

What are the Effects of (Software) Patents in Financial Services?

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*: The views expressed here are my own and not necessarily those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Overview

- Efficient financial systems have 1st order effects for economies
- The good news—financial innovation is rapid [Tufano]
 - It has been so for at least 30 years
 - It may even be accelerating
- The bad news
 - It will be difficult to attribute any effects to the “new” patents
 - We are observing a surprising amount of litigation
- Tentative conclusions from economic theory
 - In industries such as this, patent standards should be high
 - When firms’ technologies overlap a patent arms race may ensue
 - It is important that patent claims be closely tied to the invention
- We need to get serious about measurement
 - Innovation in financial services is vastly understudied
 - We have virtually no baseline for counterfactual analysis

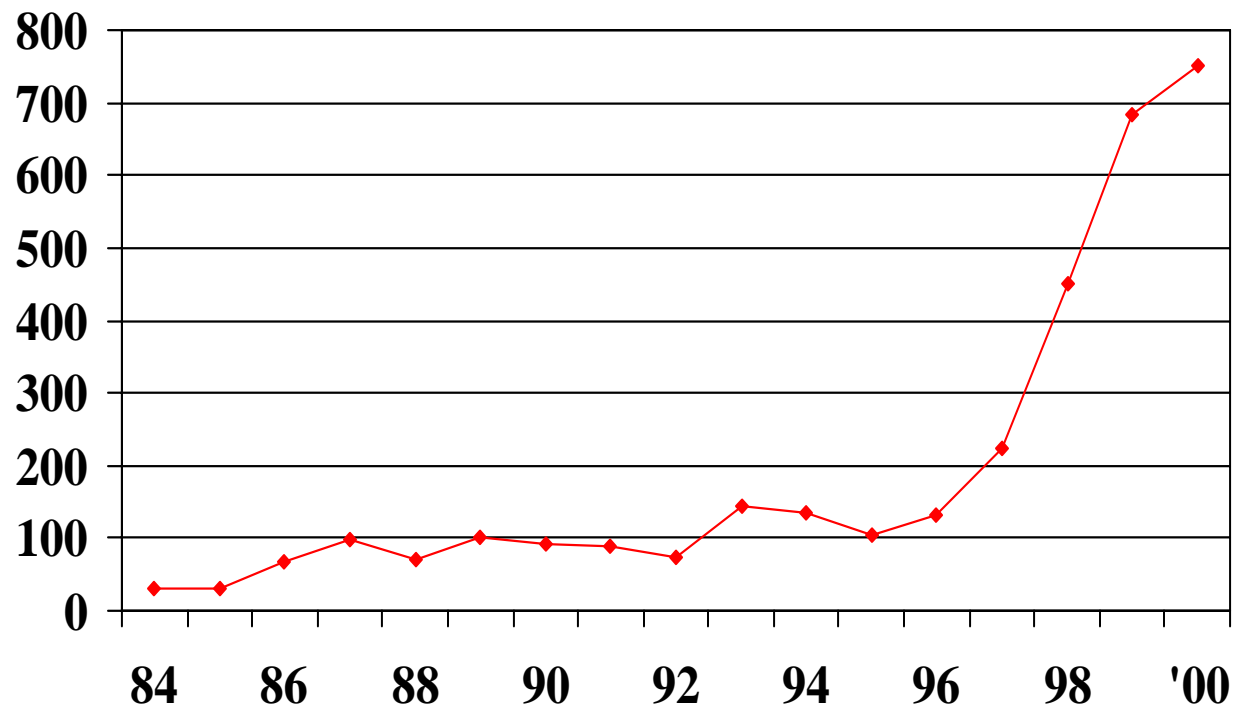
An Example of Financial Innovation: Mortgage Underwriting

