ECONOMIC ADVISORY PANEL MEETING

MAY 15, 2009

OVERVIEW OF ECONOMIC AND FINANCIAL MARKET DEVELOPMENTS

Discussion and Charts

Prepared by the staff of the
Research and Statistics Group

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Recent Economic and Financial Market Developments

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We last met on Friday, November 21. In its advance estimate of 2008Q3 GDP, the BEA had estimated that real GDP contracted at a 0.3% annual rate, led by steep declines in personal consumption expenditures, residential investment, and business investment in equipment and software. The recently-released employment report for October indicated that nonfarm payroll employment had declined by 240,000 in October following a 284,000 decline in September. The unemployment rate had increased by 0.4 percentage points in October to 6.5%, an increase of 1.8 percentage points over the preceding year. (The cyclical low of the unemployment rate had been 4.5%, the average from 2006Q4 through 2007Q2.) The S&P 500 had fallen over 40 percent since the end of August. (It was down 12.5% in just the two days prior to the meeting.) In addition, the price of oil had fallen from a peak of $145/barrel in early July to just under $50/barrel on November 20, a decline of 66 percent. In the statement following its October 29 meeting, the FOMC concluded that "…*the pace of economic activity appears to have slowed markedly…" and that "…intensification of financial market turmoil is likely to exert additional restraint on spending …."* Based on this conclusion the FOMC cut the target federal funds rate from 100 to 50 basis points. On December 1, 2008 the NBER declared a business cycle peak of December 2007.

While up until September of 2008 we thought the US economy might just skirt a recession, in October we marked down our forecast for growth to incorporate a mild recession lasting three quarters (2008Q3 through 2009Q1) followed by about a year of below potential growth. At the trough the level of real GDP was expected to be about 1¼% below the level at the peak, comparable to the 1990-91 recession. The unemployment rate was projected to rise to around 7½% by mid 2009 and then reach at peak level of 8% by the end of 2009. By 2010 a more robust recovery was expected to begin bringing the unemployment rate lower, but it would end the year at a still high 7½%. With a larger projected output gap, along with much lower energy and other commodity prices, we lowered our projected path of core PCE deflator inflation to 1¾% (Q4/Q4) for 2009 and 1½% for 2010.

The basis for projecting that the downturn would be relatively mild and that a recovery would begin in the spring of 2009 was the preemptive path of monetary policy, various initiatives to foster financial market stability, and significant additional fiscal stimulus. At the same time, however, we concluded that the risk that the downturn proves to be more severe than any of the post-WWII period was relatively high. As you may recall the panel was considerably more pessimistic on growth prospects and the risks to the forecast than the FRBNY staff forecast.

Economic Developments since November

Inflation.

Oil prices continued to decline through mid-December, reaching the $30 to $35/barrel range. They then moved slightly higher, averaging $35 to $40/barrel in January and February. As global growth prospects began to improve somewhat, oil prices rose to $50 by the end of March and are now around $56. Many non-oil commodity prices, such as industrial metals, have followed a similar pattern. The energy component of the CPI peaked in July of 2008 and remained relatively stable through September. It then plunged from October through December, falling a cumulative 30 percent. From January through March it was relatively stable, but the 2009Q1 average level was 10 percent below the 2008Q4 level. The rate of increase of food prices also slowed abruptly during 2009Q1, contributing to the year-over-year decline of the overall CPI during that period. **[Figures 1 & 2]**

Year-over-year increases of the core CPI, which averaged 2.5 percent in 2008Q3, slowed to 1¾% during 2009Q1. **[Figure 1]** A conventional Phillips curve model attributes the bulk of that

slowing to declining import prices and the increase of slack in the economy. By product type, the bulk of the slowing of core inflation reflects a significant slowing in the rate of increase of non-energy service prices. Year-over-year increases of non-food, non-energy goods prices have fluctuated substantially of late but without a clear trend downward over the past six months. Year-over-year changes on core services have slowed roughly a full percentage point over the past six months (3 ¼% to 2 ¼%). Rates of increase of owners' equivalent rent, rent of primary residence, medical care services, transportation services, and lodging away from home have all contributed to this slowing. **[Figure 3]**

After having reached 7¼% in 2008Q3, nonpetroleum import prices were 2 percent below year-ago levels in 2009Q1. This likely reflects a combination of weakening global demand and the appreciation of the exchange value of the dollar. **[Figure 4]**

As one might expect, shorter horizon inflation expectations have been strongly affected by the movements in energy prices. **[Figures 5 and 6]** Longer-dated inflation expectations have also moved down from their levels in the summer of 2008 but have been relatively stable compared to short horizon expectations. (Note that the measurement of inflation expectations derived from financial markets has been affected by illiquidity. This issue will be discussed in more detail in the overview of financial market developments. A separate note on developments in household inflation expectations will also be distributed.)

Real Activity.

Growth of real GDP during 2008Q4 and 2009Q1 turned out to be considerably weaker than our modal forecast, declining at an annual rate of around 6%. **[Figure 7]** Prospects for the remainder of 2009 also appear worse than anticipated back in November. Thus, it is likely that this will be the deepest and most protracted recession for the post-World War II period. Further, the unemployment rate and other measures of economic slack have increased at faster rates than would be implied by their traditional relationships with GDP growth.

Real PCE declined dramatically in the second half of 2008, as households responded to the large energy price shock, a deteriorating labor market, declining household net worth, and a general tightening of the supply of credit. **[Figures 8- 11]** The timing of distribution of the rebate checks with most being received in 2008Q2 accentuated the decline in 2008Q3 an accounting sense. Sales of light weight vehicles fell to below 10 million units (annual rate) in 2009Q1, compared to just over 15 million (annual rate) in 2008Q1. High gasoline prices, a tightening of credit for both new and used autos, falling prices for used vehicles and uncertainty over the future of the "Big 3" combined to produce the lowest sales volume since the early 1980s. **[Figure 9]** Although real PCE was estimated to be positive in the advanced estimate 2009Q1 GDP, the pattern of monthly expenditure along with weak light vehicle sales in April suggested that consumption growth will be at best tepid in 2009Q2. Over the medium term, the large drop in household net worth, increased uncertainty about economic prospects, and the pending arrival of many baby-boomers to traditional retirement ages all complicate the forecast for consumption going forward. In the short-run, the recent decline in debt service and financial obligation ratios suggest that consumers rate cuts have increased free cash flow albeit with the ratios at high levels compared to history **[Figure 11]**.

Once again, incoming data on housing starts, sales, and prices surprised to the downside in 2008Q4 despite the fact that contract interest rates on 30-year fixed rate mortgages moved lower. **[See Figures 12-17 for an overview of housing demand and supply developments]** More recently, the rate of decline in single-family housing starts has moderated and permits are now above starts. The rate of decline of sales of new single-family homes has also slowed and the absolute number of new homes for sale continues to decline quite rapidly although sales of existing homes appear to have stabilized around 4.5 million units (annual rate). The rate of decline of most home price indices continues to be intense but the FHFA measure of home prices showed some stabilization in the first two months of the year. **[Figures 17, 18]** Housing

affordability has increased dramatically in the last year. The decline in prices in many metropolitan areas has produced affordability levels close to their pre-2004 average affordability levels. **[Figures 20, 21]**

While the performance of consumer spending and housing market activity turned out to be weaker than expected, the growth contribution from net exports continues to be somewhat of an upside surprise. **[Figures 22, 23]** While part of the upward surprise in 2008H1 was strength in real exports, the overwhelming source of the continuing surprise remains the dramatic contraction in global trade. **[See the separate discussion of Global developments]** Based on the advance estimate of GDP for 2009Q1, the growth contribution for that quarter was 2 percentage points.

Business investment in equipment and software in standard business cycle fashion has collapsed as the recession has taken hold. **[Figure 24]** The collapse has been broad-based and non-residential structures investment has also turned down – in typical business cycle pattern this turn down occurred later than other expenditures. **[Figure 25]** The two quarter annualized rate of decline in equipment and software investment is 31%, exceeding the rate of all post-war recessions. Inventory investment was a major drag on growth in 2009Q1 after a near neutral contribution to GDP growth in 2008Q4. If earlier inventory cycle dynamics are repeated, inventory investment will provide a boost to GDP growth. **[Figures 26 and 27]**

The rate of growth of real federal spending slowed markedly from mid 2008 with the advanced estimate of 2009Q1 GDP containing a negative growth contribution due to a decline in defense expenditures. Overall we would expect federal spending to provide a significant boost to GDP in the near term. The real growth of state and local government spending has slowed dramatically and its annualized two quarter decline of 7.7% is the largest in the post-World War II period. **[Figures 28 and 29]**

Manufacturing output has declined at a fast rate although not as dramatically as in some export orientated economies. **[Figure 30]** Recent business survey indicators are consistent with some limited stabilization but the future of US owned auto manufacturers will be important for the short-term outlook. **[Figure 31]**

Employment, Wages, and Productivity.

The demand for labor input, which began to weaken in mid-2007, weakened considerably further over the first 10 months of 2008, then declined at near record rates. **[Figure 32]** Over the six months ending in April, nonfarm payroll employment has declined at a 7% annual rate. Over the past three months nonfarm payroll employment has declined an average of 640,000 per month. The unemployment rate rose to 8.9% in April, matching the peak unemployment rate of the 1973-5 recession. Further, the prime age male unemployment rate, at 8.8%, is on a trajectory to exceed its post-war high of 9.3% in December 1982. **[Figure 33]** Over the past two quarters, hours worked in the nonfarm business sector declined at an 8% annual rate, a similar decline to the post-World War II record one that occurred at the end of the 1973-5 recession. **[Figure 34]**

The rise of the unemployment rate has been, and likely will continue to be, somewhat steeper than previous business cycles after taking account of the respective growth rates. One reason for this is that thus far the labor force participation rate has not declined as typically occurs during a downturn. **[Figure 35]** Second, the rate of growth of labor productivity has been relatively well-maintained given the size of the drop in output. **[Figure 36]**

The weakening of the labor market has been associated with a substantial slowing of the rate of increase of labor compensation, as measured by the Employment Cost Index (ECI) that controls for changes in the quality of the labor force. **[Figure 37]** The rates of increase of both wages and salaries and of benefits have slowed. Within the benefits category, the rate of increase of the cost of health insurance has slowed, as have the rate of increase of benefit costs linked directly to wages.

Financial Markets.

Financial market conditions have improved somewhat since the last EAP meeting in November, particularly in areas of policy intervention, but remain under considerable stress. Corporate credit spreads have narrowed, corporate debt issuance has rebounded, and equity markets have increased. Spreads have narrowed most notably in money markets, where the Fed is now operating numerous liquidity facilities, and in the agency debt and agency mortgage-backed securities (MBS) markets, where the Fed has introduced asset purchase programs.

Financial sector conditions have deteriorated further since the last meeting by many measures, but have not approached the depths of October 2008. To address concerns about particular institutions, new or restructured packages of guarantees, liquidity access and/or capital were provided to Citigroup (in November), Bank of America (in January), and AIG (in March). To address financial sector concerns more systematically, a program of initiatives was introduced in February, including a new Capital Assistance Program, calling for stress tests of major banks, and a new Public-Private Investment Fund, providing for the removal of legacy assets from financial institution balance sheets. Fiscal policy has also attempted to address the foundations of the crisis by stabilizing the housing sector through subsidized refinancings and loan modifications.

Ongoing concern about the creditworthiness of financial firms is evident through the persistently wide CDS and corporate bond spreads of banks and securities firms. **[Figures 38, 39]** These spreads have narrowed markedly in recent weeks, however, amid indications that the economic decline is bottoming out and more recently with expectations that the capital needs emanating from the stress tests are lower than expected.

Corporate credit spreads more generally are down sharply from their recent peaks, but remain unusually wide. **[Figure 40]** Despite the high levels of yields, corporate issuance rebounded strongly in the first quarter after being weak through the second half of 2008. **[Figure 41]**

Spreads for asset-backed securities (ABS) are also markedly narrower, after peaking in late 2008, but remain historically wide. **[Figure 42]** These unusually wide spreads, combined with the cessation of new ABS issuance in late 2008, led the Fed to introduce the Term Asset-Backed Securities Loan Facility (TALF) in November 2008. The TALF was initially limited to $200 billion in size, but the Fed announced in February it was prepared to expand it up to $1 trillion.

At the same time the Fed announced the creation of the TALF, it announced it would initiate a program to purchase the direct obligations of housing-related government-sponsored enterprises and MBS backed by Fannie Mae, Freddie Mac, and Ginnie Mae. The Fed initially announced it would buy up to $100 billion in agency debt and $500 billion in MBS. These amounts were expanded to up to $200 billion and $1.25 trillion at the March FOMC meeting, when the Fed also announced its new Treasury purchase program.

Agency debt spreads narrowed sharply after the Fed's November purchase program announcement, with 10-year spreads narrowing about 40 basis points on the announcement day alone. **[Figure 43]** Spreads did not narrow with the March FOMC announcement, when Treasury yields fell as much as agency debt yields, but have continued to narrow since then.

Agency MBS spreads also narrowed after the Fed's November announcement and have continued to narrow since then. **[Figure 44]** The decline in spreads, combined with Treasury rates that are largely unchanged, on net, over the past six months, means that MBS rates have also come down. **[Figure 45]** Low mortgage rates have spurred significant refinancing activity, leading to a surge of agency MBS issuance, with non-agency (private label) MBS issuance nonexistent. **[Figure 46]** While refinancings have surged, the transmission of changes in

secondary market rates to the primary market is attenuated by the sharp increase in spreads between the two. That is, mortgage rates paid by consumers have declined much less sharply than secondary market MBS yields. **[Figure 47]**

Evidence on bank lending practices suggests that credit conditions are now deteriorating at a decreasing rate. **[Figure 48]** Commercial and industrial loans outstanding have been declining since October, but are sustaining a positive growth rate on a year-over-year basis. **[Figure 49]**

As of the last EAP meeting, money market conditions had improved from their crisis levels of October, but were still quite poor. Since then, conditions have improved markedly with sharply lower credit spreads. **[Figures 50, 51, 52]** Commercial paper outstanding has now declined below the trough reached before the introduction of the Fed's Commercial Paper Funding Facility (CPFF). **[Figure 53]** While the CPFF continues to operate, many issuers are reducing their reliance on commercial paper by, in some cases, increasing their reliance on other government programs (such as the FDIC's Temporary Liquidity Guarantee Program).

Treasury bill yields remain quite low. **[Figure 54]** Current levels are probably more indicative of the easy stance of monetary policy as opposed to high risk aversion, which was an important factor during the height of the crisis during the fall. Further evidence of reduced risk aversion in the money markets, besides that cited above, is the narrowing of spreads in the repurchase agreement (repo) market between loans collateralized by agency debt or agency MBS and loans collateralized by Treasury debt. **[Figure 55]**

The last EAP meeting occurred right around the equity market troughs of 2008. **[Figures 56, 57]** The S&P 500 rallied almost 25% from then until early January, before declining to an even lower level in early March. Since its early March lows, the S&P 500 is up about 35%. Implied equity volatility peaked right around the time of the last EAP, but has since declined markedly. **[Figure 58]** Realized volatility also peaked in late 2008 for a broad cross section of equities, but continued to rise into 2009 for banks. **[Figure 59]**

Treasury yields bottomed out in December, but have since risen strongly with the improved financial market conditions and increased expectations that the economic decline is coming to an end. **[Figure 60]** Rising yields in recent months were halted temporarily by a sharp drop in yields – almost 50 bp for the 10-year note – on March 18, when the FOMC announced it would purchase up to $300 billion in longer-term Treasury securities. On net, most Treasury yields are modestly lower since the last EAP meeting. **[Figures 61, 62]** Yields have declined most sharply at the short end of the curve, likely reflecting the Fed's policy easing, and at the long end of the curve, perhaps reflecting Fed purchases which are expected to be stronger in that sector.

In contrast to nominal yields, real yields fell sharply since the last EAP meeting. **[Figure 63]** While some of the decline may reflect the Fed's eased policy stance, much of the decline likely reflects an improvement in financial market conditions so that Treasury inflation-protected securities now have less of a price discount because of their poor liquidity relative to nominal securities. For the 0-to-5 year horizon, in particular, real yields have declined back below nominal yields. **[Figure 64]** At the 5-to-10 year horizon, real yields have also fallen more than nominal yields, but to a much lesser extent. **[Figure 65]**

The decline in real yields relative to nominal yields since November, particularly at the short end, has caused inflation compensation measures to increase. At the short end, inflation compensation is back in positive territory, but remains historically low. **[Figure 66]** Longer term inflation compensation was less out of line with historical norms in November and has commensurately increased more modestly. **[Figure 67]** Various 5-to-10 year measures, in particular, are now giving consistent reads of expectations, reflecting a reduction in liquidity risk premia, and reads that are consistent with expectations of the Fed's longer term inflation goals. **[Figure 68]** Measures of implied inflation from inflation swaps are somewhat higher than

measures constructed from real and nominal Treasury securities, but tell a similar story. **[Figures 69, 70, 71]**

Monetary Policy.

Since the last EAP meeting, the Fed has continued to act aggressively, lowering the target rate to close to zero, committing itself to low rates for some time, and indicating that its focus going forward would be to support the functioning of financial markets and stimulate the economy through measures that sustain the size of the Fed's balance sheet at a high level. Chairman Bernanke describes the latter policy as one of "credit easing." Credit easing resembles quantitative easing in that it involves an expansion of the Fed's balance sheet, but it differs from quantitative easing in its focus on the mix of loans and securities that it holds and on how this composition of assets affects credit conditions for households and businesses.

Shortly after the last EAP meeting, on November 25, the Fed announced the creation of the TALF. The facility was introduced in response to the unusually wide spreads in the ABS markets combined with the cessation of new ABS issuance in October 2008. ABS markets have historically funded a large share of consumer credit and ABS-guaranteed small business loans, so the Fed was concerned continued disruptions of these markets could significantly limit credit availability, contributing to the further weakening of the economy. The TALF was initially limited to $200 billion in size, but the Fed announced in February it was prepared to expand it up to $1 trillion.

Also on November 25, the Fed announced it would initiate a program to purchase the direct obligations of housing-related government-sponsored enterprises and MBS backed by Fannie Mae, Freddie Mac, and Ginnie Mae. The program was introduced in response to the wide spreads in these markets in an effort to reduce the cost and increase the availability of credit to buy houses and thereby support housing markets and financial market conditions more generally. The Fed initially announced it would buy up to $100 billion in agency debt and $500 billion in MBS.

At the December FOMC meeting, economic conditions had weakened further since the previous meeting, credit conditions remained tight, financial markets remained strained, and inflationary pressures had diminished. It was at this meeting that the FOMC lowered the funds rate from 1% to a target range of 0 to 0.25%. **[Figure 72]** The FOMC also indicated that "weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time." Similar statements about the persistence of low rates were made at the next three FOMC meetings, in January, March, and April.

Consistent with the policy rate cut and commitment to low rates for an extended period, the expected path of policy has shifted down since November. **[Figure 73]** Policy rate uncertainty as implied by Eurodollar options has declined markedly, particularly in the near term, consistent with the Fed's commitment to low rates, as well as a reduction in volatility in Eurodollar spreads. **[Figures 74, 75]** The implied skewness of Eurodollar rates now suggests a greater expectation of a large rate increase relative to expectations as opposed to rate decrease – unsurprising given the low level of rates. **[Figure 76]**

At the March FOMC meeting, to provide greater support to mortgage lending and housing markets, the FOMC decided to increase the size of the Fed's balance sheet by buying up to an additional $750 billion in agency MBS, bringing such purchases up to $1.25 trillion for the year, and to increase agency debt purchases by up to $100 billion this year, to a total of up to $200 billion. Moreover, the FOMC decided to purchase up to $300 billion in longer-term Treasury securities over the following six months to help improve conditions in private credit markets.

While the Fed's reliance on unconventional monetary policy has been increasing, Federal Reserve credit outstanding has remained fairly stable since November. **[Figure 77]** Agency debt

and agency MBS holdings have grown sharply since the Fed initiated agency MBS purchases in January. **[Figure 83]** The most notable offset to this increase is the decrease in the amount lent via reciprocal currency arrangements (swap lines), consistent with the previously noted improvements in funding markets. **[Figure 80]** Amounts outstanding under the Primary Credit Facility (discount window), Primary Dealer Credit Facility, Term Securities Lending Facility, and CPFF have also decreased. **[Figures 78, 81, 82]** Amounts outstanding under the Term Auction Facility, in contrast, have been fairly stable. **[Figure 79]**

Foreign Macroeconomic Conditions

Foreign economies faltered dramatically at the end of 2008 and the beginning of 2009 as part of a steep and synchronized global recession. The extent of the decline in foreign output was not anticipated at the last meeting, when our forecast expected foreign output to be flat in 2008 and up 0.6% (Q4/Q4) in 2009. The current outlook has output as having fallen 1.3% last year and falling another 1.2% this year.

There are signs that the downturn is easing in 2009Q2, with production and exports stabilizing and various confidence measures improving around the world. Still, the forecast is for very modest growth in the second half of 2009 and growth of only 2.0% next year. A key factor behind this modest growth outlook is that significant excess capacity worldwide will restrain foreign investment spending.

Europe: The downturn in Europe has been somewhat steeper than in the United States, with output in the euro area and the U.K. both down around 4.0% over year in 2009Q1. Data on production and orders stabilized in March and confidence measures improve in April from record lows.

Asia: Japan has suffered the most of the major economies. March production was down 35% over the year, while exports were down 50%. **[Figure 98]** The forecast is that GDP was nearly 8% below its year-ago level in 2009Q1. Surveys point to a rebound in exports and production in April so the worst is likely over. An addition positive factor for the second half of the year is the recently announced fiscal package.

China had very weak growth of 1.5% (SAAR) in 2008Q4, but managed a reasonably strong acceleration to 6.0% in 2009Q1. Credit growth has been skyrocketing since late last year, with state-controlled banks responding to government stimulus directives. Consistent with a stimulus-led domestic recovery, China's PMIs, industrial production, and imports have all firmed. Korean GDP was down 4.5% over the year in 2009Q1. Exports moved higher in March and April from very low levels and look set to support GDP growth in 2009Q2. **[Figure 100]**

Latin America: Mexico's economy contracted 10.4% (SAAR) in 2008Q4, pulled down by large declines in manufacturing output. Another similarly steep decline likely occurred in 2009Q1. The rate of decline is expected to ease in 2009Q2, but the economy will still shrink in part because of the influenza-induced suspension of business activity. GDP is projected to be down 5.5% over the year-ago level in 2009Q2. Brazil's output fell 13.6% in 2008Q4, but production data suggest less contraction occurred in Q1, as solid relatively solid domestic demand partially offset declining exports.

Trade: Global current account imbalances are expected to moderate this year. Lower oil prices have eliminated the large current account surpluses of oil-exporting countries while helping reduce the U.S. current account deficit. The U.S. balance has also improved from a steep fall in import volumes. **[Figures 84, 85, 87[** By the same logic, the surpluses of Asian countries will not be as big as they were in 2008 as the decline in global trade has a bigger impact on export-oriented economies.

Foreign Financial Conditions

Global funding conditions improved over the last six months **[Figures 90-95]**. Conditions remain fragile, however, as extensive liquidity support by central banks in Europe and Asia is still necessary. Since the end of last year, several European governments were forced to launch bank support packages, comprising of direct capital injections in return for equity stakes and government insurance against bad debt. More recently, some European governments have made announcements regarding "bad bank" mechanisms to clean up their banking sector's balance sheets. In particular, Germany announced a preliminary "bad bank" plan on April 21 under which banks will transfer assets that they are unable to sell to separate special purpose vehicles in return for debt certificates. These "bad bank" units will manage and eventually liquidate the assets, which in turn will be guaranteed by the government in return for fees.

In emerging markets, tentative signs of an easing of the global economic slowdown as well as declining risk aversion have pushed global equities and long-term interest rates higher and reduced sovereign debt spreads. An additional supporting factor has been the IMF providing liquidity support for a number of economies. On April 2, the G-20 announced a $1.1 trillion funding plan for emerging market economies, consisting of extra funds for the IMF, an extra $100 billion for lending by multilateral development banks and $250 billion in trade finance. So far, Mexico, Poland, and Columbia have applied for IMF FCL credit lines worth $47 billion, $20.5 billion, and $10.4 billion respectively, as an emergency back-stop.

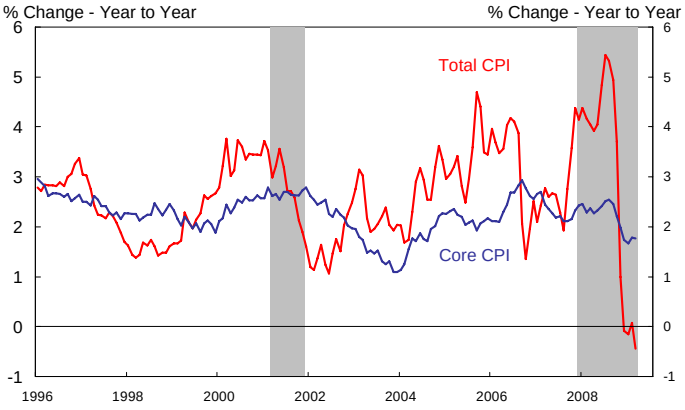
In Emerging Asia outside of China, heavy reserve losses in 2008Q4 have given way to gains in response to easing dollar funding pressures and stronger capital inflows. In China, financial outflows limited reserve accumulation to a modest pace in 2008Q4. The pace increased in 2009Q1 but remained subdued relative to the first half of 2008.

