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INTERNATIONAL MONETARY FUND

UNITED STATES

Selected Issues

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Approved by Western Hemisphere Department

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Natalia Barrera, Marcello Estevão, and Geoffrey Keim

A. Introduction

1. **Financial intermediation facilitates economic activity by allocating capital among different users; thus, financial activity is positively correlated with economic growth.** Indeed, shocks to financial conditions seem to cause variations in real activity. That was likely the case in the United States between the mid-1990s and the mid-2000s, when a surge in securitization seems to have contributed to the simultaneous economic boom. Similarly, economic activity first slowed, and then cratered after the Lehman bankruptcy in September 2008 amid the ensuing overall tightening in financial conditions.

2. **Looking forward, tighter financial conditions, together with economic restructuring, will slow U.S. potential growth.**[1] The protracted recession and tighter financial conditions will hurt investment and, thus capital accumulation, and the resulting high and more-persistent-than-usual unemployment rates will affect equilibrium rates of unemployment—both lowering potential growth. These factors will add to the downward pressure on potential growth from trends in labor force participation (driven mostly by demographics) and average hours worked per employee (a secular trend). Taking all into consideration, this chapter predicts that potential growth rates in the United States will fall below 2 percent in the coming years before rising slowly to about 2 percent by 2014.

3. **The remainder of the chapter goes over the main arguments underlying staff's potential growth projections.** Noting that potential growth can be decomposed into trend labor productivity and labor input growth, the chapter first discusses recent productivity developments in the nonfarm business sector, an aggregation level preferred by productivity researchers and the Bureau of Labor Statistics. Then, back-of-the envelope calculations are used to gauge the effect of diminished financial sector activity on GDP growth in coming years. Finally, a simple production function framework is used to give a long view of key factors explaining potential GDP growth in the United States in the last thirty years and explore possible developments in the next few years.

B. Productivity Developments in the Nonfarm Business Sector

4. **Labor productivity growth in the nonfarm business sector boomed between the mid-1990s and the mid-2000s.** Growth in labor productivity (output divided by hours of work) in the U.S. nonfarm business sector—the most visible category tracked by the Bureau of Labor Statistics—rose from 1½ percent a year between 1973 and 1995 to 2½ percent

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[1] Potential growth is defined here as the level of output that can be produced without undue strains on productive resources, i.e. without inflationary impact.

between 1995 and 2000, and a whopping 3¼ percent between 2000 and 2004 (Table 1). Oliner and Sichel (2008) broke down productivity growth into different factors (as in formula (1) in footnote 2) and concluded that the first surge in labor productivity was driven by faster capital deepening in IT (information technology) equipment and machinery, and total factor productivity (TFP) in sectors producing this type of capital.[2] The second surge occurred in capital deepening of other capital goods and in TFP growth outside sectors producing IT equipment. The non-IT related faster capital deepening in the period could be seen as the flip image of the jobless recovery after the 2001/2002 recession. Indeed, Oliner, Sichel, and Stiroh (2007) present evidence that the productivity boost during the first half of the 2000s was caused by a one-off industry restructuring in response to profit pressures and by a reallocation of material and labor inputs across industries.

5.   **After the boom, productivity growth from 2005 to 2008 returned to rates similar to pre-1995 readings.** Since 2004, productivity growth has halved due to both weaker capital deepening and lower TFP growth. At the eve of the financial crisis, the U.S. economy seemed to have returned broadly to a historical growth path. However, given the demographic pressures on labor force participation rates and the secular downward trend in hours worked per employee (both documented in the last section of this chapter), potential output growth in the United States was set to decline slowly.

C. Weaker Financial Intermediation

6.   **As a result of the crisis, financial intermediation will be weaker in the years ahead, contributing to a protracted recession and adding to demographic pressures on potential growth.** Lower financial sector activity would affect potential growth directly through lower growth in output of finance, insurance and real estate (FIRE, which contributed a fourth of aggregate output growth between 2005 and 2007) and indirectly through reduced activity elsewhere in the economy, as credit scarcity raises the cost of capital and limits the types of projects being undertaken. That is even more important during a period of sectoral restructuring, as production of some nontradable goods (say, housing) shrinks and resources need to be transferred to the tradable goods sector. These are important factors behind the weak investment flows projected by the staff.

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[2] Oliner and Sichel (2008) breaks down productivity growth as:

$$(1) \quad dyl = \alpha^I \, dk^I l + \alpha^O \, dk^O l + (1 - \alpha^I - \alpha^O) \, dq + dtfp^I + dtfp^O$$

where dx refers to the difference of the logarithm of x, yl is labor productivity, kl is the capital-labor ratio, dkl represents capital deepening, and α is the elasticity of output to capital. The superscripts I and O represent information technology and other types of equipment, respectively. Thus, the first two terms in the right-hand side represent capital deepening in these two types of equipment; tfp^I and tfp^O refer to TFP growth in sectors producing information technology equipment (and embedded semiconductors) and in other sectors, respectively, already scaled for their share in total production value and corrected for adjustment costs and factor utilization; and q refers to labor quality.

7.   **Indeed, past financial crises had severe and long-lasting effects on potential output**.[3] While this is true for a broad cross-section of financial crises, a review of the U.S. Savings and Loan (S&L) crisis of the late-1980s and early-1990s illustrates the effect of a financial crisis on the direct contributions of FIRE output to GDP growth. The S&L crisis lasted from 1986 to 1995, when 943 thrifts with a combined $519 billion in assets failed, and it was a key factor explaining the early 1990s recession in the United States. In the event, the contribution of FIRE output to GDP growth decreased (Figure 1).

Figure 1. Contribution of Finance, Insurance and Real Estate to GDP Growth
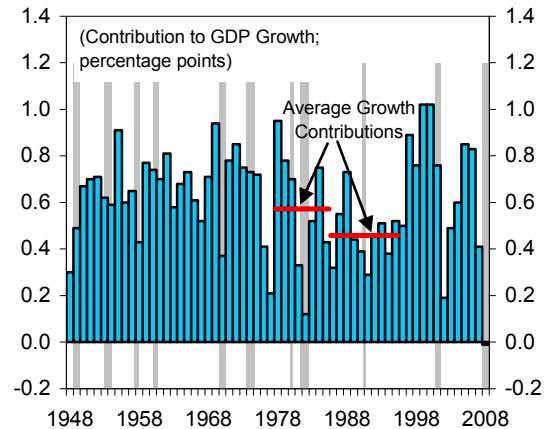
Sources: Haver Analytics and Fund staff estimates.
Note: The shaded areas correspond to NBER recessions.

8.   **By comparison, the current U.S. crisis is much more severe than the Savings and Loan episode.** The combined assets of Washington Mutual, which was closed by the OTS, and Lehman Brothers, which filed for bankruptcy protection, totaled about $1 trillion. Other systemic financial institutions, with assets totaling $1.3 trillion (Wachovia with $764 billion and Merrill Lynch with $569 billion) have had to merge, while other financial institutions have required capital injections amounting to almost $500 billion since September 2007. These developments have had unprecedented implications for growth; notably, the contribution of FIRE to 2008 growth was negative for the first time in the history of the series.

Figure 2. Assets of Savings Institutions
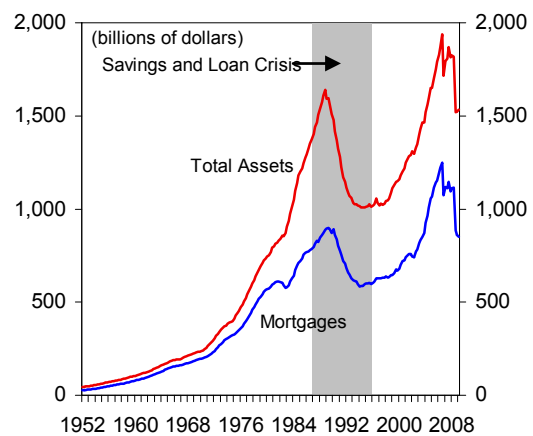
Source: Board of Governors of the Federal Reserve System.

9.   **Reflecting the relatively higher magnitude of financial sector distress, this chapter considers two scenarios,** one in which the contribution of FIRE to overall growth goes from the historic average (1948 to 2008) of 0.6 percentage point to zero over the next several years (in line with the experience of Sweden over 1991–95, the lack of growth in U.S. savings institutions' assets for several years even after the very large decline in the middle of the S&L crisis (Figure 2), and the wider impact of the recent crisis) and one in

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[3] Previous research corroborates the view that potential output growth would decline for several years after a financial crisis, although its longer-term path depends on other key variables, like institutional reforms and political stability. For examples, see Cerra and Saxena (2008), and Furceri and Mourougane (2009).

which the contribution declines only by a third of the historic value or 0.2 percentage point. The thought experiment takes these reductions as exogenous and driven by a needed adjustment in the balance sheet of financial institutions and possibly stricter regulations on the sector. To this exogenous shock we add indirect effects on other sectors, obtained using historic correlations between FIRE output and output in every other major sector.[4] Overall, GDP growth would be reduced by a percentage point in the more pessimistic scenario and by about 0.35 percentage point in the less pessimistic scenario. Applying these markdowns to our estimates for potential output growth in the 2005–08 period of 2.4 percent (see below and Table 3) would produce potential growth rates between 1.4 percent and about 2.0 percent for the 2009–14 period.

10. **Sectors that depend more on external financing will suffer the brunt of the adjustment.** Indeed, taking the 20 manufacturing industries with readily available data on external finance dependence as an example, sectors that have higher correlations with activity in FIRE tend to have stronger dependence on external finance, which corroborates the exercise above.[5] As a result, the relative growth of manufacturing sectors highly dependent on external financing would probably fall in the years ahead, an effect that is already present in the data for the post-2005 period. Table 2 ranks industries according to their dependence on external finance and groups the top-five most dependent industries and the top-five least dependent industries. Industries that are highly dependent on external financing tend to grow faster than industries that are less dependent on external financing during the whole period. However, the ratio of growth in highly dependent industries to that in less dependent industries increased significantly during the high productivity/easy financing boom period (1995–2004) and returned to its historical average after 2005 as financial conditions tightened.

D. A Simple Framework to Decompose and Project Potential Output Growth

11. **Aggregate data and trends show that potential growth has been slowing down since the early 2000s and more markedly after 2004.** Potential GDP growth can be decomposed into changes in: (i) capital stock; (ii) equilibrium capital utilization; (iii) trend hours of work per employee; (iv) the equilibrium rate of unemployment (or the non-accelerating inflation rate of unemployment, NAIRU); (v) trend labor force participation rate; (vi) working-age population; and (vii) trend TFP.[6] Figure 4 and Table 3 show actual

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[4] The resulting rule of thumb is that the indirect effect corresponds to two-thirds of the direct shock.

[5] The correlation between (i) the output correlation between manufacturing sectors and finance and insurance, and (ii) the ranking in external finance dependence is 0.35. Data on dependence in external finance for each manufacturing sector are from Rajan and Zingales (1998).

