

# Recession

# 101



# **Recession 101**

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## **Abstract**

This paper provides principles-level students of economics with an account of the recent recession. The paper first summarizes the aggregate demand-aggregate supply model employed by most textbooks to explain business cycles. It then provides a chronology of events leading up to the recession, including events related to the housing boom and bust and the associated financial crisis. Following that, the paper links observed events to the conceptual framework provided by the theory. Policy responses to the panic and recession are described and evaluated. Conventional fiscal and monetary stabilization policies are considered first; discussions of unconventional monetary policy strategies, bailouts for financial intermediaries, and regulatory reform follow.

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# Recession 101

## Introduction

During the Great Moderation, motivating the teaching of macroeconomics, at least with a focus on business cycles, became difficult. That is no longer the case. We have an all-too-obvious example to illustrate that the business cycle phenomenon lives. This paper chronicles events of the recent recession and relates them to the theory taught in principles-level economics courses.

All recessions are in some respects similar, but they also differ. Our most recent recession was preceded by a housing bubble and subsequent bust, and was, in its early stages, accompanied by a panic in financial markets. Events leading up to the recession were widely reported and clearly observable. While it is potentially helpful to observe events that appear to have triggered the recession, it also presents challenges in teaching. The connection between observable events and textbook theory is not always obvious.

The paper will begin by offering a short summary of macroeconomic facts to describe the progress of the recession. It then reviews the key elements of the aggregate demand-aggregate supply (AD-AS) model presented in most principles-level textbooks in economics. The paper provides a list of “shocks” that might induce business cycles according to the theory. A chronological summary of key events in the history of the recession follows, including those related to the housing bubble and bust and the associated financial crisis. Some attention is given to how market failure may have played a role in these events. Next the paper considers how the narrative can be translated into a story about macroeconomic shocks in the AD-AS theory. The final task is to consider policy issues. The current recession has evoked controversial policy responses, and students should have some understanding of what has motivated these responses. Supplementary materials include a chronology of important events and a glossary.

## Recession Facts

As this paper is written in January 2010, the US economy appears to be emerging from the trough of a recession. According to the National Bureau of Economic Research, an organization that dates the peaks and troughs associated with recessions, the recession began in December 2007. Real GDP growth was negative in five of the next six quarters, including a sharp decline of 5.4% for the fourth quarter of 2008. The unemployment rate rose from 4.8% at the beginning of 2008 to 10.2% in October 2009. The Dow Jones Industrial Average exceeded 14,000 in October of 2007, but plunged to less than 8000 a year later.

The impact of the recession can also be seen in the movements of other variables. Real consumption has fallen in four of the last six quarters, with an especially large 20.3% fall in spending on consumer durables in the fourth quarter of 2008. Both residential and non-residential fixed investment fell at rates close to 40% in the first quarter of 2009, and business inventories have fallen throughout 2008 and 2009. Nominal

wages (wages measured in current dollar values) have risen slightly during the recession, but at a rate that has been declining. Real wages (wages adjusted for inflation) have declined in 2009.<sup>1</sup> The inflation rate, measured according to either the GDP deflator or the consumer price index, has been subdued. According to the consumer price index exclusive of food and energy, inflation has been consistently at 2% or less in 2008 and 2009. While inflation has been low, both the M1 and M2 measures of money have surged, and the Federal funds rate, the rate directly targeted by the Federal Reserve (the Fed), is approaching zero.

Recently, there have been signs that the recession may be ending. The growth rate of productivity (non-farm output per hour) was sluggish from late 2007 through the first quarter of 2009, but increased dramatically to 6.9% and 9.5% rates in the second and third quarters of 2009. The stock market has recovered some of its losses, real GDP growth was positive at 2.8% in the third quarter of 2009, and unemployment fell to 10.0% in November.

Most of the facts for the current recession conform to typical business cycle patterns. Productivity and the various components of GDP generally move together, as they have recently. The unemployment has moved countercyclically—as production has fallen, unemployment has increased. Inflation has moderated at least slightly, as it often does in recessions.

## **Macroeconomic Theory**

This section of the paper provides a brief review of the aggregate demand–aggregate supply (AD-AS) model of business cycle fluctuations.<sup>2</sup> The notions of demand and supply are familiar to students of economics. In microeconomics, the demand curve for a product slopes downward, the supply curve slopes upward, and the intersection of demand and supply curves yields equilibrium values for price and quantity.

In macroeconomics, the AD-AS diagram has a familiar look. In Figure 1,  $Y$  refers to aggregate output (real GDP) in the economy, and  $P$  refers to the average level of prices (a price index). Equilibrium values for  $Y$  and  $P$  are determined by the intersection of aggregate demand and aggregate supply curves.

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<sup>1</sup> The real wage is measured as non-farm hourly compensation deflated by the consumer price index.

<sup>2</sup> The presentation here is abbreviated. Readers unfamiliar with the AD-AS model should consult a principles of economics textbook, for example, Mankiw (2008).

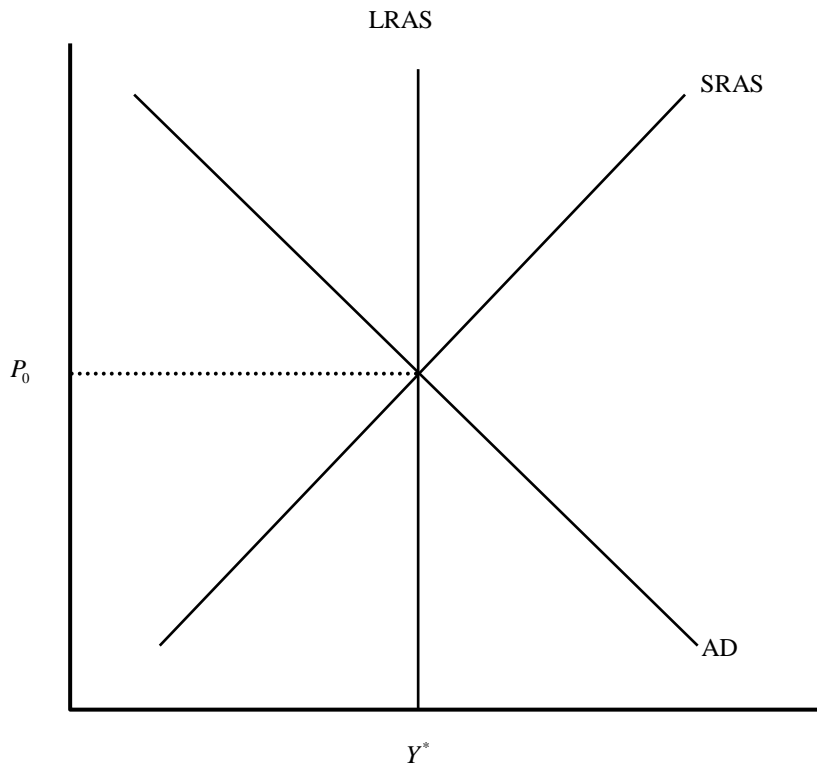


Figure 1. Aggregate Demand and Aggregate Supply

*Why is AD Downward Sloping?*

While the appearance is similar, the logic behind demand and supply curves differs in macroeconomics and microeconomics. In microeconomics, when the price of oranges falls, consumers can substitute away from other goods (like pineapples and grapefruits) in order to purchase oranges. The downward slope of the demand curve is explained by consumer responses to the change in the price of oranges relative to prices of other goods. However, in macroeconomics, output is an aggregate of all goods and there are no opportunities for substitution.

The downward slope of the aggregate demand curve requires a more involved explanation. When the average price level falls, households are willing to hold less wealth in the form of money (cash and checking accounts) because smaller money balances will now support the same level of real transactions. Households can reduce their money balances by exchanging money for bonds or other interest-bearing assets. As households attempt to buy bonds (i.e., lend), this will put downward pressure on interest rates. Low interest rates then stimulate desired investment spending, a component of

aggregate demand. Therefore output demanded increases with a lower price level, and AD is downward sloping.<sup>3</sup>

### *Shifts in AD*

GDP is the sum of spending on consumption, investment, government spending and net exports. If economic shocks cause desired spending to change in any of these categories, then the aggregate demand curve will shift.<sup>4</sup> For example, if businesses become more optimistic about future profit opportunities, they will invest in productive capacity. This increases the investment component of aggregate demand and shifts the AD curve to the right. If households expect future incomes to be higher, they will spend more on consumption, again shifting AD to the right. Some economists argue that changes in expectations and confidence that shift AD are large and frequent, but difficult to explain. The phrase “animal spirits” is often used to describe these inexplicable movements in confidence.

Government spending and taxation policies can also affect aggregate demand. Government spending is a direct component of desired spending, so increases shift AD to the right. Higher taxes reduce households’ disposable incomes, causing consumption to fall and producing a leftward shift of AD. When the Federal Reserve increases the money supply, this produces lower interest rates, stimulates investment spending, again shifting AD to the right.<sup>5</sup>

### *Why is AS Upward Sloping?*

The upward slope of the AS also requires explanation. In the long run, output is determined by an economy’s productive capacity, which in turn depends on the state of technology and quantities of available inputs like capital, labor, and natural resources. These are not affected by the price level, so in the long run, the aggregate supply curve should be vertical (see LRAS in Figure 2). We call the output level determined by the location of LRAS ( $Y^*$  in the diagram) the natural rate of output.

