

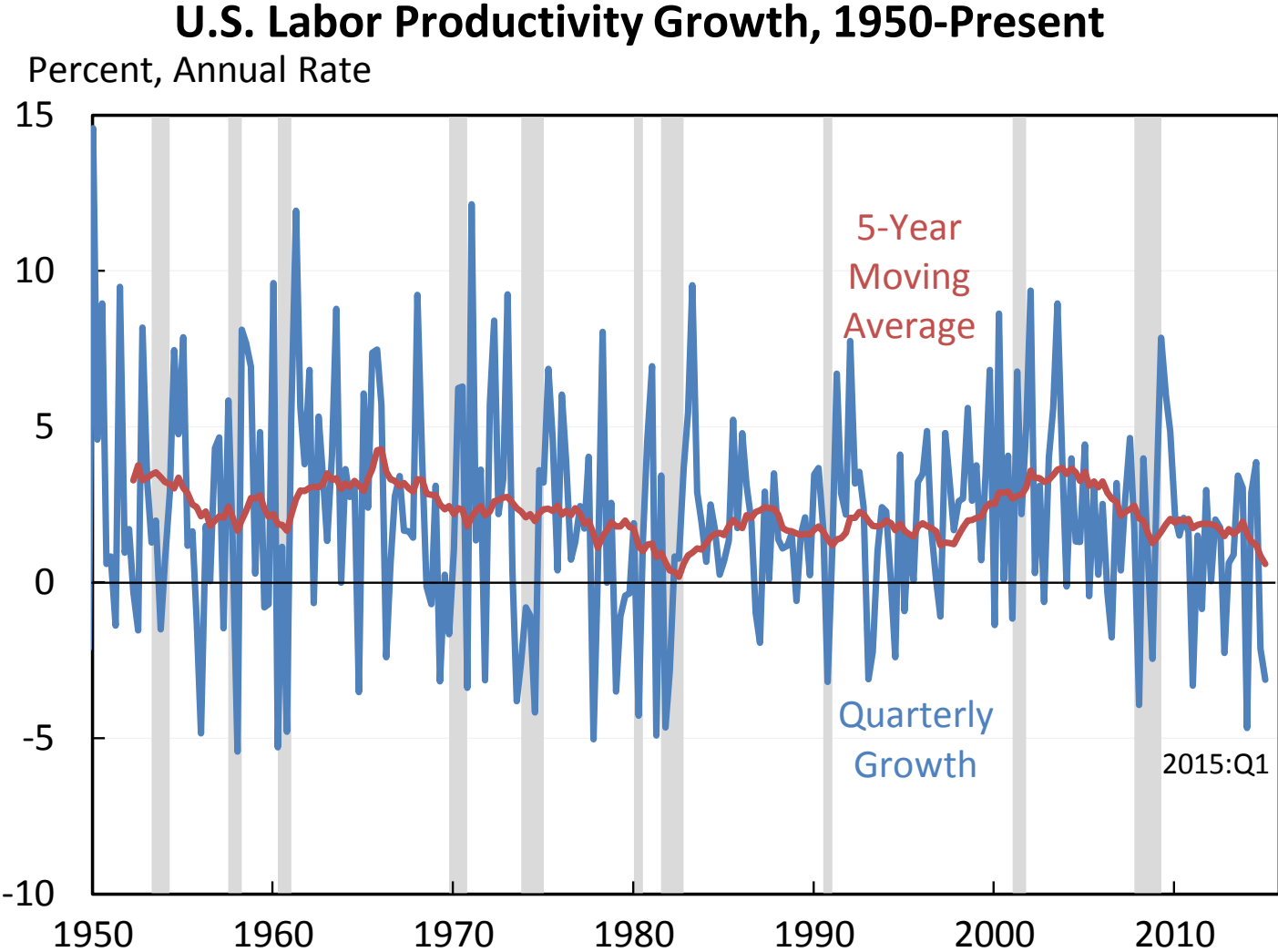
Productivity Growth in the Advanced Economies: The Past, the Present, and Lessons for the Future

Jason Furman
Chairman, Council of Economic Advisers



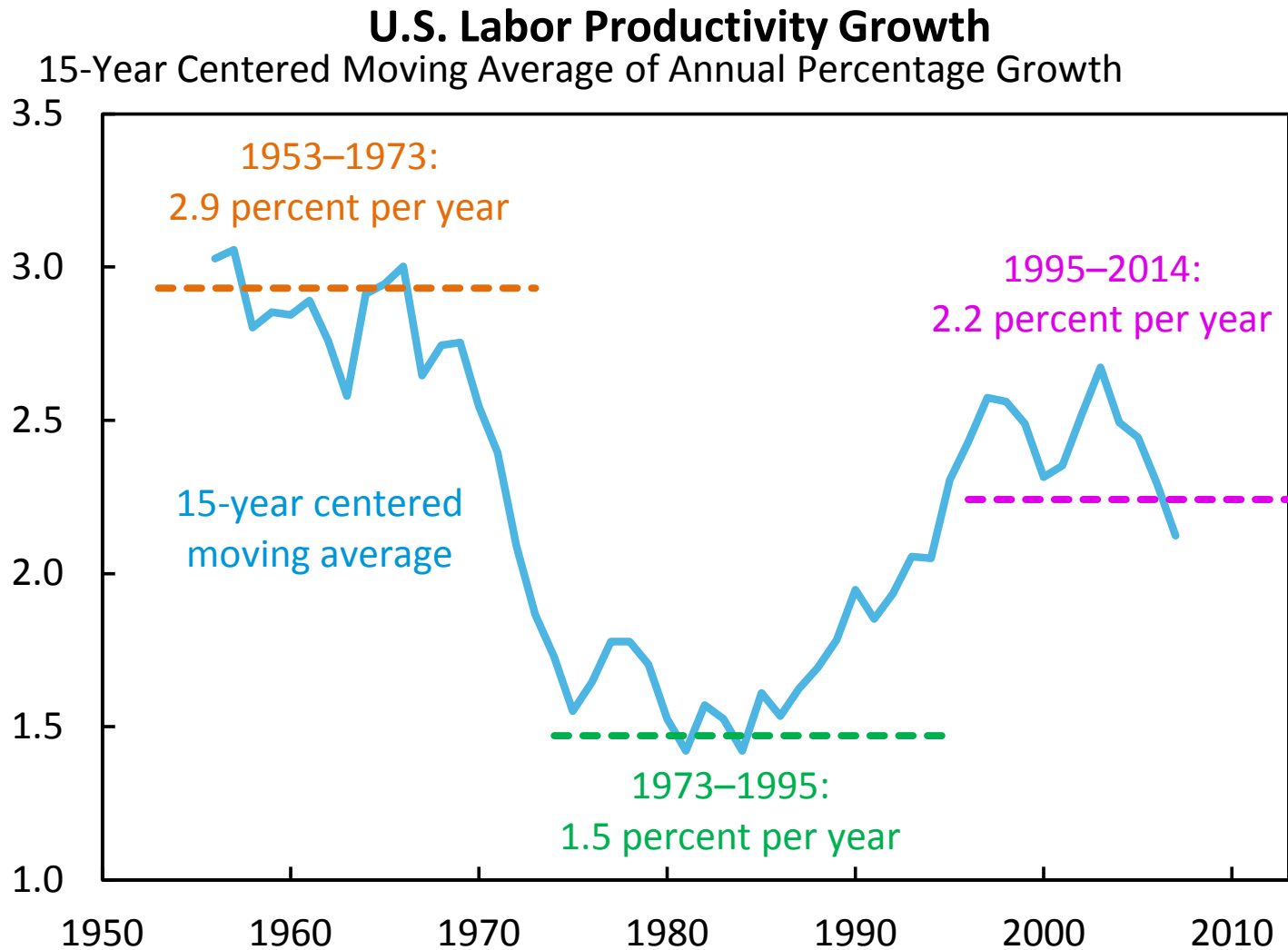
Peterson Institute for International Economics
July 9, 2015

Labor Productivity Data are Notoriously Volatile



Note: Data reflect quarterly releases of labor productivity for the nonfarm business sector. Shading denotes recession.
Source: Bureau of Labor Statistics.