The trade-weighted U.S. dollar index has fallen recently with the increase in investors' risk appetite. **[Figure 89]** The dollar has remained broadly stable against the euro and the yen, but has weakened against the U.K. pound, the Canadian dollar, and a number of EM currencies. The dollar remains broadly stable against the Chinese yuan.

Central banks around the world are likely at the end of their policy easing cycle. The ECB refi rate is down to 1% and may not go lower based on the tentative signs that the euro area economy is stabilizing. The ECB also announced credit easing operations that will buy covered bonds from banks and supply liquidity to the European Investment Bank. The Bank of England has purchased over GBP 50 billion in bonds, mostly gilts, and has room to go up to GBP 150 billion. The Bank of Japan has expanded the range of collateral it will accept for liquidity operations and is continuing to buy commercial paper, corporate bonds, and stocks held by banks. Additional broadening of these measures is likely. In Emerging Asia outside China, the pace of monetary easing has slowed and looks to be nearing an end.

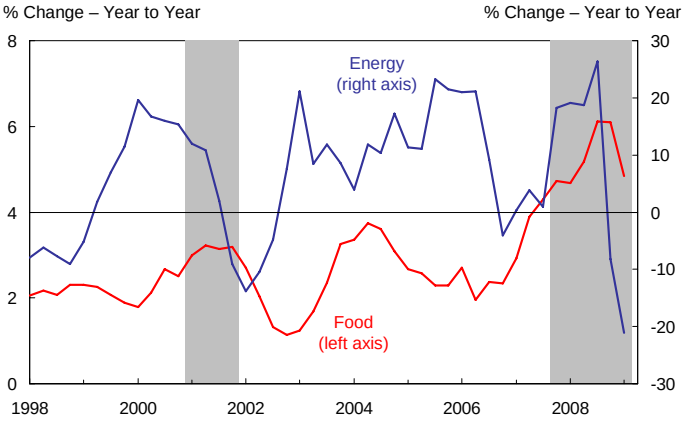
Inflation

Figure 1: Total and Core CPI Inflation



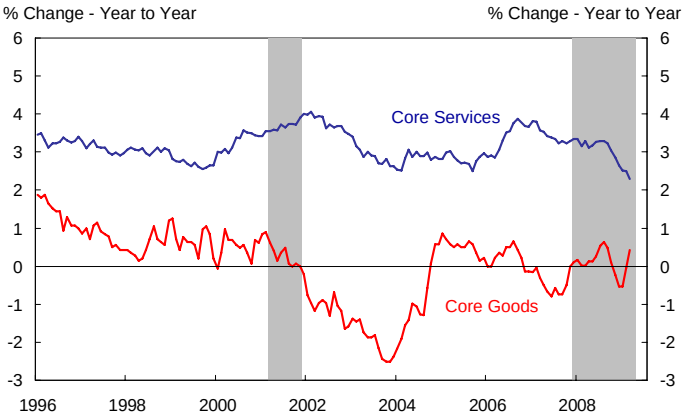
Source: Bureau of Labor Statistics

Figure 2: CPI Inflation: Food and Energy



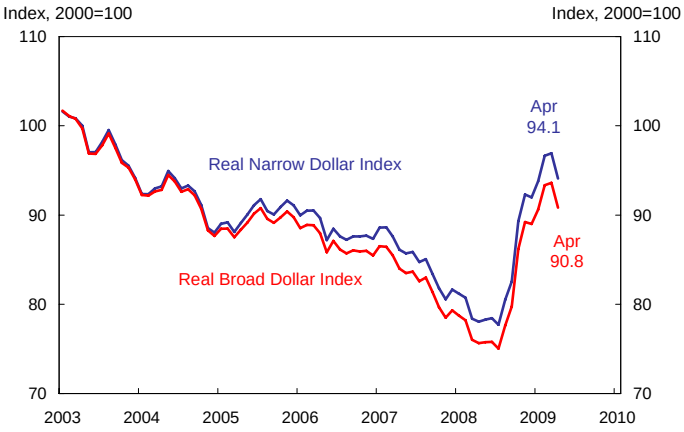
Source: Bureau of Economic Analysis

Figure 3: Core CPI Inflation



Source: Bureau of Labor Statistics

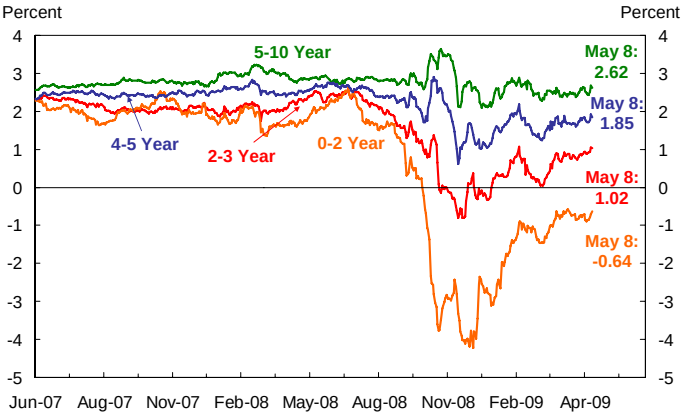
Figure 4: Real Effective Exchange Rates



Source: Bureau of Labor Statistics

Figure 5: TIPS Implied Inflation Compensation

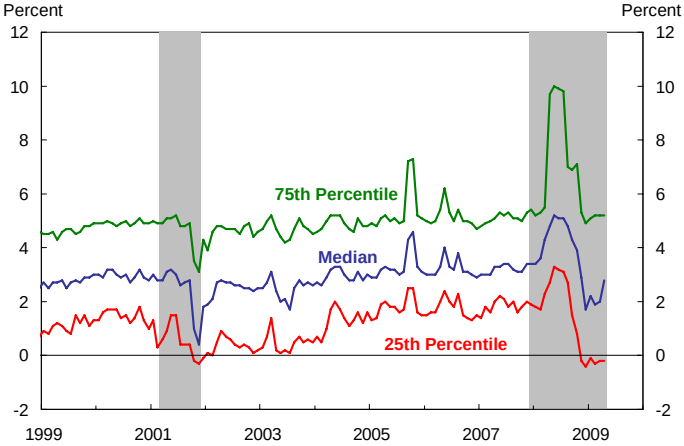
(0-2, 2-3, 4-5, & 5-10 Year Horizons)



Source: Federal Reserve Board

Note: Carry Adjusted.

Figure 6: Michigan Survey Inflation Expectations: 1 Year Ahead

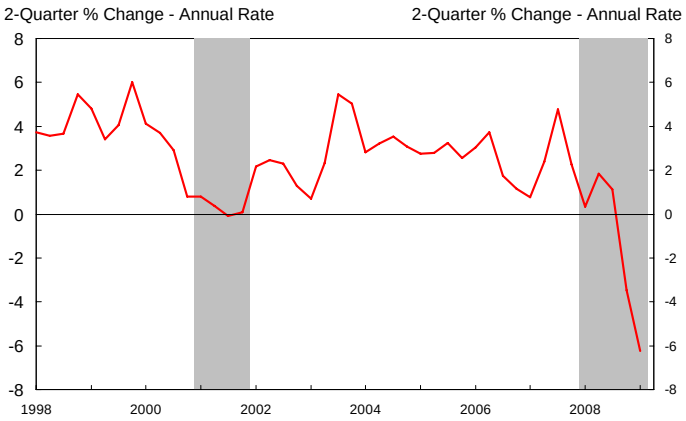


Source: University of Michigan

Note: Shading represents NBER recessions, unless otherwise noted.

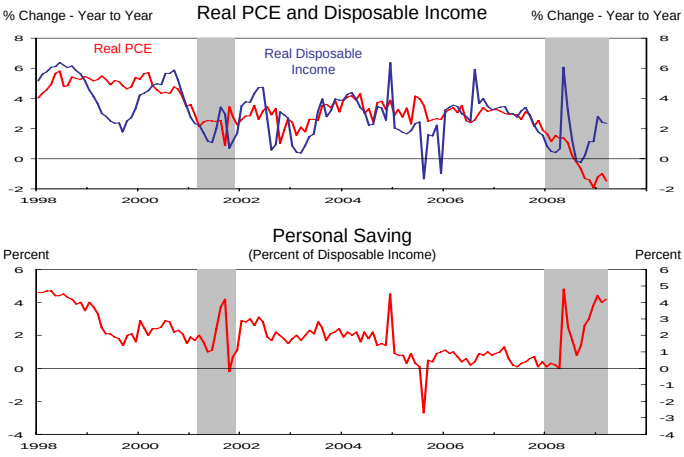
Real Activity

Figure 7: Gross Domestic Product



Source: Bureau of Economic Analysis

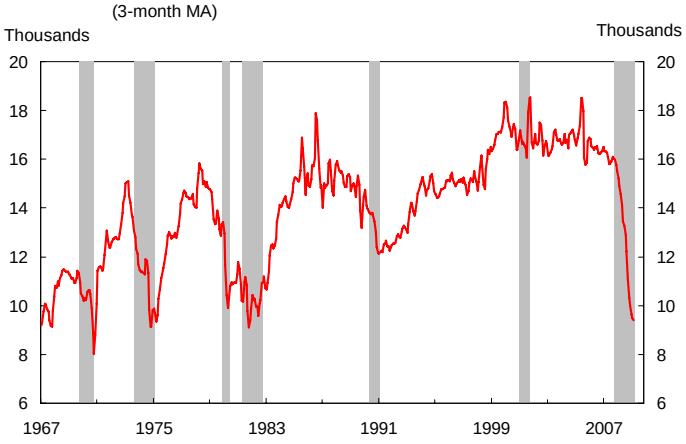
Figure 8: Consumption, Income, and Saving



Source: Bureau of Economic Analysis

Figure 9: Auto and Light Truck Sales

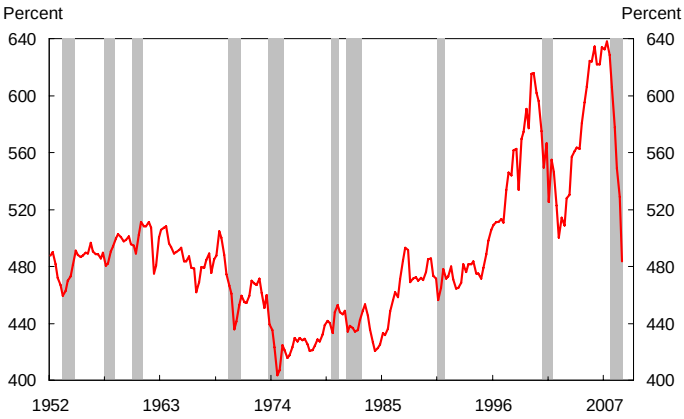
(3-month MA)



Source: Bureau of Economic Analysis

Figure 10: Net Worth

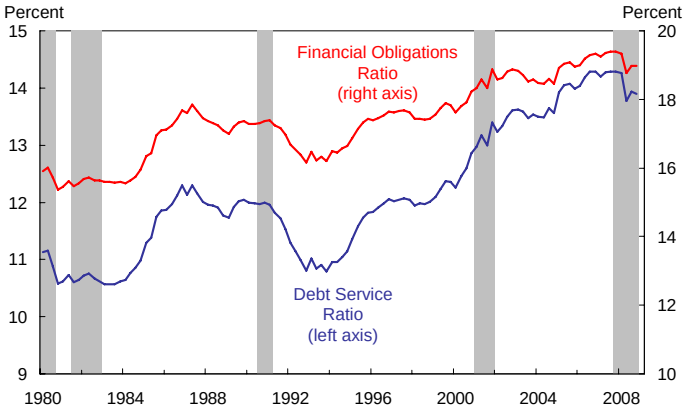
(Percentage of Disposable Personal Income)



Source: Federal Reserve Board

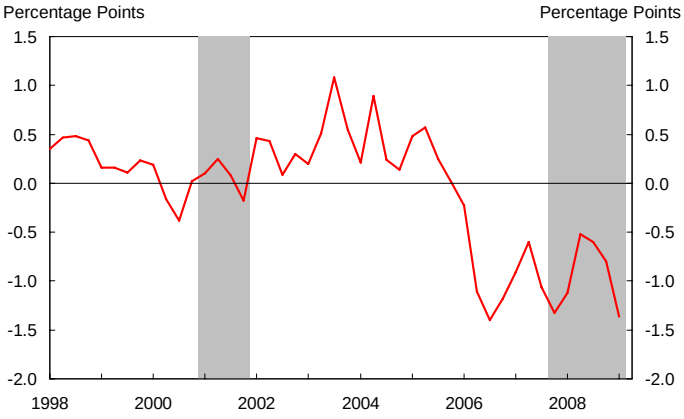
Figure 11: Debt Service and Financial Obligations

(Percent of Disposable Personal Income)



Source: Federal Reserve Board

Figure 12: Private Residential Investment: Contribution to Real GDP



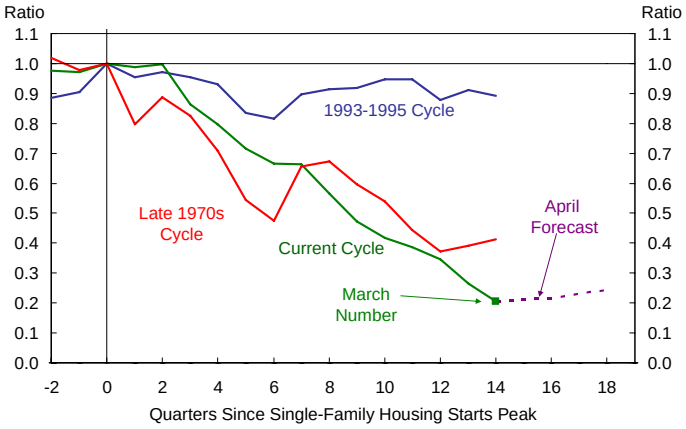
Source: Bureau of Economic Analysis

Note: Shading represents NBER recessions, unless otherwise noted.

Real Activity, ctd.

Figure 13: Single-Family Housing Starts

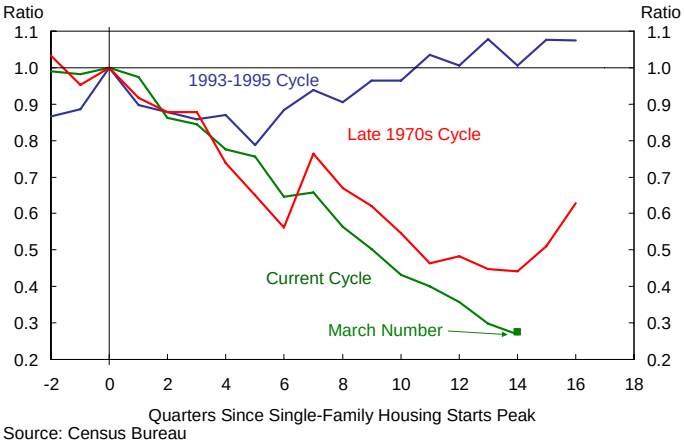
(Series Set to 1.0 at Housing Start Peak)



Source: Census Bureau

Figure 14: Single-Family New Home Sales

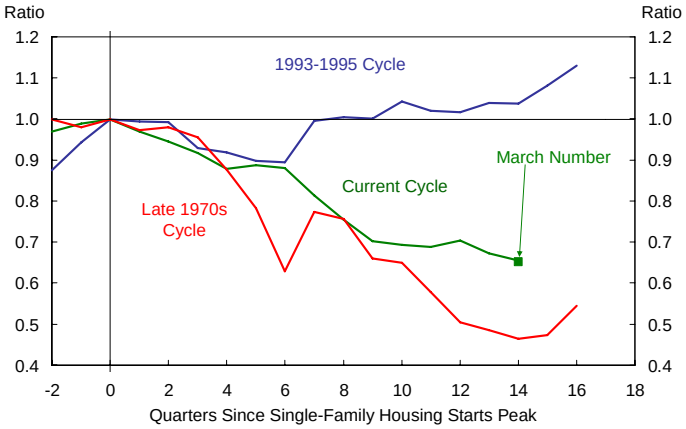
(Series Set to 1.0 at Housing Start Peak)



Source: Census Bureau

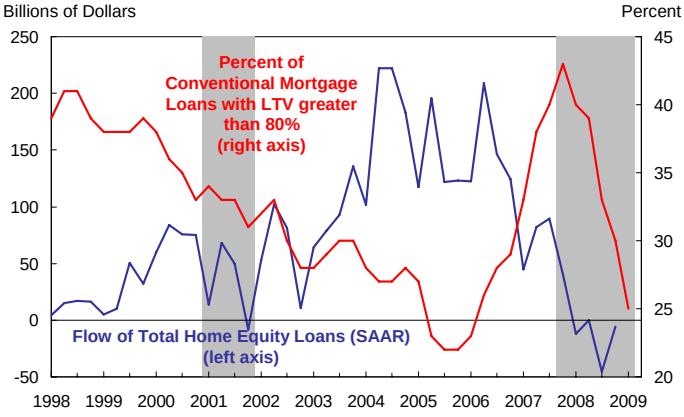
Figure 15: Single-Family Existing Home Sales

(Series Set to 1.0 at Housing Start Peak)



Source: Census Bureau

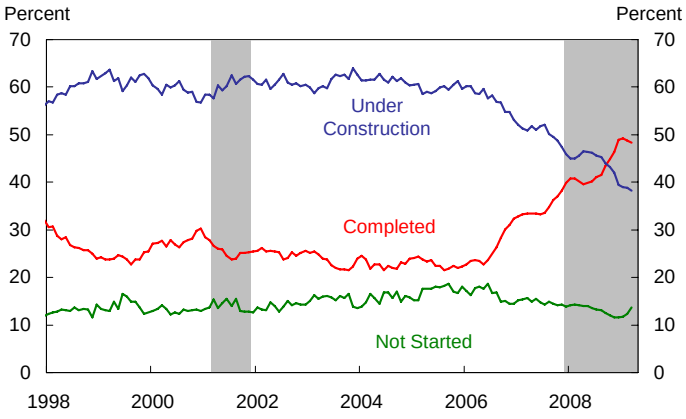
Figure 16: New Mortgage Loan LTV



Source: Federal Housing Finance Board & Federal Reserve Board

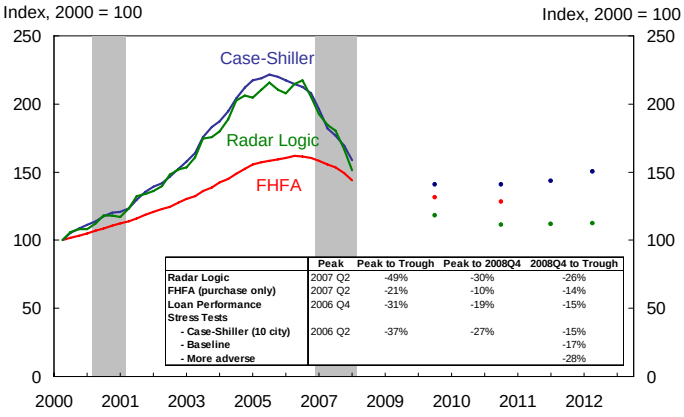
Figure 17: Inventory of Unsold New Homes

(Percent of total new houses for sale)



Source: Census Bureau

Figure 18: Actual and Projected House Price Indices



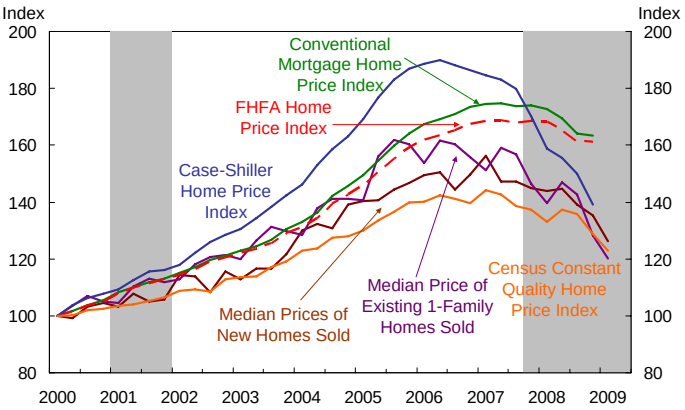
Source: Bloomberg, FHFA, S&P, Radar Logic

Note: Shading represents NBER recessions, unless otherwise noted.

Real Activity, ctd.

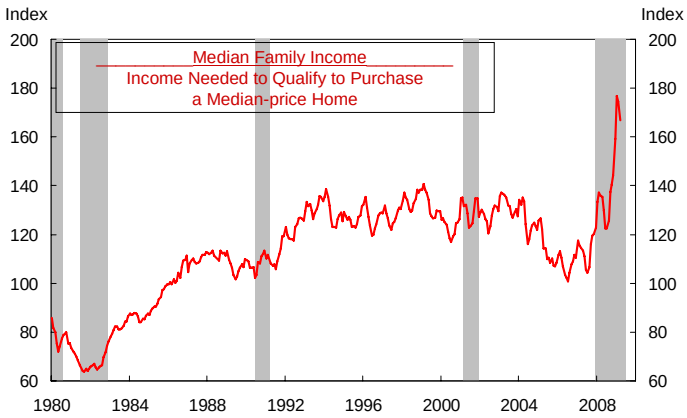
Figure 19: Home Price Indexes

2000 Q1 = 100



Source: U.S. Census, National Association of Realtors, Freddie Mac, Federal Housing Finance Administration, and Standard and Poors.

Figure 20: National Housing Affordability Index

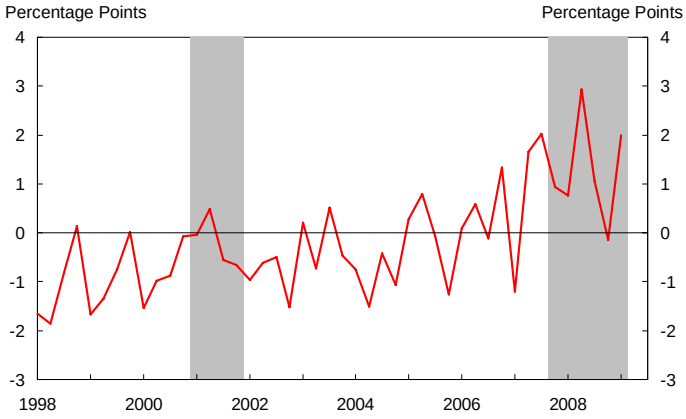


Source: National Association of Realtors Note: Shading represents NBER recessions.