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<sup>3</sup> A lower interest rate may also stimulate demand for exports, a component of aggregate demand, since low interest rates lower the value of the dollar and make U.S. goods cheaper. Also, a lower price level increases real wealth of those holding cash, increasing desired spending.

<sup>4</sup> Changes in the average price level cause movements along the AD curve, but do not shift it.

<sup>5</sup> The magnitude of these effects is a matter of debate. If higher government spending “crowds out” private investment by raising interest rates, the net impact on aggregate demand may be small. If tax cuts are saved rather than spent by households, again the impact will be small.

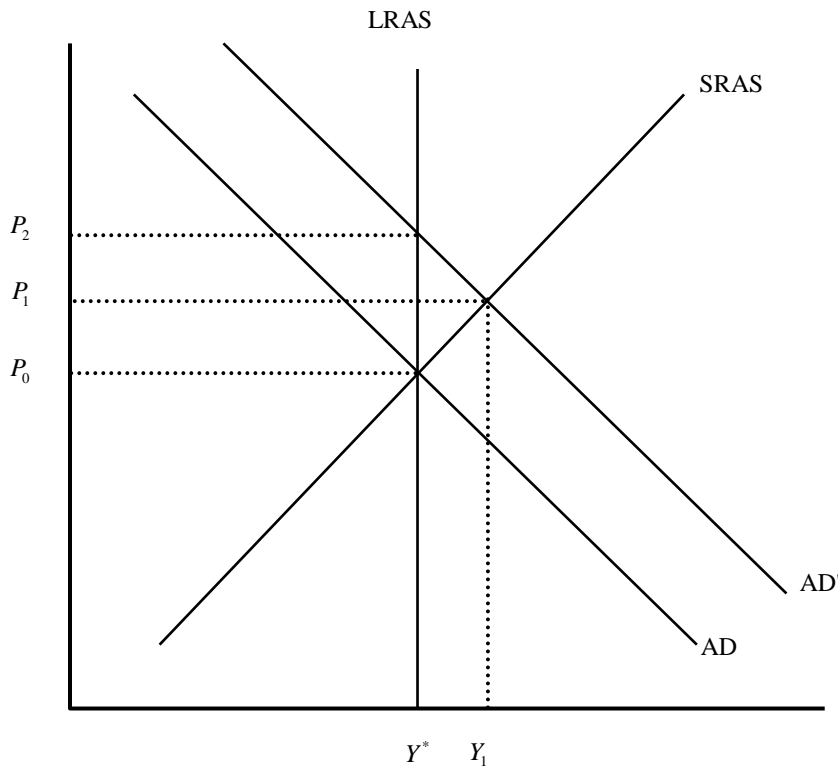


Figure 2. An Aggregate Demand Shock

However, in shorter time frames, the AS curve is upward sloping, as we showed in Figure 1. Suppose that, starting from equilibrium at  $P_0$  and  $Y^*$  in Figure 2, aggregate demand increases, perhaps because of an increase in the money supply. In the diagram, aggregate demand shifts from  $AD$  to  $AD'$ . If  $AS$  were vertical, then the price level would rise to  $P_2$  and output would be unchanged. However, some firms will not immediately change prices. Firms whose prices are unchanged will see higher sales, and will increase production. In the diagram, the average price level rises to  $P_1$  and output rises to  $Y_1$  as the economy moves along an upward-sloping short-run aggregate supply curve ( $SRAS$ ).<sup>6</sup> Here the distinction between short run and long run hinges on whether prices have partially or fully adjusted to a shock.

Why are prices sticky? There are several possible reasons. First, changing prices quickly is sometimes difficult or costly. A firm that sells by way of a mail-order catalog must normally set prices in advance and then stick with them until it publishes a new catalog. Second, for many firms, prices are based on costs of production, and costs are

<sup>6</sup> There are other arguments that might explain an upward sloping  $SRAS$  curve. For example, an explanation might be based on wage stickiness rather than price stickiness. Short-run confusion about average price changes and market-specific price changes might also provide the basis for an explanation.

largely driven by wages. However, wages are negotiated infrequently and are therefore themselves sticky. Less flexible wages lead to less flexible prices.

### *Shifts in AS*

We have noted that in the long run, the output is determined by the productive capacity of the economy, which in turn depends on the quantity of available labor, availability of capital and natural resources, and the state of technology. Events that change productive capacity will shift both long- and short-run aggregate supply curves. For example, improvements in technology or increases in resource availability will shift the LRAS and SRAS curves to the right.

### *The Relationship between SRAS and LRAS Curves*

Again consider Figure 2. When AD shifted to the right, the economy initially moved to the intersection of AD' and SRAS, where output and the price level were higher. At this point, prices had not fully adjusted—some prices still reflected erroneous expectations that had been embedded in earlier decisions. However, as the economy moves from a short-run equilibrium to a new long-run equilibrium, expectations will adjust. Higher price expectations eventually lead firms and workers to negotiate higher wages, and higher costs cause the short-run aggregate supply curve to shift upward over time. As shown in Figure 3, SRAS shifts upward until LRAS, SRAS', and AD' again intersect. Eventually output returns to  $Y^*$  and the price level rises to  $P_2$ .

In terms of the mechanics of the model, any event that shifts the LRAS curve also shifts the SRAS curve. In addition, changing price expectations cause SRAS (but not LRAS) to shift, and this provides the channel by which we describe the movement of the economy from short- to long-run equilibrium. We also see that the output effect of an aggregate demand shock is temporary. Given enough time, the economy will right itself following a demand shock, since output returns to its natural rate.

### *Business Cycles in the AD-AS Model*

With the basic apparatus of the AD-AS model, it is possible to describe the business cycle phenomenon as a consequence of movements in AD and/or AS and consequent movements in GDP. Eventually, when prices fully adjust, the economy returns to an intersection of AD and LRAS. The movements that occur between the initial shock and the restoration of long-run equilibrium constitute business cycles in our model. Table 1 summarizes how various shocks to the economy can shift AD and AS, leading to recessions and booms.

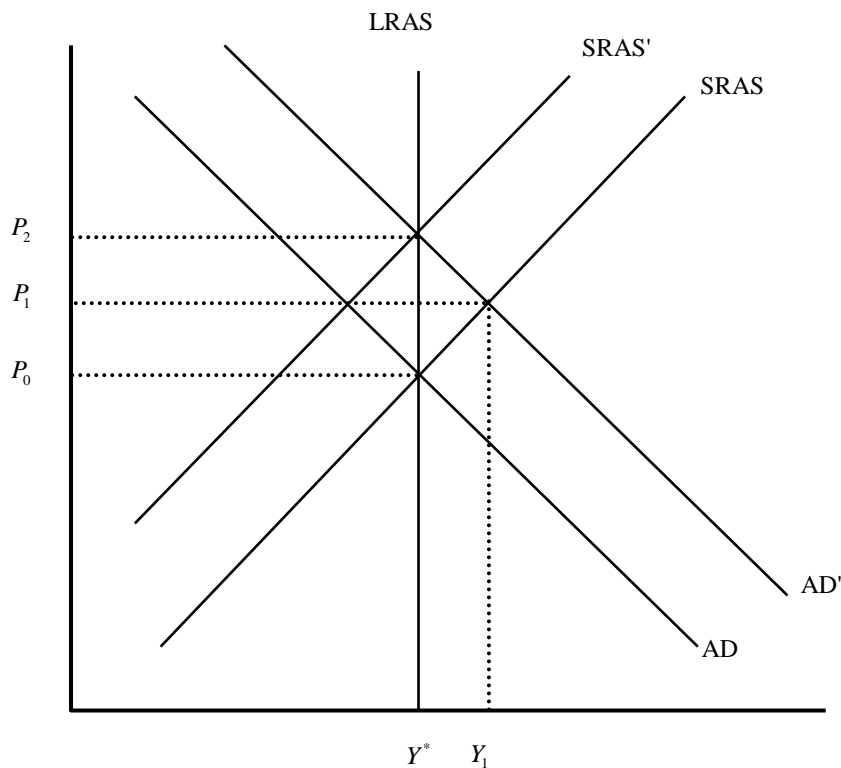


Figure 3. Long-Run Adjustment

### Possible Causes of Business Cycle Fluctuations

I will defer most discussion of the causes of the recent recession until I have more thoroughly discussed the facts. However, I will make several observations in advance. First, there has been no obvious source of technological regress, although I will consider this possibility at greater length later. Second, oil prices rose sharply from mid-2007 to mid-2008. Because higher oil prices reflect increased scarcity of oil, this can be interpreted as a negative supply shock resulting from decreased resource availability.<sup>7</sup> However, the oil price increase was quickly reversed, and most observers look elsewhere to explain the recession.<sup>8</sup>

On the demand side of our model, neither monetary nor fiscal policies were contractionary leading up to the recession, so these do not explain leftward movements in AD. However, changing expectations may be relevant. Increasing wealth and rising confidence about the future could explain a rightward shift of the AD curve during the

<sup>7</sup> A high price of energy induces firms to substitute away from energy inputs, implying less energy for given capital and labor inputs, and consequently less output. Oil price shocks and recessions occurred in the mid 70s, early 80s, 1990-1991 and 2000-2001.