- An order of magnitude decline in underwriting costs
 - Significant automation in back office processing
 - Maturation of credit scoring technologies
 - Real time access to credit bureau information
- Required a secondary market in mortgages
 - Standardized purchase contracts
 - Perfection of legal technicalities in securitization
 - Development of hedging technologies (interest & prepayment risk)
- Development of new mortgage products
 - E.g. Fixed vs. adjustable rates, HELOCs, zero amortization loans
 - Coming soon, reverse mortgages
- Interoperability is a critical factor
 - Speed & cost
 - Liquidity

Appropriating Returns from Financial Innovation

- The Traditional mechanisms (see Tufano)
 - Lead time
 - Reputation & Size
 - Complementary assets
 - Joint ventures
 - Regulatory barriers to entry
- More recently, Copyright, Trademark, & Patents
 - Patents are not new to financial services
 - But today's patents are rather different

"Soft" Business Method Patents



Source: CHI Research and author's calculations

A Few Interesting Financial Patents

Patent No.	Year	Description
4,346,442	1982	Securities Brokerage Cash Management System (CMA)†
5,532,464	1996	Electronic Check Presentment*
5,677,955	1997	Personal Online Banking (Intuit)
5,677,955	1997	Electronic Funds Transfer Instrument*
5,848,400	1998	Electronic Check Clearing and Settlement*
5,978,485	1999	Foreign Exchange Transaction System*
6,017,063	2000	Financial Certificates (inflation indexed bonds?) †
6,076,074	2000	Intraday Netting Payment Finality*
6,078,903	2000	Modeling Risks of Loans in a Financial Portfolio (KMV)#
6,112,190	2000	Method and System for commercial Credit Analysis (Citi)#

