Alan Greenspan remarks as prepared

IMF Forum: *Statistics for Policymaking-Identifying Macroeconomic and Financial Vulnerabilities* (Nov. 18, 2014)

In recent years, the foundations of modern economic policymaking have been severely shaken, first by back-to-back financial bubbles—dot-com stocks and subprime mortgages—and then by an unexpected six years of economic stagnation. The macro models of all prominent global forecasters failed to capture the magnitude of these crises in advance.

In retrospect, both economic upheavals were initiated by financial crises, as has been the case for virtually all such episodes dating back into the early 19th century. U.S. nonfinancial private business exhibited little cumulative weakness leading up to the 2008 crisis. In early 2007, American nonfinancial corporate balance sheets and cash flows appeared in as good a shape as I can ever recall. Short-term debt as a share of total liabilities was close to the lowest levels since the end of World War II. Liquid assets relative to short-term liabilities were at exceptionally high levels historically, and net worth as a ratio to assets, unconsolidated, was several multiples higher than that of financial intermediaries. To be sure, household debt was elevated, but the crisis was not initiated by a slowing of consumer demand, but an evaporation of credit availability. Finance, on the other hand, was exceptionally highly leveraged—for some banks tangible capital was as low as 3 percent.

The 2008 crisis, and indeed virtually all such crises that dot U.S. and global economic history, was the result of a failed, overleveraged financial system. To make matters worse in 2008, private risk management failed, as did our credit rating agencies and most all regulatory buffers.

Financial Supervision and Regulation

What type of financial supervision and regulatory structure could have muted, and arguably defused, the American financial serial contagion of 2008? Aside from fraud, I know of no financial structure problems following the Lehman default that could not have been contained had financial intermediaries' capital and collateral been adequate. Debt default, and default contagion, by definition, could not have occurred.[1]

Most bankers argue that a rise in financial intermediary capital requirements would markedly reduce the rate of return on bank equity and force them to retrench or liquidate. American banking history, however, suggests otherwise. From 1869 to 1966, net income as a percent of equity capital ranged predominantly between 5 percent and 10 percent annually (Exhibit 1). The rate of return on capital has drifted higher in the years since, reflecting a marked expansion in the legal scope of commercial bank powers and the onset of securitization. If net income as a percent of equity capital were constant, a change in capital requirements as a percent of assets would necessarily move proportionately with the ratio of net income to assets.[2] Historically, net income as a percent of equity capital has not quite been wholly stable, but competitive arbitrage has clearly been a potent force that has converged *risk-adjusted* rates of return on equity capital across industries and countries.

If net income as a percent of equity remains in the narrow range that it has occupied for almost all of the last century and a half, an increase in regulatory capital requirements would presumably pressure loan spreads (income as a ratio to assets) to widen to restore the historic rate

[1] Contingent convertible (CoCo bonds), with spreads over debentures of an average of X percentage points, are developing into a broad market in Europe, with issuance of approximately $50 billion. In the U.S., regrettably their issuance is thwarted by unfortunate tax and other regulatory restraints.

[2] If π=net income, E=equity capital, and A=assets, then $(\pi/E)=(\pi/A)\cdot(A/E)$. Therefore, if π/E is a constant, K, then $(E/A)\cdot K=(\pi/A)$.

of return on capital. To the extent that net income-to-equity margins are not fully offset, the degree of intermediation may lessen. But that would not be all that undesirable.

This raises the question of, what is the optimal level of financial intermediation? Some, of course, is essential. Barter is not a viable alternative. But too much intermediation, especially that driven by animal spirits, can bring us the subprime mortgage breakdown of 2008 and the broker loan crisis of 1929. A modestly lower level of intermediation is a small price to pay for insurance.

Adequate capital can prevent default contagion following the collapse of a bubble. It cannot, however, prevent bubbles whose roots lie in human nature. While all bubbles burst, only those supported by significant leverage are truly economically disruptive. The recession following the dot-com boom is barely visible in GDP data.

Bubbles

Bubbles reflect the inbred propensities of euphoria, fear, herding, inertia, and a long list of repetitive and often forecastable responses to economic outcomes. The investor confidence that emerges in the wake of a period of protracted prosperity, with moderate inflation, invariably engages herding behavior that propels speculative markets ever higher until they inevitably deflate. Only monetary policies that severely clamp down on inflationary bubbles will defuse them, as the Volcker Fed demonstrated in 1979. Incremental defusing of bubbles, an often expressed policy recommendation, has never worked in the United States. Bubbles, the result of a period of euphoria, are a market phenomenon. They did not emerge in the former Soviet Union, nor in today's North Korea.

People's behavior in the marketplace has always been the result of a combination of rational thought and, as John Maynard Keynes put it, "animal spirits." Only business decisions ultimately based on rational perceptions of how the physical world behaves can propel productivity and standards of living ever higher. Material progress derives from actions based on reasoned insights, for example, advances in engineering and quantum mechanics. Random irrationality, driven by animal spirits, produces nothing of lasting material value.

The data economists use for analysis and policymaking reflects the *actual* behavior of people, driven by a combination of reason and spirits. The new school of "behavioral economics" has contributed significantly to our understanding of what propels markets subject to intuitive probabilities of day-by-day decisions, not their objective probabilities. People's perceived probability of contracting Ebola is many multiples of actual medical—that is, reasoned—probabilities.

One representative statistic that combines the rational- and "spirits-" based behavior is stock prices. They are driven in the long run by the underlying earnings of companies, and in the short run by the spirits-driven behavior of investors and speculators in the marketplace that shapes price-earnings ratios.

Because animal spirits surface only in combination with rationality, we need to create a means of separation. A key determinant, if not *the* determinant, of earnings growth (and stock prices) is productivity (Exhibit 2)—in the end, a product of reasoned insights, I would thus expect that stock price movements, statistically stripped of such long-term, reason-driven growth, would reflect most of animal spirits' impact on stock prices, as well as the random results of rational, but mistaken, judgments of the future—that is, all forces that do *not* contribute to real GDP growth.

I first adjust the daily changes in America's Standard & Poor's 500 stock price index for the growth in real earnings per share over the 15,858 days the markets were open during the years 1951 to 2013. The resulting series of adjusted daily stock price changes since 1951 traces a bell curve where the x-axis is the size of the adjusted daily percentage stock price change (separated into incremental buckets defined by the size of the daily change, ranging from "greater than 5 percent *decrease*" to "greater than 5 percent *increase*"), and the y-axis is the number of market days in the six-decade sample that fall in each specified bucket (Exhibit 3). To display the extent to which this distribution varies from a normal distribution depicting wholly chance events, I calculated a normal distribution whose mean and standard deviation were set to match those of the distribution of the adjusted sample of stock price changes (shown as a logarithmic first difference to avoid the percentage bias).

Human decision making as represented by our near 16,000-day sample has characteristics quite similar to a reason-associated normal distribution, but with some notable differences.

First, stock market trading appears to be significantly subject to greater inertia—which is to say, periods with no meaningful change in stock price levels—than would be the case if behavior were wholly randomly driven. This includes "negative spirits", that is, action less than would otherwise be expected if the propensity to trade stocks were wholly random. It clearly is not. Sixty-seven percent of the 16,000 daily adjusted price changes occur between -0.7 percent and +0.7 percent, compared with 53 percent expected for a normal distribution.

Second, a bulging of the tails of the distribution evidently takes hold when daily price change exceeds 3 percent in either direction. I attribute this bulging of the tails to herding instinct—that is, people's propensity to follow the crowd. This is a response of spirit-driven market participants whose actions demonstrably tend to enlarge above-average price movements,

in both directions. Herding apparently does not take hold until evidence of rising momentum in stock prices engages such behavior. Presumably, small price changes do not do that. It is not until enough market participants unthinkingly follow the "price leader" that generalized herd instinct is apparently engaged. Herding accounts for the large bulge in both tails of the distribution relative to a normal distribution.

Third, the data also portray a significant asymmetric bias of fear being a more powerful driver of large price change than euphoria. The asymmetry is particularly evident in the fact that daily losses of 5 percent or more significantly outnumber daily gains of 5 percent or more over a sixty-three-year period of daily price change. The remainder of the buckets largely capture intermediate price changes (between 1 and 3 percent), positive or negative.

But what I find most intriguing is that these data convey an ever widening standard deviation (variance) through time of the sixty-three separate annual samples of approximately 250 days each since 1972, after a period of stability during the previous two decades of annual distributions. A five-year moving average of those sixty-three annual observations is shown in Exhibit 4.[3] Exhibit 5 demonstrates that during the years 2008 to 2013, herding and the fear-euphoria imbalance were far more prevalent than in recent years. In short, the sample data exhibit a visible shift of daily price change to ever larger percentage increases—and as a result, they portray progressively fattened tails, especially since the 2008 crisis, compared with the years 1951 to 1969.[4] The rise in the proportion of animal-spirits-driven economic activity is reflected in a significant shift from inertia to herding.

[3] Because each year's observations include approximately only 250 days in which the markets were open and are thus subject to wide sampling error, I chose the five-year average to infer the trend.

[4] The traditional twenty-one-day standard deviation exhibits a mild uptrend as well. But it is less pronounced than my five-year moving average. Trends in VIX are still even less pronounced. But it implies a forecast, whereas the twenty-one-day moving average does not.