Figure 21: Housing Affordability

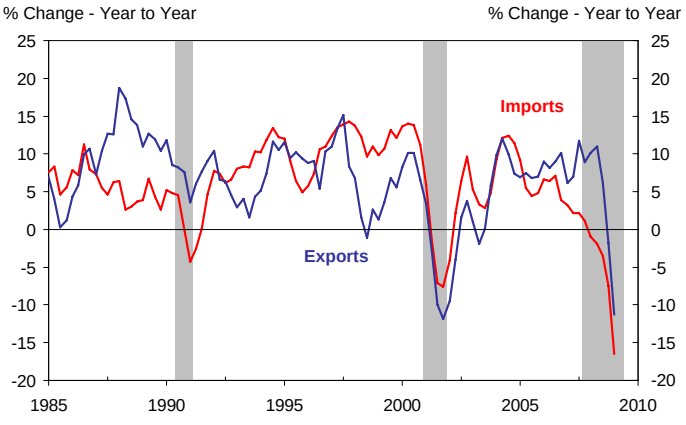
City	Price Decline Required to Reach Pre-2004 Mean (%)	Decline from Peak (% of run-up)	Current Affordability Index/ Pre-2004 Peak Affordability Index
Portland-Vancouver-Beaverton, OR-WA	24.8	43.9	0.66
Seattle-Bellevue-Everett, WA	19.8	51.9	0.73
New York-White Plains-Wayne, NY-NJ	19.5	60.8	0.57
Los Angeles-Long Beach-Glendale, CA	15.2	83.0	0.61
Boston-Quincy, MA	10.9	77.8	0.80
San Diego-Carlsbad-San Marcos, CA	8.7	90.7	0.79
Washington-Arlington-Alexandria, DC-VA-MD-WV	7.8	88.5	
Miami-Miami Beach-Kendall, FL	7.3	91.9	0.61
Denver-Aurora-Broomfield, CO	3.4	91.5	0.90
San Francisco-San Mateo-Redwood City, CA	0.9	99.0	0.73
Tampa-St. Petersburg-Clearwater, FL	-0.9	101.4	0.75
Phoenix-Mesa-Scottdale, AZ	-3.7	104.0	0.77
Minneapolis-St. Paul-Bloomington, MN-WI	-6.1	114.4	0.86
Chicago-Naperville-Joliet, IL	-6.4	123.6	0.75
Las Vegas-Paradise, NV	-8.6	110.0	1.00
Charlotte-Gastonia-Concord, NC-SC	-15.8	212.9	0.80
Atlanta-Sandy Springs-Marietta, GA	-23.0	251.9	0.87

Figure 22: Net Exports: Contribution to Real GDP



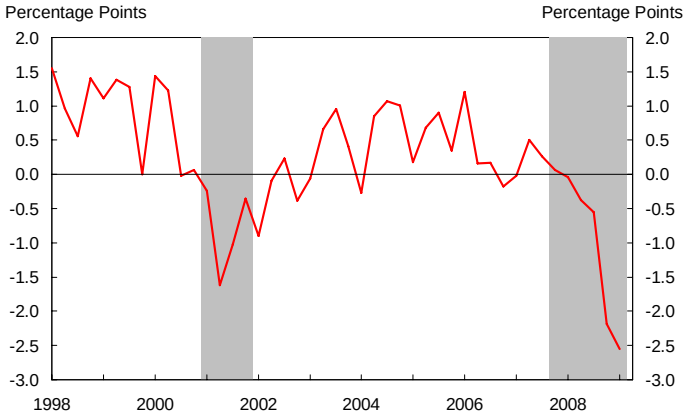
Source: Bureau of Economic Analysis

Figure 23: Quantity Index of Imports and Exports



Source: Bureau of Economic Analysis

Figure 24: Private Nonresidential Equipment/Software: Contribution to Real GDP

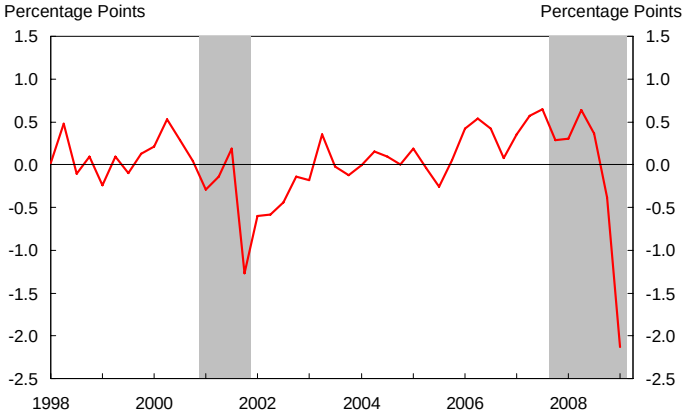


Source: Bureau of Economic Analysis

Note: Shading represents NBER recessions, unless otherwise noted.

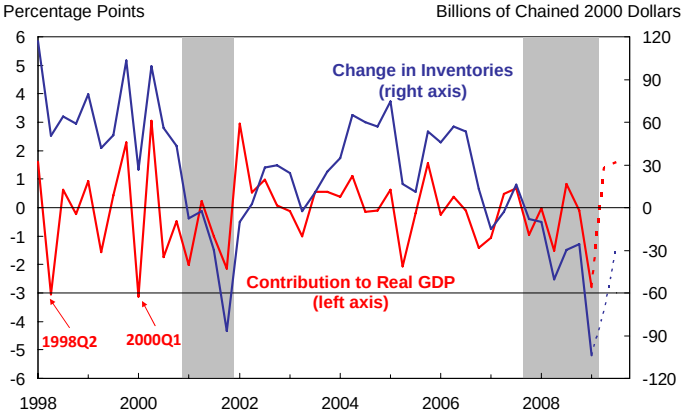
Real Activity, ctd.

Figure 25: Real Nonresidential Structures: Contribution to Real GDP



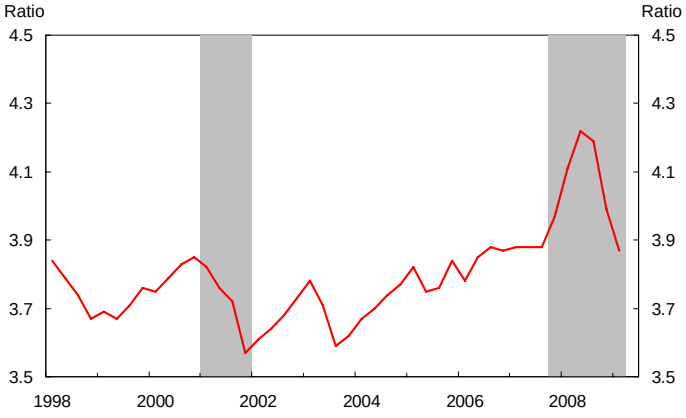
Source: Bureau of Economic Analysis

Figure 26: Real Change in Private Inventories and Contribution to Real GDP Percent Change (SAAR)



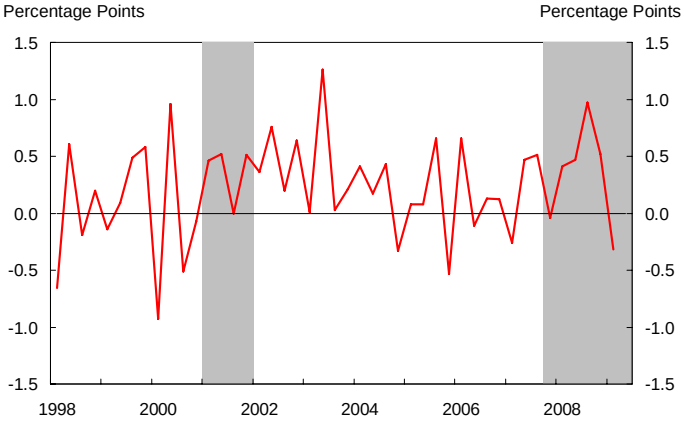
Source: Bureau of Economic Analysis Note: Dashed lines represent FRBNY forecast.

Figure 27: Ratio of Nonfarm Inventory to Final Sales of Goods & Structures



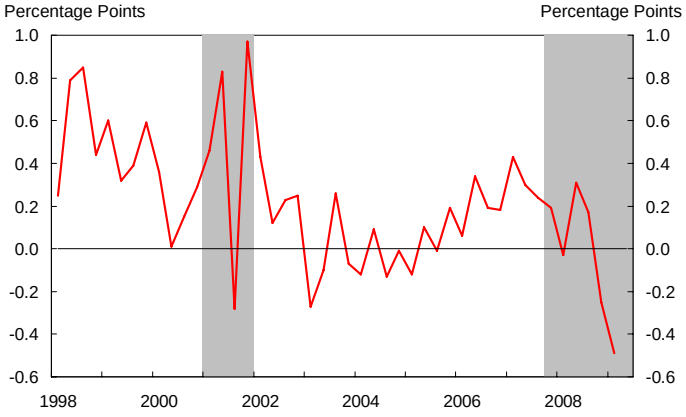
Source: Bureau of Economic Analysis Note: Shading represents NBER recessions.

Figure 28: Federal Government Consumption & Investment: Contribution to Real GDP



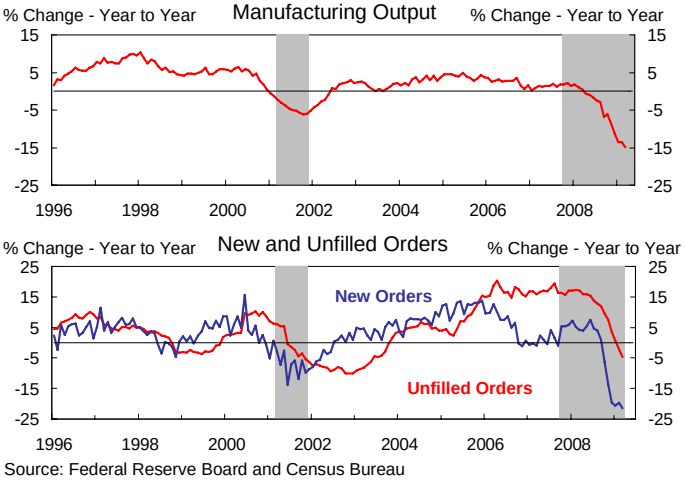
Source: Bureau of Economic Analysis

Figure 29: State & Local Government Consumption & Investment: Contribution to Real GDP



Source: Bureau of Economic Analysis

Figure 30: Manufacturing Sector Overview

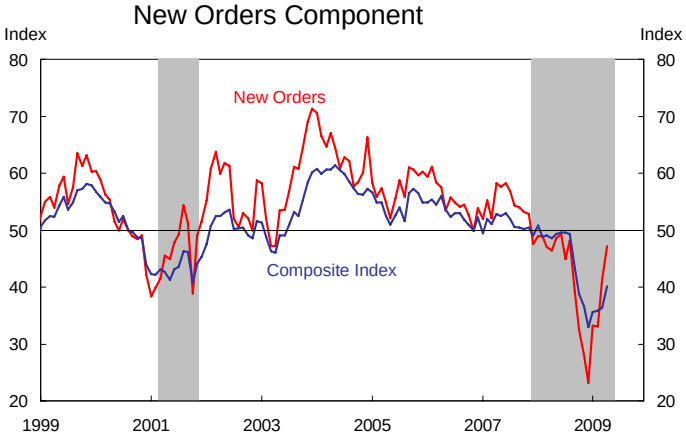


Source: Federal Reserve Board and Census Bureau

Note: Shading represents NBER recessions, unless otherwise noted.

Real Activity, ctd.

Figure 31: ISM Manufacturing Index and New Orders Component

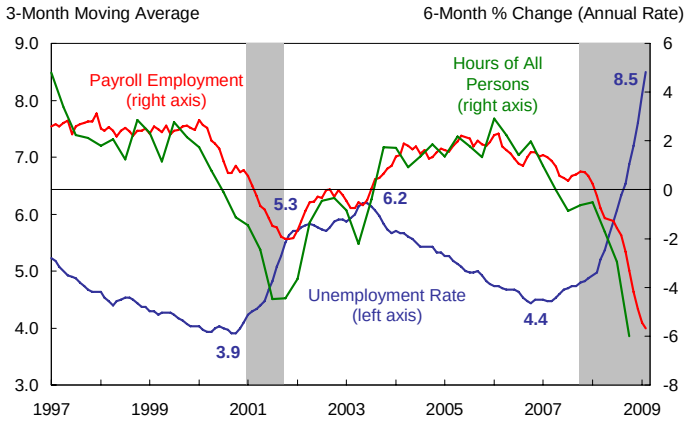


Source: Institute for Supply Management

Note: Shading represents NBER recessions, unless otherwise noted.

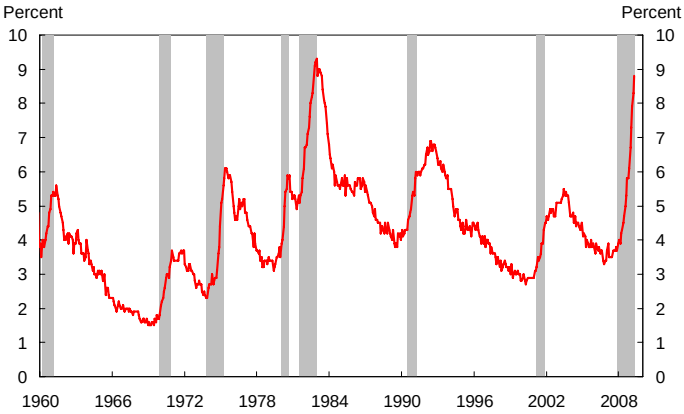
Employment, Wages, and Productivity

Figure 32: Labor Market Indicators



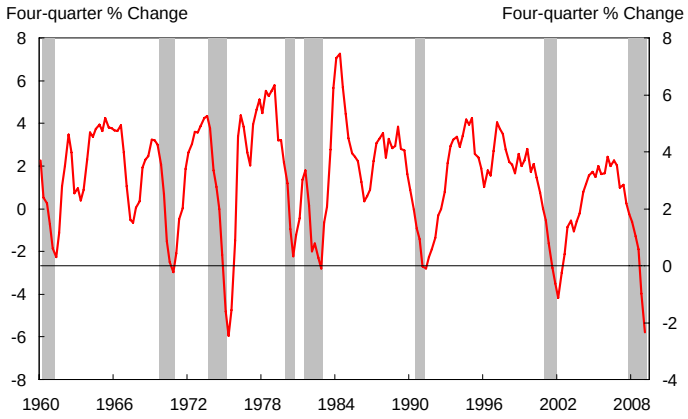
Source: Bureau of Labor Statistics

Figure 33: Prime-Age Male Unemployment Rate



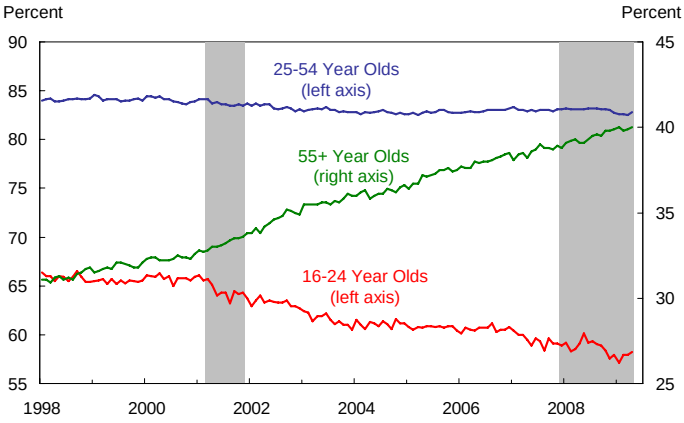
Source: Bureau of Labor Statistics

Figure 34: Hours of All Persons: Nonfarm Business Sector



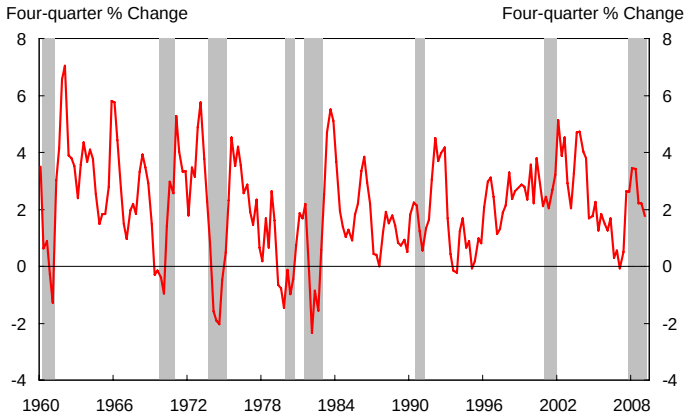
Source: Bureau of Labor Statistics

Figure 35: Labor Force Participation Rate



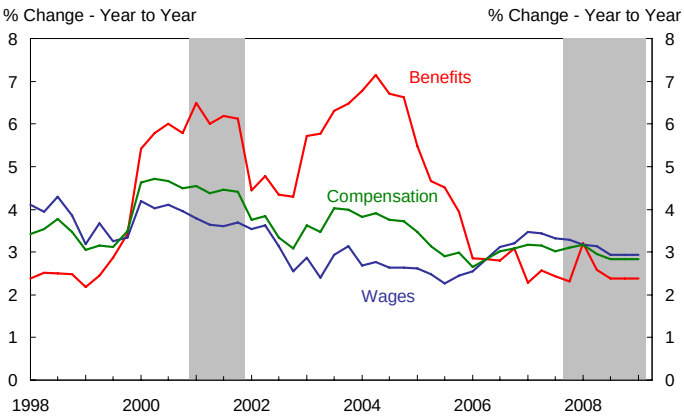
Source: Bureau of Labor Statistics

Figure 36: Productivity: Nonfarm Business Sector



Source: Bureau of Labor Statistics

Figure 37: Employment Cost Index: Private Industry

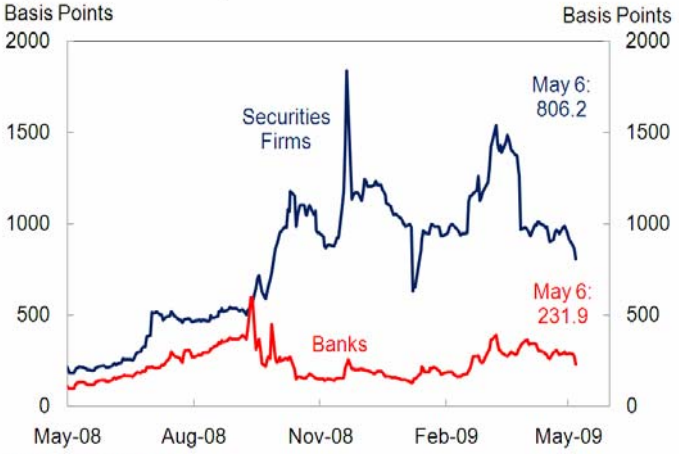


Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions, unless otherwise noted.

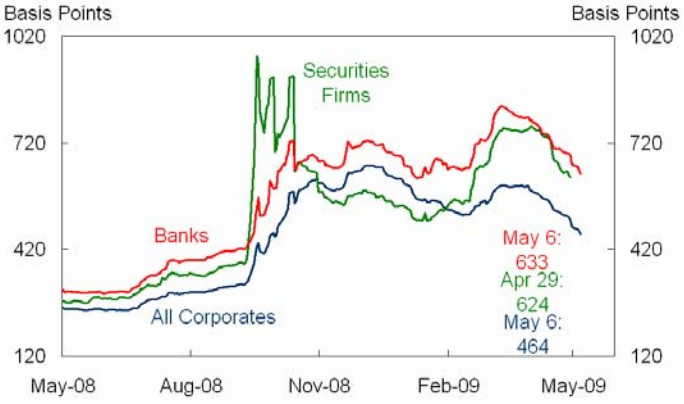
Credit Risk

Figure 38: CDS Spreads



Source: Datastream

Figure 39: Credit Spreads



Note: Option-adjusted spreads. Banks series is Merrill Lynch Corporates, Banks bond index. Securities Firms series is Merrill Lynch Corporates, Brokerages bond index.

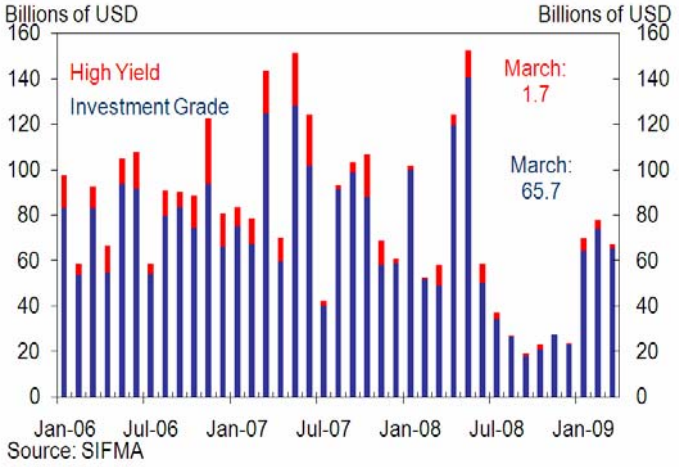
Source: Merrill Lynch

Figure 40: Corporate Credit Spreads

Source: Merrill Lynch

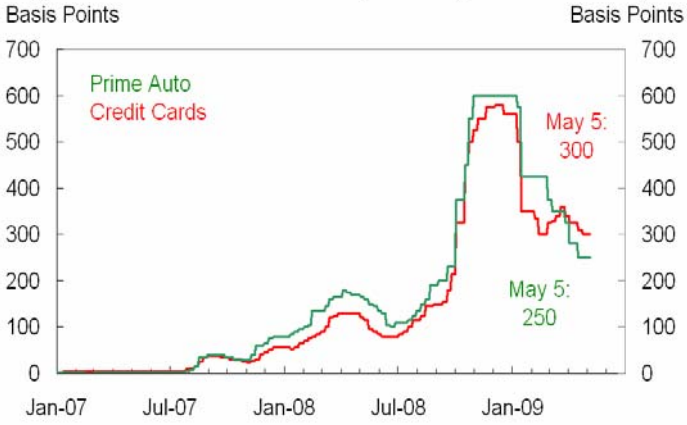
Note: Option-adjusted spreads.

Figure 41: U.S. Issuance of Corporate Debt



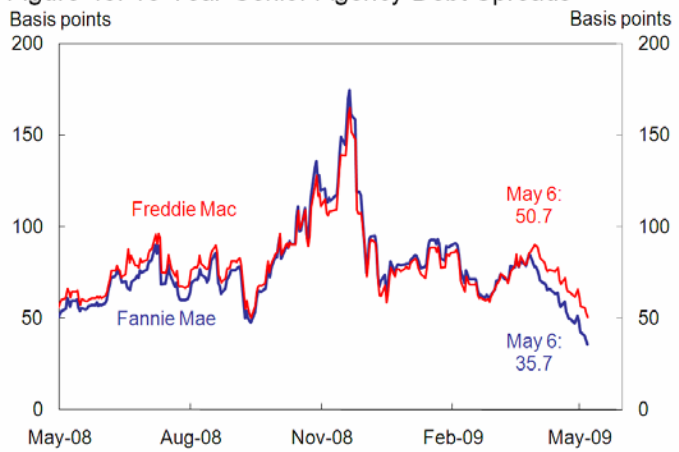
Source: SIFMA

Figure 42: Consumer ABS Spreads (AAA tranches)



Source: JPMorgan

Figure 43: 10-Year Senior Agency Debt Spreads

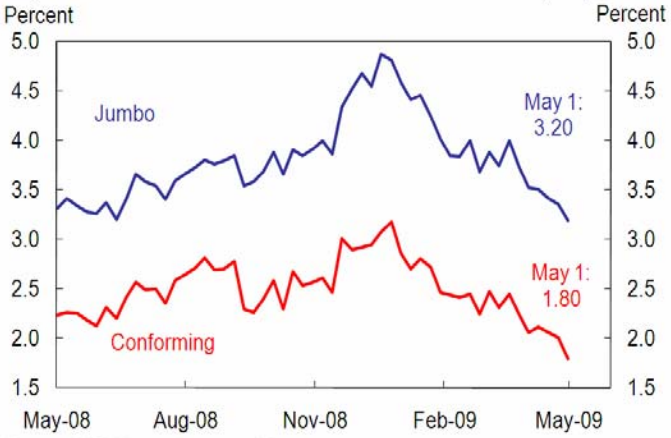


Source: Bloomberg

Note: Shading represents NBER recessions, unless otherwise noted.

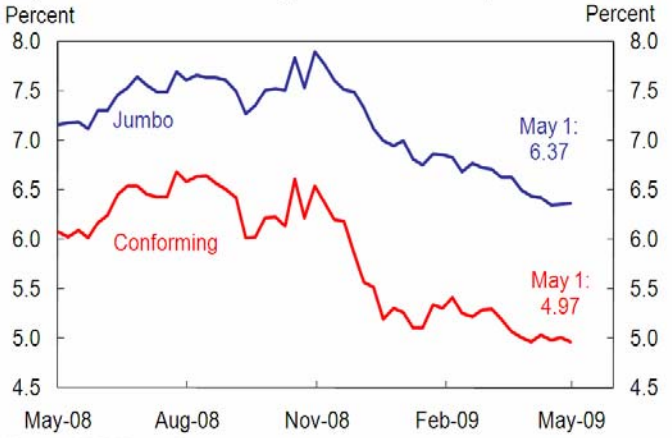
Mortgage Market and Bank Lending

Figure 44: 30-Year FRM to 10-Year Treasury Spreads



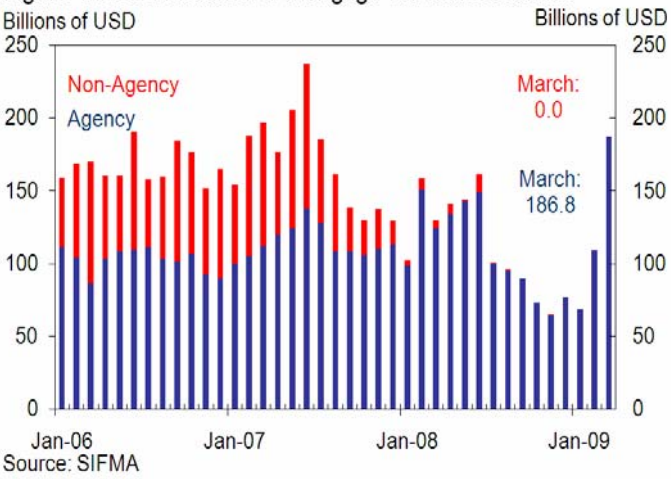
Source: HSH Associates and Datastream

Figure 45: National Avg. Offered Rates, 30-Year FRM



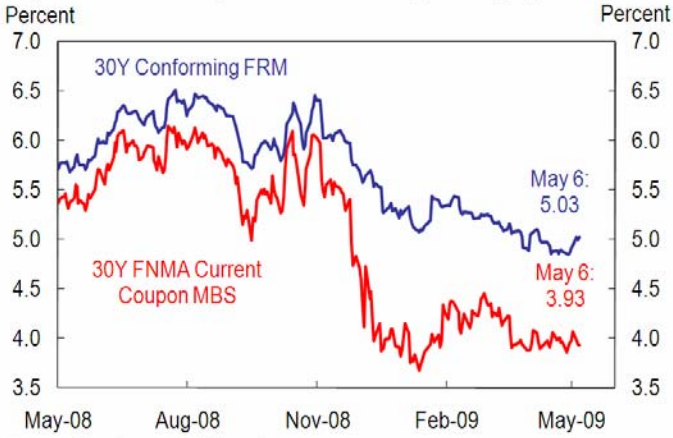
Source: HSH Associates

Figure 46: U.S. Issuance of Mortgage-Backed Securities



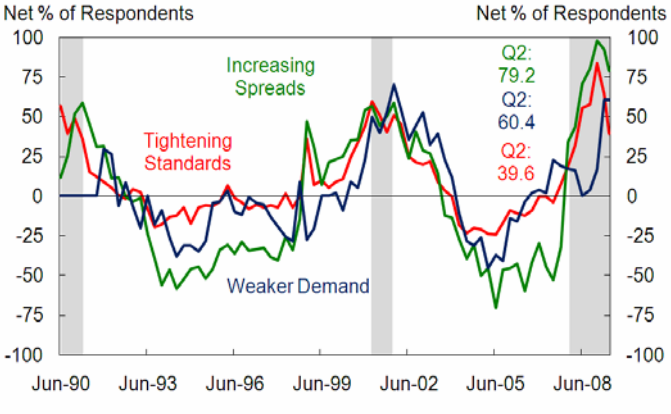
Source: SIFMA

Figure 47: Primary and Secondary Mortgage Rates



Source: Bankrate and Bloomberg

Figure 48: Bank Lending Practices



Source: Federal Reserve Board

Note: Data cover C&I loans to large- and medium-sized firms

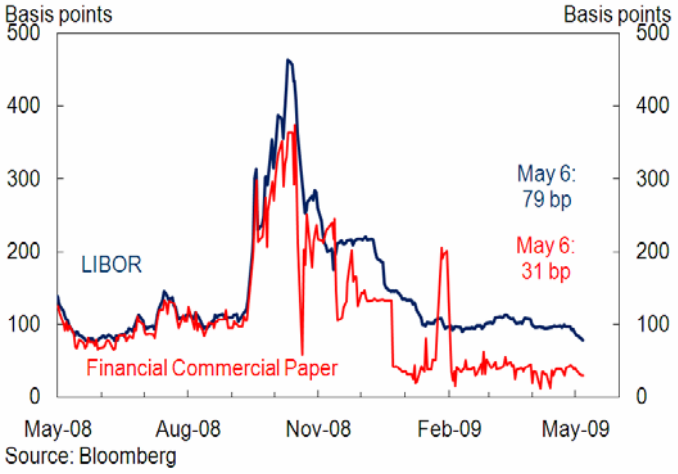
Figure 49: Commercial and Industrial Loans Outstanding

Source: Federal Reserve Board

Note: Shading represents NBER recessions, unless otherwise noted.