<sup>8</sup> Hamilton (2009), while agreeing that other factors were involved, argues that the oil price shock made a material contribution to the current recession.

housing boom preceding the recession. A reversal of mood might explain a leftward shift in AD, falling output, and rising unemployment as the recession began and progressed. The next section discusses these possibilities more fully.

## **Housing, Mortgages, Bubbles and Panic**

There is broad agreement that the current recession is related to events that have occurred in housing, mortgage, and related financial markets. In this section we provide some background on these topics. A more detailed chronology of events is provided in Table 2. A glossary of terms is also provided at the end of the paper.

### *Old-Fashioned Mortgages*

If you buy a house, you probably borrow money by taking out a mortgage. At times in the past, your mortgage relationship might have involved only you and your bank (or other financial institution). The bank would originate your loan and service it. Every month, as you made payments, you would provide the bank with a stream of revenues that would provide the source for its profits. The ability of banks to make loans was ultimately dependent upon their ability to attract checking and savings deposits from local depositors.

### *Securitization*

Since the 1970s, mortgage operations have often worked differently. When you obtain a mortgage loan, you initially work with a mortgage originator. The originator arranges the terms of the contract and organizes appraisals, inspections, and evaluations of your ability to pay. However, originators typically do not maintain an ownership interest in the mortgage over time. The mortgage on your home will be sold to another entity, perhaps one of the government sponsored enterprises (GSEs) Fannie Mae or Freddie Mac.<sup>9</sup> These firms were created by the government to support housing markets and mortgage finance, but are private enterprises.<sup>10</sup> Your mortgage and others are then bundled together and sold to investors as securities.

There are potential advantages to bundling through securitization. For a lender, an individual mortgage can be risky in terms of chances of repayment. If a borrower loses his job or has a serious health problem, he may default. However, in a large pool of mortgages, the number of defaults usually will be small and predictable, so risk is reduced by pooling over mortgages for many homes in varied locations. Mortgage-backed securities may be purchased by banks or other financial institutions. It is the

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<sup>9</sup> Fannie Mae is the Federal National Mortgage Association; Freddie Mac is the Federal Home Loan Mortgage Corporation.

<sup>10</sup> Currently both enterprises have been placed under the conservatorship of their regulator, the Federal Housing Finance Agency (FHFA).

owners of these firms (or purchasers of securities they have issued) who are ultimately the lenders providing funding for your mortgage loan.

### *Slicing and Dicing Mortgages*

In the late 1980s, a new financial innovation, the collateralized debt obligation, or CDO, was developed. Once mortgages have been pooled, they generate a stream of payments to the owners of the bundle. CDOs divide the flow of payments from the bundle into distinct ownership shares (tranches) that differ in terms of the priority of their claims to payments. For example, if losses from default are larger than expected, then “senior” tranches might still receive a specified income flow while lower priority tranches would not.

Now consider a pool of mortgages of the sub-prime variety (implying that borrowers are of higher than normal risk). When underlying mortgages are risky, the senior tranche of a CDO might still be considered rather safe. After all, in a pool of subprime borrowers, not all borrowers will default, and the senior tranches of the CDO have a claim on the income flow from the performing mortgages. CDOs that bundled subprime mortgages might even produce senior tranches with “AAA” ratings, implying that ratings agencies judged the risk of loss to be very low. Some institutional investors, including pension funds and insurance companies, only buy AAA securities, but senior tranches of CDOs built on subprime mortgages could satisfy this requirement. Lower tranches were necessarily risky, but given that subprime borrowers paid high rates of interest and high upfront fees, and given that expected house price appreciation was likely to reduce the risk of foreclosure and default, even lower rated tranches could be sold to investors willing to take on more risk. By 2004, a much larger fraction of all new mortgages were of the sub-prime variety.

### *Boom and Bust*

As housing prices leveled off and then fell in 2006, so did the performance of subprime mortgages. Borrowers who could afford low teaser rates found that they could not afford their mortgage payments at higher, post-teaser rates. Many homeowners had negative home equity, and lenders were hesitant to refinance loans with home prices falling. Further, for homeowners who recognized that a home’s value might be less than the balance on the loan, foreclosure could be a more appealing option than continuing to pay. Foreclosures began to accelerate, and the forced sale of foreclosed homes added to the downward pressure on home prices. Eventually, it became clear to investors that even the senior tranches of CDOs were vulnerable to loss. A complicating factor was that the complexity of the new financial products like CDOs made them opaque—it was difficult to discern how their values were affected by losses occurring in the mortgage market.

### *Leverage and the Shadow Banking System*

When house prices began to fall in 2006, mortgage defaults rose, and holders of mortgage-backed securities took losses. Many of the owners were non-bank financial

intermediaries, for example, hedge funds.<sup>11</sup> These non-bank intermediaries are sometimes collectively referred to as the “shadow banking system.” Hedge funds bought mortgage backed securities, but often financed their purchases with short term borrowing—they did not obtain funds from insured depositors like banks do. Many of these funds were highly-levered, meaning that their asset purchases were heavily funded by borrowing.

Leverage can magnify returns. Consider an example for an individual. If you buy a \$200,000 home, perhaps you make a down-payment of \$20,000 and borrow \$180,000 at an interest rate of 5%. Now suppose that you sell the house one year later for \$220,000. The price has gone up 10%. After paying interest of \$9,000 you still net a profit of \$11,000 on your initial investment of \$20,000. As a consequence of leverage, your rate of return on investment is 55% even though the appreciation rate of the home was only 10%. Highly-levered hedge funds magnify their returns in similar fashion.<sup>12</sup>

Unfortunately, negative returns are also magnified by leverage, and leverage increases the risk that a hedge fund will become insolvent (lacking assets sufficient to cover its debts). When a fund’s mortgage-backed securities lost value, investors who had been lending to them on a short-term basis became reluctant to lend further. If lenders refused to extend loans, then funds could be forced to liquidate assets in order to repay existing loans. If many funds’ assets were simultaneously offered on the market, asset prices would be likely to spiral downward, exacerbating the losses.

### *Premonitions of Panic*

Problems with hedge funds exposed to investments in mortgage-backed securities became apparent by May 2007, when UBS, a Swiss bank, announced that it was shutting down a hedge fund that had suffered heavy losses related to investments in subprime mortgages. In June, Bear-Stearns, an investment bank and brokerage firm, announced that it had pledged a loan to “bail out” one of its own hedge funds. By July, two of its hedge funds had lost almost all of their value. In early August, the French banking firm BNP Paribas suspended withdrawals from three funds after announcing that it could not fairly value the funds’ underlying assets. Later in August, Countrywide Financial, a huge U.S. mortgage banking firm, “expressed concerns” over liquidity because of the decline of the secondary market for securitized mortgage obligations. Depositors fled and share prices fell. Countrywide was later absorbed by Bank of America. In September, Northern Rock PLC, a British bank, experienced a run on deposits.<sup>13</sup> It sought support from the

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<sup>11</sup> Banks sometimes sponsored “off-balance sheet” entities called structured investment vehicles (SIVs) that held asset-backed securities. Banks avoided stringent capital requirements by moving activities off of their balance sheets, but they were nevertheless subject to high risk of loss. For example, a bank might extend an affiliated SIV a line of credit that would result in a loan loss for the bank if the SIV failed.

<sup>12</sup> The degree of leverage employed by hedge firms is much higher. In the example, the homebuyer’s down payment represented 10% of the value of the asset purchased. For hedge funds, shareholders’ equity might normally amount to only 2% of the value of assets in the fund portfolio.

<sup>13</sup> A bank run occurs when many depositors withdraw funds from a bank out of fear that the bank may have insufficient funds to meet its obligations.

Bank of England and was later nationalized. In March of 2008, Moody's downgraded mortgage-backed debt issued by a Bear-Stearns Fund, and rumors circulated that Bear faced "liquidity problems." JPMorgan Chase, in conjunction with the New York Fed, provided Bear with an emergency loan with a term of 28 days. By the end of March, JPMorgan had acquired Bear for \$10 per share. Clearly problems were emerging, but even at this point the panic seemed to be contained.

### *Accelerating Panic*

By the summer of 2008, losses on loan portfolios were mounting at the GSEs, Fannie Mae and Freddie Mac. Both firms engaged in purchasing and bundling mortgages and selling them to investors. Both also held inventories of unsold mortgages. Like other players in the mortgage market, Fannie and Freddie were highly levered and dependent on short term financing. Many investors who lent to the GSEs were under the impression that there was an implicit U.S. government guarantee of their debt obligations, and this belief would prove to be accurate. The Fed first offered Fannie and Freddie emergency loans. Then, in July, the government passed legislation to recapitalize the firms with government funds, and created a new regulatory agency, the Federal Housing Finance Agency (FHFA), to oversee them. On September 7, 2008, the FHFA placed Fannie Mae and Freddie Mac into conservatorship, a state akin to a temporary and limited nationalization.

