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FINANCIAL CRISIS OF 2007–2010

Winston W. CHANG

Department of Economics, State University of New York at Buffalo, Buffalo, U.S.A.

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Abstract: This paper discusses the causes and impacts of the financial crisis of 2007–2010 and examines the reforms aimed at the prevention of its recurrence. The causes to be discussed include housing and commodity bubbles, easy credit conditions, subprime lending, predatory lending, deregulation and lax regulation, incorrect risk pricing, collapse of the shadow banking system and systemic risk. The impacts to be examined include the major financial institutions, the financial wealth, the economies of the U.S. and other countries—Iceland, Hungary, Russia, Spain, Ukraine, Dubai, and Greece. The paper further discusses emergency policy responses, principles of financial reforms and various regulatory proposals. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 and the Basel III accord are also discussed. Concluding remarks provide a brief discussion of the latest economic problems in 2011.

Key words: Financial crisis, housing and commodity bubbles, shadow banking system, systemic risk, principles of financial reform, Dodd-Frank Reform Act, Basel III accord.

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1. INTRODUCTION

The financial crisis of 2007–2010 was the most severe financial downturn since the Great Depression. Economist Peter Morici coined the term the “The Great Recession” to describe the severity of the crisis. The crisis resulted in the failure of key businesses, declines in financial wealth estimated in the trillions of U.S. dollars, contractions in economic activities (Baily and Elliott, 2009), and a severe global economic recession in 2008. Numerous large financial institutions needed bailout from national governments. Both regulatory and market based solutions were proposed or executed to combat the crisis (Roubini, 2009).¹

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E-mail: ecowwc@buffalo.edu

¹ For an extensive discussion of the recent financial crisis, see Wikipedia’s “Late-2000s Financial Crisis.”

The global housing bubble collapsed after peaking in the U.S. in 2006. Home prices in the U.S. dropped over 30% according to the Case-Schiller Home Price Index. Securities with risk exposure to the housing market plummeted, causing great damage to financial institutions across the globe. Stock markets all over the world suffered large drops in 2008 and early 2009 as questions arose regarding the solvency of major financial institutions and the disappearance of liquidity in the credit markets. Worldwide growth slowed under tightened credit markets and declines in world trade (IMF, 2009). Governments, central banks and international organizations implemented various plans including fiscal expansion, monetary expansion and institutional bailouts to an unprecedented degree.

The crisis can be vividly revealed by examining the underlying stress in the financial system. Fig. 1 shows the index of financial stress produced by the Federal Reserve Bank of St. Louis. The index is constructed by principal components analysis using a group of 18 variables including various interest rates, yield spreads and stock and bond indices.² The higher the index, the higher the stress level. In 2006, the index had a negative number, showing that the financial market was ultra calm with no stress at all. It began to rise rapidly in 2007 and reached almost 5.0 by the end of 2008. It is worth noting that the index was not more than 1.0 in 2001 after the September 11 terrorists attacks in the U.S.

The calm prior to 2007 led Bloomberg Businessweek to claim in a cover story that economists failed miserably to predict the worst international economic crisis since the Great Depression.³ However, not everyone was caught off guard. Dirk Bezemer (2009)



Figure 1. Financial Stress Index
Source: Federal Reserve Bank of St. Louis

² For more details about the index, see Federal Reserve Bank of St. Louis, National Economic Trends, January 2010.

³ See also e.g., Coy (2009) and Knowledge@Wharton (2009).

credited a handful of economists with predicting the crisis.⁴

In light of the severity of this crisis, the present paper aims at deciphering its causes, examining its impacts on the U.S. and several other countries that were particularly hit by the crisis. It also discusses the implemented short-term policy measures, the principles of financial reform, the Dodd-Frank Wall Street Reform and Consumer Protection Act, and the Basel III accord. In the concluding remark, the paper briefly discusses the subsequent economic crisis of 2011.

2. THE CAUSES

2.1. *Housing and Commodity Bubbles*

The event that precipitated the crisis was the overvaluation of the United States housing market in 2006 and the subsequent crash. Housing prices were driven up by easy credit and over speculation on the belief that housing prices would keep going up. Low initial rates on adjustable rate mortgages (ARM) and low down payment requirements encouraged more demand for housing. After a prolonged period of rising home prices, 2006 saw home prices start to decline as interest rates rose creating a poor refinancing environment. A rapid increase in default activity followed as home prices failed to rise as expected and mortgagors were unable to refinance upon the expiration of the initial ARM ‘teaser’ rates being reset to higher rates.

The growth of modern financial instruments such as Mortgage-backed securities (MBSs) and collateralized debt obligations (CDOs) gave lenders extra incentive to make various types of loans available to consumers. As the risks associated with loan repayment (mortgages, credit cards, auto loans) were passed through to the investors in these instruments, it became easier for consumers to obtain loans and grow debt to unprecedented levels (Krugman, 2009). The growth in the markets for these instruments also made it possible for investors all over the world to invest in the U.S. housing market.

Major financial institutions around the world suffered major losses when home prices dropped due to their investments in the subprime MBS market. The vicious cycle of foreclosure and falling house prices started when home values dropped below the value of the outstanding mortgage. The crisis spread to other parts of the economy as the deflationary economy increased the burden of debt. Global losses across all loan types have been estimated to be in the trillions of U.S. dollars.

At the same time that the housing bubble grew, the shadow banking system started to play a greater part in facilitating credit market liquidity. The shadow banking system consists of institutions like investment banks and hedge funds, which are not subject to the same regulations as depository institutions like commercial banks. Many of these institutions that had high exposures to the MBS market suffered large losses leading to unprecedented write-downs. Some engaged in betting against one another on MBS and

⁴ They are: Dean Baker, Wynne Godley, Fred Harrison, Michael Hudson, Eric Janszen, Stephen Keen, Jakob Brøchner Madsen (with Jens Sørensen), Kurt Richebächer, Nouriel Roubini, Peter Schiff and Robert Shiller.

other investment vehicles even though a majority of them routinely passed on these securities to final investors.⁵ These losses were unable to be absorbed because of already high debt burdens. As losses mounted, the credit-providing facilities of these institutions dried up and inhibited economic activity across the world. Governments stepped in with bailout funds directed at key financial institutions with hopes of restoring confidence and restarting the flow of credit.

During the housing bubble, the growth of home prices outpaced income growth. Over the decade ending in 2006, the price of the typical American house increased 124%. At the peak of the bubble in 2006, the national median home price was 4.6 times the median household income. In 2004, it was 4.0. Over the entire twenty-year period prior to 2001, the ratio was in the range of 2.9 to 3.1. This implies that new homebuyers increasingly took on larger loans relative to their incomes. Additionally, existing homeowners leveraged their increased paper wealth by taking out second mortgages or home equity loans (HEL) to finance home improvements and consumer spending.

Home prices were partly pulled up by a strong appetite from investors for exposure to the high yielding MBS and CDO markets over the low yielding treasuries. The flow of foreign money kept pouring into the U.S. during 2000 and 2007. By 2003, the supply of securities backed by mortgages originated in the traditional way began to run out. Faced with high demand from investment banks and no intention of retaining the resulting loan on their own books, mortgage originators lent with increasingly less stringent standards.

The ultimate investors overlooked the drop in lending standards because of the complexity of the origination, aggregation, and securitization process. CDOs and collateralized mortgage obligations (CMOs) acted as conduits through which thousands of underlying mortgage loan payments were packaged into a pool and then rolled out in a series of tranches by a well defined sequence of priority called a cash flow waterfall (Eavis, 2010). The highest priority tranches garnered AAA or other investment grade ratings, while the lower ones received lower ratings. Due to the sheer magnitude of the pools and the complexity of the waterfall structure, investors relied heavily on the rating agencies' assessments.

Fig. 2 shows the S&P Case-Shiller 10-city home price index. The index reached a peak of over 220 in 2006. It started to decline and reached a bottom of 151.19 by May 2009. It then staged a small recovery to over 160 in 2010 but slid again to 151.66 in March 2011.⁶ With decreased asset values, homeowners with ARM were unable to re-finance before their interest rates were due to step up. Foreclosures in 2007 increased 79% over 2006 with approximately 1.3 million properties in some stage of the foreclosure processes. This number rose to 2.3 million in 2008 (an 81% increase over 2007), with over 9% of all mortgages in the U.S. falling into delinquency or foreclosure. The number further increased to 2.8 million in 2009, a 21% increase over 2008.

Following the collapse of the housing bubble, the global commodity market entered

⁵ As the referee pointed out, the losses accrued to financial investors were even higher than the shadow banks.

⁶ For the percentage change in housing price since 1978, see Bernanke (2010).

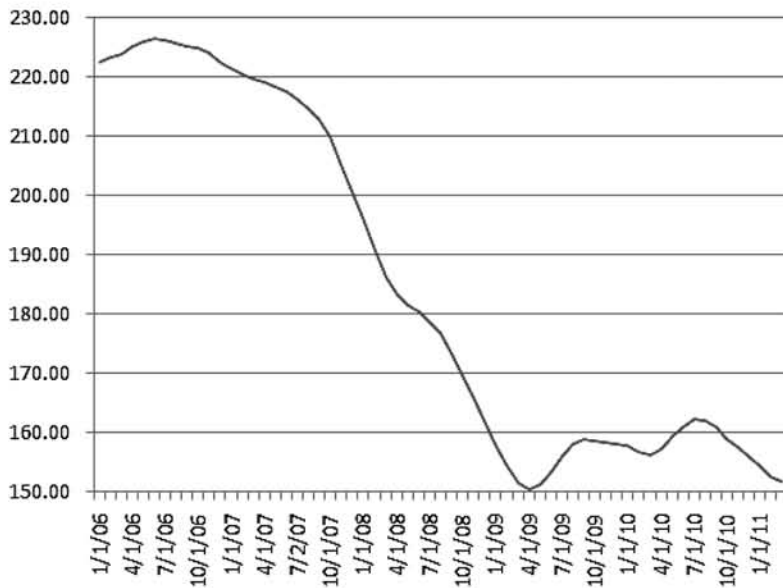


Figure 2. S&P Case-Shiller 10-city home price index

Source: ALFRED, St. Louis Fed

its own bubble. From early 2007 to mid-2008 oil prices skyrocketed from \$50 to \$140 a barrel and then plunged to \$30 by the end of 2008. The commodity bubble was attributed to the flight of capital from the housing market, pure speculation, increasing concern over the limited supply of natural resources, and increased demand from growing and resource-hungry economies in Asia. With more money flowing to oil producing nations, economic growth in the rest of the world suffered under the increased cost burden.

