,318	353	203	768	283	162	23
PATRIOT	2,717	239	83	244	87	62	9
F-15	2,482	135	68	5	5	6	<1
F/A-18 E/F	2,242	19	17	58	29	14	3
CH-47F	1,858	33	18	<1	3	3	0
AMRAAM	1,822	17	4	102	444	123	5
DDG 51	1,562	10	7	476	121	76	26
AH-64E Rmfg.	1,342	24	15	1	1	1	0
CVN 68	1,221	81	64	6	48	14	<1
Patriot/MEADS	1,181	36	26	74	440	184	6
SCOUT	1,174	10	7	4,809	14	13	407
Tactical UAV	1,119	10	6	16	28	19	1

Sources: Federal Procurement Data System – Next Generation (FPDS-NG), Federal Funding Accountability and Transparency Act Subaward Reporting System (FSRS), 2017.

# Top 2016 Weapon System Contracts With No Reported Subaward Data

Awarded \$ M	Weapon system	Agency	# contracts	# NAICS	# Contractors
2,979	KC-46A	Air Force	2	2	2
1,592	DDG 51	Navy	19	11	14
1,394	F/A-22	Air Force	9	6	5
1,077	LHA 6	Navy	8	4	5
688	DDG 1000	Navy	14	10	10
513	CVN 68	Navy	9	5	6
291	JLTV	Army	6	6	6
242	Javelin	Army	6	2	2

Sources: Federal Procurement Data System – Next Generation (FPDS-NG), Federal Funding Accountability and Transparency Act Subaward Reporting System (FSRS), 2017.

# Weapon Systems with the Most Reported Subaward Dollars

Weapon	Prime			Subawards			
	\$s M	Contracts	Contractors	\$s M	Contracts	Contractors	% prime \$s
Patriot/MEADS	1,181	36	26	4,809	14	13	407
STRYKER (IAV)	661	31	25	2,548	642	225	385
E-2D AHE	322	26	19	1,359	500	198	422
Trident II	3,318	353	203	768	283	162	23
BRADLEY FVS	292	42	30	725	689	237	249
AMRAAM	1,822	17	4	476	121	76	26
POSEIDON	268	2	2	469	141	107	175
P-8A	369	22	15	351	27	24	95
PATRIOT	2,717	239	83	244	87	62	9
Minuteman III	243	5	4	161	12	8	66
AIM-9X	251	4	2	147	42	30	59
G/ATOR	21	4	2	135	2	2	631
ABRAMS Upg	86	8	7	125	165	80	145
TACTOM	275	4	2	118	57	49	423
F-35	5,789	34	16	113	111	63	2

Sources: Federal Procurement Data System – Next Generation (FPDS-NG), Federal Funding Accountability and Transparency Act Subaward Reporting System (FSRS), 2017.

# Findings

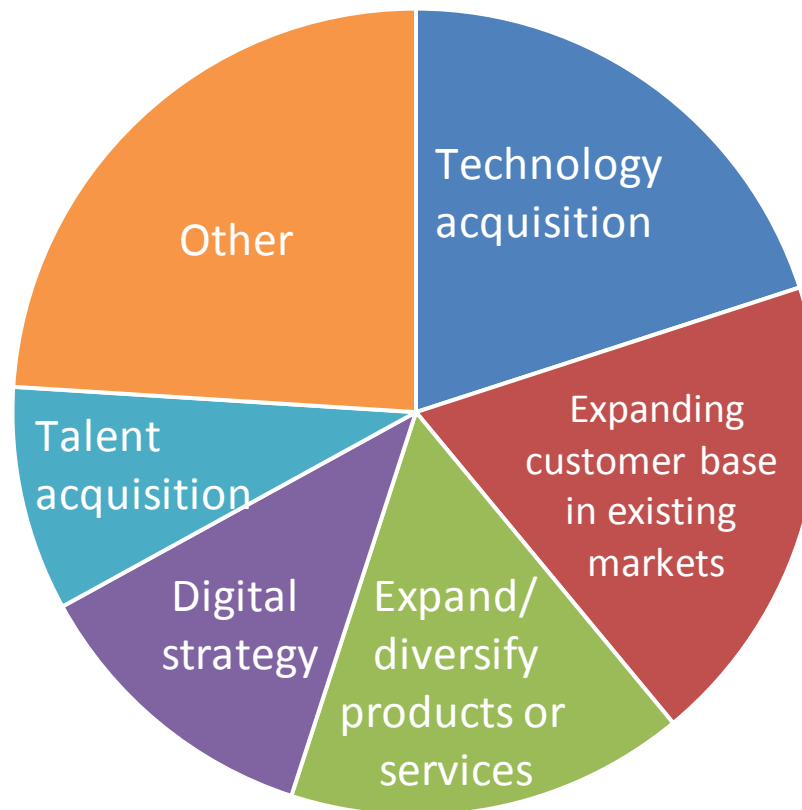
- Industries continue to consolidate globally, while Defense and Aerospace is consolidating slower
- DoD is a dominant or major buyer in some, but not all, top procurement industries
- One top DoD industry by total Procurement dollars is already highly concentrated and several more are close to being so
- Data on weapon system subawards is still incomplete and questionable

# Questions?



# Mergers and Acquisitions Are Driven By Many Factors in 2018

Reasons for M&A

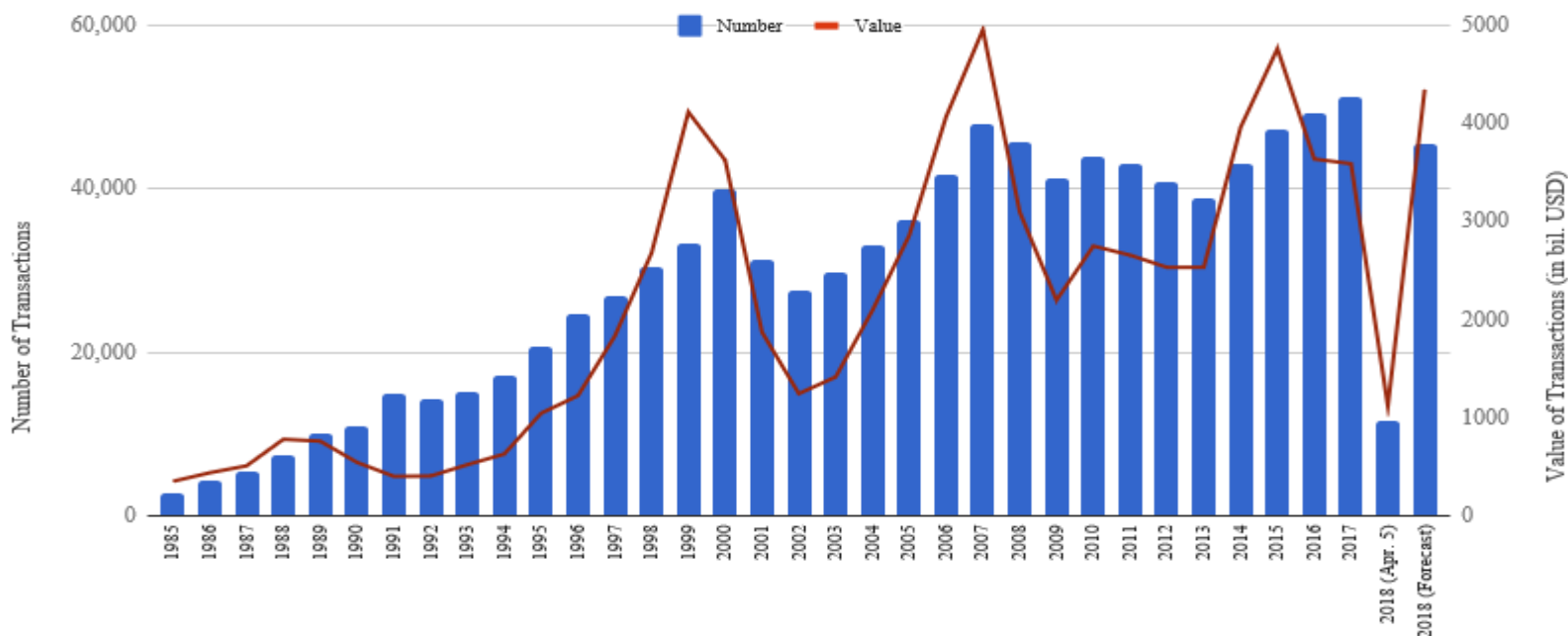


# Continuing Substantial Number and Value of Worldwide Mergers and Acquisitions

## Number & Value of M&A Worldwide

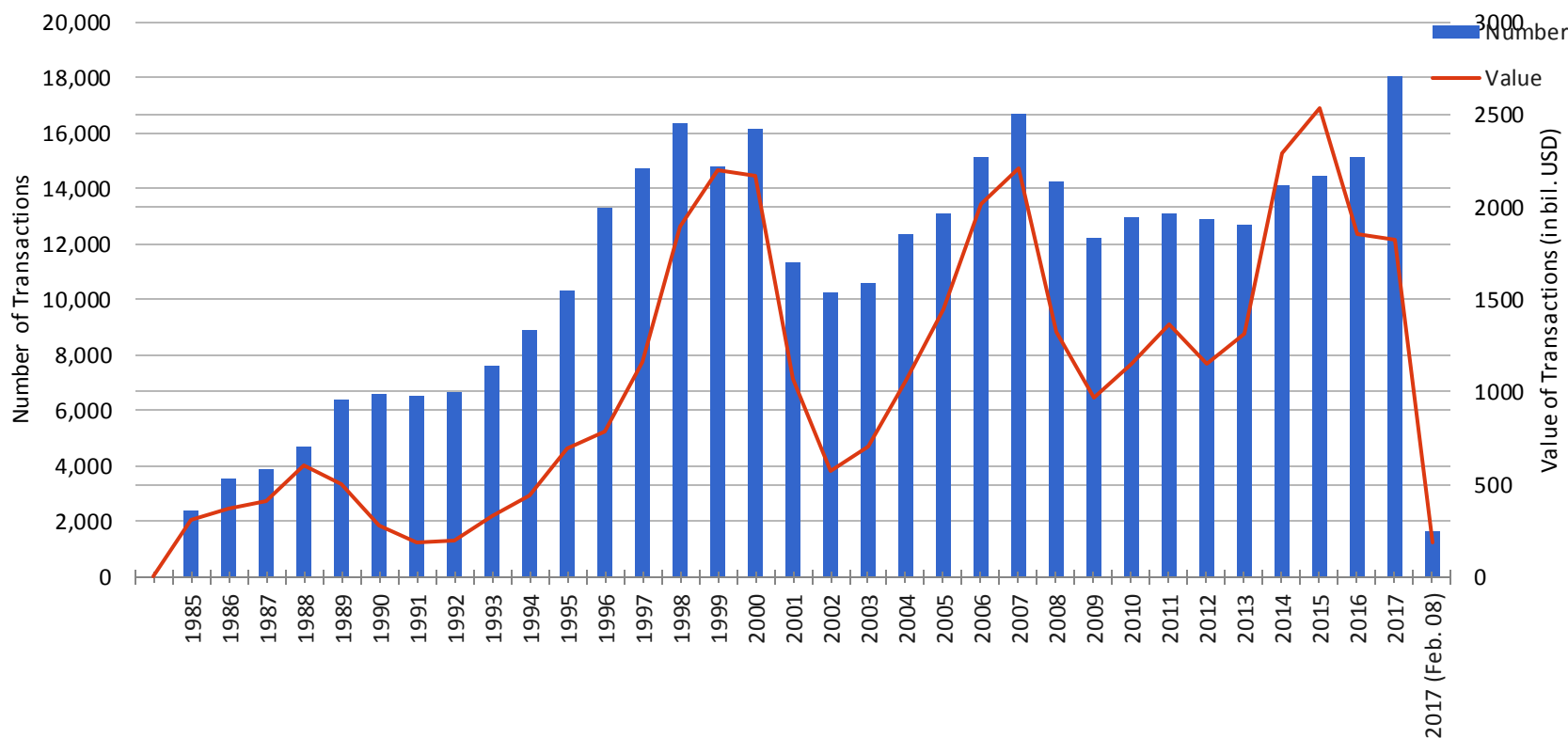
In 2017, companies announced over 50'600 transactions with a total value of more than 3.5 trillion USD (2.9 trillion EUR/ 2.5 trillion GBP). Compared to 2016, the numbers of deals grew only marginally by 2.9% while the value declined by 2.00%.