On September 15, 2008, Lehman Brothers, a financial services firm, declared bankruptcy. The problems were much like those that had earlier beset Bear-Stearns. Lehman faced heavy losses on mortgage-backed securities, and was unable to continue to roll over its short-term debt. The Fed had facilitated a rescue for Bear, but attempts to secure a private rescue for Lehman failed, and the Treasury and Federal Reserve declined to provide guarantees that might have supported a rescue. With the Fed failing to step in as a lender of last resort, the panic heightened. With hindsight, some have suggested that the failure of the Fed to act on Lehman was an extraordinary error that created uncertainty about the Fed's willingness to act as a lender of last resort. Had the Fed intervened, the panic might have been contained.

The next crisis involved American International Group, or AIG, a huge insurance company. AIG's problems arose in part from its holdings of mortgage-backed securities, but, perhaps more catastrophically, from sales of credit default swaps (CDSs). By selling credit default swaps, AIG effectively sold insurance to protect the holders of mortgage-backed CDOs from risk of loss. Once mortgage default rates rose, AIG was liable for huge payouts, even though many of the insured CDOs had once been highly-rated. On September 16, the Federal Reserve announced that it was making \$85 billion in credit available to AIG (collateralized by AIG assets). In doing so, the Fed relied upon powers conferred upon it by Article 13.3 of the Federal Reserve Act, which gives it considerable discretion to offer loans in "unusual and exigent" circumstances.

On September 25, 2008, Washington Mutual Bank (WaMu) failed after facing a run on uninsured deposits (those in excess of \$100,000). The bank was seized by

regulators and placed into receivership of the Federal Deposit Insurance Corporation (FDIC). Eventually its assets were sold to JPMorgan Chase. On September 29 another bank, Wachovia, followed. A run on large deposits triggered a crisis, and the FDIC intervened to arrange a takeover by Citigroup with government guarantees against losses. Ultimately Wachovia received a competing offer from Wells Fargo, and was purchased by Wells without government aid. On October 3, The Emergency Economic Stabilization Act of 2008 was passed. This legislation authorized subsequent bailouts through the Troubled Asset Relief Program (TARP). On October 13, 2008, Treasury Secretary Henry Paulson met with the CEOs of the nine largest U.S. banks. After some prodding, the banks agreed that the Treasury would use TARP funds to buy equity stakes in each bank, injecting \$250 billion into those banks and others. The government had become a major shareholder in what had previously been privately owned institutions.

By this time concerns over the economy were not limited to those closely related to housing. The stock market continued to fall as confidence eroded. Wealth, in the form of both housing and the value of U.S. corporations, had declined precipitously. Aggregate spending and production began falling, unemployment rose, and the recession was underway.

### **Institutional Failure**

We earlier described how practices in the mortgage market changed over time. Financial innovations played a role in the bubble and panic; however, we have also noted that they offered the potential to reduce risk and spread it more efficiently. Innovations should not necessarily have caused either housing market bubbles or collapse and panic. In this section I will look further at how and why these unfortunate events may have occurred.

#### *Principal Agent and Moral Hazard Problems*

As we have described, a mortgage loan is no longer a simple deal between a borrower and a lender mediated by a single intermediary. A mortgage transaction involves a borrower, a mortgage originator, a mortgage servicer, a mortgage bundler, a mortgage insurer, bond rating agencies, home appraisers and inspectors, credit reporting agencies, and others. Most of these parties provide specialized services, and specialization can aid in efficiency. However, the incentive of most of these actors is to see that more deals are done. So long as you do not have a stake (or do not *perceive* that you have a stake) in the residual flow of income from a mortgage, you may not be especially worried about the outcome. An originator is paid fees regardless of whether a loan is repaid; so is an appraiser; so is a ratings agency. In some cases, these parties surely failed in their responsibilities because they did not have strong incentives to meet them. We know that mortgage originators sometimes accepted, and perhaps solicited, false claims about the financial status of loan applicants.

In economics, this type of misalignment of incentives is called a principal-agent problem. One party (the principal) contracts with another party (the agent) to complete a

task, but is unable to costlessly verify that the task has been satisfactorily completed. Moreover, if a party does not bear all of the risks associated with his actions, his behavior may be excessively risky, increasing the odds of an undesirable outcome. The latter situation is referred to as a problem of “moral hazard.” These problems involving principals and agents and moral hazard had existed for some time, so their presence cannot fully explain why the crash occurred when it did.

### *Moral Hazard and the Housing Boom*

So long as home prices were soaring, the existence of incentive problems seemed not to matter much. Even if a homeowner defaulted, rising home prices left a lender with valuable collateral. In hindsight, it seems obvious that house prices could not possibly have maintained the trajectory they were on, but an eventual smooth landing, rather than a crash, was a plausible possibility. As it turned out, the landing was not smooth. Once housing prices were falling the undesirable consequences of moral hazard were quickly exposed. The interaction of falling home prices and pre-existing, but ignored, incentive problems triggered the panic; the panic was amplified by the leveraged condition of financial intermediaries.

### *Asymmetric Information*

We have described how the peak and decline of house prices led to loan defaults, foreclosures, and losses for holders of mortgage-backed securities. In part because of the complexity of the composition of many mortgage-backed securities, it became difficult to assess their values. This problem was magnified by the uncertainty surrounding the potential for losses. In such situations the owner of a security might have more information about its quality than potential buyers (or lenders), and we say that “asymmetric information” exists. If there is a tendency for only the lowest quality assets to be offered for sale by sellers, then buyers naturally are reluctant to purchase. Similarly, lenders become reluctant to finance borrowers when the quality of collateral is suspect. Given these circumstances, normal lending patterns between firms began to break down.

### *Bank Runs: An Analogy*

In the past bank runs in the U.S. were not unusual. Banks accepted customer deposits, and then loaned a portion of the deposits to borrowers. Loans were extended for long terms, but deposits were subject to withdrawal upon demand. If depositors feared that a bank might not have funds sufficient to cover their deposits, they would rush to withdraw funds. At times the expectation of bank failure became self-fulfilling; depositors withdrew funds, banks had insufficient liquidity to cover the withdrawals, leading to panic by depositors and even further withdrawals. If a bank were forced to liquidate long-term assets quickly, it could fail. The problem of bank runs in the U.S. eventually led to institutional changes in the form of deposit insurance and the establishment of the Federal Reserve as a lender of last resort. As a consequence, bank runs became much less common.

Leading up to the panic of 2008, mortgage-backed securities were often purchased by non-banks; e.g., hedge funds, and financed with short term debt. When securities lost value, highly-levered funds teetered on the brink of insolvency and lenders would not renew funding. The flight of lenders is analogous to the flight of depositors in a bank run. This phenomenon contributed to crises and/or failures for Bear-Stearns, Lehman brothers, AIG, and others.

### *Origins of the Boom*

The housing boom and bust seems to have been a proximate cause of the panic and recession. We have also seen that incentive problems in the mortgage process exacerbated the boom phase as home prices rose; this set up a bigger fall when the bust arrived. But how did the housing boom get its start? There is no obvious answer, but there are suggestions. Public policy had long promoted home-ownership and, with political support, financial institutions increasingly extended new loans to less credit-worthy borrowers. Politicians who advocated reigning in Fannie and Freddie were ignored. Observers have suggested that expansionary monetary policy also played a role, with low interest rates over a long period eventually leading to an asset price inflation. Others have pointed to an international savings glut that kept world-wide interest rates low and provided funding for mortgages. Some combination of these factors fueled an initial appreciation of housing, and the bubble was sustained by induced changes in animal spirits. People observed rising home prices, and came to expect even higher ones, at least until the bubble had burst.

### *Greed?*

Some of the behavior that occurred in the boom might have been narrowly selfish, irresponsible, or even fraudulent. This has led some to conclude that “greed” was a cause of the panic. There is little doubt that self-interest plays a role in economic activity, including recent events. In economics, we regularly assume that individuals would prefer to have more wealth rather than less. We also know that when actors are motivated by self-interest, but play by the rules in an appropriate institutional setting (like a competitive market), good outcomes can result. In any case, it seems either misleading, or vacuous to claim that greed has caused the current crisis. Has there really been an *increase* in greed to explain what has happened?

### **Macroeconomics Revisited**

With some knowledge of events and institutions that are important for the current recession, I now return to the topic of macroeconomic theory. Once again, I will ask how we might, in textbook fashion, explain the recession as the response to a shock, or perhaps a collection of shocks.

### *Expectations and Wealth*

Referring back to Table 1, at least two entries, expectations and wealth, seem to have some relevance given the chronology of events observed in the recession. The discussion in the previous section explains how specific events in housing and mortgage markets may have contributed to shifts in confidence. Before the recession, rising home prices led to expectations of further increases, which stimulated spending. Higher home and stock prices increased market valuations of wealth, which further increased spending. Some of the added spending may have been directly related to the ability of homeowners to borrow against home equity credit lines. Then, once housing prices and the stock market peaked and fell, wealth was reduced, spending fell, output and employment declined, and the unemployment rate rose. As borrowers defaulted on loans, investors in mortgage backed securities also faced losses, and wealth and confidence eroded further. Aggregate demand shifted to the left, sending the economy into recession.