Oil wasn't the only commodity to undergo boom bust. Other commodities also had very wide swings in prices in the past.⁷

2.2. *Easy Credit Conditions*

Easy credit was available in the U.S. in the early 2000s because of significant inflows of foreign money and the Fed's expansionary monetary policy. Much of the influx of foreign money came from the booming Asian economies and oil producing nations. Such influx was mainly due to these countries' accumulation of the U.S. dollar earned from their exports. Most of the accumulated dollars were then recycled back to the U.S. by their purchase of U.S. financial assets. For reasons such as the dollar being the main reserve currency in the world, the comparative advantage the dollar commands as a result of the U.S. economic and military power as well as the stability of its political system and favorable business environments, foreign official and private sectors would prefer investing in the U.S.'s real and financial assets. Holding dollar reserve assets

⁷ See, e.g., IMF (2009), Table 1.2.

facilitated many central banks' management of exchange risks.

Low interest rates made credit more accessible, enabling American consumers to increase their borrowing. In 2000, the fed funds target rate was 6.5%. Coupled with the perceived risk of deflation, the dot-com bubble and the September 11 terrorists' attacks prompted the Fed to lower the fed funds rate to 1% by 2003. Between mid-2004 and mid-2006, the fed funds rate began to rise rapidly, causing ARM rates to be reset higher. This policy change caught the market by surprise and made speculation in the housing market riskier (Altman, 2009).

Bernanke (2005) argued that further downward pressure on rates came with the large U.S. current account deficit (Bernanke, 2005). The consequential strong international demand for U.S. financial assets drove up bond prices and therefore drove down yields. Bernanke's argument is based on the balance of payments relationship between the current account and the capital account. In order to finance the growing U.S. current account deficit, which increased by \$650 billion from 1996 to 2004 or from 1.5% to 5.8% of GDP, the U.S. needed to borrow large amounts of money from abroad. Therefore, large amounts of foreign money flowed into the U.S. to finance its imports. The main reasons why foreign countries were able to lend to the U.S. were high savings, high oil prices and huge current account surpluses. American consumers used these borrowed funds to finance current consumption including housing. This inflow of capital increased demand for U.S. financial assets. For these reasons Bernanke suggested that one driver of the crisis was a foreign "savings glut." As already discussed, another driver was the low interest rate policy of the Fed. Since it is difficult to determine the cause and effect between the U.S. current account deficit and capital account surplus, it is hard to determine which driver is the dominant one in contributing to the financial crisis.

2.3. *Subprime Lending*

Subprime loans are those deemed to have a greater risk of default than conventional loans. This can be due to a poorer credit rating of the borrower and different terms of the loan such as lower down payments. In March 2007, 7.5 million first-lien subprime mortgage loans were outstanding totaling \$1.3 trillion. High risk subprime lending increased due to government policies and competition among financial institutions like investment banks and the Government Sponsored Enterprises (GSE) Fannie Mae and Freddie Mac.

In 2004, the subprime market grew to 20% of the overall U.S. housing market. At that time the Securities and Exchange Commission (SEC) relaxed its net capital rules thereby making it more attractive for investment banks to increase leverage and expand their MBS issuance. This thirst for MBS spurred more lending to riskier borrowers and spurred the GSEs to follow suit under competitive pressures. The evidence of poor loan screening was revealed in the rise in subprime defaults, which rose to 25% in 2008 after remaining between 10–15% in the eight years prior to 2006.

On September 30, 1999, the New York Times reported that the Clinton Administration pushed for sub-prime lending: "Fannie Mae, the nation's biggest underwriter of

home mortgages, has been under increasing pressure from the Clinton Administration to expand mortgage loans among low and moderate income people.... In moving, even tentatively, into this new area of lending, Fannie Mae is taking on significantly more risk, which may not pose any difficulties during flush economic times. But the government-subsidized corporation may run into trouble in an economic downturn, prompting a government rescue similar to that of the savings and loan industry in the 1980s.” Furthermore, the anti-redlining components of the 1977 Community Reinvestment act (CRA) were regulated and strengthened in 1995. A 2000 study by the U.S. Department of the Treasury (Litan et. al. (2010)) reported that \$467 billion of mortgage credit went to low and middle-income neighborhoods from CRA-covered lenders between 1993 and 1998. This was still only a small portion of the increase in subprime lending as only 25% occurred at CRA-covered institutions.

Even the increase in subprime lending was unable to satisfy investor appetite. The shadow banking system was driven to replicate exposure to the MBS market using financial derivatives one hundred times over! The losses far exceeded the loans.

2.4. Predatory Lending

Predatory lending refers to the practices of unfair, deceptive, or fraudulent lending. One example is a bait-and-switch technique whereby low advertised interest rates were swapped for higher or adjustable interest terms. In some instances, negative amortization (Neg-Am) was created which acted to conceal the true terms from the borrower until a much later date.

Countrywide, a mortgage lender was charged in California with “Unfair Business Practices” and “False Advertising” by originating “to homeowners with weak credit, ARMs that allowed homeowners to make interest-only payments.”

Speculative mortgagees forego the equity building benefits of home ownership and rely solely on the home price appreciation component for their investments. When home prices decreased, there was little incentive not to default. With rising homeowner defaults, Countrywide ended up being acquired by Bank of America in early 2008.

Employees at mortgage lenders frequently described an atmosphere whereby they were pushed to originate loans and sell them through to investors with commission incentives. With no intention of keeping loans on their own books, false documentation and fraud became more prevalent.

2.5. Insufficient Regulation and Deregulation

Many argued that regulation lagged behind changes in modern finance. Some areas where change outpaced regulation include the increased relevance of the shadow banking system, the standardization and regulation of new derivative contracts and creative accounting techniques, which took advantage of off-balance sheet financing. To compound matters, financial deregulation was commonplace.

2.5.1. The Gramm-Leach-Bliley Act

In November 1999, President Bill Clinton signed into Law the Gramm-Leach-Bliley Act, which repealed part of the Glass-Steagall Act of 1933. Some pointed to the

Gramm-Leach-Bliley Act as an impetus for reduced separation between traditionally conservative commercial banks and the more risky investment banks.

2.5.2. *The Garn-St. Germain Depository Institutions Act*

In October 1982, President Ronald Reagan signed into Law the Garn-St. Germain Depository Institutions Act, which began the process of banking deregulation that helped contribute to the savings and loan crises of the late 80's/early 90's, and the subsequent financial crises of 2007–2010. President Reagan stated at the signing, “All in all, I think we hit the jackpot.”

2.5.3. *The Net Capital Rule*

In 2004, the Securities and Exchange Commission relaxed the net capital rule, which enabled investment banks to substantially increase the level of debt they were taking on, fueling the growth in mortgage-backed securities supporting subprime mortgages. The SEC conceded that self-regulation of investment banks contributed to the crisis.

2.5.4. *The Commodity Futures Modernization Act of 2000*

Passed in 2000, this act allowed markets for over-the-counter (OTC) derivatives to be self-regulating. Originally, derivatives were meant as tools to hedge certain risks associated with investments. However they quickly grew to be speculative tools. Credit Default Swaps (CDS) allowed investors to gain exposure to a certain corporation without investing directly in its debt or equity. Volume in the CDS market grew 100-fold between 1998 and 2008. By late 2008 the total outstanding debt linked to CDS was around \$40 trillion and the total outstanding value of the OTC derivative market hit \$683 trillion in June 2008. Derivatives used in this manner allowed firms to take on excessive amounts of risk through high leverage ratios. Warren Buffet coined the term “financial weapons of mass destruction” in 2003 when referring to derivatives used as speculative tools.

2.6. *Over-leveraging by Consumers and Financial Institutions*

U.S. households and financial institutions became increasingly indebted or overleveraged during the years preceding the crisis. This increased their vulnerability to the collapse of the housing bubble and worsened the ensuing economic downturn. Key statistics include:

1. Consumers taking advantage of rising home prices by tapping their growing equity in the form of home equity loans (HELs) that doubled from \$627 billion in 2001 to \$1,428 billion in 2005, a total of nearly \$5 trillion dollars over the period. U.S. home mortgage debt relative to GDP increased from an average of 46% during the 1990s to 73% during 2008, reaching \$10.5 trillion.
2. U.S. household debt as a percentage of annual disposable personal income was 127% at the end of 2007, versus 77% in 1990.
3. In 1981, U.S. private debt was 123% of GDP. By the third quarter of 2008, it increased to 290%.
4. From 2003–2007, the top five U.S. investment banks each significantly increased

their financial leverage. These five institutions reported over \$4.1 trillion in debt for fiscal year 2007, about 30% of GDP. Lehman Brothers was liquidated, Bear Stearns and Merrill Lynch were sold with the help of Fed intervention, and Goldman Sachs and Morgan Stanley became commercial banks, thereby becoming subject to more regulations. All except Lehman were beneficiaries of government bailout programs.