The larger the standard deviations, presumably the larger the proportion of economic outcomes determined by animal spirits. The more decision making that is detached from reality, the more likely it is to be infected by spirits—especially during euphoria-driven bubbles and their subsequent fear-driven demise.

Moreover, the data also imply that the acceleration of the standard deviation must be a relatively recent phenomenon. As can be seen in Exhibit 4, that acceleration is evident only since 1972. Animal spirits as a driver of economic outcomes conceivably has been rising relative to the prevalence of rational decisions. If true, that could possibly explain why we experienced the housing bubble (2000s) immediately following the dot-com bubble (1990s). Two observations, however, are scarcely statistically compelling.

Secular Stagnation

Policymaking, by definition, comprises the actions taken to direct the path of an economy toward specific goals. With six years of subnormal growth in our immediate past, for effective policymaking it is essential that we know the nature of the "secular stagnation" (the depression-era term of Harvard's Alvin Hansen) that afflicts us. The void is most evident in the United States. One way to measure its cause is to disaggregate U.S. GDP, not in terms of the usual categories of consumption expenditures, investment, and government outlays, but by the distribution of the expected duration—that is, life expectancy—of the products produced.

Employing data mainly from the Bureau of Economic Analysis, I constructed a series of the average maturity or durability of personal consumption expenditures and private fixed investment (combined, they compose between eight and nine tenths of total GDP). Software, according to the BEA, lasts 3.5 years, industrial equipment 19 years, nonresidential structures 38

years, and homes approximately 75 years. Where there are no official estimates, I fill in the missing numbers—mainly for short-lived services—haircuts one month, for example. Not unexpectedly, the resulting series closely parallels its major weighted component, the share of long-lived equipment and structures in GDP, both residential and nonresidential (Exhibit 6).

Given the tight convergence of the average maturity of GDP and the ratio of investment to GDP, I have chosen to employ the latter, a simpler and more generally globally available statistic than average maturity. In Exhibit 7, I plot nominal gross fixed capital formation as a percent of GDP for the United States, the Eurozone, and the OECD countries in aggregate. In this context, the apparent statistical source of the stagnation is evident. Following the 2008 crisis, private investment's share of GDP fell sharply across the globe, with only a few exceptions. Long-lived assets, proxied by capitalized investments, accounts for almost all of GDP shortfall since from 2007 in the U.S., and much of the shortfall in other OECD countries.

Expected income projections from long-lived assets are exhibiting particularly large variances and accordingly are being heavily discounted. In the U.S., in addition to discounting in the business sector, the homeownership rate has declined sharply from 69 percent in 2004 to only 64 in the third quarter of 2014, reflecting households' shift from long-lived investment in homes to one- to to-year rentals and leases.

Business executives withdraw from long-term investment commitments when the outlook for the distant future becomes increasingly uncertain. For U.S. corporations, our sensitive measure of the degree of that uncertainty is the share of liquid cash flow they *choose* to invest in illiquid long-term assets.

In 2009, capital expenditures as a share of cash flow for U.S. nonfinancial corporate business were at their lowest peacetime levels since 1938. The recovery since has been modest.

The increasingly heavy discounting of long-lived physical assets in the United States is reflected in a dramatic rise in the interest rate spread between thirty-year and five-year U.S. Treasury obligations; the latter maturity is beyond the horizon of most business cycles. In late 2010, this highly statistically significant measure portrayed a yield spread that was wider than at any time in American history (Exhibit 8). The rapid rise in the term structure of rates implies an increasingly heavier discounting of income from assets expected to be produced beyond five years.

Some business uncertainties are easy to identify, such as tax rates whose future level is clouded by heavy U.S. federal debt and prospective budget deficits. Global warming is real, but with uncertain economic implications. In addition, the recent upheavals in Ukraine and the wholly unwelcome emergence of ISIS have added more uncertainty to the outlook. Russian expansion in Ukraine seems to have been temporarily suppressed by the consequent sharp fall in the Ruble and decline in oil prices that threaten Russian economic stability.

Particularly troubling in the United States is the huge shortfall in tax revenue owing to a six-year period of subnormal taxable incomes. Our budget spending projections, however, guided mainly by retirement demographics, not taxable income, has created major shortfalls in funding. The increasing underfunding of entitlements has been eroding gross domestic savings, seemingly on a dollar-to-dollar basis (Exhibit 9). That has led to a decline (as a percent of GDP) in gross domestic capital investment, even after increased borrowing of savings from abroad (Exhibit 10). That, in turn, has slowed the growth in America's capital stock (Exhibit 11), causing a slowing in output per hour and hence in the average real compensation of our workforce (Exhibit 12), which, given the rise in capital gains, has increased income inequality. Moreover, capital appears to be slowing to a near halt (Exhibit 13).

Fiscal Stimulus

Exhibit 14 displays savings minus investment by households, business, government, and net borrowing of savings from the rest of the world. The sum of the foregoing sectors, leaving out a small statistical discrepancy and transfers, must be equal to zero. Thus any increase in the government deficit, for example, must show up as savings exceeding investment in the remaining sectors of the economy—households, business, and foreign accounts—by exactly the amount that the government deficit increased.

More dynamically, as government deficits rise, some private capital investments, especially those financed with less-than-investment-grade debt, tend to be crowded out. The Congressional Budget Office estimated that over the long run, a third of the deficit increase is crowded out. I obtain similar magnitudes in the short run as well. Under most circumstances, borrowing, a necessary component of fiscal stimulus, creates a nominal GDP increase and new savings, as Keynesian models demonstrate. But that still leaves a large proportion of the stimulus funded with government debt. New tax revenue flow, for example, has not consistently "paid for itself." Were it the case, lowering tax rates or raising spending would have little impact on government debt creation.

The U.S. government tried that policy in 1980 and failed. The large tax cut in the end created an increase in the federal deficit and debt. Similarly, I suspect that, should we engage in a major increase in federal expenditures on infrastructure such as highways and bridges, the associated increase in productivity would eventually appear as an indeterminate increased private sector taxable income. But the timing of such a sequence will be difficult to judge, and how

much addition tax revenue was obtained from the fiscal stimulus almost surely will be difficult to judge as well.

There is, of course, a limit to fiscal stimulus because it almost always requires the selling of securities to raise the cash to fund the stimulating investment. There is a limit to the ability to borrow. For example, Greece in 2011 and 2012 could borrow only at an interest rate that would have caused an explosive rise in interest payments and destabilizing deficits. Greece at that point could no longer productively borrow, and had the European Central Bank not opened a lending window for the necessary funds, deficit spending would no longer have been possible. The United Kingdom was in a similar bind in 1975 when it had to borrow from the IMF. Such crises have occurred in recent decades in Brazil, Argentina, and, most recently, Venezuela.

Current global fiscal policy thus has its limits. Private capital investment does not. American nonfinancial corporations, for example, have not been able to find profitable uses for all of their large cash flows in recent years, leading to an accumulation of investable funds. If large uncertainties about the future were significantly lessened, those liquid assets could fund large private capital investment opportunities without incurring debt, private or public. What can induce nonfinancial corporations who have consistently invested less of their cash flow to start to employ their formidable uncommitted liquid funds to investment and GDP without the incurrence of debt? Unless new uncertainties are created, uncertainty overall should gradually dissipate, releasing unspent private funds.

Quantitative Easing

Aside from fiscal stimulus and public policy that reduces business investment uncertainty, there is monetary policy. The central banks' set of quantitative easings (QEs) added

trillions of dollars to their balance sheet and, as a consequence of purchasing securities, drove interest rates on long-term securities to exceptionally low levels. Those long-term interest rates fostered increased price-earnings ratios on stocks and lowered capitalization rates on real estate. As I noted in *The Map and the Territory*, the large capital gains that emerged have been, as best I can judge, a major force in maintaining even the subdued levels of economic activity that have existed globally since the 2008 Lehman crash.

Capital gains have had a larger effect on economic activity in the United States than elsewhere. However, the three QE programs initiated by the Federal Reserve have had only modest direct impact on the lending activity that they support. In the American case, virtually all of the excess reserves engendered by the balance sheet expansions have laid dormant as reserve balances at Federal Reserve banks, which pay a competitive 25 basis points to attract those riskless balances. Given that very little in the way of capital requirements is required by the commercial banks on those deposits, there has been scarce willingness on the part of the banks to relend those deposits into the commercial markets to, for example, steel companies, retail establishments, consumers, and other borrowers. It is that process which, of course, creates the income multiplier and an expansion of economic activity. Very little such net lending has occurred as a result of any of the quantitative easing programs.

There is some evidence, however, that commercial and industrial loans in the United States broke out of their lethargy earlier this year and have undergone a marked increase. But, regrettably, not enough to increase aggregate borrowing throughout the U.S. economy and galvanize economic activity.

Thus, QE has succeeded in part in engendering capital gains and the equity stimulus that bolsters GDP. But it has done very little in the way of conventional monetary expansion that finances economic activity.