Three Periods of U.S. Productivity Growth

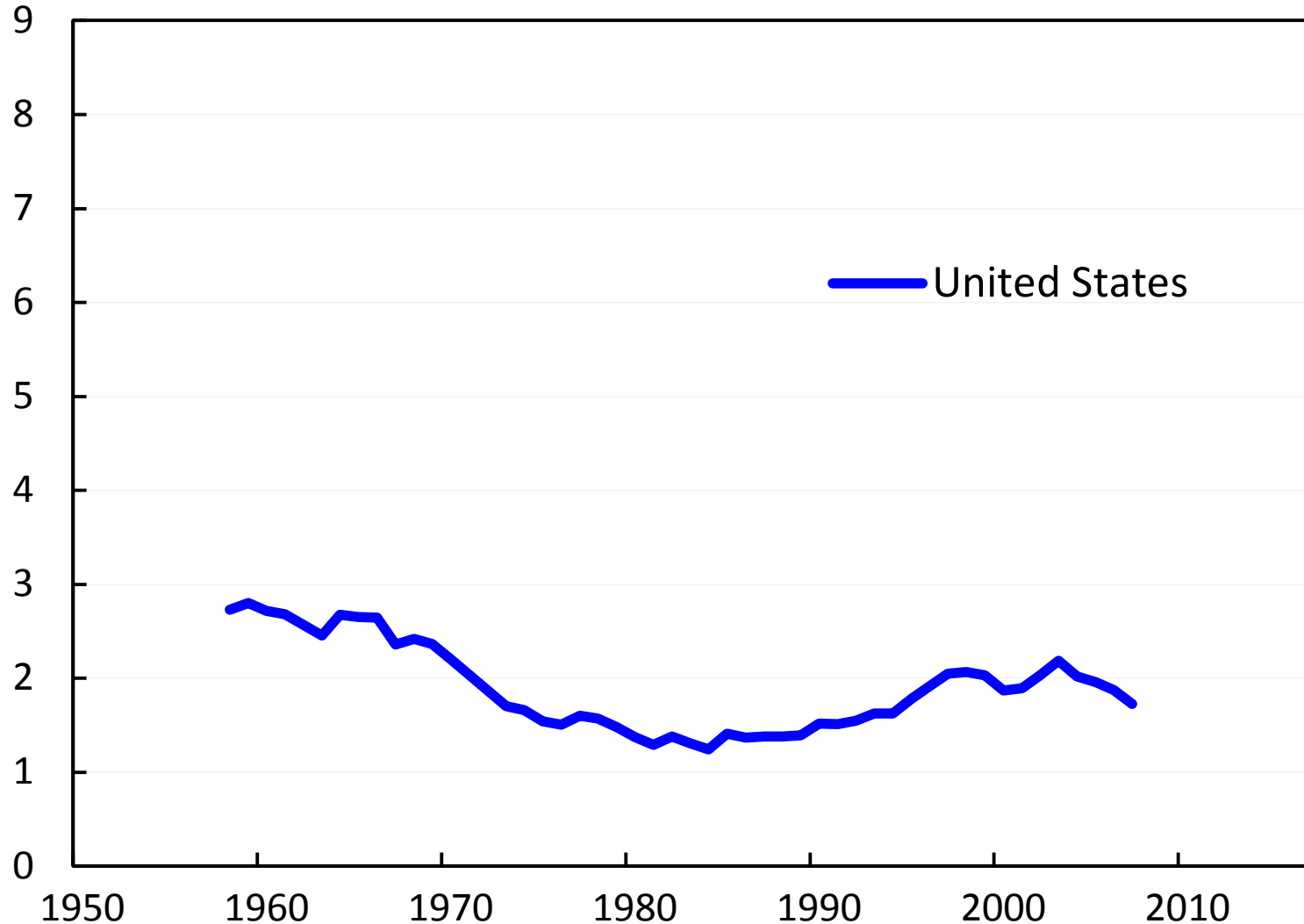


Note: This figure—and all subsequent references to U.S. labor productivity reported by the Bureau of Labor Statistics in these remarks—references real output per hour worked in the private nonfarm business sector (excluding government enterprises). The dotted lines divide the last 60 years into three periods that broadly reflect three "episodes" in productivity growth for the private nonfarm business sector.
Source: Bureau of Labor Statistics.

Three Periods of U.S. Productivity Growth

Labor Productivity Growth, 1950-2014

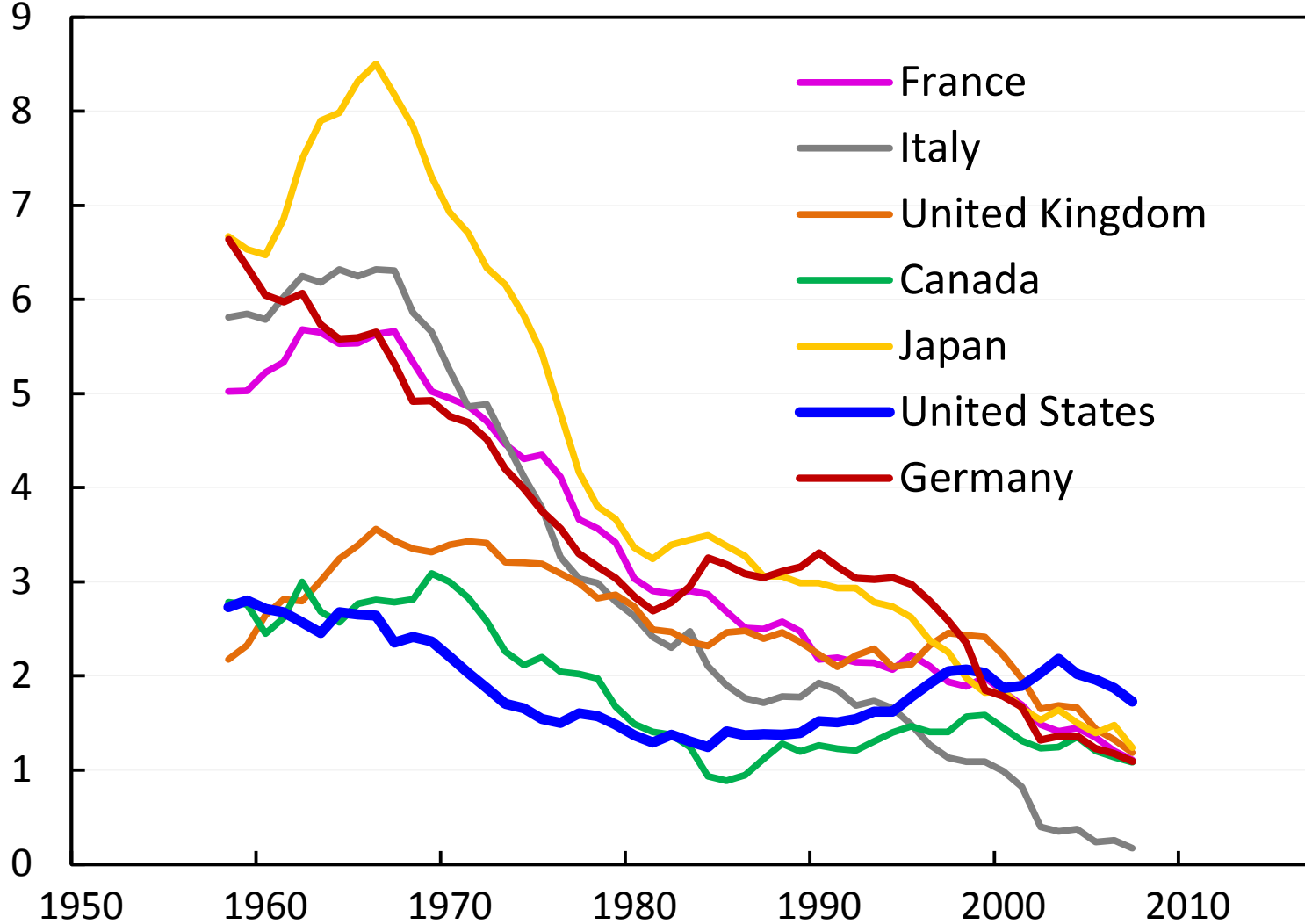
15-Year Centered Moving Average of Annual Percentage Growth