† : Financial Instrument; *: Payment Systems; #: Risk Management

Standards Setting, Economies of Scale, Network Effects, Regulatory Compliance

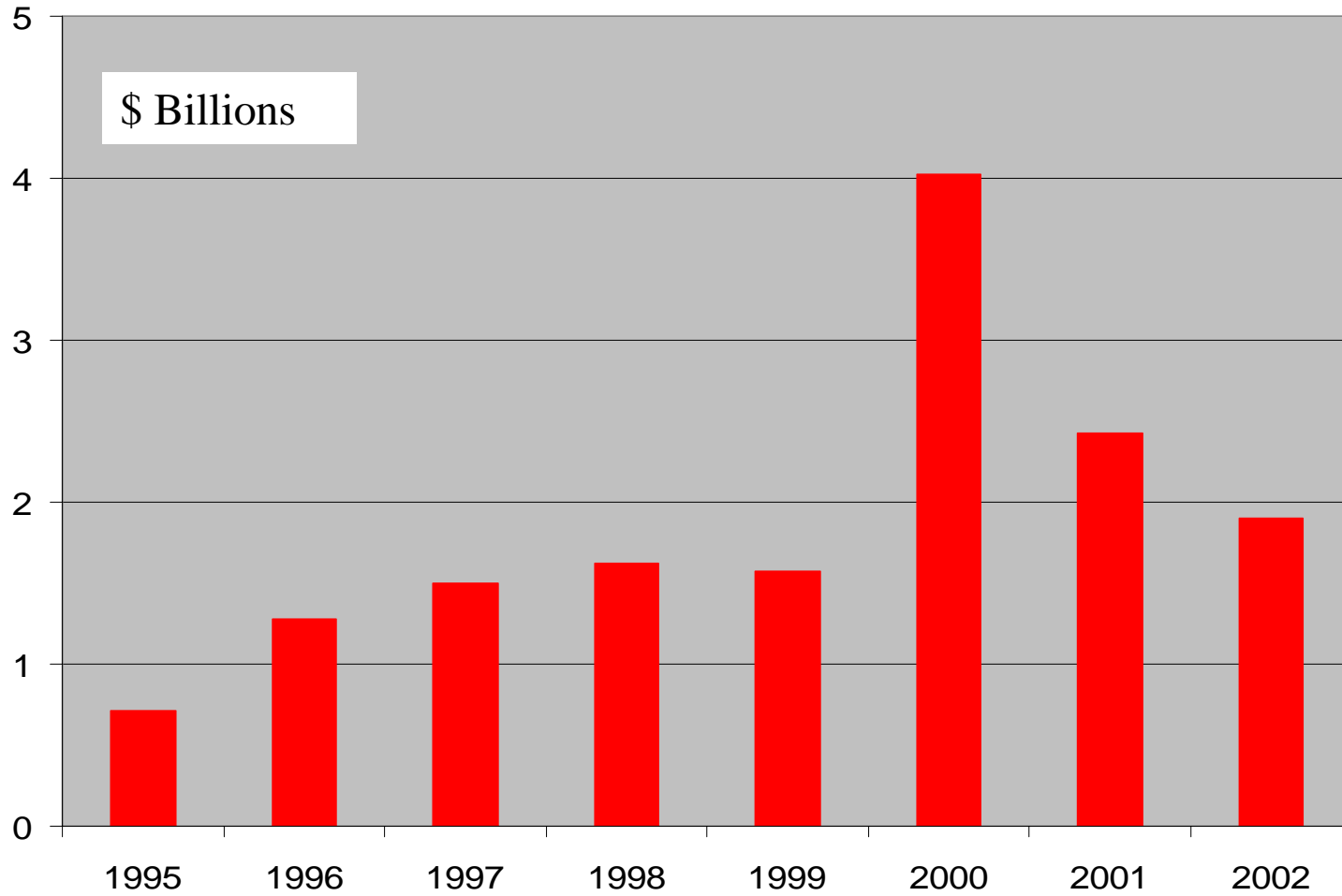
Patents & Financial Services

- Financial Services are highly innovative
 - At least \$23 billion in custom software alone
 - Single largest consumer of IT outside of IT sector.
- Theory suggests patent standards should be higher
 - Granting too many patents dissipates the value of inventions
 - The effect is strongest for rapidly innovating industries
 - PHOSITA should reflect rate of technical advance (Hunt 2004)
- There is significant technological overlap between firms
 - An artifact of interoperability (see above)
 - Also characteristic of their vendors—IT firms
- Such industries are susceptible to patent arms races
 - Firms race to tax each others' inventions (Hunt 2006)
 - Patent claims should be closely tied to the actual invention

Patents in Financial Services (tentative)

- Network effects are important in financial services
 - Present in many payment systems and most financial exchanges
 - Creates a tendency towards winner takes all or band wagon effects
 - Also reflected in standard setting
- What are the effects of patents in network industries?
 - If patents & network effects are substitutes, they may not matter
 - Merges (2003), Lerner (2003)
 - But if they are complements, patents may enhance market power
- Mistakes (bad patents) may be more costly
 - Same intuition for government hesitancy to promulgate standards
 - May want stricter patentability criteria
 - May want narrower claims
 - May want modified criteria for (preliminary) injunctions