### *A Financial Market Supply Shock*

Earlier, we noted that there has been no obvious event that caused a negative shock to technology. Plant and equipment has not been destroyed, engineering knowledge has not been forgotten; all of those foreclosed homes still have value (in terms of offering the potential to house people). It might seem that a change in animal spirits and a resulting aggregate demand shift provides the only appealing account for the recession. However, there is a possible supply-side explanation.

One can think of institutional failure in financial markets as a shock to technology. Financial markets exist to facilitate transactions, to direct resources from lenders to borrowers, and to take advantage of opportunities for efficient risk-pooling. If financial markets work efficiently, then more mutually beneficial transactions will take place. However, financial market transactions normally involve trades in promises, and there are risks that promises will be broken. When these risks are high, fewer potentially beneficial transactions take place. In effect, we get less output from given amounts of labor and capital inputs in a world with poorly functioning financial markets.

As an example to illustrate the importance of promises and trust, suppose that my house needs painting. If I am a plumber, I am probably better at plumbing than house-painting. I can hire a painter, meaning that he will promise to paint my house and I will promise to pay him when he is finished. He might be concerned that after he finishes the paint job, I will renege on my promise to pay. He proposes that I pay him first, and then he will paint the house. But I will be worried that he will take my money and leave my house unpainted, or perhaps he will paint it, but he will do a sloppy job. In the absence of trust or effective legal recourse, the promise-based transaction might not take place. I will then need to devote some of my time to painting my house, even though I could produce more highly valued output if I were instead plumbing. When trade is foregone, real income falls. Transactions involving lending and borrowing are, for obvious reasons, reliant on promises, and, consequently, easily disrupted when trust deteriorates or institutions fail.

In the current recession, some of the seizing of activity in financial markets is related to uncertainty about the value or quality of collateral offered by those seeking loans. Owners of assets may have more information about the quality of those assets than potential buyers or lenders; we have termed this asymmetric information. If the willingness of a firm to sell an asset or offer it as collateral signals that the asset is of poor quality; this becomes a reason to “distrust” the seller/borrower, and to avoid completing the transaction.

Todd Vermilyea, an Assistant Vice President of the Federal Reserve Bank of Philadelphia who has expertise in the area of credit cards, provides an example of adverse selection in the retail cards market.<sup>14</sup> Vermilyea says that, in the current recessionary environment, that if you initiate an effort to obtain a credit card, you will probably be turned down. The act of seeking a card indicates to the issuer that, because you need credit, you are likely to be poor risk. However, if you respond to a solicitation, or if you apply in response to a promotional event staged by the bank, you are more likely to be approved. A randomly approached person is a better risk than one who seeks a card.

Charles Evans, President of the Chicago Federal Reserve Bank and a member of the Federal Open Market Committee (FOMC), concurs in the view that financial market disruptions are a result of increasing information asymmetries and adverse selection. He goes on to argue that it might also be reasonable to model those disruptions as technology shocks. In Evans (2008), he says “the cost of producing an intermediate input—credit intermediation—has become more expensive.” According to our theory, negative productivity shocks shift both long- and short-run AS curves to the left, resulting in falling output and employment.<sup>15</sup>

If the recession is the consequence of a supply shock, some uncomfortable questions arise. Supply shocks can be brief, persistent, or permanent. However, they are not likely to be fully cured by ordinary demand management policies or short-term financial rescues. If we have suffered technological regress in financial markets, then institutional changes may be needed to achieve a proper repair. Evans (2008) summarizes the problem nicely:

Can markets easily work around the disruptions to the credit intermediation process that channels funds from savers to borrowers? Or have we experienced a permanent destruction in something we might want to think about as the financial sector capital stock? If so, does the economy need to develop entirely new infrastructures for some types of intermediation, or perhaps will reviving earlier more traditional approaches suffice once the turmoil has abated?

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<sup>14</sup> Speech by Todd Vermilyea to the University of South Carolina Economics Society, September 24, 2009.

<sup>15</sup> In Table 1, an analog is provided by the treatment of an oil price shock as a productivity shock (oil also being an intermediate good).

### *Which Explanation is Correct?*

It is natural to ask whether a leftward shift of AD caused by shifting animal spirits and declining wealth is responsible for the recession, or whether it was a leftward shift of the LRAS and SRAS curves caused by institutional failure. In our AS-AD model, the two explanations appear to have differing implications regarding prices. A negative demand shock should lead to downward pressure on prices, while a negative supply shock should put upward pressure on prices. The observation that inflation has softened as output has dropped would seem to favor the demand shock explanation.

However, matters may be more complicated. When there is a shock to technology, this directly affects the position of the LRAS and SRAS curves. However, a persistent negative shock to technology will also affect expected future incomes, wealth, and the profitability of current investment spending. These are all demand shifters. This means that a shock that is normally thought of as a supply curve shifter will also have demand side effects; in the current situation these effects might be strong enough to result in downward pressure on prices in the short-run.

### **Policy Responses to the Recession**

There have been both ordinary and extraordinary responses by government to the ongoing recession. The more ordinary aspects of fiscal and monetary policies will be discussed first; a discussion of monetary policymaking in a zero interest rate setting follows. Next, attention is given to bailouts in the financial sector. Related to this, we will consider another example of moral hazard that arises when large financial institutions anticipate bailouts. Finally, comments on regulatory reform will be offered.

#### *Fiscal Policy Responses*

In the AD-AS theory, policies that shift aggregate demand can influence macroeconomic outcomes. If declines in wealth and unfavorable animal spirits have reduced aggregate demand, expansionary monetary and fiscal policies can be used to stimulate demand in a countervailing fashion. In best-case scenarios, countercyclical government policy actions might eliminate, or greatly ameliorate, a recession.

In February of 2009, only a month into his presidency, President Obama signed a major fiscal policy stimulus plan (the American Recovery and Reinvestment Act of 2009). The legislation called for spending increases and tax cuts valued at \$787 billion. It added spending on education, health care, and infrastructure, and increased transfers for unemployment benefits and other social welfare programs. It offered reduced payroll taxes for individuals and a variety of targeted tax credits, including credits for home purchases by first-time buyers.

Needless to say, economists disagree on matters of theory, and they also disagree on matters of policy. Some advocate fiscal stimulus in the form of government spending,

since spending is a direct component of aggregate demand. There are also arguments against increased spending. As a practical matter, it is difficult to quickly spend newly appropriated dollars. If the government plans to repair bridges and highways, someone must select projects, design solutions, and choose contractors. Selected contractors must then gear up for production. Much of the production (and the resulting income flows) will be delayed. It is possible that once spending is flowing freely, the recession will already have ended, and the countercyclical macroeconomic objectives will no longer be relevant.

Another argument against increased spending is that the spending itself may not be worthwhile. Given political motivations of policymakers, it is easy to be skeptical of the value of projects selected for purposes of stimulating the economy. If wind farms are judged to be unprofitable and inefficient in normal times, then the existence of a recession, by itself, is not a strong argument for construction of new wind farms. Many economists are hesitant to favor countercyclical spending in recessions, arguing instead that government spending decisions should consistently be based on an assessment of costs and benefits.

If spending is to be employed as a tool it would seem that a good strategy would be to spend on one-time infrastructure projects that would eventually have been undertaken anyway. That is, if a bridge will have to be repaired in the next few years, it is sensible to repair it today when the spending also plays a role in macroeconomic stabilization. If the federal government transfers funds to the states to avoid layoffs of state workers, this may also be reasonable. States had already hired these workers to perform tasks judged to be worthwhile, and the spending works quickly since employees are already in place. Much of the spending in the stimulus bill seems to be reasonable on these grounds, although critics have had no difficulty finding items to complain about.

Tax cuts might also stimulate demand. One advantage of using tax cuts is that spending power is placed in the hands of households, who will spend on items they judge to be valuable. A disadvantage of broad-based tax cuts is that households may not spend a large portion of their tax savings. A 2009 Congressional Budget Office study suggested that only about 40% of 2008 Bush-era rebates were spent, while the remaining 60% was saved.<sup>16</sup>

### *Deficits and Debt*

Spending increases and tax cuts result in deficits and higher levels of debt. The ratio of the government debt to GDP in the U.S. is currently approaching 70%. In comparison to other countries, this ratio is not exceptionally large, and the current debt

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<sup>16</sup> See “Did the 2008 Tax Rebates Stimulate Short-Term Growth?” Economic and Budget Issue Brief. Congressional Budget Office, June 10, 2009.

level is probably not yet a matter of crisis proportions.<sup>17</sup> However, there is no free lunch. Issuing debt commits the government to higher future interest payments and taxes than would otherwise have been required.