Most G-7 Nations Have Seen Declining Productivity Since the 1970s

Labor Productivity Growth, 1950-2014

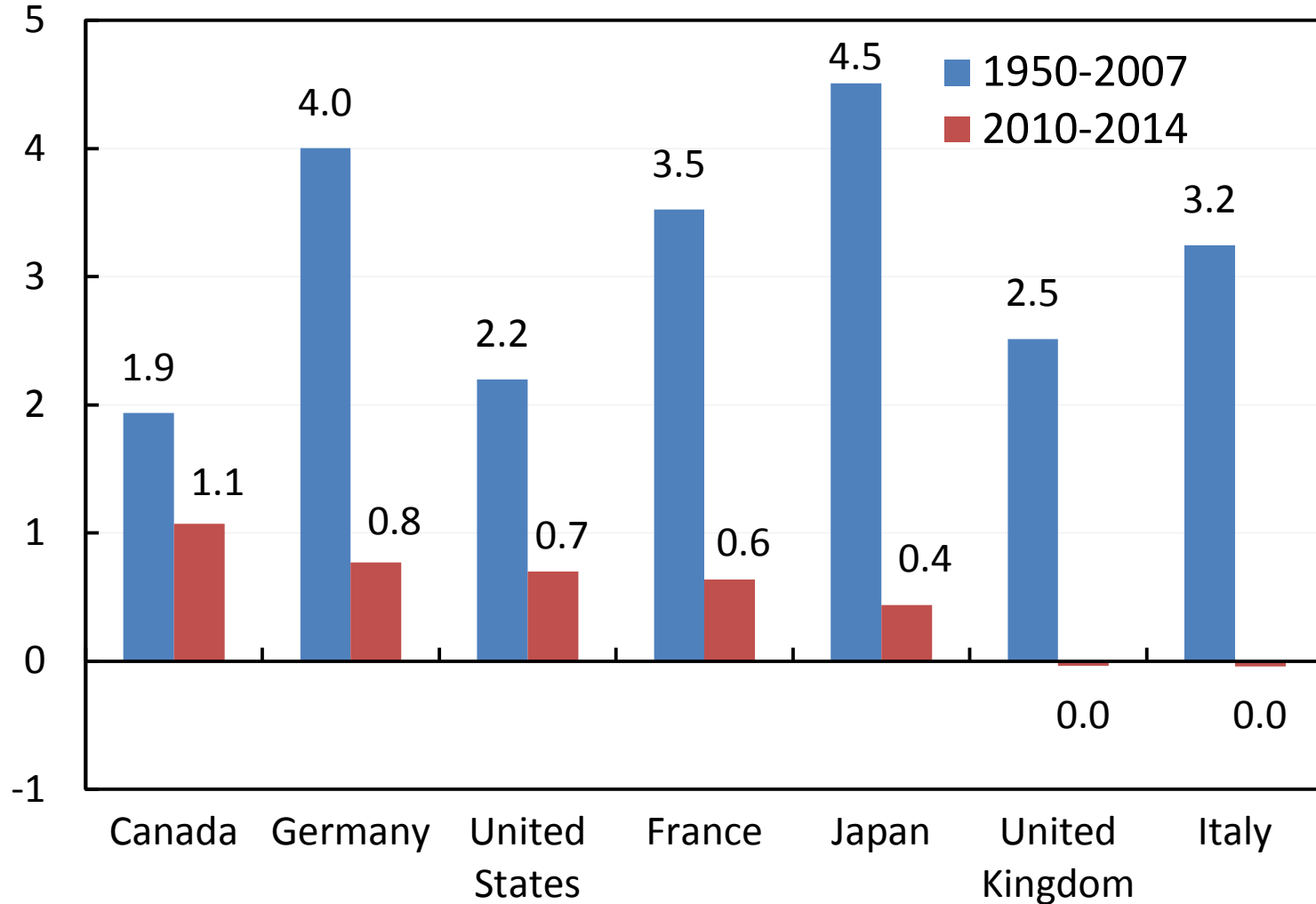
15-Year Centered Moving Average of Annual Percentage Growth



