Middle-Class Incomes and Innovation Policy

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Table of Contents

Table of Contents

Middle-Class Income Growth Has Slowed in Recent Decades

Annual Real Middle-Class Income Growth

	1948-1973	1973-2015
Median Family Income *(Census Bureau)*	3.0%	0.4%
Median Household Income with Benefits *(CBO, adj. for household size)*	N/A	0.5%
Median Household Income with Gov't Transfers/Taxes *(CBO, adj. for household size)*	N/A	1.0%

Note: Income levels from the Census Bureau are deflated with the CPI-U-RS price index, and income levels from the Congressional Budget Office (CBO) are deflated with the personal consumption expenditures price index. CBO median income is extended before 1979 and after 2013 with the growth rate of Census median household income.
Source: World Wealth and Income Database; Census Bureau; Congressional Budget Office; CEA calculations.

Drivers of Income Growth: Productivity, Inequality, and Participation

Determinants of Middle-Class Income Growth

	1948-1973	1973-2015
Labor Productivity Growth (Annual Average)	2.8%	1.8%
Income Shares		
Top 1 Percent	11% → 8%	8% → 18%
Bottom 90 Percent	66% → 68%	68% → 52%
Labor Force Participation Rate		
Men, 16 and Older	87% → 79%	79% → 69%
Women, 16 and Older	33% → 45%	45% → 57%

Source: Bureau of Labor Statistics, Productivity and Costs; World Wealth and Income Database; Bureau of Labor Statistics, Current Population Survey; CEA calculations.

Some Thought Experiments

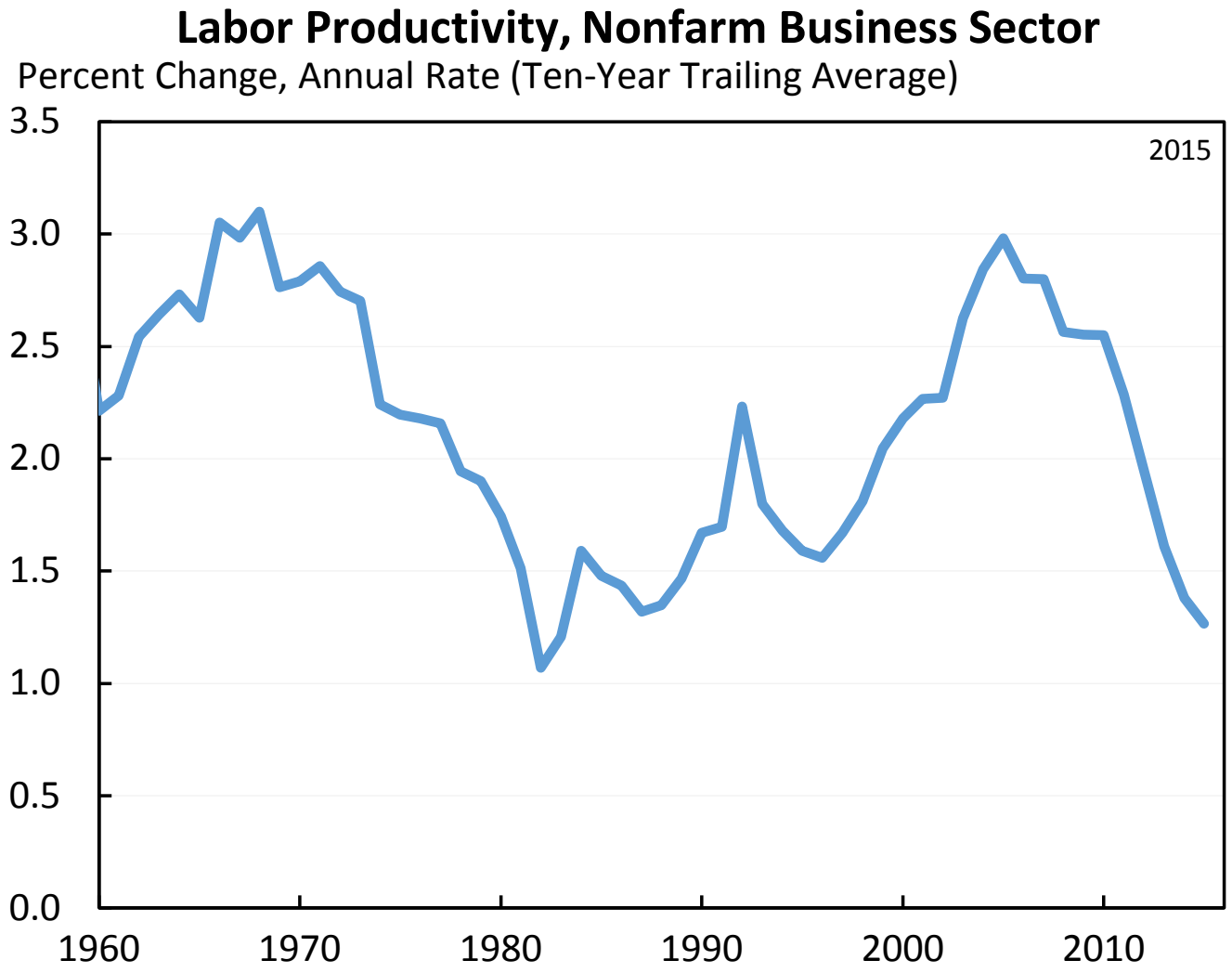
Counterfactual Scenarios for Productivity, Equality, and Participation

Thought Experiment	Factor	Base Period	Percentage Impact on 2015 Average Income	Income Gain to 2015 Typical Household
Productivity	Total Factor Productivity Growth	1948-1973	65%	$37,000
Inequality	Share of Income Earned by Middle 20%	1973	19%	$10,000
Participation	Female Labor Force Participation Rate	1948-1995	6%	$4,000
Combined Impact	**All of the Above**		**108%**	$61,000

Note: These thought experiments are intended to demonstrate the importance of these three factors for middle-class incomes. They do not consider second-order effects or interactive effects. The first thought experiment assumes that an increase in productivity is associated with an equal increase in the Census Bureau's mean household income. The second thought experiment uses the Census Bureau's mean income of the middle quintile as a proxy for median income. The third thought experiment assumes that newly-participating women will have the same average earnings as today's working women. The first and third thought experiments assume that income gains are distributed proportionally such that mean and median incomes grow at the same rate. Dollar gains are calculated off a base of the Census Bureau's median household income in 2013. The fourth thought experiment compounds the effects of the first three.
Source: World Top Incomes Database; Census Bureau; Congressional Budget Office; Bureau of Labor Statistics, Current Population Survey; Bureau of Economic Analysis; CEA calculations.