R&D in Financial Services



Source: NSF

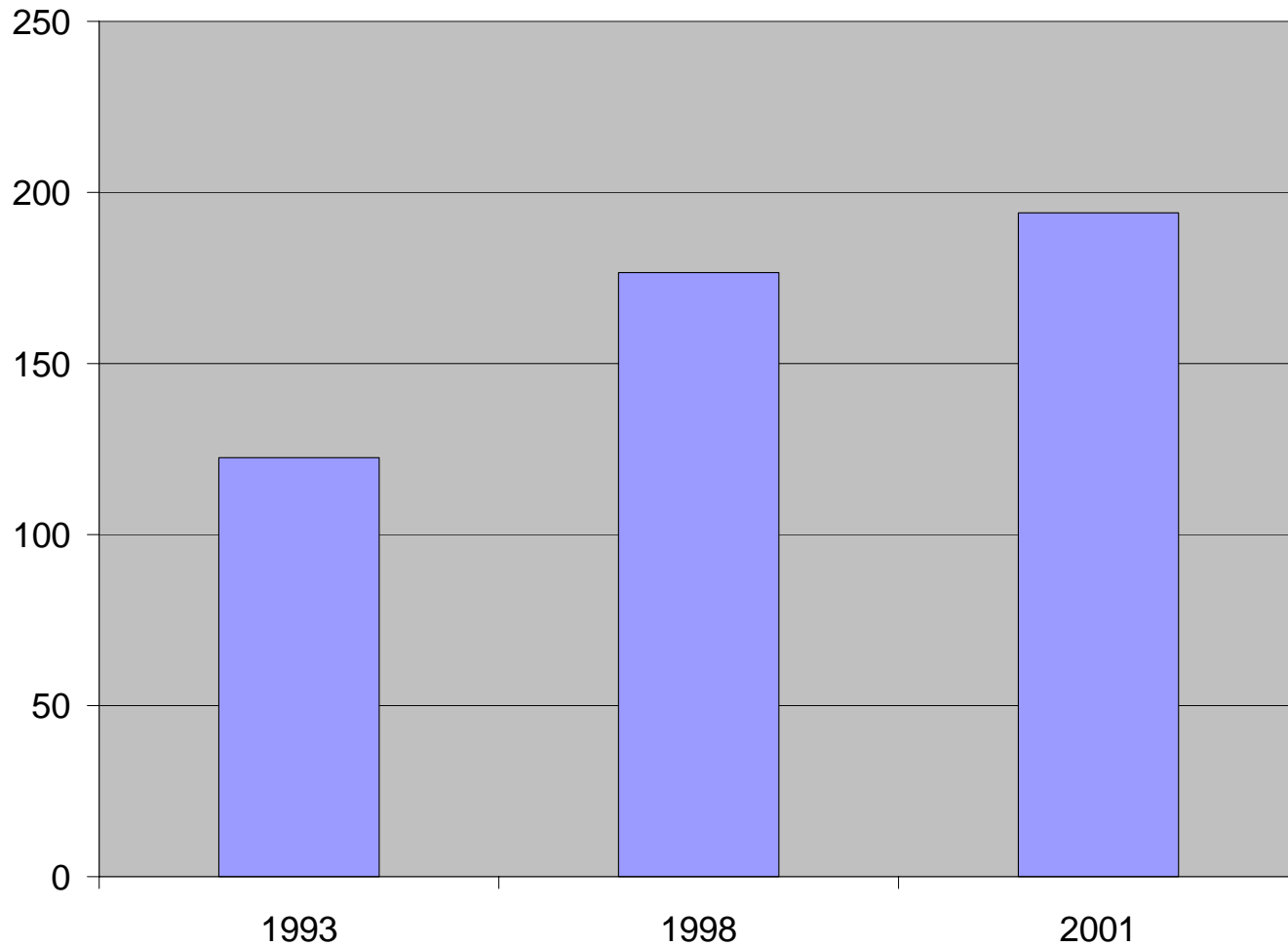
Financial R&D Prior to State Street

Industry	...	1994	1995
Depository institutions.....	NA	NA	(D)
Nondepository credit institutions.....	NA	NA	NA
Security and commodity brokers, dealers and exchanges, and services	NA	NA	NA
Insurance carriers, agents, brokers and services	NA	NA	NA
Real estate; holding and other investment offices	NA	NA	NA