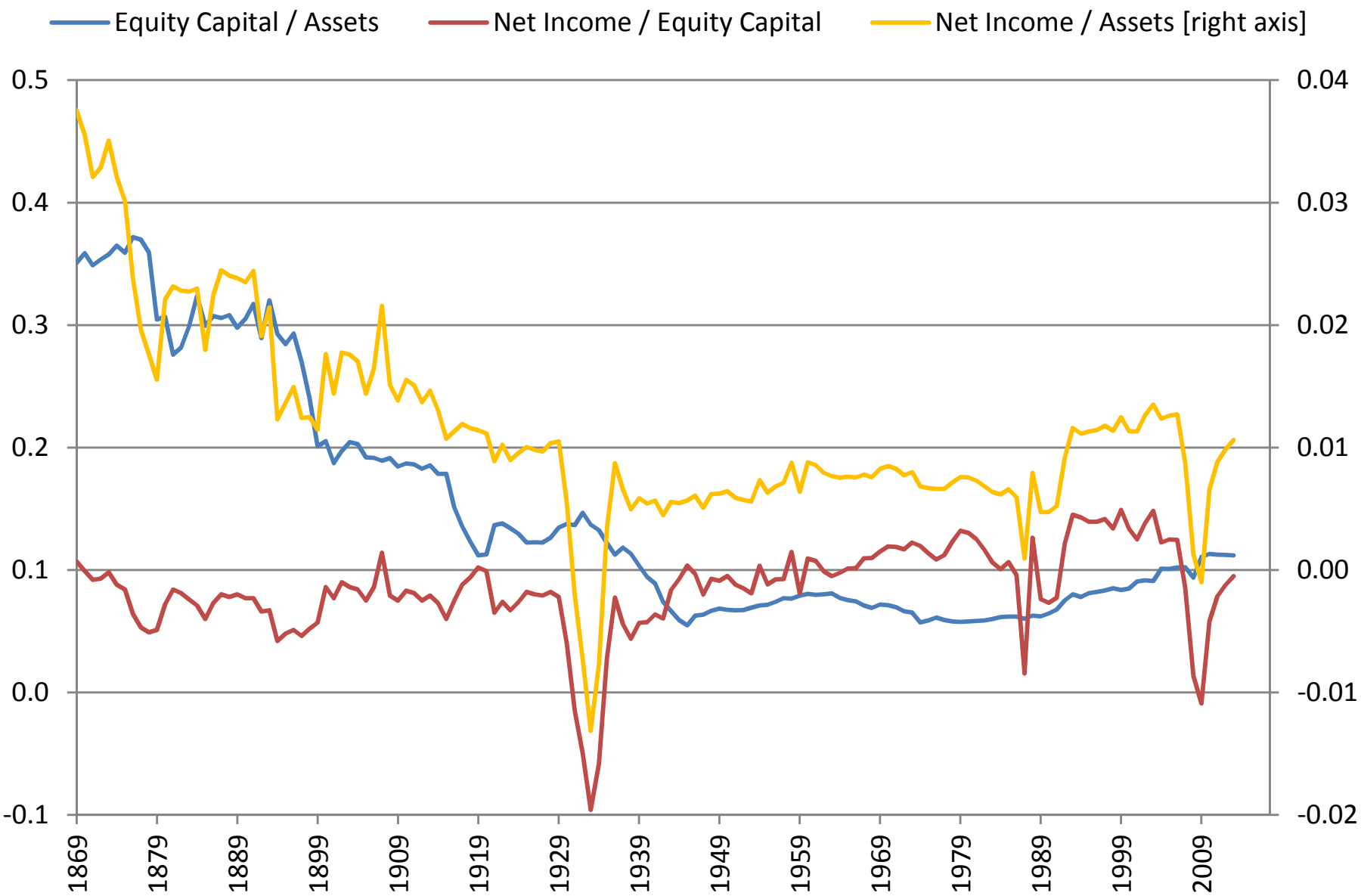
Finally, it should be noted that monetary policy operates in the context of broader economic long-term forces. Expansionary policies, or monetary stimulus, cannot engage *real* GDP unless it directly or indirectly affects potential productivity growth.

If all of this sounds dreary, let me read to you the last sentences of The Map and the Territory, which I wrote in 2013: "But before I despair of the future, financially or economically, I need to remind myself that we have been here before. Consider the national psyche of the United States in 1940. We had just been through a near decade of economic stagnation and financial upheaval. The future appeared bleak. America's greatness was in our past.

Less than a decade later, the American economy was humming on all cylinders."

Exhibit 1

U.S. Commercial Banks
(1869-2013)



Source: Federal Deposit Insurance Corporation; Federal Reserve Board; U.S. Department of Commerce.

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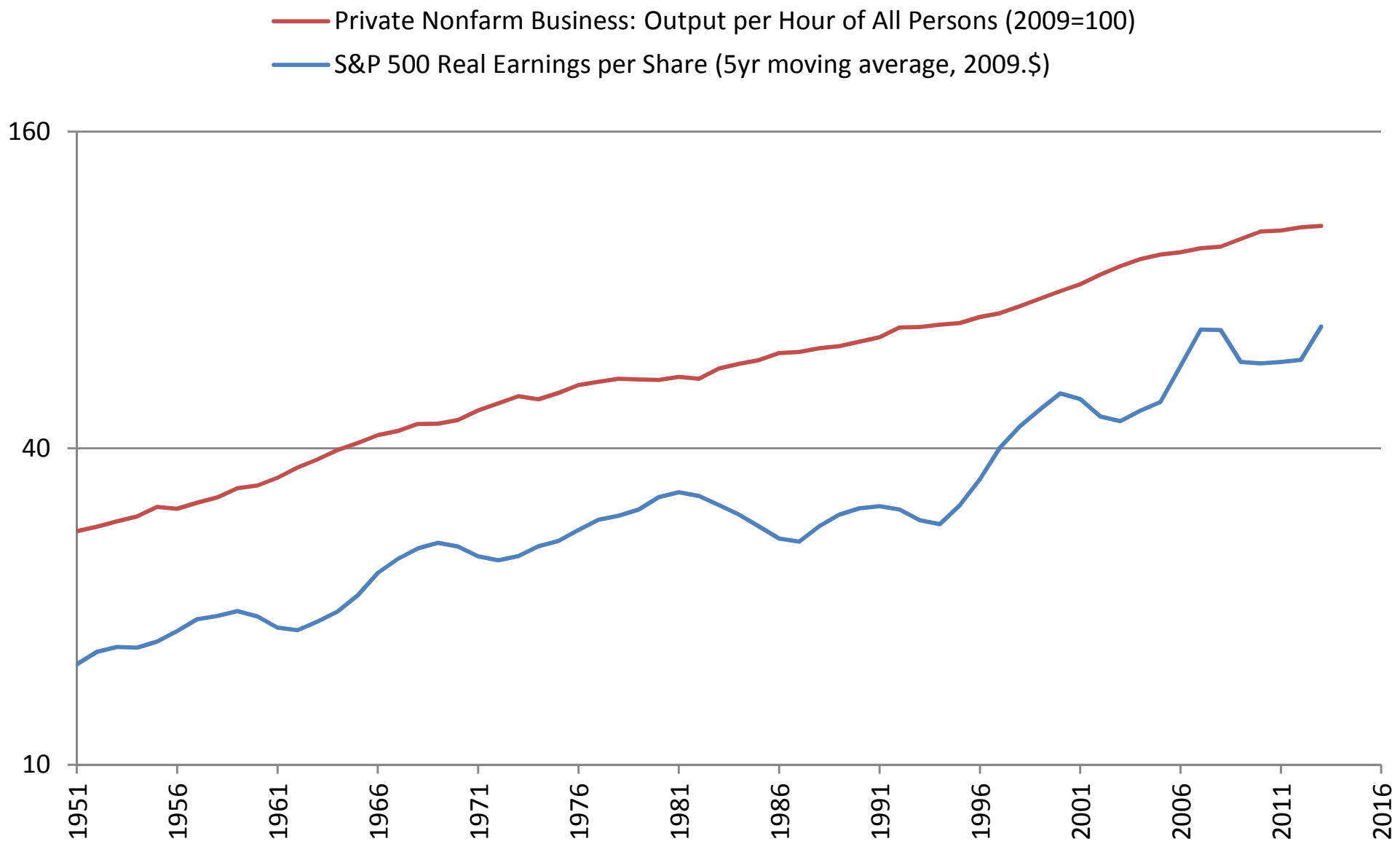
Exhibit 2

Nonfarm Productivity vs Real Earnings per Share
(1951 - 2013)



Source: Standard and Poor's; U.S. Department of Commerce.