**Mergers & Acquisitions Worldwide**



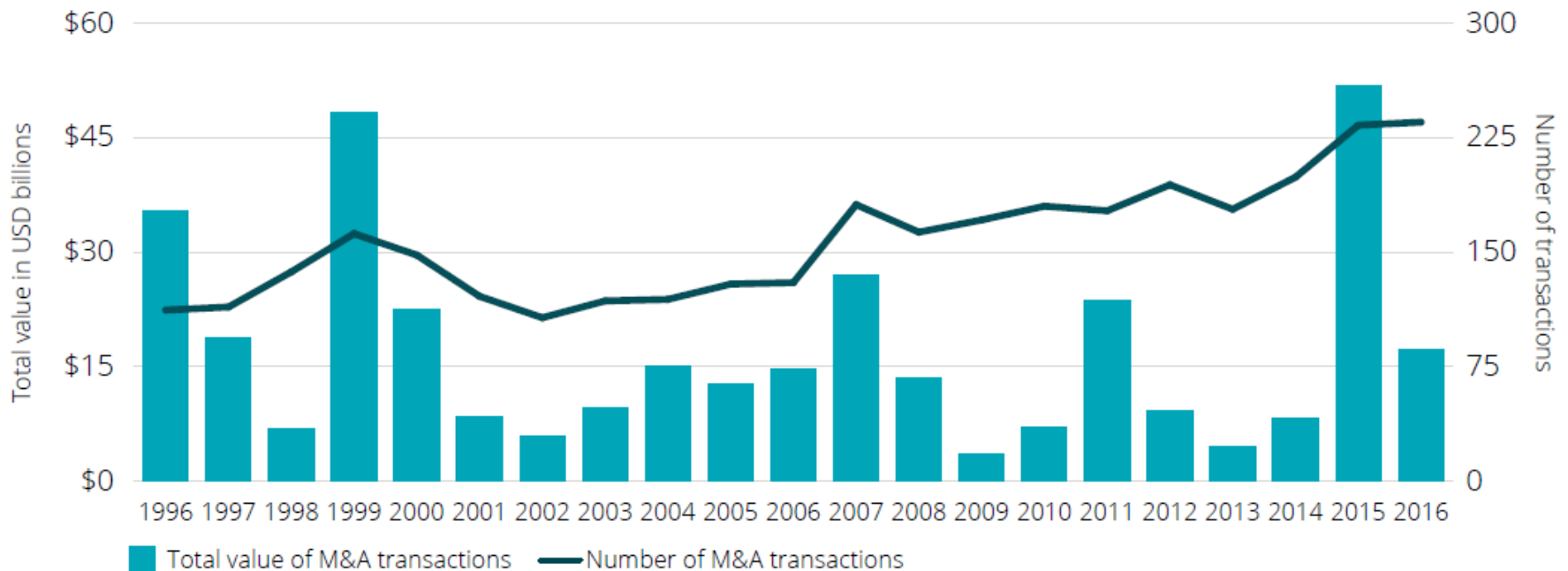
# Continuing Substantial Number and Value of Mergers and Acquisitions in North American

## Mergers & Acquisitions North America



# Aerospace and Defense M&A Activity Is Less Than it Was, But Still Occurring

Figure 1. Annual aerospace and defense transactions and transaction value (1996-2016)



Source: SDC Platinum

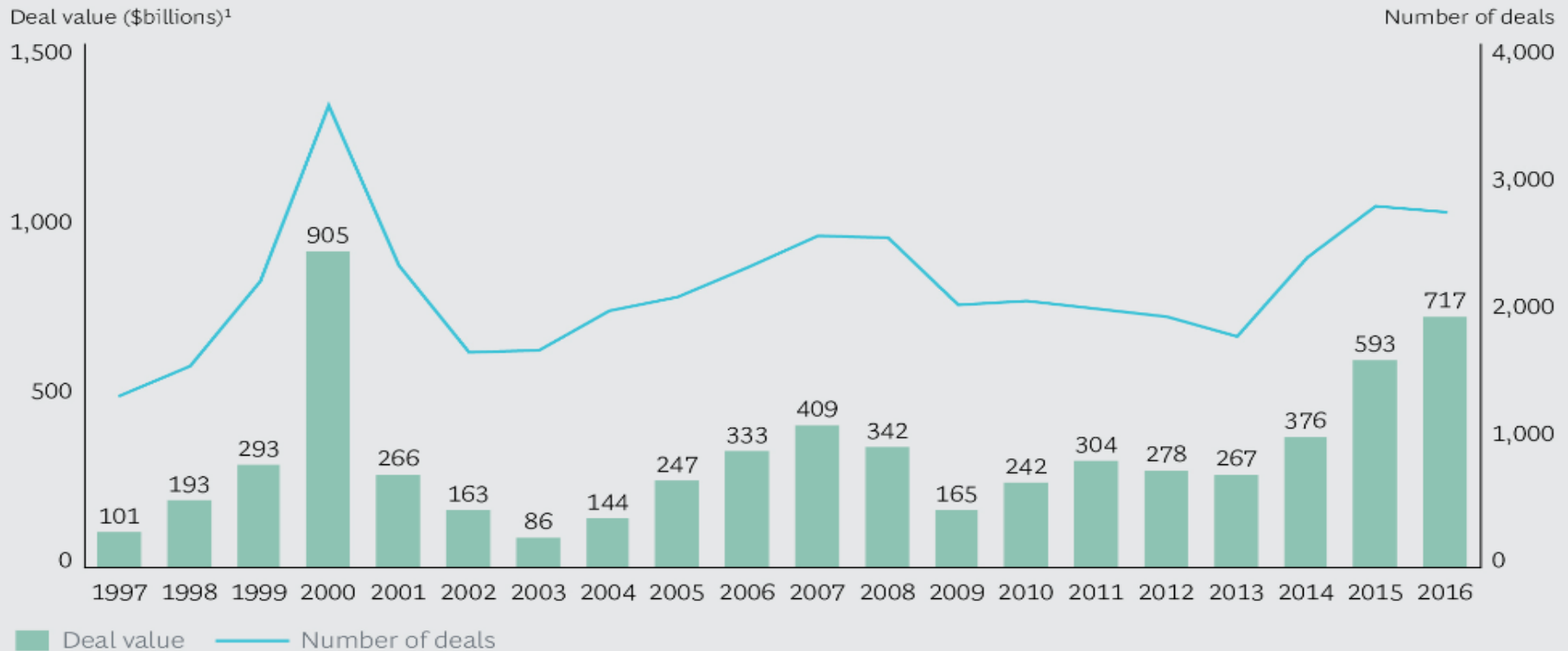
# Aerospace and Defense Enterprises Continue to Acquire Firms

Enterprise	Well known recent examples
Lockheed Martin	Savi, Sirkorsky
General Dynamics	Gulfstream, GM Defense, CSRA?
Textron	Beechcraft, Arctic Circle
Boeing	Aurora Flight Sciences
United Technologies	Rockwell Collins
Raytheon	Websense, Blackbird Technologies
Northrop Grumman	Orbital, ATK

# Technology Industry M&A Is A Factor of Ten or More Greater than Aerospace and Defense

## EXHIBIT 1 | Tech M&A Value and Volume Approach the Heights of 2000

TECH M&A VALUE AND VOLUME SHOW A STRONG TRAJECTORY OVER TIME



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 43,101 tech M&A transactions with a disclosed deal value comprises completed and unconditional deals announced between 1997 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded.

<sup>1</sup>Enterprise values include the net debt of targets.

# Technology Industry Leaders Have Been Making a LOT of Acquisitions

Enterprise	Estimate of Number acquisitions	Well known examples
Alphabet (Google)	215	YouTube, Waze, Nest
Amazon	85	Ring, Whole Foods
Facebook	67	WhatsApp, Oculus, Instagram
Microsoft	208	Hotmail, LinkedIn
Apple	94	Siri
Cisco	190	Linksys, Jasper, Jabber
Twitter	54	

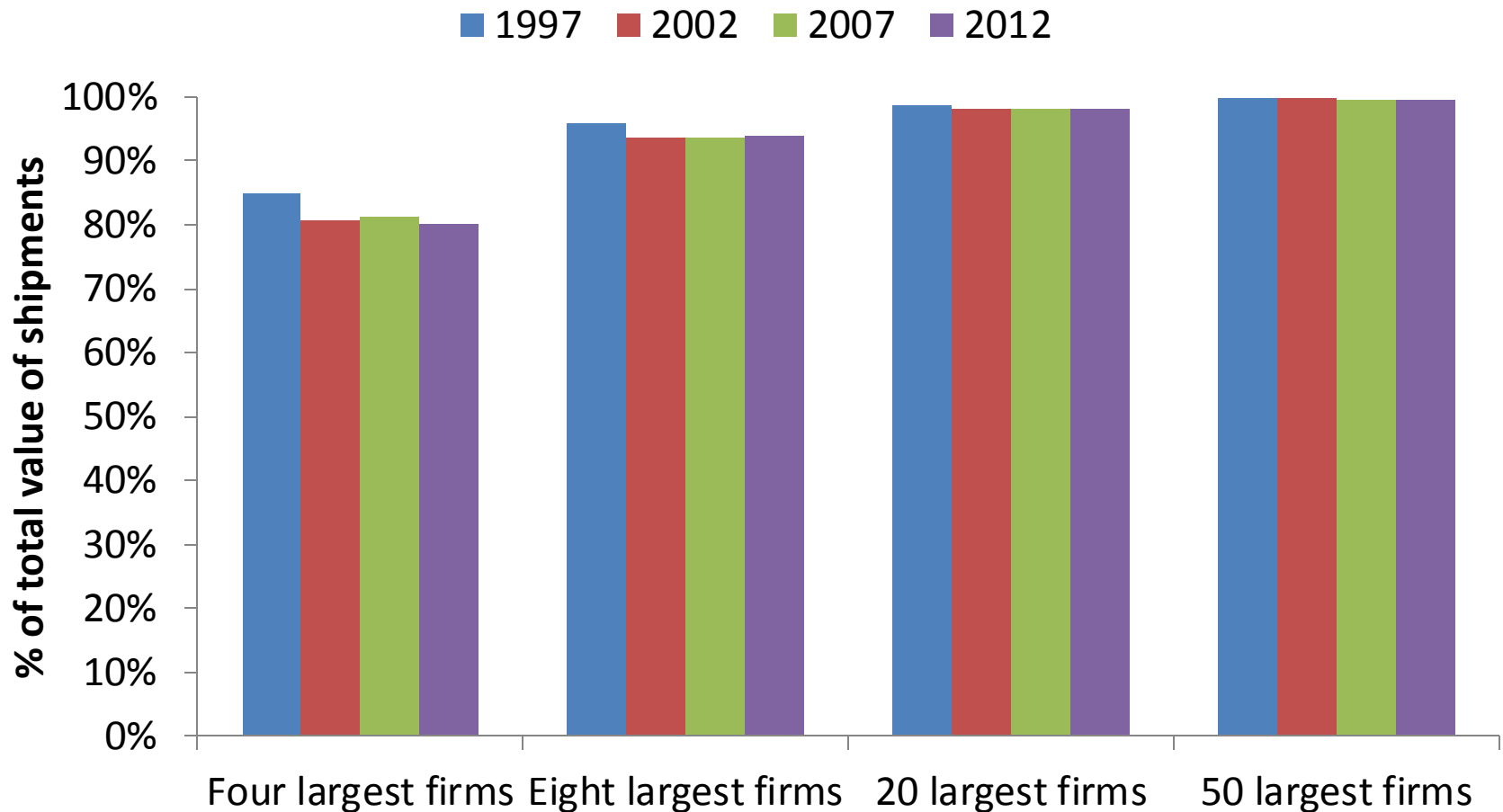
They also have stakes in other companies

# NAICS Codes Are Often Very Broad — Aircraft Manufacturing Example

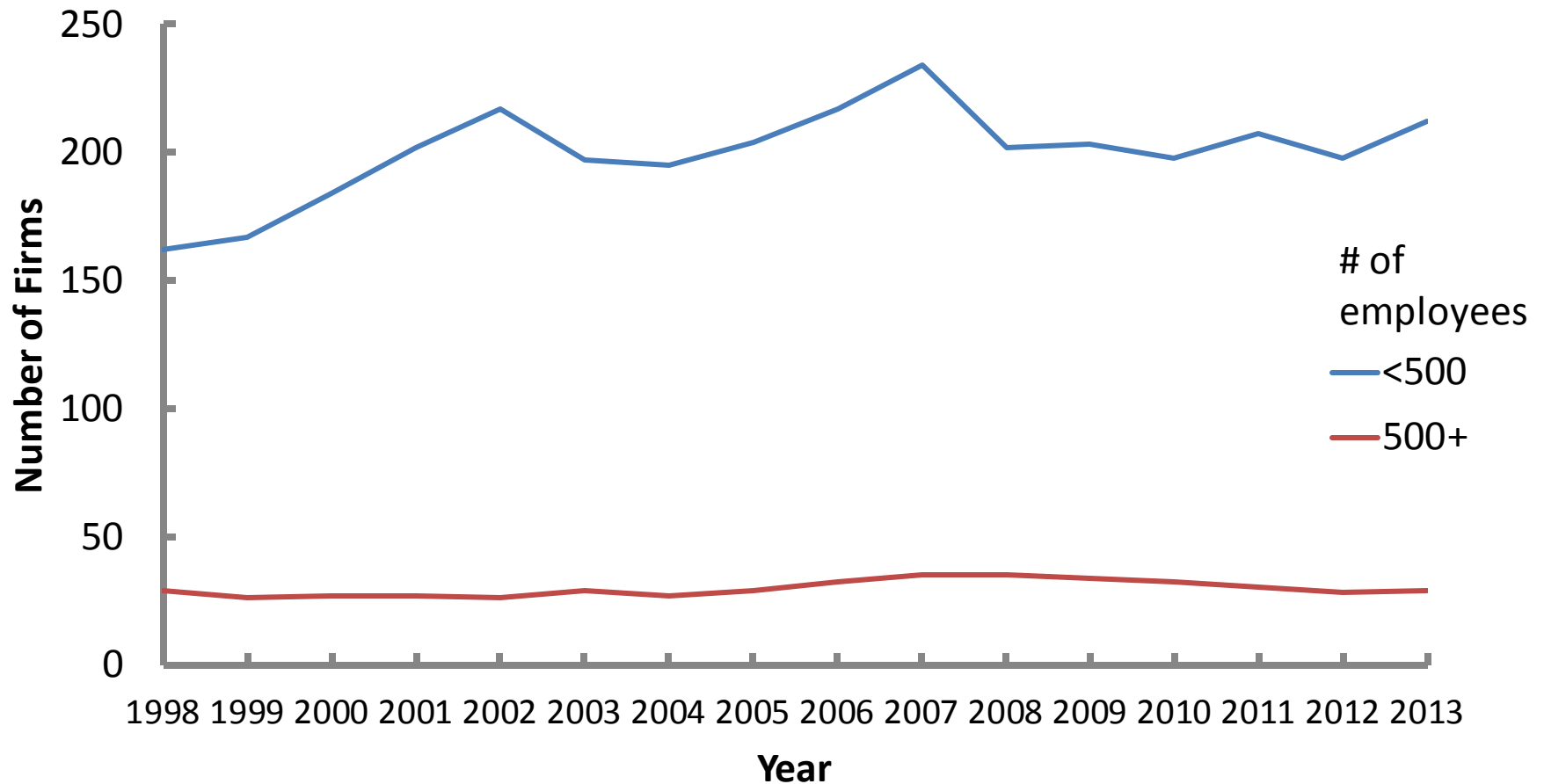
- Airplane(military, civilian, general aviation)
  - Manufacturing
  - Conversions
  - Overhauling
  - Rebuilding
  - Prototype development
- Other aircraft mfg.
  - Autogiro
  - Blimp
  - Drone
  - Glider
  - Helicopter
  - Ultralight