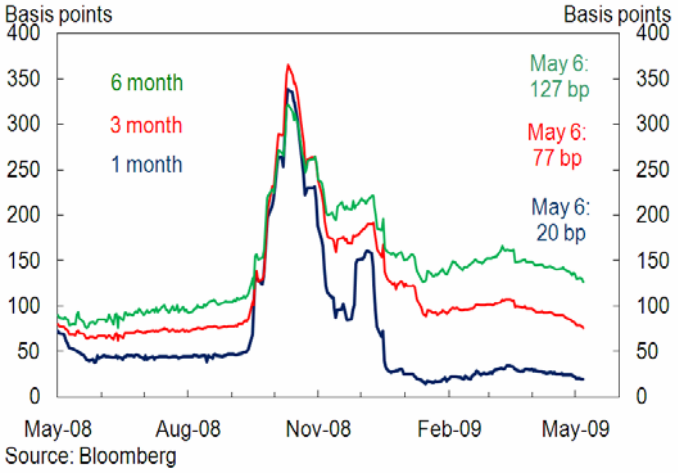
Money Markets

Figure 50: Unsecured Lending: 3 Month Spreads to Treasury



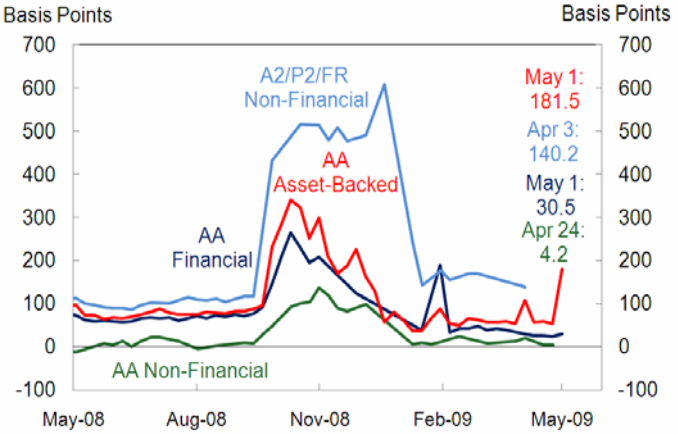
Source: Bloomberg

Figure 51: USD LIBOR-to-OIS Spreads



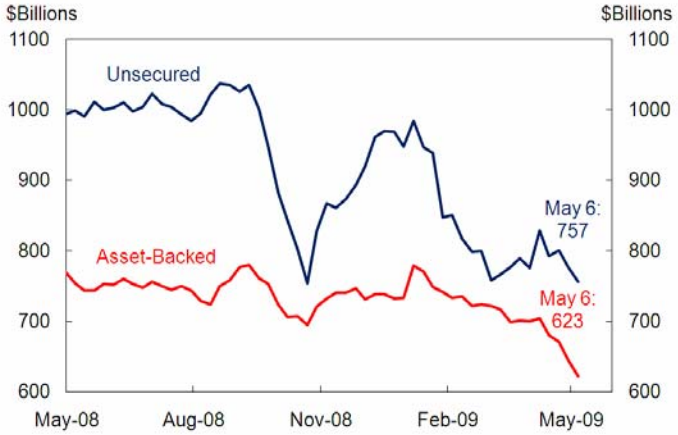
Source: Bloomberg

Figure 52: 3-month CP Rates over OIS



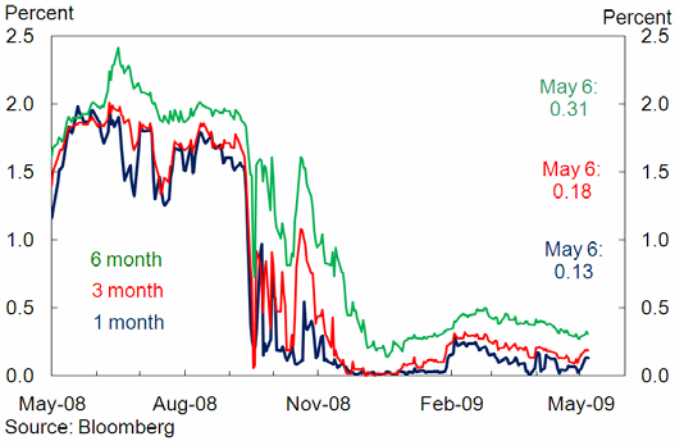
Source: Federal Reserve Board, Haver, Bloomberg

Figure 53: Commercial Paper Outstanding



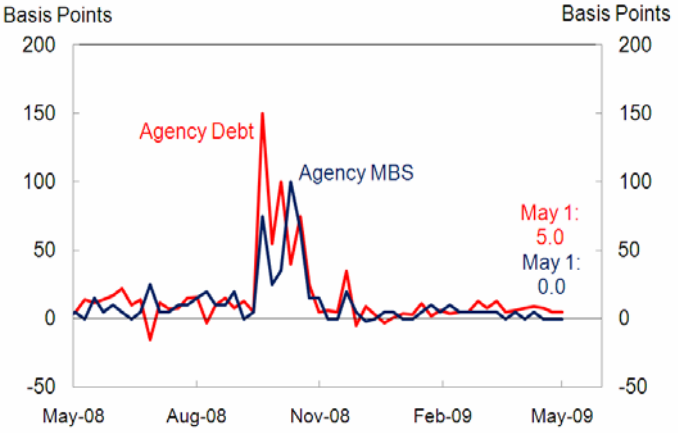
Source: Federal Reserve Board

Figure 54: U.S. Treasury Bill Yields



Source: Bloomberg

Figure 55: Overnight Financing Spreads



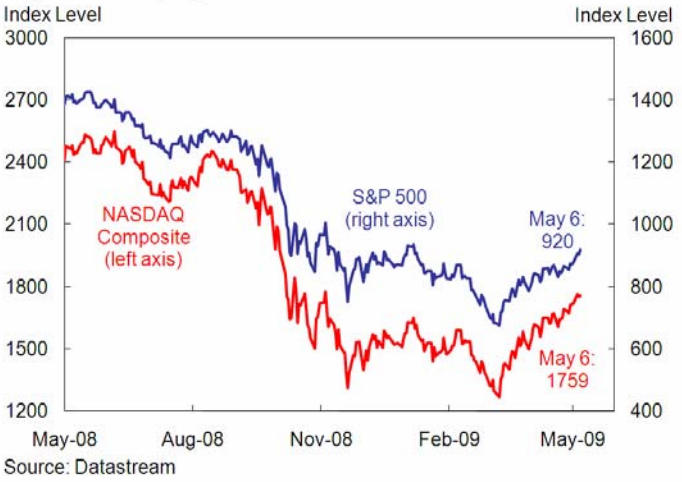
Source: Bloomberg

Note: Spreads are between overnight agency debt and MBS and Treasury general collateral repo rates

Note: Shading represents NBER recessions, unless otherwise noted.

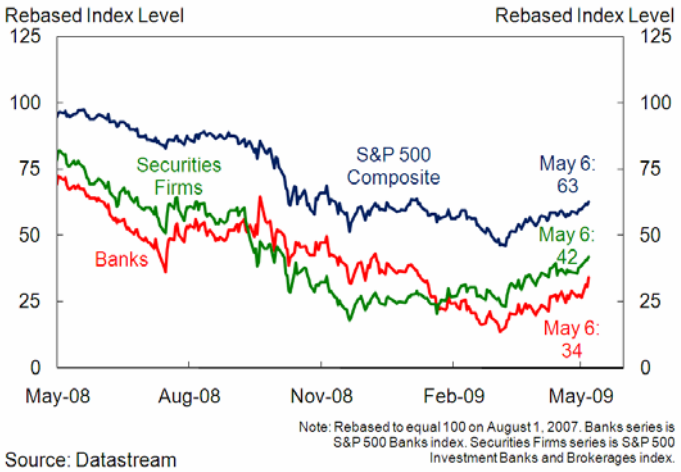
Equity Markets

Figure 56: Equity Market Performance



Source: Datastream

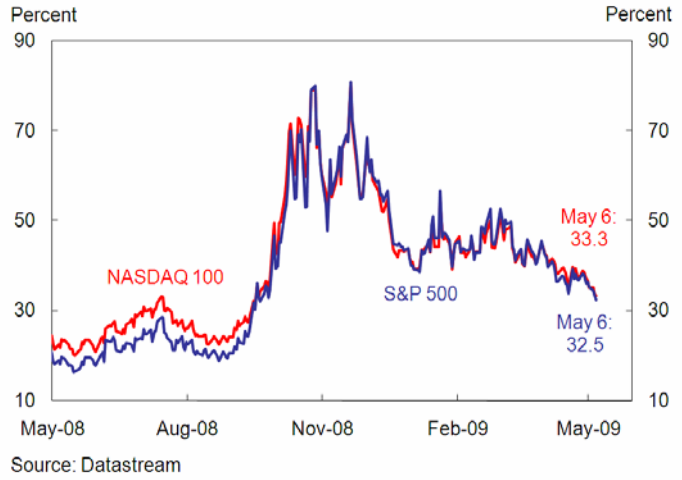
Figure 57: Equity Performance



Note: Rebased to equal 100 on August 1, 2007. Banks series is S&P 500 Banks index. Securities Firms series is S&P 500 Investment Banks and Brokerages index.

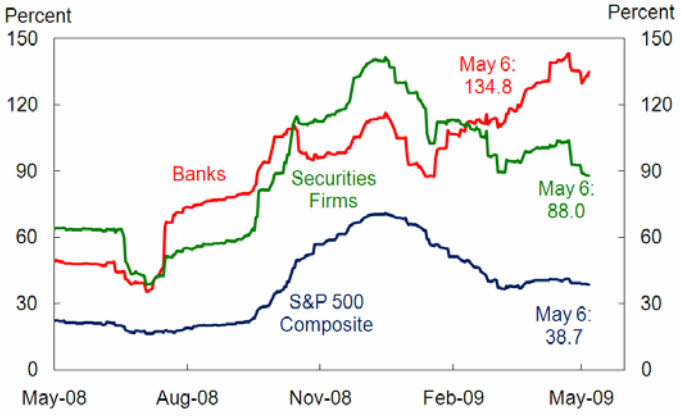
Source: Datastream

Figure 58: Equity Market Implied 1-Month Volatility



Source: Datastream

Figure 59: Historical Equity Volatility



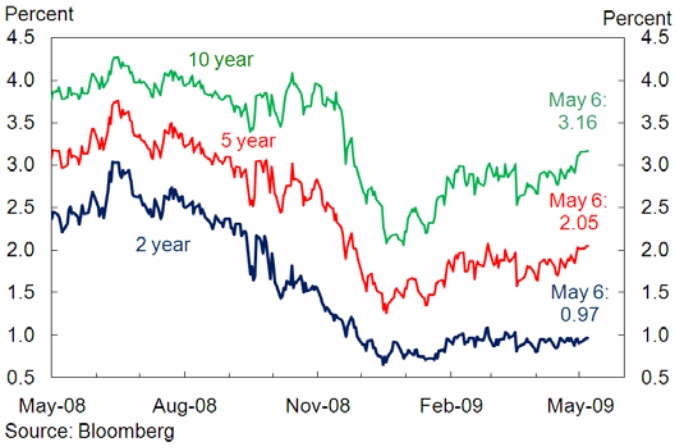
Note: Annualized rolling 3-month standard deviation of daily returns. Banks series is S&P 500 Banks index. Securities Firms series is S&P 500 Investment Banks and Brokerages index.

Source: Datastream

Note: Shading represents NBER recessions, unless otherwise noted.

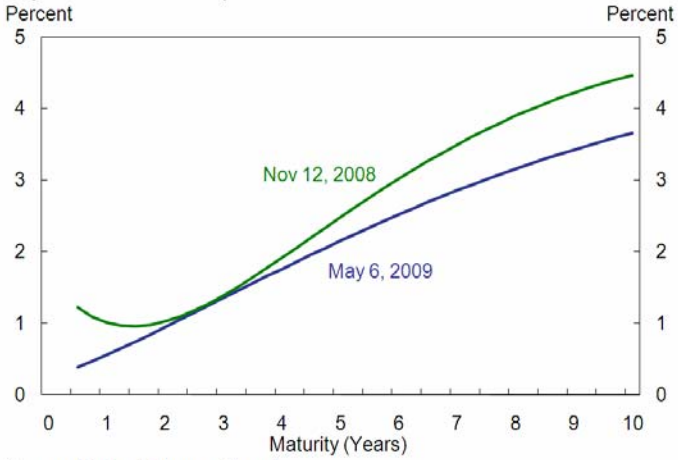
Treasury Yields

Figure 60: U.S. Treasury Note Yields



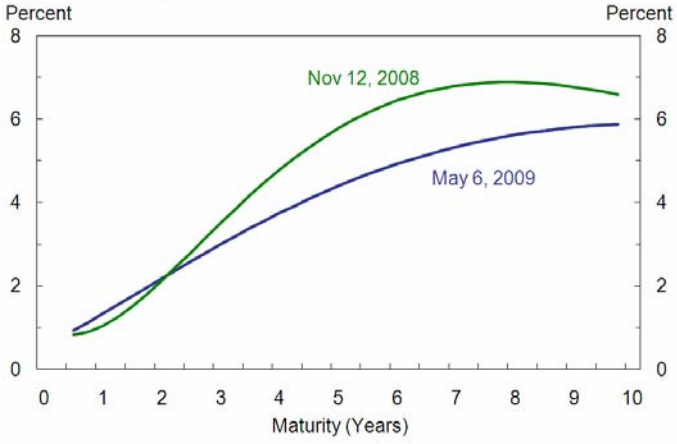
Source: Bloomberg

Figure 61: Treasury Yield Curves



Source: Federal Reserve Board

Figure 62: Implied One-Year Forward Rates

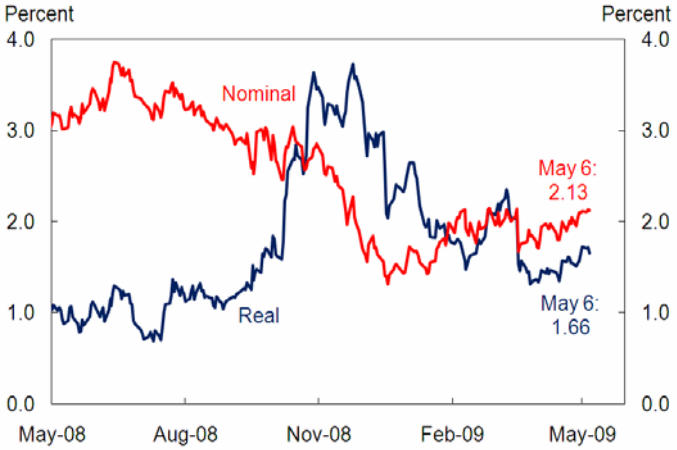


Source: Federal Reserve Board

Figure 63: 5- and 10-Year Real Treasury Rate

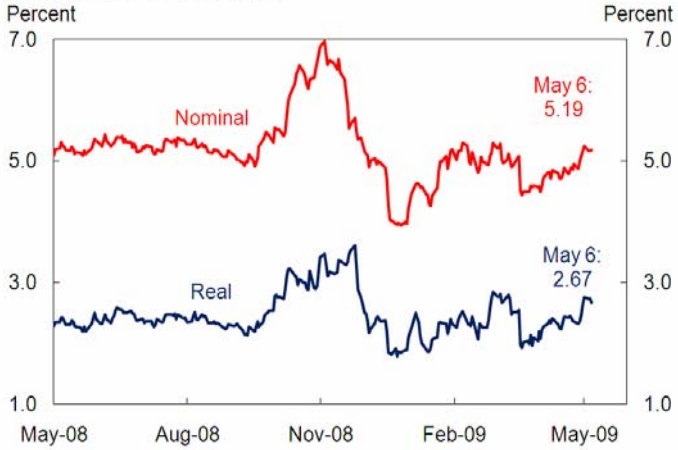
Source: Federal Reserve Board

Figure 64: 0-5 Year Rates



Source: Federal Reserve Board

Figure 65: 5-10 Year Rates

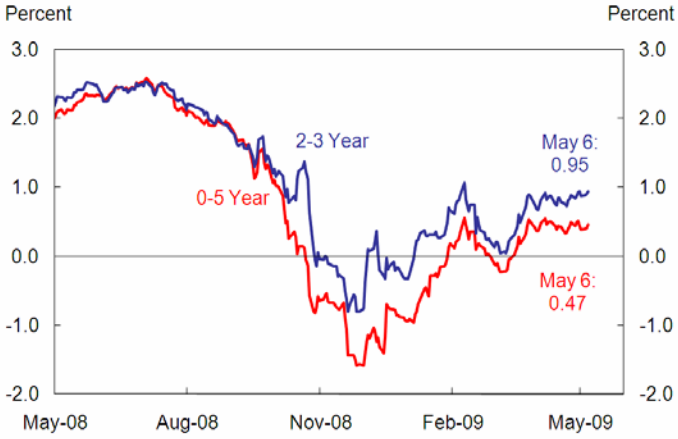


Source: Federal Reserve Board

Note: Shading represents NBER recessions, unless otherwise noted.

Inflation Expectations

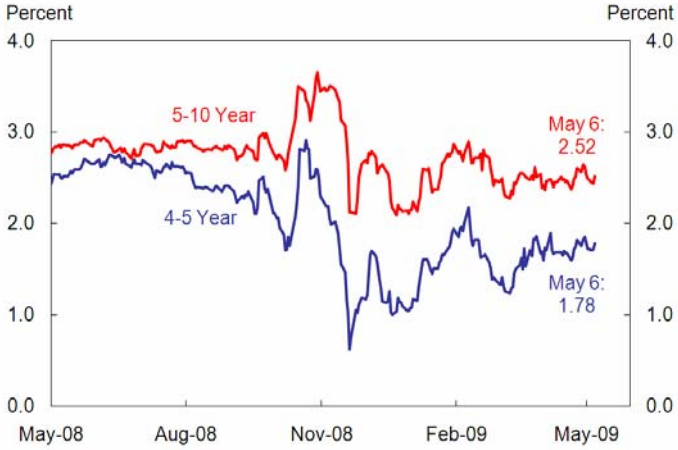
Figure 66: TIPS Implied Inflation: 0-5, 2-3 Year Horizons



Source: Federal Reserve Board

Note: Carry-adjusted

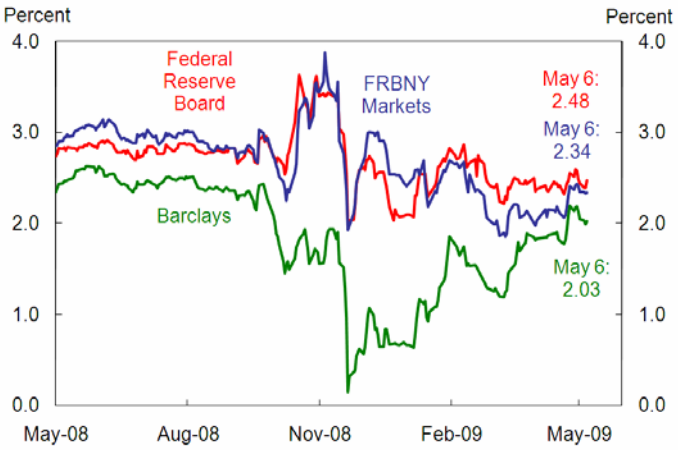
Figure 67: TIPS Implied Inflation: 4-5, 5-10 Year Horizons



Source: Federal Reserve Board

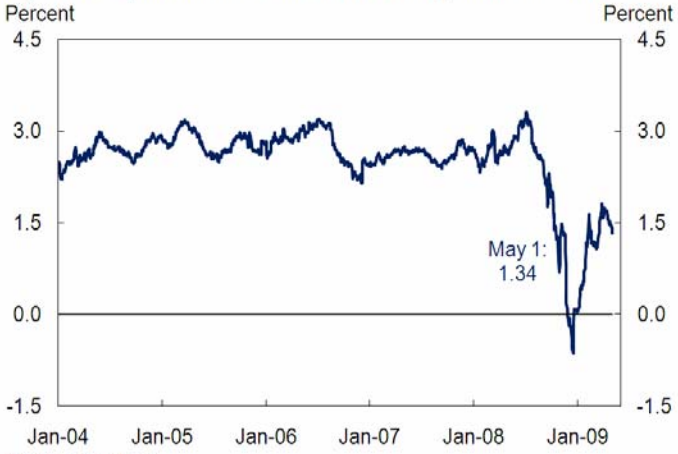
Note: Carry-adjusted

Figure 68: Alternative Measures of 5-10 Year Implied Inflation Compensation



Source: Federal Reserve Board, Barclays, and FRBNY calculations

Figure 69: Implied Inflation from Inflation Swaps: 0-5 Year Horizon

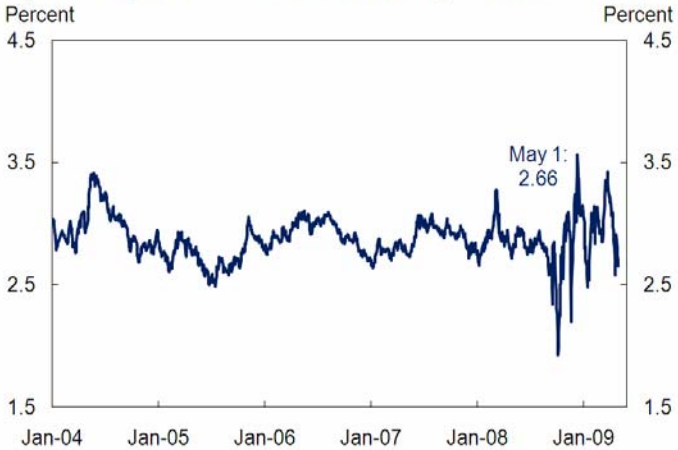


Source: Barclays

Figure 70: Implied Inflation from Inflation Swaps: 0-1, 1-2, 2-3 Year Horizons

Source: Barclays

Figure 71: Implied Inflation from Inflation Swaps: 5-10 Year Horizon



Source: Barclays

Note: Shading represents NBER recessions, unless otherwise noted.