5. GSEs owned or guaranteed nearly \$5 trillion in mortgage obligations at the time they were placed into conservatorship in September 2008.

2.7. *Financial Innovations*

Financial innovation, or financial engineering, describes the creation of more and more specialized investment instruments designed to meet specified risk exposure profiles or diverse funding instruments, which can aid in credit flow. Examples pertaining to the financial crisis are ARM, CDO (collateralized debt obligation), CDS (credit default swap),⁸ CMO (collateralized mortgage obligation) and MBS (mortgage-backed security). All of these instruments gained in popularity prior to the crisis and some became very difficult to price when the market turned illiquid. An even more extreme example is the “CDO-square” instrument. This is a CDO whose underlying reference entities are themselves other CDOs. Such complex instruments became commonplace leading up to the crisis.

Besides making credit more accessible and allowing for more specialized risk distribution, some financial innovation was designed strictly as a way to bypass regulations. The structured investment vehicle (SIV) was invented by Citigroup in the 1980s as a way of moving liabilities off the balance sheet thereby allowing for increased leverage.⁹ As crisis struck, it was reported in 2009 that between \$500 billion and \$1 trillion of liabilities would have to be returned to the balance sheets of the four largest U.S. banks.¹⁰

New trading strategies were developed to take advantage of these new instruments. CDOs were divided into tranches of decreasing priority in the waterfall with senior, mezzanine and equity classes. Before the crisis, hedge funds began to set up correlation trading desks operating on the concept that if defaults across firms or industries were highly correlated then it didn’t matter which class of CDO you invested in, they would all suffer significant losses. One way of being “long correlation” involved buying the equity classes (lower rated and thus cheaper) and selling the mezzanine class (higher rated and thus more expensive).

⁸ CDS was invented in 1997 by Blythe Masters, Cambridge University mathematics graduate, during her mid-twenties when her employer JP Morgan was looking for a way to loan five billion dollars in oil-spill damage money to Exxon without tying up cash that could be chasing new loans. She came up with the idea of selling off all the risk of the loan to the European Bank of Reconstruction and Development. CDS is a primary cause that brought down Bear Stearns, AIG, WaMu and other mammoth corporations such as Enron.

⁹ Wolf (2009) wrote: “...an enormous part of what banks did in the early part of this decade—the off-balance-sheet vehicles, the derivatives and the ‘shadow banking system’ itself—was to find a way around regulation.”

¹⁰ Similar balance sheet manipulation techniques were used by Enron, precipitating its downfall in 2001.

2.8. *Incorrect Risk Pricing*

Pricing risk involves adding fees or higher interest rates to compensate an investor for taking on higher risk. There are several reasons why market participants failed to accurately price the risks embedded in their investments. One example is the structural risk that CDO investment introduced into the financial system. The average loss for senior CDO tranches was 68% while mezzanine tranches lost 95% on average. These massive losses left banks crippled with massive write-downs.

Another instance of incorrect risk pricing relates to CDS. A CDS contract has one party paying a periodic premium and a counterparty paying a lump sum in the case of a credit event. Bondholders used CDS as a way of credit insurance. AIG was a major player in the CDS market. When defaults mounted, AIG was unable to meet its obligations as a default insurer and had to be taken over by the U.S. government in 2008. \$180 billion in government funds were spent to fulfill AIG's obligations to its CDS counterparties, including many large financial institutions. The bailout of AIG was argued to have prevented many more failures through the fulfillment of its CDS obligations.

As financial assets became more and more complex, and harder and harder to value, investors were reassured by the fact that both the rating agencies and bank regulators, who came to rely on agencies, accepted as valid some complex mathematical models which theoretically showed the risks were much smaller than they actually proved to be in practice. Soros (2008) made the following point: "The super-boom got out of hand when the new products became so complicated that the authorities could no longer calculate the risks and started relying on the risk management methods of the banks themselves. Similarly, the rating agencies relied on the information provided by the originators of synthetic products. It was a shocking abdication of responsibility."

2.9. *Collapse of the Shadow Banking System and the Trouble in the Credit Markets*

In a June 2008 speech, President and CEO of the NY Federal Reserve Bank Timothy Geithner, who in 2009 became Secretary of the Treasury, placed significant blame for the freezing of credit markets on a "run" on the entities in the "parallel" banking system, also called the shadow banking system. These entities, investment banks and hedge funds in particular, became increasingly important as a source of credit in the economy, but were not subject to the same regulatory controls that applied to depository banks. Further, these entities were vulnerable because they borrowed short-term in liquid markets in order to fund purchases of long-term, illiquid and risky assets. This meant that disruptions in credit markets would make them subject to rapid deleveraging, selling their long-term assets such as MBS at depressed prices. Geithner described that "In early 2007, asset-backed commercial paper conduits, in structured investment vehicles, in auction-rate preferred securities, tender option bonds and variable rate demand notes, had a combined asset size of roughly \$2.2 trillion. Assets financed overnight in triparty repo grew to \$2.5 trillion. Assets held in hedge funds grew to roughly \$1.8 trillion. The combined balance sheets of the then five major investment banks totaled \$4 trillion. In comparison, the total assets of the top five bank holding companies in

the United States at that point were just over \$6 trillion, and total assets of the entire banking system were about \$10 trillion.” He continued by saying that “the combined effect of these factors was a financial system vulnerable to self-reinforcing asset price and credit cycles.”

Paul Krugman put the collapse of the shadow banking system at the center of the crisis. “As the shadow banking system expanded to rival or even surpass conventional banking in importance, politicians and government officials should have realized that they were re-creating the kind of financial vulnerability that made the Great Depression possible—and they should have responded by extending regulations and the financial safety net to cover these new institutions. Influential figures should have proclaimed a simple rule: anything that does what a bank does, anything that has to be rescued in crises the way banks are, should be regulated like a bank.” This lack of regulation was deemed by Krugman as “malign neglect” (Krugman, 2009).

In September 2008, there was a run on money market mutual funds. These funds typically invest in short term commercial paper, which are used by corporations to obtain working capital. The run on money market funds prevented corporations from rolling their short term debts. The U.S. government responded by extending insurance for money market accounts analogous to bank deposit insurance via a temporary guarantee and with Federal Reserve programs to purchase commercial paper. The TED spread,¹¹ an indicator of perceived credit risk in the general economy, spiked up in September 2008, reaching a record 4.65% on October 10, 2008.¹²

On September 18, 2008, the Fed and the Treasury proposed a \$700 billion emergency bailout for congressional approval. The Emergency Economic Stabilization Act, also called the Troubled Asset Relief Program (TARP), was signed into law on October 3, 2008.

2.10. *Systemic Risk*

Systemic risk covers the risk of an entire financial system or economy as opposed to the risk associated with a specific entity or sector of the economy. The systemic risk relevant to the crisis is the overall financial system instability which is measured by the reliance of the system on specific key entities and can be compounded when certain events occur. Measures of systemic risk include “too big to fail” and “too interconnected to fail” tests. These tests refer to the systemic risk posed by the exposure of the overall welfare of the economy to the failure of a specific firm due to its size or interconnectedness. AIG’s large presence in the CDS bond insurance market exposed the entire system to the potential for massive failure as defaults mounted in the wake of the real estate bubble.

¹¹ The TED spread is calculated as the difference between the three-month London Interbank Offered Rate (LIBOR) and the three-month U.S. T-bill interest rate. It is an acronym formed from T-Bill and ED, the ticker symbol for the Eurodollar futures contract.

¹² See Bloomberg Chart.

3. IMPACT ON MAJOR FINANCIAL INSTITUTIONS

The International Monetary Fund (IMF) periodically estimated the global losses of this financial crisis. The losses were difficult to estimate, as they occurred in a continuous fashion and the loss-recognition process was slow to follow. In April 2009, it estimated global losses on all loans and other financial assets to reach \$4.1 trillion, almost doubling its estimate made in January of that year.¹³ At that time, financial firms only acknowledged \$1.29 trillion losses. The IMF also estimated that total write-downs on U.S. assets which included assets held by banks, insurance companies and pension funds, etc. would reach \$2.7 trillion, up from \$2.1 trillion it forecast in January that year and almost double what it forecast in October 2008. Banks were hit hardest, as their losses comprised about two-thirds of the total. Large U.S. and European banks already recognized losses of more than \$1 trillion from investments in toxic assets backed by bad loans between January 2007 and September 2009. These losses were expected to top \$2.8 trillion from 2007 to 2010. U.S. banks' losses were forecast to hit \$1 trillion and European bank losses were \$1.6 trillion. The IMF asserted that U.S. banks were about 60 percent through their loss-recognizing process, but British and Eurozone banks only completed 40 percent. Later in April 2010, in light of faster economic recovery than its original forecast, the IMF revised downward its estimate of global bank losses to \$2.28 trillion, and its forecast for losses for U.S. banks dropped to \$885 billion.¹⁴

A recession that is caused by the asset price bubble leaving many private-sector balance sheets with more liabilities than assets has been called the "balance sheet recession" (Koo, 2009). One of the first victims was Northern Rock, a medium-sized British bank (Altman, 2009). It requested a bailout from the Bank of England. This in turn led to investor panic and runs on bank in mid-September 2007. Initially, calls for nationalization were ignored. In February 2008, however, the British government took the bank into public hands when no private buyer surfaced. Northern Rock's problems proved to be an early indication of the troubles that would soon befall other business entities.

The first companies to be hit were those directly involved in the housing market like home construction firms and mortgage lenders who could no longer obtain financing through the frozen credit markets. Over 100 mortgage lenders went bankrupt during 2007 and 2008. The crisis peaked in September and October 2008. A large number of major institutions failed, were acquired under duress, or were subject to government takeover. We discuss a few below.