[6] Equations (2) and (3) were used to calculate U.S. potential growth:

$$(2)\ dtfp = dy - \alpha\, dks - \alpha\, dku - (1-\alpha)\, dl$$

(continued)

data and trends (when relevant) for these variables, with trend values obtained by applying a Hodrick-Prescott filter to each data series. The data show clearly that, even before the crisis, labor force participation, growth in working-age population, and hours worked per employee had been declining, while the NAIRU had begun to increase. Together, these factors were forcing reductions in trend labor input growth in the last years of the sample. The filtered TFP growth varies little but captures the increase in the period 1995–2004, also observed in Oliner and Sichel (2008) for the nonfarm business sector, and the return to historic growth rates since then.

12.   **Looking ahead, staff have allocated further reductions in potential growth across slower capital accumulation, higher NAIRU, lower labor force participation rates, continuing declines in hours worked per employee, and slightly reduced TFP growth in the next couple of years**. The exact path for each of these variables should be seen as illustrative and will be subject to further research by the staff in the coming year. Key factors determining future potential growth are:

- The WEO forecast has gross private fixed investment declining by 21.1 percent in 2009 (by far, the largest decline in the post-WWII period) and by 2.7 percent in 2010, as corporations feel the full sting of the recession. Following these sharp declines, investment is set to return slowly to near pre-crisis ratios to output by the end of the forecast horizon. Using a perpetual inventory method, including by accounting for a historical rate of depreciation of 5 percent a year,[7] we obtain the path for the growth in the capital stock shown in Figure 4 and Table 3. The dramatic investment dynamics are key to the overall shape of potential growth going forward and consistent with the overall view that financing conditions will remain tight for a while, and that aggregate demand growth will remain sluggish.

$$(3)\ dy^* = \alpha\ dks + \alpha\ dku^* + (1-\alpha)\ dh^* + (1-\alpha)\ d(1-u^*) + (1-\alpha)\ dlfp^* + (1-\alpha)\ dwap + dtfp^*$$

where *dx* refers to difference of the logarithm of *x*, *y* is output, *ks* is the capital stock, *ku* is capital utilization, *l* is total labor hours, *h* is average hours of work, *u* is the unemployment rate, *lfp* is the labor force participation rate, *wap* is working-age population, and tfp is total factor productivity. Variables with a * are trend values. All variables refer to the whole U.S. economy and were constructed using information from Haver Analytics and the Organization for Economic Co-Operation and Development (OECD). TFP growth is obtained by applying formula (2) using the level of capacity utilization in the industry calculated by the Federal Reserve Board as a proxy for economy-wide capital utilization and the average share of labor compensation in value added in the past 30 years (about 0.7 in the United States) as a proxy for *(1- α)*. Once TFP growth is obtained, HP filters were applied to capture trend values. Other trend values were obtained by using an HP filter and formula (3) is used to calculate potential GDP growth (Figure 4). The HP filter used for all series assumes a smoothness parameter, λ, of 100—the traditional value for annual-frequency data.

[7] This is consistent with an average duration of capital stock in the United States of about 20 years, as reported in the official statistics.

- Staff calculated a measure of the NAIRU by fitting an HP filter to actual unemployment rates in the United States. This procedure has the advantage of being simple but is devoid of economic structure and can misrepresent changes in structural labor market functioning. Indeed, when compared to results from Gianella et al. (2008)[8] our NAIRU estimates have wider swings and may be overestimating the degree of NAIRU dependence on the actual unemployment rate path, a matter for further research. Going forward, staff (i) forecast a path for the NAIRU that mirrors historic relationships between the filtered series and the actual unemployment rate, and (ii) complete OECD estimates originally ending in 2010 with milder NAIRU dynamics for the 2011–14 period (see top left chart in Figure 4). Despite some differences between the two NAIRU series, the shape of potential growth estimates using the two series (and the same methods for all remaining variables) are similar (shown in the middle chart of Figure 5), although the OECD-consistent measure has slightly higher growth rates in 2009–10 and slightly lower rates in 2011–14.

- After a brief pause in the next two years as older individuals remain in or return to the working force to rebuild lost savings, the labor force participation rate is assumed to contract slowly. This path is more benign than the trend based on labor force characteristics and demographic changes produced by Aaronson et al (2006). The gap between the two paths for labor force participation suggests that in the absence of crisis-related changes in labor supply attitude, demographic trends will put even larger pressure on potential output growth going forward than we currently assume.[9]

- Growth in working-age population (individuals at least 16 years old) is set to decline slowly in the next few years, according to projections from the U.S. Census Bureau.

- Average hours of work is assumed to continue its long-term downward trend in the coming years.

- Equilibrium capacity utilization in U.S. industry (a proxy for overall U.S. capital utilization) seems to have declined for more than a decade beginning at the end-1960s. After somewhat of a rebound in the 1990s and consistent declines since then, we assume that it will remain constant throughout the forecast period.

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[8] The authors estimate time-varying NAIRUs for a panel of OECD economies using Phillips curve equations and Kalman filter techniques.

[9] The authors estimated a detailed model combining developments in labor force attachment for particular age-sex groups and demographic changes. Their results show a faster contraction in labor force participation than forecasts done at the time by the Congressional Budget Office, the Bureau of Labor Statistics, and the Social Security Administration Office, although these agencies also anticipated a noticeable downward trend in participation rates.

- Trend aggregate TFP growth is relatively smooth, and going forward we assume only a slight contraction of TFP growth in the coming years to account for disturbances from ongoing structural changes in the U.S. economy. Trend TFP growth is assumed to go back to pre-crisis rates by the end of the forecast horizon.[10]

13. **Estimated potential output growth lies between 1 and 2 percent for the next five years** (Figure 5, top chart, and Table 3). After being hit severely by the capital growth dynamics, potential growth converges slowly towards 2 percent in 2014—a level somewhat lower than the one estimated for 2005–08, but consistent with estimates of potential growth in the absence of the crisis.[11] The average potential growth rate for 2009–2014 turns out to be 1½ percent, about ½ percentage point below our estimates for potential growth in the absence of the crisis. The resulting paths for the output gap and the unemployment gap (defined as the difference between actual unemployment rates and the NAIRU) are shown in the bottom chart of Figure 5. The output gap reaches its widest point in 2010 at about similar levels as in the early-1980s recession.

14. **Ultimate losses in potential output are in the ball park of previous research.** By 2014, potential output is expected to be about 5¾ percent below the counterfactual level produced by assuming potential output grows from 2009 to 2014 at the same average rate observed in 2005–08 (Figure 3). This gap is a bit larger than the ones observed after previous financial crises as documented in OECD (2009) but is closer to the lower end of the interval estimated by Cerra and Saxena (2008) of 4 percent to 16 percent permanent output loss following financial crisis in developed and less developed economies.

Figure 3. Potential GDP

(trillions of chained 2000 dollars)

Counterfactual Potential GDP Path

Potential GDP

Source: Fund staff estimates.

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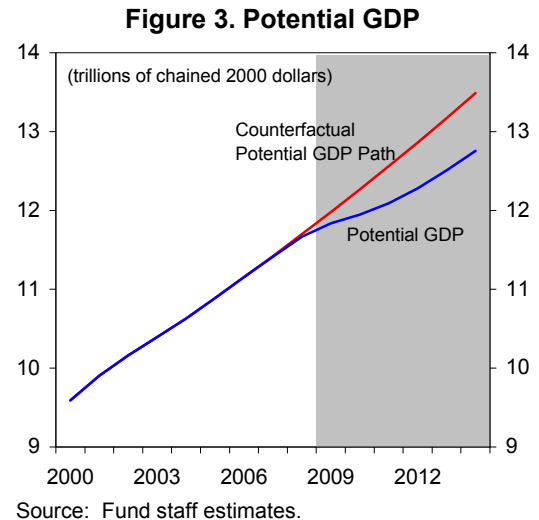
[10] Projecting trend TFP becomes more uncertain during extreme episodes like the current turmoil. In one hand, the sharp contraction of the housing and financial sector induces costly factor reallocations that, at least in the short term, will hurt total factor productivity. On the other hand, exceptional circumstances triggered by the financial meltdown favor structural reforms that may enhance TFP in the medium to long run. As pointed out by Haugh et al. (2009), financial crises usually have negligible effects on trend TFP for industrial countries over horizons of 5 to 10 years. Nonetheless, the authors stress that trend TFP was adversely affected in Japan during its banking crisis in the 1990s (probably due to the protracted resolution of the difficulties faced by the financial system and the associated inefficiencies resulting from the misallocation of factors).

[11] Assuming that in the absence of the crisis labor force participation rates would progress as in Aaronson et al (2006) but other factors would behave as shown in Table 3 for the 2005-2008 period, we obtain an average potential growth rate of 2 percent for the 2009–2014 period.

E. Conclusion and Policy Implications

15.   **The financial crisis will likely weigh on potential growth going forward, which will impose a constraint to economic policy.** In particular, public debt-to-GDP ratios will trend up faster than otherwise in the following years, although the exact path will depend on the behavior of interest rates in this lower-growth (but high-debt-accumulation) environment. Going beyond the medium-term period analyzed here, there is even larger uncertainty about key determinants of potential output, but demographic forces will likely limit economic growth in outer years, raising the stakes for fiscal consolidation.

Table 1. United States: Contributions to Labor Productivity Growth in the Nonfarm Business Sector
(in percent)

	1973-95	1995-2000	2000-04	2004-08
Labor productivity growth	1.5	2.5	3.3	1.7
Contributions from				
IT (information technology) capital deepening	0.5	1.1	0.7	0.5
Other capital, labor quality and adjustments to TFP 1/	0.6	0.3	0.8	0.4
TFP after adjustments	0.4	1.1	1.8	0.8
IT sectors	0.3	0.8	0.6	0.4
Other nonfarm business	0.1	0.4	1.2	0.4

Sources: U.S. Bureau of Labor Statistics and Oliner and Sichel (2008).
1/ Adjustments account for factor adjustment costs and utilization.

Table 2. United States: Industries' Reliance on External Funding and Average Growth
(in percent, unless otherwise indicated)

	External funding need 1/	Average growth		
		Dec 1972 - Dec 1995	Dec 1995 - Dec 2005	Dec 2005 - Dec 2008
Food, Beverages, and Tobacco	-0.08	1.6	1.1	-0.7
Apparel and Leather Goods	-0.06	-0.5	-7.5	-4.0
Nonmetallic Minerals	0.06	0.8	2.2	-6.1
Total Metals	0.11	0.4	1.0	-5.0
Textiles and Product Mills	0.16	0.9	-1.5	-11.4
Paper and Paper Products	0.17	1.7	-0.6	-6.0
Printing and Related Support Activities	0.20	3.3	-1.0	-3.8
Furniture and Related Products	0.24	1.4	2.5	-8.3
Wood Products	0.28	1.1	2.3	-16.0
Petroleum and Coal Products	0.33	0.9	1.9	-0.1
Aerospace and Miscellaneous Transportation Equipment	0.39	0.4	2.8	4.2
Motor Vehicles and Parts	0.39	2.1	2.5	-11.6
Machinery	0.45	1.7	0.6	-4.3
Chemicals	0.53	2.3	2.7	-3.2
Plastics and Rubber Products	0.69	3.5	2.1	-5.2
Electrical Equipment and Components	0.77	1.2	-0.4	-0.3
Computer and Electronic Products	1.02	13.7	17.9	4.4
Total manufacturing IP (NAICS)		2.6	3.5	-2.9
Avg. growth, five industries most reliant on external funds		4.5	4.6	-1.7
Avg. growth, five industries least reliant on external funds		0.7	-0.9	-5.4
Top five industries' growth minus bottom five industries' growth		3.8	5.5	3.7

Sources: Board of Governors of the Federal Reserve System; Haver Analytics; and Fund staff estimates.