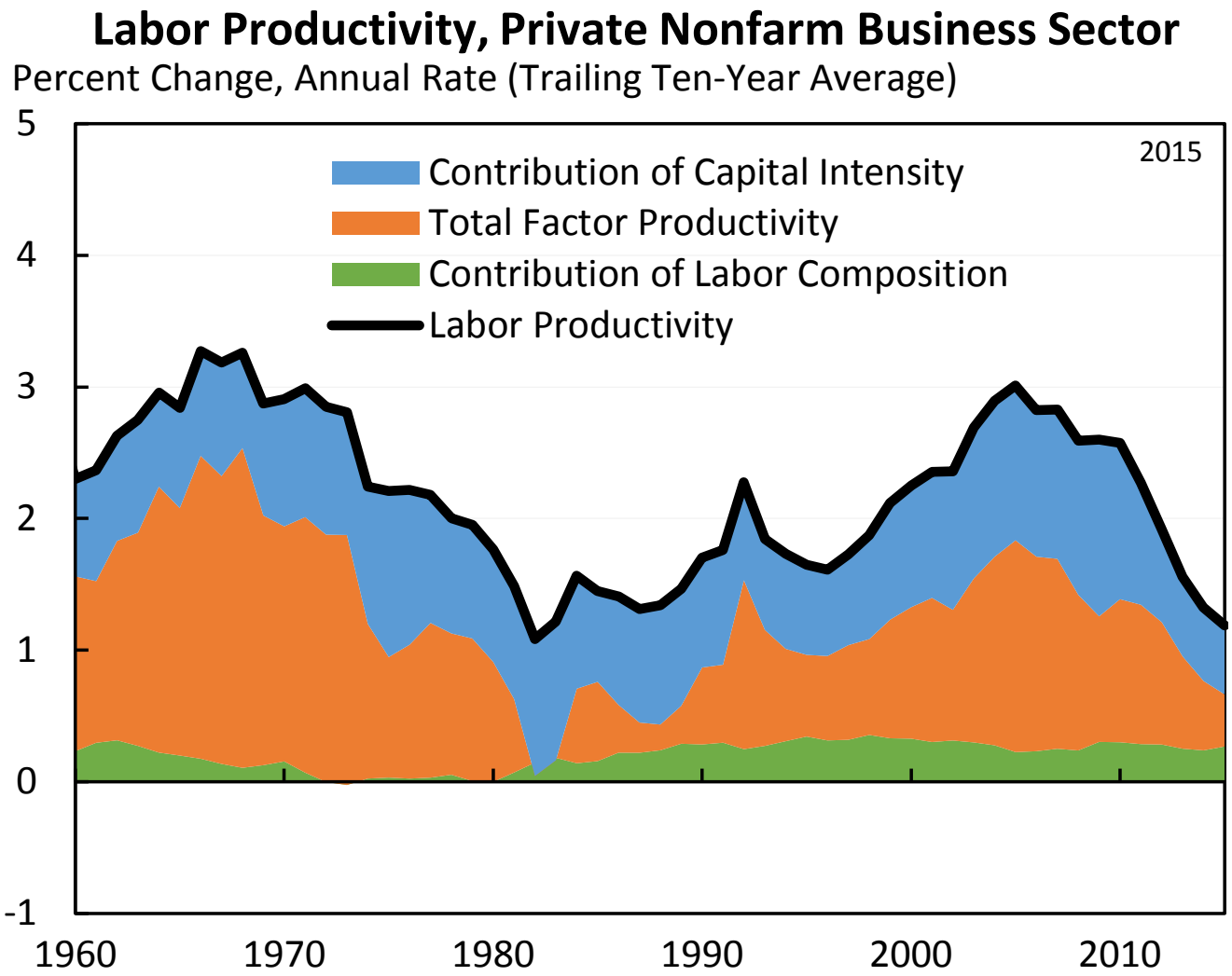
Table of Contents

A History of Productivity Growth in the United States



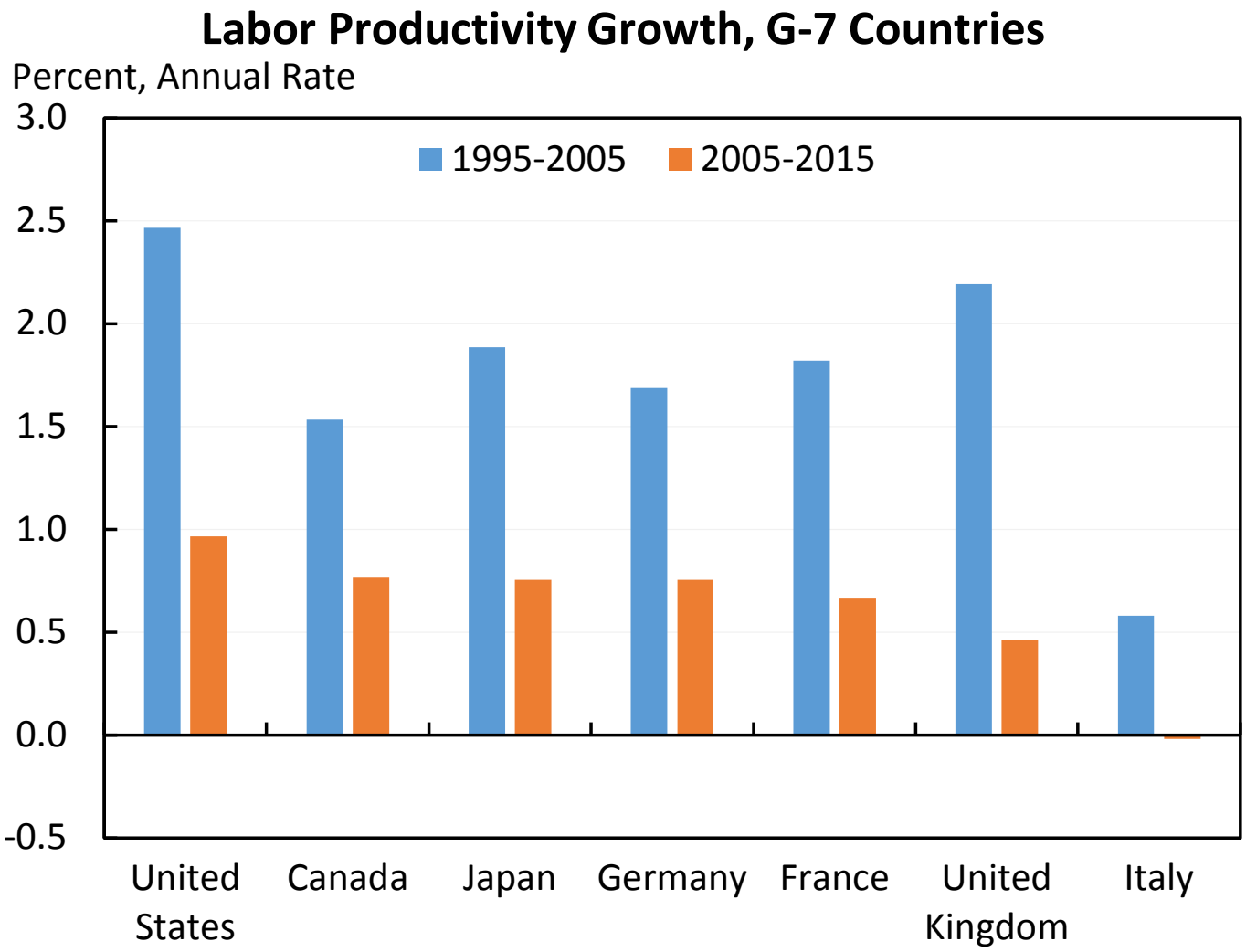
Source: Bureau of Labor Statistics, Productivity and Costs; CEA calculations.

Both Capital Deepening and TFP Growth Have Slowed in Recent Years



Source: Bureau of Labor Statistics, Multifactor Productivity; CEA calculations.

Average Annual Productivity Growth Has Slowed in All of the G-7 Economies

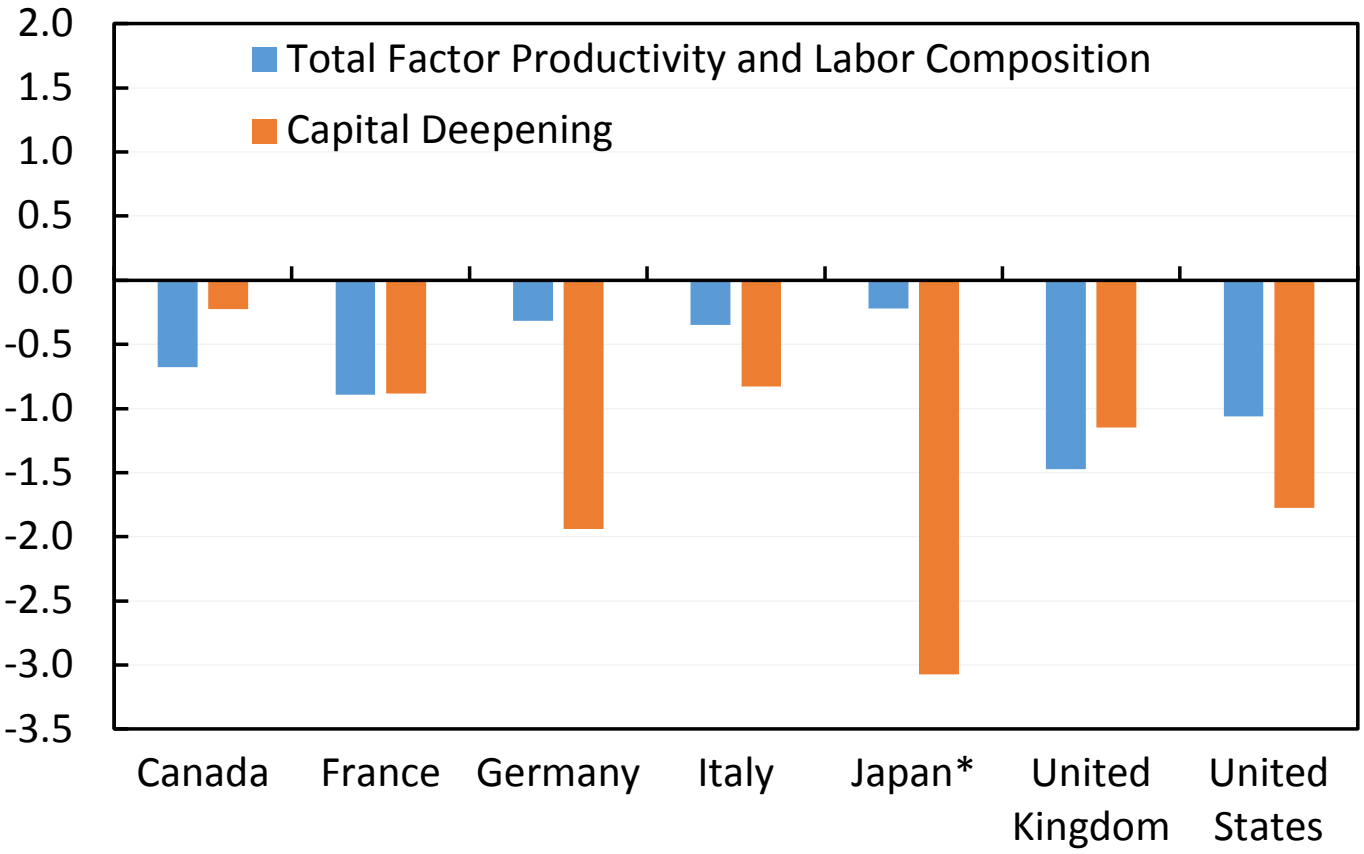


Source: Conference Board, Total Economy Database; CEA calculations.