### *Meltzer, Krugman, and Keynes on Fiscal Policy*

Some economists, for example Alan Meltzer, have suggested that the risk of depression has been exaggerated and that fiscal stimulus is an over-reaction. On the other hand, Nobel winner Paul Krugman has argued that the Obama stimulus has been far too small.<sup>18</sup> Our theory suggests that the economy will return to its natural rate of output in the long run, regardless of the demand policies undertaken by government. Economists like Meltzer believe that self-correcting mechanisms are adequate, and that demand management policies rarely improve matters. Krugman, like John Maynard Keynes before him, believes that self-equilibration is very slow, and that the losses suffered on the way to the long-run are devastating. As Keynes said, “in the long run, we are all dead.”

### *Cash for Clunkers*

While it is of modest importance for macroeconomics, I will briefly discuss the Cash for Clunkers program. Officially known as the Car Allowance Rebate System (CARS), the Cash for Clunkers program was passed in a supplemental appropriations act in 2009. The popular program offered new car buyers rebates of up to \$4500 if they traded in a vehicle with low fuel efficiency for one with higher fuel efficiency. The program required that the older, fuel-inefficient vehicle be scrapped.

While successful in the sense that it generated considerable spending on cars for at least brief period, this legislation reveals much of what is undesirable about politically motivated fiscal stimulus. Because it was temporary, the program shifted the timing of auto purchases around within the year, but it may not have had much impact on either auto demand or aggregate demand over a slightly longer time frame. The program was costly, however. Each trade-in resulted in the destruction of a vehicle worth as much as \$4500 on the used car market. Moreover, the plan was inequitable. Rebates went to car buyers who happened to own clunkers, but not to car buyers who previously had owned more fuel-efficient cars. There were no rebates for car buyers who had purchased autos just before the program went into effect or for those who would purchase later. People who bought worthwhile items other than cars received nothing. The plan favored the rich (who can afford new cars) and harmed the poor (who saw a portion of the supply of used cars relegated to scrap). Further, it favored auto dealers and manufacturers, but not sellers

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<sup>17</sup> While the current level of the debt might not suggest crisis, the trajectory of growth in unfunded liabilities related to Medicaid, Medicare, and Social Security makes the longer run fiscal outlook perilous regardless of the impacts of the current recession.

<sup>18</sup> See Meltzer (2009) and Krugman (2009).

of other goods. For a program so lacking in economic efficiency, one would at least hope for greater equity!<sup>19</sup>

### *Conventional Monetary Policy Responses*

As we have noted, expansionary monetary policy, involving increased money growth and lower short term interest rates, is frequently advocated to help to stabilize an economy in recession. In accordance with this prescription, the money supply has grown and the Federal funds rate, the rate most directly controlled by the Federal Reserve, fell from 5.25% in September 2007 to near zero by December of 2008. Low interest rates should encourage households and firms to spend (especially on interest-sensitive items like housing, durable consumption goods, and investment), increasing aggregate demand and output.

While there has been little complaint about Fed policies lowering interest rates after the onset of the recession, there has been criticism of policies that preceded it. Specifically, the extended period of low interest rates following the 2000-2001 recession may have fueled spending that produced the housing bubble. *Ex post*, this criticism may have some validity. However, if the key goal of the central bank is to maintain overall price stability, then the Fed has not done too badly. The Fed has influence over the average level of prices, but much less power to affect prices in specific sectors like housing.

### *Monetary Policy in a Zero Interest Rate Environment*

The Federal funds rate has been targeted at 0.0% to 0.25% since December of 2008. Once the rate reaches zero no further reductions are possible and the economy may find itself in what is called a “liquidity trap.” Additional injections of money cannot stimulate spending by the usual interest rate channel.

Interestingly, Fed Chairman Ben Bernanke is on record regarding what the Fed should do if confronted with a liquidity trap, and spoke about this back in 2004 (see Abel, Bernanke, Croushore, 2008, p. 424-427). Bernanke offered three prescriptions. First, the Fed should try to convince the public that interest rates will be low for a long time, so that long-term interest rates (which more directly affect spending) will also be low. Second, it should attempt to influence long-term rates directly by purchasing longer term, rather than very short-term securities. Third, it should increase the size of its balance sheet through purchases of securities, thereby expanding the money supply, bank reserves, and lending.

The Fed has adopted each of these three strategies. First, in December 2008, the FOMC’s minutes recorded an intention to leave the target Federal Funds rate near zero for a prolonged period, presumably in an effort to influence expectations and long term rates. That language has stayed in the directive since then. Second, the Fed has adopted

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<sup>19</sup> Some of these criticisms would also apply to programs offering tax credits to first time home buyers.

special lending programs to make loans to depository institutions over somewhat longer terms than its usual discount window loans. Beginning in March 2009, the Fed has purchased treasury bonds as well as bills (bonds have longer terms). Third, the Fed has funded purchases of securities collateralized by student loans, auto loans, credit card loans, small business loans, and commercial paper.<sup>20</sup> In doing so, the Fed has dramatically increased the size and diversity of its balance sheet.

### *What about Those Bailouts?*

In the midst of the panic, actions taken by the Treasury and the Federal Reserve have included more radical interventions, including huge bailouts of potentially failing firms in the financial sector. Many of these firms comprised what has been called the shadow banking system, in which firms pursued bank-like activities, but in a more highly levered and less regulated environment. For banks, deposit insurance and the presence of the Federal Reserve as a lender of last resort have historically been effective in preventing runs. However, high leverage, lack of regulation, and the absence of a (clear) lender of last resort left the shadow banking system vulnerable to a run, and that was the result once losses were suffered in mortgage investments.

When the panic materialized, bailouts became a vehicle for making the Federal Reserve the lender of last resort for much of the shadow banking system. The actions of the Fed and the Treasury in purchasing equity, offering loans collateralized by mortgage-backed securities, and purchasing suspect assets were all intended to alleviate the crisis and induce firms to resume normal activities in financial intermediation. Wessel (2009, Kindle location 2807) describes the rationale for one of the Fed's new lending plans:

The thinking behind the move was simple: Bernanke was trying to unclog what he dubbed the “credit channel.” Since the investment houses’ collateral was increasingly suspect, he reasoned, giving them a chance to replace bad paper with something nearly as good as cash [government securities] would get credit flowing again.

It is reasonable to ask whether these actions were appropriate, or whether the government and the Federal Reserve should have stepped aside and let financial institutions fail. A strong case can be made in favor of the general direction that was taken. In principle, the Federal Reserve acted as a lender of last resort responding to a panic that was analogous to a bank run, but which took place outside of the traditional banking sector. The mortgage market is huge, many institutions were directly involved, and even more were indirectly involved. Once several financial institutions have failed, then the banks and other institutions who lent to them would be at risk. And if those firms failed, others would follow. Even institutions that had been rather well-behaved and prudent would be at risk. In the event of an epidemic of collapse, the government, as the

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<sup>20</sup> Commercial paper refers to short-term unsecured debt issued by corporations.

insurer of bank deposits, would be obliged to cover huge losses and sorting through the wreckage of a collapse would itself have been very costly.<sup>21</sup>

A small indication of the potential costs of failure to act was provided by the events that followed the Lehman bankruptcy. When the Fed failed to save Lehman, it was quickly confronted by crises at AIG, WaMu, and Wachovia. These crises may have been inevitable, but perhaps they were not. The Great Depression also provides a reminder of the possible consequences of failing to act. Avoiding collapse is worth a great deal.

We should also remember that the costs of undertaking the bailout may not turn out to be as high as some have suggested. After all, assets the Fed has acquired have value, and many loans the Fed has made will be repaid. Some have already been repaid.

#### *What about the GM Bailout?*

If the government is bailing out banks and financial institutions, should it also bail out a failing automobile company? Here the answer is probably no. The failure of an auto company, even one as large as General Motors, would not have the same potential for systemic risk as the collapse of financial institutions. Bankruptcy is one effective way of reorganizing a company like GM so that it can become a viable competitor.<sup>22</sup> For financial firms, bankruptcy is a less effective option. GM can continue to manufacture automobiles while it undergoes bankruptcy, but financial firms in bankruptcy proceedings would find it difficult to attract funds from lenders or depositors.

#### *Moral Hazard Revisited*

Moral hazard is important in another aspect of the banking crisis and it leads to an important argument that can be made against bailouts. The basic problem of moral hazard is that individuals or firms take inordinate risks when they do not bear the full brunt of the loss in the event of a bad outcome. Many actors who took part at various stages of the mortgage-making process perceived that they would not ultimately bear the burden of a loss even in worst-case scenarios. Now add the possibility that the government is expected to bail out institutions that are deemed “too large to fail.” That is, in the event of a systemic catastrophe, the losses of risk-taking lenders will be covered by a government rescue. For financial institutions, this is a situation of “heads I win, tails you lose.” Risk takers see high profit on the upside, without the possibility of large personal losses on the downside. An important negative consequence of bailouts may be the continued expectation that government will bailout losers in the future, encouraging firms to continue risky behaviors. In current circumstances, the government would like to be able to “clean up the mess” with a bailout and to simultaneously promise never to bail anyone out again. But without a means of commitment, such a promise will be seen as empty.

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<sup>21</sup> As of October 24, 106 U.S. banks had failed in 2009, despite the actions that have been taken.

<sup>22</sup> After receiving bailout funds, General Motors ended up in bankruptcy anyway.