1/ External funding need is calculated by Rajan and Zingales (1998) and is the fraction of capital expenditures not financed with cash flow from operations. Where necessary, external funding needs were averaged to reconcile SIC industrial classifications to NAICS definitions.

Table 3. United States: Path for Potential Output Growth Components 1/

	1977-1994	1995-1999	2000-2004	2005-2008	2009	2010	2011	2012	2013	2014
Potential Growth, percentage change	*3.0*	*3.4*	*2.8*	*2.4*	*1.4*	*0.9*	*1.2*	*1.6*	*1.9*	*2.0*
Capital Services*, percentage change*	4.2	5.3	3.9	3.5	2.0	0.3	1.2	1.8	2.2	2.6
Stock of Capital, *percentage change*	4.2	5.7	4.5	3.6	1.8	0.4	1.2	1.8	2.2	2.6
Capacity Utilization, *percentage points 2/*	80.8	82.0	79.4	78.1	77.9	78.1	78.0	78.0	78.0	78.0
Labor Services, *percentage change*	1.5	1.4	1.2	0.8	0.2	0.4	0.4	0.7	0.7	0.7
NAIRU, *percentage points 3/*	6.9	5.3	5.1	5.2	6.0	6.4	6.3	6.0	5.6	5.3
Labor force participation rate, *percentage points 4/*	64.9	66.8	66.6	66.1	65.9	65.9	65.6	65.3	64.9	64.6
Annual hours worked per employee, *percentage change 5/*	-0.2	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Working age population, *percentage change 6/*	1.3	1.2	1.4	1.2	1.1	1.0	0.9	0.9	0.9	0.9
Total Factor Productivity, *percentage change*	0.7	0.9	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.7

Contributions to Potential Output Growth 1/
(Percentage points)

	1977-1994	1995-1999	2000-2004	2005-2008	2009	2010	2011	2012	2013	2014
Potential Growth	*3.0*	*3.4*	*2.8*	*2.4*	*1.4*	*0.9*	*1.2*	*1.6*	*1.9*	*2.0*
Capital Services	1.3	1.6	1.2	1.0	0.6	0.1	0.3	0.5	0.7	0.8
Stock of Capital	1.3	1.7	1.4	1.1	0.5	0.1	0.3	0.5	0.7	0.8
Capacity Utilization 2/	0.0	-0.1	-0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Labor Services	1.1	0.9	0.8	0.6	0.2	0.3	0.3	0.5	0.5	0.5
NAIRU 3/	0.0	0.1	0.0	0.0	-0.5	-0.3	0.1	0.3	0.3	0.2
Labor force participation rate 4/	0.3	0.0	-0.1	-0.1	0.0	0.0	-0.3	-0.3	-0.3	-0.3
Annual hours worked per employee 5/	-0.2	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Working age population 6/	0.9	0.8	1.0	0.8	0.8	0.7	0.6	0.6	0.6	0.6
Total Factor Productivity	0.7	0.9	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.7

Sources: Economic Outlook, OECD; Haver Analytics; World Economic Outlook, IMF; and Fund staff calculations.
1/ Output-labor elasticity assumed to be 0.7 and output-capital elasticity assumed to be 0.3.
2/ Trend capacity utilization in the U.S. industry calculated by the Federal Reserve Board obtained by using an HP filter.
3/ Non-accelerating inflation rate of unemployment. HP filter of civilian unemployment rate, 16 years and over (seasonally adjusted).
4/ Trend labor force participation rate calculated by applying the HP filter of the ratio between civilian labor force and working age population.
5/ Trend changes in annual hours work per employee is calculated by applying the HP filter of annual hours worked per employee in the total economy.
6/ Working-age population refers to U.S. population 16 years of age and over.

Figure 4. United States: Decomposing Potential Output Growth
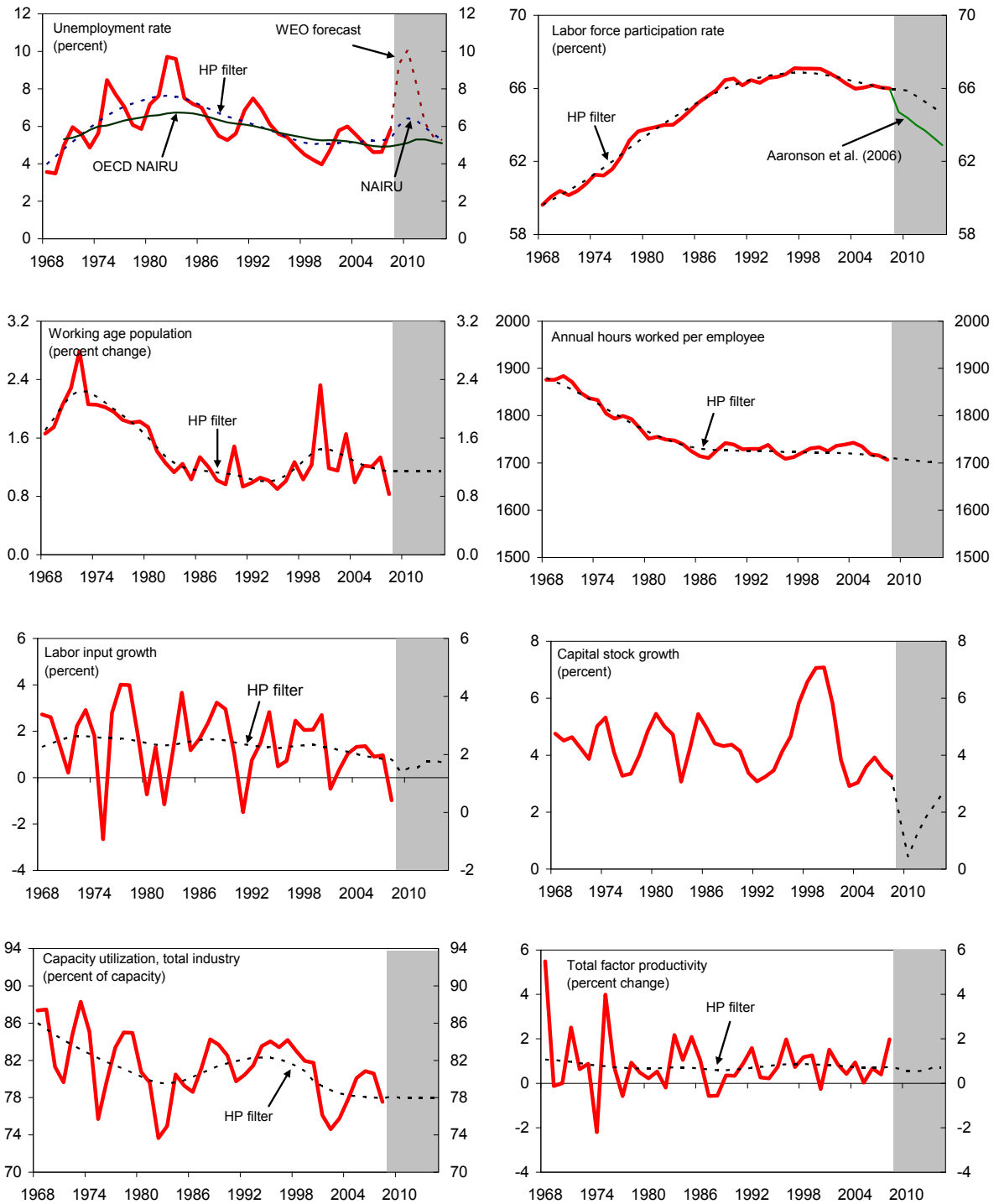
Sources: Aaronson et al. (2006); Economic Outlook, OECD; Haver Analytics; World Economic Outlook, IMF; and staff calculations.

Figure 5. United States: Potential Output Growth, and Output and Unemployment Gaps
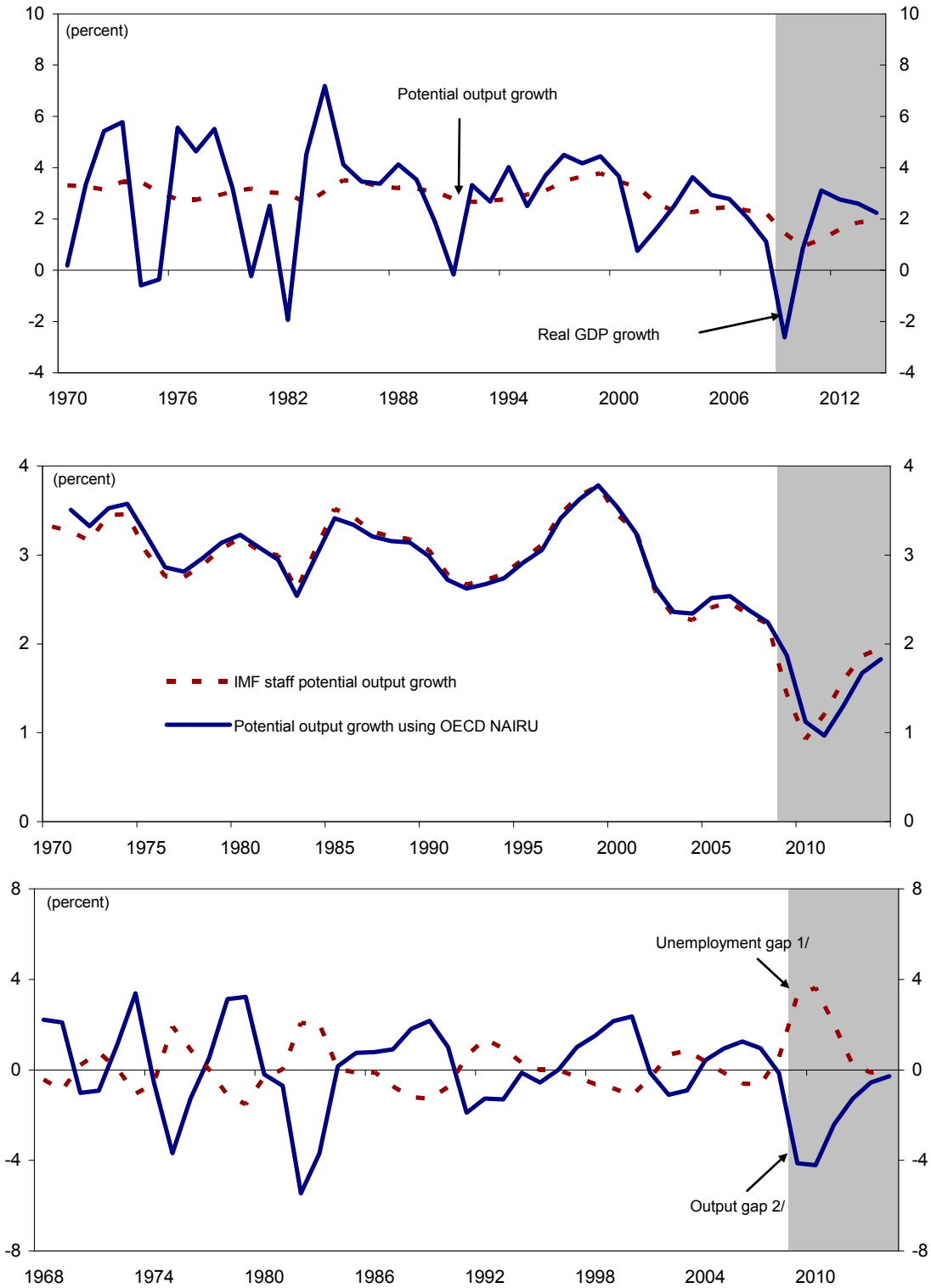
(percent)

Potential output growth

Real GDP growth

(percent)

- - - IMF staff potential output growth
—— Potential output growth using OECD NAIRU

(percent)

Unemployment gap 1/

Output gap 2/

Sources: Economic Outlook, OECD; Haver Analytics; World Economic Outlook, IMF; and staff calculations.
1/ Unemployment gap is the difference between unemployment rate and the natural rate of unemployment.
2/ Output gap is the difference between actual output and potential output as percent of potential output.