# Concentration Indexes for Aircraft Manufacturing (NAICS Code 336411)

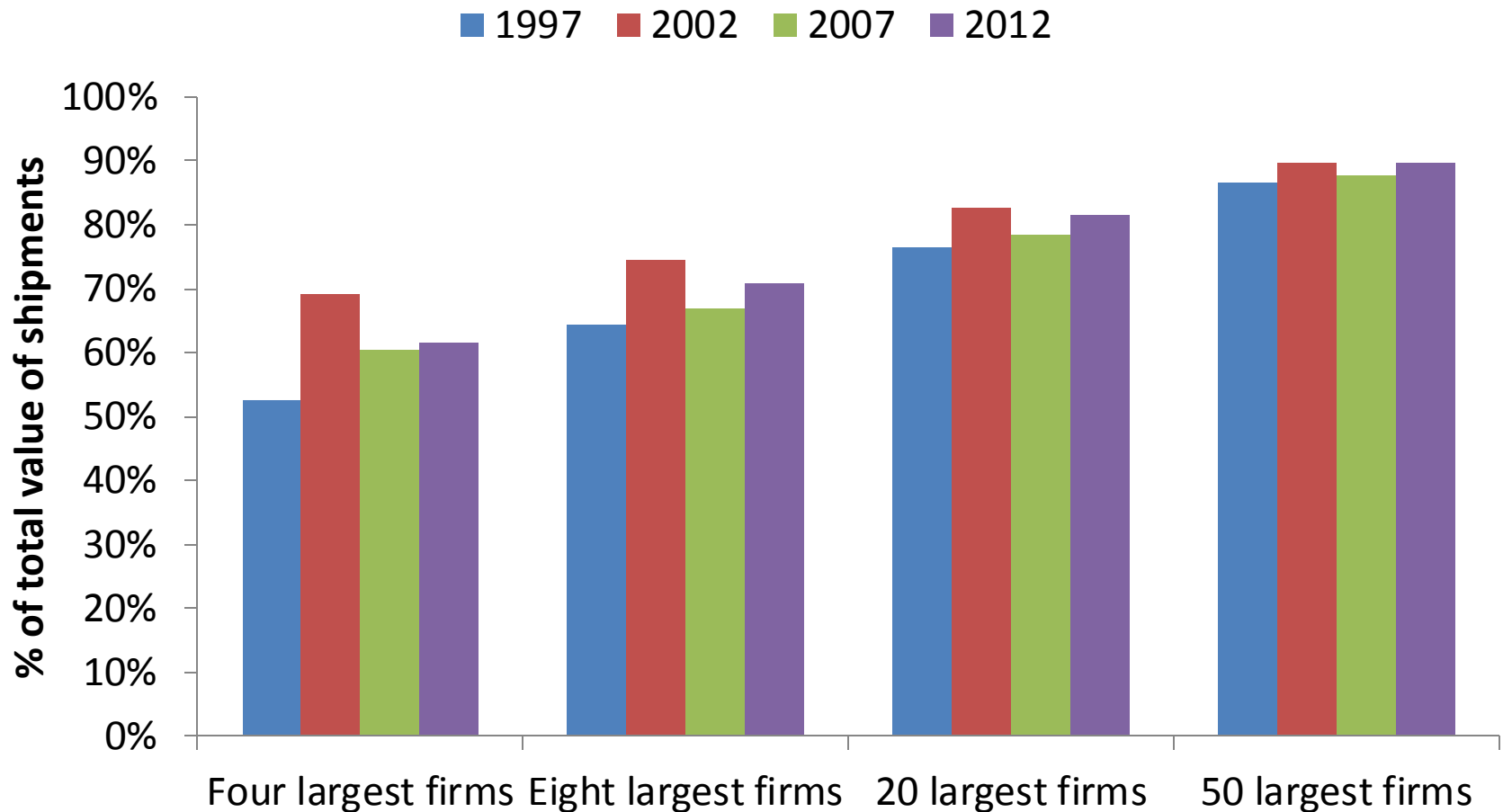


# Aircraft Manufacturing (NAICS Code 336411) Firms by Number of Employees

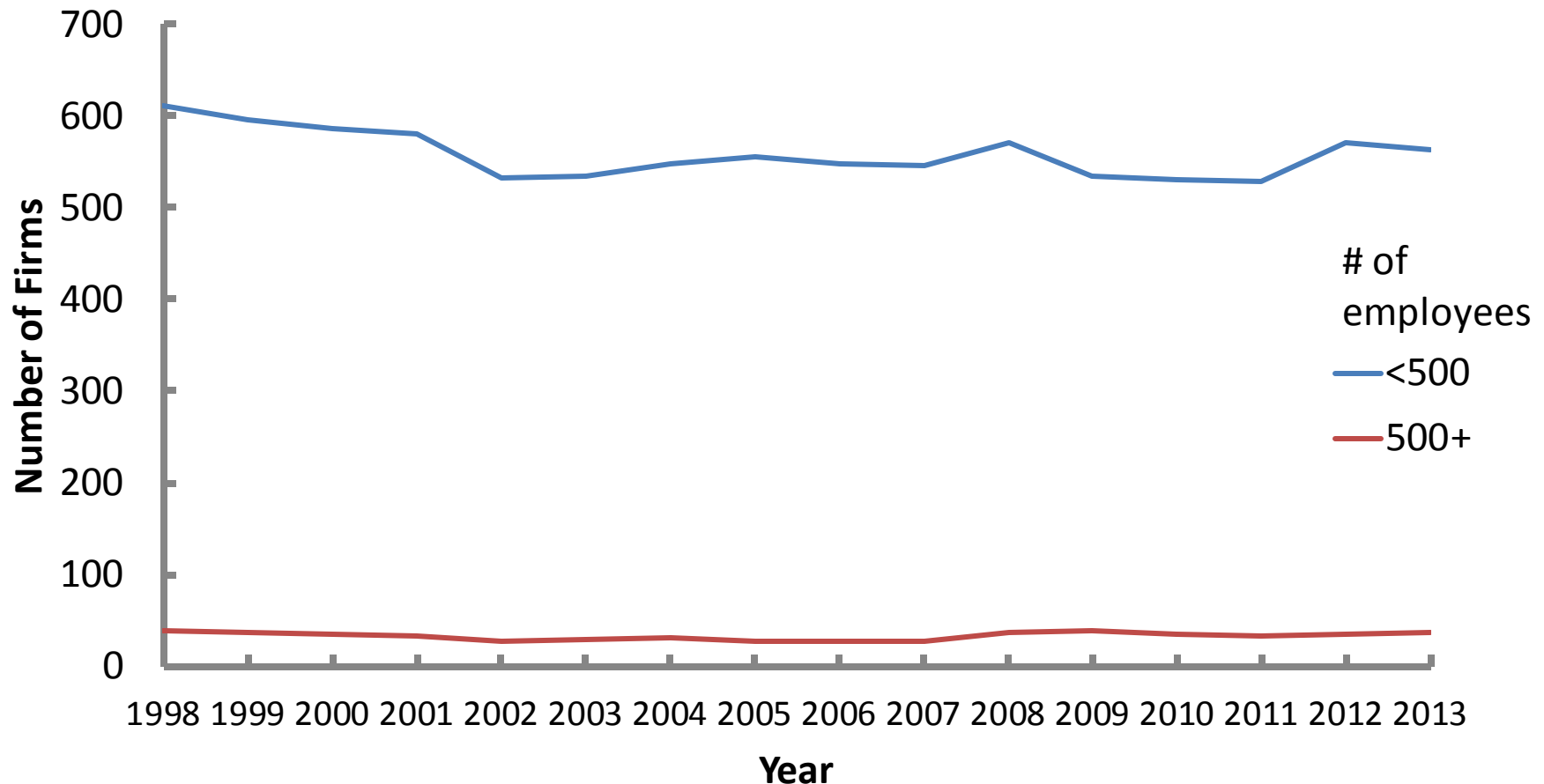


SBA size standard = 1,500 employees

# Concentration Indexes for Ship Building and Repairing (NAICS Code 336611)

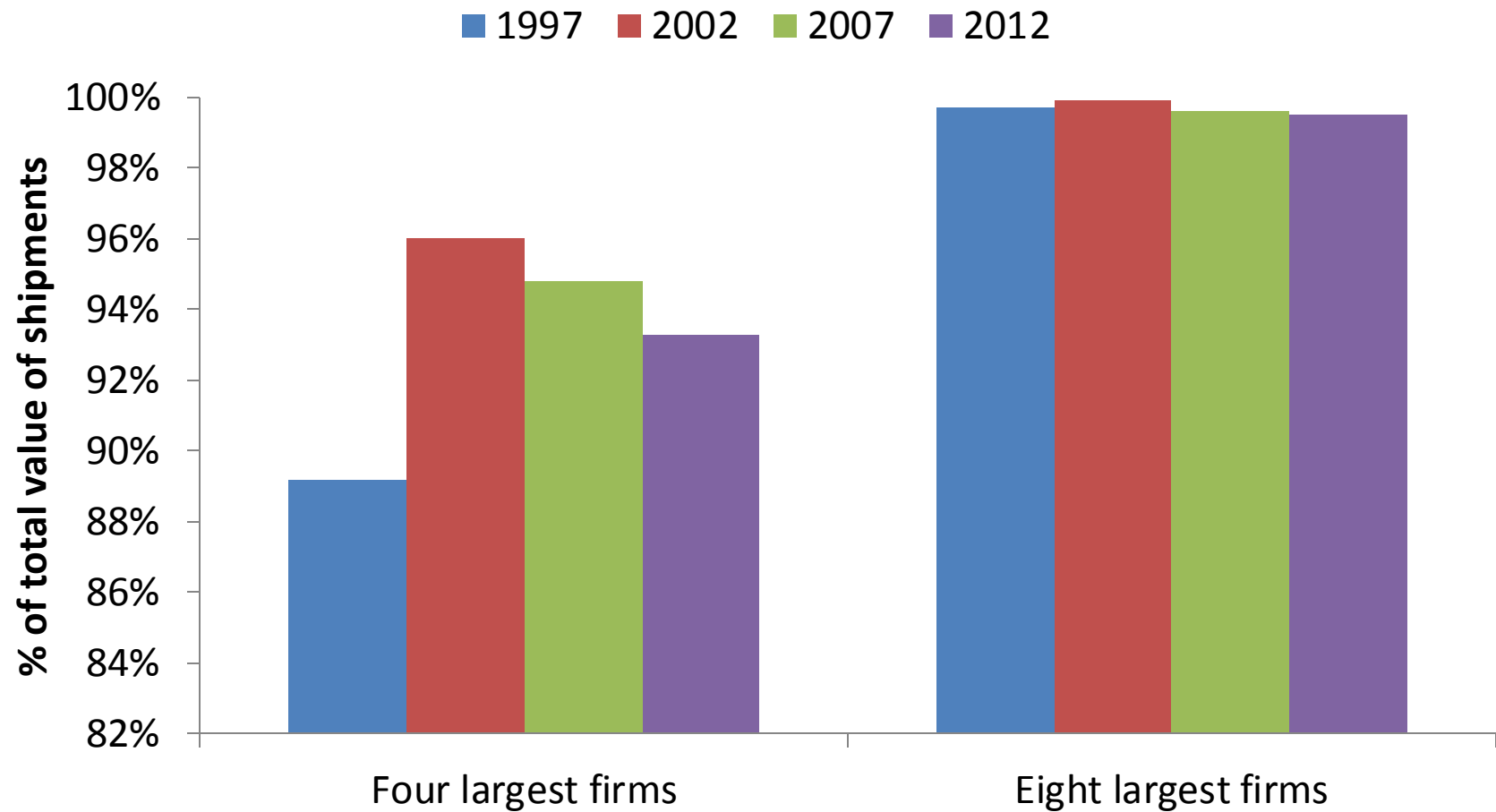


# Ship Building and Repairing (NAICS Code 336611) Firms by Number of Employees

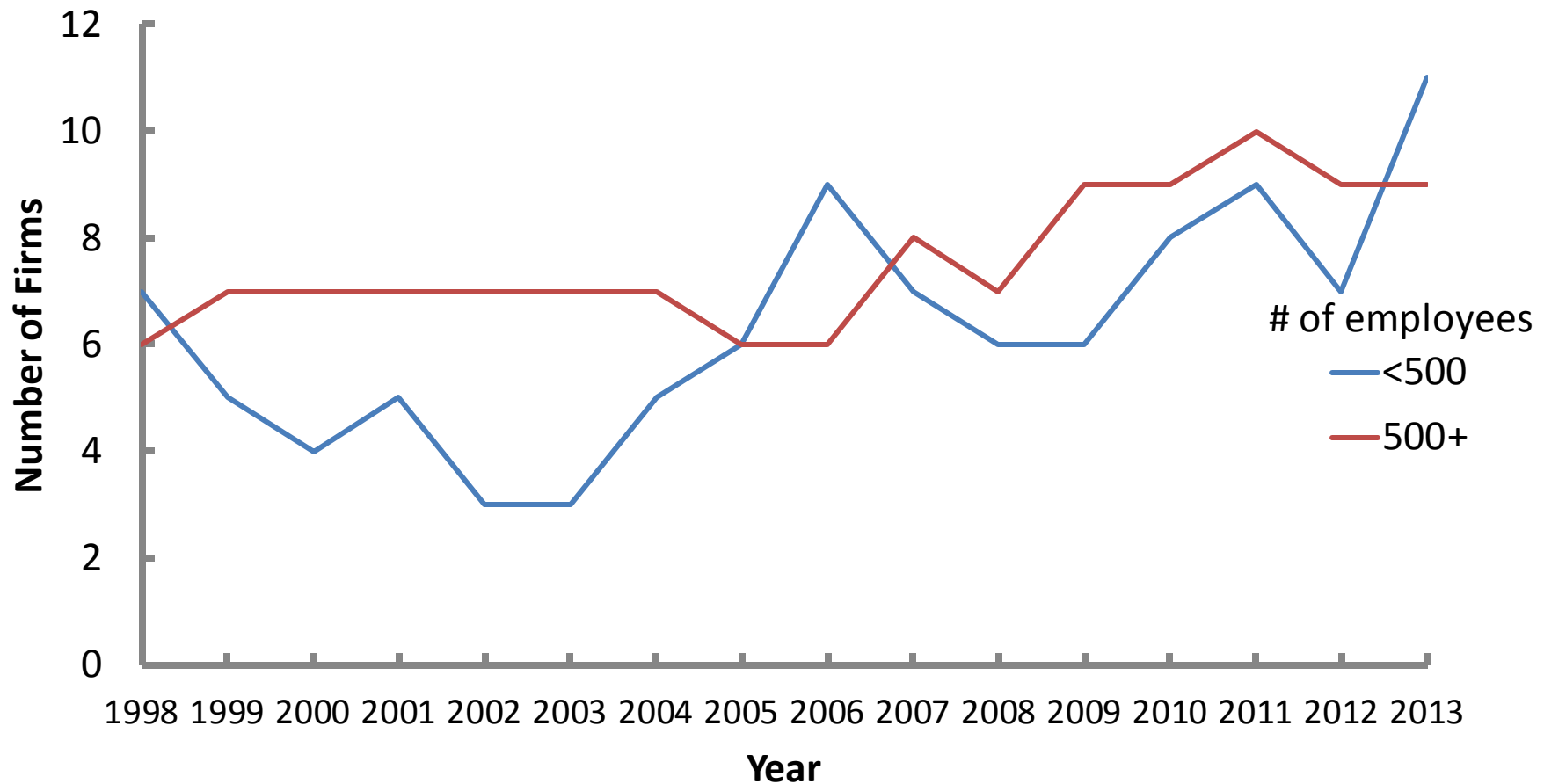


SBA size standard = 1,250 employees

# Concentration Indexes for Guided Missile and Space Vehicle Manufacturing (NAICS Code 336414)

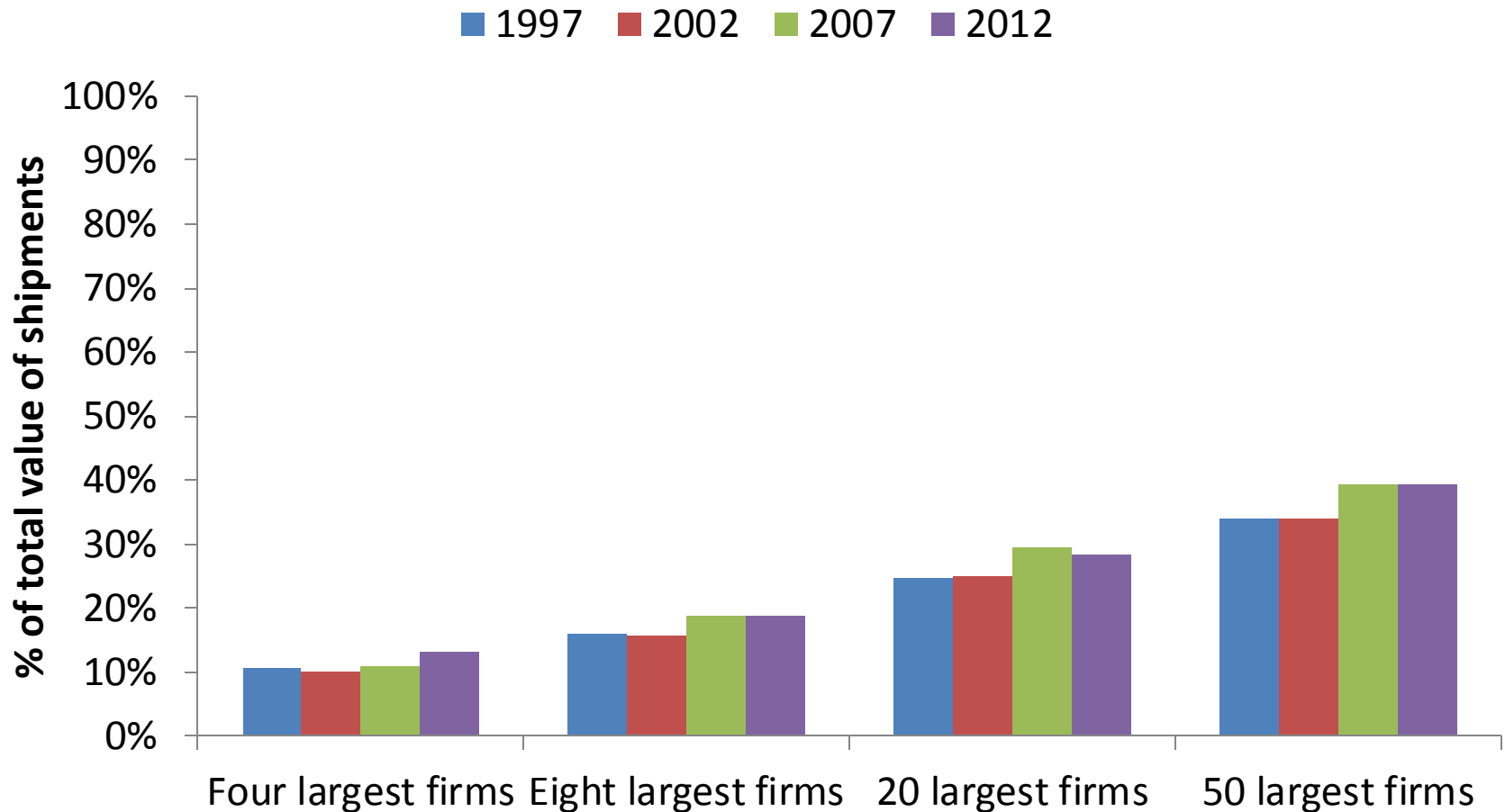