The Sources of the Productivity Slowdown Vary by Country

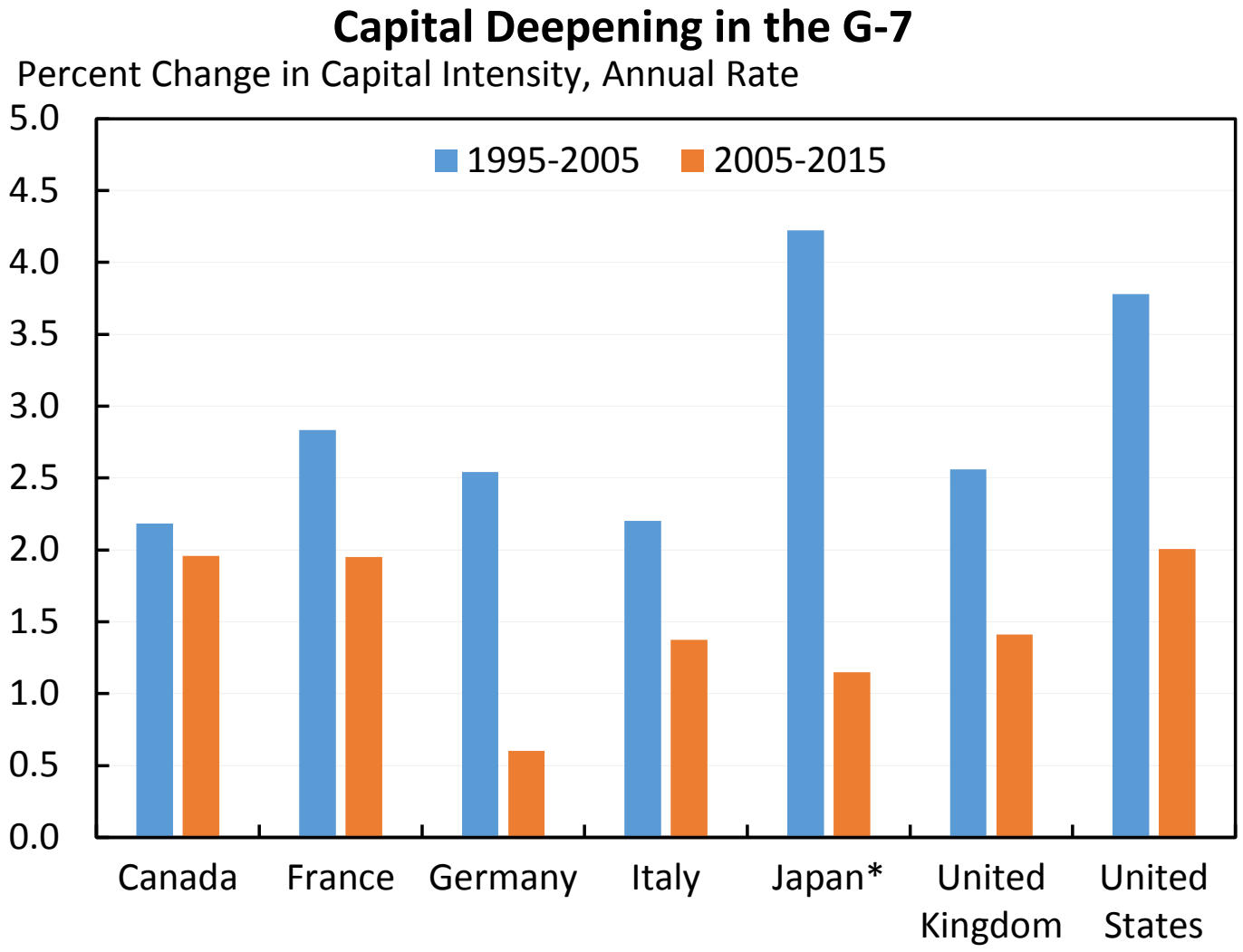
Change in Growth in Components of Productivity in the G-7, 1995-2005 to 2005-2015

Change in Average Annual Growth Rate, Percentage Points



Note: *Data for Japan for 1994-2004 and 2004-2014.
Source: Organisation for Economic Co-operation and Development; CEA calculations.

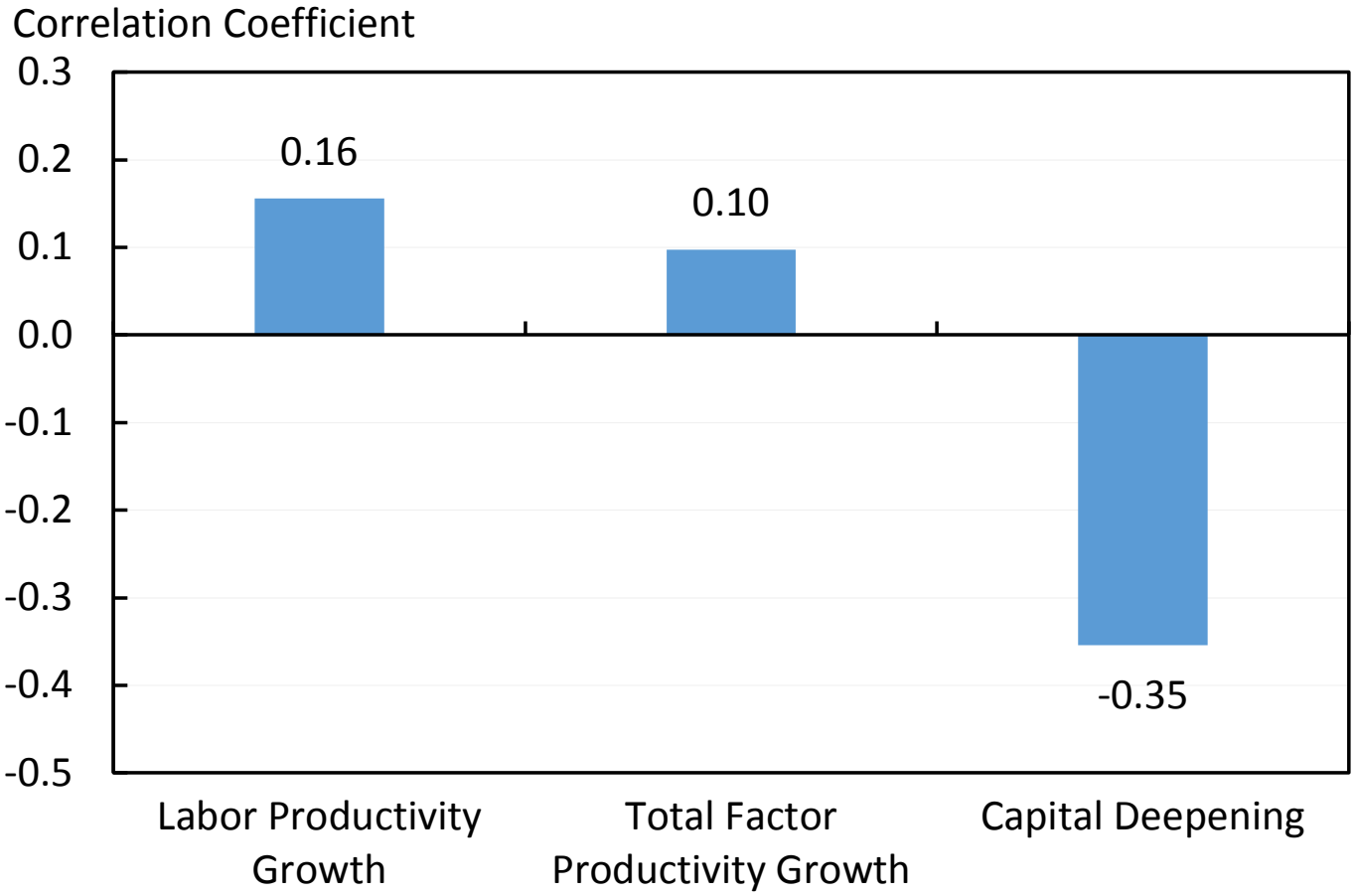
All G-7 Countries Have Seen Slowdowns in Capital Deepening



Note: *Data for Japan for 1994-2004 and 2004-2014.
Source: Organisation for Economic Co-operation and Development; CEA calculations.

Investment Busts Tend to Be Followed by Booms, But Total Factor Productivity Growth is Positively Serially Correlated

Correlation of Five-Year Growth with Prior Five Years' Growth, Labor Productivity and Components (1953-2015)



Note: Data for private nonfarm business sector.
Source: Bureau of Labor Statistics, Multifactor Productivity; CEA calculations.