References

Aaronson, S., B. Fallick, A. Figura, J. Pingle, and W. Wascher, 2006 "The Recent Decline in the Labor Force Participation Rate and Its Implications for Potential Labor Supply", *Brookings Papers on Economic Activity,* Vol. 1, pp. 69–134.

Cerra, V. and S. C. Saxena, 2008, "Growth Dynamics: The Myth of Economic Recovery", *American Economic Review*, Vol. 98(1), pp. 439–457.

Furceri, D. and A. Mourougane, 2009, "The Effect of Financial Crises on Potential Output: New Empirical Evidence from OECD Countries", *OECD Economics Department Working Papers,* No. 699, OECD, Paris, France.

Gianella, C., I. Koske, E. Rusticelli, and O. Chatal, 2008, "What Drives the NAIRU? Evidence from a Panel of OECD Countries", *OECD Economics Department Working Papers,* No. 649, OECD, Paris, France.

Haugh, D., P. Ollivaud, and D. Turner, 2009, "The Macroeconomic Consequences of Banking Crises in OECD Countries", *OECD Economics Department Working Papers*, No. 683, OECD, Paris, France.

Oliner, S. D., D. E. Sichel, and K. J. Stiroh, 2007, "Explaining a Productive Decade", *Brookings Papers on Economic Activity,* Vol. 1, pp. 81–135.

Oliner, S. D. and D. E. Sichel, 2008, "Explaining a Productive Decade: An Update", Presentation at the Federal Reserve Bank of San Francisco, San Francisco, CA.

Rajan, R. G. and L. Zingales, 1998, "Financial Dependence and Growth", *American Economic Review*, Vol. 88(3), pp. 559–586.

II.   SPILLOVERS FROM U.S. FEDERAL DEBT ISSUANCE: THE CASE OF EMERGING MARKET SOVEREIGN BORROWING
Oya Celasun

A.   Introduction

1.   Large projected federal budget deficits in the United States have led to concerns that large amounts of Treasury debt issuance may increase global interest rates and crowd out emerging market (EM) borrowing from global markets. The empirical literature suggests that an increase in publicly held U.S. federal debt of one percent of GDP raises long-term real U.S. Treasury debt yields by 3–4 basis points.[1] A key question is how much of the increase in U.S. yields in response to higher U.S. federal public debt would be transmitted into yields on other instruments, including those issued by EM governments.

2.   **The yield on an EM sovereign bond can be decomposed into two parts; the yield on a corresponding U.S. Treasury bond and the spread between the yield on the EM sovereign bond and the corresponding U.S. Treasury bond.** This chapter discusses the possible effects of U.S. Treasury debt issuance on the latter part—the spread between EM sovereign yields and U.S. Treasury debt yields.

B.   Literature and Results

3.   **There are reasons to expect both negative and positive effects of U.S. federal debt on EM spreads.** Empirical evidence points to a negative correlation between the amount of U.S. federal debt as a share of GDP and the spread between U.S. corporate and U.S. Treasury bond yields. Krishnamurthy and Vissing-Jorgensen (2008) argue that this correlation reflects a "convenience yield" on U.S. Treasury debt, the marginal valuation of which declines with the amount of outstanding debt. They attribute the convenience yield to the superior trading liquidity and low default risk of Treasury debt instruments, as well as their use in satisfying regulatory mandates. It is possible that this negative correlation also applies to the yield spread between EM sovereign bonds—often considered to be an asset class similar to U.S. high yield corporate bonds—and U.S. Treasury debt.

4.   **At the same time, as argued by Kamin and Kleist (1999), an increase in U.S. Treasury rates—an asset class with very little default risk—could be met by a bigger increase in yields on all risky assets, including EM debt, as investors seek compensation**

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[1] Laubach (2009) identifies the relationship by estimating the effect of long-horizon forward rates (the five-year ahead 5- or 10-year forward rates) and future deficits projected by the Congressional Budget Office (under the assumption of unchanged laws and policies). He finds an effect of 3-4 basis points per one percentage point increase in the debt/GDP ratio. Engen and Hubbard (2004) test an array of specifications and conclude that the effect is about 3 basis points.

for the extra risk.[2] Higher real benchmark rates could also raise perceptions of EM sovereign default risk given the larger debt servicing burden, thereby increasing spreads.

5.   **Regression analysis of EM sovereign spreads for the period 1997–2006 lends some support to the view that higher expected levels of U.S. federal debt (as a share of U.S. GDP) are associated with higher EM spreads.** These types of regressions can face identification issues; in this context, changes in the level of federal public debt could capture a host of factors that can directly impact EM spreads—such as the business cycle and financial conditions in the United States. Accordingly, the regressions control for U.S. real GDP growth forecasts (from Consensus Economics), changes in real U.S. stock prices (as a forward looking indicator of U.S. activity), term premia on longer maturity U.S. Treasury debt, the VIX volatility index, and high-yield corporate spreads. Measures of EM sovereign creditworthiness, including credit ratings, external public debt as a share of GDP, real growth, equity price changes, and indices of political risk are included as controls.

6.   **The estimated effect of U.S. debt on EM spreads is statistically and economically significant** (Table 1, column 1). The estimated equation implies that if projected U.S. federal debt were to increase by 20 percentage points of U.S. GDP, EM spreads would increase by about 8 percent. If the initial level of debt is 40 percent of GDP and all other explanatory variables are set to their sample mean, the resulting increase in spreads would be about 30 basis points. This effect would come on top of the roughly 60 basis points increase in Treasury yields that would be expected on the basis of a U.S. federal debt increase of that magnitude. The size of the estimated effect is robust to controlling for EM specific one-year ahead growth forecasts for the subset of the sample for which GDP forecasts are available (column 2). Higher yields on U.S. Treasury bonds, e.g. with five year maturity, are also found to be associated with higher EM spreads (column 3).[3] This finding is consistent with the notion that the increase in EM yields on account of higher U.S. debt would be larger than the corresponding increase in U.S. Treasury yields.

7.   **Evidence on how prospective U.S. economic performance affects EM sovereign spreads is mixed**. Near term indicators such as growth expectations for the current year and the changes in real stock prices over the past year possibly capture current global investor sentiment and are associated with lower spreads. By contrast, two-year ahead U.S. growth expectations or the term-premium on ten year Treasury bonds are weakly related to higher EM spreads, suggesting that demand for EM sovereign debt may be higher when expectations of medium-term U.S. growth are relatively weak.

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[2] Consistent with this hypothesis, Kamin and Kleist (1999) find evidence of a positive relationship between three-month U.S. T-bill rates and EM Brady bond spreads.

[3] The results are similar for yields on three- or ten-year Treasury bonds.

C. Conclusions and Policy Implications

8.   **The regressions presented in this chapter suggest that a large increase in U.S. federal public debt is likely to put upward pressure on EM spreads.** The effect of U.S. debt issuance could be moderated by stronger growth expectations in EMs relative to the United States, or actions that would lower EM sovereign risk, such as reducing external public debt. The findings reinforce the importance of implementing fiscal reforms and stabilizing federal public debt in the United States given its potential global spillover effects.

Table 1. The Determinants of Emerging Market Sovereign Spreads

		(I)	(II)	(III)
	Lagged spread (in logarithms)	0.836***	0.782***	0.844***
		[0.062]	[0.090]	[0.059]
U.S. Variables:				
	Projected U.S. debt/GDP (one-year ahead)	0.004**	0.004*	
		[0.002]	[0.002]	
	Five year Treasury bond yield			0.001***
				[0.000]
	Current real GDP growth forecast	0.001	0.01	-0.002
		[0.010]	[0.012]	[0.007]
	One year ahead real GDP forecast	-0.001	-0.002	0.008
		[0.011]	[0.014]	[0.009]
	Two years ahead real GDP forecast	0.058	0.103*	0.068*
		[0.040]	[0.051]	[0.035]
	Three years ahead real GDP forecast	0.001	-0.024	0.029
		[0.029]	[0.037]	[0.035]
	Real stock price index growth	-0.007***	-0.007***	-0.006***
		[0.001]	[0.002]	[0.001]
	Spread between 10 and 5 year Treasury yields	0.001***	0.001***	0.001
		[0.000]	[0.000]	[0.001]
	VIX index	0.013***	0.013***	0.015***
		[0.002]	[0.002]	[0.002]
Country-specific controls:				
	Sovereign Rating (Moody's)	-0.026**	-0.028**	-0.025**
		[0.010]	[0.013]	[0.010]
	Public external debt/GDP	0.003**	0.005**	0.004**
		[0.002]	[0.002]	[0.002]
	Real GDP growth (current year)	-0.663**	-0.478	-0.690**
		[0.277]	[0.298]	[0.298]
	Real stock price index growth	-0.001***	-0.001***	-0.001***
		[0.000]	[0.000]	[0.000]
	Political risk index (ICRG)	-0.002	-0.003	-0.002
		[0.001]	[0.002]	[0.001]
	Real GDP growth forecast (1 year ahead)		-0.016**	
			[0.007]	
	Adjusted R-squared	0.98	0.98	0.98
	N	2048	1319	2048
	Number of countries	24	20	24

Source: Fund staff estimates.

Notes: Robust standard errors clustered by country, ***, **, and * denote significance at 1, 5, and 10%, respectively. The dependent variable is the natural logarithm of EMBI Global sovereign stripped spreads (i.e. stripped of collateralized cash flows). The U.S. debt variable is a rolling weghted average of CBO baseline debt projections for the current and next years. All regressions include country fixed effects. Also included were the spread between five and one year Treasury yields, four and five year ahead U.S. real growth forecasts, and the U.S. high yield corporate bond spread; the coefficients for these variables are not shown as they were not significant in most specifications. EM sovereign spreads are from J.P. Morgan (EMBI Global bond index), all growth forecasts are from Consensus Economics. A higher value of the political risk index denotes lower risk.

Table 2. Estimated economic effects of selected explanatory variables

	Amount of increase in the explanatory variable, in percentage points	Change in EM spread	
		In percent	In basis points
U.S. debt/GDP	1	0.38	1.5
U.S. debt/GDP	20	7.89	31.5
EM real growth	1	-0.66	-2.6
EM real growth	4	-2.6	-10.4
EM external debt/GDP	1	0.34	1.4
EM external debt/GDP	16	5.6	22.3
EM expected growth	1	-1.59	-6.3
EM expected growth	4	-6.2	-24.7

Source: Staff calculations.