# Guided Missile and Space Vehicle Manufacturing (NAICS Code 336414) Firms by Number of Employees



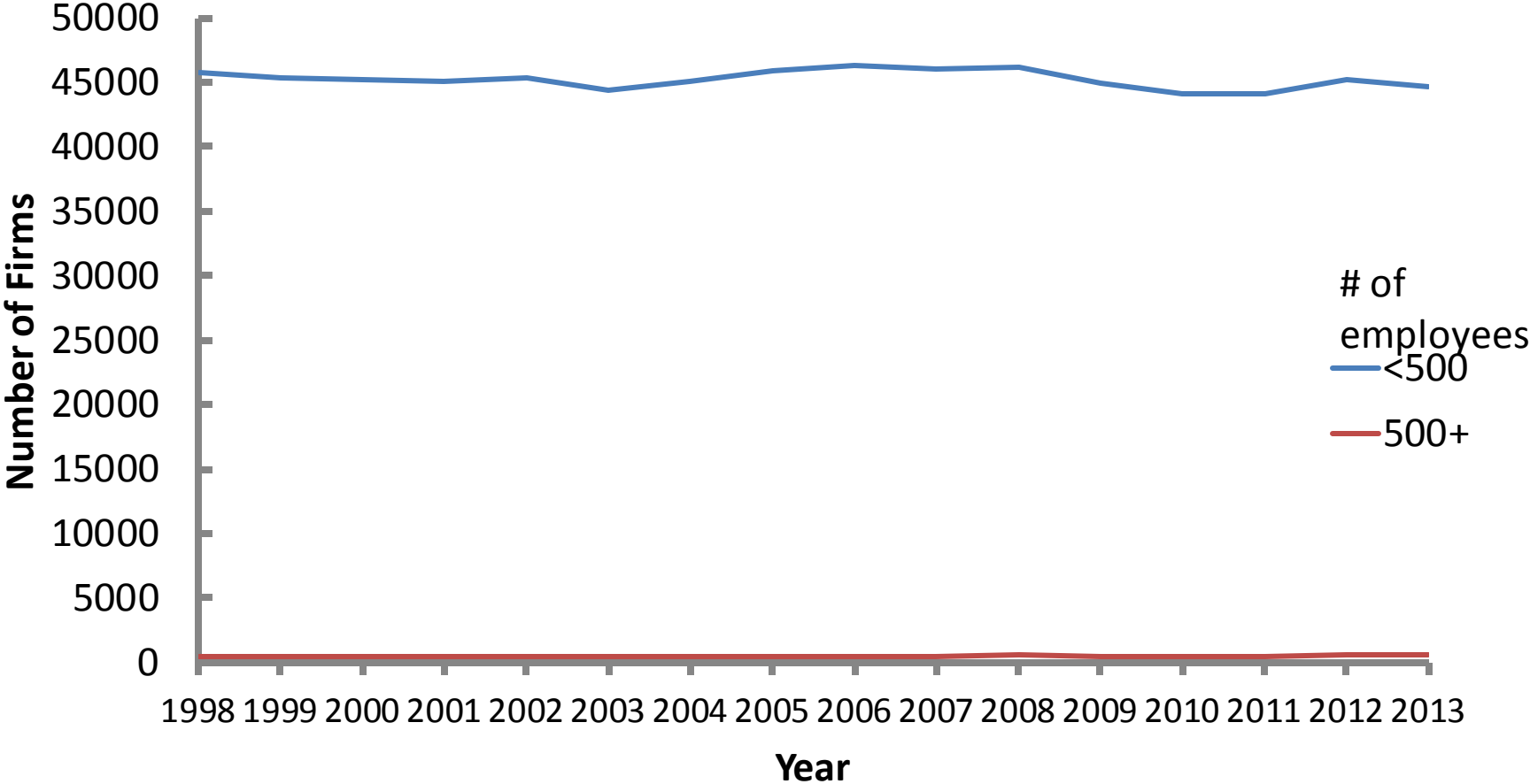
SBA size standard = 1,250 employees

# Concentration Indexes for Engineering Services (NAICS Code 541330)



# Engineering Services (NAICS Code 541330)

## Firms by Number of Employees



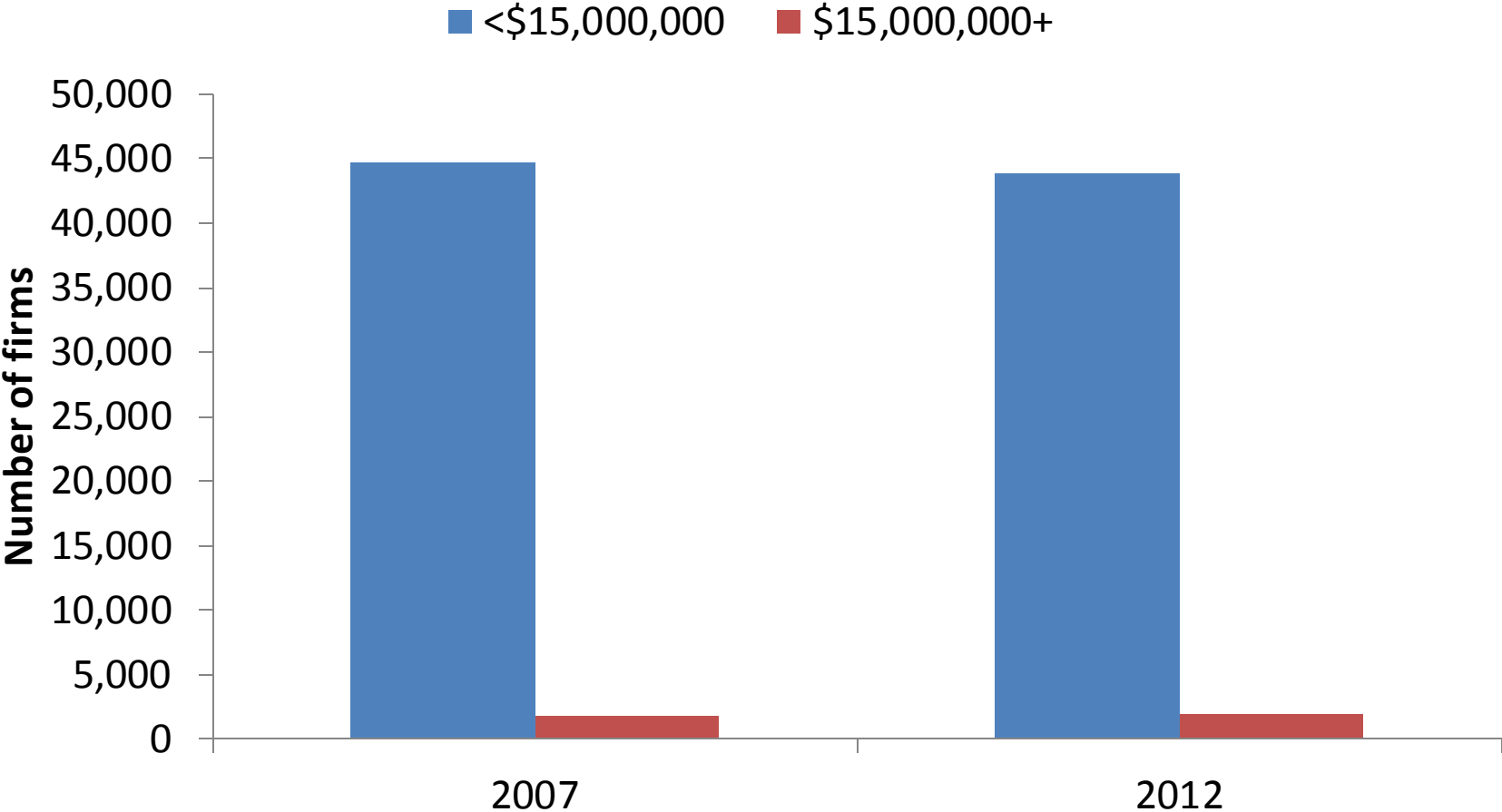
SBA size standard = \$15 million in revenue except Military and Aerospace Equipment and Military Weapons, Contracts and Subcontracts for Engineering Services Awarded Under the National Energy Policy Act of 1992, and Marine Engineering and Naval Architecture = \$38.5 million in revenue