3.1. *Countrywide Financial*

Countrywide Financial issued about 17% of all mortgages in the U.S. in 2007. The California-based company was founded in 1969. Between 1982 and 2003, Countrywide delivered investors a whopping 23,000% return. Rooted in subprime mortgages, it faced imminent collapse as a result of the financial crisis. It was purchased by Bank of America in July 2008 and is now named Bank of America Home Loans.

¹³ See Larson (2009) and O'Connor (2009).

¹⁴ See Crutsinger (2010).

3.2. *Investment Banks: Bear Stearns, Lehman Brothers and Merrill Lynch*

Three of the largest U.S. investment banks—Bear Stearns, Lehman Brothers and Merrill Lynch—were hit hard by the crisis and were either sold in emergency government backed acquisitions or entered bankruptcy. Bear Stearns was on the brink of collapse in March 2008 when it was sold to JP Morgan Chase with the Federal government's help. Lehman Brothers' bankruptcy on September 15, 2008 marked one of the largest bankruptcies in U.S. history. It folded with a record \$613 billion debt (Mamudi, 2008). Barclays and Nomura Holdings bought up different parts of Lehman Brothers along regional lines.¹⁵ The world's largest brokerage firm, Merrill Lynch, was acquired by Bank of America in 2008 under distressed circumstances.

3.3. *Bank Holding Companies: Washington Mutual and Wachovia*

The largest bank failure in U.S. history was the collapse of Washington Mutual on September 25, 2008. It was placed into the receivership of the Federal Deposit Insurance Corporation (FDIC). Subsequently, the FDIC sold its banking subsidiaries (minus unsecured debt or equity claims) to JPMorgan Chase for \$1.9 billion and the remaining part went into bankruptcy.

The fourth largest bank holding company in the U.S., Wachovia, was arranged by the government and sold to Wells Fargo to avoid an imminent failure on December 31, 2008.

3.4. *The GSEs: Fannie Mae and Freddie Mac*

The Federal National Mortgage Association (FNMA) and The Federal Home Loan Mortgage Corporation (FHLMC), commonly known as Fannie Mae, and Freddie Mac, respectively, underwent massive changes. They were chartered as stockholder-owned corporations by Congress during the 60s and 70s. The corporations' purposes are to purchase and securitize mortgages in order to ensure that funds are consistently available to the institutions that lend money to home buyers, to buy mortgages on the secondary market, and to pool and sell them as MBS on the open market to help facilitate American homeownership. As of 2008, Fannie and Freddie owned or guaranteed about half of the U.S. \$12 trillion mortgage market.

On September 7, 2008, the Federal Housing Finance Agency (FHFA) announced that Fannie Mae and Freddie Mac were placed into its conservatorship. The action was one of the most sweeping government interventions in private financial markets in decades. By reassuring the soundness of the GSEs, the conservatorship prevented the imminent collapse of the two GSEs and other financial institutions.

Prior to the conservatorship action, the two companies' bonds were favorites of Asian central and commercial banks' investments as the yields were slightly better than plain-vanilla Treasuries. Eihhorn and Francis (2008) reported that, as of June 30, 2007, the top five non-U.S. holders of Fannie's and Freddie's debts were (in billion dollars): China (376), Japan (228), Russia (75), South Korea (63) and Taiwan (55). At the onset of the

¹⁵ See Wikipedia (2010), "Lehman Brothers."

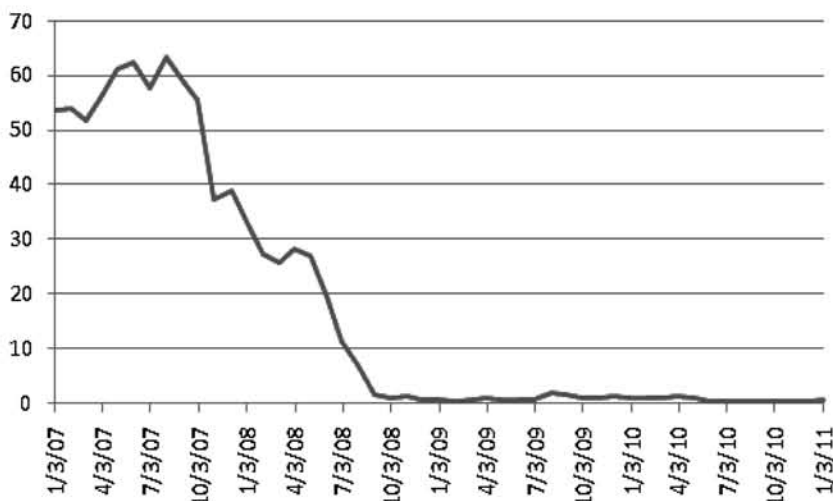


Figure 3. Fannie Mae's stock price: January 3, 2007–January 3, 2011

Source: Yahoo!Finance

financial crisis, the investors began losing confidence and began trimming their holdings. The effective nationalization of the two GSEs gave the signal that the U.S. would stand behind these debts.

The common stock prices of Fannie Mae and Freddie Mac plummeted, however, as the common shareholders would only receive the residual liquidation value which had vanished. Fig. 3 shows the share price of Fannie Mae from January 3, 2007 to January 3, 2011. During this period, it dropped from over \$60 per share to less than \$1.00. As of June 17, 2011, Fannie Mae's stock price stood at \$0.335.

3.5. AIG

Once the 18th largest publicly traded company worldwide and part of the Dow Jones Industrial Average, AIG suffered from the credit crisis and ultimately required over \$180 billion in government aid to avoid bankruptcy. In September 2008, AIG received \$85 billion first credit line from the Fed to help meet its increasing liabilities in the wake of a downgrade in its credit rating. In exchange, the Fed received a 79.9% equity stake in the firm.

In addition to direct assistance from the Fed and Treasury, the U.S. government also stepped in to purchase distressed assets owned or guaranteed by AIG. Even while selling off assets and subsidiaries, AIG managed to pay retention bonuses totaling over \$160 million, drawing the ire of American public and Congress. Many employees even received hate mail and death threats.

Fig. 4 shows AIG's stock price from January 3, 2007 to January 3, 2011 which has been adjusted for AIG's reverse split of 1 for 20 on July 1, 2009.

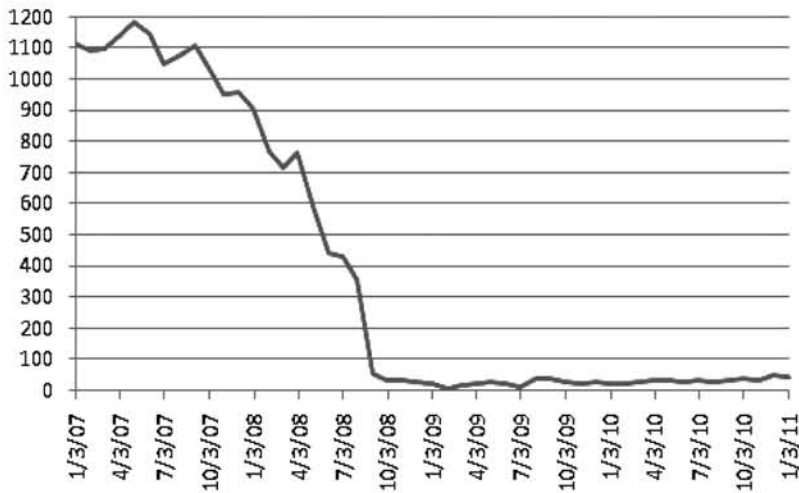


Figure 4. AIG's stock price: January 3, 2007–January 3, 2011

Source: Yahoo!Finance

4. IMPACT ON THE U.S.

The U.S. economy suffered greatly from the financial crisis. From June 2007 to November 2008, the average American lost approximately 25% of their collective net worth and the S&P 500 index lost 45% from the prior year's highs. In November 2007, home prices had fallen 20% from the high in late 2006 with a further 30% drop later. Total home equity in 2006 was at \$13 trillion, but declined to \$8.8 trillion by the middle of 2008. During the same period, retirement assets declined 22% while pensions and other savings and investments declined by \$1.3 and \$1.2 trillion, respectively. The U.S. home mortgage debt relative to GDP increased from 46% in the 1990s to 73% in 2008, reaching a staggering 10.5 trillion dollars. The tax deductibility of interest on home equity loans added fuel to the crisis. As home prices rose during the boom time, homeowners tapped into home equity loans. Cash used by consumers from home equity extraction doubled from \$627 billion in 2001 to \$1,428 billion in 2005, totaling nearly \$5 trillion over the period.

Real gross domestic product decreased at an annual rate of approximately 6 percent in 2008. The U.S. GDP had a net contraction in 2008 and 2009. The worst contraction in the amount of \$300 billion occurred in October 2008, as shown in Fig. 5. The GDP level, however, recovered to the 2007 level towards the end of 2009.

The total U.S. civilian employment held well at the beginning of the crisis. In November 2007, there were over 146 million civilians employed. But the number started a quick decline, reaching a low of 137.9 million in December 2009. Since then the recovery has been slow. As of May 2011, the number was still a low 139.7 million.