Policy Rates and Expectations

Figure 72: Effective Fed Funds Rate and Target

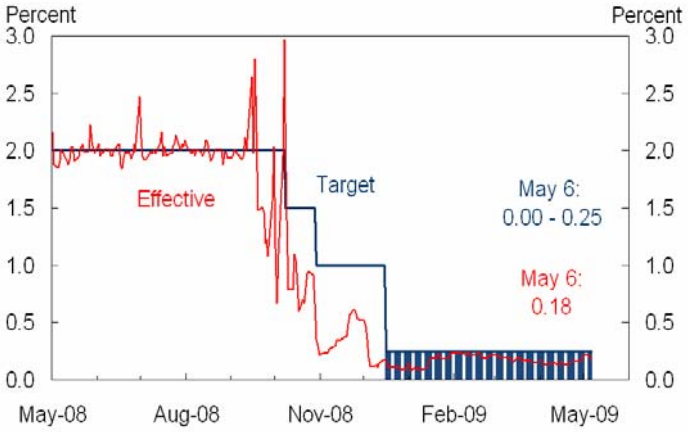
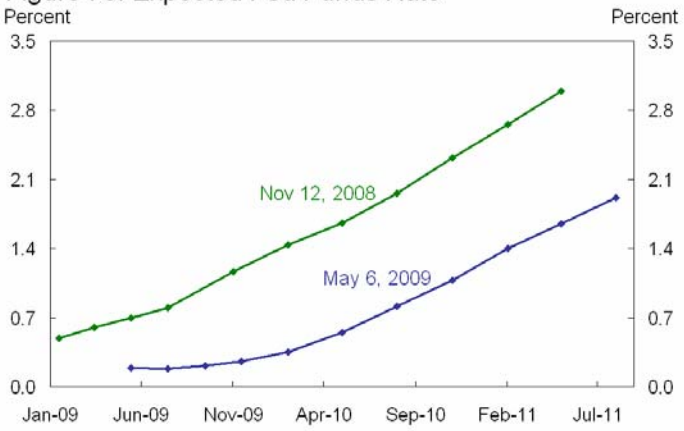


Figure 73: Expected Fed Funds Rate

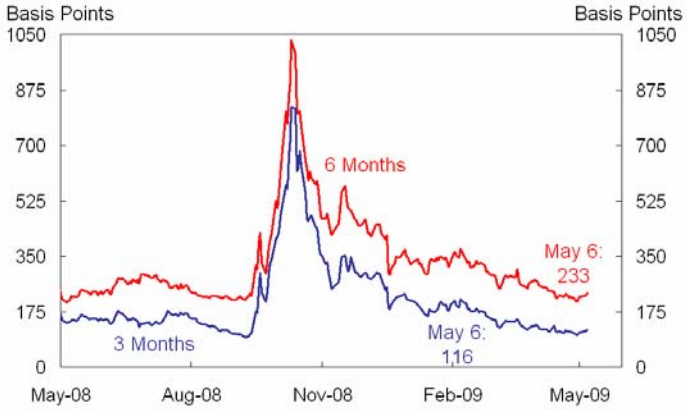


Note: Estimated using fed funds and Eurodollar futures.

Source: Federal Reserve

Figure 74: Short-Term Interest Rate Expectations

Width of 90% Confidence Interval Implied by Eurodollar Options

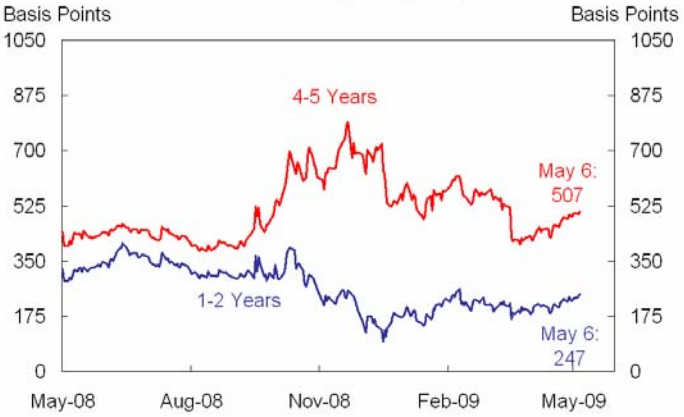


Source: Datastream, FRBNY calculations

Note: Data not available past 12/30/2008

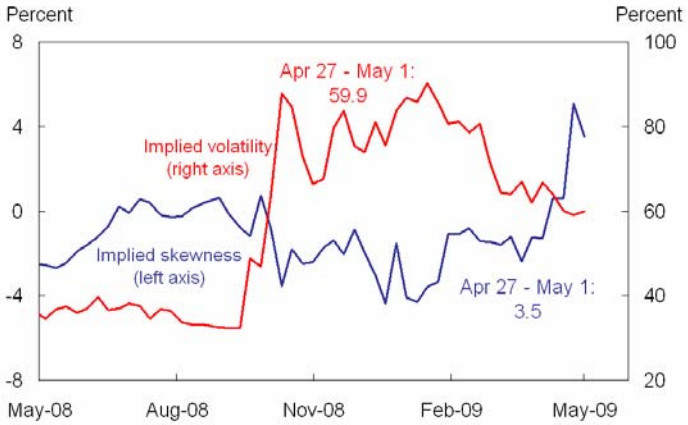
Figure 75: Long-Term Interest Rate Expectations

Width of 90% Confidence Interval Implied by Swaptions



Source: Datastream, FRBNY calculations

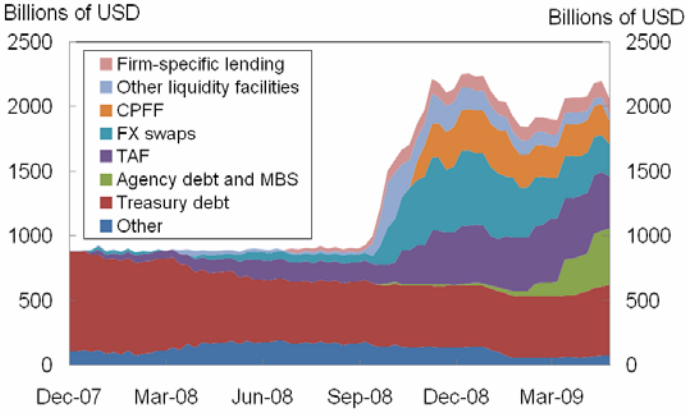
Figure 76: Implied Skewness and Volatility



Source: CME and FRBNY calculations

Note: Weekly averages based on 3-9 month implied volatilities from Eurodollar futures options.

Figure 77: Federal Reserve Assets

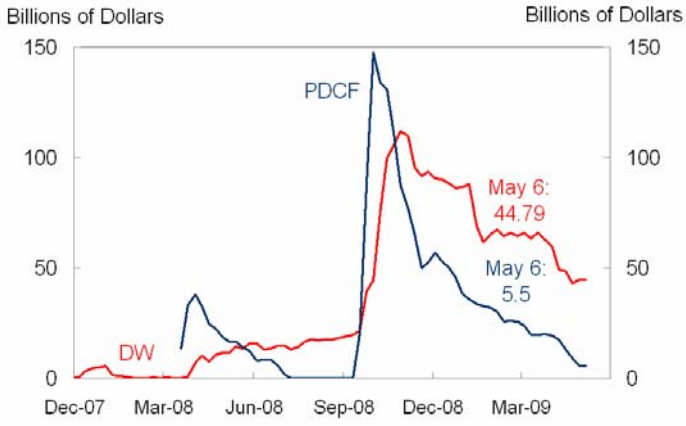


Source: Federal Reserve H.4.1 report

Note: Shading represents NBER recessions, unless otherwise noted.

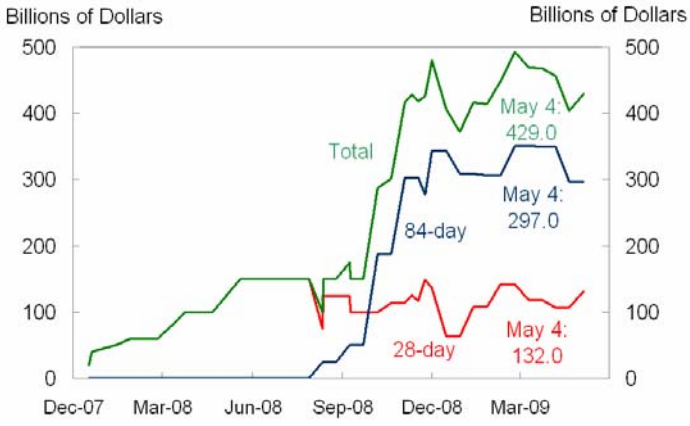
Liquidity Facilities

Figure 78: Discount Window and PDCF Borrowing



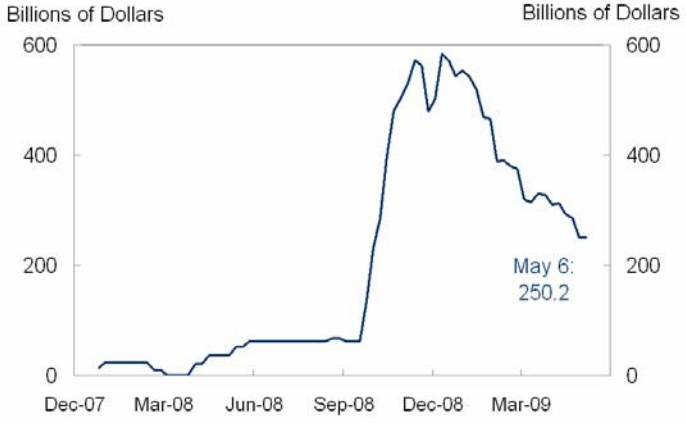
Source: Federal Reserve Board

Figure 79: TAF 28-day, 84-day, and Total Outstanding



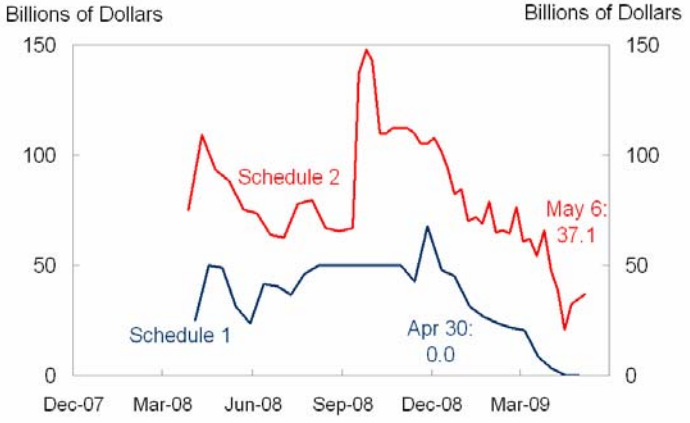
Source: Federal Reserve Board

Figure 80: Central Bank Liquidity Swaps Holdings



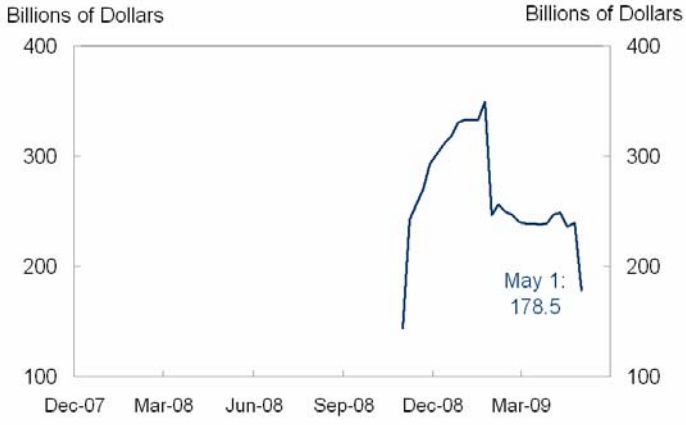
Source: Federal Reserve Board, Bloomberg

Figure 81: TSLF Schedule 1 & 2 Total Outstanding



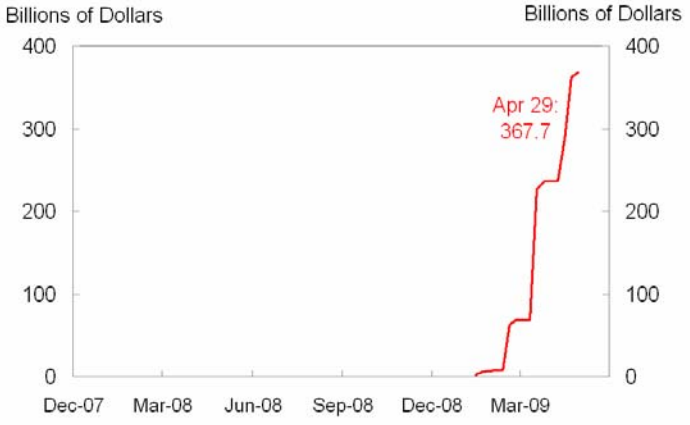
Source: Federal Reserve Board

Figure 82: CPFF Holdings



Source: Federal Reserve Board, Haver

Figure 83: Agency MBS Outright Purchases

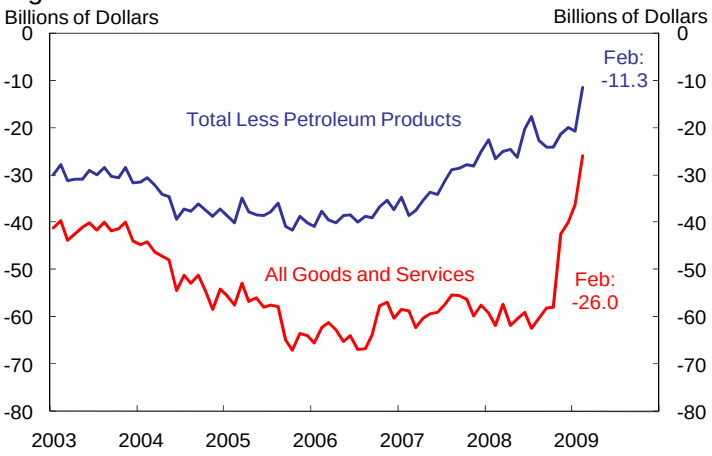


Source: Federal Reserve Board, Haver

Note: Shading represents NBER recessions, unless otherwise noted.

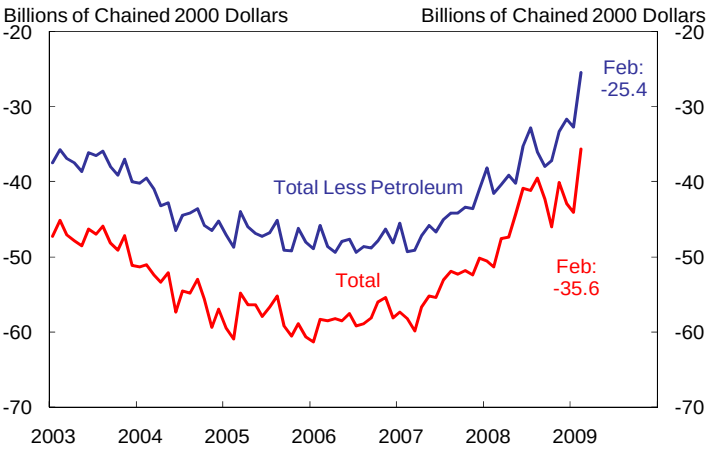
Recent Releases: U.S. Trade in Goods and Services

Figure 84: Total Balance in Goods and Services



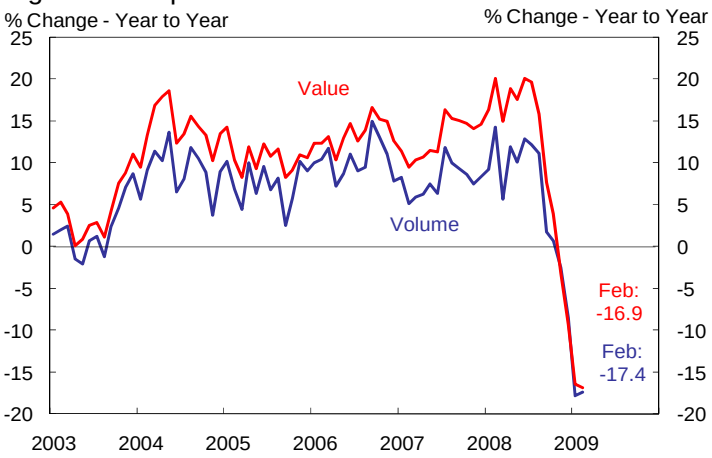
Source: Census Bureau

Figure 85: Real Total Balance of Goods



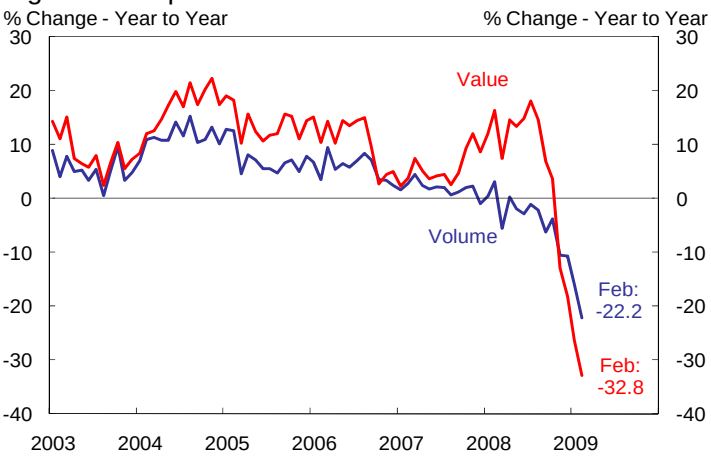
Source: Census Bureau

Figure 86: Exports of Goods



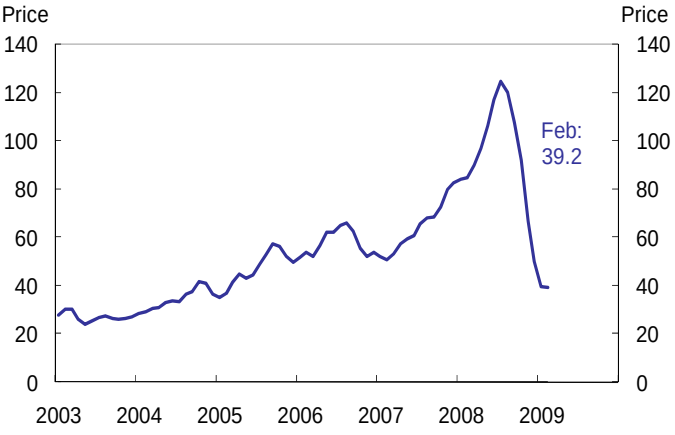
Source: Census Bureau

Figure 87: Imports of Goods



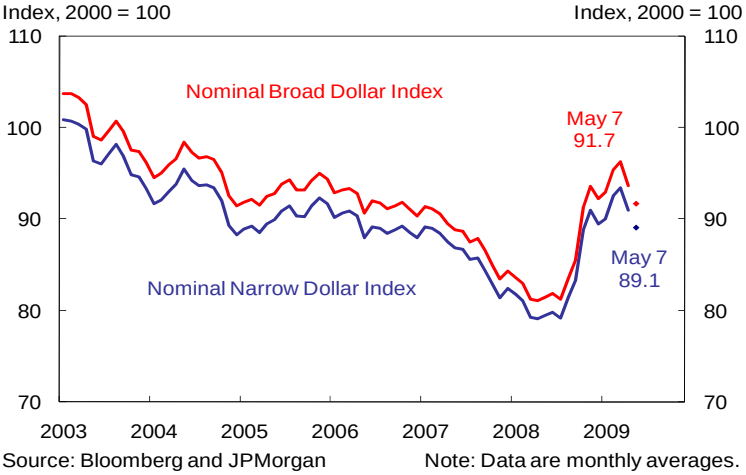
Source: Census Bureau

Figure 88: Crude Oil Price Per Barrel



Source: Census Bureau

Figure 89: Nominal Effective Exchange Rates

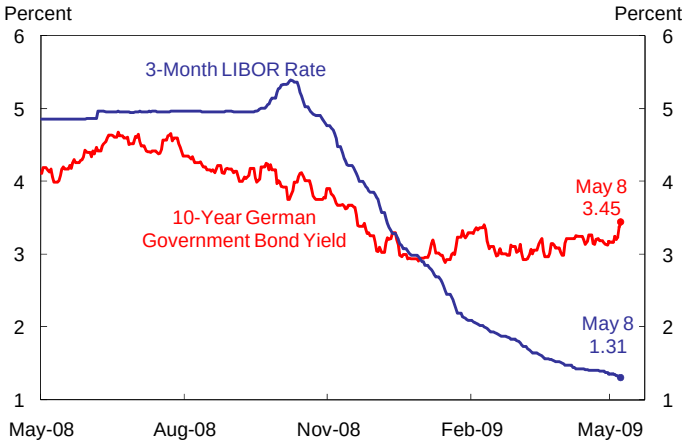


Source: Bloomberg and JPMorgan

Note: Data are monthly averages.

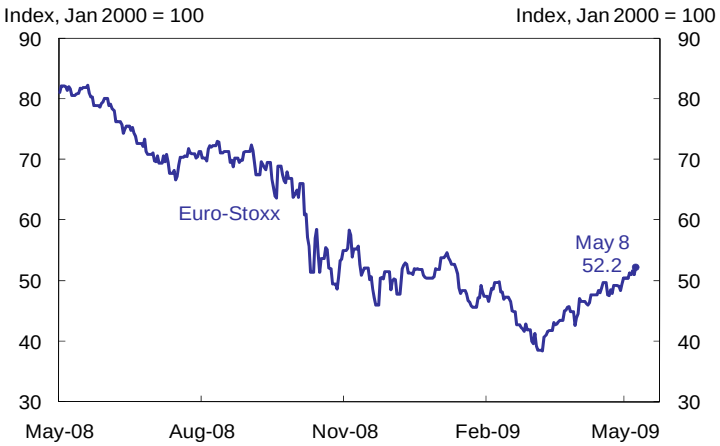
International Financial Markets Overview