Source: Statistics of U.S. Businesses

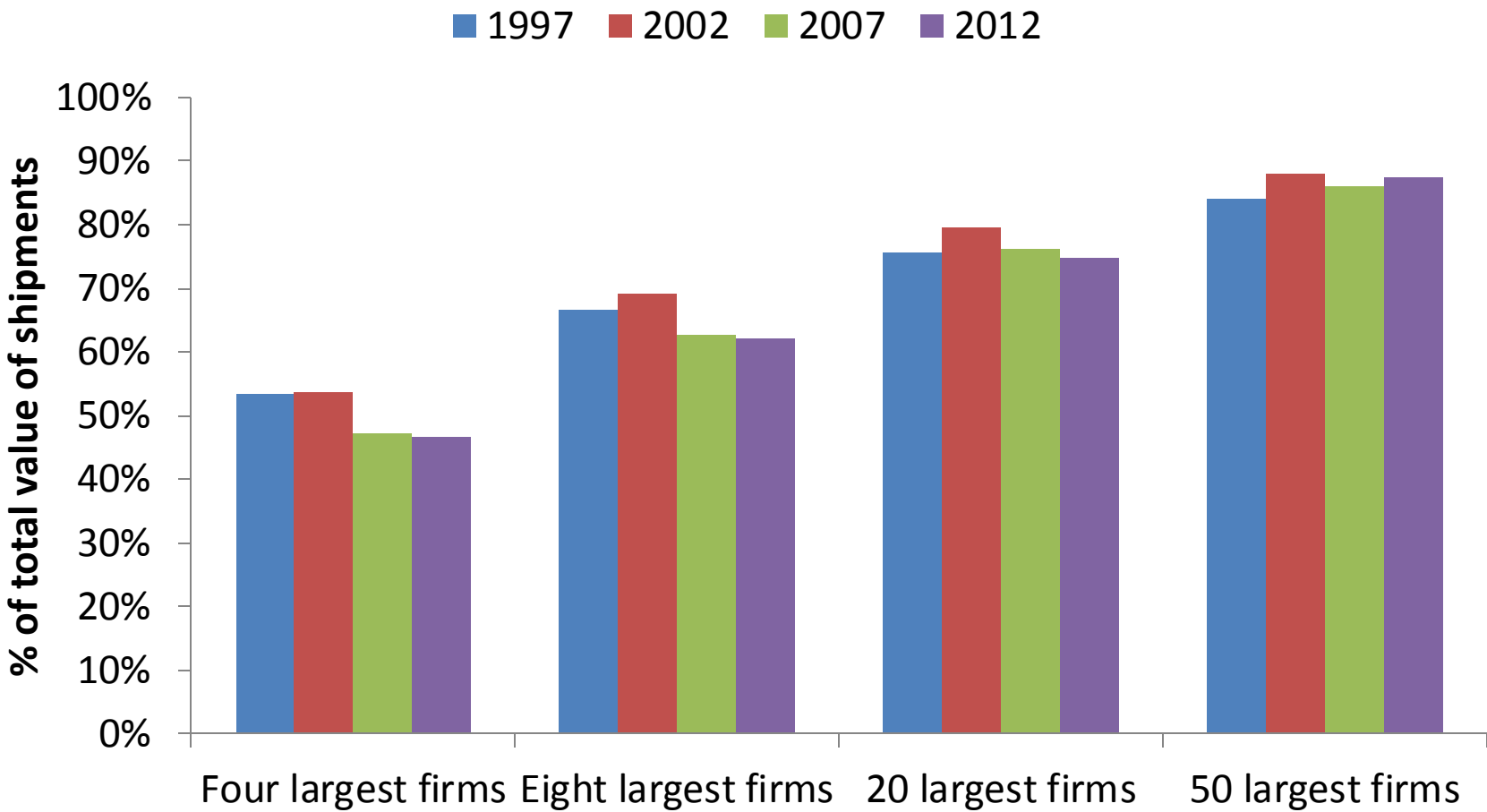
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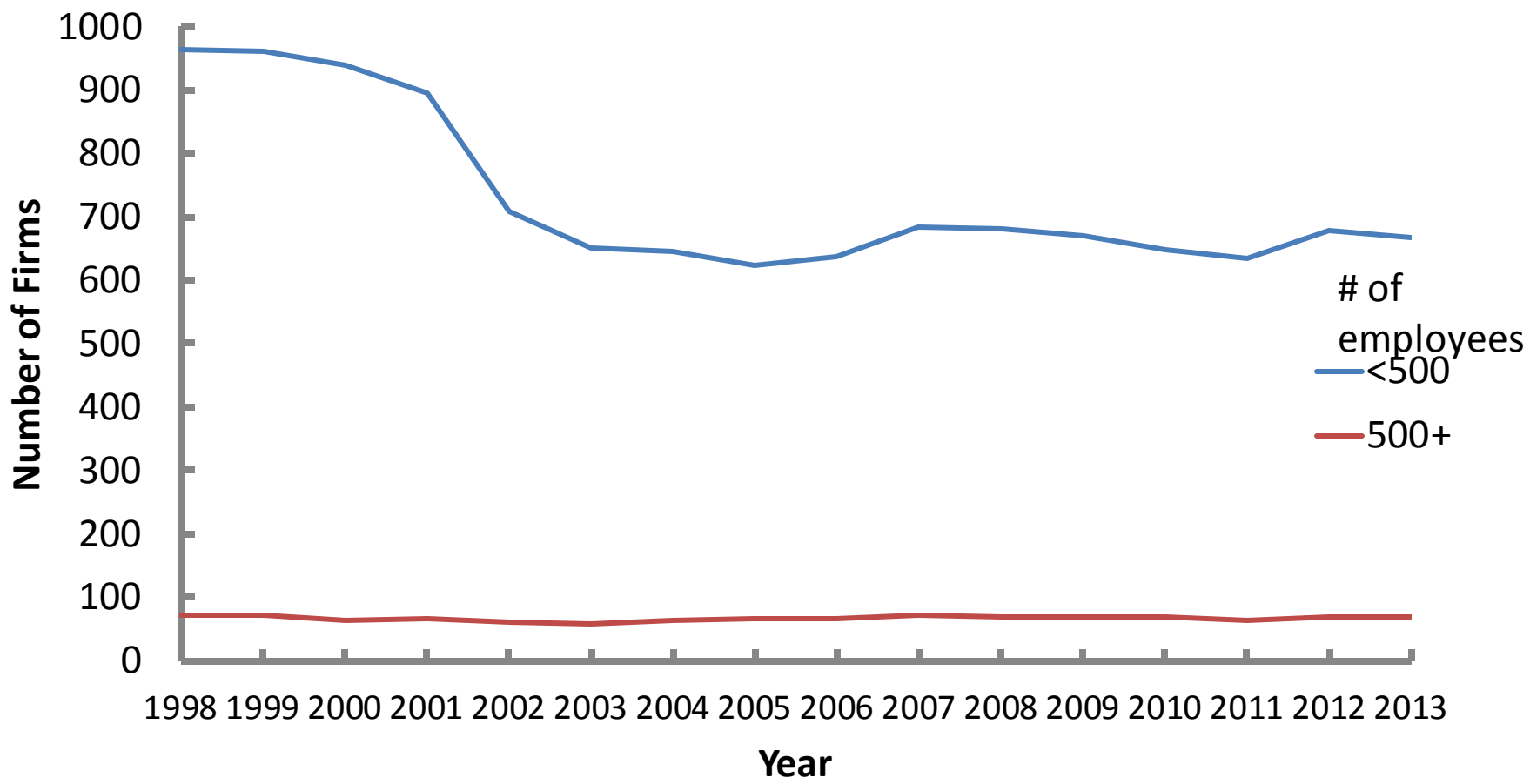
# Engineering Services (NAICS Code 541330) Firms by Annual Receipts