All G-7 Economies Have Seen Slower Productivity Growth in this Recovery

Labor Productivity Growth in the G-7

Percent Change, Annual Rate



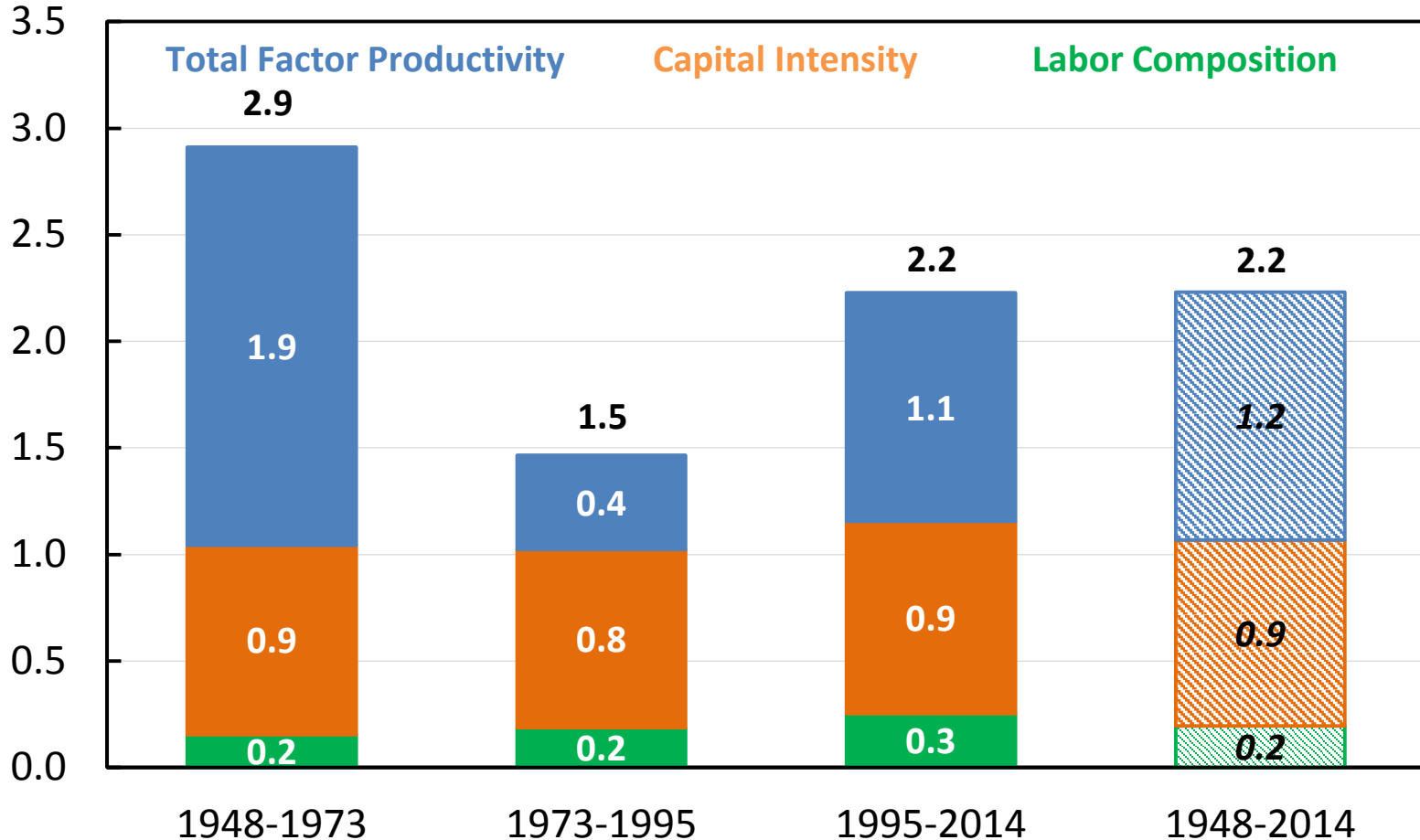
Note: For all nations except the United States, productivity growth rates are those reported in the Conference Board Total Economy database; for the United States, the Bureau of Labor Statistics' productivity series for the private nonfarm business sector is used.

Source: Conference Board; CEA calculations.

Most Historical Variation in U.S. Productivity Growth is Accounted for by TFP

Sources of Productivity Growth Over Selected Periods

Percentage Points, Annual Rate

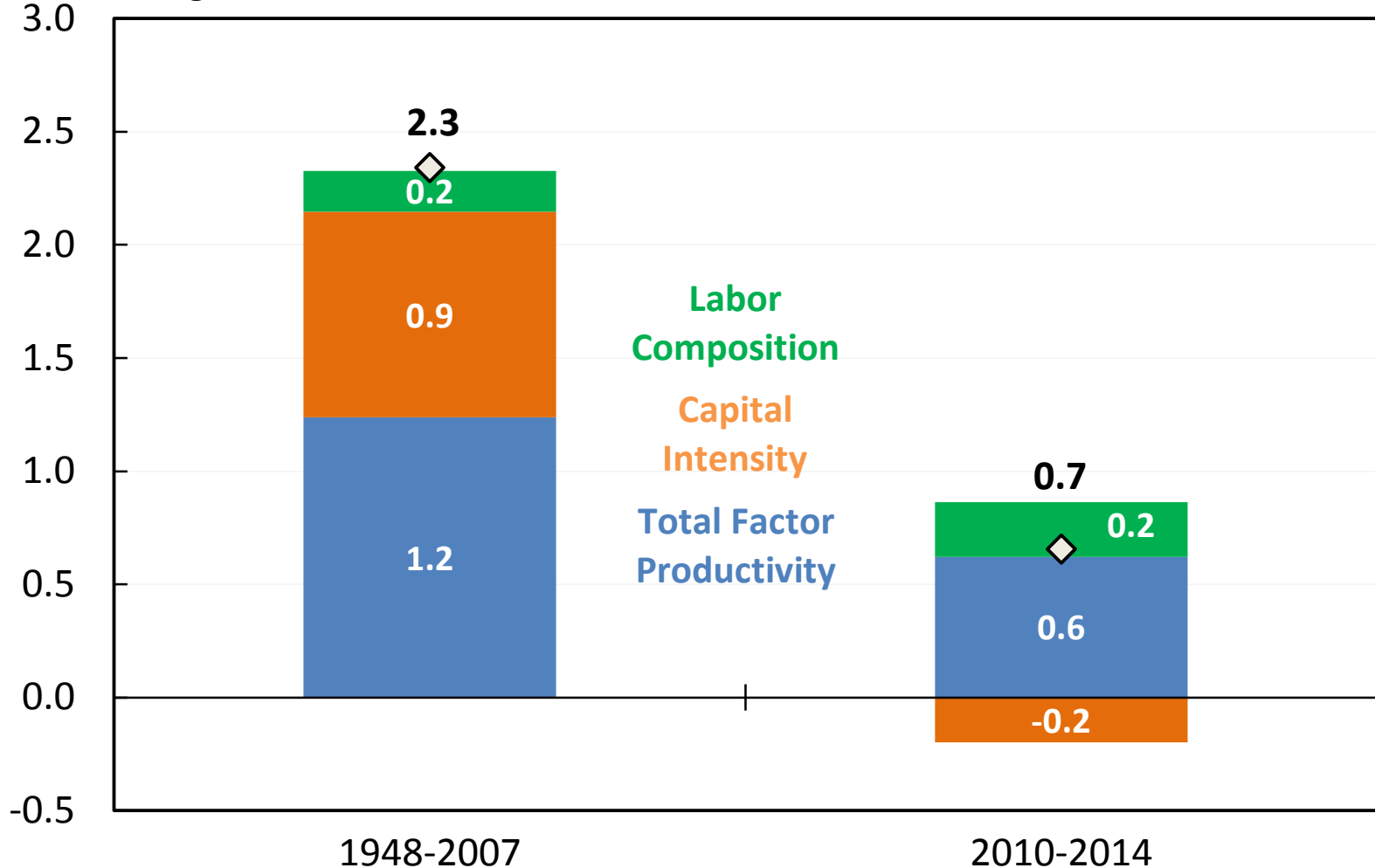


Note: Displayed series are the contributions to labor productivity growth in the private nonfarm business sector.
Source: Bureau of Labor Statistics; CEA calculations.