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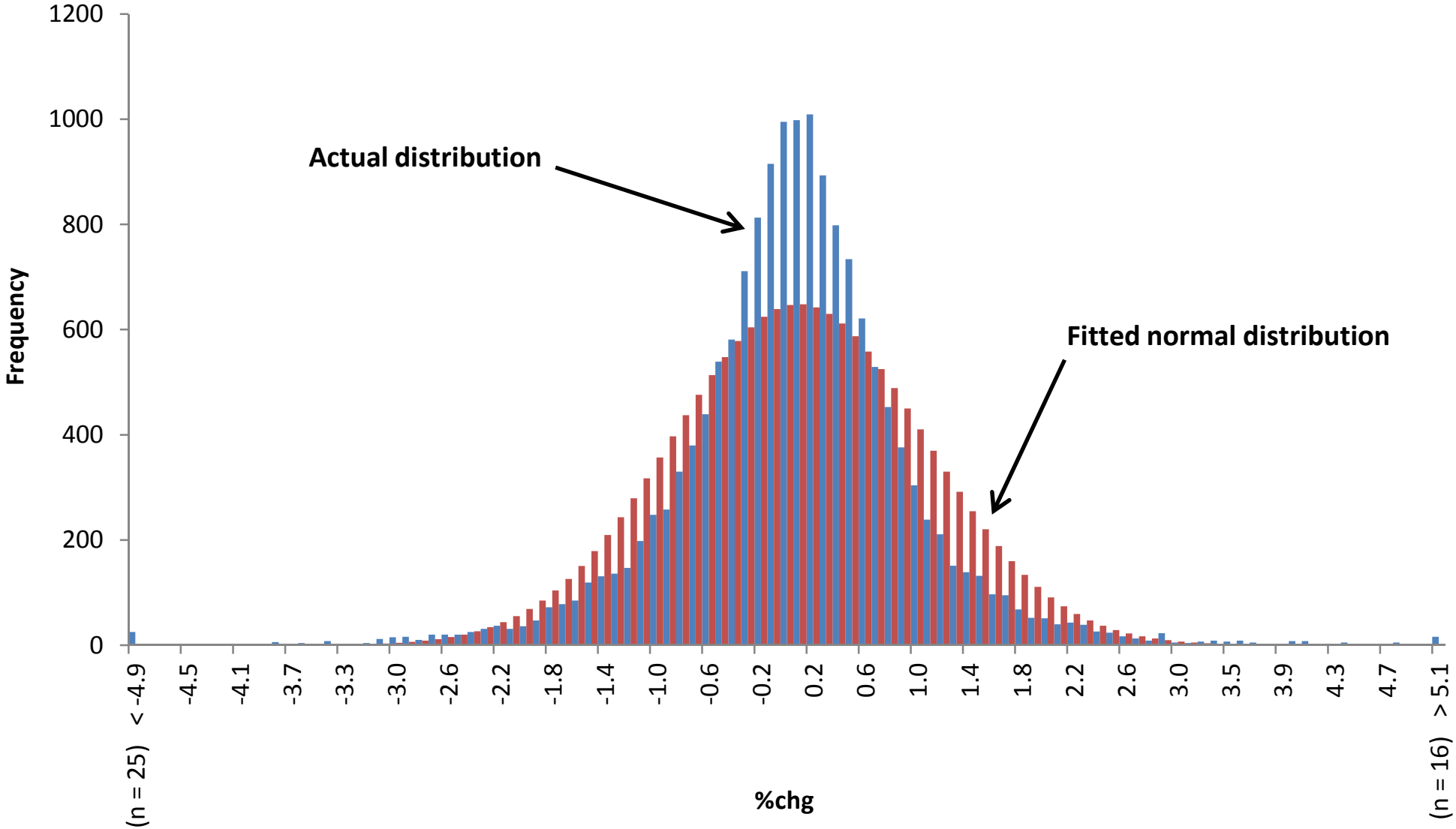
Exhibit 3

Daily %chg in S&P 500 Price Index
(adjusted for Real Earnings per Share growth, 1951-2013)



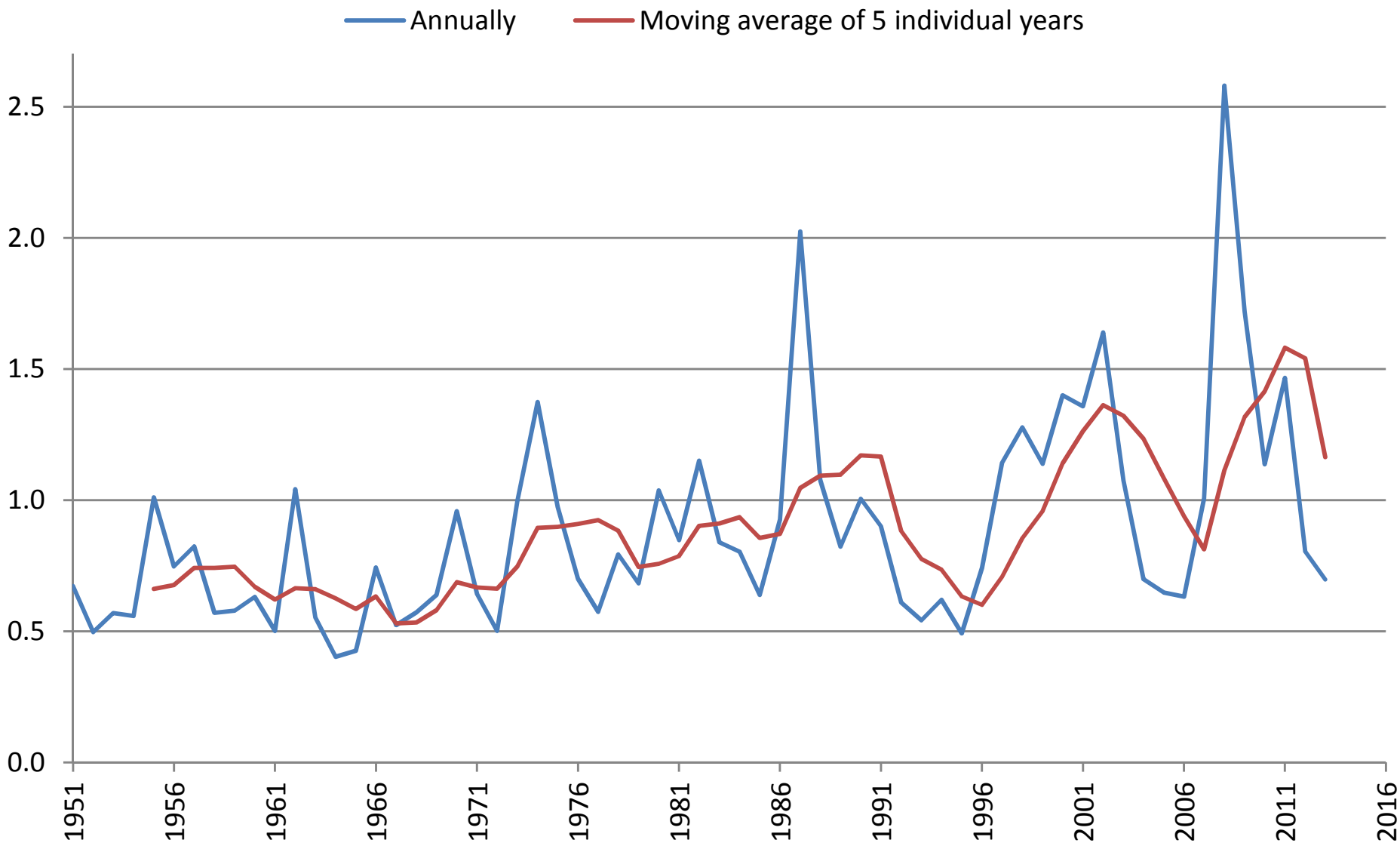
Source: Standard and Poor's.

Greenspan Associates LLC

Exhibit 4

Standard deviation of daily %chg in S&P 500 Price Index (%)

(adjusted for real earnings per share growth, 1951 - 2013)

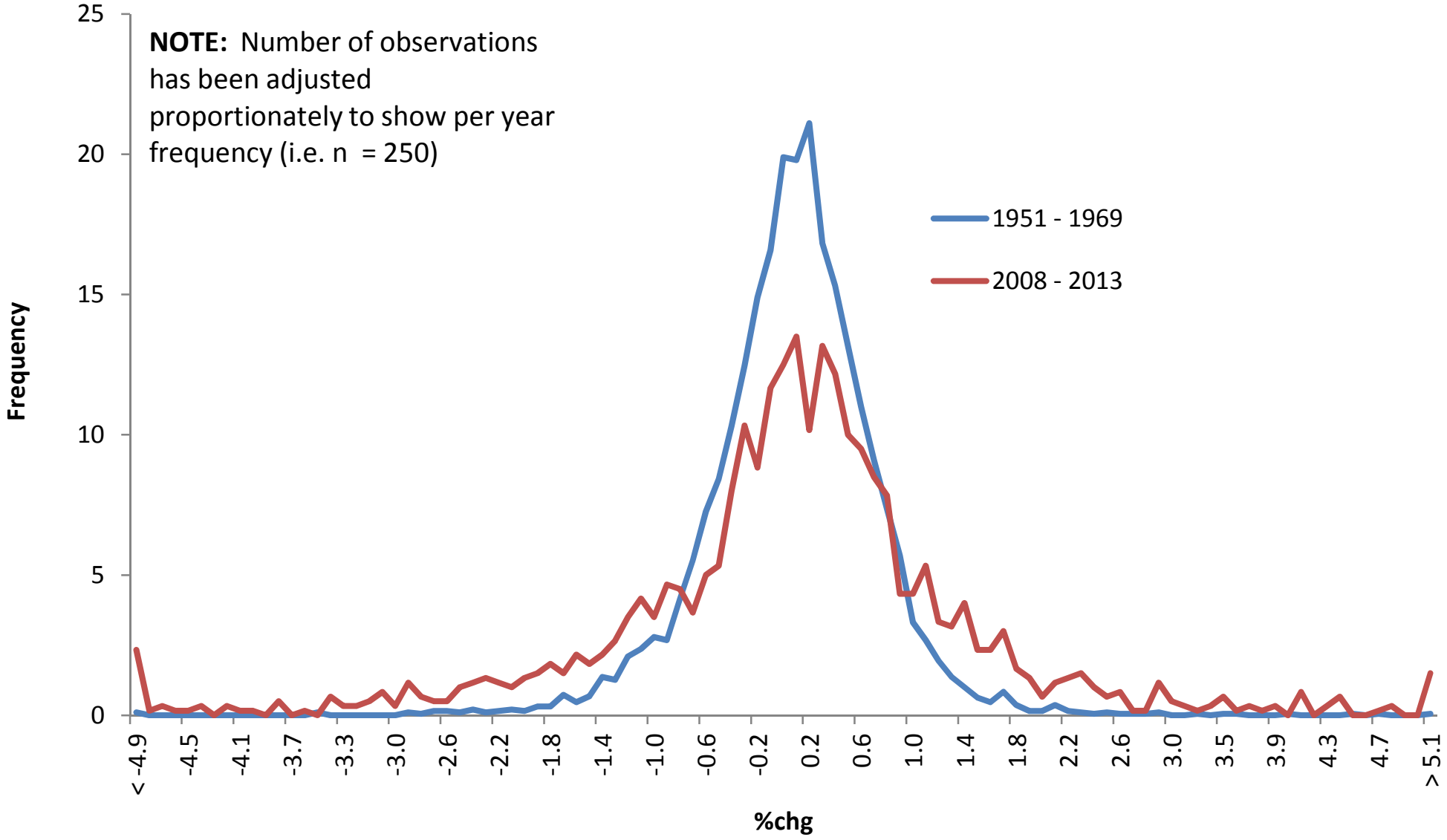


Source: Standard and Poor's.