Source: NSF

Employment of Scientists & Engineers in FIRE

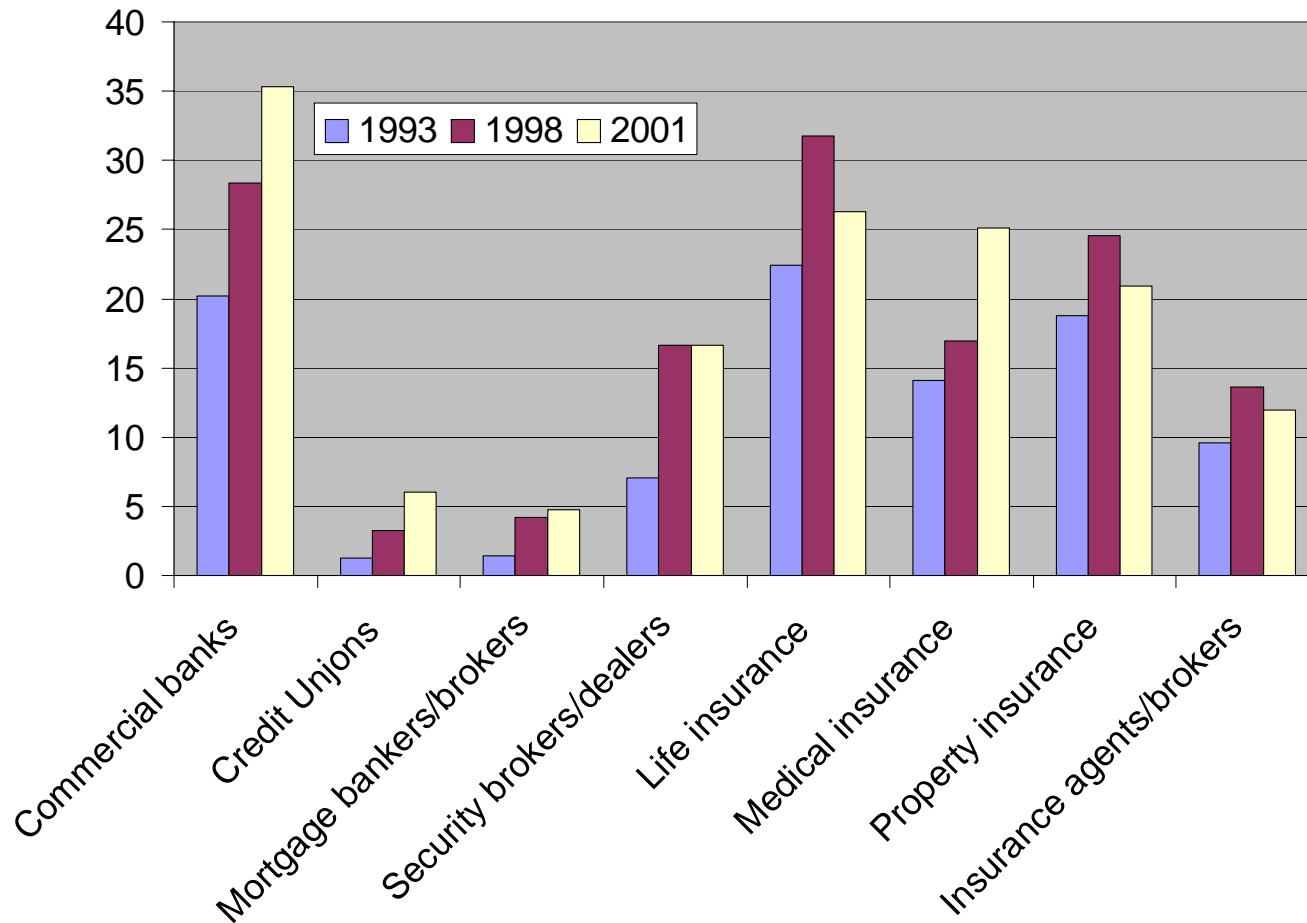
Thousands



Source: NSF, & author's calculations

Scientists & Engineers by Financial Sector

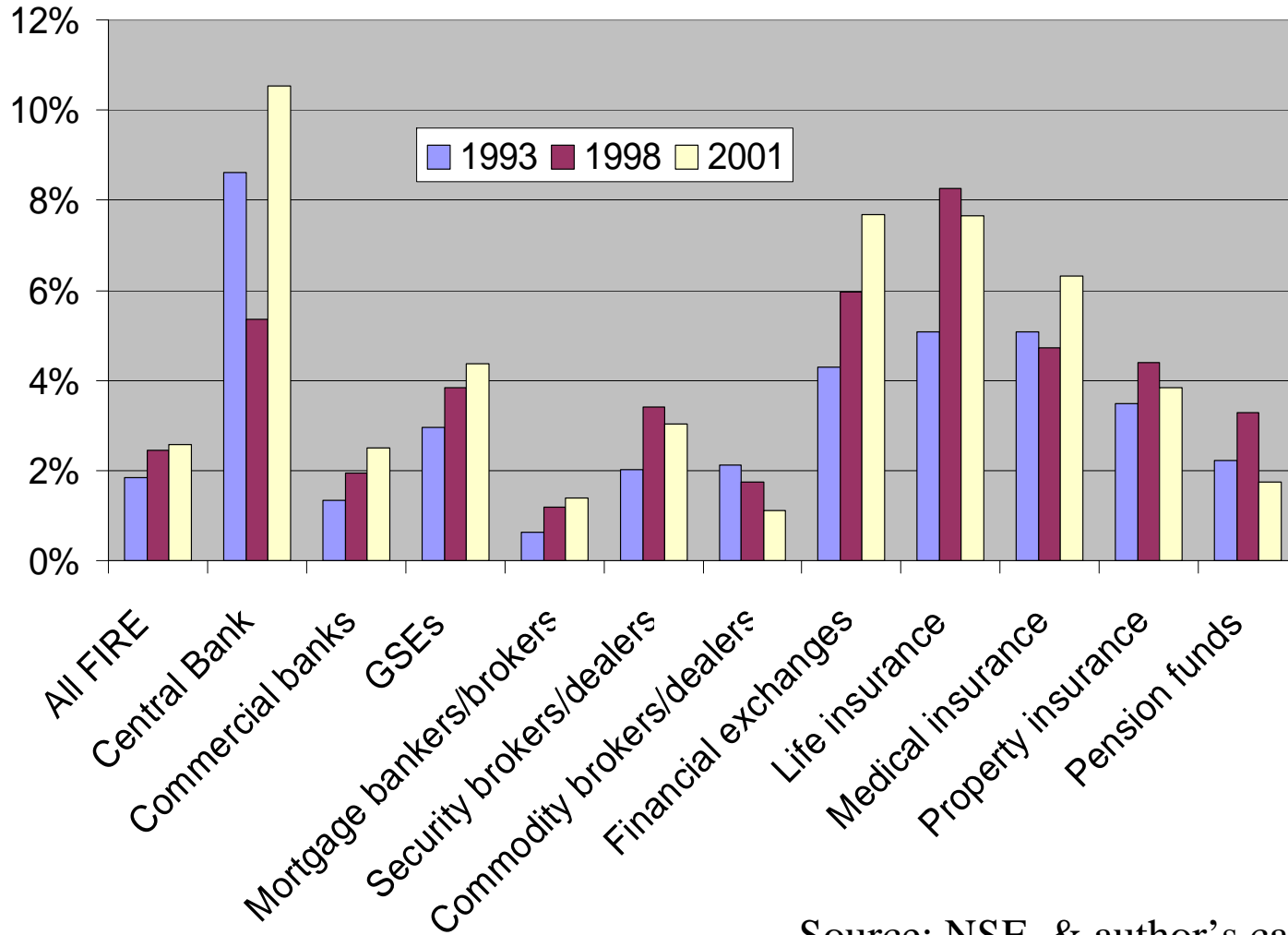
Thousands



Source: NSF, & author's calculations

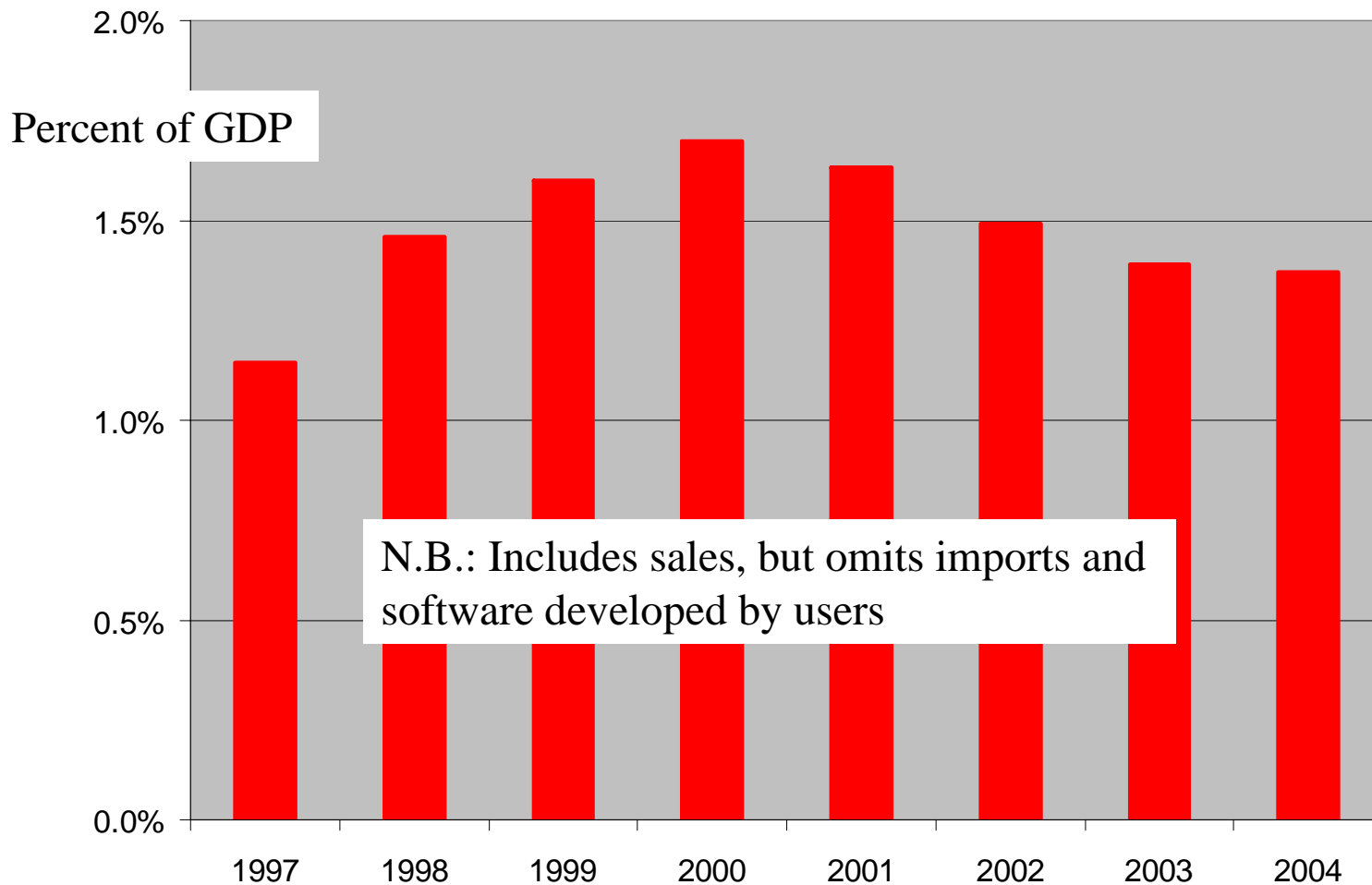