The U.S. civilian unemployment rate was below 5% in 2007 as shown in Fig. 6. It started to rise rapidly in 2008 and reached a high of 10.1% in October 2009. Since then

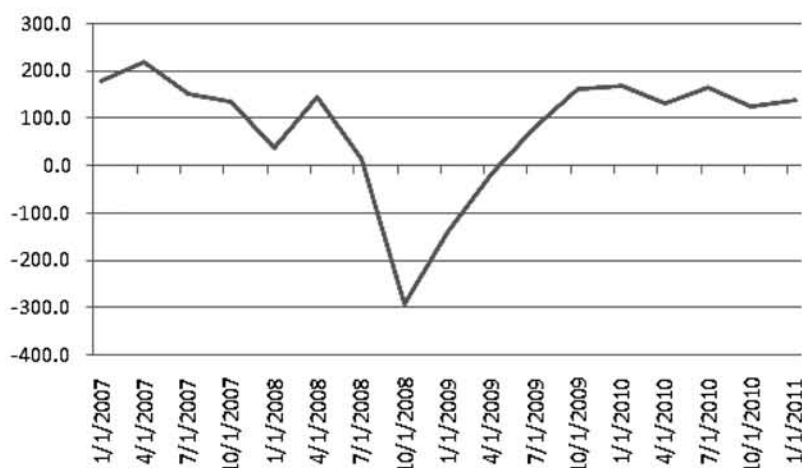


Figure 5. Changes in U.S. GDP (billion dollars): January 1, 2007–January 1, 2011

Source: Federal Reserve Bank of St. Louis

it has stayed high even with the help of monetary and fiscal stimulus measures. The new persistent high unemployment rate may be a structural one, as unskilled workers do not have suitable jobs and technological change has raised the productivity for those that are fit to be employed. Even those employed have suffered decreased workloads as furloughs become more common, especially for state government employees. The average hours per workweek declined to 33, the lowest level since the government began collecting the data in 1964.

5. IMPACT ON THE GLOBAL ECONOMY

The financial crisis rapidly developed and spread into a global economic shock, resulting in a number of European bank failures, declines in various stock indexes and large reductions in the market value of equities and commodities.

Both MBS and CDO were purchased by corporate and institutional investors globally. Derivatives such as CDS also increased the interdependence of large financial institutions through counterparty credit risk. Moreover, financial institutions' oversized debts could not be rolled over in the illiquid credit markets, forcing the sale of assets to solve the liquidity need. The liquidity crisis accelerated and caused a decrease in international trade.

Despite coordinated efforts to quell the crisis, a currency crisis developed by the end of October 2008. As global capital fled to the safety of stronger currencies such as the yen, dollar and Swiss franc, many emerging market countries sought aid from the IMF (Fackler, 2008).

The Brookings Institution reported in June 2009 that U.S. consumption accounted for more than a third of the growth in global consumption between 2000 and 2007. With a recession in the U.S., declines in growth elsewhere have been dramatic. During the first

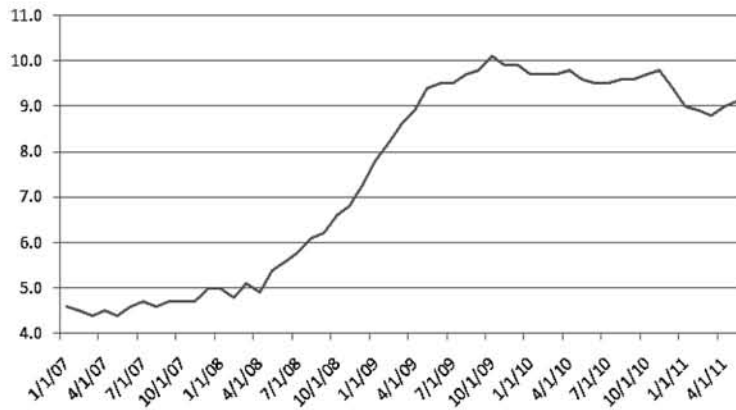


Figure 6. U.S. civilian unemployment rate (in percent)

Source: Federal Reserve Bank of St. Louis

quarter of 2009, annualized rate of decline in GDP was 14.4% in Germany, 15.2% in Japan, 7.4% in the UK, 9.8% in the Euro area and 21.5% in Mexico.

The Arab world had lost \$3 trillion by early 2009 due to the crisis and unemployment. Much of the loss occurred in oil producing Middle-Eastern states. In May 2009, the United Nations reported a drop in foreign investment in Middle-Eastern economies due to a slower rise in demand for oil. In September 2009, Arab banks reported losses of nearly \$4 billion since the crisis began.

5.1. Iceland

In 2008, all three of Iceland's major banks collapsed following difficulties in refinancing short-term debts along with a run on deposits in the UK. With over 75% of the bank sector's share in its GDP, Iceland's banking collapse was the largest suffered by any country relative to the size of its economy. Iceland's external debt was 9.553 trillion Icelandic krónur (€50 billion) in mid 2008, more than 80% of which was held by the banking sector.

Starting in late September 2008, all major banks in Iceland—Glitnir, Landsbanki, Glitnir and Kaupthing—were taken over by the governments. The Icelandic krónur depreciated drastically against the U.S. dollar and the Euro, with foreign currency transactions suspended for weeks. Its stock index dropped by more than 90% and its GDP decreased by 5.5% in real terms in the first six months of 2009.

5.2. Ireland

The Irish economy was championed around the world in the years leading up to the crisis as the “Celtic Tiger,” a reference to the Asian Tigers of the Far East. Friendly corporate tax laws and the low interest rates contributed to expanded credit availability and to its own property bubble. In September 2008, with the banks already overextended, the global crisis pushed Ireland into its first recession since the 1980s and the first among euro zone members to suffer from the financial crisis. In February 2009, amid a series

of banking scandals and the civil unrest, Dublin's ISEQ index dropped to a 14-year low and the director of the Anglo Irish bank resigned unexpectedly. Unemployment claims in January 2009 hit 326,000, the highest in a single month on record.

5.3. *Hungary*

The financial crisis in Hungary was rooted in its large dependence on foreign capital coupled with its large public deficit. In order to take advantage of lower interest rates, many Hungarians took out loans in Swiss Francs or Euros to finance home purchases or consumption. Amid the high debt burden, the forint underwent its own currency crisis and dropped 10% on October 10, 2008. The IMF and ECB stepped in with a \$20 billion bailout later that month.

Hungary implemented high interest rates and cut many public programs in an effort to meet the standards required for Euro adoption. It successfully solved the crisis without prolonged damage.

In the fall of 2008, many countries in Central and Eastern Europe such as Latvia, Estonia, and Lithuania also experienced financial crisis. However, after about two years, the crisis in the region had more or less abated.

5.4. *Russia*

The crisis in Russia was mainly related to the Russian financial markets, the extreme volatility of the price of oil and the political uncertainty caused by the war with the former Soviet republic of Georgia. A World Bank study concluded that despite strong macroeconomic fundamentals, the large role of oil in the economy and a 70% drop in the price of oil made the crisis more acute than it otherwise would have been.

The Russian markets lost more than \$1 trillion in market value in 2008, but the Micex index gained back more than 50% of its losses in 2009. From July 2008–January 2009, Russia's foreign exchange reserves fell 35% as the central bank adopted a policy of gradual devaluation to slow down the sharp decline of the ruble. The ruble stabilized in early 2009 and reserves grew 17% to \$452 billion by the end of 2009.

5.5. *Spain*

The 2009 recession swelled its budget deficit to more than 11% of GDP and pushed its unemployment rate to 19.3%. It suffered from uncompetitiveness, overconsumption and real estate bubbles. According to Fidler (2010), Spanish home prices more than doubled in real terms in the decade ending in 2008. At the peak, it was building more houses than the combined total of Germany, France and Italy. Spanish public and private debt in 2008 reached 342% of GDP, exceeding most other major economies. In July 2010, Spain raised its general VAT from 16% to 18% and its special VAT—which applies to art, services and food production—from 7% to 8%.

5.6. *Ukraine*

The crisis in Ukraine was related to the drop in steel prices and problems with local financial institutions and was exacerbated by the gas dispute with Russia in January 2009. The World Bank predicted Ukraine's economy to shrink 15% in 2009 with inflation at 16.4%. The State Statistics Committee reported that actual year-on-year wages

in Ukraine fell in October 2009 by 10.9%. In November 2008 the IMF extended a \$16.5 billion emergency loan to Ukraine.

5.7. *Dubai*

Dubai, one of the seven states that make up the United Arab Emirates (UAE), experienced a severe financial crisis in which a six-year construction boom came to a halt. More than half of all the UAE's construction projects, totaling \$582 billion, had either been put on hold or cancelled, including a \$100 billion tower project headed by Donald Trump. The root of Dubai's trouble was its over-ambitious development plan that included world famous infrastructures and the tallest building on earth.

In November 2009, Dubai asked creditors of Dubai World, the conglomerate behind its rapid expansion that built the world's tallest building, and Nakheel, the builder of its palm-shaped islands, to freeze debt repayments for six months. Dubai World had a debt of \$59 billion and Dubai's total debt stood at \$80 billion. If creditors were to reject proposals to postpone debt repayments, the Dubai government could be forced to hold a fire sale of its real estate assets (Shostak, 2009). In December 2009, Abu Dhabi, the wealthiest of the Emirates, extended Dubai \$10 billion credit to cover a portion of its debt.

5.8. *Greece*

Greece suffered a series of unprecedented financial crises in recent years. As a member of the eurozone, it lacked competitiveness and suffered from overvalued real exchange rate. Coupled with excessive spending and insufficient tax revenues, its external debt reached a whopping \$300 billion in 2009, and its government deficit amounted to 12.7 percent of GDP.

Greece's manipulations of accounting records were glaring examples of financial mismanagement. It was reported that Greece deliberately treated subsidies to state entities as equity purchases, a trick later also used by Portugal. Forelle and Fidler (2010) reported that Greece barely recorded any expenditure on military equipment for years, routinely overestimated tax collections, failed to include hospital costs in its state health system and counted EU's subsidies to private entities as government revenues. Story, et al. (2010) pointed out that Greece obtained needed cash by mortgaging its future airport landing fees and highway tolls with derivatives developed by global investment banks. In 2000, the instrument *Ariadne* was created which devoured all future revenues of its national lottery in exchange for an upfront payment. Such a short-term gain would only exacerbate its long-term pain.