But the Recent Slowdown is Mostly the Result of Capital Deepening

Sources of Productivity Growth, 1948-2007 vs. 2010-2014

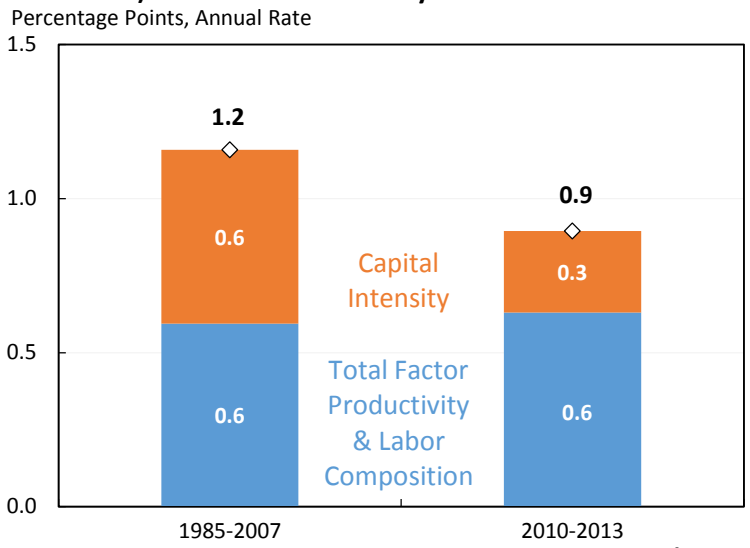
Percentage Points, Annual Rate



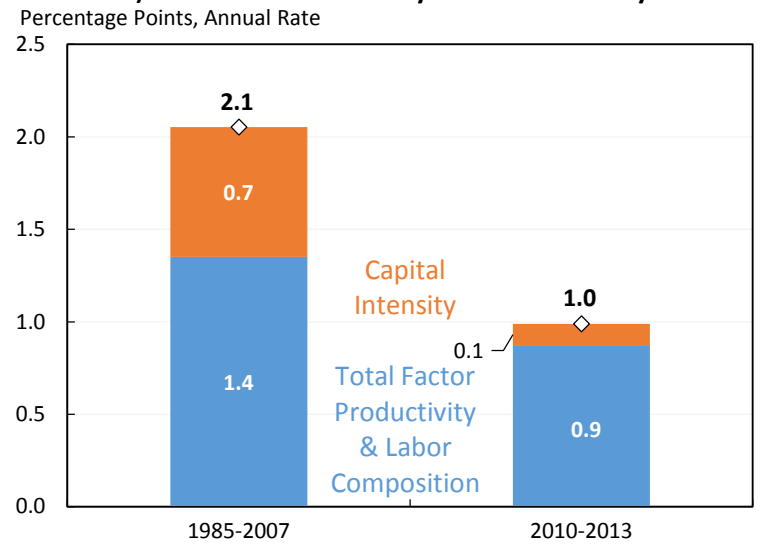
Note: Displayed series are the contributions to labor productivity growth in the private nonfarm business sector.
Source: Bureau of Labor Statistics; CEA calculations.

The Productivity Slowdowns in Canada, Germany, and Japan Have Also Been Investment-Driven

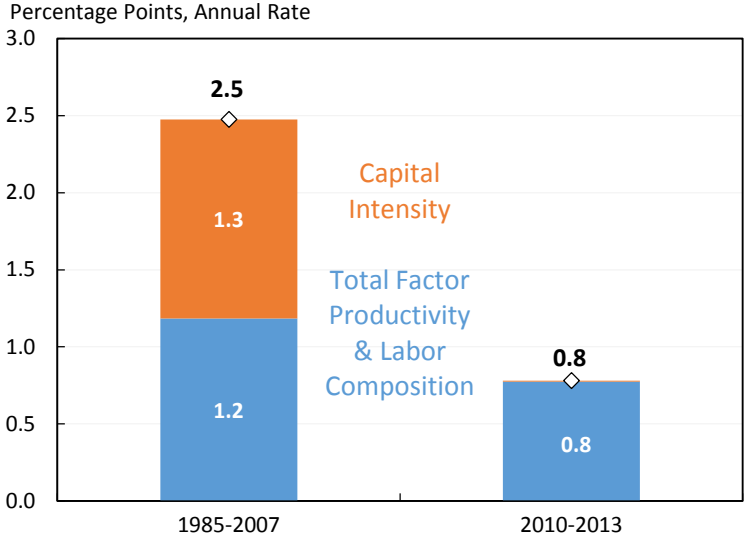
a) Sources of Productivity Growth: Canada



b) Sources of Productivity Growth: Germany



c) Sources of Productivity Growth: Japan

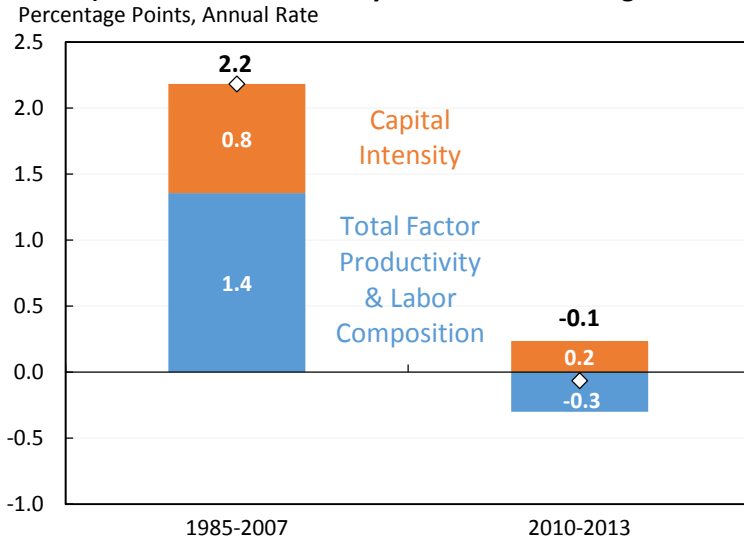


Note: Total labor productivity growth and total multifactor productivity growth (including labor composition changes) for the displayed nations are reported by the OECD. The contribution of capital deepening is inferred as the difference between the two.

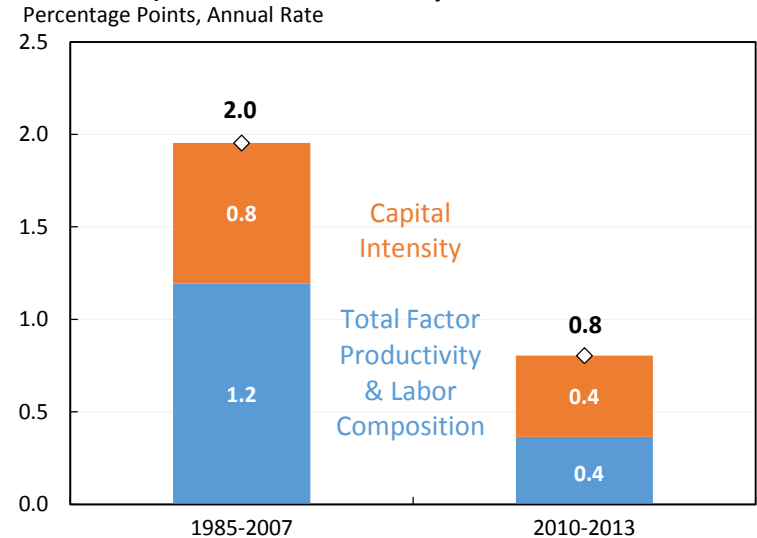
Source: Organisation for Economic Co-operation and Development.