# Concentration Indexes for Other Aircraft Parts and Auxiliary Equipment Manufacturing (NAICS Code 336413)

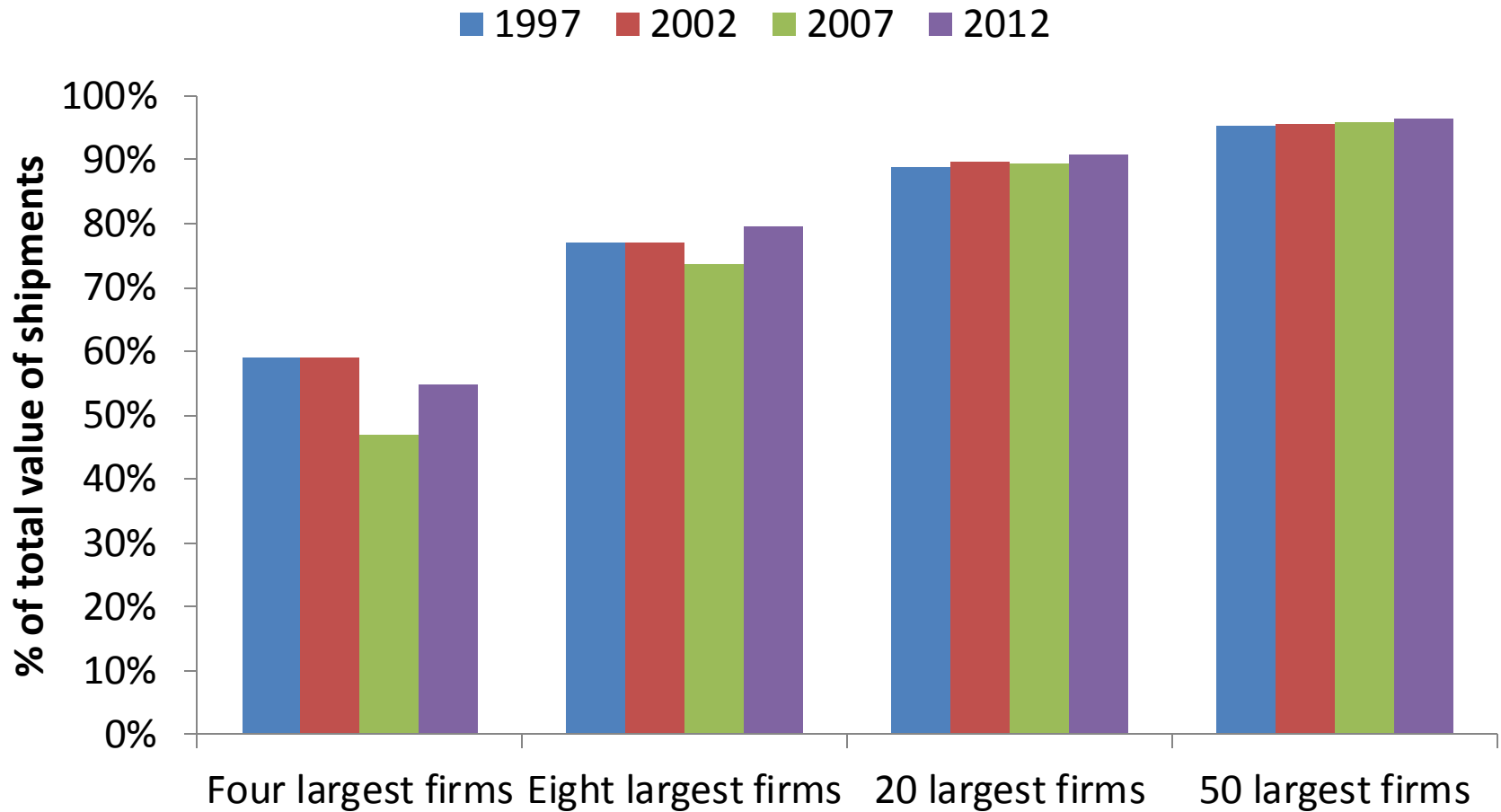


# Other Aircraft Parts and Auxiliary Equipment Manufacturing (NAICS Code 336413) Firms by Number of Employees

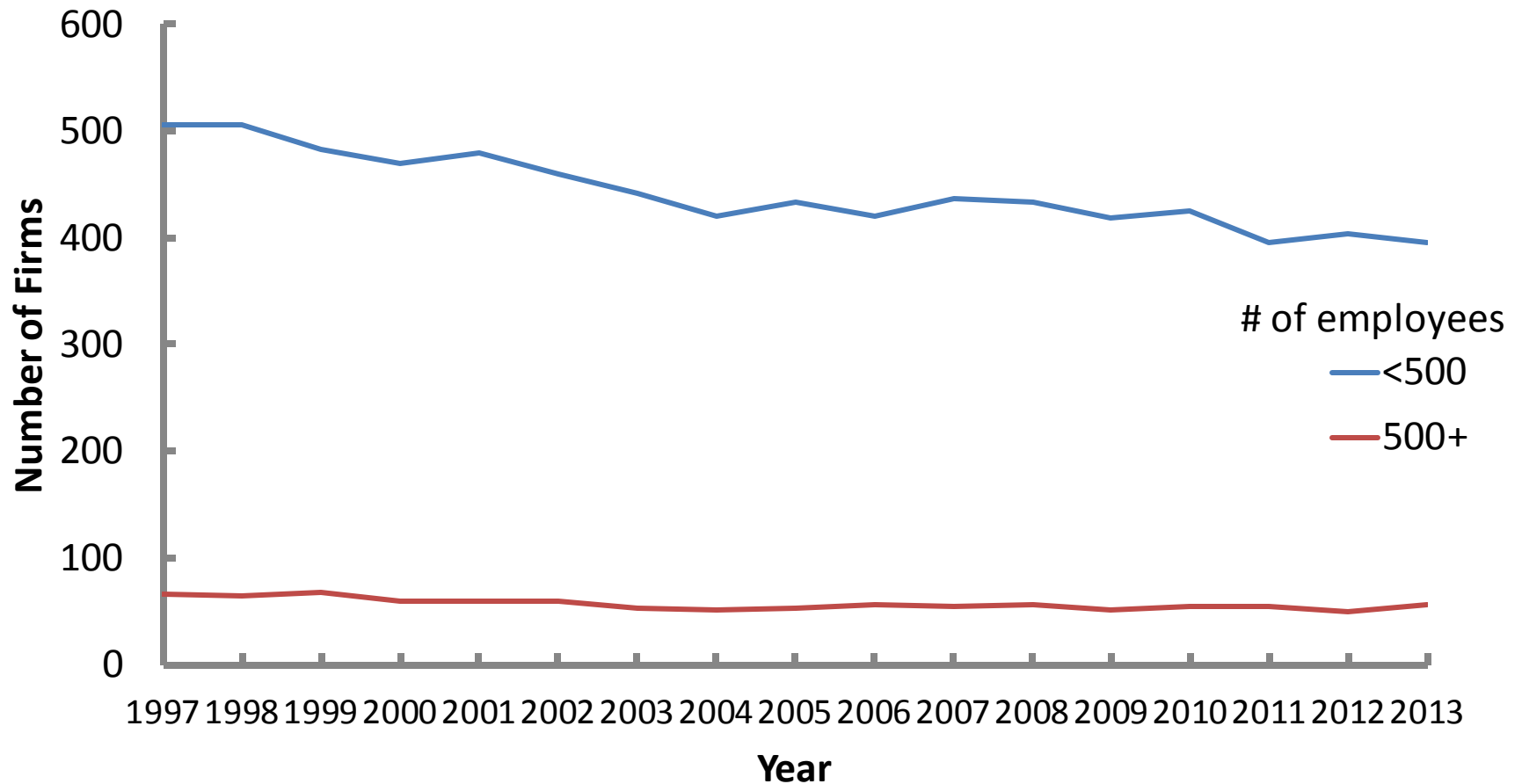


SBA size standard = 1,250 employees

# Concentration Indexes for Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing (NAICS Code 334511)

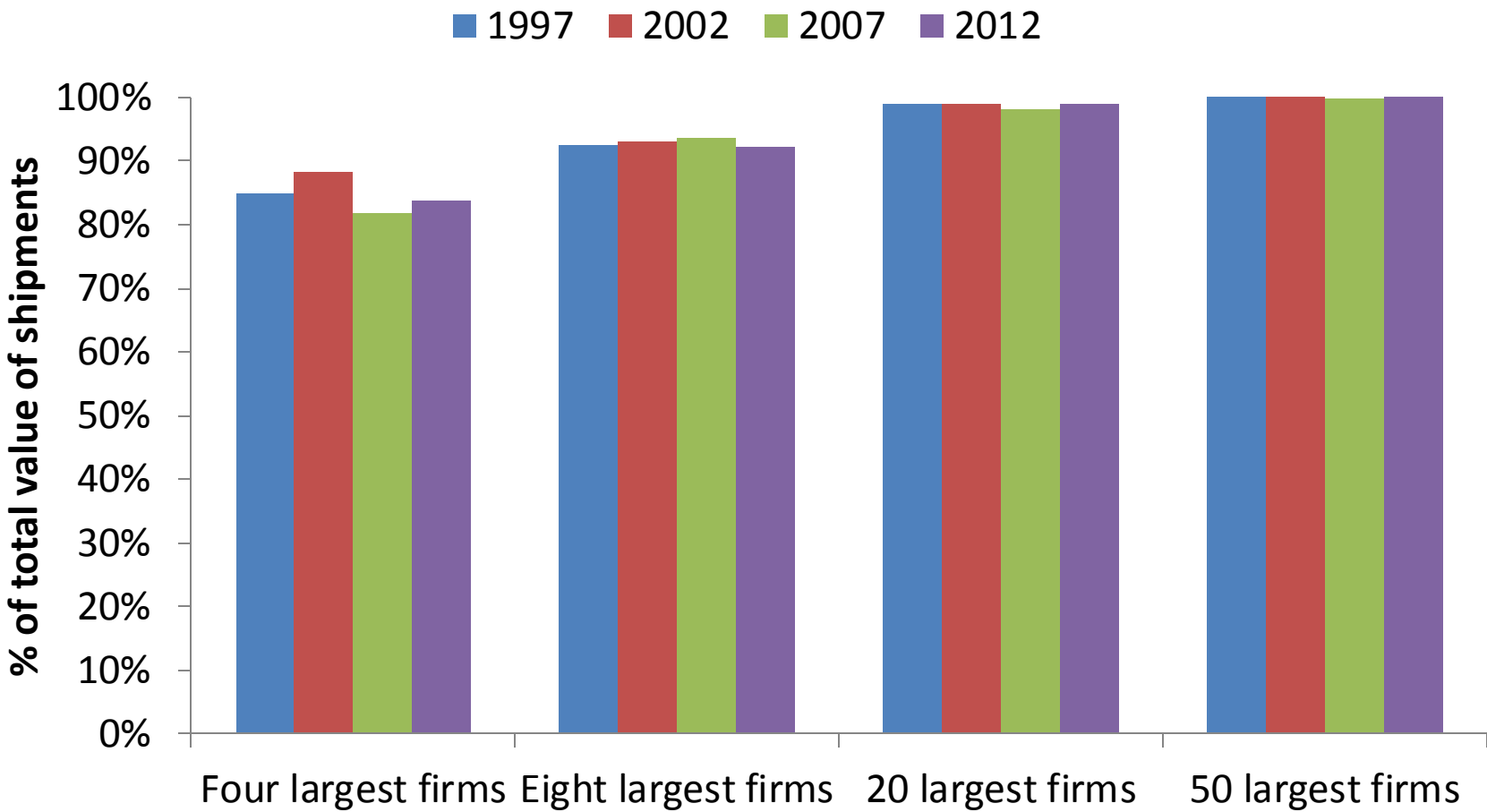


# Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing (NAICS Code 334511) Firms by Number of Employees

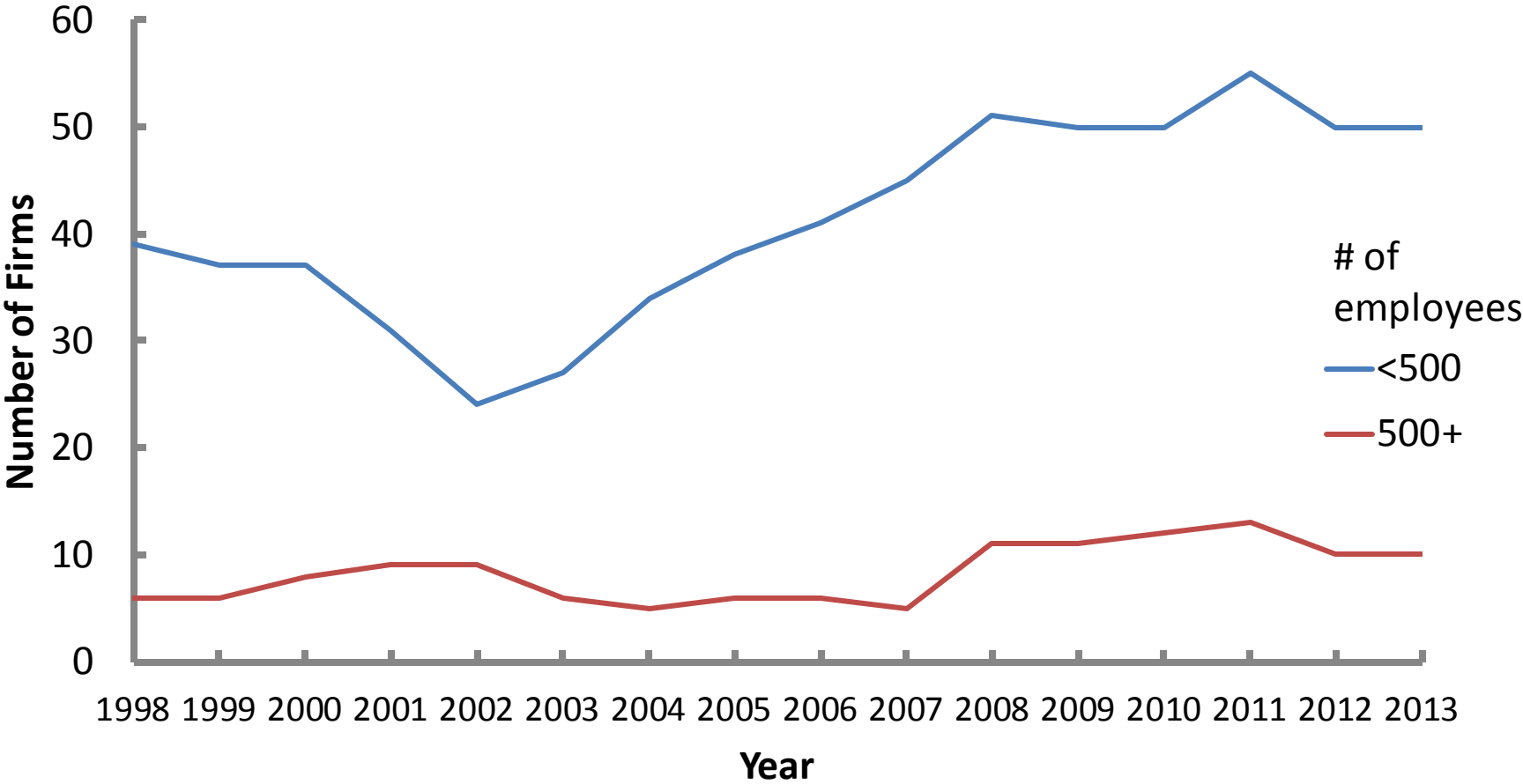


SBA size standard = 1,250 employees

# Concentration Indexes for Military Armored Vehicle, Tank, and Tank Component Manufacturing (NAICS Code 336992)



# Military Armored Vehicle, Tank, and Tank Component Manufacturing (NAICS Code 336992) Firms by Number of Employees



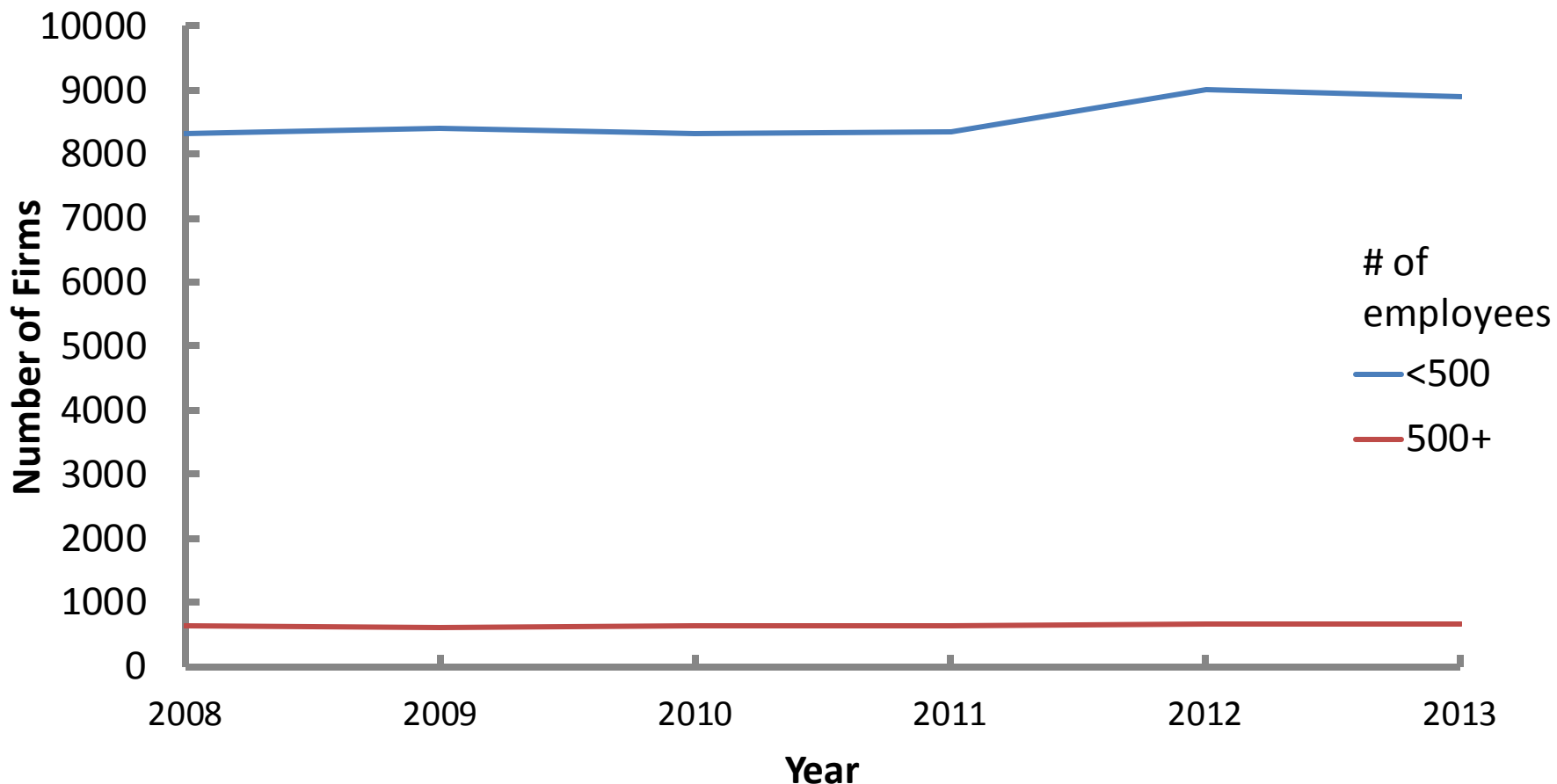
SBA size standard = 1,500 employees

# Concentration Indexes for Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) (NAICS Code 541712)





# Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) (NAICS Code 541712) Firms by Number of Employees