Greece had to undergo austerity programs by cutting spending and raising taxes in order to obtain financial aid from the eurozone and the IMF. It raised the value-added tax to 21%, froze civil servants' pensions, stepped up excise taxes on tobacco, alcohol and fuel, and added a new tax on luxury goods. It also included an unprecedented 30% cut in civil servants' Christmas, Easter and summer bonuses. This is equivalent to a cut of one month's pay out of two-month bonuses traditionally enjoyed by Greece's

700,000 public-sector employees.¹⁶ The cuts have angered workers leading to repeated protests and work stoppages. There has been a debate on whether or not Greece should leave the eurozone.¹⁷

6. EMERGENCY AND SHORT-TERM POLICY RESPONSES

The credit freeze brought the global financial system to the brink of collapse. The responses of the Fed, the ECB, and other central banks were immediate and dramatic. During the last quarter of 2008, central banks purchased \$2.5 trillion of government debt and troubled private assets from banks. This was the largest liquidity injection into the credit market, and the largest monetary policy action in world history. Many key non-financial institutions were also recipients of bail-out funds.

As a result of aggressive monetary policy, the short-term interest rate in the U.S. hit the zero lower bound, as Fig. 7 shows. The economy quickly entered into a liquidity trap in 2009.

There have been considerable debates on whether or not the monetary policy can still be effective when the economy is in a liquidity trap. Some argued that since the policy can no longer lower the nominal rate as it has hit the lower bound of 0%, the policy of increasing money supply cannot be effective. Such arguments relied on the Keynesian model structure. Thus, under liquidity trap, this school argued for the use of expansionary fiscal policy.

The Keynesian model has been criticized by Pigou (1943), among others. He argued that the stock of real money balances is an element of the aggregate demand function.

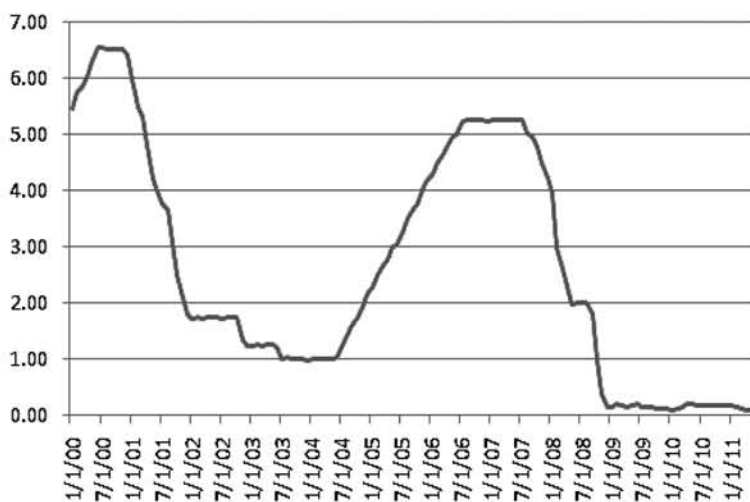


Figure 7. Federal funds rate (in percent): January 1, 2000–May 1, 2011

Source: Federal Reserve Bank of St. Louis

¹⁶ See Paris and Granitsas (2010).

¹⁷ For an indepth discussion on the Greece's problem, see Chang (2010).

Thus, an expansionary monetary policy would affect the economy even if interest rates fail to decline. This has been called the “wealth effect” (Metzler, 1951), the “real balance effect,” or the “Pigou effect.”

Whatever the debates on the relative efficacy of the monetary and fiscal policy, both were actively used in the U.S. to combat the crisis. The U.S. government spent a total of \$3 trillion on various rescue programs which are briefly described below.

1. Federal Reserve Rescue Plans

The Federal Reserve spent a total of \$1.5 trillion to restore liquidity to the financial markets. The largest item was \$775.6 billion on purchases of GSE mortgage-backed securities held by Fannie Mae and Freddie Mac aimed at reducing rates on home loans. Other items included: Purchases of Fannie Mae and Freddie Mac debts (\$149.7 billion); U.S. government bond purchases (\$295.3 billion) to help keep interest rates down for consumer loans; Term Auction Facility (\$109.5 billion) to inject cash to commercial banks in exchange for hard-to-sell assets to help solve banks' liquidity problem; Term Asset-backed Securities Loan Facility (\$43.8 billion) to buy consumer loan-backed securities to revive the securitization market for consumer loans like credit cards and auto loans; foreign exchange dollar swaps (\$14.3 billion) to supply dollars to 13 foreign central banks to provide liquidity to foreign financial institutions; Bear Stearns bailout (\$26.3 billion) to facilitate JPMorgan Chase's takeover of the failed investment bank; and Commercial Paper Funding Facility (\$14.3 billion) to buy short-term corporate debt to revive the struggling commercial paper market. With these policy measures, the Fed held \$1.75 trillion of bank debt, MBS and Treasury notes by March 2009. The holding reached a peak of \$2.1 trillion in June 2010. Further purchases were halted as the economy showed sign of improvement. However, facing sluggish growth in the U.S. economy, the Fed renewed quantitative easing in August 2010, the so-called QE2, announcing it would buy \$600 billion of Treasury securities by the end of the second quarter of 2011. Its goal was to keep total security holdings at the \$2.054 trillion level. The Fed recently announced it had no further plan to do quantitative easing.

2. Troubled Asset Relief Program (TARP)

TARP is a program signed into law by President George W. Bush on October 3, 2008 for the U.S. Treasury to purchase or insure “troubled assets” held by financial institutions. The Emergency Economic Stabilization Act of 2008 requires that financial institutions selling assets to TARP must issue equity warrants for publicly listed companies (or equity or senior debt securities for non-publicly listed companies) to the Treasury. The Treasury will only receive warrants for non-voting shares or will agree not to vote the stock. TARP's original authorization amount is \$700 billion but the final usage is only \$356.2 billion. The largest item is Capital Purchase Program (\$204.7 billion) that provides preferred investments in hundreds of banks to raise capital reserves and encourage lending in return for dividend payments and stricter executive compensation requirements.

Other items include Automotive Industry Financing, Consumer and Business Loan Initiative, and Making Home Affordable that helped 9 million homeowners to modify or refinance mortgages in order to prevent foreclosure, etc.

3. Federal Stimulus Programs

These programs consist of various federal fiscal programs totaling \$577.8 billion to save or create jobs and jumpstart the economy from recession. The largest program is the American Recovery and Reinvestment Act of 2009 (\$358.2 billion) that provides infrastructure spending and funding for states (\$295.6 billion) and tax cuts for individuals and businesses (\$62.5 billion). The second largest program is the Economic Stimulus Act of 2008 (\$168 billion) that provides tax rebates for individuals (\$117 billion) and tax breaks for businesses (\$51 billion). Other programs include student loan guarantees (\$32.6 billion), unemployment benefit extension (\$8 billion), etc.

4. Other Programs

This group includes rescue package for AIG (\$127.4 billion), FDIC bank takeover (\$45.4 billion), other financial initiatives (\$366.4 billion) that include Temporary Liquidity Guarantee Program (\$308.4 billion) to provide guarantees on newly issued bank bonds, and other housing initiatives (\$130.6 billion) including additional expenses on Fannie Mae and Freddie Mac bailout as well as FHA housing rescue.¹⁸

7. PRINCIPLES OF FINANCIAL REFORM AND REGULATORY PROPOSALS

The recent financial crisis has brought some consensus on the changes that are needed in the global financial sector. As Lipsky (2010) pointed out, some of the needed reforms include:

1. Strengthen risk management at many financial firms.
2. Re-evaluation of compensation schemes.
3. Bolster capital standards.
4. Reform regulation and improve supervision.
5. Remove impaired assets from financial institutions' balance sheets.

The reform will have to be weighed against preserving efficiency and restoring growth, both of which call for renewed credit flows. The reform of this nature would be politically difficult, as various interest groups would try to influence the direction and the outcome of the reform. There are, however, some key principles that must serve as guidelines for the reform:

1. The scope of regulation needs to be widened to cover all systemically important financial institutions.
2. Macro-prudential elements need to be added to existing regulations that focus almost exclusively on individual instruments and institutions.

¹⁸ For a summary of U.S. government financial commitments and investments, see Goldman (2010).

3. Regulatory standards on capital and liquidity must be strengthened to better reflect firm risk exposures and risk profiles. This will necessitate increased capital buffers and new limits on risk-taking.
4. A robust resolution regime is required for large, complex financial institutions that operate in multiple jurisdictions.

The Financial Stability Board (FSB), established in 1999 by the Finance Ministers and Central Bank Governors of the Group of Seven (G-7), has taken a leading role in coordinating the development of new global standards for regulation and supervision. Some of these standards have been adopted and implemented at the national level. The IMF would assume the role of monitoring the implementation of the agreed standards.

The G-20 leaders, in their September 2009 Summit, requested the IMF to investigate how the financial sector could make a fair and substantial contribution to paying for the reform and implementation costs. The issue of cost sharing can be contentious and complex; for example, using a Tobin tax on financial transactions and directly taxing the financial institutions have been suggested.