Greenspan Associates LLC

Exhibit 5

Daily %chg in S&P 500 Price Index
(adjusted for Real Earnings per Share growth)



Source: Standard and Poor's.

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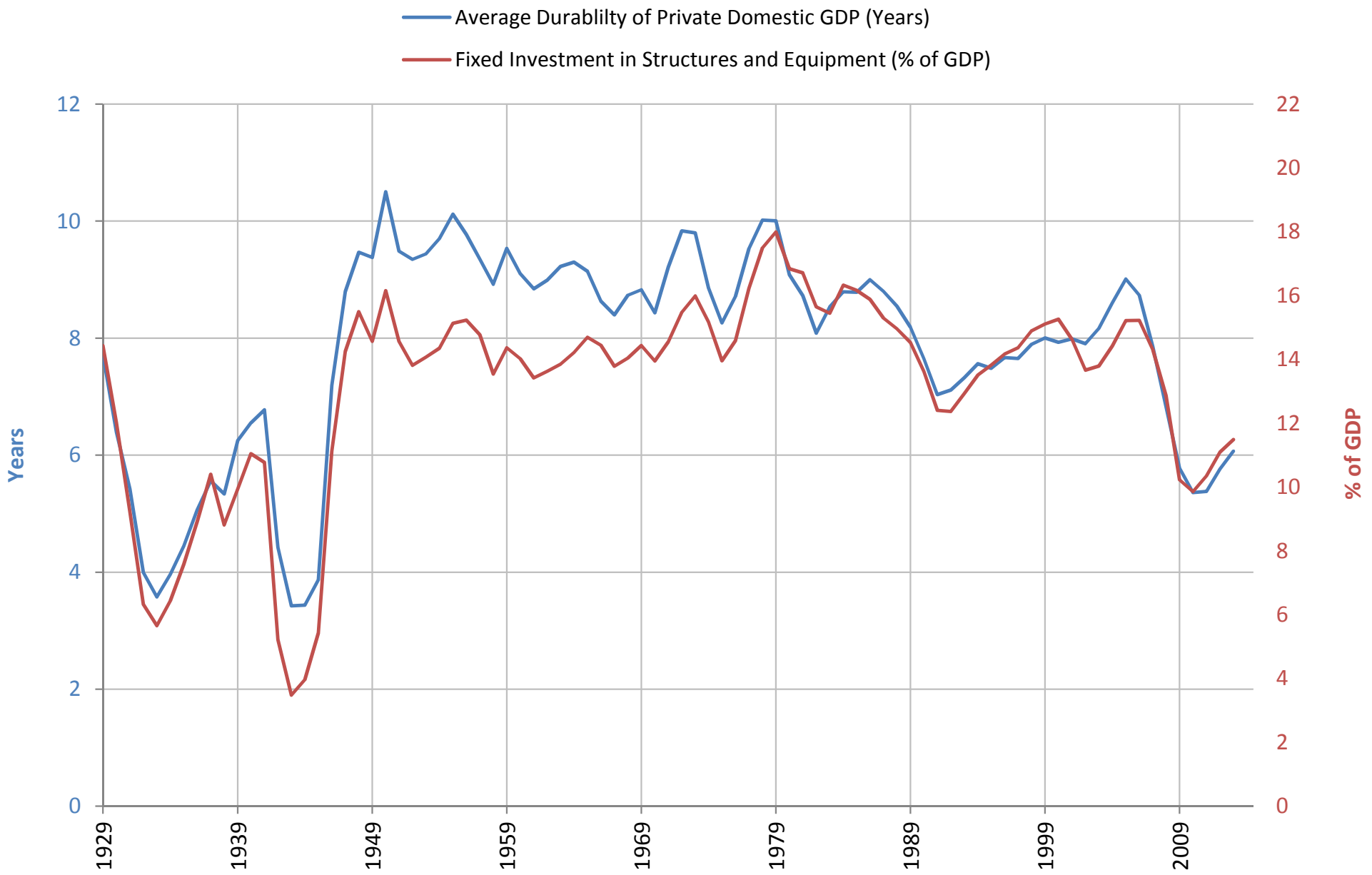
Exhibit 6

U.S. Fixed Investment
(1929 - 2013)



Source: U.S. Department of Commerce.

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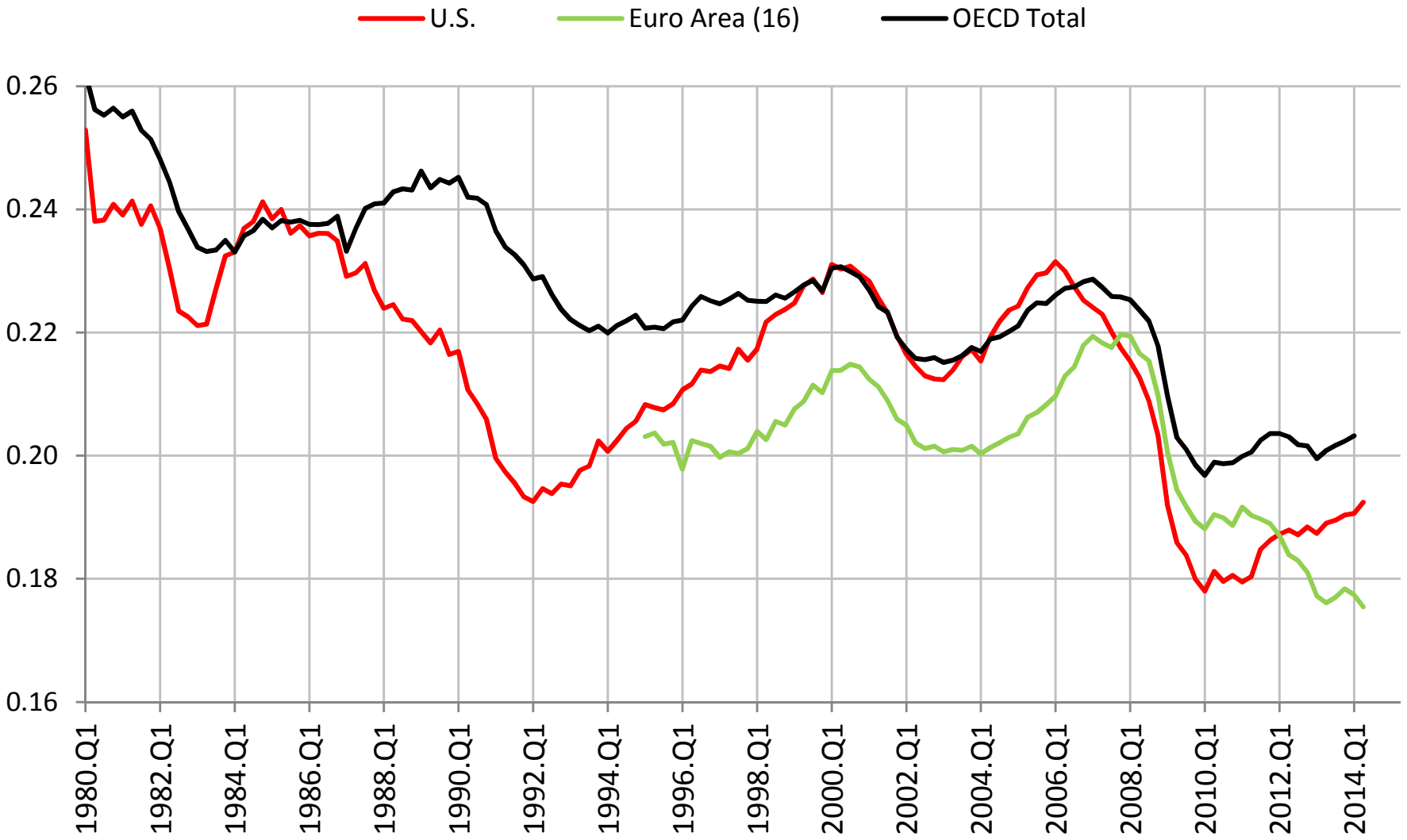
Exhibit 7

Total Gross Fixed Capital Formation / GDP

(all statistics seasonally adjusted, in US$, PPP)

Q1 1980 - Q2 2014



Source: Organisation for Economic Co-operation and Development.