### *Future Inflation Risks*

There is yet another problem with the financial bailout and the expansion of the Fed's balance sheet through its new lending operations. The Federal Reserve's primary concern today is avoiding collapse, but in the future it will need to reverse its accommodating actions. It will need to sell assets it has added to its balance sheet, limit growth of the money supply, and let interest rates rise. If it fails to do so in a timely manner, increases in the money supply might someday fuel inflation. The government's fiscal condition adds to the risk. At some point the Fed may be pressed to monetize the government debt (i.e., purchase government bonds by printing money), which would also add inflationary pressure.

### *Monindustrial Policy?*

By intervening to provide loans to or purchase equity in firms engaged in specific activities, but not others, the government and the Federal Reserve are indirectly picking winners and losers. In normal times, such decisions are normally left to the impersonal workings of markets. Economist John Taylor has called this non-neutral aspect of the interventions as "monindustrial policy" (combining monetary policy and industrial policy).<sup>23</sup> If such interventions become a permanent feature of policy, then the direction of economic activity could become both more politicized and less efficient.

### *Regulatory Reform*

Because of the potential for bank runs and the existence of moral hazard, banks have long been regulated in an attempt to insure that they do not undertake excessive risk. There are multiple regulating agencies, and sometimes institutions can choose among regulators. In the recent panic, much of the problematic activity arose in unregulated or lightly regulated sectors. The adeptness of banks in innovating around regulatory constraints has also weakened the effectiveness of regulation. Moreover, while each regulating agency has oversight over a particular group of institutions, no single authority has been explicitly charged with responsibility for systemic risk. Recent events make it clear that these arrangements are not fully satisfactory.

There is widespread agreement that changes in regulatory policy and practice are needed to prevent a reoccurrence of the events that led to the panic. Designating an entity with oversight of systemic risk would be one desirable action; such reforms are being considered.<sup>24</sup> Regulations to improve transparency of opaque financial products might also be wise, as would limitations on leverage permitted for non-bank financial intermediaries, especially for firms that are judged to be too large or too interconnected to fail. Stricter enforcement of current mortgage loan requirements would be desirable, and perhaps mortgage loans should be accompanied by larger mandatory down-payments. In

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<sup>23</sup> See Kemp (2009).

<sup>24</sup> Bank "stress-testing" with a concern for systemic risk was carried out by a multi-agency task force on a one-time basis in the spring of 2009, but may not become a permanent regulatory practice.

practice, successful financial system reform is likely to be difficult, especially if firms continue to find ways to circumvent regulation.

In November 2009, Senator Christopher Dodd introduced a financial regulation reform bill that would create a consumer financial protection agency, create a new independent agency to oversee systemic financial risk, and consolidate bank regulation into a single agency. In December, the House passed its own financial regulation bill that differs significantly from that proposed in the Senate. As this paper is written, it is difficult to predict how legislation will eventually reform the regulatory environment.

Ultimately, successful reform of institutions surrounding financial markets will be of great importance. Institutional quality affects productivity and our standard of living just as engineering knowledge does. In terms of the theory, well-designed regulatory reforms have the potential to shift LRAS to the right, resulting in a permanent increase in the natural rate of output.

## **Conclusions**

It is widely recognized that events in housing and mortgage markets precipitated the recent financial panic and the recession, but there is still some disagreement over how to translate events into existing macroeconomic theory. Although aspects of the cycle seem to fit nicely with fluctuations in expectations or animal spirits, it is not possible to rule out an explanation of the recession based on a productivity shock, specifically a shock related to institutional failure in financial market activities.

There is also some disagreement about appropriate policy responses. Stimulus in the form of increased government spending, tax reductions, and expansion of the money supply might shift the AD curve to the right, stabilizing the economy. However, determining the appropriate magnitude and timing of the stimulus is difficult. In addition, the economy has some tendencies to return to long-run equilibrium on its own, and some think that demand interventions will not greatly improve on self-equilibrating forces. There is more agreement that the existing regulatory framework for financial institutions has been inadequate and that appropriate reforms might be able to improve matters.

With hindsight it is also easy to criticize the emergency actions taken in the midst of financial panic. Bailouts may be costly, and they may encourage risky behavior by firms who anticipate bailouts in the future. However, by serving as a lender of last resort, the Federal Reserve may have averted a disaster of greater proportions than the one we have observed. Unfortunately (from a scientific point of view), we cannot run the recession twice, employing different policy choices and observing the consequences. What might have happened under alternative policy scenarios will remain an unknown.

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**Table 1. Shocks that Can Cause Fluctuations**

<i>Source of Shock</i>	<i>Short Run Impacts</i>	<i>Current Recession</i>
Technology	A positive technology (productivity) shifts LRAS and SRAS to the right, increasing output.	Although technology in the usual interpretation has not regressed, real disruption in the financial services sector might be modeled as a productivity shock.
Price of oil	An increase in the price of oil indicates increased oil scarcity, and shifts LRAS and SRAS to the left, reducing output.	There was an oil price run-up prior to the recession; however, the price quickly fell to a much lower level.
Wealth	Higher wealth increases consumption spending and shifts AD to the right, increasing output.	Increased housing wealth may have sustained high spending prior to the recession; decreased wealth in housing and the stock market probably contributed to the downturn.
Expectations	Expectations of higher income or wealth can increase current spending, shifting AD to the right and increasing output.	One might explain the housing bubble and bust and related spending effects as consequences of changes in expectations.
Government Spending	Higher government spending shifts AD to the right and increases output.	There were no major spending shifts prior to the recession. There have been spending changes in response to the recession.

Taxes	Higher taxes reduce desired spending, shifting AD to the left, and reducing output.	There were no major tax policy shifts prior to the recession. There have been some tax cuts in response to the recession.
Money Supply	An increase in the money supply lowers the interest rate and increases desired spending, shifting AD to the right and increasing output.	Contractionary monetary policy was not a cause of the recession. Some have argued that excessively easy monetary policy might have played a role in the boom phase of the housing bubble. In response to the recession, monetary policy has been expansionary.

**Table 2. Recession Chronology**

8/2006	Housing prices peaked (according to the Case-Schiller National Index) and began to fall.
5/3/2007	UBS (UBS), a Swiss bank, announced it was shutting down its Dillon Read Capital Management hedge fund. The fund had lost \$123 million related to U.S. subprime mortgage market investments.
6/22/2007	Bear Stearns announced that it had pledged a loan of up to \$3.2 billion to “bail out” one of its hedge funds and was negotiating loans with banks for another fund. The funds had invested in assets backed by subprime mortgages. Bear losses would produce a crisis in March 2008 (see later entries) and a subsequent takeover by JPMorgan Chase.
8/9/2007	BNP Paribas, a French banking company, announced that it could not fairly value the assets in three hedge funds with investments in U.S. subprime mortgages. It suspended withdrawals from the three funds.
8/16/2007	Countrywide Financial, a large mortgage lender, “expressed concerns” over liquidity because of uncertainty in the market for securitized mortgage obligations. Depositors fled and share prices fell.  Later (1/11/2008) Countrywide was purchased by Bank of America.
9/14/2007	Northern Rock PLC, a British bank, received liquidity support facility from the Bank of England following “problems” in the credit markets and a run on deposits.  In February 2008 the bank was, at least temporarily, nationalized.
9/18/07	The Fed began rate cuts with a move in target Federal Funds rate from 5.25 to 4.75.
12/12/2007	The Term Auction Facility (TAF) was created by the Federal Reserve.  Under TAF the Fed auctions collateralized loans with terms of 28 and 84 days to depository institutions.

1/11/2008	Bank of America announced it had agreed to buy Countrywide for \$4 billion in an all-stock transaction.
3/10/2008	Moody's Investors Service downgraded debt issued by a Bear Stearns fund. Rumors began to circulate in the market that there were "liquidity problems."
3/11/2008	The Term Securities Lending Facility (TSLF) was announced. Under this program, the Fed agreed to accept up to \$200 billion worth of mortgage-backed securities in exchange for U.S. Treasury bills for up to twenty-eight days.
3/14/2008	JPMorgan Chase, in conjunction with the Federal Reserve Bank of New York, agreed to provide an emergency loan, up to 28 days, to Bear Stearns.
3/16/2008	Bear Stearns signed a merger agreement with JP Morgan Chase in a stock swap worth \$2 a share (less than 10 percent of Bear Stearns' market value just two days before). A week later, the agreement was revised, raising the offer to \$10 per share.
6/2008	The price of oil rose to \$134 per barrel, double what it had been a year earlier.
7/1/2008	Bank of America completed its purchase of Countrywide Financial Corporation.
7/2008	The Fed granted Fannie Mae and Freddie Mac access to Federal Reserve low-interest loans in response to their liquidity problems and losses on mortgage holdings. By August 2008, share prices for both Fannie Mae and Freddie Mac had fallen 90% from year-earlier levels.
7/24/2008	The Housing and Economic Recovery Act of 2008 was passed by the Congress. It was subsequently signed into law by President Bush. The act created the FHFA (The Federal Housing Finance Agency) with expanded regulatory authority over Fannie Mae and Freddie Mac.
9/7/2008	The FHFA placed Fannie Mae and Freddie Mac into conservatorship. A conservatorship is akin to "temporary" nationalization.