Candidates for Source of Slowdown in TFP Growth

1. **Demography: increasingly older population is less innovative** (Feyer 2007; Aiyar, Ebeke, and Shao 2016)

2. **Lags due to innovation waves or recent subpar investment** (Syverson 2013; McAfee and Brynjolffson 2014; CEA 2016)

3. **Low-hanging fruit has been taken** (Gordon 2016; Bloom, Jones, Van Reenan, and Webb 2016)

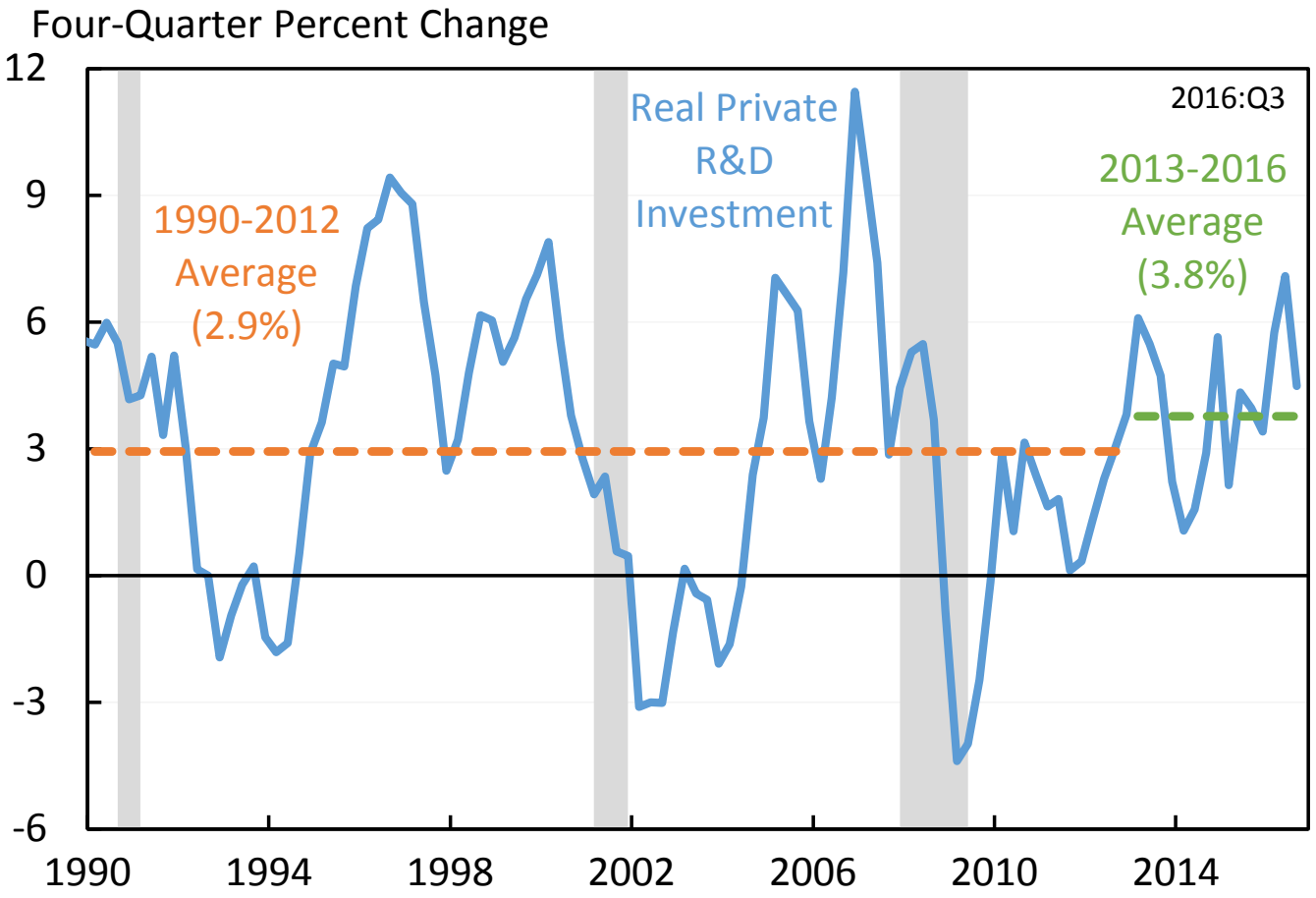
4. **Reduced dynamism/competition/churn** (OECD 2015; Davis and Haltiwanger 2014; Furman 2016)

Table of Contents

Table of Contents

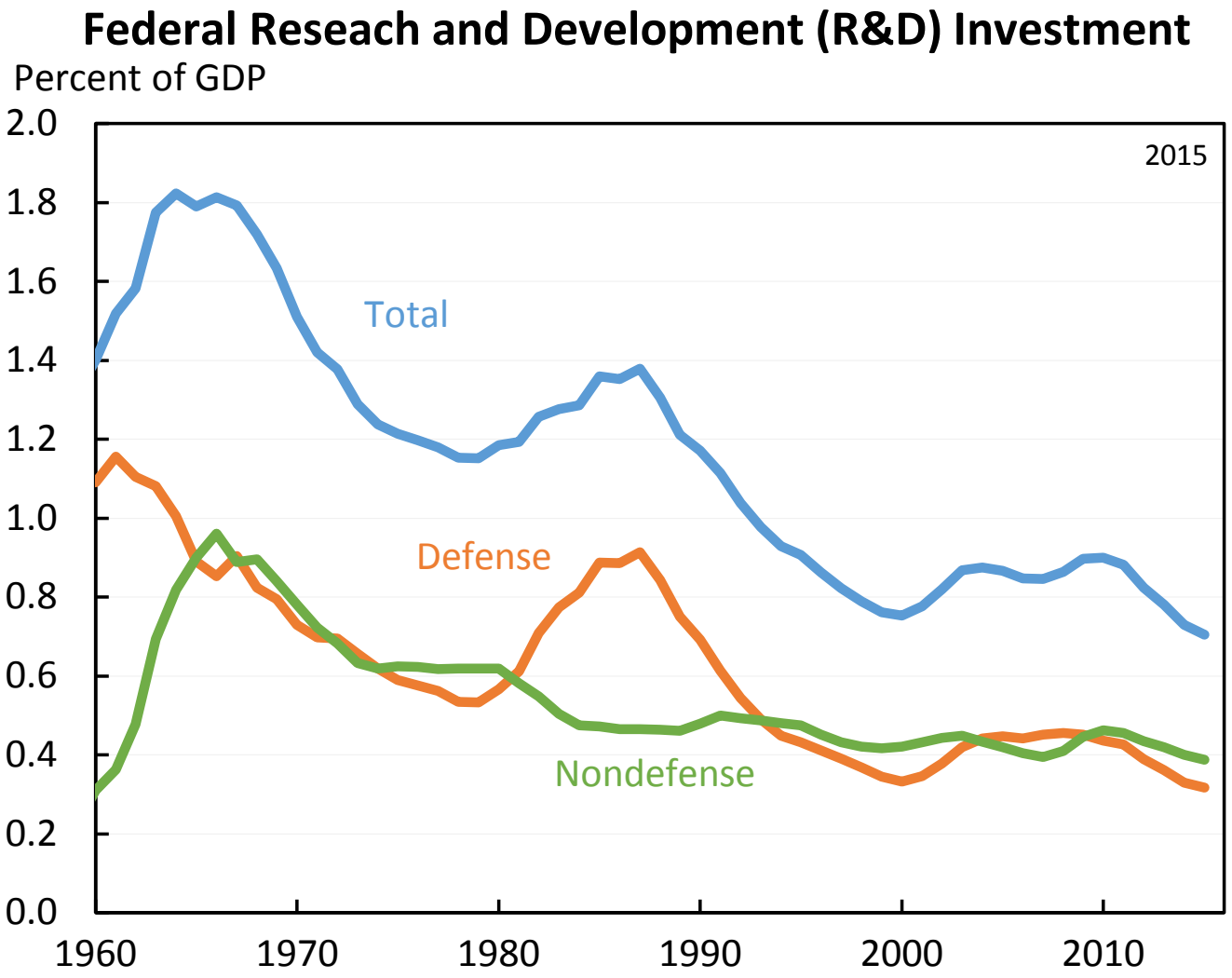
Private R&D Has Grown Rapidly in Recent Years, Hitting Records As a Share of GDP