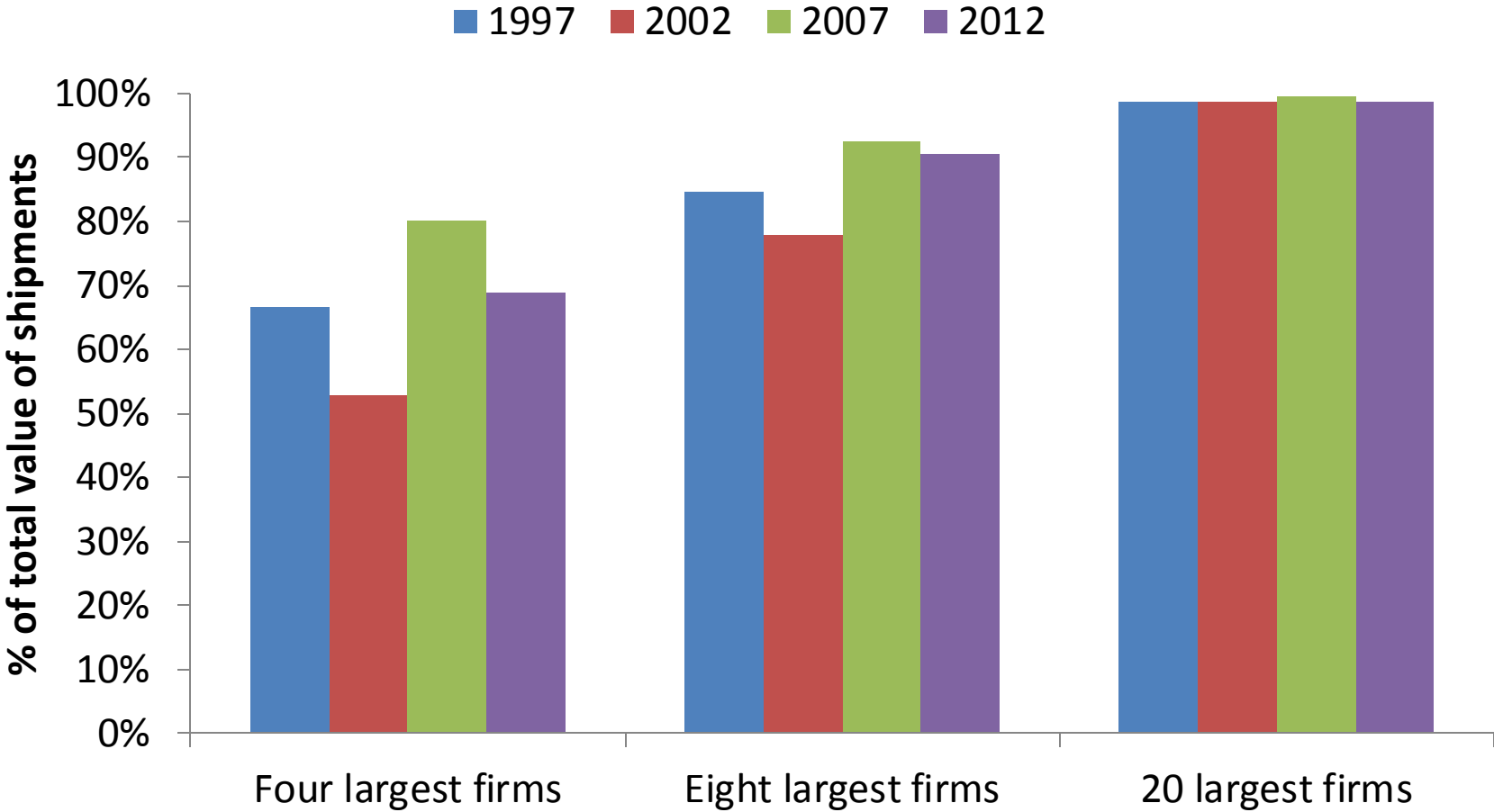


SBA size standard = 1,000 employees except Aircraft Engine and Engine Parts = 1,500 employees and Other Aircraft Parts and Auxiliary Equipment and Guided Missiles and Space Vehicles, Their Propulsion Units and Propulsion Parts = 1,250 employees

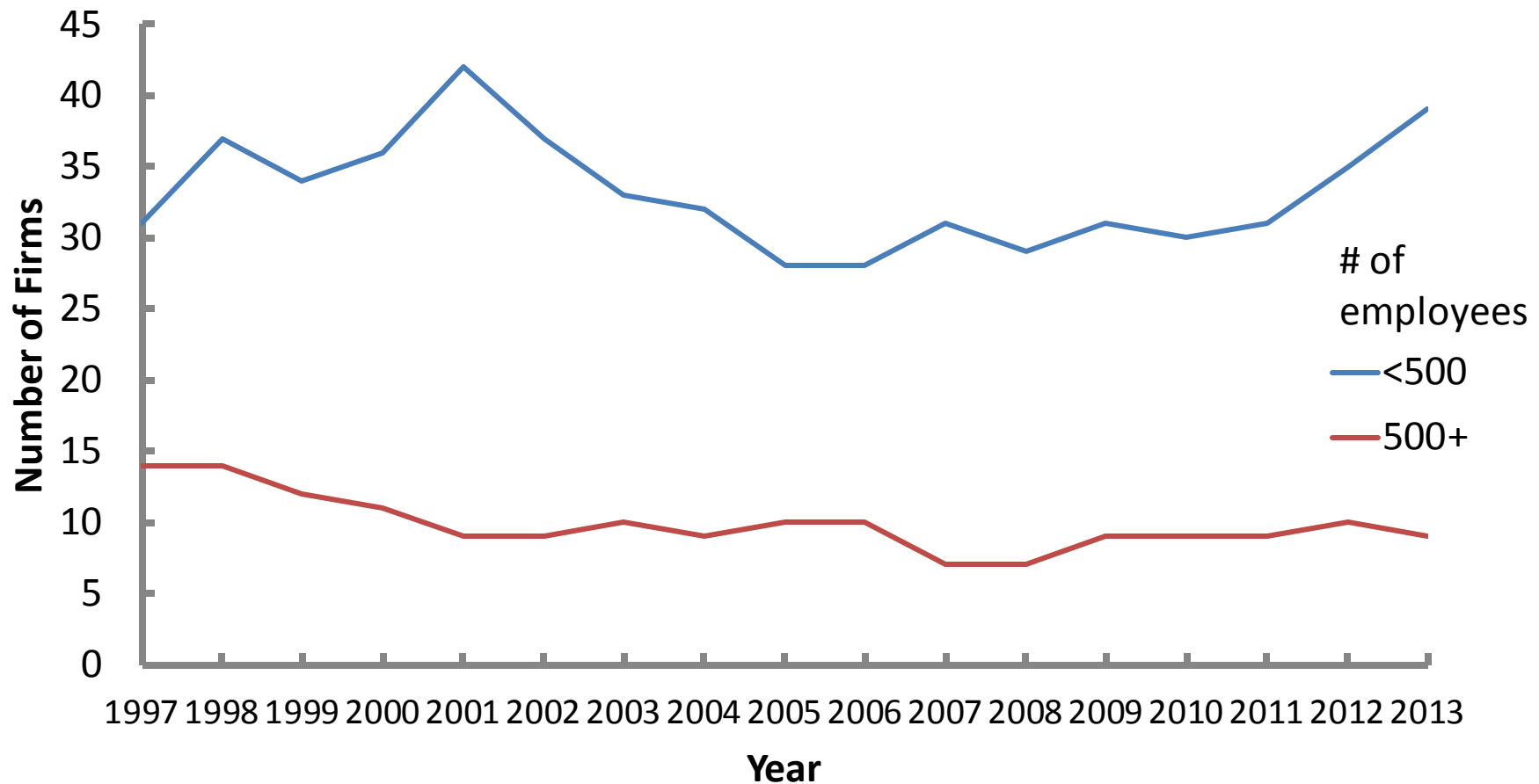
Source: Statistics of U.S. Businesses. Current definition of industry implemented in 2007.

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# Concentration Indexes for Ammunition (except Small Arms) Manufacturing (NAICS Code 332993)