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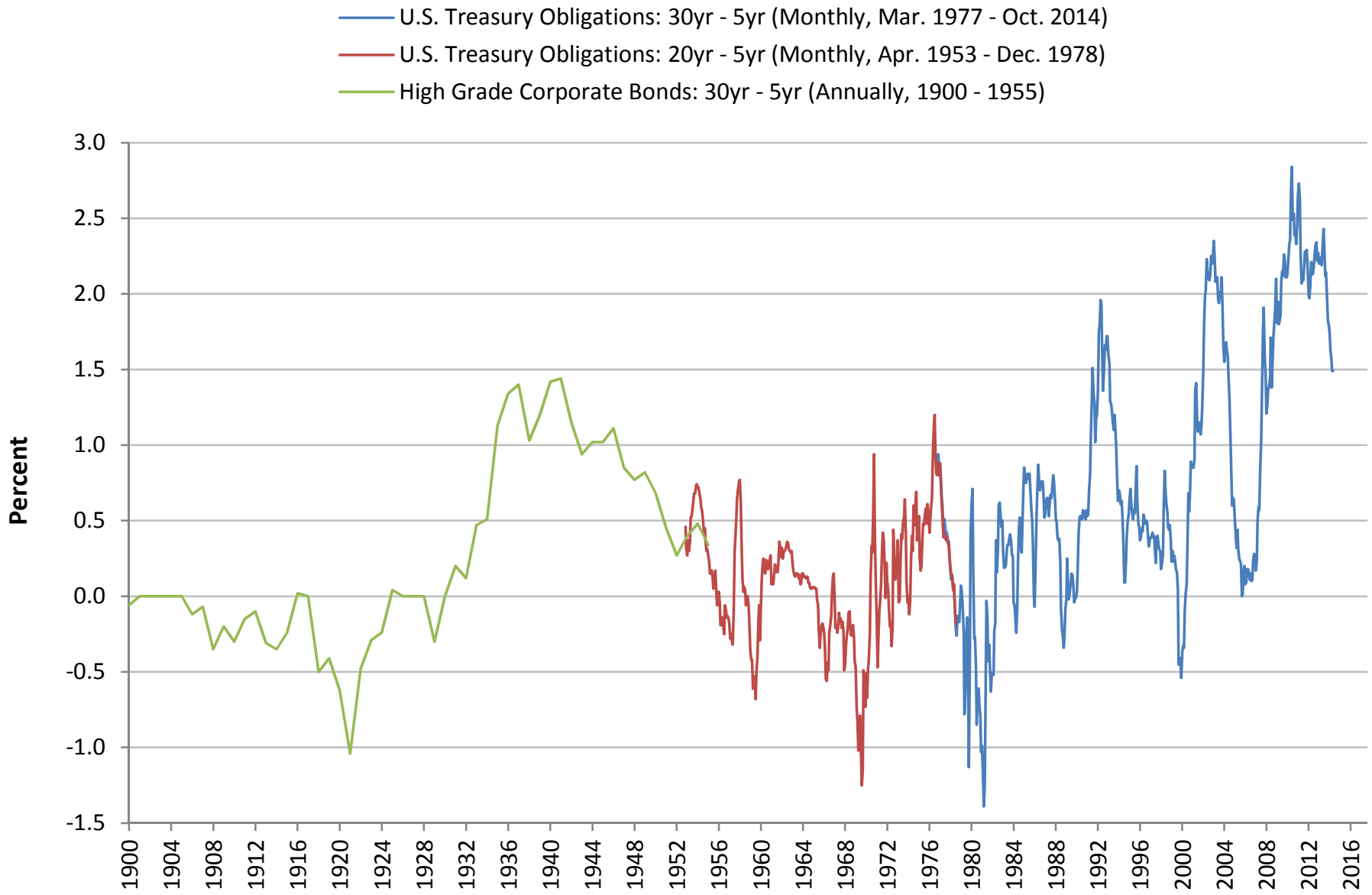
Exhibit 8

Yield Spreads (%, average*), 1900-2014

*historical high grade bond yields are annual averages, U.S. Treasury yields are monthly averages



Source: Federal Reserve Board; National Bureau of Economic Research.

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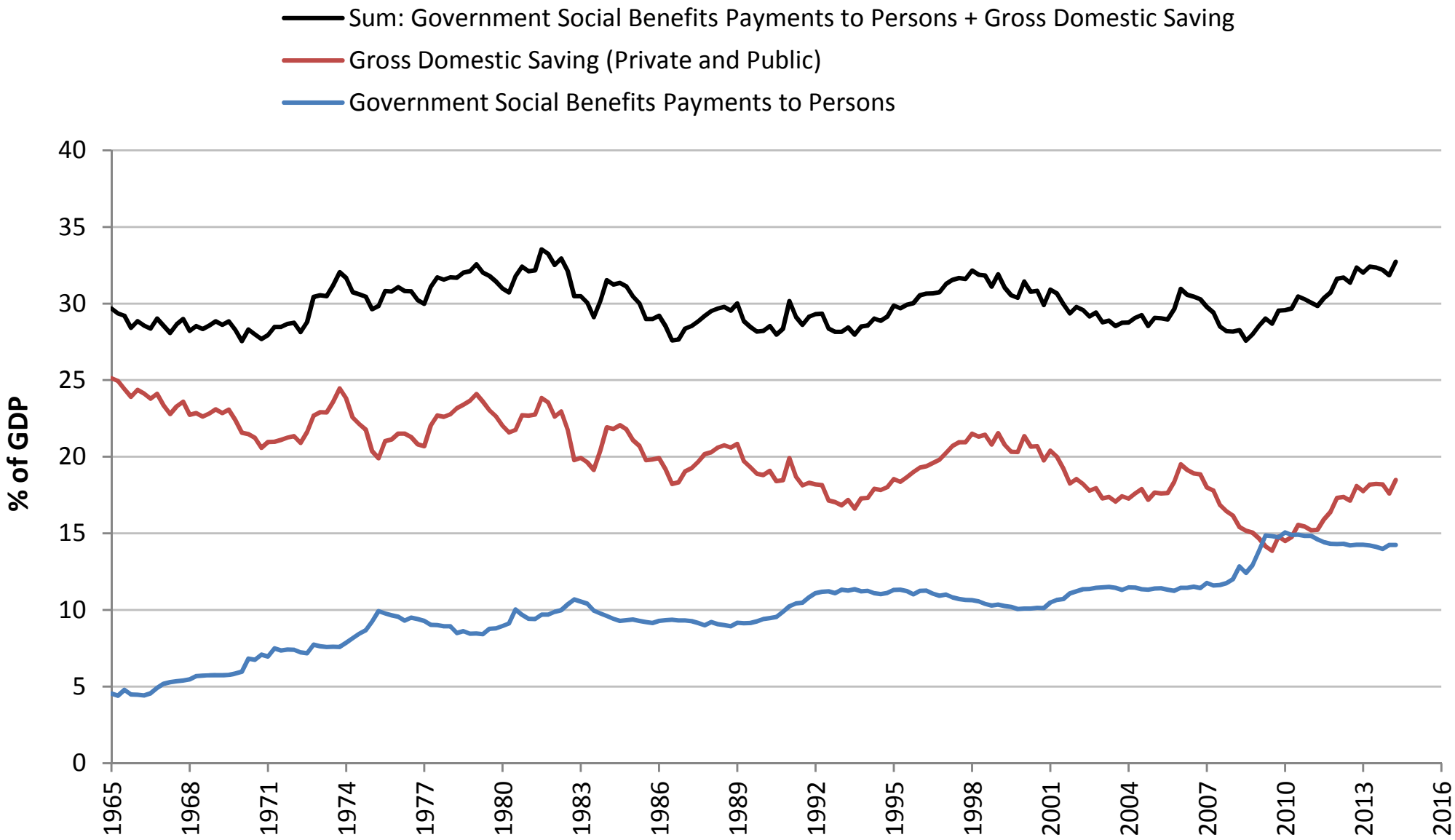
Exhibit 9

U.S. Government Benefits and Domestic Savings (as % of GDP)

(Q1 1965 - Q2 2014)



Source: U.S. Department of Commerce.