9/11/2008	AIG (American International Group) CEO, Robert Willumstad, notified New York Fed President Timothy Geithner that the company was having difficulty obtaining short-term loans.
9/15/2008	Lehman Brothers, a major financial services firm facing losses from holdings of mortgage-backed securities, declared bankruptcy. The government did not step in with a rescue when possible private takeovers fell through.
9/16/2008	The Fed bailed out AIG for \$85 billion. AIG's losses had stemmed from its sales of credit default swaps ("insuring" collateralized debt obligations that had by that time declined in value). The proximate crisis occurred when AIG's credit rating was downgraded and the company was required to post additional collateral with its trading partners. This led to a liquidity crisis. The Fed announced the creation of a credit facility to enable AIG to meet its obligations. The government received warrants (options to buy) for a 79.9 percent equity stake in AIG. The credit facility was created under the auspices of Section 13(3) of the Federal Reserve Act.
9/25/2008	After a run on large deposits, Washington Mutual (WaMu) was seized by the Federal Office of Thrift Supervision and placed it into receivership of the Federal Deposit Insurance Corporation (FDIC). Its assets were subsequently sold to JPMorgan Chase. This was the largest bank failure in U.S. history.
9/29/09	Wachovia was the next bank to go. After a run on large deposits, Wachovia began talks with Citigroup and Wells Fargo. The FDIC decided to sell Wachovia's banking operations to Citigroup, and offered to absorb Citigroup's losses above \$42 billion.
10/3/2008	In an agreement superseding the earlier plan, Wells Fargo and Wachovia announced on October 3, 2008 they had agreed to merge in a transaction requiring no FDIC involvement and no government guarantees.

10/3/2008	The Emergency Economic Stabilization Act of 2008 was enacted. This legislation established TARP (the Troubled Asset Relief Program), to be administered by the department of the Treasury. The program was initially announced as a plan to purchase troubled assets, but later the funds were used to purchase equity stakes in major banks (see 10/13/2008)
10/13/2008	Treasury Secretary Henry Paulson met with the heads of the nine largest U.S. banks. The banks agreed that the Treasury would buy equity stakes in each bank, injecting \$250 billion in capital.
10/27/2008	The Commercial Paper Funding Facility was created as a special purpose vehicle (SPV) to permit the Fed to lend (indirectly) to a variety of companies. The SPV was permitted to purchase 3-month unsecured and asset-backed commercial paper.
11/20/2008	The price of oil fell below \$50 a barrel for the first time in three and half years.
11/25/2008	The Term Asset-Backed Securities Loan Facility (TALF) was created. The Treasury agreed to provide \$20 billion from TARP and the Fed contributed \$180 billion. This fund was used to make loans collateralized by securities backed by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration.
11/10/23008	The U.S. Treasury announced it would purchase \$40 billion in newly issued AIG senior preferred stock, under the authority of the Emergency Economic Stabilization Act's Troubled Asset Relief Program.
12/16/2008	The Fed cut the Federal funds rate to a range of 0 to 0.25 percent.
12/19/2008	The White House agreed to a \$17.5 billion bail-out for General Motors and Chrysler under TARP (even those these are not financial institutions).
1/1/2009	Bank of America closed its deal to purchase Merrill Lynch. Shortly after, Bank of America received additional government funded loans.
1/20/2009	Barack Obama was inaugurated.

1/28/2009	An FOMC policy directive reported that “The Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.”
2/17/2009	President Obama signed the \$787 billion economic stimulus plan (the American Recovery and Reinvestment Act of 2009).
2/27/2009	The U.S. Commerce department reported that the U.S. economy shrank 6.2 percent (later revised to 5.4%) in fourth quarter of 2008.
3/2009	In March 2009, AIG announced that they were paying out \$165 million in executive bonuses.
3/23/2009	The U.S. unveiled a trillion-dollar “Public-Private” plan to take toxic assets out of banks. From the Treasury website: “Using \$75 to \$100 billion in TARP capital and capital from private investors, the Public-Private Investment Program will generate \$500 billion in purchasing power to buy legacy assets – with the potential to expand to \$1 trillion over time.”  Source: <a href="http://www.treasury.gov/press/releases/tg65.htm">http://www.treasury.gov/press/releases/tg65.htm</a>
5/7/2009	Results of bank “stress tests” undertaken by the Federal Reserve and other regulators were announced. Although tests showed capital deficiencies for some large banks, the results were primarily viewed as being better than expected.
11/10/2009	Senator Christopher Dodd introduced a bill to reform financial regulation. The bill would create a consumer financial protection agency, create an independent agency to oversee systemic financial risk, and consolidate bank regulation into a single agency.

## Recession Glossary

American Recovery and Reinvestment Act of 2009	This is the Obama Stimulus Bill. The bill offered \$787 billion in tax cuts and funding for spending in response to the recession.
CDO	Collateralized debt obligations (CDOs) are asset-backed securities whose value and payments to owners are derived from underlying assets like mortgages. CDO payment streams are divided into “tranches” with differing claim priorities on income flows. Senior tranches have higher priority claims. Junior tranches have lower priority claims, but pay higher returns in the absence of losses in the underlying assets.
CDS	<p>Credit Default Swap</p> <p>A credit default swap (CDS) is a contract in which the buyer of the CDS pays the seller and, in exchange, receives a payoff if an asset (like a CDO) goes into default.</p>
CPFF	<p>Commercial Paper Funding Facility</p> <p>The Federal Reserve Board created the Commercial Paper Funding Facility (CPFF), to purchase commercial paper. Commercial paper includes unsecured notes issued by banks or corporations. According to the Fed, “The commercial paper market has been under considerable strain in recent weeks as money market mutual funds and other investors, themselves often facing liquidity pressures, have become increasingly reluctant to purchase commercial paper, especially at longer-dated maturities. By eliminating much of the risk that eligible issuers will not be able to repay investors by rolling over their maturing commercial paper obligations, this facility should encourage investors to once again engage in term lending in the commercial paper market.”</p> <p>Source:  <a href="http://www.federalreserve.gov/newsevents/press/monetary/20081007c.htm">http://www.federalreserve.gov/newsevents/press/monetary/20081007c.htm</a></p>

Emergency Economic Stabilization Act of 2008	The Emergency Economic Stabilization Act of 2008 was the legislation that created TARP, used in the “bailout” of large financial sector firms. The act authorized Secretary of the Treasury to spend up to \$700 billion to purchase “distressed assets” and make capital injections into banks.
Fannie Mae and Freddie Mac	Fannie Mae (the Federal National Mortgage Association) and Freddie Mac (the Federal Home Loan Mortgage Corporation) are government sponsored enterprises (GSEs) created to expand funding for mortgage lending and to promote securitization of mortgages.
Federal Reserve Act Article 13.3	Article 13.3 of the Federal Reserve Act states that: “In unusual and exigent circumstances, the Board of Governors of the Federal Reserve System, by the affirmative vote of not less than five members, may authorize any Federal reserve bank ... to discount for [make loans to] any individual, partnership, or corporation, notes, drafts, and bills of exchange when such notes, drafts, and bills of exchange are indorsed or otherwise secured to the satisfaction of the Federal Reserve bank.” In emergencies, the Fed has the ability to make loans to almost anyone!
FDIC	The Federal Deposit Insurance Corporation is the agency responsible for insuring deposits at banks.
FHFA	The Federal Housing Finance Agency was created as a regulatory agency by passage of the Housing and Economic Recovery Act of 2008. Of particular importance, the agency assumed oversight of Fannie Mae and Freddie Mac.
Hedge Fund	A private investment fund that trades and invests in a variety of assets that might include securities, commodities, currency, and derivatives on behalf of its clients.
SIV	Structured investment vehicles (SIVs) are funds, often created by banks but operated “off-balance sheet. Typically these funds borrowed by issuing short-term debt and then bought longer-term securities like asset-backed securities.
Shadow Banking System	This term refers to the broad collection of non-bank financial intermediaries who have had increasing importance in world-wide lending activities. These institutions do not accept deposits like banks do, but have usually been funded by issuance of short-term debt.

TAF	Through the Fed’s Term Auction Facility (TAF), the Fed provides collateralized loans to depository institutions over somewhat longer terms (28 to 84 days) than its usual discount window loans.
TALF	The Fed launched the Term Asset Backed Securities Loan Facility (TALF) to directly provide credit supporting the issuance of asset-backed securities collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration (SBA).
TARP	The Troubled Asset Relief Program (TARP) was created by the Emergency Economic Stabilization Act of 2008. It permits the U.S. government to purchase or insure assets necessary to promote financial stability (i.e., arrange “bailouts”). The TARP program was the largest component of the government's measures in 2008 to address the subprime mortgage crisis.
TSLF	The Term Securities Lending Facility (TSLF) was created by the Federal Reserve to temporarily exchange treasury bills owned by the Fed for mortgage-backed securities for up to 28 days. The facility was intended to improve liquidity by providing firms with high-quality collateral.