Notes: For all variables except U.S. debt, calculations were done using the sample means as initial values. The means were about four percent for actual and expected real growth and 27 percent of GDP for external public debt in EMs. The initial value of the U.S. debt variable was set to 40 percent of GDP (its level at end-FY2008). The table presents the estimated effects of increases in U.S. debt of one and twenty percent of GDP, respectively, as shown in column 2. For all other variables, the calculations show the effect of increases of one percentage point versus increases equal to one sample standard deviation of the variable, as listed in the first column.

References

Engen, E., and G. Hubbard, 2004, "Federal Government Debt and Interest Rates," *NBER Macroeconomics Annual 2004*, pp. 83–138.

Kamin, S., and K. von Kleist, 1999, " The Evolution and Determinants of Emerging Market Credit Spreads in the 1990s," Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 653.

Khrishnamurty, A., and A. Vissing-Jorgensen, 2008, " The Demand for Treasury Debt," Manuscript, Northwestern University.

Laubach, T., 2009, "New Evidence on the Interest Rate Effects of Budget Deficits and Debt," forthcoming in the *Journal of the European Economic Association*.

III. STRATEGIC PRIORITIES FOR THE REFORM OF U.S. FINANCIAL REGULATION
Ashok Vir Bhatia, Andrea Maechler, and Paul Mills

A. Fundamental Challenges

1.   **Established in the Great Depression, the U.S. system of financial regulation now requires sweeping modernization**. A primary cause of the crisis of 2007–09 was lax financial regulations in the United States. That, in turn, reflected a U.S. regulatory philosophy that focused on protecting retail depositors and depository institutions from the bank-based panics of the decades before the introduction of federal deposit insurance in 1933. The "runs" of this crisis have centered on institutional creditors, however, forcing an improvised but radical expansion of the safety net to a multitude of nonbanks, and prompting a renewed appreciation for the systemic risk arising from wholesale financial markets.

2.   **Although the widening of the federal financial safety net was a necessary and appropriate response to the turmoil, it has underscored the need for better regulation.** Financial firms ranging from government-sponsored enterprises (GSEs) to broker-dealers to insurance holding companies have benefited, variously, from liquidity provision from the Federal Reserve (Fed), guarantees from the Federal Deposit Insurance Corporation (FDIC), and capital support from the U.S. Treasury, with an attendant dilution of market discipline. More fundamentally, even the most advanced risk management systems have proven unable to anticipate and prepare adequately for the collapse of market liquidity and jump in price correlations. Effective regulation and supervision, focused on systemic risk, have thus been shown essential to controlling the collective tendency toward booms and busts (Figure 1).

Figure 1. Net Income of U.S. Financial Sector and Total Private Sector Debt
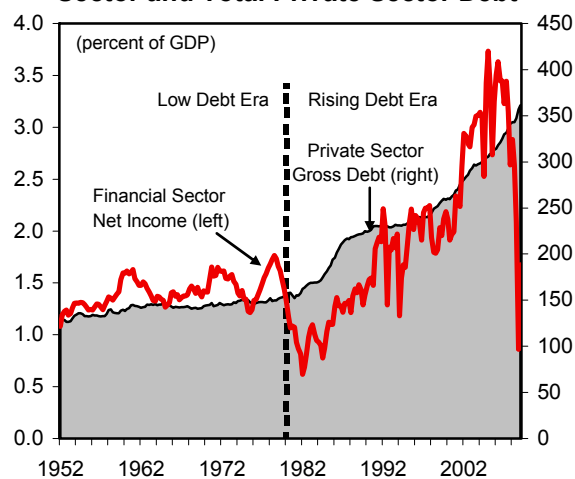
Sources: Board of Governors of the Federal Reserve System; Bureau of Economic Analysis; and Haver Analytics.

B. Assessing the Administration's Reform Proposals

3.   **Cognizant of the above, the U.S. Administration and Congress are committed to the timely passage of substantive regulatory reform**. The Administration outlined its comprehensive package of proposals in mid-June (Box 1), including a raft of measures to better address systemic risk. The proposals are broadly in line with recent G-20 recommendations and past staff analysis (IMF, 2007). At the same time, they break new

Box 1. Key Elements of the U.S. Treasury's Financial Regulatory Reform Proposals [1]

More robust supervision and regulation of financial institutions:

- Creating a Financial Services Oversight Council (FSOC) of financial regulators, backed by force of law and chaired by the Treasury, to identify emerging risks and improve interagency cooperation. The FSOC would have authority to gather information from any financial firm and to recommend any such firm for designation as a "Tier 1 financial holding company" (FHC; see below).

- Introducing a new category of financial firm, the Tier 1 FHC, under consolidated supervision and regulation by the Federal Reserve, with selection criteria based on, but not limited to, size, leverage, and interconnectedness per broad guidelines set in legislation.

- Subjecting these systemically important Tier 1 FHCs to consolidated supervision with a macroprudential focus and stricter prudential standards, the latter linked to a prompt corrective action regime and special resolution mechanism at the holding company level.

- Eliminating the federal thrift charter and the industrial loan company exception, such that holding companies of either (or both) will be reclassified as Fed-supervised bank holding companies (BHCs).

- Merging the Office of Thrift Supervision and Office of the Comptroller of the Currency into a single National Bank Supervisor.

- Reviewing the Fed's governance structure and the supervision of all banks and BHCs, by end-September 2009; regulatory capital requirements for banks, BHCs, and Tier 1 FHCs, by end-2009; and the future of the housing GSEs, by the time of the President's 2011 budget release.

Comprehensive regulation of financial markets:

- Enhancing regulation of securitization markets, including through greater market transparency, more robust disclosure for credit rating agencies, and stronger incentives for securitizers to conduct due diligence on pooled assets and avoid excessive complexity.

- Introducing comprehensive regulation for over-the-counter derivatives and encouraging centralized clearing of standard contracts.

- Making money market mutual funds less vulnerable to liquidity pressures and credit losses through strengthened prudential requirements.

- Requiring the registration with the Securities and Exchange Commission (SEC) of most advisors to hedge funds and other private pools of capital.

- Mandating the Federal Reserve to oversee the payment, clearing, and settlement systems.

Consumer and investor protection from financial abuse:

- Creating a new Consumer Financial Protection Agency to improve the transparency, fairness, and appropriateness of consumer financial products, services, and practices.

- Promoting higher standards for providers of consumer financial products and services through greater reliance on standardized "plain vanilla" products.

Better crisis-management tools:

- Creating a new resolution regime for any firm whose disorderly unwinding would risk serious adverse effects for the economy, as determined by the Secretary of the Treasury after consulting with the President and upon the written recommendation of the Federal Reserve Board and the FDIC Board (the latter replaced by the SEC Commissioners if the largest subsidiary in the group is a broker-dealer).

- Requiring written approval from the Secretary of the Treasury for the Federal Reserve's emergency lending powers under Section 13(3) of the Federal Reserve Act.

Higher international standards:

- Encouraging a stronger capital and liquidity framework for all banks; more effective oversight of global financial markets; stronger cross-border supervision and coordination of resolution frameworks; and robust crisis-management arrangements internationally.

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1/ The full proposal is available at http://www.financialstability.gov/roadtostability/regulatoryreform.html.

ground, nowhere more so than in the call to subject *all* systemic financial intermediaries—whether they own banks or not—to consolidated supervision focused on systemic risk, and to group-level prudential requirements linked to a bank-like prompt corrective action regime and resolution mechanism. The calls for more rigorous oversight of over-the-counter derivatives and centralized clearing of standardized contracts are similarly essential.

4.   **That said, many difficult issues will need to be tackled in the implementation phase**. This chapter focuses on three key reform areas where the crisis and its aftermath have revealed major shortcomings, assessing them against the authorities' reform objectives and proposals: first, internalizing the risk-taking of systemic financial intermediaries; second, designing a broader financial stability framework to control systemic risk; and third, closing key regulatory gaps.

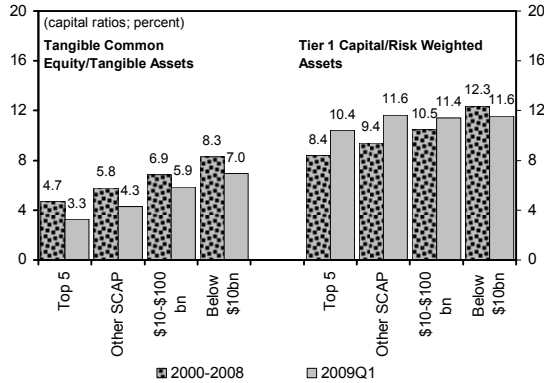**Addressing the role of systemic financial intermediaries**

5.   **At the heart of the challenge lies a select set of systemically critical financial conglomerates**. These groups, straddling the boundary between the heavily regulated, bank-centric core and the more lightly regulated, nonbank periphery of the system, dominate key market segments ranging from private securitization and derivatives dealing to triparty repo and leveraged investor financing. Regulated by a multitude of agencies with narrow but at times overlapping jurisdictions, their complex webs of subsidiaries—bound together, ultimately, by a shared franchise—have made it difficult to assess group-wide resilience, let alone systemic risk. Without a means to resolve such groups while keeping them open, and lacking an official resolution mechanism for systemic nonbanks, "too big to liquidate" has become "too systemic to restructure," eroding market discipline and exacerbating moral hazard. This calls for a two-pronged approach: controlling risk-taking while internalizing systemic risk, and strengthening crisis management and market discipline.

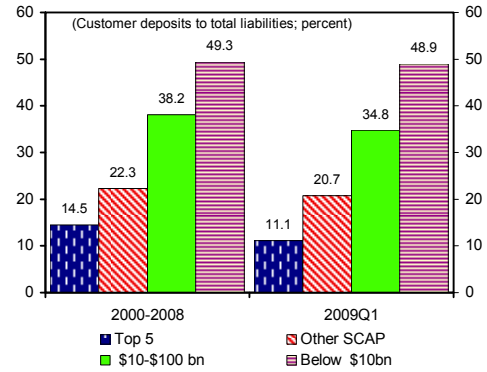*Controlling risk-taking while internalizing systemic risk*

•   *Issue:* Pre-crisis, vulnerabilities were concentrated in the largest BHCs, investment banking groups, and GSEs, which also held the thinnest capital buffers (Figure 2). During the crisis, these firms required massive government support, necessary to mitigate systemic risk, but also leaving little ambiguity (if there was much at all) about which firms were (or are) "too big to fail" (Litan, 2009). As a result of crisis-related mergers, liquidations, and policies (e.g., the ramping up of GSE mortgage securitizations), they are emerging from the turmoil with even larger market shares, exacerbating the systemic risk associated with their size, leverage, and interconnectedness—even as the authorities' *ex post* assumption of risk has cemented moral hazard. A major challenge will be to design a prudential regime that fully internalizes the potential for moral hazard.