Real Private Research and Development (R&D) Investment Growth, 2001-2016



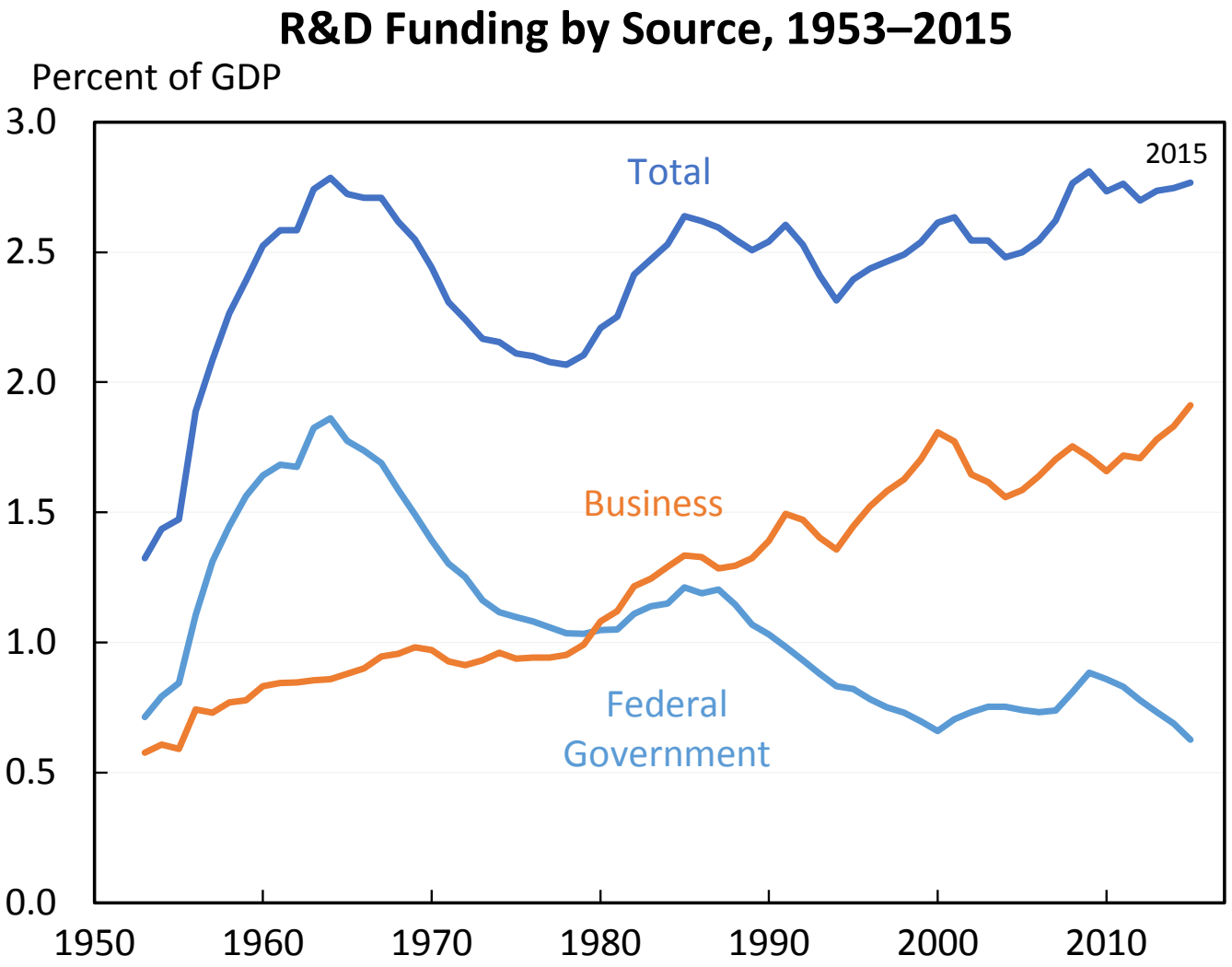
Note: Shading denotes recession. Pre-crisis average defined as 2001:Q4 through 2007:Q4.
Source: Bureau of Economic Analysis, National Income and Product Accounts; CEA calculations.

Federal Research Has Declined As a Share of GDP Since the 1960s



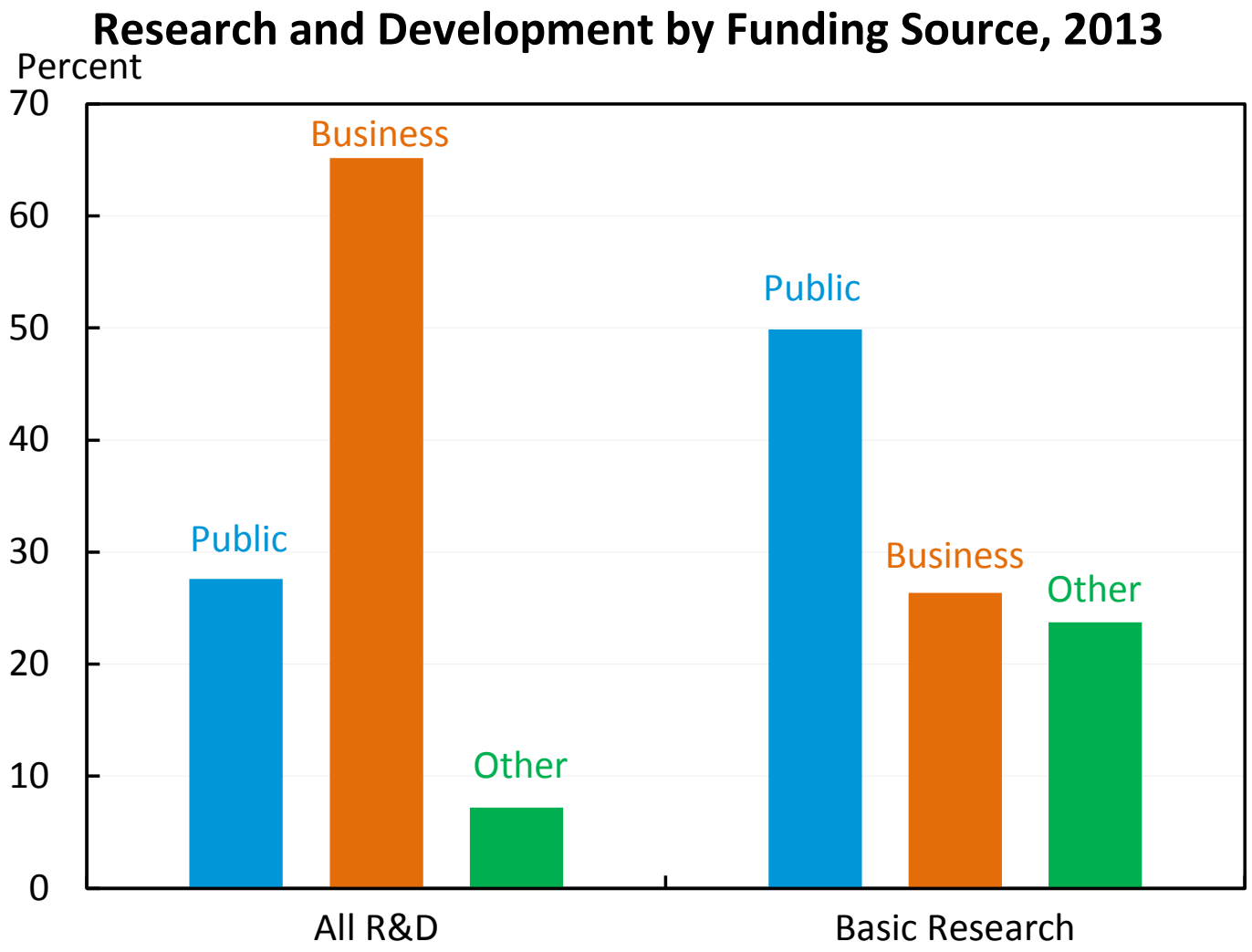
Source: Bureau of Economic Analysis, National Income and Product Accounts; CEA calculations.

Total R&D Nearing the President's 3% Goal, With the Composition Shifting to Business Instead of Government



Source: National Science Foundation; Bureau of Economic Analysis, National Income and Product Accounts; CEA calculations

Government Contributes Disproportionately to Basic Research



Source: National Science Foundation, Science and Engineering Indicators 2016.

Table of Contents

Business Tax Reform: Quantity of Capital vs. Quality of Capital

Business Tax Reform: Increasing *quantity* of investment or *quality* of investment.

Revenue-Neutral Reform: Hard time substantially increasing quantity, but can increase neutrality, reducing distortions and resulting in better allocation of capital.

Two Methods Intended to Increase Innovation:

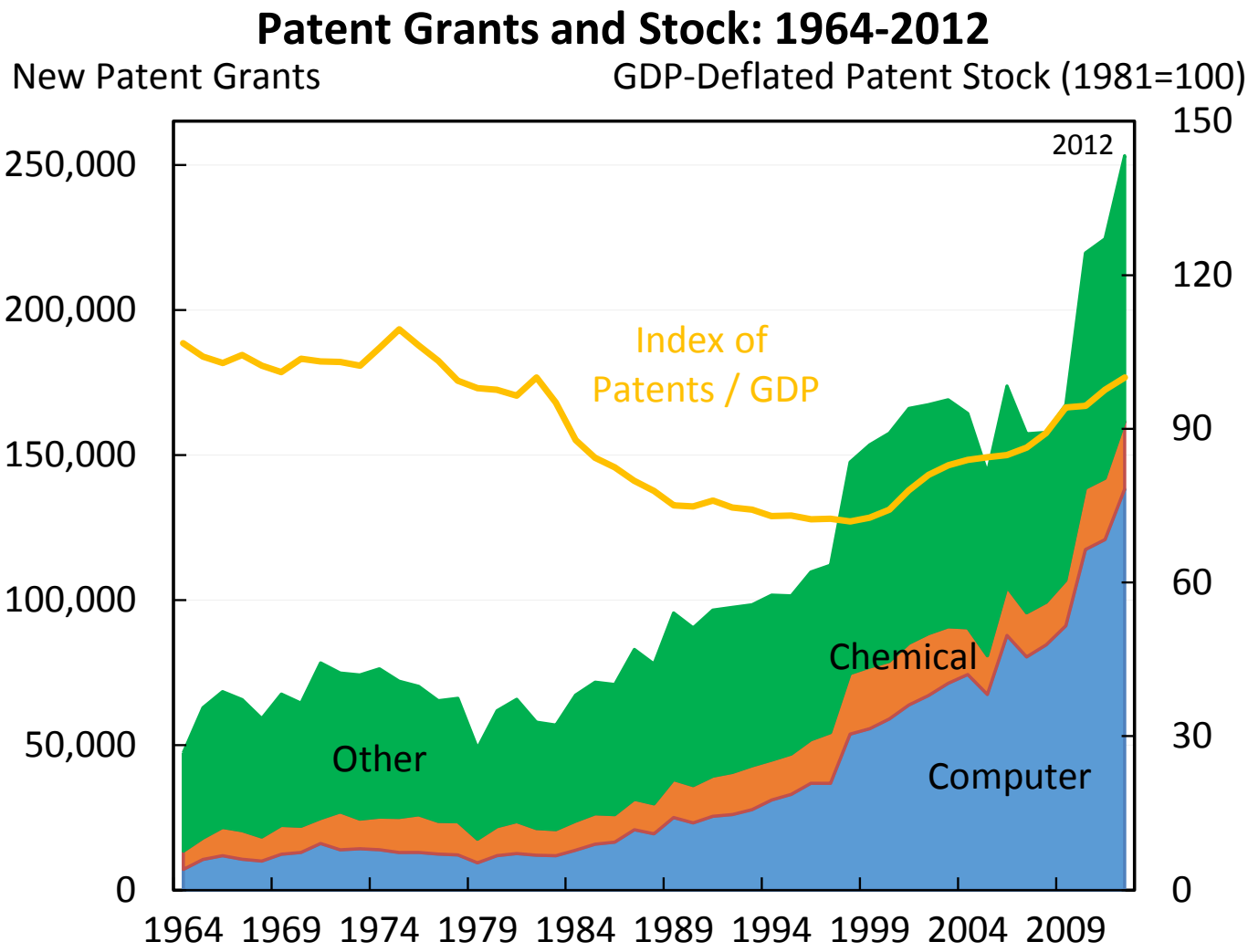
- **R&E Credit:** Subsidizes inputs to production
- **Innovation Box (or Patent Box):** Subsidizes outputs of research

Reasons to Prefer an R&E Credit to an Innovation Box

1. An R&E credit better addresses positive the externality of more basic research spillovers. In contrast, an innovation box rewards more commercializable research.
2. An innovation box leads to windfall gains by rewarding luck, market power, and supernormal returns.
3. An innovation box leads to windfall gains by rewarding past research.
4. An innovation box raises tax policy considerations: it does not improve cash flow (which may matter to more credit-constrained companies), its cost is highly uncertain and potentially very large, and it entails substantial complexity and potential for abuse.

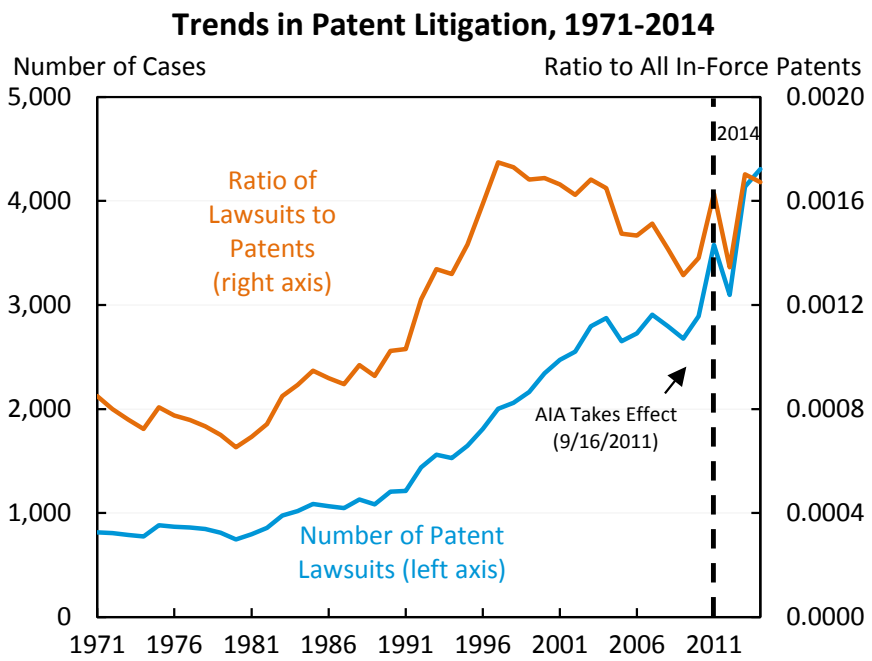
Table of Contents

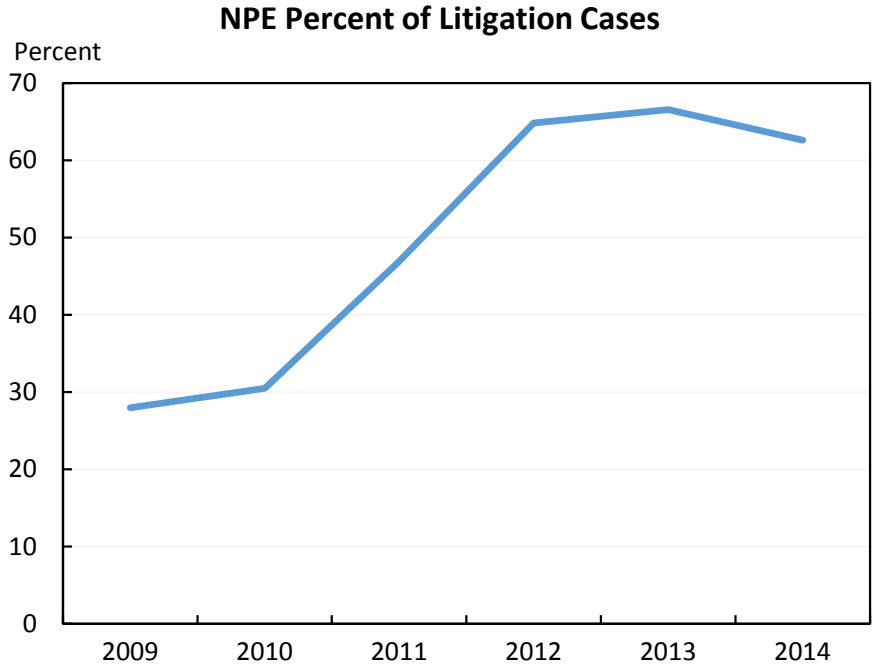
Patenting Has Increased Rapidly in Recent Years



Source: U.S. Patent and Trade Office.

Patent Litigation Has Increased Rapidly, Especially Suits by Non-Practicing Entities