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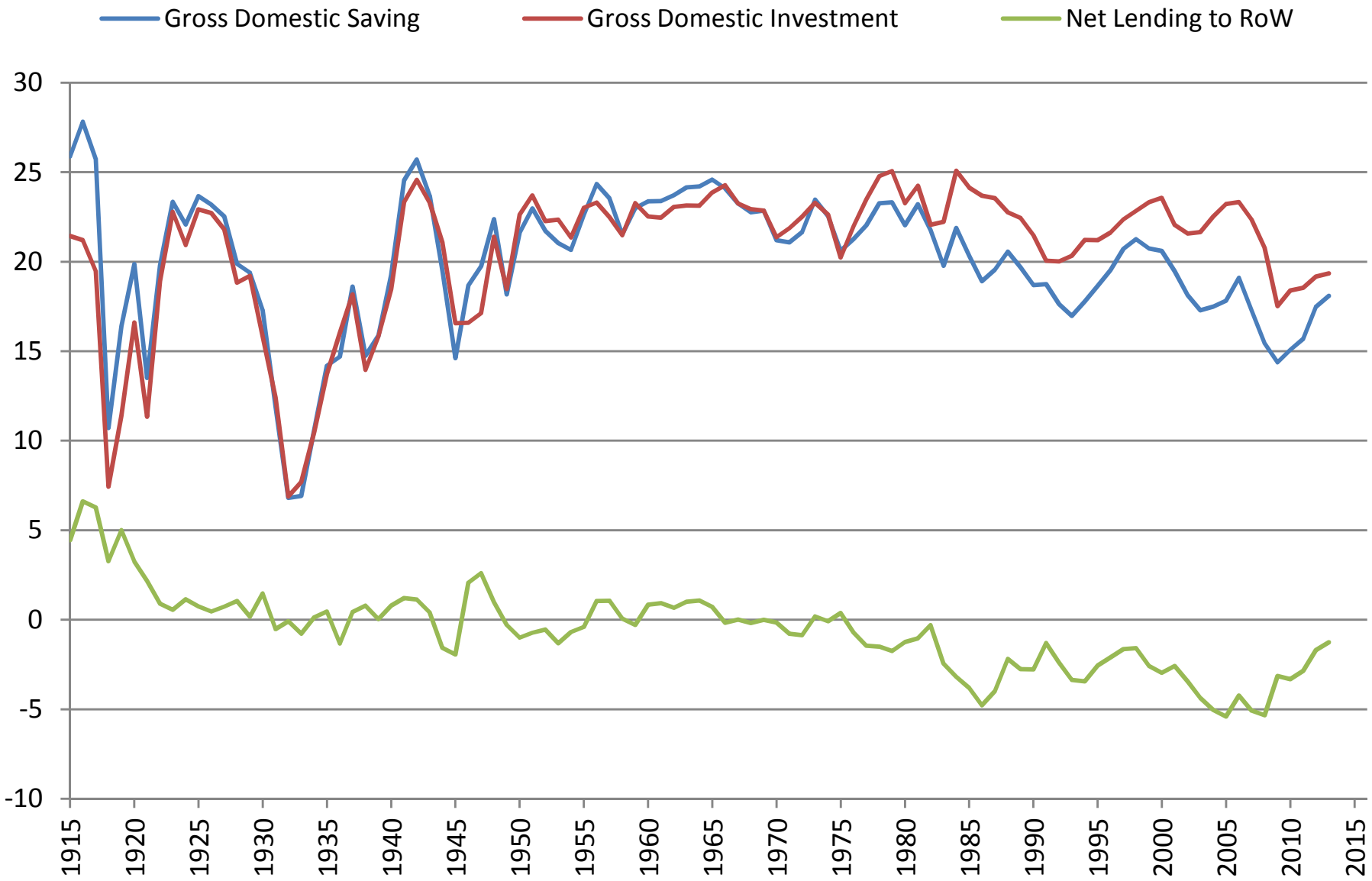
Exhibit 10

U.S. Saving and Investment (as % of GDP)

1915 - 2013



Source: U.S. Department of Commerce.

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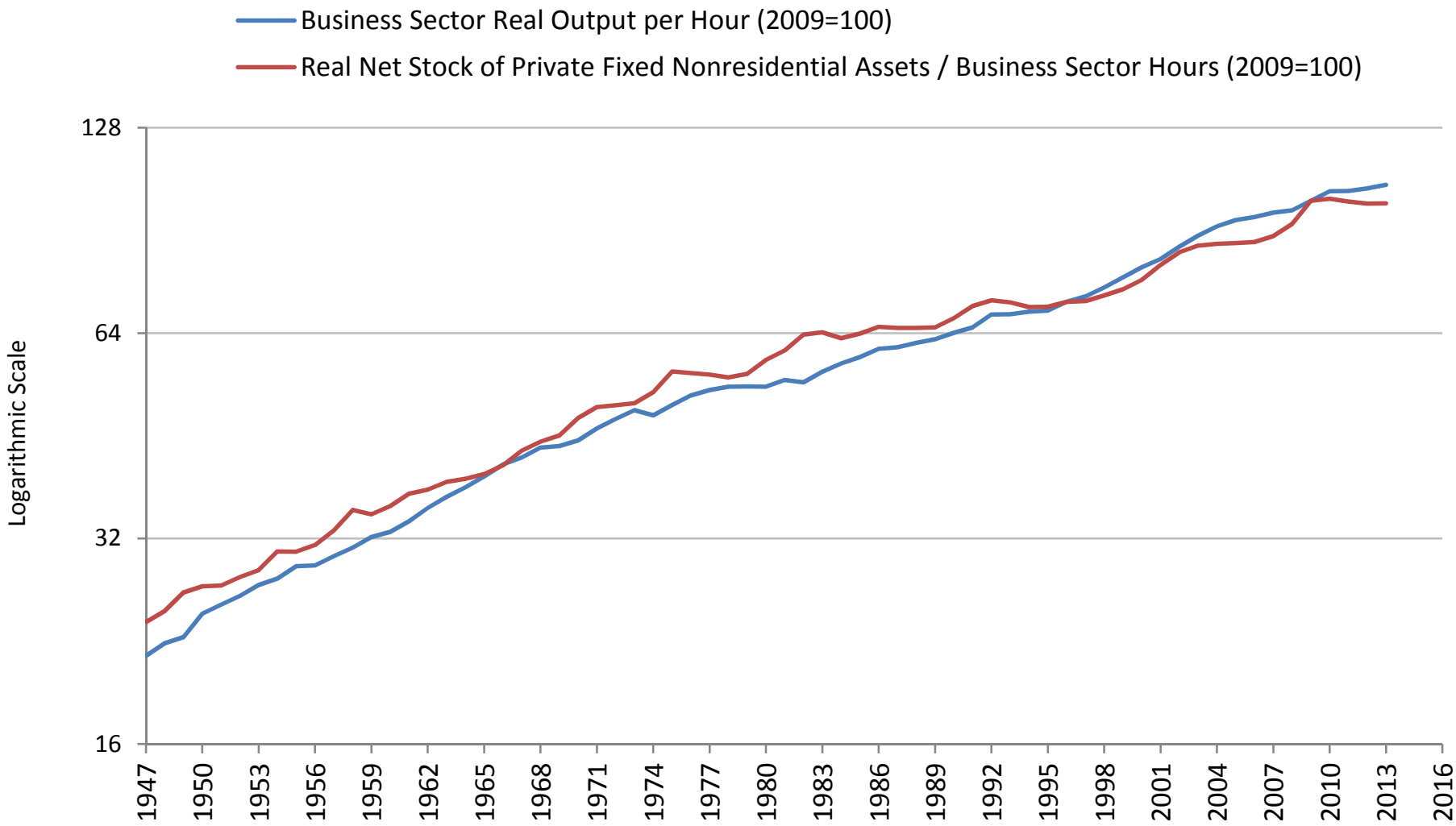
Exhibit 11

Capital Stock and Productivity
(1947 - 2013)



Source: U.S. Department of Commerce.

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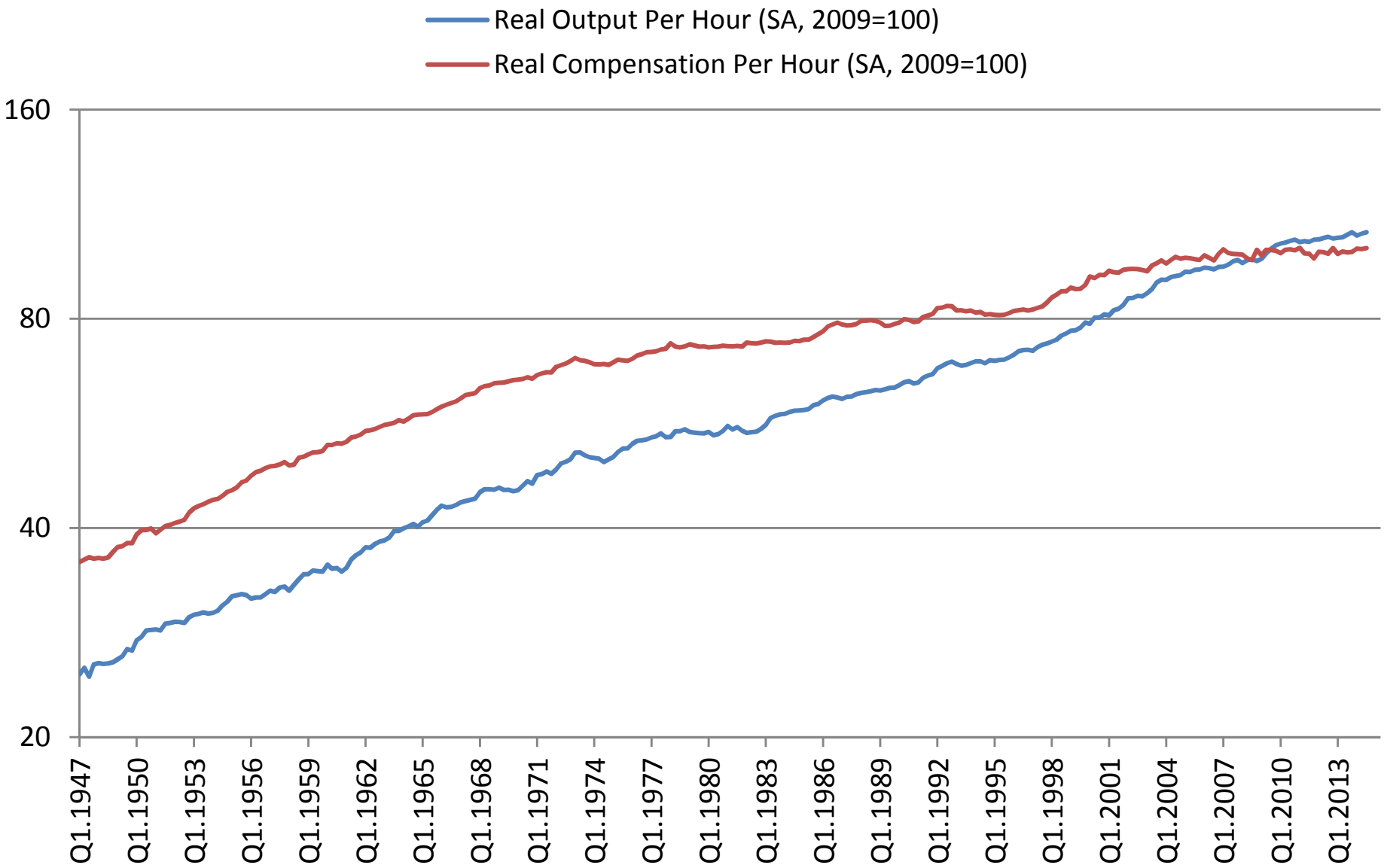
Exhibit 12