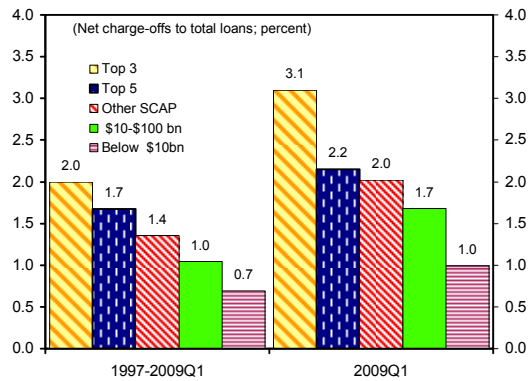**Figure 2. Vulnerabilities in U.S. Banking Institutions**

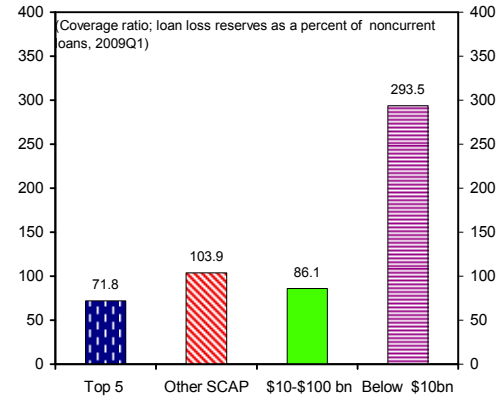The BHCs with the largest assets had the lowest capital buffers...

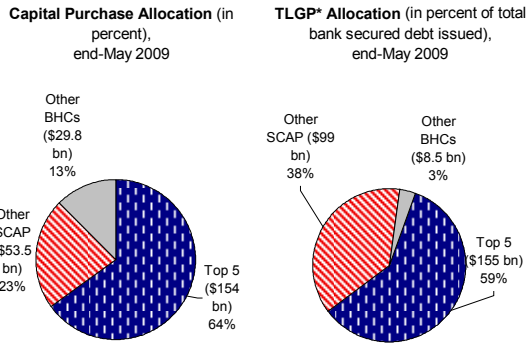...and the highest reliance on non-deposit funding...

(capital ratios; percent)

Tangible Common Equity/Tangible Assets

Tier 1 Capital/Risk Weighted Assets

4.7 3.3 5.8 4.3 6.9 5.9 8.3 7.0
8.4 10.4 9.4 11.6 10.5 11.4 12.3 11.6

Top 5   Other SCAP $10-$100 bn   Below $10bn

☒ 2000-2008   ☐ 2009Q1

(Customer deposits to total liabilities; percent)

14.5 22.3 38.2 49.3   11.1 20.7 34.8 48.9

2000-2008   2009Q1

■ Top 5   ▧ Other SCAP
■ $10-$100 bn   ▧ Below $10bn

... but experienced the highest loan losses...

… while maintaining the lowest reserves to absorb losses.

(Net charge-offs to total loans; percent)

Top 3
Top 5
Other SCAP
$10-$100 bn
Below $10bn

2.0 1.7 1.4 1.0 0.7   3.1 2.2 2.0 1.7 1.0

1997-2009Q1   2009Q1

(Coverage ratio; loan loss reserves as a percent of noncurrent loans, 2009Q1)

71.8   103.9   86.1   293.5

Top 5   Other SCAP $10-$100 bn   Below $10bn

They became the main recipients of public funding...

… while continuing to grow and gain market share.
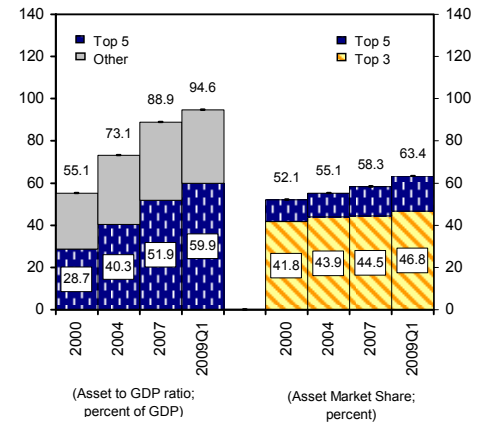
Capital Purchase Allocation (in percent), end-May 2009

Other BHCs ($29.8 bn) 13%
Other SCAP ($53.5 bn) 23%
Top 5 ($154 bn) 64%

TLGP* Allocation (in percent of total bank secured debt issued), end-May 2009

Other SCAP ($99 bn) 38%
Other BHCs ($8.5 bn) 3%
Top 5 ($155 bn) 59%

■ Top 5   ■ Top 5
☐ Other   ▧ Top 3

55.1 73.1 88.9 94.6
28.7 40.3 51.9 59.9
52.1 55.1 58.3 63.4
41.8 43.9 44.5 46.8

2000 2004 2007 2009Q1   2000 2004 2007 2009Q1

(Asset to GDP ratio; percent of GDP)   (Asset Market Share; percent)

- *Objective*: The goal should be to give financial firms sufficient incentives to reduce their contributions to systemic risk by penalizing their systemically important status. This could be done through capital charges graduated to reflect contributions to systemic risk; rigorous application of competition limits (e.g., as with the current cap on an institution's share of insured deposits); and greater use of risk- and size-sensitive insurance premia. Given the lack of evidence of efficiency benefits from scale once financial institutions reach a (reasonably low) size threshold, the policy objective should be for managers and shareholders to wish to avoid their firms being designated "systemic" due to the resulting additional costs imposed (Akhavein et al., 1997; and Berger et al., 1999).

- *Assessment of U.S. proposals*: The Administration's proposals contain many bold and innovative suggestions—e.g., for Tier 1 FHCs to prepare prepackaged resolution plans and purchase contingent capital—that should help to address moral hazard. In practice, it will be important that additional capital and liquidity requirements on Tier 1 FHCs fully internalize their contributions to systemic risk and, at the margin, disincentivize size, leverage, and interconnectedness. Otherwise, there could be a risk that, as with the pre-crisis regime for the housing GSEs, the regulatory structure would not address the problems associated with "too big to fail."

Strengthening crisis management and market discipline

- *Issue*: Rescues, expanded deposit insurance coverage, and liquidity support measures, while necessary to stabilize the system, have undermined market discipline and diluted market participants' incentives to monitor risk-taking, especially by large institutions.

- *Objective*: The goal should be to underpin market discipline through a resolution regime that ensures that senior managers, uninsured creditors, and equity holders each face a credible threat of consequences (including significant loss) in the event of failure. As the Administration has proposed, this expectation can be reinforced by requiring systemic financial firms to prepare and periodically update prepackaged wind-up plans. Also, a requirement to issue contingent capital (debt convertible to common equity in a crisis) for large firms would reinforce market discipline in benign times and protect taxpayers when capital is stressed (Rajan, 2009).

- *Assessment of U.S. proposals*: The authorities' decision to propose a comprehensive resolution mechanism for failing nonbank financial institutions and holding companies deemed systemically important is a significant step toward supporting market discipline and, *in extremis*, orderly crisis resolution. Given the groundbreaking nature of this framework, many issues are yet to be finalized, including which criteria would trigger the special resolution mechanism and for which firms, how to mitigate uncertainty regarding which insolvency regime will apply, and how to ensure that the special resolution mechanism does not reinforce the perception that creditors will be insulated from losses (as occurred when the two largest GSEs were put into conservatorship). Consequently, disincentivizing firms from

being deemed systemic, including through a robust prompt corrective action framework built around consolidated capital requirements as proposed, would be a necessary complement for the special resolution regime to restore market discipline.

Addressing systemic risk

6.   **To address systemic risk, financial surveillance should be integrated into a broader financial stability framework**. Individually sound institutions can, as a group, be conducive to risk accumulation. In stable conditions, market participants pursue profitable opportunities that are individually beneficial. But, if a sufficient mass of similarly motivated agents moves in lockstep, the result can be the formation of bubbles whose eventual bursting may impose unacceptable economic cost. A stability framework is thus needed that recognizes both the micro dimension of systemic risk, with regulations tailored to support a diversity of financially sound actors, and its macro dimension, with prudential tools deployed as a counterweight to procyclical behavior. This requires a surveillance framework that has an explicit mandate to mitigate financial vulnerabilities, wherever they emerge, and with a macroprudential orientation to account for the interlinkages among financial firms, financial markets, and developments in the broader economy.

The role of a systemic risk regulator

•   *Issue:* The crisis has demonstrated the need for an agency to be charged with identifying and assessing the buildup of risk concentrations across the whole system and their feedback effects on the broader economy.

•   *Objective:* The goal would be to designate an agency as systemic risk regulator (SRR), with a clear mandate for overall financial stability, and with the ability to work with other regulators to gather relevant information and potentially require them to address risk accumulations in particular firms or subsectors (Nier, 2009). Because of the potential fiscal implications, the SRR would need to work closely with the Treasury—the systemic insurer of last resort—while maintaining its independence. This could be achieved, for example, through a council of financial regulators, which could (say) be required to need a super-majority vote to overturn an SRR recommendation. Quantifying and addressing financial firms' contributions to systemic risk would be a core mandate of the SRR. In turn, the SRR would publish regular financial stability reports flagging key vulnerabilities and risks.

•   *Assessment of U.S. proposals:* The Treasury's new financial stability framework is based on the Federal Reserve regulating and supervising all systemic institutions and the FSOC facilitating interagency discussion and identifying emerging risks. This two-pillar structure has many noteworthy features. It gives the central bank explicit responsibility for the prudential oversight of all financial firms that could pose a threat to financial stability—Tier 1 FHCs as well as all BHCs—which has advantages, given its mandates for payment systems stability and lender of last resort and its broader macro perspective. Critically, the

envisaged categorization of Tier 1 FHCs should include any broker-dealer, hedge fund, or insurance company deemed to be systemic. This would be a major improvement over the past, when the Federal Reserve's reach was limited to BHCs. Finally, the proposal strengthens substantially the Fed's powers to conduct effective consolidated supervision, including over any regulated or unregulated subsidiaries, which will help address previous regulatory gaps. However, the proposals also leave a number of issues unaddressed for now:

- The success of the proposed framework will depend on the Federal Reserve's ability to interact effectively with other regulatory agencies to identify and control risk concentrations. This, in turn, will require a clear accountability mechanism for each of the relevant agencies, including the FSOC, effective information-sharing and coordination, and an explicit mandate for each agency to monitor and flag systemic risk within its regulatory perimeter. Under the Treasury proposals, the FSOC, rather than the Fed as SRR, would be responsible for reporting publicly on risks to financial stability.

- It remains to be seen how the Federal Reserve, in consultation with the Treasury, will draw up rules to guide the identification of systemic firms to be brought under its purview, and how the FSOC will ensure that remaining intermediaries are monitored from a broader financial stability perspective. Although the criteria for Tier 1 FHC status appropriately include leverage and interconnectedness as well as size, identifying systemic institutions *ex ante* will remain a difficult task (cf., AIG).

- In the proposed stability framework, the Fed's still-constrained regulatory perimeter, extending to Tier 1 FHCs and BHCs, might not capture threats to financial stability arising out of the collective risk-taking of many smaller nonbank financial firms. A broader financial stability mandate that allows the Fed to monitor an institution's (or group of institutions') contribution to systemic risk without designating it *ex ante* as systemic would provide a more flexible surveillance tool.

Designing a macroprudential framework for financial stability

- *Issue:* A key challenge for policymakers—now widely seen as a priority—will be to adapt prudential regulations to limit the procyclical trends inherent in financial markets and encourage financial firms to build larger capital and liquidity buffers in "good times" that can be drawn down as strains materialize (e.g., Brunnermeier et al., 2009).