Separately, Bailly, et al. (2009) proposed a detailed set of bipartisan policy statement on the principles and recommendations of financial reform for the U.S. Their principles and recommendations are summarized below:

7.1. Systemic Risk and Macro-Prudential Regulation

A new Financial Services Oversight Council (FSOC) should oversee policy on systemic stability. That policy should be developed in consultation with the Fed. If signs of stress emerge, the FSOC should initiate action based on consideration of specific responses recommended by the Fed. Once approved by the FSOC, interventions should be implemented by the relevant federal financial regulatory agencies. The Fed should retain observer status on specific examinations and have the authority to collect any information directly from financial institutions and markets relevant to monitoring systemic risk that was not available from their primary supervisors.

7.2. Large Complex Financial Institutions

1. The larger and more complex an institution is, the higher the standards for capital, liquidity and leverage to which it should be held.
2. Large institutions should maintain regulator-approved wind-up plans and, if they cannot, they should shrink. No institutions, however large or complex, should be “too big to fail.” Depository institution failures should continue to be handled by the FDIC.
3. A hybrid solution should be adopted for non-depository financial institutions comprising a strengthened bankruptcy process as the default approach and a backstop administrative resolution process, available in exceptional circumstances after strong safeguards have been met.
4. In all circumstances, shareholders in a failing institution should lose their investment, senior management responsible for the institutional failure should lose their jobs, and creditors should face a haircut.

7.3. *Micro-prudential Regulation and Consolidation*

1. A new National Financial Regulator (NFR) for safety and soundness regulation should be created by combining the Office of the Comptroller of the Currency (OCC), the Office of Thrift Supervision (OTS) and the Federal Deposit Insurance Corporation (FDIC). The Regulator should take on all of the micro-prudential responsibilities of the Fed, the Securities and Exchange Commission (SEC), the Commodity Futures Trading Commission (CFTC) and the Federal Housing Finance Agency (FHFA).
2. Within the NFR, the FDIC should retain distinct roles for resolution and the deposit insurance fund.
3. Capital standards should be significantly increased. Banks should issue debt that converts to equity in times of stress.
4. Regulation should focus on risk governance and management as much as measurement, and examinations should be strengthened.

7.4. *Strengthening Markets and Market Discipline*

1. OTC derivative transactions should be recorded with trade registries and collateral in OTC transactions should be managed by third parties.
2. The migration of OTC transactions onto clearing houses and exchanges should be encouraged through capital requirements assessed on OTC instruments that are not centrally cleared.
3. A private Securitization Board should be created to establish best practices at every stage of securitization including credit ratings. Risks that arise from using inaccurate credit ratings in regulation should be addressed.
4. Executive compensation should be aligned with risk in financial institutions.
5. Banks should issue subordinated debt.
6. Excessive subsidization of household mortgage risk should be addressed, and the FHA and the GSEs should be reformed.

7.5. *Consumer Protection*

1. A new federal Consumer Financial Protection Agency (CFPA) should be created with the sole mandate of protecting consumers of financial products and services. It should have powers of rulemaking, enforcement and preemption of state rules.
2. All the powers for consumer protection for financial products and services currently assigned to federal financial regulatory agencies should transfer to the CFPA. Other federal financial regulatory agencies should be represented on the CFPA Board to ensure balanced deliberation and coordination of policy.

There are many other specific recommendations. In June 2009, the Obama administration introduced a series of regulatory proposals. These proposals addressed consumer protection, executive compensation, bank capital requirements, regulation of the shadow banking system and derivatives, and enhanced authority for the Federal Reserve, among others.

Economists, politicians, journalists, and business leaders have proposed various solutions to minimize the impact of the current crisis and prevent recurrence.¹⁹ For example, some drastic ones include Joseph Stiglitz's proposal to reinstate the separation of commercial and investment banking established by the Glass-Steagall Act (Stiglitz, 2009) and Simon Johnson's proposal (Johnson, 2009) to break-up institutions that are "too big to fail" to limit systemic risk.

In January 2010, President Obama proposed the Financial Crisis Responsibility Fee that would only apply to firms that received subsidies from the U.S. with \$50 billion or more in consolidated assets.²⁰ The tax would be calculated by taking the total assets and subtracting it from Tier 1 capital and insured deposits. The remaining amount would be subject to a 0.15% tax. It would raise an estimated \$117 billion over 10 years or longer—the amount of TARP funds that likely won't be repaid by some TARP recipients.

Two Chicago economists, Diamond and Kashyap (2010) proposed the idea of taxing banks based on the difference between their assets at the end of August 2008 and their current level of capital. They argued that the support that these firms received was based on the size of assets before the crisis began, not the size of those assets today.

President Obama on January 21, 2010 proposed new rules designed to restrict the size and activities of the U.S.'s biggest banks (Weisman, Paletta and Sidel, 2010). The proposal consisted of two rules: the first, dubbed by Obama as the Volcker rule,²¹ would bar a bank, or a financial institution that contains a bank from owning, investing in, or sponsoring a hedge fund or a private equity fund, or conducting proprietary trading operations unrelated to serving customers for its own profit, though they could continue to offer investment banking services to clients in underwriting securities and merger advice.²² This is sort of a return to Glass-Steagall in spirit. Bank regulators would not be required to enforce the rule. The second rule would limit the size of the bank. Since 1994, no bank can have more than 10% of the nation's insured deposits. The proposed rule would also include non-insured deposits and other assets.

The new proposed rules would reduce the role of banks to their more traditional intermediary functions and would help prevent the "too big to fail" problem. But critics have argued that this would reduce the competitiveness of U.S. banks in the world markets.

8. THE DODD-FRANK WALL STREET REFORM AND CONSUMER PROTECTION ACT

On July 21, 2010, President Obama signed the Dodd–Frank Wall Street Reform and Consumer Protection Act, originally proposed in December 2009 by the Chairman of the House Financial Services Committee Barney Frank and the Chairman of Senate

¹⁹ For further information, see Wikipedia's "Regulatory Responses to the Subprime Crisis" and "Subprime Mortgage Crisis Solutions Debate."

²⁰ The White House Press Release, January 14, 2010.

²¹ Paul Volcker was the Chairman of the Federal Reserve Board under Presidents Carter and Reagan (from August 1979 to August 1987). He was appointed by President Obama to serve as the chairman of the Economic Recovery Advisory Board.

²² The White House Press Release, January 21, 2010.

Banking Committee Chris Dodd.

The Act changes the existing regulatory structure by creating a host of new agencies while merging and removing others to streamline the regulatory process, increases oversight of specific institutions prone to systemic risk, amends the Federal Reserve Act, and promotes transparency, among others. It also establishes rigorous standards and supervision to protect the consumers, investors and businesses, ends taxpayer funded bailouts of financial institutions, provides for an advanced warning system on the economic crisis, and sets rules on executive compensation and corporate governance.

Important new agencies created include Financial Stability Oversight Council, the Office of Financial Research, and the Bureau of Consumer Financial Protection. Of the existing agencies, changes are made that affect most of the regulatory agencies currently involved in monitoring the financial system (FDIC, SEC, Comptroller of the Currency, the Fed, and the Securities Investor Protection Corporation (SIPC)). The Act is a monumental document containing over two thousand pages of text. Some major reforms are briefly described below.²³

8.1. Financial Stability Oversight Council

The Financial Stability Oversight Council is charged to identify and address systemic risks posed by large, complex companies, products, and activities before they threaten the stability of the economy. It will make recommendations to regulators for increasingly stringent rules on firms that grow large and complex enough to pose a systemic risk to the U.S. economy. It is empowered to require nonbank financial companies that would pose a risk to financial stability to be regulated by the Federal Reserve. Under this provision the next AIG would be regulated by the Federal Reserve. The Council will have the power to approve a Federal Reserve decision to require a large, complex company to divest some of its holdings if it poses a grave threat to the financial stability of the United States. The Council will create an Office of Financial Research within the Treasury with a staff of economists, accountants, lawyers, former supervisors, and other specialists to support the council's mission.

8.2. Improving Bank Supervision and Regulation

The Act implements the Volcker Rule on banks, their affiliates and holding companies that prohibit proprietary trading, investment in and sponsorship of hedge funds and private equity funds. Nonbank financial institutions supervised by the Fed will also face similar restrictions.

The Act also requires large, complex companies to periodically submit plans for their rapid and orderly shutdown should they face the outcome. If they fail to submit acceptable plans, they will be hit with higher capital requirements and restrictions on growth and activity, as well as divestment. The Act authorizes the FDIC to create an orderly liquidation mechanism to unwind failing financial companies by removing their management teams and having their shareholders and unsecured creditors to bear the losses. It will charge the largest financial firms \$50 billion for an upfront fund, built up over

²³ For details, see U.S. Government Printing Office (2010).

time, to be used if needed for any liquidation. Industry, not the taxpayers, will take a hit for such liquidation. The Act thus ends taxpayer funded bailouts of financial institutions.

The Act streamlines bank supervision with clear lines of responsibility:

1. The Fed will regulate bank and thrift holding companies with assets of over \$50 billion.
2. The Office of the Comptroller of the Currency will regulate national banks and federal thrifts of all sizes and their holding companies with assets below \$50 billion. The Office of Thrift Savings is eliminated.
3. The dual banking system will be preserved, leaving in place the state banking system to govern the community banks. The FDIC will regulate state banks and thrifts of all sizes and bank holding companies of state banks with assets below \$50 billion.

8.3. Transparency and Accountability for Exotic Instruments

The Act will eliminate loopholes that allow risky and abusive practices to go on unnoticed and unregulated. Over-the-counter derivatives, to be regulated by the SEC and the Commodity Futures Trading Commission (CFTC), will be traded on exchanges and cleared through centralized clearing houses. Uncleared swaps will be subject to margin requirements, and swap dealers and major swap participants will be subject to capital requirements. All trades will be reported so as to enhance regulator's ability to monitor risks.