Nonfarm Business Sector

(Q1 1947 through Q3 2014)



Source: U.S. Department of Commerce.

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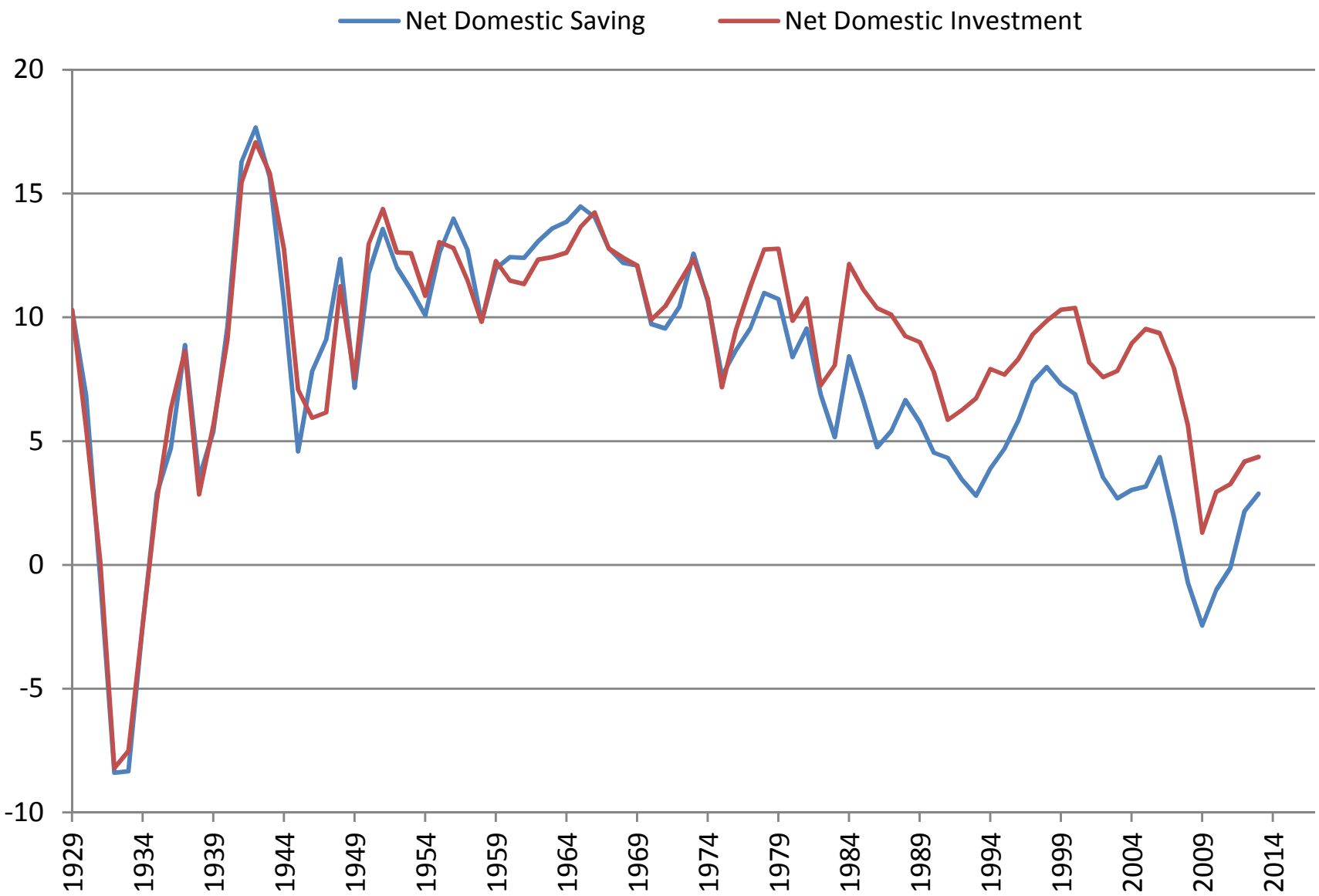
Exhibit 13

U.S. Saving and Investment as % of Net Domestic Product

1929 - 2013



Source: U.S. Department of Commerce.

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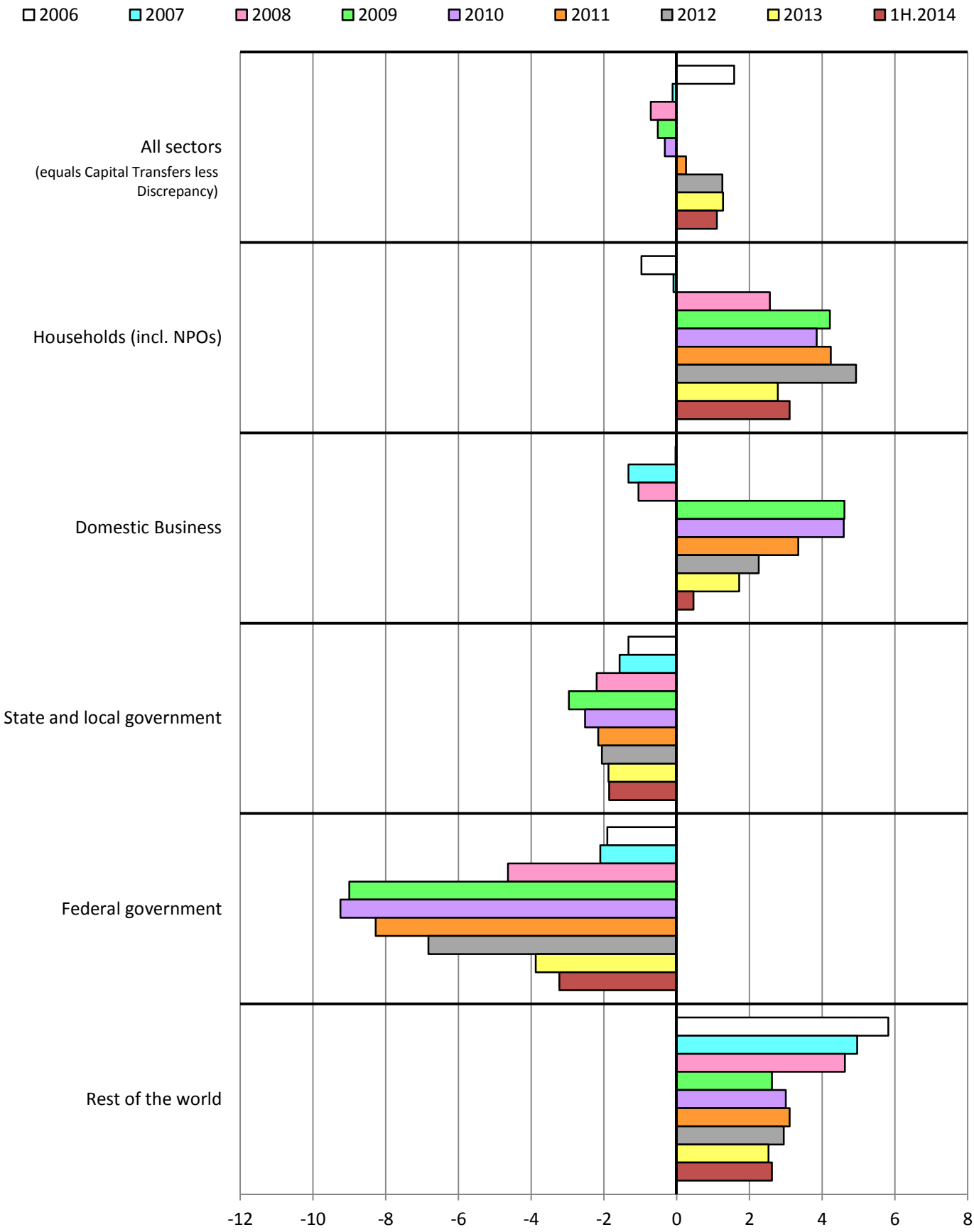
Exhibit 14

Gross saving less Gross investment by Sector (as % of GDP)



Source: Federal Reserve Board.

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