Figure 90: Euro Area Interest Rates



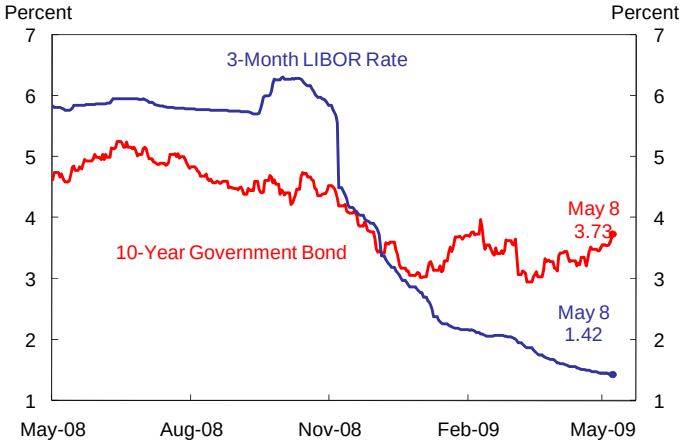
Source: Bloomberg

Figure 91: Euro Area Equity Index



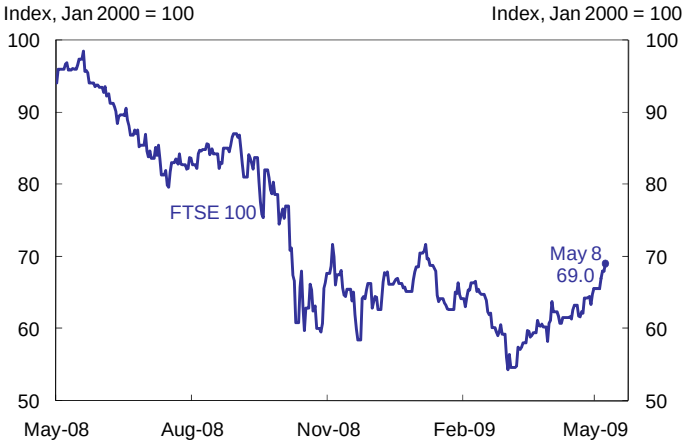
Source: Bloomberg

Figure 92: United Kingdom Interest Rates



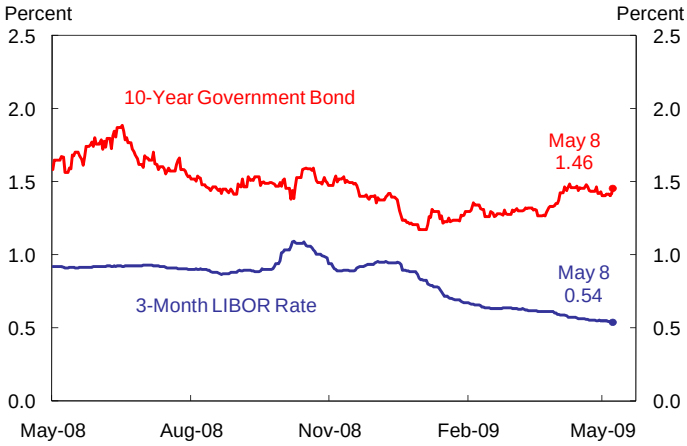
Source: Bloomberg

Figure 93: United Kingdom Equity Index



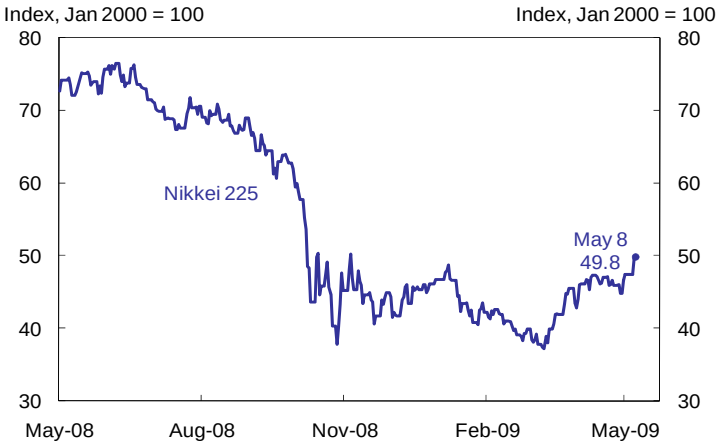
Source: Bloomberg

Figure 94: Japan Interest Rates



Source: Bloomberg

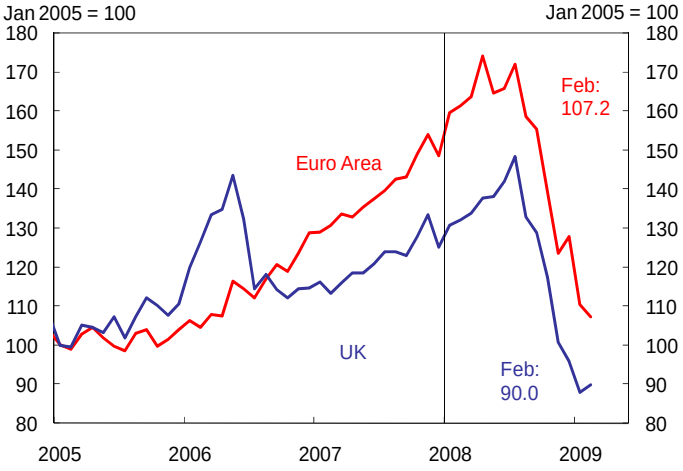
Figure 95: Japan Equity Index



Source: Bloomberg

Exports and Industrial Production

Figure 96: Exports



In Dollar Terms

Figure 97: Industrial Production

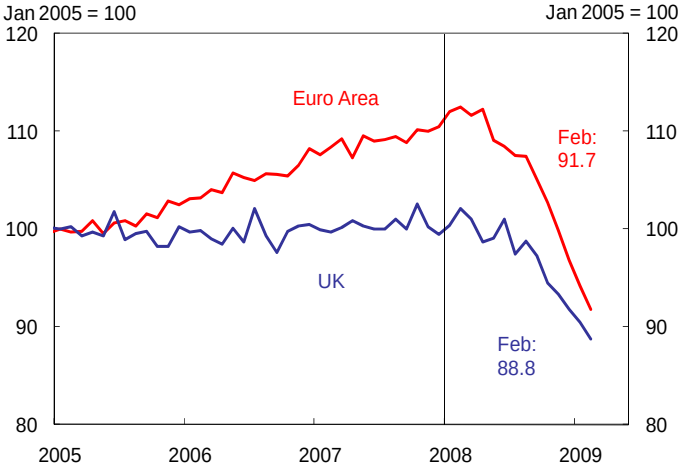
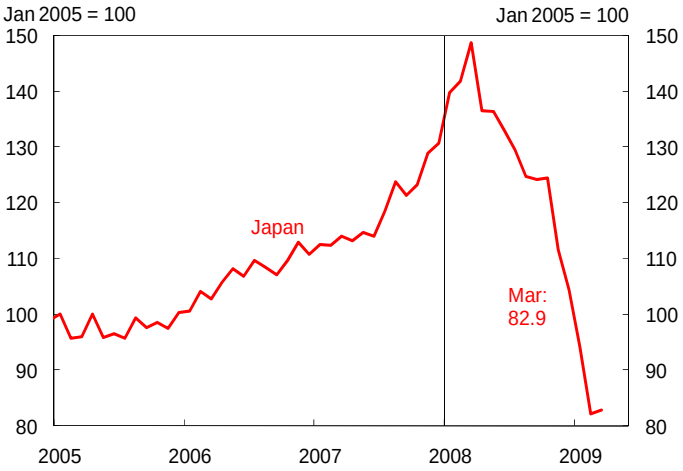


Figure 98: Exports



In Dollar Terms

Figure 99: Industrial Production

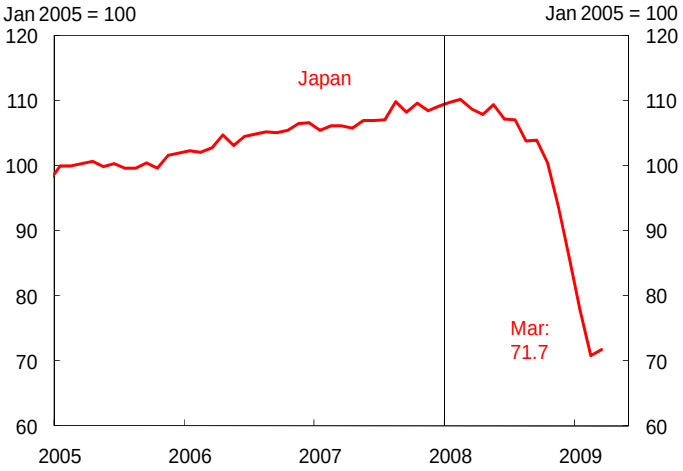
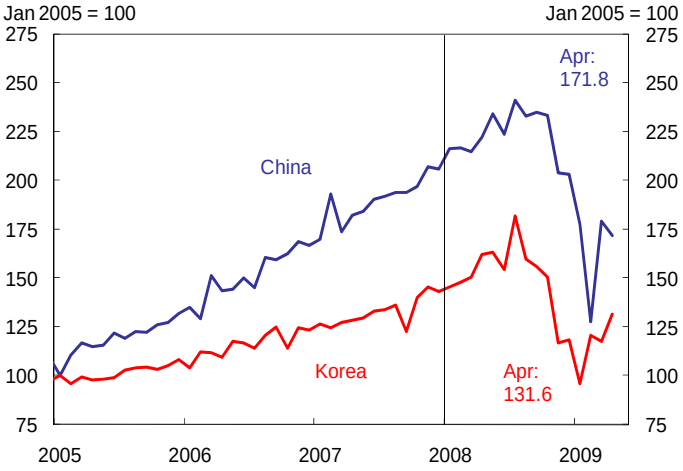
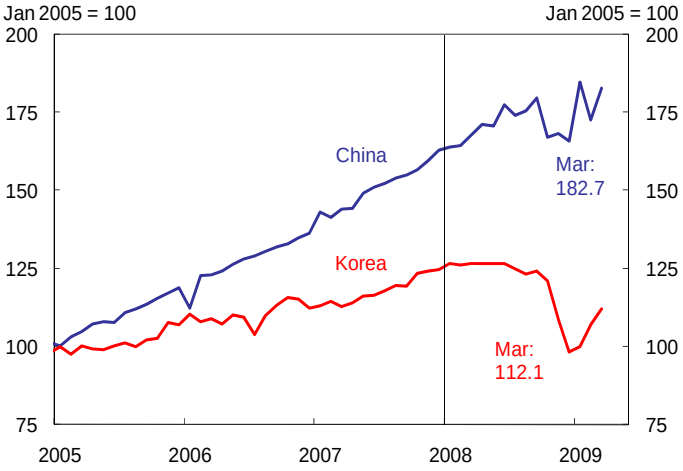


Figure 100: Exports



In Dollar Terms

Figure 101: Industrial Production



Material on Inflation Expectations

1. **Rethinking the measurement of household inflation expectations: preliminary findings –New York Fed Staff Report 359**
   http://www.newyorkfed.org/research/staff_reports/sr359.pdf

2. **Internal memo updating the working paper with new survey data** A memo by Wilbert van der Klaauw and Giorgio Topa with new results from New York Fed inflation expectations survey

3. **Summary of Economic Projections January 2009** The link is to the January FOMC minutes, the Summary of Economic Projections is at the end of the minutes. Table 1 and Figure 2C contain information on FOMC participants "long-run" inflation forecasts
   http://www.federalreserve.gov/monetarypolicy/files/fomcminutes20090128.pdf

FEDERAL RESERVE BANK

OF NEW YORK

OFFICE MEMORANDUM

DATE May 12 2009

To: William Dudley
From: Wilbert van der Klaauw, Giorgio Topa, Simon Potter
Subject: Some Results from the Household Inflation Expectations Project

Accurate and consistent measurements of inflation expectations […] represent an important source of information for appropriately calibrating monetary policy and deepening our understanding of economic behavior (Bernanke 2007).

The value-added of survey measures of inflation expectations

- Survey-based measures allow for measurement of heterogeneity in inflation expectations which may be relevant for forecasting inflation and behavior. **Disagreement**, both within and across groups of forecasters, may convey additional information relative to market-based measures of inflation and have predictive power. For example, the distribution of point forecasts may be bimodal. Individuals may have different information sets, update differently (e.g. some backward and others forward looking), or give different weights to items in their information sets when thinking about inflation. In our research we have found considerable heterogeneity in expectations, which appears to be strongly related to financial literacy and numeracy. Importantly, we also found the extent of disagreement to be informative for future realized inflation. As shown in Table 1, estimates from regressions that also include a large number of lags in realized inflation, suggest that multiple aspects of the forecast distribution have predictive power for year-ahead inflation.

- Survey questions enable us to measure individual **forecast uncertainty**. What percent change do individuals assign to alternative inflation outcome ranges? Measures of inflation uncertainty may have predictive power and help improve the forecast accuracy of inflation expectations.

- Survey questions give us a tool to measure different aspects of inflation, such as changes in the price of labor. Despite the obvious importance of wage expectations, as noted by Bernanke (2007), information on nominal wage expectations is particularly scarce. Surveys represent a potentially important vehicle to measure individual **wage expectations** and their associated forecast uncertainty.

- Survey questions can be designed to assess how individuals **form and update expectations** and how they **act upon** their expectations of inflation in a wide range of economic decisions, including current consumption and savings decisions, labor force participation, schooling, etc. As argued by Bernanke (2007), "a fuller understanding of the public's learning rules would improve the central bank's capacity to assess its own credibility, to evaluate the implications of its policy decisions and communications strategy, and perhaps to forecast inflation".

- Survey measures can help us overcome certain well known shortcomings of market measures such as those based on TIPS, which capture liquidity and risk premiums**.**

Project Status

Starting in November 2007, we have conducted a set of open-ended in-person cognitive interviews and administered a series of survey modules to participants in RAND's American Life Panel to track inflation expectations and to analyze in depth the information content of a wide range of alternative inflation expectations questions. In addition to their point predictions, respondents were asked for their subjective assessments of the percent chance that several alternative inflation outcomes would be realized.

HIEP Results to Date

Improvements on current survey measures

- Analysis of Reuters/Michigan Survey of Consumers Survey identified a number of important shortcomings and potential for **improved survey design**. We found that ambiguous question wording, where respondents are asked about changes in 'prices in general', leads to heterogeneity in question interpretation. For a significant fraction of respondents it elicits responses that focus on the most visible, often increasing prices. This is most common among those with lower financial literacy. There are also issues with selective follow-up questions in the Michigan Survey, which may lead to measurement biases.
- Our findings suggest that the ambiguity in question meaning can be reduced by directly asking about the "rate of inflation". This **alternative question** had a high response rate and improved construct validity, exhibiting less disagreement across respondents, lower overall forecast uncertainty, and expectations that were less strongly correlated with price expectations for gas and food. We have also developed a version of the alternative question at a three-year ahead horizon, which is better suited to our monetary policy objectives than the five-to-ten year version in the Michigan Survey.
- Our analysis shows that it is feasible and fruitful to measure **forecast uncertainty**. The results show that disagreement is not always a good proxy for uncertainty about future inflation. Tracking uncertainty in inflation expectations is crucial to assess central bank credibility and

effectiveness of communication, to better understand the linkages between expectations and actual behavior, to improve our forecast accuracy, and to detect potential turning points in inflation expectations. The latter is particularly important in the recent environment, where we have observed a rapid shift from somewhat elevated inflation expectations to concerns about deflation, with various sources arguing that the current liquidity expansion may give rise to future inflationary pressures.

- Similarly, we find that respondents are willing and able to provide point as well as density forecasts about **future wages**. During the survey period, respondents expected wages to rise significantly less than prices, and expressed less uncertainty about future wage changes than about future price changes.
- Repeated measurement of expectations for the same set of consumers over time, provides useful insights into **inflation expectations dynamics**. The evidence points to much considerable persistence in inflation expectations and uncertainty. We find that those who are more uncertain are more likely to make larger revisions in their forecasts.

Current Patterns

- There is considerable heterogeneity across individuals in the levels and trends in inflation expectations. As seen in Figure 1, which shows trends by income level, differences can be substantial. Additional survey evidence indicates that much of the heterogeneity across demographic groups is related to variation in financial literacy.
- Disagreement and individual forecast uncertainty (as measured by the interquartile range of the forecast density) are distinct and complementary concepts, with each being a relatively poor proxy for the other. While the two measures are positively correlated, disagreement in central forecasts is more volatile (with a spike during the summer of 2008) and often moves in opposite direction to individual uncertainty about future inflation realizations. Moreover, the overall change in disagreement during the survey period is close to zero, whereas uncertainty has declined considerably (Figure 2).
- Expectations for near (1 year ahead) and medium term (3 years ahead) inflation indicate that while until recently near-term expectations exceeded medium term expectations, this pattern has now reversed (solid lines in Figure 3). The same time pattern emerges for the median values of the 25^{th} and 75^{th} percentiles of the individual density forecasts. The figure also indicates that uncertainty about both year-ahead and three-years-ahead inflation is of similar magnitude and has been falling through most of the past year.
- After a run up in expectations of deflation during the second half of last year, individuals have started to lower the probability they assign to year-ahead deflation. Consumers continue to assign a relatively low likelihood to deflation three years from now (Figure 4).
- The decline in year-ahead inflation expectations has been accompanied by a parallel decline in wage-growth expectations, with individuals generally expecting a decline in real wages (Figure 5).

Next steps

- Implement a permanent survey module providing better measures of consumer inflation expectations.
- Extend ongoing research to (1) learn more about expectation formation: how do people form/update?, and (2) analyze the relationship to behavior: do individuals act on their beliefs about future inflation and if so, how?
- Join an initiative by the FRB-Atlanta to build on the HIEP with the goal of improving the measurement of inflation expectations of firms.

Table 1

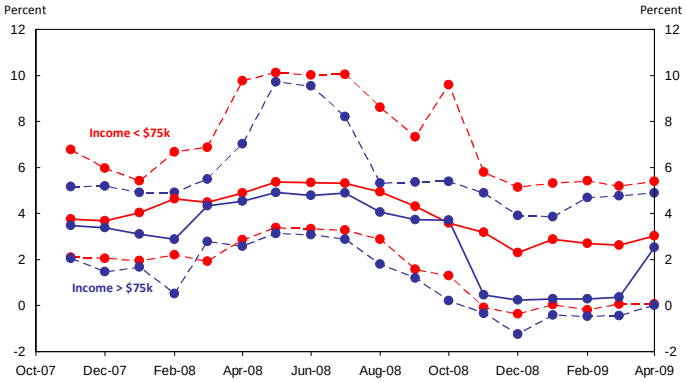
Regression of Inflation Realizations on Inflation Expectations

Median of Year-Ahead Forecasts	1.37 (0.28)	0.76 (0.46)
IQR of Year-Ahead Forecasts	-0.33 (0.16)	
25^{th} Percentile of Year-Ahead Forecasts		0.71 (0.30)
75^{th} Percentile of Year-Ahead Forecasts		-0.01 (0.25)

Data source: Reuters/Michigan Survey of Consumers 1979-2009.

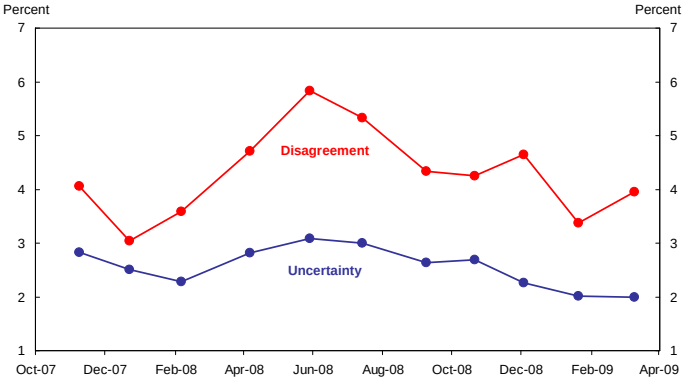
Figures:
Household Inflation Expectations Project

Fig 1. Trends in Forecast Quartiles by Income



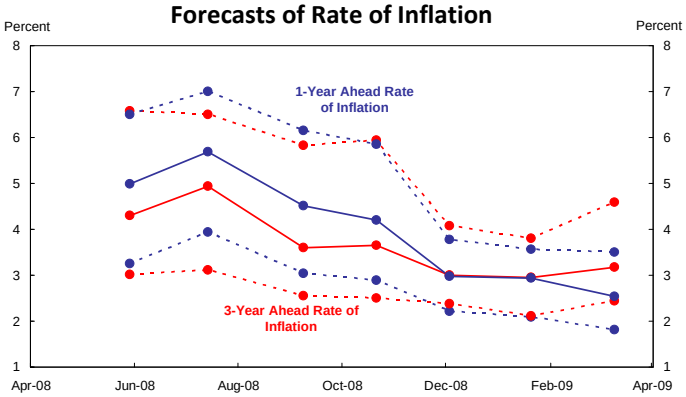
Michigan Survey micro data. Quartiles of the distribution of point forecasts for 'prices in general' by income group.

Fig 2. Measures of Disagreement and Uncertainty



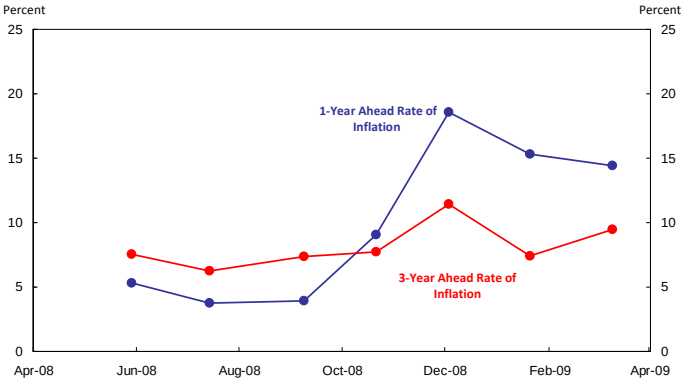
Fed-ALP Panel data on individual density forecasts for 'prices in general'. Disagreement is measured by the IQR of the distribution of density medians across forecasters. Uncertainty is measured by the median of the individual density IQRs.

Fig 3. Trends in Quartiles of 1-Year and 3-Year Ahead Forecasts of Rate of Inflation



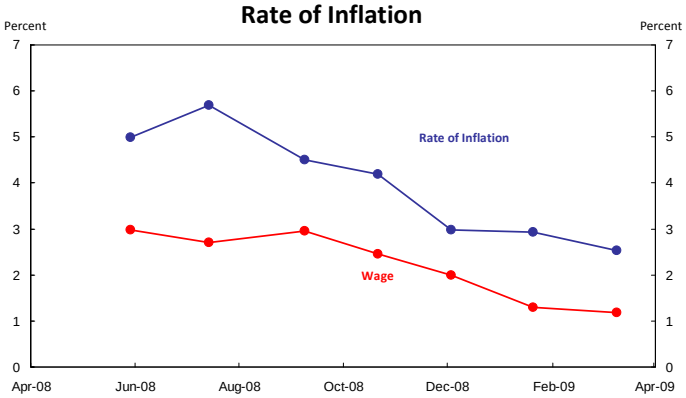
Fed-ALP Panel. Medians of individuals' quartiles of density forecasts for the 'rate of inflation' one year and three years in the future.

Fig 4. Deflation Expectations Over Time Horizons



Fed-ALP Panel. Average probability (%) assigned by individuals to deflation.

Fig 5. Trends in 1 Year-Ahead Expectations of Wages and Rate of Inflation



Fed-ALP Panel. Medians of individuals' median density forecasts for year-ahead 'rate of inflation' and year-ahead wage changes on current job.

Material Relating to Financial Stability

1. **Supervisory Capital Assessment Program Material – Links to the two white papers published by the Federal Reserve summarizing methods and results**
   http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090424a1.pdf
   http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090507a1.pdf

2. **Short note comparing SCAP to IMF**

3. **Internal memo using Lown-Morgan VAR model based on senior loan officers opinion survey**

4. **A note analyzing credit flows**

5. **Two memos on ring fencing**

Comparison of IMF to SCAP

The IMF Global Financial Stability Report uses the projections for the US economy contained in the IMF World Economic Outlook to estimate worldwide “credit” losses on US assets. In April 2008 the estimate was just under $ 1 trillion, it moved up to around $1.4 trillion in October 2008, the current estimate is now up to $2.7 trillion. This estimate contains a mixture of actual and estimated future losses on loans and actual and potential further writedowns on securities. These total losses will be incurred by US bank holding companies, other US based financial institutions and foreign based financial institutions.

The baseline macroeconomic assumption underlying this new IMF estimate of losses is slightly more "optimistic" than the more adverse scenario in the supervisory capital assessment process, with IMF estimates of unemployment going to 10.1 in 2010 and the level of real GDP almost 3 percent below its 2008 average in 2010.

With the exception of Commercial Real Estate the SCAP produced higher future loss rates than the IMF for 2009-10 for loans. For Commercial Real Estates the two estimates are very similar. The IMF assumes loss rates remain high in 2011 with losses on consumer loans higher than their average over 2009-10. For all US, European and UK banks they assume charge-offs in 2011 are $893 bn in 2011 compared to $901 bn in 2010.

The IMF estimates are based on a top-down model. That is, they estimate an aggregate loss rate for a loan class then distribute it across banks by their holding of that loan class. The SCAP followed a more rigorous and detailed analysis of individual loan level data with the overall aggregate result guided by an in-depth analysis of various top-down models and recent behavior of loans. If the SCAP loss rates are applied to the rest of the US banking industry, future losses would be higher than the IMF’s estimates.

The IMF assumes pre-provision net revenue (PPNR) of banks will fall substantially, for example in 2010 the SCAP estimate for the 19 US banks is about 50% of the IMF's assumption for **all banks** in the US, Europe and the UK. PPNR is the main source of loss absorption so this estimate is at least as critical as the overall loss estimate. The IMF argue that the projected 25% fall in PPNR is consistent with the Japanese experience and is optimistic compared to the Great Depression when the IMF estimates bank earnings fell by 50%. The SCAP process involved combining detailed projections of each component of pre-provision net revenue both using firm’s business plans and statistical models. Since it is difficult to discern any additional information about the IMF’s methods other than the vague comparison to previous banking crises the SCAP estimate is of much higher quality. Further, even if one takes the minimum by PPNR estimate for each institution in SCAP, the implied industry PPNR would be above the IMF’s.

Finally the IMF uses a 4% target for tangible common equity to tangible assets producing an additional capital need for all US banks of $275 billion. The SCAP used a tier 1 common to risk weighted assets ratio of at least 4%. As tangible assets tend to be larger than risk weighted assets and tangible common equity is a little smaller than tier I common the IMF’s target is more exacting on average. The IMF’s estimates do not involve a sophisticated calculation of how losses and revenue affect capital or the distribution of capital across banks.