8.4. New Regulation on Hedge Funds

Hedge funds that manage over \$100 million will have to register with the SEC as investment advisers and disclose information about their trades and portfolios. The data will be shared with the systemic risk regulator. The SEC will provide an annual report to Congress on how it uses the data to protect investors and market integrity. Those not covered by the SEC will be regulated by individual states.

8.5. Office of National Insurance

The Act creates the Office of National Insurance housed in the Treasury Department to monitor the insurance industry and coordinate international insurance issues. It is charged to study ways to modernize insurance regulation and to provide Congress with reform recommendations.

8.6. Bureau of Consumer Financial Protection

The Act establishes the Bureau of Consumer Financial Protection with an independent budget paid by the Fed. The Bureau is charged to protect American consumers from unfair, deceptive and abusive financial products and practices. It will ensure that clear information be available for consumers who need loans and other financial services from credit card companies, mortgage brokers, banks and others. In addition, the Bureau will have the power to write rules on consumer protection and have the authority to examine and enforce regulations for banks and credit unions with assets over \$10

billion, and also all mortgage-related businesses and large non-bank financial companies. Banks with assets of \$10 billion or less will be examined by the appropriate bank regulator.

8.7. New Regulation on Credit Rating Agencies

The Act contains a series of provisions dealing with credit rating agencies (formally called Nationally Recognized Statistical Rating Organizations (NRSRO)) on the oversight and structure of this industry. It requires the SEC to write new rules and to undertake studies for future legislation. The Act establishes SEC Office of Credit Ratings. This Office is charged to administer SEC rules with respect to credit rating agencies' practices and to conduct annual examination of each NRSRO with a public report.

1. Each NRSRO is required to have a board of directors, at least half of whom are independent. The board oversees the implementation of internal controls on policies and procedures of rating determination, as well as compensation and promotions within the organization. It must also provide appropriate policies and procedures in the management of conflicts of interest.
2. Each NRSRO is required to maintain a documented, effective system of internal controls for determining ratings, and file an annual report regarding its controls to the SEC. The report must include an attestation by the CEO that describes the responsibility of management for establishing and maintaining the organization's operation.
3. Each NRSRO is also required to designate an independent compliance officer who cannot perform credit ratings or participate in marketing or sales activities and whose compensation cannot be tied to the financial performance of the organization. The officer is charged with preparing an annual report addressing changes in the internal compliance procedures and code of ethics of the organization, as well as compliance with the securities laws.
4. Each NRSRO must conduct a "look-back" review of any securities rated by an employee who then went to work for the company that issued the securities. (The so-called "revolving door" conflict of interest.) The latest SEC proposal on carrying out the look-back review requires that ratings agencies must place any such affected securities on a credit watch list and immediately inform investors of the potential conflict of interest. If a conflict is found, the rating agency must immediately revise the ratings on any affected securities.²⁴
5. The Act specifies that statements made by NRSROs be subject to liability in the same manner as those of accounting firms and securities analysts under the federal securities laws. Statements by the rating agencies are not forward looking statements.
6. The SEC is charged to write various other rules such as rules to preclude ratings from being influenced by sales and marketing, and rules requiring that each NRSRO assess and disclose the probability of an issuer's default or not making

²⁴ The Act parallelly provides look-back review requirement on the SEC itself.

payments in accord with the terms of the instrument.

The Dodd-Frank Act is the most sweeping overhaul to financial regulation in the U.S. since the Great Depression. It represents a major shift in the American financial regulatory environment impacting all federal financial regulatory agencies and affecting almost every aspect of the nation's financial services industry. Still some experts argued that the Act isn't strong enough, and it does not limit the size of banks.

9. REFORM OF GLOBAL CAPITAL RULES

Since 1988, global capital rules have been set by the Basel Committee on Banking Supervision, a club of regulators relying on national authorities to implement its standards. The 2004 Basel II Accord, an enhanced version of the original rules set in Basel I in 1988, has been adopted by most European banks. Basel II involves the valuation of risk-adjusted assets in order to arrive at the calculation of risk-adjusted capital, which is the difference between the risk-adjusted assets and liabilities. The rules say that Core Tier 1 capital—which consists of common stock and disclosed reserves (or retained earnings), must be at least 2% of a bank's risk-adjusted assets. Tier 1 capital, which is core tier 1 plus non-redeemable, non-cumulative preferred stocks, must be at least 4% of a bank's risk-adjusted assets. Generally speaking, the rules ensure that the greater the risk to which a bank is exposed, the greater the amount of capital is needed to safeguard its solvency.

But the valuation of assets is difficult because there are so many categories of assets, and in times of emergency, the market prices for some categories may not even exist. Basel II did not prevent the recent financial meltdown. To prevent the recurrence of the recent financial crisis, the Basel Committee on September 12, 2010 reached a new agreement, dubbed Basel III, with the following new rules (BIS, 2010):²⁵

1. Core tier 1 capital ratio to rise from a current 2% to 3.5% in 2013, to a final minimum of 4.5% in 2015.
2. Tier 1 capital ratio to rise from 4% to 6%.
3. New conservation buffer of 2.5% is added on top of the 6% tier 1. If capital ratio falls below the buffer line, banks will face supervisory restrictions, for example, on dividends payout. The buffer should consist of common equity, to be phased in from 2016 to 2019.
4. A countercyclical capital buffer will consist of 0–2.5% of loss-absorbing capital. It will impose extra requirements on banks during boom times so as to accumulate plenty of reserves if the economy falters.
5. A leverage ratio is introduced that binds the total size of a balance sheet not to exceed 33 times tier 1 assets.

The rules thus require reserves of 7–9.5% (4.5% (Core Tier I) + 2.5% (conservation buffer) + 0–2.5% (seasonal buffer)) in common equity, 8.5–11% in Tier I capital and

²⁵ For a detailed analysis of Basel's rules and critiques, see Blundell-Wignall and Atkinson (2010).

10.5–13% in total capital. The Basel III accord was approved by the 2010 G-20 Seoul Summit and targeted for full implementation by the end of 2019.

In June 2011, the Basel Committee proposed new rules to combat the remaining “too big to fail” issue. The rules will require the world’s top banks to hold an extra capital of 1% to 2.5% of their risk-weighted assets on top of the minimum 7% capital requirement (4.5% minimum Core Tier I capital + 2.5% conservation buffer). The rules also feature the threat of an additional 1% capital on giant banks that further grow in size. Banks will be graded on five characteristics: size, complexity, interconnectedness, cross-border activity and the availability of competitors to pick up their business in a crisis. Roughly 30 of the world’s top banks will be affected by the newest rules, including Bank of America, Citigroup, JPMorgan Chase, Barclays, HSBC, Royal Bank of Scotland, BNP Paribas and Deutsche Bank. The full details of the proposed rules are yet to be issued by the Basel Committee.

Some have criticized that the timescale for introduction is relatively long, and this could undermine the whole exercise. Some have expressed concern about whether the rules will stick, since some good aspects of Basel II were not implemented under an excess of discretion. Some have argued that banks will, in the future, provide fewer credits than they did in the past under the new capital requirements, causing reduced growth and investment in the world economy. OECD (2011) estimated the medium-term impact of Basel III on annual global GDP to be in the range of -0.05% to -0.15% .

10. CONCLUDING REMARKS

In this paper, we have discussed the causes and impacts of the recent financial crisis (the Great Recession) which was the most severe financial downturn since the Great Depression. We have also discussed the principles of financial reform and the monumental Dodd-Frank reform act and the new global Basel III capital rules. Historically, credit cycle recessions have frequently been recorded. Starting in the 20th century, there were the insolvency of the U.S. banking system in 1907, Wall Street crash of 1929 followed by the Great Depression in the 1930s, the collapse of the Bretton Woods system in 1971, the oil crisis in 1973 followed by the stock market crash in 1973–1974, the Latin American debt crisis of 1980s, Black Monday on October 19, 1987 with the largest one-day percentage share-price drop in stock market history (the Dow Jones Industrial Average dropped 22.61%), the U.S. savings and loan crisis of 1989–1991, Japan’s asset price bubble in the 1990s, the Mexican financial crisis of 1994, Asian currency contagion in 1997–1998, Russian default in 1998, Argentine financial crisis in 2001, the dot-com bubble in 2001, and the recent financial crisis of 2007–2010 followed by the latest economic crisis of 2011 and the ongoing European sovereign debt crises.

If history is any guide, the reforms implemented in various countries in response to the crisis of 2007–2010 will likely prove insufficient to prevent future recurrence of financial crises, in consideration of ever more financial innovations, rapid economic globalization and the ongoing structural changes (both micro and macro) in the world economy. The world is still full of macro imbalances that require more international

monetary and fiscal policy cooperation. The levels of public debts have skyrocketed in most countries, leaving the global economy with fewer options to absorb future economic and global shocks. The eurozone is still struggling to prevent Greece from defaulting. Current unemployment rates in all major advanced economies are far higher than were the case in 2008. Factors such as continuing decline of housing prices in the U.S., Chinese high inflation with an incipient real estate bubble, and rising food prices that can cause instability in underdeveloped countries are the potential culprits in stalling the world economic recovery. On the geopolitical front, the world faces turmoils in the Middle East and North Africa. In addition, many have worried about the potentially damaging impacts of the restrictive reform policies implemented in response to the recent financial crisis. Economic crisis has lingered into or reappeared in 2011.

Finally, all of the reforms discussed in this paper have focused on the U.S. and Europe. With restrictive reforms and Basel III in place, there would be fewer credits available to finance small businesses and riskier investment projects in Asia and other emerging economies. There is an urgent need for the world institutions such as the UN, the IMF and the World Bank and also the developed countries to collectively devise aid packages in this regard.

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