- *Objective:* The goal would be to introduce tools that help mitigate the procyclical tendencies of asset valuations and their distorting impact on risk perceptions. Potential tools to address these issues include policies that use a longer "through-the-cycle" horizon to measure risk, forward-looking loss provisioning, and capital or liquidity requirements linked to selected macroeconomic indicators, e.g., credit growth or asset prices (BIS, 2009; Borio and Drehmann, 2009; and Laeven and Valencia, 2008). Other commonly cited measures include maximum loan-to-value ratios to reduce the sensitivity of credit supply to collateral

values; deposit insurance schemes funded more generously during benign times (currently permitted only within limits for the FDIC); and a leverage ratio that extends to off-balance sheet risk exposures. Dampening procyclicality would also require ensuring consistency in the macroeconomic policy mix and avoiding market distortions (e.g., short-sighted executive compensation schemes, subsidized risk-taking through the housing GSEs) that could further amplify the build-up of financial imbalances (Andritzky et al., 2009).

- *Assessment of U.S. proposals:* The Administration's proposals contain many sensible suggestions to strengthen resilience—e.g., accounting reforms to permit forward-looking provisioning, policies, to reduce procyclicality (which would become a priority at the international level). However, it is unclear which actor in the system will be in charge of an overarching macroprudential financial stability framework that accounts for the effects and interactions of financial sector and macroeconomic policies. Such a role would seem to fall naturally to the Federal Reserve, given its mandate for both macroeconomic stability and the stability of systemic institutions. Key in this will be ensuring its ability to influence the supervision and regulation of institutions and markets not within its purview, to the extent these may pose systemic risks, perhaps through the offices of the FSOC.

Closing regulatory gaps and simplifying the regulatory structure

7.   **In one sense, the task is to catch up with three decades of financial innovation**. Those parts of the system subject to limited prudential regulation expanded the fastest, reducing the retail deposit-taking core of the financial system to a diminishing fraction of the whole (Figure 3). Spurred in part by regulatory arbitrage, new institutions and markets took root—money funds in the 1970s, pass-through securitizations in the 1980s, hedge funds, structured finance, and credit derivatives in the 1990s—outside the perimeter of the safety net, often with limited or no safety-and-soundness requirements, and in key instances exempt from conduct-of-business rules. The demand for higher-yielding financial investments and safe and liquid collateral was met by a supply of complex instruments that would prove brittle under duress. Systemic risk built up largely unrecognized.

Figure 3. Total Assets of U.S. Financial Sector (Excluding Hedge and Private Equity Funds)
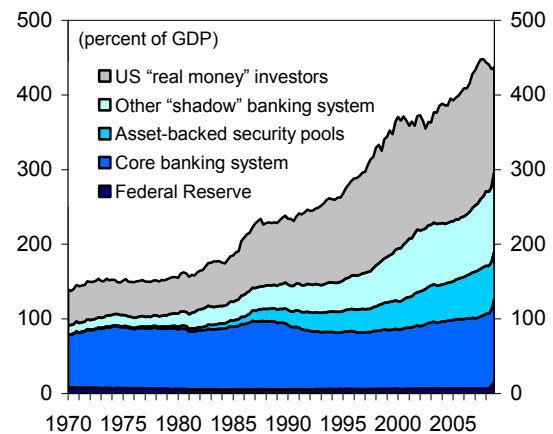
Sources: Board of Governors of the Federal Reserve System and Fund staff calculations.
Note: U.S. "real money" investors include insurers, mutual funds, and pension funds. Asset-backed security pools include those of Government Sponsored Enterprises (GSEs) and private-label issuers. Other "shadow" banking system includes GSEs, money market mutual funds, finance companies, broker dealers, etc. Core banking system includes depositories and BHCs.

Rationalizing U.S. financial regulatory structure

- *Issue:* While no one financial regulatory model has proven optimal in the global crisis, the overlapping multiplicity of federal and state regulators in the United States has resulted in regulatory arbitrage by firms and competition for assessment fees by regulators, a lack of coordination in addressing the build-up of vulnerabilities, unnecessarily complex interactions with foreign counterparts, and inconsistent crisis management. Key gaps in oversight highlighted by the crisis included state-licensed mortgage brokers and originators, institutions' opaque exposures to special investment vehicles, and unregulated subsidiaries of holding companies (cf., AIG's Financial Products unit). In addition, most hedge fund advisors do not currently need to register with the SEC.

- *Objective:* The U.S. financial regulatory structure should be rationalized to remove gaps and prevent firms from being able to "shop" for lighter regulation. Regulatory arbitrage can be moderated through the abolition of overlapping charters for similar activities. To minimize the risk of a monolithic view developing, the SRR will need well-informed and motivated counterweights among other regulators and at the Treasury, to test its assumptions.

- *Assessment of U.S. proposals:* The Administration's proposals close some important regulatory "gaps, loopholes, or opportunities for arbitrage," even if the final number of federal regulatory agencies would increase with the creation of two new agencies and some clear opportunities for consolidation (e.g., moving toward a single capital markets regulator) were not taken. The planned merger of the Office of the Comptroller of the Currency and the Office of Thrift Supervision would be welcome, as would the elimination of the federal thrift charter, the exemption of industrial loan holding companies from BHC-type consolidated supervision, and other "nonbank bank" categories. The Fed's ability to designate any systemic institution as a Tier 1 FHC should ensure that unregulated entities that come to own significant financial firms (e.g., private equity partnerships) could be addressed. Conversely, the proposal to establish an Office of National Insurance does not seem to address the overlap and inefficiency that arise from 50 state regulators—although the Treasury's declared support for strong risk standards and increased uniformity for insurers, and the likely inclusion of selected large insurance groups as Tier 1 FHCs, are positive.

Ensuring effective international coordination

- *Issue:* Improving international coordination will be key to avoid uneven competition, cross-border regulatory arbitrage, potentially destabilizing financial flows, and protectionism, while improving prospects for the orderly resolution of internationally active financial firms.

- *Objective:* Consistent regulations—including higher, countercyclical, and progressive capital requirements—will need to be established in all significant jurisdictions and are being considered in the Basel context. Similarly, international coordination and mutual recognition of bankruptcy and resolution frameworks—e.g., compatible treatment of collateral and

preemption rights—are critical to achieving clarity and speed in the resolution of failing cross-border firms. Ongoing Fund-Financial Stability Board work, commissioned by the G-20, can provide background on how to set guidelines for assessing firms' systemic importance, including as they relate to potential threats to international financial stability.

- *Assessment of U.S. proposals:* The U.S. authorities' support for rapid progress on cross-border resolution and crisis management is welcome, not least for the recognition that the national ring-fencing of liquidity and collateral can have international spillover effects.

C. Conclusions and Policy Implications

8.   **The Administration's regulatory reform proposals represent a major step forward**. In particular, ensuring that systemic financial holding companies are subject to tougher prudential requirements should go some way toward mitigating systemic risk and moral hazard. Related key advances include calls to strengthen consolidated supervision of all systemic financial intermediaries, to establish an attendant framework for systemic risk, and to rationalize the bank supervisory structure.

9.   **The key now will lie in determined implementation of the proposals, ideally as a holistic package, with due attention to important details.** Critical among these will be clarifying the respective roles of the Federal Reserve and the FSOC in identifying, managing, and communicating about systemic risks, calibrating the additional requirements for systemic institutions so as to incentivize the reduction in size and complexity, and ensuring that any gaps and inconsistencies in the still-complex regulatory structure can be bridged effectively. Measures will also be needed to mitigate procyclicality, with due international coordination. But overall, the proposals lay out a broad and appropriate agenda for addressing the issues thrown up by the crisis. These and other areas will be analyzed further in the context of U.S. participation in the Fund's Financial Sector Assessment Program, scheduled to begin soon.

References

Acharya, V., and M. Richardson (eds.), 2009, *Restoring financial stability: How to repair a failed system*, Wiley, March.

Akhavein, J.D., A.N. Berger, and D.B. Humphrey, 1997, "The Effects of Megamergers on Efficiency and Prices: Evidence from a Bank Profit Function," *Review of Industrial Organization*, Vol. 12.

Andritzky, J., J. Kiff, L. Kodres, P. Madrid, A. Maechler, A. Narain, N. Sacasa, and J. Scarlata, 2009, "Policies to Mitigate Procyclicality," *IMF Staff Position Note*, SPN/09/09, May 7.

Bank for International Settlements, 2001, "Marrying the Macro- and Macroprudential Dimensions of Financial Stability, *BIS Papers*, No. 1.

———, 2009, "79th Annual Report, 1 April 2008–31 March 2009", Basel, Bank for International Settlements, June 29.

Bank of Canada, 2009, "Reports: Procyclicality in the Financial System," in *Financial System Review*, June.

Berger, A.N., R.S. Demstz, P.E. Strahan, 1999, "The Consolidation of Financial Services Industry: Causes, Consequences and Implications for the Future", *Journal of Banking and Finance*, Vol. 23(2/3/4) pp.135–94, February.

Borio, C., and M. Drehmann, 2009, "Towards an Operational Framework for Financial Stability: 'Fuzzy' Measurement and its Consequences," *BIS Working Paper*, No. 284, June.

Brunnermeier, M., A. Crockett, C. Goodhart, A.D. Persaud, and H. Shin, 2009, "The Fundamental Principles of Financial Regulation," *Geneva Reports on the World Economy*, 11, CEPR, January.

Crockett, A., 2000, "Marrying the Micro- and Macroprudential Dimensions of Financial Stability," BIS Speeches, September 21.

De Larosière, J. (Chair), 2009 "The High-Level Group on Financial Supervision in the EU: Report," Brussels, February 25.

Financial Stability Forum, 2009, "Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System," Basel, April.

Group of Twenty, 2009. "G-20 Working Group 1: Enhancing Sound Regulation and Strengthening Transparency," March 25.

International Monetary Fund, 2007, "New Landscape, New Challenges: Structural Change and Regulation in the U.S. Financial Sector," IMF Country Report No. 07/265.

Kashyap, A.K., R.G. Rajan, and J.C. Stein, 2008, *Rethinking Capital Regulation*, Federal Reserve Bank of Kansas City Symposium on "Maintaining Stability in a Changing Financial System," Jackson Hole, August 21–23.

Knight, M., 2006, "Marrying the Micro and Macroprudential Dimensions of Financial Stability: Six Years On," speech delivered at the 14th International Conference of Banking Supervisors, BIS Speeches, October.

Litan, R.E., 2009, "Regulating Systemic Risk," Initiative on Business and Public Policy at Brookings, *Fixing Finance Series*, 2009–03, March.

Mayes, D., R. Pringle, and M. Taylor (eds.), 2009, *Towards a New Framework for Financial Stability*, Central Banking Publications.

Nier, E., 2009, "Financial Stability Frameworks and the Role of Central Banks: Lessons from the Crisis," *IMF Working Paper* No. 09/70.

Poole, W., 2009, "A Market Solution to Secure Banks' Future," *Financial Times*, May 20.

Rajan, R., 2009, "Cycle-proof Regulation," *The Economist*, April 8.

Stern, G.H., and R.J. Feldman, 2009, *Too Big to Fail: The Hazards of Bank Bailouts*, (Washington: Brookings Institution Press).

U.S. Department of the Treasury, 2009, *Financial Regulatory Reform—A New Foundation: Rebuilding Financial Supervision and Regulation*, June 17.