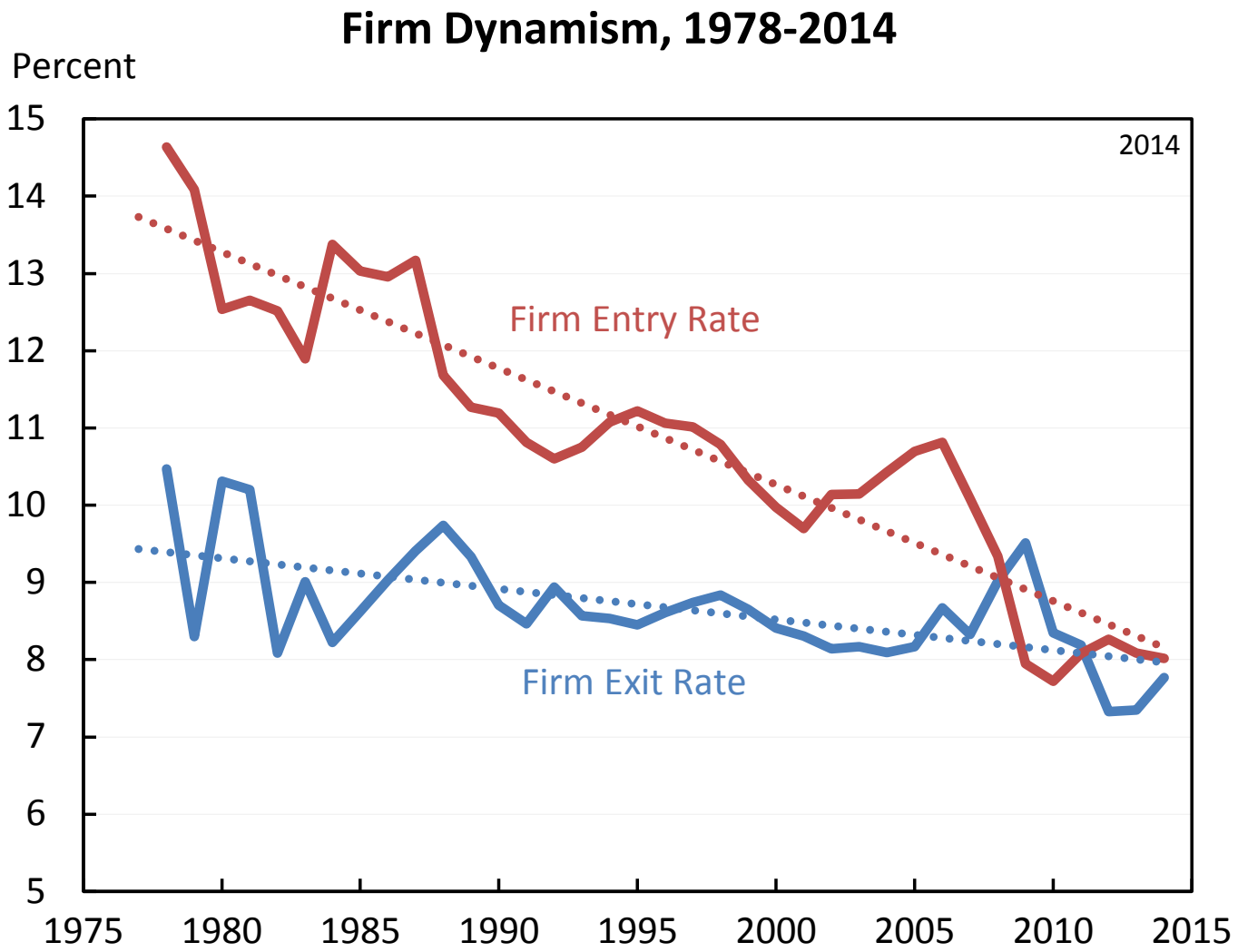




Note: AIA stands for the Leahy-Smith America Invents Act.
Source: USPTO; FJC; Lex Machina; CEA calculations; RPX Corporation, 2013 NPE Litigation Report.

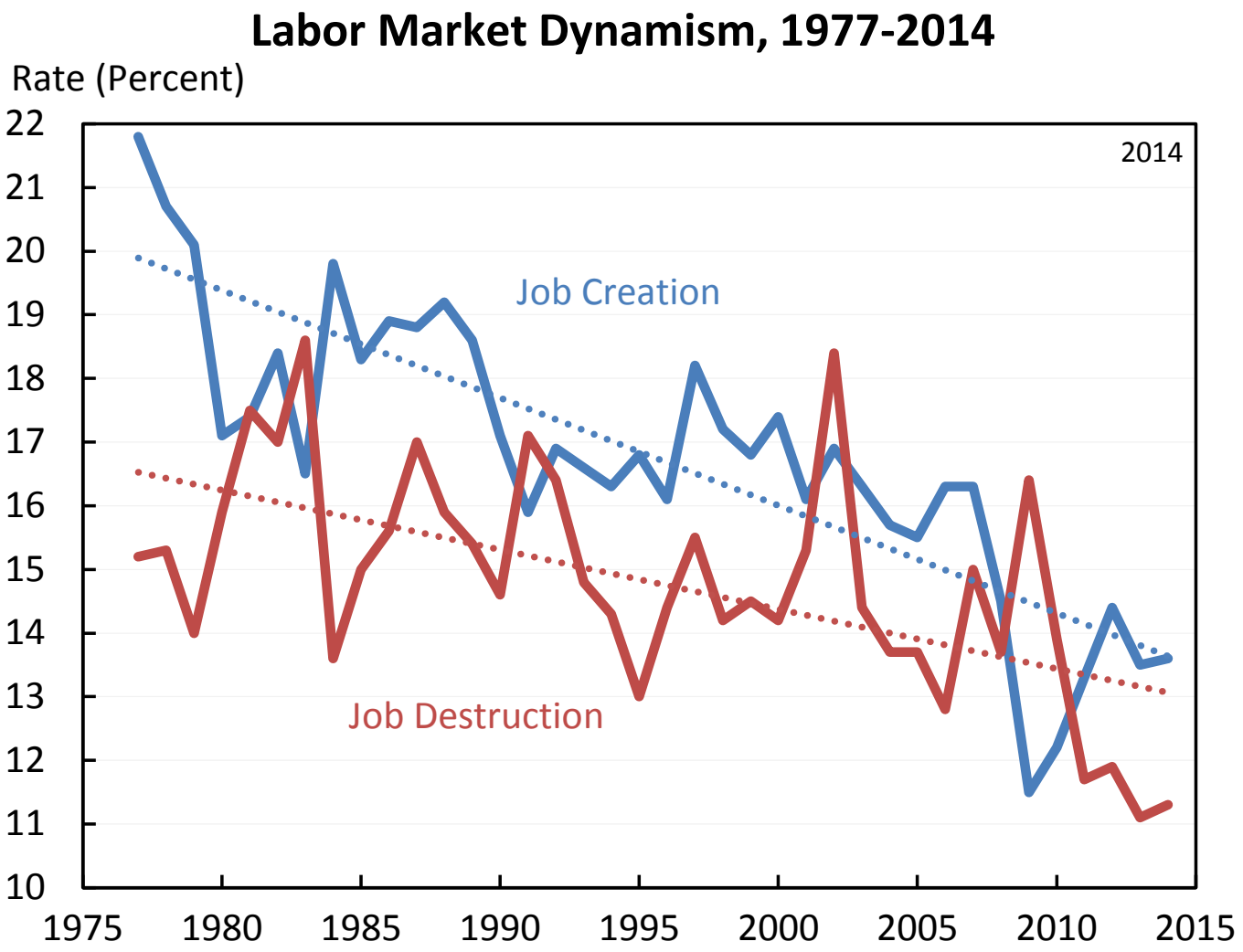
Table of Contents

Over the Last 35+ Years, Firm Exit Has Remained Relatively Steady But the Firm Entry Rate Has Decreased Substantially



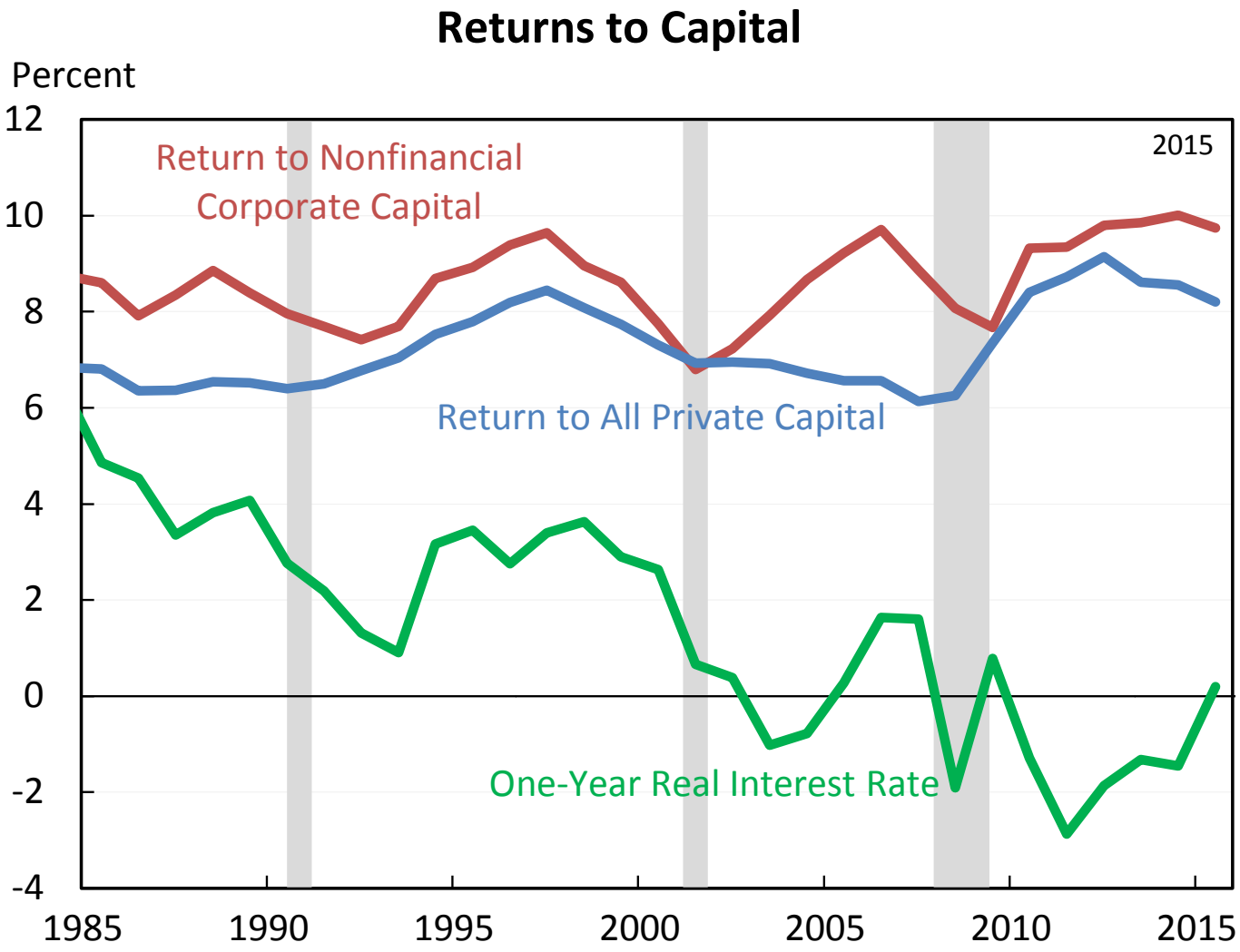
Source: Census Bureau, Business Dynamics Statistics; CEA calculations.