But Lower TFP Growth Explains Most of the Slowdown in France, Italy, and the United Kingdom

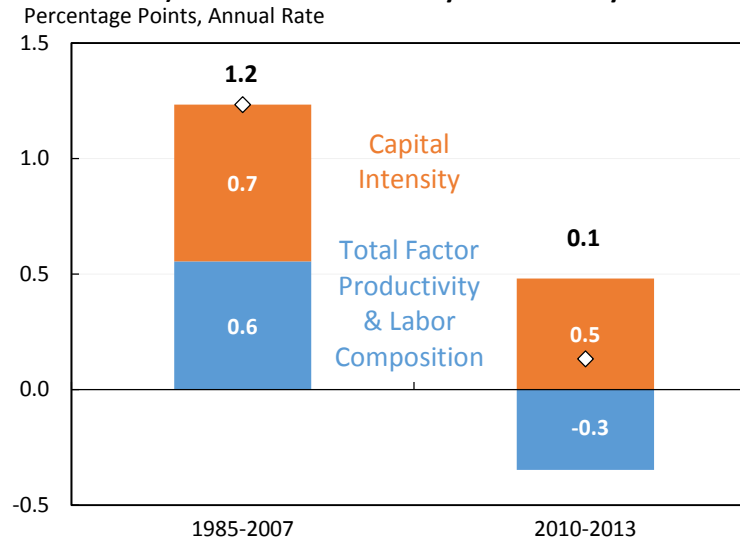
d) Sources of Productivity Growth: United Kingdom



e) Sources of Productivity Growth: France



f) Sources of Productivity Growth: Italy



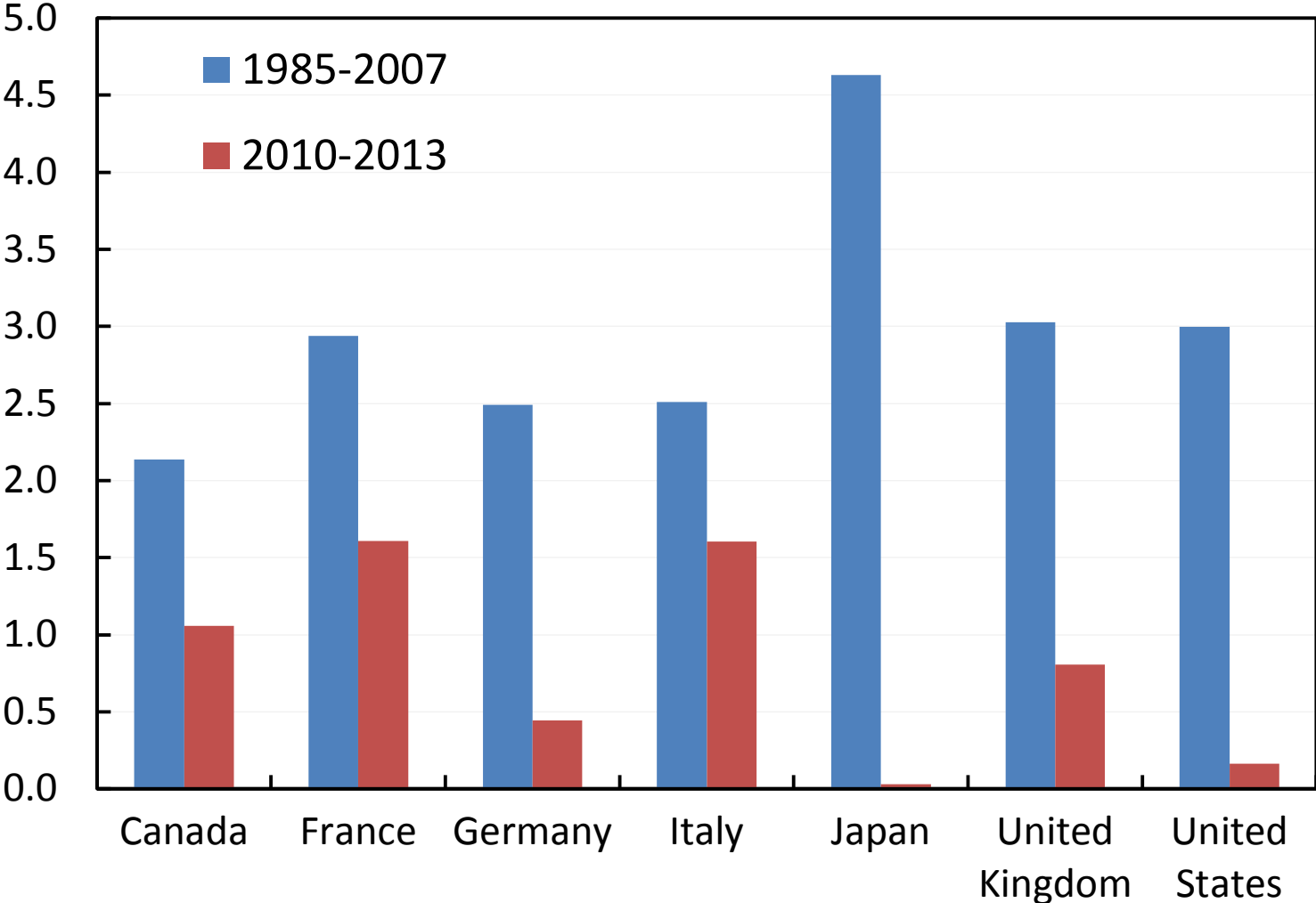
Note: Total labor productivity growth and total multifactor productivity growth (including labor composition changes) for the displayed nations are reported by the OECD. The contribution of capital deepening is inferred as the difference between the two.

Source: Organisation for Economic Co-operation and Development.