IV.   THE U.S. FEDERAL DEBT OUTLOOK: A STOCHASTIC SIMULATION APPROACH
Oya Celasun and Geoffrey Keim

A.   Introduction

1.   **The future path of U.S. federal government debt is subject to an unusual level of uncertainty**. Current federal debt projections (Figure 1) rely on highly uncertain projections for the economic outlook, future course of fiscal policies, and gross borrowing needs for measures to stabilize the financial sector.[1] Carefully assessing the risk profile of debt projections is important for policymakers since the public debt outlook has potential implications for borrowing costs in the United State and abroad, and puts limitations on the set of feasible future fiscal policies.

Figure 1. Federal Debt Held by the Public
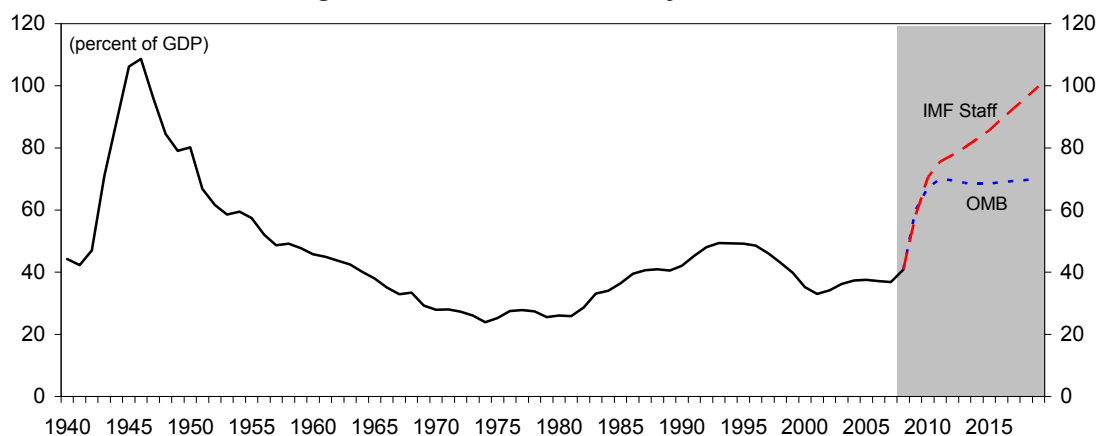
Sources: Office of Management and Budget; Haver Analytics; and Fund staff estimates.

2.   **Drawing on stochastic simulations, this chapter quantifies the uncertainty surrounding medium-term debt projections**.[2] It derives frequency distributions for debt over the horizon 2011–19 based on plausible constellations of shocks to real output, interest

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[1] The staff's fiscal projections are based on the Administration's FY 2010 budget proposal adjusted for differences in the staff's macroeconomic projections and assumptions on the costs of financial system stabilization policies.

[2] A vector autoregression (VAR) model is estimated for real GDP growth and real interest rates on three-month and 10-year Treasury debt. A large number of stochastic forecasts are then derived from the estimated equation system, with shocks to the variables sampled from the estimated joint error probability distribution. For a description of the methodology see Celasun, O., X. Debrun, and J. Ostry, 2006, "Primary Surplus Behavior and Risks to Fiscal Sustainability in Emerging Market Countries: A Fan Chart Approach", *IMF Staff Papers*, Vol. 53 (3), pp. 401–25.

rates, and primary balances. The chapter also evaluates debt profiles under two alternative assumptions for the evolution of the primary balance: the primary balance path implied by the President's FY 2010 Budget Proposal versus a primary balance path implied by estimated past policy adjustments to changing debt levels and the output gap.

B. Results

3.   **Federal primary budget balances in the United States. have historically increased rapidly in response to higher debt and the deviation of real GDP from potential output.** A simple estimated fiscal reaction function for the period 1949–2008 suggests that the primary balance has risen on average by 0.039 percent of GDP for a one percentage point of GDP increase in debt held by the public (Table 1). This result can be interpreted as indicating policymakers have bolstered public finances in response to increases in debt, and suggests that fiscal policy has on average been responsible. Likewise, the primary balance has on average increased by 0.310 percentage points of GDP given a percentage point increase in the output gap, illustrating the sensitivity of the federal government balance to economic conditions. Notably, however, actual surpluses exceeded the predicted levels quite significantly in most of the 1990s, but fell short of the model predictions over most of the 2000s (Figure 2).

Table 1. Determinants of the Primary Balance

Lagged Debt (percent of GDP)	0.039	**
	[0.015]	
Output Gap (percent of GDP)	0.310	***
	[0.083]	
Constant	-1.717	**
	[0.658]	
R-squared	0.28	
Number of Observations	60	

Note: Standard errors are shown in brackets. *** and ** denote significance at the 1 and 5% levels, respectively. Ordinary least squares estimation, dependent variable: the Unified Federal Government Primary Balance as a percent of GDP. Sample: 1948-2008.

Figure 2. Actual vs. Predicted Primary Balances
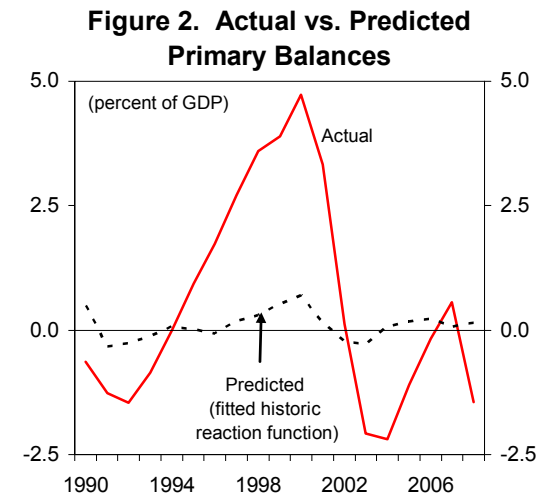
Sources: Office of Management and Budget; Haver Analytics; and Fund staff estimates.

4.   **The policy proposals under the FY 2010 budget would lead to a significantly higher level of debt than the path of primary surpluses implied by historical policy behavior.** Under the staff's baseline macroeconomic projections, if primary balances from 2011 onwards were to follow the equation estimated above using historical data, debt would decline to around 67 percent of GDP by 2019 (Table 2). By contrast, the FY 2010 budget projections—adjusted for differences between the staff's and the Office of Management and

Budget's (OMB) macroeconomic assumptions—would bring debt to almost 100 percent of GDP by 2019.[3]

Table 2. Primary Balances and Debt Under Staff's Baseline Projections vs. Historical Primary
Surplus Behavior
(Fiscal years, in percent of GDP)

	2008	2009	2010	2011	2015	2019
Primary balance						
Staff's baseline based on the FY 2010 budget	-1.4	-13.2	-9.7	-5.6	-2.3	-2.4
Historic behavior (2011 onwards)	-1.4	-13.4	-9.3	-5.6	1.0	0.9
OMB budget projection	-1.4	-11.9	-7.6	-4.4	-0.1	-0.5
Debt held by the public						
Staff's baseline based on the FY 2010 budget	40.8	58.2	70.5	75.5	85.6	99.7
Historic behavior (2011 onwards)	40.8	57.0	68.8	73.9	68.6	67.5
OMB budget projection	40.8	59.9	67.1	70.1	68.5	70.1

Sources: Office of Management and Budget and Fund staff estimates.

5.   **Stochastic forecasts of growth and real interest rates derived from a vector autoregression model, combined with the primary surplus path under staff's baseline, imply a significant degree of uncertainty around debt projections.** The probability that FY 2019 debt would fall into the range of 69–107 percent of GDP would be 80 percent, with a relatively greater chance of debt falling into the upper half of that range (Figure 3).[4] The probability of debt being higher than the Administration's projection of 67 percent of GDP in 2019 would top 90 percent. The staff's baseline debt projection is higher than the mean path of the simulated debt distribution since the average economic forecast based on the estimated VAR is more favorable than the economic assumptions under the staff's baseline. Nonetheless, debt would exceed staff's baseline debt projection with a probability of more than 20 percent in 2019.

Figure 3. Debt Profile Under Projected Primary Surplus Behavior
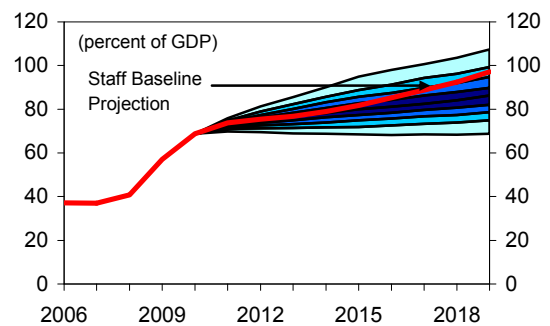
Sources: Office of Management and Budget; Haver Anaytics; and Fund staff estimates.
Note: The dark cone in the center is the 20 percent standard error interval around the median projection, and the overall cone marks the 80 percent confidence interval.

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[3] The Administration's FY 2010 budget projects debt to reach levels similar to those that would be obtained under the assumption of historical fiscal behavior, but with much less primary fiscal effort.
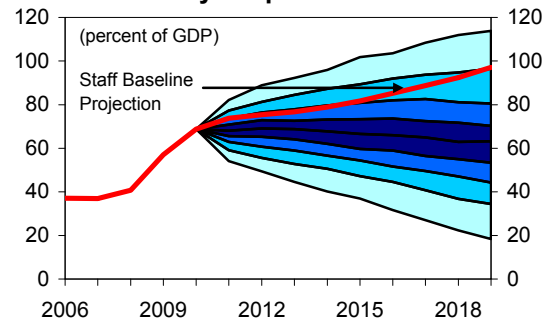
[4] The asymmetry (upward skewness) of the debt distribution around its mean reflects the relatively greater likelihood of adverse economic outcomes and debt dynamics—real growth falling short of real interest rates through the forecast horizon—given the unfavorable initial economic conditions.

6.   **Combining the estimated historical primary surplus reaction function with stochastic forecasts of real GDP growth and real interest rates—and allowing for empirically realistic shocks to the primary surplus—imply a much more favorable median projection but slightly larger risks around the baseline.** If the federal government on average adjusts the primary surplus as it has done in the past—implying a stronger improvement in the primary balance than under the baseline projections—the probability that debt would exceed 67 percent of GDP by year 2019 would be around 40 percent (Figure 4). Notably, with 80 percent probability, debt would be lower than the level it would reach under staff's baseline by 2019.

Figure 4. Debt Profile Under Historical Primary Surplus Behavior

Sources: Office of Management and Budget; Haver Anaytics; and Fund staff estimates.
Note: The dark cone in the center is the 20 percent standard error interval around the median projection, and the overall cone marks the 80 percent confidence interval.

C.   Conclusions and Policy Implications

7.   **Fiscal policies that yield a strong primary balance response to debt in line with the historic experience in the United States would imply a much higher chance of bringing debt to levels projected by the Administration in the medium term, as compared with the FY 2010 budget projections adjusted for the staff's baseline economic forecasts.** Taking account of the joint stochastic behavior of real growth and real interest rates suggest significant uncertainty around the debt projections, with risks tilted toward a higher level of debt at the end of the forecast horizon, especially if primary surpluses do not rise to the same degree in response to rising debt as they have since 1949.