INTERNAL FR

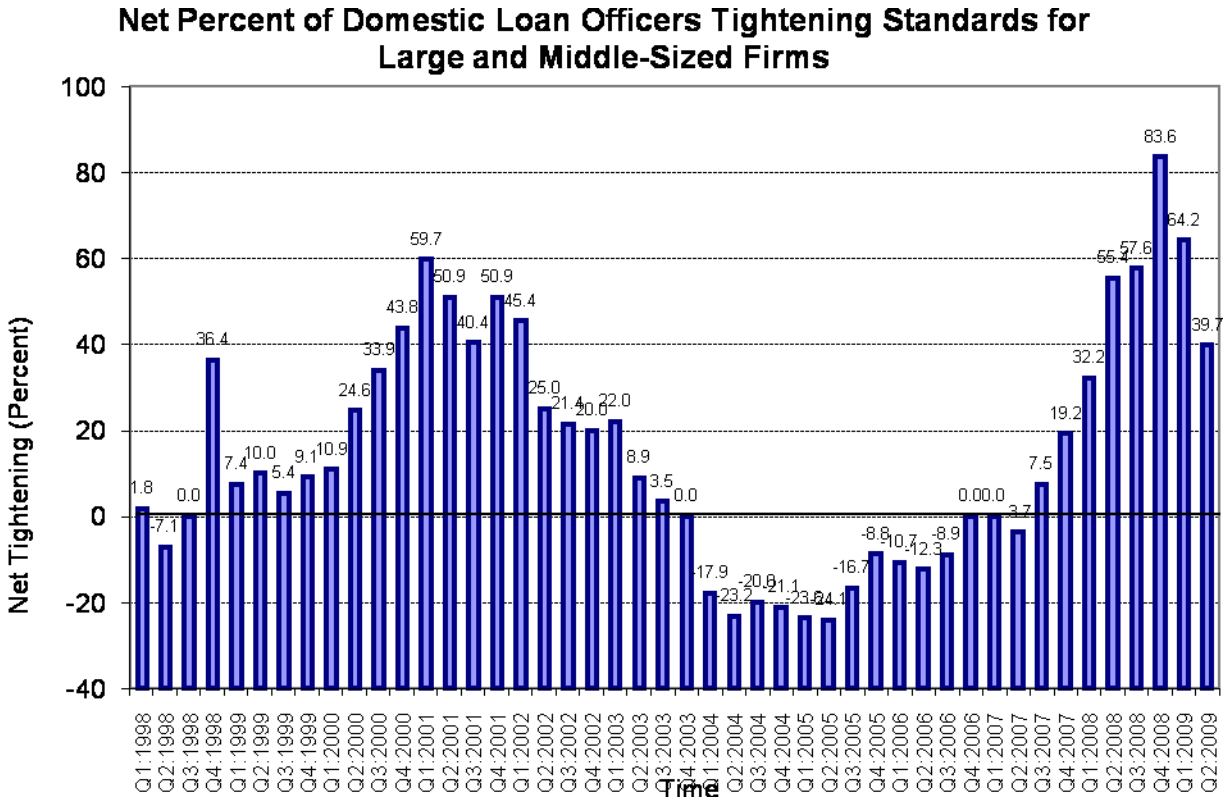
Senior Loan Officer Opinion Survey in 2009:Q2: *Tightening Abates Further*
Don Morgan (x6572) and Ihab Seblani
4/22/2009

According to preliminary estimates, the net fraction of senior loan officers reporting tightening standards for approving loans to large and medium-sized firms fell to 39.7 percent in 2009:Q2 from 64.2 percent the quarter before (Chart 1). Our model predicts continued contraction in C&I lending over 2009, but the contraction in lending is predicted to decelerate by 2009:Q4 due (partly) to less tightening of standards (Chart 2).[1]

Two sets of special questions on the survey asked loan officers how they expected loan performance and delinquency to change over the rest of 2009, and how supply and demand of credit to finance international trade finance has changed over the past six month. Final survey estimates will be publicly available after April 28 at http://www.federalreserve.gov/boarddocs/snloansurvey/s.

[1] Forecast from VAR comprising four lags of real GDP, GDP deflator, commodity prices, federal funds rate, C&I loans, and commercial credit standards (the net percent tightening) estimated over 1968:3 - 2007:4. For model details, see "Listening to Loan Officers …," *Economic Policy Review,* Lown, Rohatgi, and Morgan, July 2000 or "….New Finding Using the Loan Officer Opinion Survey, Lown and Morgan, forthcoming, *Journal of Money, Credit, and Banking).*

Chart 1


Net Percent of Domestic Loan Officers Tightening Standards for Large and Middle-Sized Firms
Net Tightening (Percent)
100
80
60
40
20
0
-40
1.8
-7.1
0.0
36.4
7.4
10.0
5.4
9.1
10.9
24.6
33.9
43.8
59.7
50.9
40.4
50.9
45.4
25.0
21.4
20.0
22.0
8.9
3.5
0.0
-17.9
-23.2
-20.8
-21.1
-23.6
-24.1
-16.7
-8.8
-10.7
-12.3
-8.9
0.0
0.0
-3.7
7.5
19.2
32.2
55.4
57.6
83.6
64.2
39.7
Q1:1998
Q2:1998
Q3:1998
Q4:1998
Q1:1999
Q2:1999
Q3:1999
Q4:1999
Q1:2000
Q2:2000
Q3:2000
Q4:2000
Q1:2001
Q2:2001
Q3:2001
Q4:2001
Q1:2002
Q2:2002
Q3:2002
Q4:2002
Q1:2003
Q2:2003
Q3:2003
Q4:2003
Q1:2004
Q2:2004
Q3:2004
Q4:2004
Q1:2005
Q2:2005
Q3:2005
Q4:2005
Q1:2006
Q2:2006
Q3:2006
Q4:2006
Q1:2007
Q2:2007
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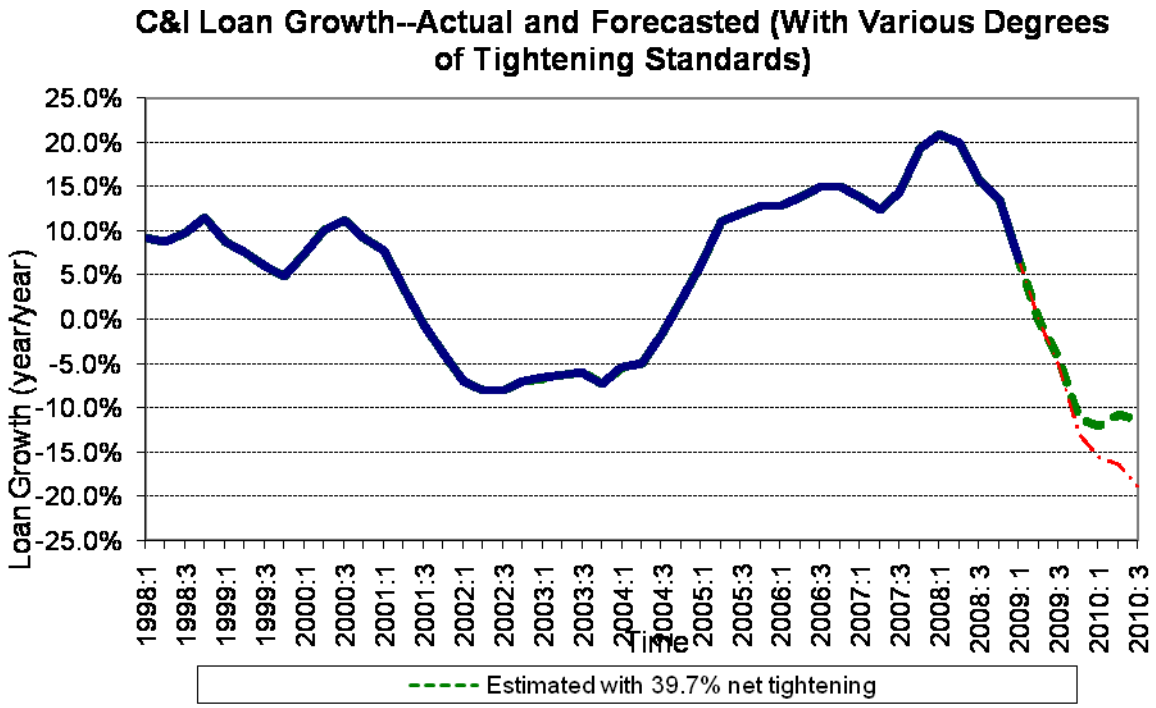
Q2:2008
Q3:2008
Q4:2008
Q1:2009
Q2:2009
Time

Chart 2



Forecast from vector autoregression model comprising (four lags of) real GDP, GDP deflator, commodity prices, federal funds rate, C&I loans, and the net percent of domestic loan officers reporting tightening standards for loans to large and middle-market firms. Model estimated over 1968:3 – 2009: 1. For details, see "Listening to Loan Officers …," Economic Policy Review, Lown,

Note on Analysis of Credit Flows

Simon Potter

Federal Reserve Bank of New York

The assessment of the impact of recent official measures to support the financial system on credit flows to the households and non-financial firms is complicated by the large drops in demand observed over the last few months. This has exacerbated the usual identification problem between changes in credit supply and demand. Even in normal times it is very difficult to accurately measure the links between the growth in financial intermediation and credit flows to the non-financial sector. In the current extraordinary times these difficulties increase especially with the massive contraction in the so-called shadow banking system and its use of market-based assets (see Adrian and Shin 2009). With the growth in securitization in the last twenty years and the surge in mortgage lending back by securitization from 2003 to 2007, market-based assets became larger than bank-based as can be seen in Exhibit 1.

In this note we start by considering some traditional measures of credit flows from the US commercial banking sector. We then move on to assessing the success of various policy innovations in reducing internal stress within the financial system. Then we finish by discussing two programs, the Commercial Paper Funding Facility (CPFF) and Term Asset Backed Securities Loan Facility (TALF) that are directed at supporting credit provision to US firms and households without the involvement of the traditional commercial banking sector.

A traditional method of measuring credit flows is to consider the scale of loans directly from the commercial banking sector to firms and households. The Federal Reserve conducts a weekly survey (known as H8) with aggregate information on a range of loan classes. As pointed out by Chari, Christiano and Kehoe (2008) many loan categories show healthy growth in this survey from the start of the financial crisis through October 8 2008. In order to take account of the recession in the United States a set of spider charts were developed to compare commercial bank lending in the current recession with previous ones (See Exhibit 1). Spider charts are constructed by normalizing the value of a time series to unity at the business cycle peak and then examining the growth before and after the peak. Unlike CCK the real value of loans were calculated and adjustments for takeovers of non-commercial banks were made.

The spider charts shows that Commercial and Industrial loans continued to grow after October 8th 2008 and their behavior is very different to the 1990-1 and 2001 recessions. Note that the path of C&I loans is most similar to the 1981-2 recession with 1973-5 recession being similar up to the funding of the Troubled Asset Relief Program (TARP). The recession paths for consumer loans and the pattern the current recession shows significantly more loan growth than in previous ones particularly after the introduction of the TARP. On the other hand, these charts clearly show that the 1990-1 recession was characterized by a decline in commercial bank credit more pronounced than other recessions, consistent with the interpretation of a credit crunch in this mild recession and recovery.

One conclusion from these charts might be that the TARP was very effective in increasing credit flows from the commercial bank sector to firms and households. Another response might be that without TARP the capacity of the commercial banking system to fill some of the hole produced by the collapse in the shadow banking system would have been substantially lower. The paper by CCK has been criticized for not taking into account the possibility that the increase in loans represents a drawn down in credit lines forced by the contraction in the shadow banking sector particularly the decline in the syndicated loan market (see Cohen-Cole et al 2008, Ivashina and Scharfstein (2008)). It is not clear how to isolate cause and effect in some of these discussions. However, as discussed below with securitization market closed since September 2008 it is clear that the increase in bank-based assets has only partially filled the financing capacity lost.

An alternative approach is to measure stress within the broader banking system as a whole. While this is indirect, the assumption is that lower levels of stress make it easier for the broader banking system to meet credit demand from firms and households. Of course in a recession this demand might drop and the compensation for risk required by financial intermediaries might increase but at least official attempts to reduce stress within the financial system can be examined. There are a wide range of measures one could use to measure the stress within the system. Rosenberg and Maurer (2008) develop a stress index from three underlying indices: (1) banking sector credit risk, which is a key determinant of the supply of funds; (2) Fed lending facilities use which provides a measure of the demand for funds; (3) credit spreads that directly measures the cost of funds in the interbank market.

The individual stress indices are normalized to zero in the pre-crisis period and standardized by the pre-crisis standard deviation. The pre-crisis period is defined to be January 1 2006 to August 8th 2007. The overall interbank funding stress index is a simple average of the three component indices. All of the indices show a steady upward movement from August 9th 2007 to early September 2008. They then all increase dramatically in September with peaks occurring around mid-October when the Treasury's Capital Purchase Program (CPP), FDIC's Temporary Liquidity Guarantee Program (TLGP) and the expansion of a number of Federal Reserve liquidity Facilities were announced. The measure of banking sector credit risk is still higher than its levels prior to September 2008 and has increased in the last few weeks.

One Federal Reserve facility not captured by these interbank measure is the foreign exchange swaps. Exhibit 3 shows how the massive increase in swaps in late September-early October was successful in reducing the euro-dollar swap implied basis spread. While the amount of the swaps have come down from their highs of fall 2008 they still represent a large component of the increase in the Federal Reserve's Balance sheet since September 2008. An unresolved issue is the relative efficacy of expansion of the balance sheet (i.e., non-sterilized interventions) and changing the asset composition of the balance sheet to improve liquidity.

At the end of October 2008 the CPFF facility went into operation. From mid-September 2008 there had been a decline in commercial paper issuance and a big shortening of the maturity structure. One cause of this was a large withdrawals from prime money market funds, one of the main buyers of commercial paper. Exhibit 3 shows the extent of these withdrawals. Both the Treasury's guarantee of certain money

market funds and the Federal Reserve's Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) introduced in mid-September were designed to ease the adjustment process for money market funds and thus provide indirect support for the Commercial Paper market. Despite these efforts and the shortening of the maturity structure there was a large increase in spreads for commercial paper over OIS. While the announcement of the CPFF had little effect, once it went into operation it was successful in lowering spreads. When the paper issued from the CPFF started to rollover in early 2009 many issuers were able to access traditional private market buyers.

The financial crisis started with problems in the asset back securitization market and in the late summer of 2008 these problems intensified until new issuance came to a virtual halt in October 2008 as can be seen in Exhibit 4. Around $200 billion of consumer loans were being securitized annually prior to the financial crisis. Loans by banks have increased by about $90 billion since the start of the recession filling at best about half of this hole. This is an upper bound because some consumer assets have been on-boarded by commercial banks over this period.

The new TALF program is intended to re-start the market for consumer asset backed securities and there have been plans announced to expand it to other asset classes. Similar to the CPFF it circumvents the balance sheet constraints of the more traditional banking sector by the Federal Reserve acting as an intermediary. In addition it deals with the reluctance of pension funds and life insurers to increase their holdings of ABS and the lack of interest from hedge funds by the Treasury providing equity to support non-recourse loans by the Federal Reserve. There was an announcement effect observable in the secondary market rates when TALF was announced in November but no actual issuance has taken place in the program yet.

References

Adrian, Tobias and Shin, Hyun. (2009). Money, Liquidity and Monetary Policy, forthcoming *American Economic Review Papers and Proceedings*

Chari, V.V, Christiano, Lawrence and Kehoe, Patrick. Facts and Myths about the Financial Crisis of 2008. Working Paper 666, October 2008, Federal Reserve Bank of Minneapolis.

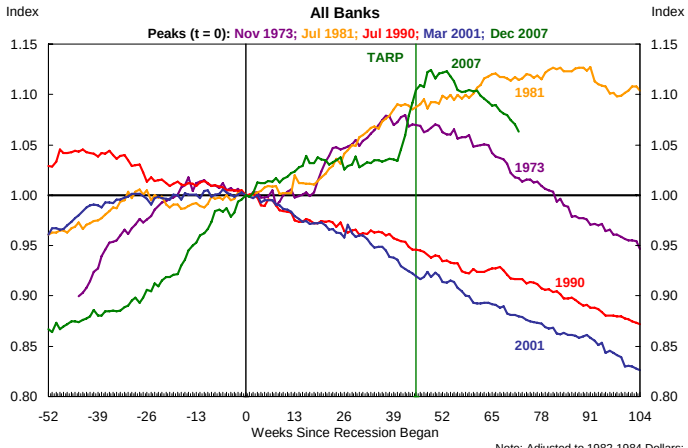
Cohen-Cole, Ethan, Duygan-Bump, Burcu, Fillat, José and Montoriol-Garriga, Judit. (2008). Looking Behind the Aggregates: A Reply to "Facts and Myths about the Financial Crisis of 2008". QAU Working Paper No. QAU08-5, Federal Reserve Bank of Boston.

Ivashina, Victoria and Scharfstein, David. (2008). Bank Lending During the Financial Crisis of 2008. Working Paper, Harvard Business School.

Rosenberg, Joshua and Maurer, Samuel (2008). Tracking Stress in the interbank Funding Market. Internal Memo Federal Reserve Bank of New York, attached to this note.

Exhibit 1: Market and Bank Assets

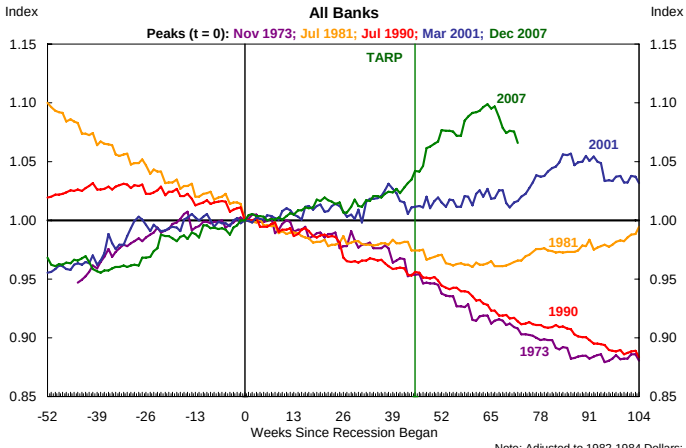
Commercial & Industrial Loans



Source: Board of Governors (H.8)

Note: Adjusted to 1982-1984 Dollars; Adjusted for divestitures & acquisitions for nonbank institutions

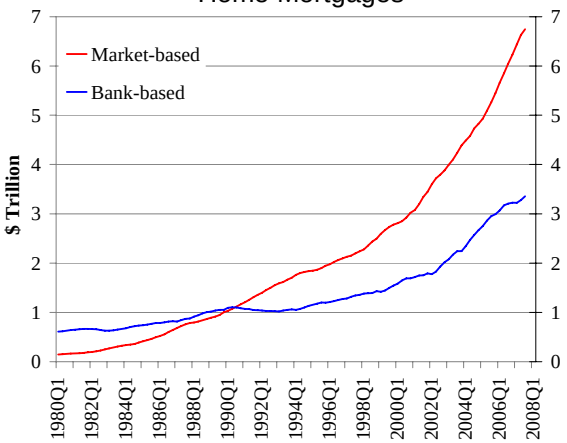
Consumer Loans



Source: Board of Governors (H.8)

Note: Adjusted to 1982-1984 Dollars; Adjusted for divestitures & acquisitions for nonbank institutions

Market-Based and Bank-Based Holding of Home Mortgages



Market-Based Assets (2007Q2)

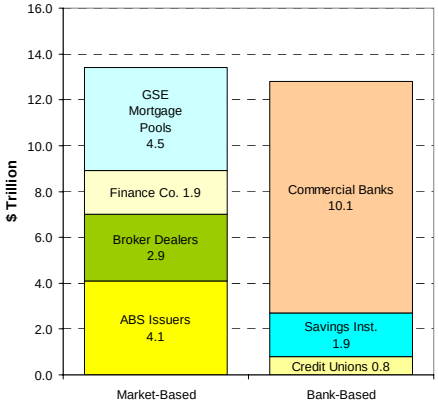


Exhibit 2: Interbank Funding Stress Index

	Current level (Apr 30)	Change since Jan 1	1-year low	1-year high
Interbank funding stress index				
Overall index	**4.73**	**-0.51**	**2.19**	**10.67**
Banking sector credit risk	10.08	2.04	2.55	12.22
Fed lending facilities use	2.38	-2.94	1.91	8.80
Cost of funds in the interbank market	1.72	-0.63	1.01	12.75

Overall interbank funding stress index

Source: New York Fed calculations

Banking sector credit risk

Source: New York Fed calculations

Fed lending facilities use

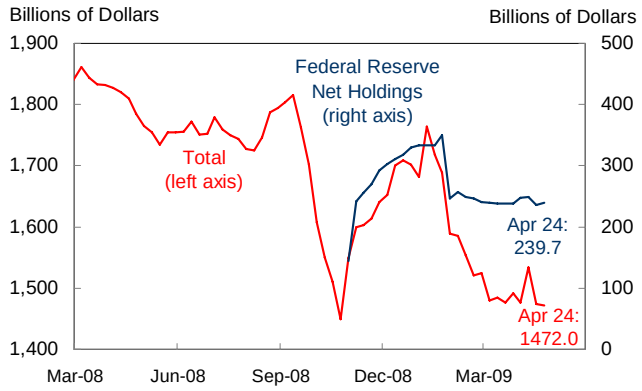
Source: New York Fed calculations

Cost of funds in the interbank market

Source: New York Fed calculations

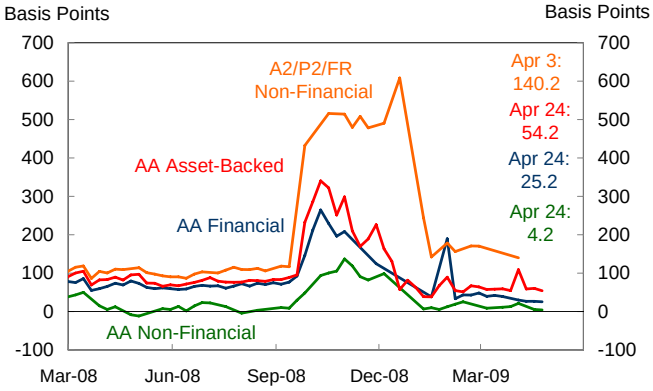
Exhibit 3: Liquidity Facilities

CPFF and Commercial Paper Outstanding



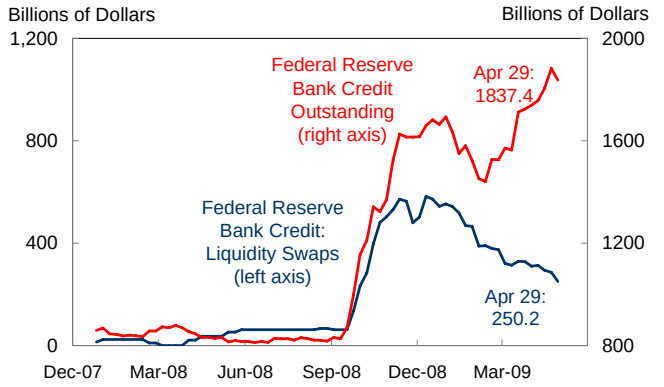
Source: Federal Reserve Board, Haver

3-month CP Rates over OIS



Source: Federal Reserve Board, Haver, Bloomberg

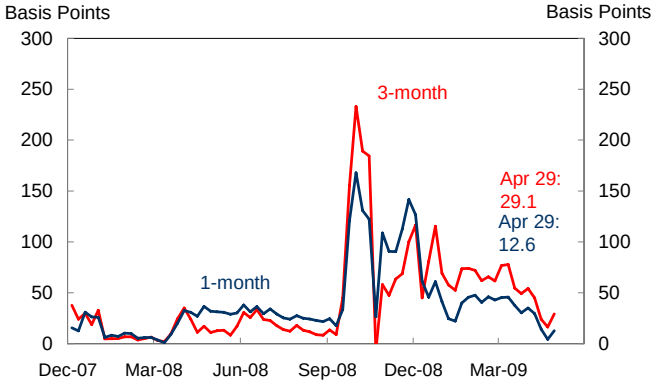
Central Bank Liquidity Swaps



Source: Federal Reserve Board, Bloomberg

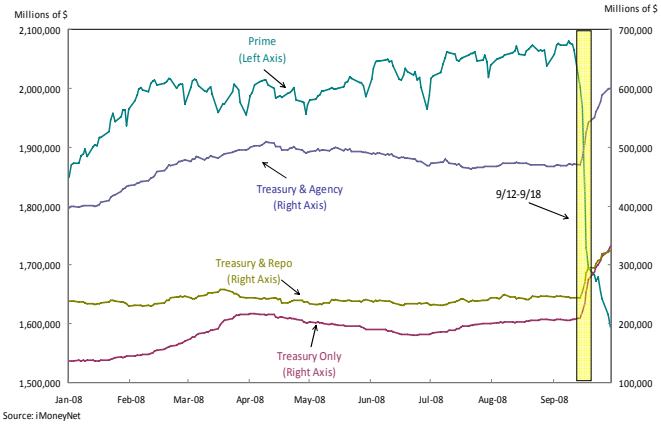
Note: FRB Credit Outstanding is net of Credit to Liquidity Swaps

Euro-Dollar Swap Implied Basis Spreads



Source: Reuters, Tulletts

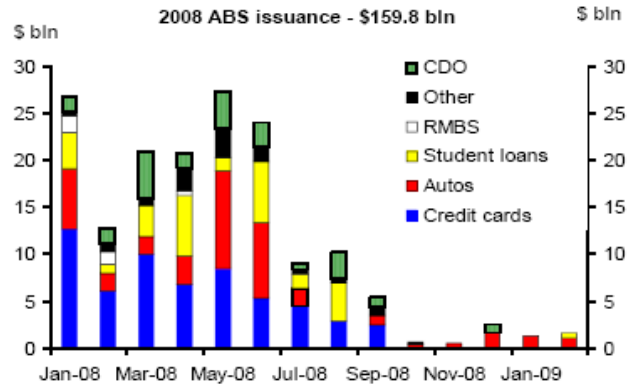
Assets by Money Fund Type: Jan 1 - Sep 30, 2008



Source: iMoneyNet

Exhibit 4: TALF

Securitized Lending Collapse Post-Lehman



Source: DB Global Markets Research

Prime Retail Auto Loan Background

CARAT 2008-2 (GMAC)	Mean FICO	717	Original maturity	62.94 m
73,776 contracts	Mean LTV	103.96%	Remaining maturity	58.61 m
$1.788 billion	Mean APR	4.34%	New cars	80.28%
Mean loan loan size: $24,243	Mean APR (non-sub)	10.52%	Sub-vented	78.70%
	Discount rate	9.25%		

Class	Original ($mm)	Sub	Type	Coupon	Original rating	Current rating	WALM
A-1	285	81.89%	Fixed	2.78%	P-1	P-1	0.24
A-2a	100	50.12%	Fixed	3.74%	Aaa	Aaa	1.00
A-2b	400	50.12%	Floating	2.19%	Aaa	Aaa	1.00
A-3a	320	17.08%	Fixed	4.68%	Aaa	Aaa	2.25
A-3b	200	17.08%	Floating	2.68%	Aaa	Aaa	2.25
A-4	187	5.20%	Fixed	5.42%	Aaa	Aaa	3.26
B	51	1.96%	Fixed	6.46%	A2	A2	
C	23	0.50%	Fixed	7.96%	Baa2	Baa2	
D	8	0.00%	Fixed	8.25%	Ba1	Ba1	
Total	1,574			3.60%			
Reserve	8						

Note: Weighted Average Life to Maturity in years calcualted at 1.40 ABS

According to the credit rating agencies, the A-4 Aaa tranche should be able to withstand a 20 percent unemployment rate

Prime Retail Auto Loan Economics

Demand:

1-month LIBOR+433 bps secondary market spread

Supply:

1-month LIBOR+280 bps maximum issue spread

At current market price, issuers have decided not to issue.