Capital Deepening Has Slowed Across the G-7

Capital Deepening in the G-7

Percent Increase in Capital Intensity, Annual Rate

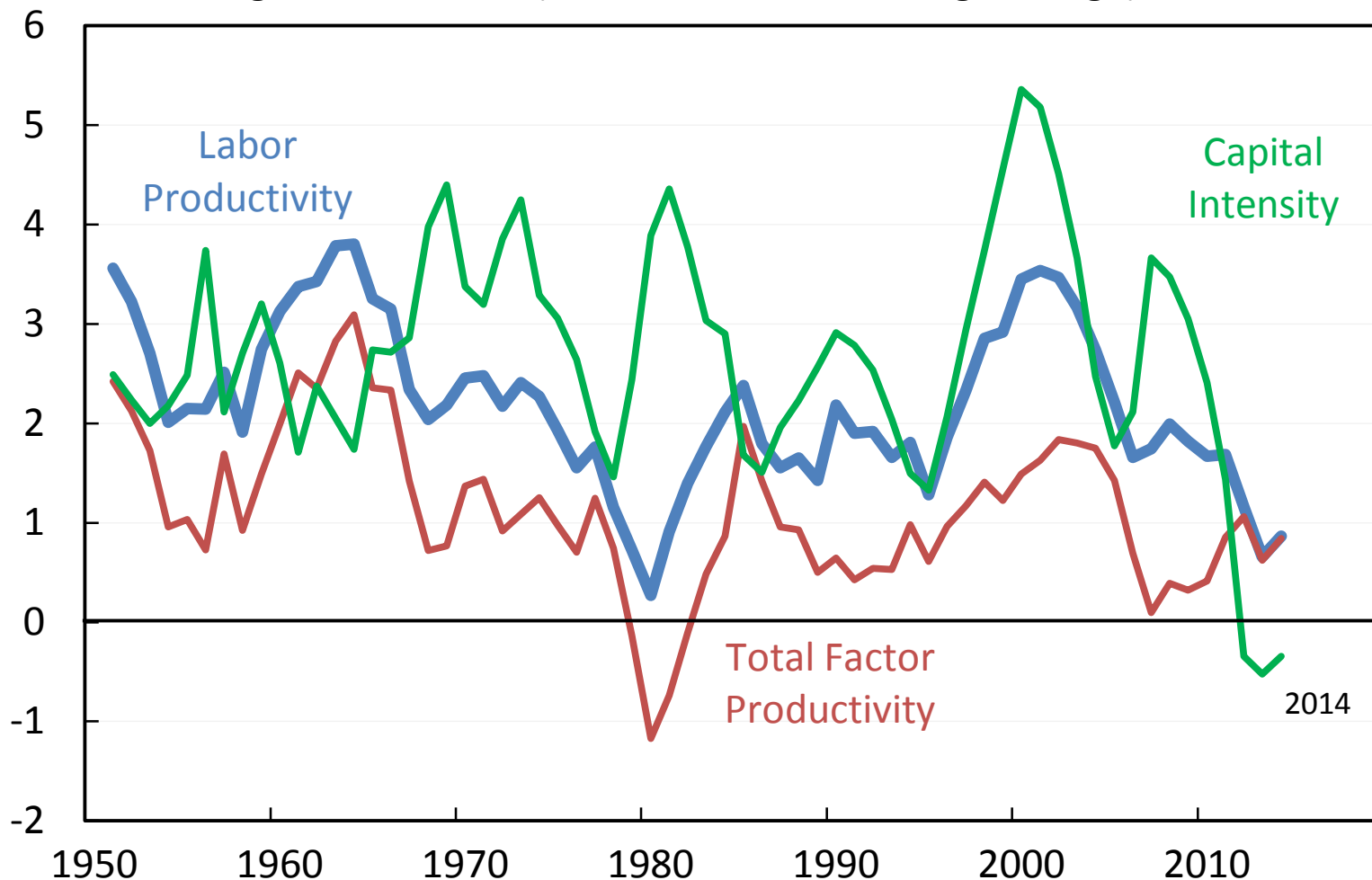


Note: Capital intensity is defined as capital services per hours worked of all persons. Capital deepening is the percent increase in capital intensity.
Source: Organisation for Economic Co-operation and Development; CEA calculations.

Labor Productivity and TFP Usually Move Together, but Diverged Around the Crisis

Labor Productivity and Major Components

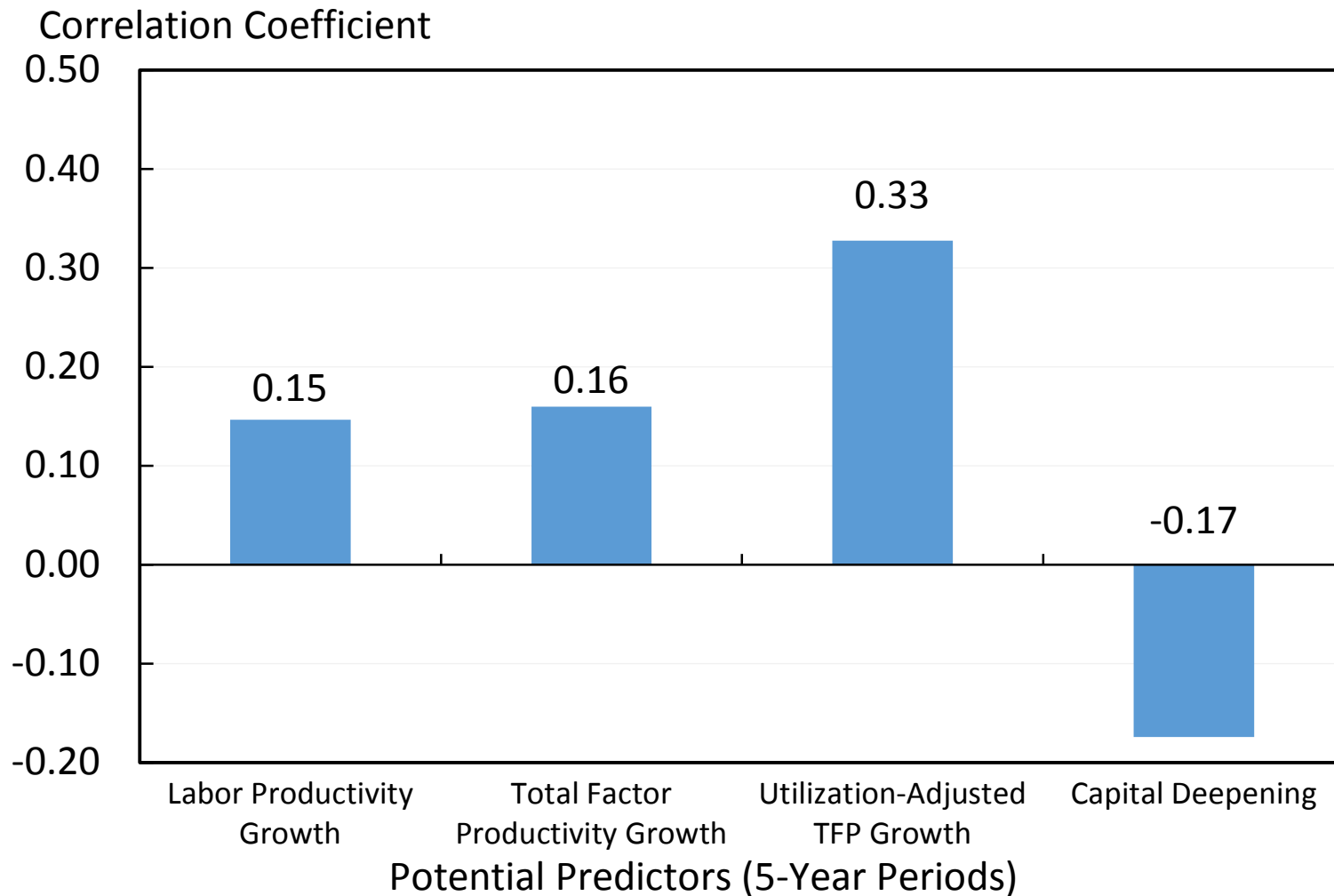
Percent Change, Annual Rate (5-Year Centered Moving Average)



Note: Capital intensity is defined as capital services per hour worked.
Source: Bureau of Labor Statistics; CEA calculations.

TFP is a Better Predictor of Future Productivity Growth After Adjusting for Factor Utilization

Correlation of Five-Year Productivity Growth with Prior Five Years' Growth in Potential Predictors