Labor Market Dynamism Has Been Declining for Decades



Source: Census Bureau, Business Dynamics Statistics; CEA calculations.

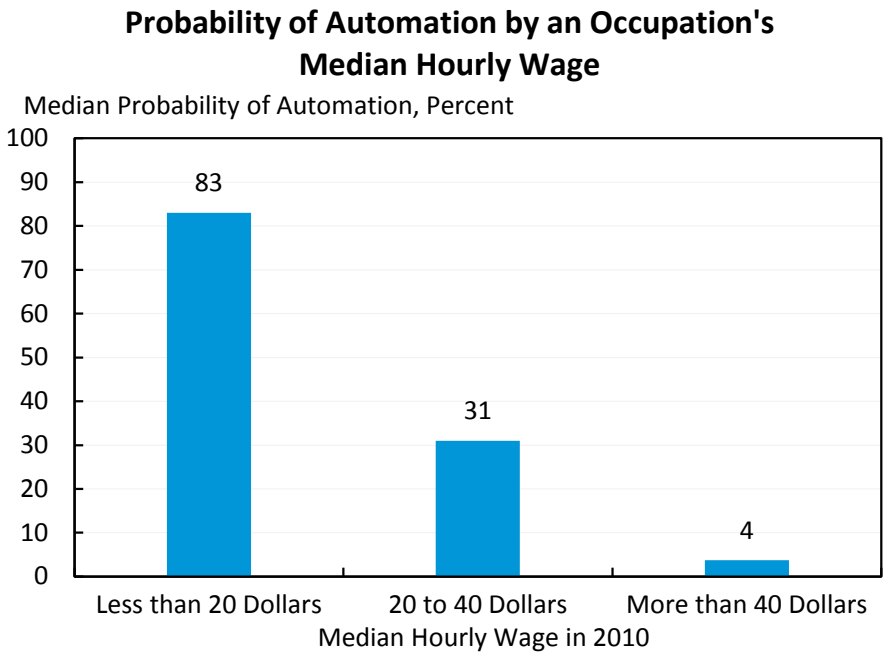
The Past 30 Years Have Seen an Increase in the Returns to Capital Relative to the Safe Rate of Return

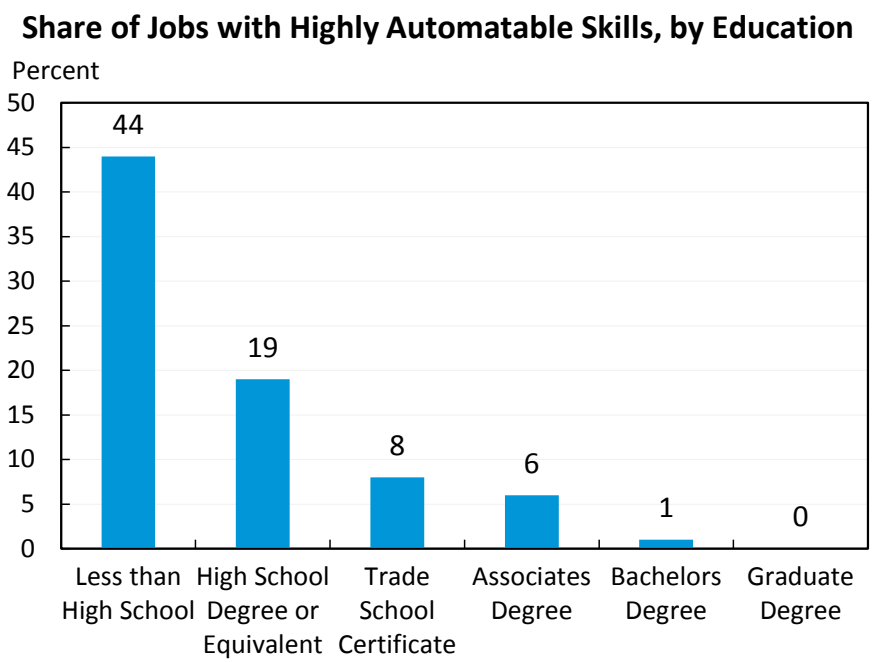


Note: Shading denotes recession.
Source: Bureau of Economic Analysis; Federal Reserve; Bureau of Labor Statistics; CEA calculations.

Table of Contents

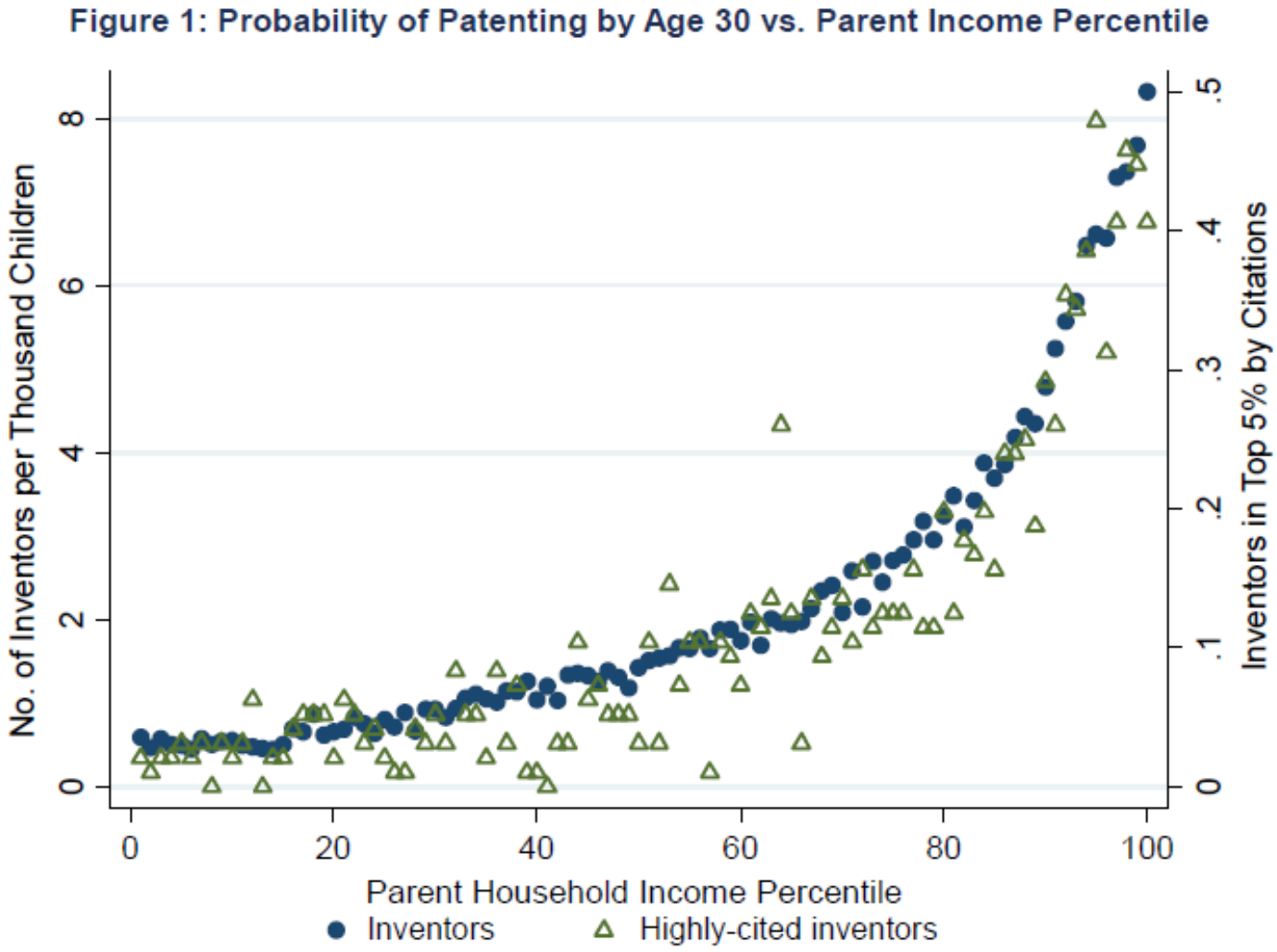
The Probability of an Occupation's Automation Varies Dramatically by Wage and Educational Attainment





Source: Bureau of Labor Statistics, Occupational Employment Statistics; Frey and Osborne (2013); Arntz, Gregory, and Zierahn (2016) calculations based on the Survey of Adult Skills (PIAAC) 2012; CEA calculations.

Children of Low-Income Parents Are Much Less Likely to Become Inventors Than Children of Higher-Income Parents



Source: Bell et al. (2016).

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