Intensity of Scientists & Engineers

Percent of Industry Employment



Source: NSF, & author's calculations

Revenues of Software Companies*

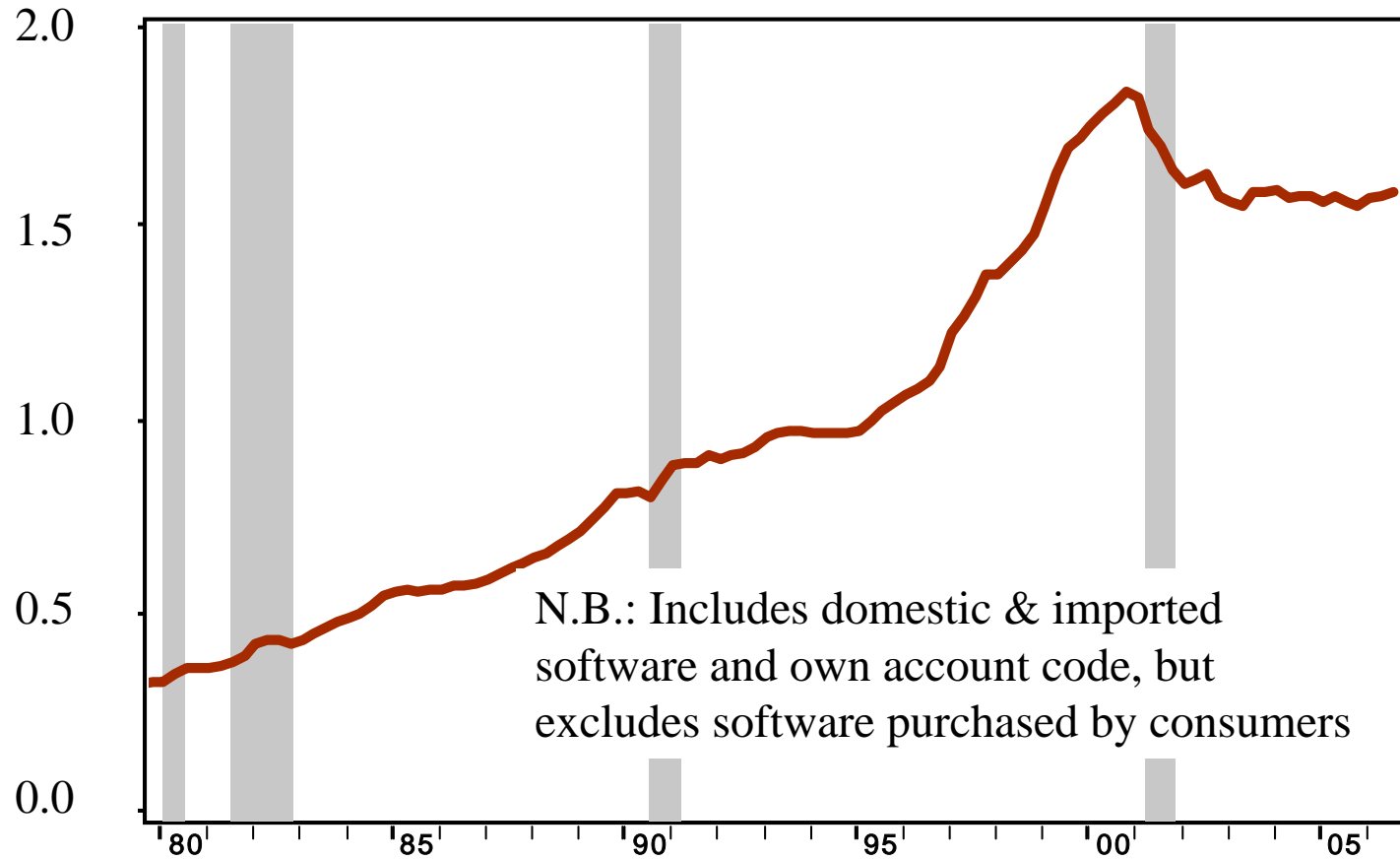


Source: Census Bureau & author's calculations

*: Includes Software Publishing & Custom Computer Programming

Business Investment in Software

Percent of GDP



Source: Bureau of Economic Analysis & author's calculations

Implications for Patent Policy

- **Relevant Facts**
 - Financial services are highly innovative (and were before)
 - There is an extremely high degree of interaction between firms
 - The sector relies extensively on standard setting
- **(Possible) Implications**
 - Patentability standards should be relatively strict
 - Patent claims should be closely tied to actual inventions
 - The effects of injunctions merit serious consideration
- **We need rigorous studies now and in the future**
 - Important to establish a baseline for comparison
 - Important to study how firms manage the benefits & costs