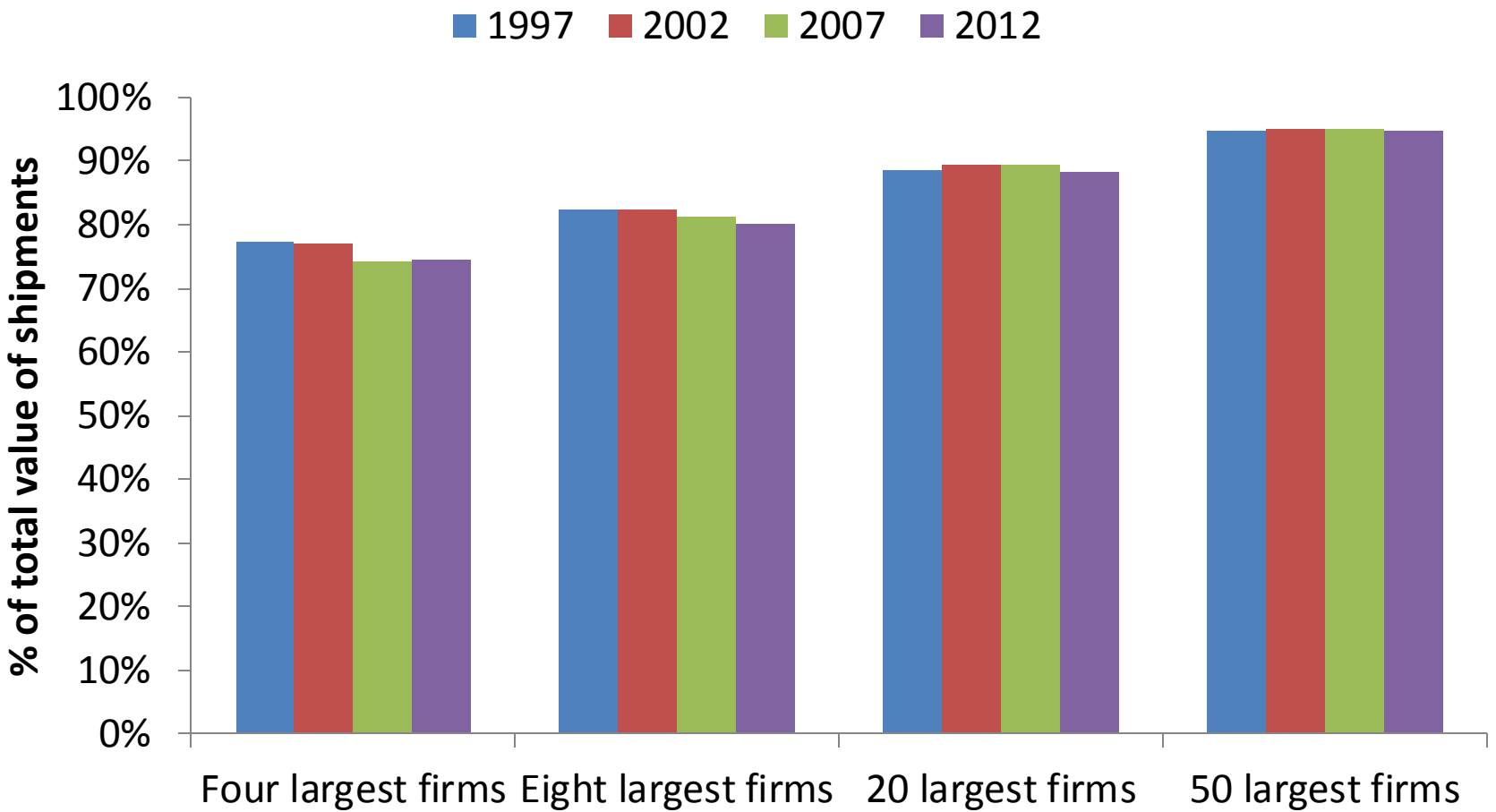


# Ammunition (except Small Arms) Manufacturing (NAICS Code 332993) Firms by Number of Employees

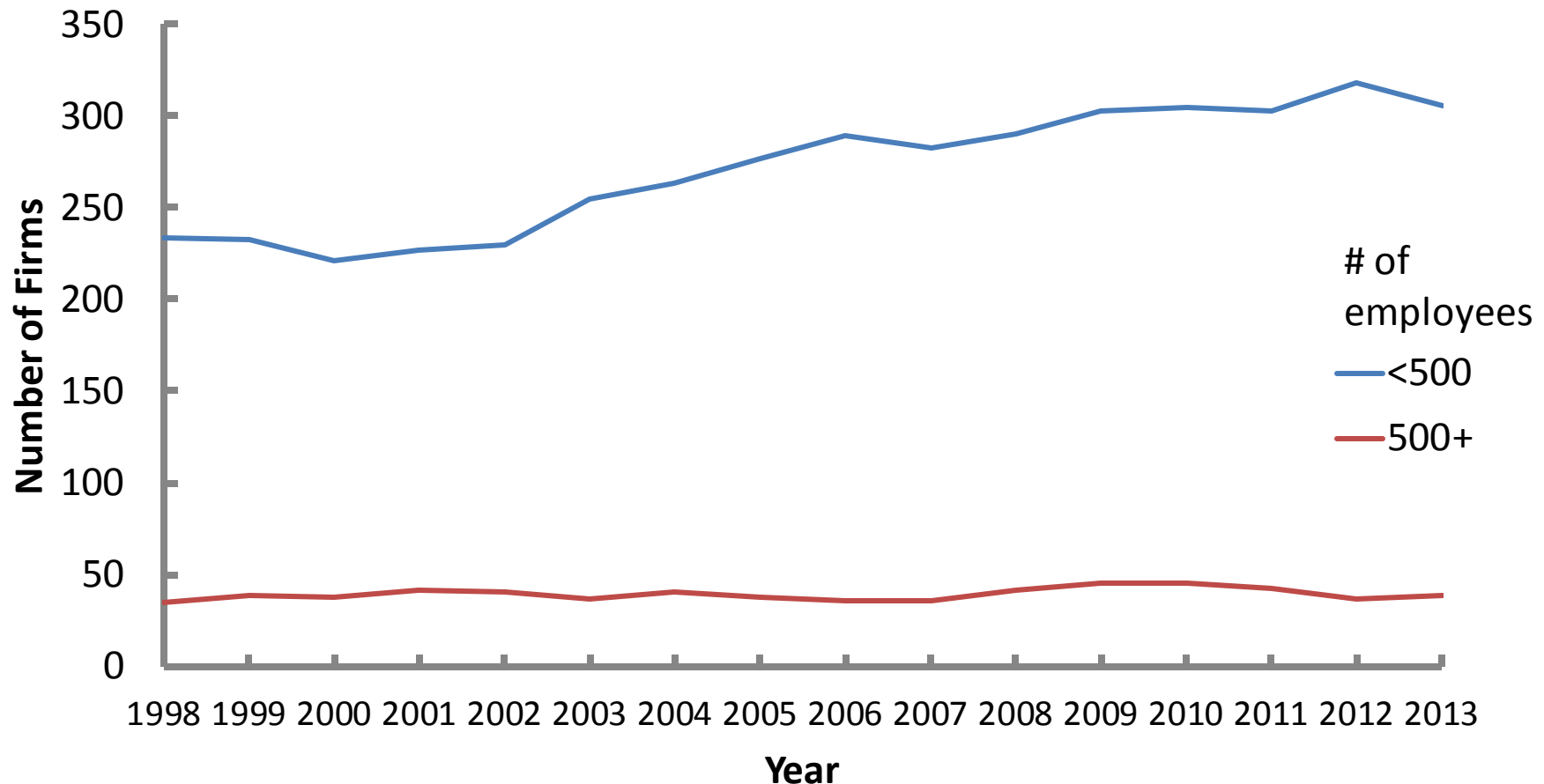


SBA size standard = 1,500 employees

# Concentration Indexes for Aircraft Engine and Engine Parts Manufacturing (NAICS Code 336412)



# Aircraft Engine and Engine Parts Manufacturing (NAICS Code 336412) Firms by Number of Employees

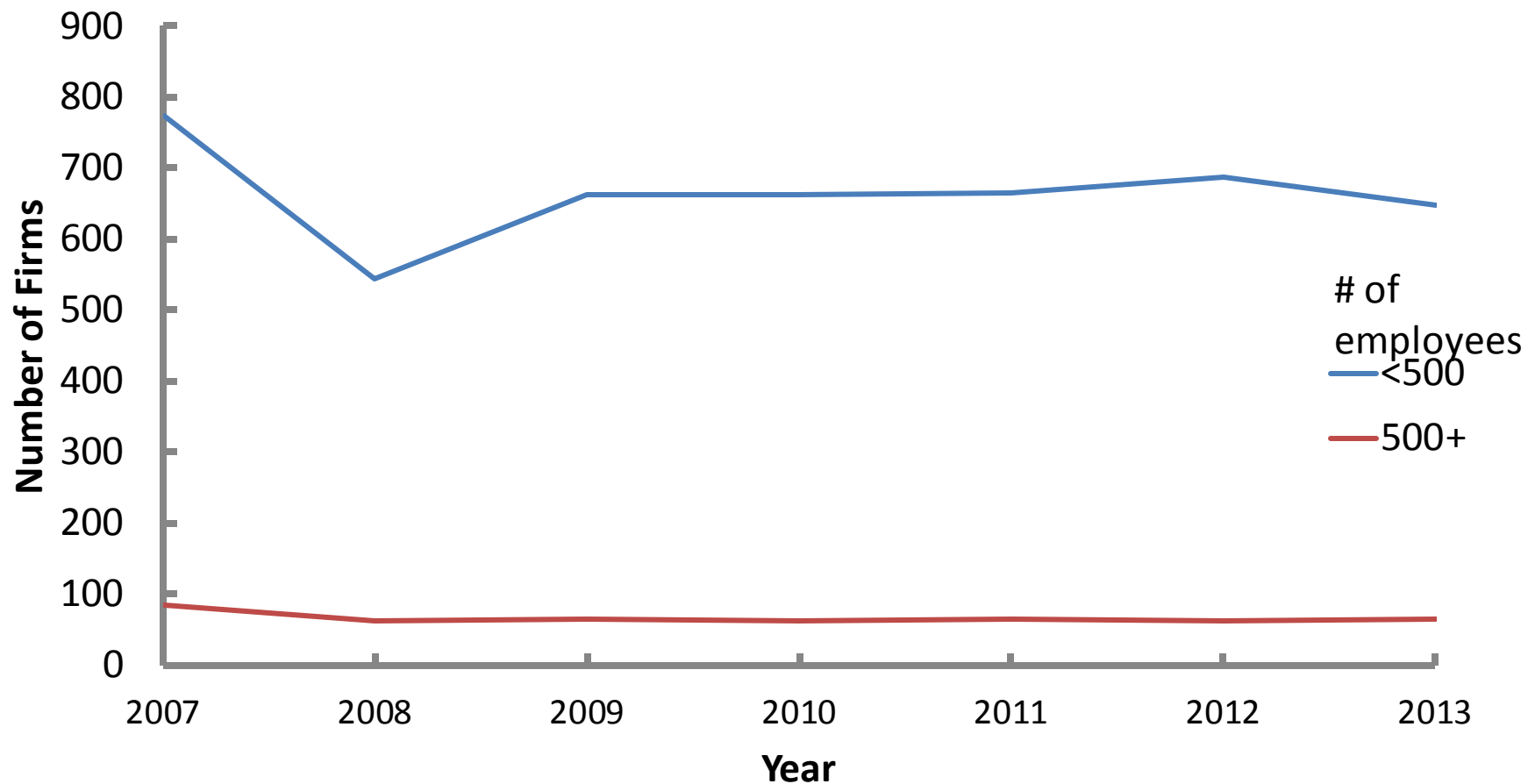


SBA size standard = 1,500 employees

# Concentration Indexes for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing (NAICS Code 334220)

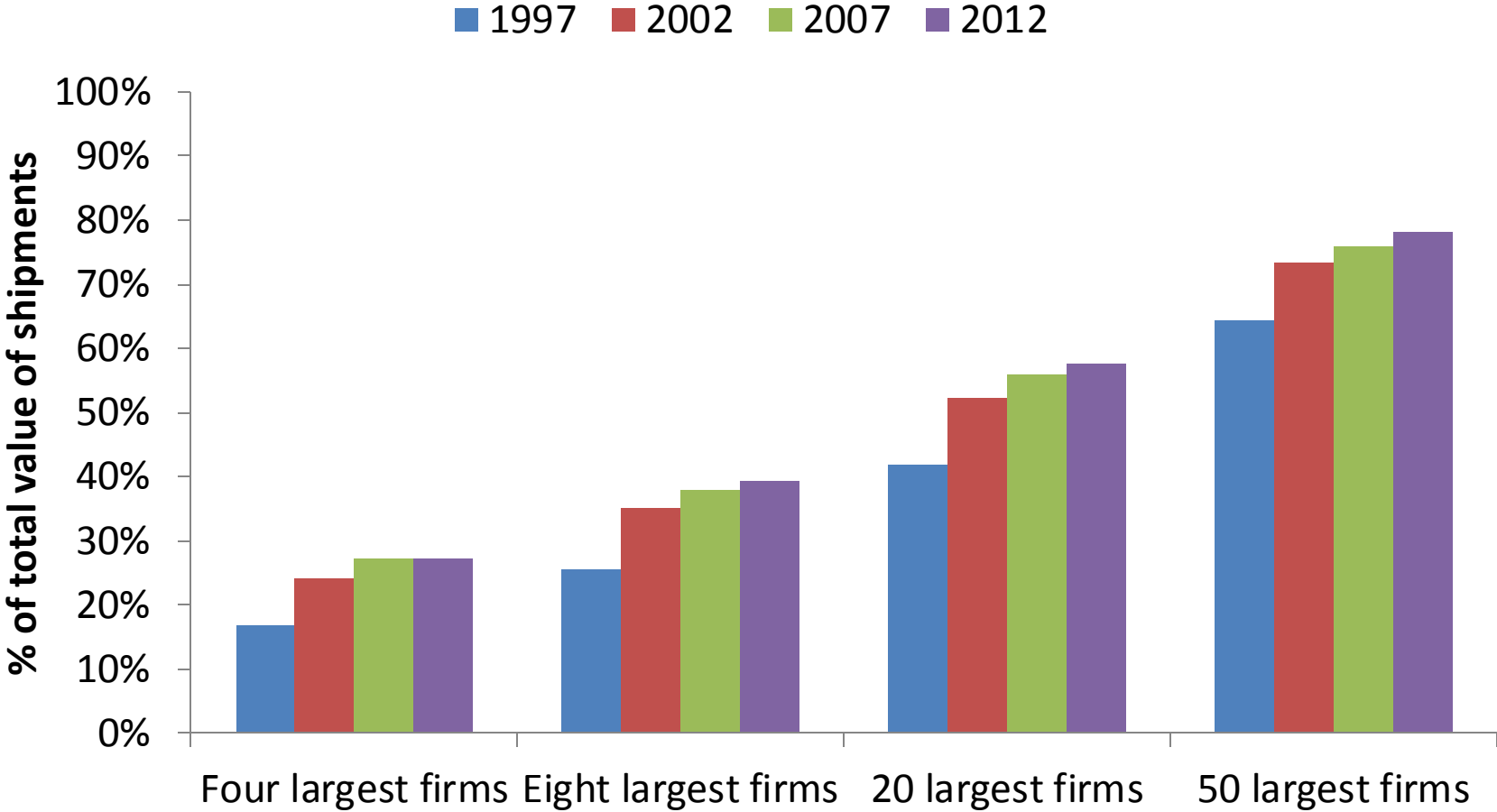


# Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing (NAICS Code 334220) Firms by Number of Employees



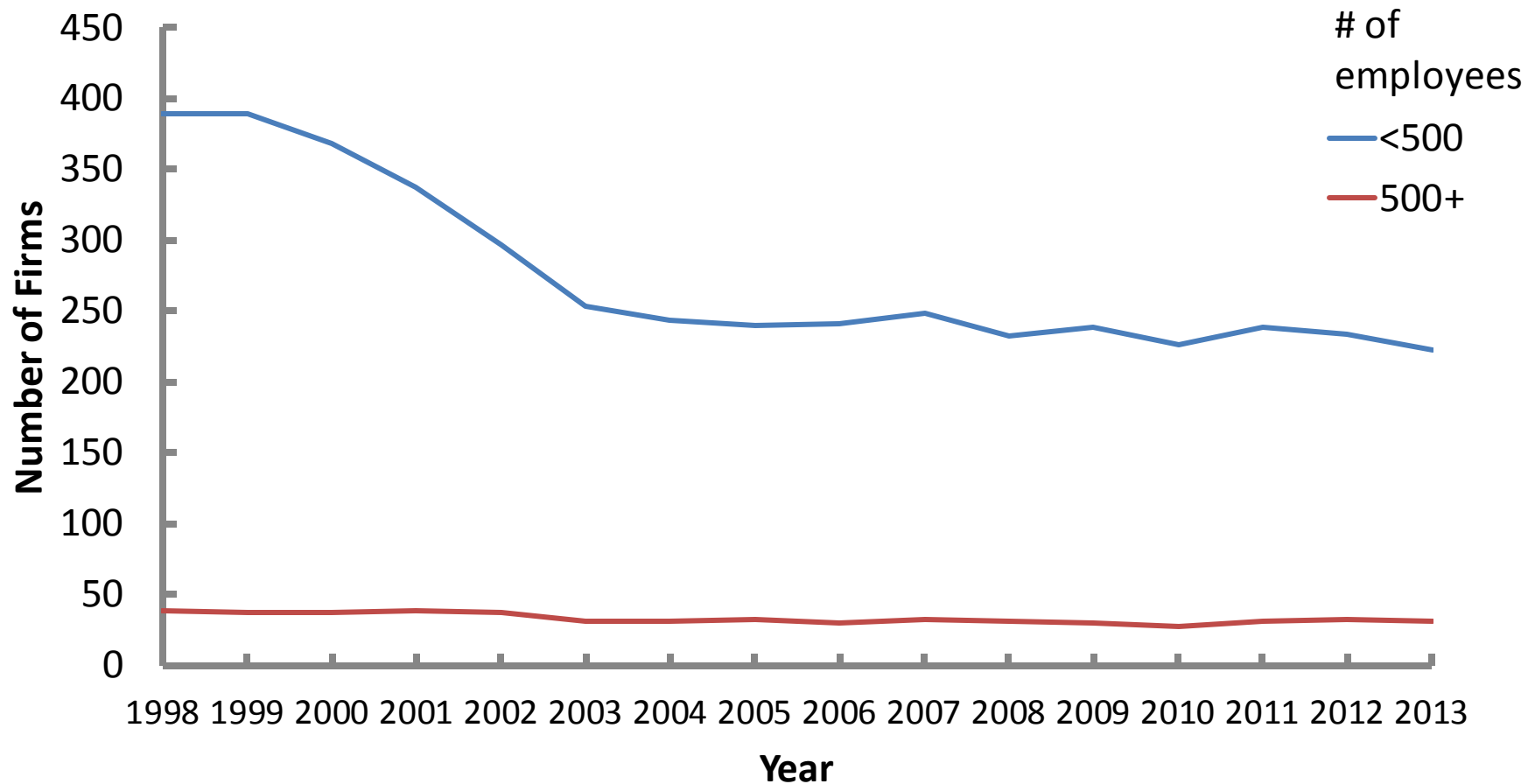
SBA size standard = 1,250 employees

# Concentration Indexes for Power Boiler and Heat Exchanger Manufacturing (NAICS Code 332410)





# Power Boiler and Heat Exchanger Manufacturing (NAICS Code 332410) Firms by Number of Employees



SBA size standard = 750 employees

Source: Statistics of U.S. Businesses.

# Herfindahl-Hirshman Index (HHI)

- Sum of the squared market shares of all the firms in the industry
- The Federal Trade Commission (FTC) used the following cutoffs for the HHI\* in 1997
  - Less than 1,000: unconcentrated
  - 1,000 to 1,800: moderately concentrated
  - Above 1,800: highly concentrated

\*FTC Horizontal Merger Guidelines, revised April 8, 1997, pp. 14-15.

# Registered Firms by Industry and Size