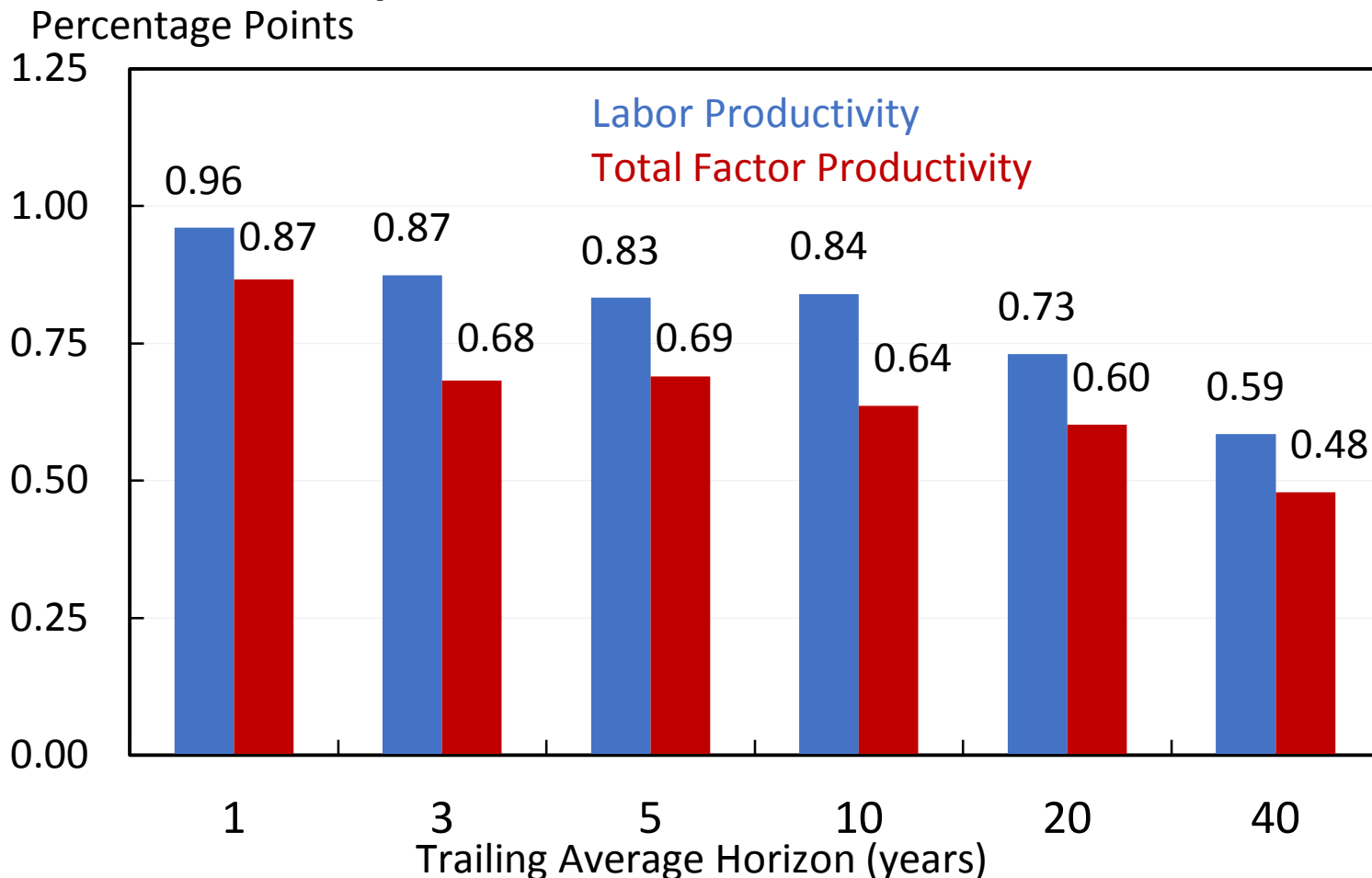


Note: The displayed correlation coefficients result from the comparison of a five-year moving average of labor productivity growth with a five-year lag of five-year moving averages of the potential predictors. Accordingly, they reflect the ability of the predictors averaged from years t to $t+4$ to predict labor productivity growth from years $t+5$ to $t+9$.

Source: Bureau of Labor Statistics; Federal Reserve Bank of San Francisco; CEA calculations.

Trailing Averages of Productivity Growth are Better Predictors When the Historical Window is Longer

Average Absolute Forecast Error from Using Trailing Average Productivity Growth to Forecast the Next Five Years

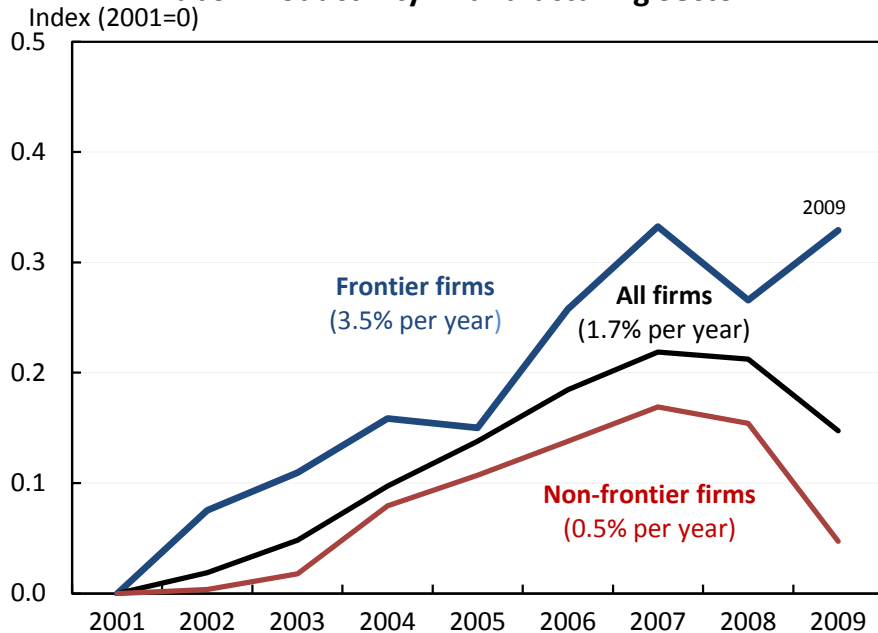


Note: This analysis follows the general methodology adopted in Goldman Sachs Research, 2014. "US Daily: Trend Productivity Growth: 2% Still Seems About Right (Mericle)." The displayed values are the average absolute difference between trailing averages of growth in the given productivity series (for the given horizon) and averages of the next five years' growth in the given series, from 1988 to 2008. This is the longest period over which the calculation can be performed for a forty-year time horizon.

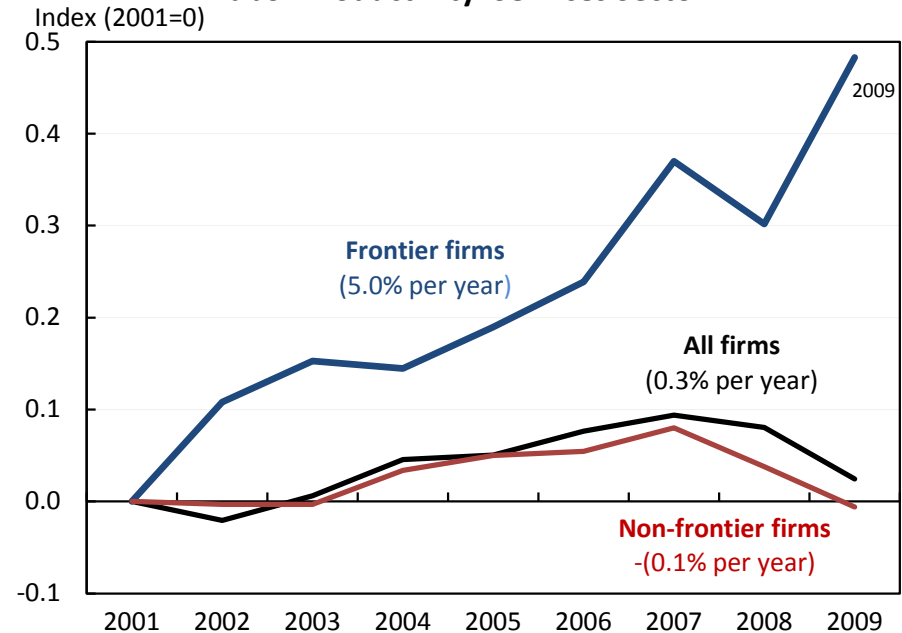
Source: Bureau of Labor Statistics; CEA calculations following Goldman Sachs (2014).

OECD: Firms at the Productivity Frontier Have Seen Continued Robust Productivity Growth

Labor Productivity: Manufacturing Sector



Labor Productivity: Services Sector



Note: These figures are adapted from the OECD's 2015 work *The Future of Productivity*. "Frontier firms" corresponds to the average labor productivity of the 100 globally most productive firms in each 2-digit sector. "Non-frontier firms" is the average of all other firms. "All firms" is the sector total.

Source: Organisation for Economic Co-operation and Development. 2015. *The Future of Productivity*. Andrews, D., C. Criscuolo and P. Gal (2015). "Frontier firms, technology diffusion and public policy: micro evidence from OECD countries," OECD Mimeo.

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