Any lending must be retained on balance sheet, but this is limited by funding and capital.

Prime Retail Auto Loan Economics

1-month LIBOR+2000 bps, hedge fund opportunity cost of funds

Next best alternative use of capital is investment in Aaa-rated RMBS or CMBS super senior bond with very little credit risk and a 25% yield to maturity on an unlevered basis

Demand:

1-month LIBOR+433 bps secondary market spread

Supply:

1-month LIBOR+280 bps maximum issue spread

Prime Retail Auto Loan Economics

1-month LIBOR+2000 bps, hedge fund opportunity cost of funds

Through the use of leverage, TALF helps investors and issuers clear the market, permitting originators to clear their warehouses and originate new loans

Demand:

1-month LIBOR+433 bps secondary market spread

Supply:

1-month LIBOR+280 bps maximum issue spread

TALF Equilibrium:

1-month LIBOR+271 bps TALF issue spread

The Economics of TALF Leverage

- For simplicity, assume haircut of 9 percent and loan rate of 1-month LIBOR plus 100 basis points
- From the issuer's point of view, 9 percent of issue is funded at hedge fund target return, and 91 percent at TALF loan rate, corresponding to a weighted-average funding cost of:

investor cost of capital — TALF cost of funding

9% x (1-mo LIBOR+2000 bps) + 91% x (1-mo LIBOR+100 bps)

- Issue spread is 1-mo LIBOR + 271 bps

Tracking stress in the interbank lending market

Joshua Rosenberg and Samuel Maurer[1]
Research and Statistics Group
October 8, 2008

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1. Introduction

In this memo, we develop an index of stress in the interbank lending market and use this index to track stress during the current financial crisis. Our index combines information on the credit risk in the banking sector, bank use of the Fed's lending facilities, and interbank funding costs.

What makes our approach unique is its focus on the interbank lending market rather than financial conditions in general (e.g., Swistin, 2008), liquidity across markets (e.g., Kerry 2008), or a combination of those factors (Illing and Kiu, 2006; Rosenberg, 2008).[2] An advantage of our methodology is that the components of the index are well-motivated by fundamentals, are easily interpretable, and are relevant to policy decisions related to the interdealer market.

Our main findings are:

- The interbank financial stress index is currently at a record high level, reflecting spikes in counterparty credit risk, funding demand, and funding costs.

- The stress index has historical peaks during the beginning of the credit crisis (August 2007), the tightening of short-term funding conditions preceding the TAF introduction (December 2007), and the Bear Stearns collapse (March 2008).

2. The three components of the stress index

Our index combines information on three key characteristics of the interbank lending market: (1) banking sector credit risk, which is a key determinant of the *supply* of funds, (2) Fed lending facilities use, which provides a measure of the *demand* for funds, and (3) credit spreads that directly measure of the *cost* of funds in the interbank market.

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[1] We are grateful to Tobias Adrian, Jennie Bai, Michael Fleming, Matthew Raskin, and Jennifer Roush for helpful suggestions.

[2] Kerry, William, 2008, Measuring Financial Market Liquidity, Journal of Risk Management in Financial Institutions, Vol. 1, No. 2, pp. 181–90. Swiston, Andrew J., 2008, A U.S. Financial Conditions Index: Putting Credit Where Credit is Due, IMF Working Paper No. 08/161. Mark Illing and Ying Liu, 2006, Measuring Financial Stress in a Developed Country: An Application to Canada, Journal of Financial Stability, Vol. 2, No. 3, pp. 243-265. Rosenberg, Michael, Financial Conditions Watch: Global Financial Market Trends and Policy, August 13, 2008, Vol. 1, No. 1.

2.1 Banking sector credit risk

The first index component, banking sector credit risk, is closely linked to the supply of funds in the interbank market. A negative shock to the banking sector is usually associated with an overall increase in credit risk. Higher credit risk can decrease the supply of credit if some lenders have a minimum credit quality threshold.

In addition, a rise in credit risk is often associated with increase in uncertainty about the credit risk of any individual firm, since the intensity of a credit shock typically varies across firms. As uncertainty about counterparty credit risk rises, some lenders may step back from lending if they have difficulty pricing credit. Alternatively, lenders may offer credit at rates that reflect the risk of their weakest counterparties, tightening credit conditions for all.

We create the banking sector credit risk component using measures of default risk from the equity market (equity index level and volatility), bond market (corporate bond spreads and commercial paper spreads), and credit default swap market (CDS spreads). The 2-year swap spread also incorporates a counterparty credit risk premium, so we include that as well. We do not, however, include any spreads that measure the direct cost of interbank borrowing; those are included in the funding cost index component.

Variables in the banking sector credit risk index are:

- S&P500 financials equity index level (negative)
- S&P500 financials implied volatility
- 5-year CDS spread for J.P. Morgan banks index
- 5-year CDS spread for J.P. Morgan financial services index
- Merrill Lynch banks corporate bond index option-adjusted spread
- Merrill Lynch brokerages corporate bond index option-adjusted spread

2.2 Fed lending facilities use

As the second component of the index, we track bank use of the Federal Reserve's lending facilities to proxy for frictions in the interbank market. For various reasons (including perceived stigma and potentially higher costs), banks utilize Fed facilities primarily when they are having difficulty accessing funds in the interbank market. Thus, the extent of borrowing through these facilities is a natural proxy for interbank market frictions.

Two of the Fed's liquidity facilities – the Term Auction Facility and the Term Securities Lending Facility – use an auction format. A simple measure of demand is the total dollar amount bid compared to the total dollar amount offered. The ratio of these two quantities is

referred to as the bid-to-cover ratio, which we use to measure excess demand for funds (or Treasury collateral).[3] We convert these intermittent series to a daily frequency by holding the values constant until the next auction.

We also consider demand for funds through the Fed's two standing primary credit facilities, the Discount Window and the Primary Dealer Credit Facility. We track the total amount of borrowing, which is reported as a weekly average in the Fed's H.4.1 data release.

Variables in the Fed lending facilities use index are:

- Bid-to-cover ratio, Term Securities Lending Facility schedule 1 auction[4]
- Bid-to-cover ratio, Term Securities Lending Facility schedule 2 auction
- Bid-to-cover ratio, Term Auction Facility
- Amount borrowed, Discount Window
- Amount borrowed, Primary Dealer Credit Facility

2.3 Cost of funds in the interbank market

The third component of the index, the cost of funds in the interbank market, is the equilibrium outcome of supply and demand effects. As stress increases, we expect that the cost of borrowing in the interbank market relative to a riskless benchmark will rise due to an increase in the quantity and price of credit and liquidity risk as well as higher demand for funds.

In this index, we only use credit spreads that directly reflect interbank borrowing. We focus on term borrowing, since the term market is more sensitive to disruptions in the supply of credit than the overnight market.

The variables included in the cost of funds index are: [5]

- 3-month LIBOR to 3-month overnight index swap spread
- 1-month term federal funds to 1-month overnight index swap spread

[3] The amount offered for each of these facilities has also increased over time. We do not currently incorporate this effect.
[4] There are two types of Term Securities Lending Facility auctions. Schedule 2 auctions accept a broader range of collateral.
[5] We originally used the three-month Eurodollar-U.S. dollar FX swap spread basis as a measure of dollar borrowing costs overseas, but this data is no longer available to us. We could also use stop out rate in ECB dollar auctions as an alternative proxy. We also originally included data on secured term lending spreads (Agency and Agency MBS to general collateral repo) but this data is not consistently available from Bloomberg.

- 1-week Agency repo rate to 1-week general collateral repo rate

2.4 Creating the indices

Each index is constructed so that a value of zero means that the stress level is equal to the average stress level in the period prior to the financial crisis. A value of 1 means that the stress level is 1 standard deviation higher than the average during the pre-crisis period.

We define the pre-crisis period as January 1, 2006 to August 8, 2007, because on August 10, 2007 the Federal Reserve announced it was providing liquidity because of "dislocations in money and credit markets." We normalize each series by subtracting the pre-crisis mean and dividing by the pre-crisis standard deviation.[6]

Each of the three index components is an equal-weighted average of its standardized variables. The overall interdealer funding stress index is an equal-weighted average of the three component indices.

3. Tracking stress in the interbank funding market

As shown in Figure 1, the interbank funding stress index is near zero through mid-2007. This indicates that stress levels over this period are close to the pre-crisis average.

Then, there is a rapid rise in stress at the beginning of the financial crisis in August 2007. The elevated level of stress persists until mid-September 2007, reaching a peak of 1.6 and then declining to 0.6 in October 2007. Stress rises again in November and December, reaching a second peak level of 2.8 around the tightening of short-term funding conditions preceding the TAF introduction at the end of 2007.[7]

Stress remains elevated for about two months, but then declines to as low as 1.5 in early February of 2008. The index climbs again in March 2008, reaching a peak of 3.2 following the collapse of Bear Stearns.

Stress levels decline again, this time to a low of 2.2 in May 2008. There is then a gradual rise in stress back up to a level of 3.2 just after the government takeover of Fannie Mae and Freddie Mac on 9/7. The index rises particularly sharply after the Lehman bankruptcy (9/15) and the AIG loan (9/17), spiking up from 3.5 on 9/9 to 7.3 on 9/18.

After the announcement of the Troubled Asset Relief Program on 9/18, the stress index briefly retreats (9/19-9/23). The index then rises steadily, reaching its latest peak of 10.2 on 10/10.

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[6] Because the TSLF was announced on March 11, 2008, we calculate the standard deviations for variables in the demand for funds index over the period from March 11, 2008 to July 31, 2008.

[7] The TSLF was announced on March 11, 2008, and the PDCF was announced on March 16, 2008 (Sunday). The TSLF and PDCF were justified under the Section 13(3) of the Federal Reserve Act. The Term Auction Facility (TAF) was announced on December 12, 2007.

The currently high level of the stress index is due to exceptionally high levels of all three index components (Figures 2, 3, and 4). How does this compare to other peaks in the interbank stress level? At the beginning of the financial crisis, the Fed had not yet expanded its range of liquidity facilities, so the funding demand component remained near zero (Figure 3) and the main measurable drivers of stress were from banking sector credit risk and funding costs. In contrast, the second stress peak in December 2007 reflected increases in all three components of the stress index.

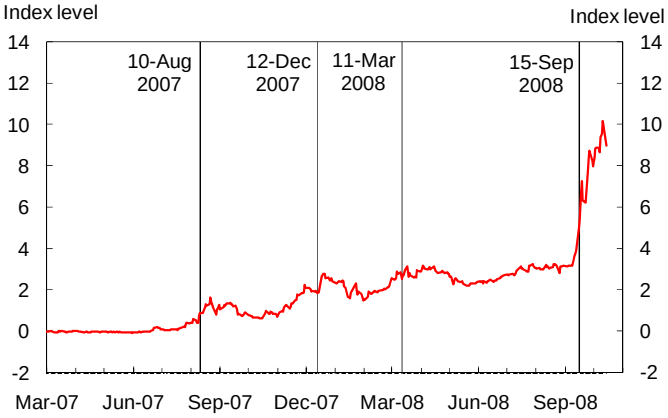
During the third peak around the Bear Stearns crisis, funding costs rose but did not reach the peak experienced around the announcement of the TAF (Figure 4). This may be because the Fed liquidity facilities had effectively contained the cost of funding for dealers. The main drivers of stress at that point were banking sector credit risk and funding demand.

4. Conclusions

There are a range of stress indices available, but for the most part, they are fairly general in terms of the range of variables included and the markets they cover. We introduce a new index of financial stress that focuses on the interbank lending market. The narrow definition of this index, we believe, is helpful because it is easier to interpret and potentially more valuable in making policy decisions related to conditions in the interbank market.

Figures

Fig. 1: Overall interbank funding stress index



Source: New York Fed calculations

Fig. 2: Banking sector credit risk

Source: New York Fed calculations

Fig.3: Fed lending facilities use

Source: New York Fed calculations

Fig. 4: Cost of funds in the interbank market

Source: New York Fed calculations

Asset Portfolio Insurance versus Whole Bank Insurance

December 8, 2008

James McAndrews

Why ring-fence a specific portfolio within the bank, and not insure the whole bank? Recently, Kashyup, Rajan, and Stein (2008) and Rochet (2008) discussed the desirability of catastrophic capital insurance for a bank. Rochet's version would have the government offer insurance to a major financial institution that would pay off in a situation in which the aggregate write-offs of the major financial institutions in a given period exceed some trigger level. Alternatively, Flannery (2005) offered a related idea in which the institution would obtain more equity capital when its aggregate market value fell below some trigger level. We'll call the idea that the government would inject capital into a major financial institution based on some trigger event "whole bank" insurance, to distinguish it from the asset guarantee involved in the Citibank case. Below are some preliminary thoughts on a comparison of these two options.

The ring-fencing and tail risk guarantee for a specific portfolio might be useful in an environment in which a. the asset is held for trading, and b. the asset can't be sold as it has become completely illiquid. In that case marks can fall as a result of purely sunspot expectational fears that the assets are even worse than had been thought yesterday, leading to a confidence destroying series of lower marks. (I think this can also affect the accrual-book assets as well, if the firm feels that it has to increase loan-loss provisions with each mark-down of the asset by it or some other bank.) In such a situation, an asset ring-fence and tail-risk guarantee can prevent the serial deterioration of the bank, and promote some liquidity for the assets in the portfolio, as the assets can be safely pledged as collateral, and the deductibles combined with the price of insurance give some indication of asset values too. In any case, it stabilizes the value of that portfolio, which removes uncertainty regarding the contribution of that portfolio to the bank's health.

The ring-fence asset guarantee also takes the view that banks were caught by the illiquidity of those "legacy" assets through the working of systemic forces. The rest of their banking business, including business that might be extremely risk given the economic climate is something that should be managed by the bank.

The whole bank guarantee, if provided with co-pay, is similar to the provision of contingent capital with coinvestment. The capital purchase program is somewhat similar, although it has the government's interest as senior to, rather than junior to (or 90 percent junior to) the existing common equity holders. There may be more difficulty in moral hazard when trying to insure a whole bank, as opposed to a set of ring-fenced assets. Even though the insurance is used based on some public signal, nonetheless, the bank could anticipate that signal and destroy value through various bet the ranch strategies, significantly increasing the government's losses.

Both Ring-fencing and Whole-Bank guarantee have mixtures of adverse selection and moral hazard, with ring-fencing possibly suffering more adverse selection risk and whole-bank guarantees suffering from more moral hazard risk. Ring-fencing might be better if there is a clear "vintage" of assets that just went illiquid, while whole-bank might be better if the banks simply are highly correlated with the economy, and no subset of assets is to blame. (We seem to

have both conditions now. That might suggest the Citi solution--ring-fence guarantee and purchase of capital).

Depending on which type of trigger event is used to call on the insurance, a whole bank guarantee could be even more costly, from an operational perspective, to implement than the ring-fencing of a specific portfolio. In particular, if the Kashyup, Rajan, and Stein (2008) trigger of an aggregate amount of write-offs is used, then the banking supervisor would need to monitor a dynamic portfolio of all the bank's assets to assure compliance with the best practice in terms of marking the bank's assets to market. Alternatively, the market value trigger, suggested by Flannery (2005) might be simpler to administer. Both alternatives involve moral hazard, although Flannery argues that the moral hazard is attenuated as the market value of the institution is largely out of the fine control of management.

Both strategies are novel in that they intend to maintain the bank in business (as opposed to paying off the insurance only on the failure of the bank, or taking assets off the balance sheet only if the bank fails--as was the case with the RTC for the S&Ls).

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A simple model of the efficiency of capital with insurance.

Simon Potter
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January 3, 2009

1 Introduction

Experience shows that what happens is always the thing against which one has not made provision in advance." Letter from John Maynard Keynes to Jacob Viner as reported by Tom Sargent.

This note presents a simple model to examine the relative efficiency of capital injections alone compared with a capital injection plus insurance on some subset of assets in an economy with high levels of macroeconomic risk. The model assumes the existence of uncertainty in the Knightian sense, in the modern literature this is often called ambiguity aversion following the experimental work of Ellsberg that showed that the standard Savage expected utility framework did not capture behavior in environments with Knightian uncertainty. In the experiments of Ellsberg, individuals react adversely to lotteries that if repeated many times would be fair but in a single instance might be arbitrarily biased. Form the ex ante averaging perspective of Savage expected utility the lottery is assessed as if it would be repeated many times in terms of decision making. In the current situation where individuals might be facing a large number of such ambiguous choices the government can have an advantage by acting as if the gamble will be repeated many times, whereas as an individual might exhibit extreme ambiguity aversion. In this perspective much of the illiquidity in certain assets (for example, high bid to ask spreads) is caused by the ambiguity aversion.

The model presented below captures some of the salient features of the current situation: macroeconomic risk is high and there are some assets that

are very difficult to value, we will call these ambiguous assets. The results indicate that if the share of ambiguous assets is high it is more efficient to offer a combination of capital and insurance. The reason is that the government can "price" the insurance in a less ambiguity averse manner than the private sector would. Also since the insurance provides an option on the payoffs for good outcomes, the ambiguity makes this option more valuable since in the model used here agents assume the maximum amount of uncertainty in the ambiguous assets. In addition, insurance is in practice an ex-post capital injection and thus assuming some diversification in payoffs across the financial systems it can more efficiently distribute capital.

2 Simple Model

To simplify assume two Banks A and B and two types of assets x_1, x_2. The share of asset x_1 in each bank's portfolio is given by λ and the total holdings of each bank is one unit. Asset x_2 is ambiguous in the sense that its probability distribution is not known. It is useful to think of these as the legacy assets.

In order to capture macroeconomic risk it is assumed that the payoffs (here expressed as losses) on the two types of assets are correlated through the state of the economy. Further, it is assumed conditional on the state of the economy, the losses across assets are independent and more importantly the losses on the same asset held by different banks are also independent. The latter assumption allows a simpler set of calculations. This environment is formalized by the use of a mixture of normals for each asset:

$$x_1 \sim \begin{cases} N(\mu(R), \sigma_1^2(R)) \text{ if the economy is in state } R \\ N(\mu(D), \sigma_1^2(D)) \text{ if the economy is in state } D \end{cases},$$

$$x_2 \sim \begin{cases} N(\mu(R), \sigma_1^2(R)) \text{ if the economy is in state } R \\ N(\mu(D), \delta^2(D)) \text{ if the economy is in state } D \end{cases},$$

where δ is drawn from a uniform distribution on $[\sigma_1(D), \overline{\sigma}]$. For a fixed δ there is no ambiguity about asset 2 but economic agents are unsure about its value, leading to ambiguity. Finally let π be the (objective) probability assigned to the realization of state R. In some approaches to Knightian uncertainty the presence of the ambiguity over the payoffs to asset 2 would also lead economic agents to alter their views about the likelihood of various states of the world. This phenomenon is what Bucklew (2004, p. 27) calls

Murphy's law: *The probability of anything happening is in inverse ratio to its desirability.* Instead of using a modern approach (see work by Hansen and Sargent) to dealing with this form of uncertainty, it will be assumed that economic agents use a maximin type approach. That is, agents assume the worst outcome $\delta = \overline{\sigma}$ and the existence of ambiguity does not skew the probability of state D as in some of Hansen and Sargent's work. Thus, the results here will underestimate the government's advantage in combating ambiguity aversion.

First consider the case where the government injects capital to achieve a joint probability of α, as perceived by private agents, that net losses will be less than ℓ **for each bank**. In order to achieve this probability in the face of uncertainty over the probability distribution of losses in state D, assume the government needs to respect the maximin strategy of assuming the worst of private agents, i.e., $\delta = \overline{\sigma}$ for both Banks. Then each bank will require a capital injection of k such that

$$\pi\Phi\left[\frac{\ell-\mu(R)+k}{\sigma_1(R)\sqrt{\lambda^2+(1-\lambda)^2}}\right]^2+(1-\pi)\Phi\left[\frac{\ell-\mu(D)+k}{\gamma}\right]^2=\alpha,$$

where $\gamma=\sqrt{\lambda^2\sigma_1^2(D)+(1-\lambda)^2\overline{\sigma}^2}$.

Now consider a mixture of a capital injection for the banks and insurance on losses for assets x_2. The criterion is still the same, provide sufficient capital and insurance to achieve a probability of α, as perceived by private agents, that net losses will be less than ℓ **for each bank.** To further simplify assume the insurance contract just has one parameter the first loss position of the bank, F per unit of x_2, thus the government provides 100% insurance after this first loss position. Thus the losses on assets x_2 are now given by a truncated normal distribution in both states of the economy and the expected cost of the insurance conditional on δ to the government can be calculated as:

$$\begin{aligned}C_F(\delta) &= \pi\left(1-\Phi\left[\frac{F-\mu(R)}{\sigma(R)}\right]\right)\left[\mu(R)+\sigma(R)\frac{\phi\left[\frac{F-\mu(R)}{\sigma(R)}\right]}{1-\Phi\left[\frac{F-\mu(R)}{\sigma(R)}\right]}-F\right]+\\ &\quad (1-\pi)\left(1-\Phi\left[\frac{F-\mu(D)}{\delta}\right]\right)\left[\mu(D)+\delta\frac{\phi\left[\frac{F-\mu(D)}{\delta}\right]}{1-\Phi\left[\frac{F-\mu(D)}{\delta}\right]}-F\right].\end{aligned}$$

Finally to construct the loss distribution with insurance and a capital injection simplify (wlog) by assuming the capital k_1 is used only for losses against asset x_1 after the realization of the losses against asset $x_2, f \leq F$. Thus to find capital k_1 that satisfies the probability of loss ℓ condition it will be necessary to integrate out the first loss position on asset x_2 using the truncated normal distributions $g_R(f), g_D(f)$. For consistency with the capital injection defined above, the government again assumes that the private sector is using the worst case for the loss distribution for this calculation. Note that because of the truncation of losses at F the ambiguity in the distribution now can have some potential benefits as the Bank has received some option value that increases with δ.

$$\begin{aligned} & \pi \left[\int_{-\infty}^{F} \Phi \left[\frac{\ell - \lambda\mu(R) + (k_1 - f)}{\lambda\sigma_1(R)} \right] g_R(f;\lambda) df \right]^2 + \\ & (1-\pi) \left[\int_{-\infty}^{F} \Phi \left[\frac{\ell - \lambda\mu(D) + (k_1 - f)}{\lambda\sigma_1(D)} \right] g_D(f;\overline{\sigma},\lambda) df \right]^2 \\ = \quad & \alpha. \end{aligned}$$

In the case of the capital injection only the government's "cost" is $2k$. In the case of capital injection plus insurance the government's ex ante "cost" is $2k_1(F) + E[C_F(\delta)|A] + E[C_F(\delta)|B]$. Consider the case where the government uses the uniform distribution over the standard deviation of losses in state D for x_2 for both banks to calculate the expected cost of the insurance. Insurance+capital is more efficient if it achieve the same level of α with lower cost. The expressions above are difficult to compare analytically, however it is likely that a formal proof could be constructed of the efficiency of capital+insurance in this environment. For the moment, simulation will be used to illustrate the result.

3 Simulation

In order to investigate these issues numerically consider a case where expected losses in the state R are normalized to zero ($\mu(R) = 0$). With this normalization the expected capital hole for the banking system can be defined as $2(1-\pi)\mu(D)$. Assume that the deductible on the insurance is set equal to the expected loss on the legacy portfolio, $F = (1-\pi)(1-\lambda)\mu(D)$ and the government charges for the insurance using the uniform distribution

over δ. Thus, the government is providing risk and ambiguity neutral pricing of the insurance. In terms of dispersion of the loss distributions normalize by setting $\sigma_1(R) = \sigma_1(D)$. Finally, set the desired loss absorption level for each bank as $\ell = 2$, $\mu(D) = \overline{\sigma} = 2$ and $\pi = 0.75$. The share of non-ambiguous assets $\lambda = 0.9, 0.8, 0.7, 0.6$. This fixes the expected capital hole at 1 and the first loss positions at $0.05, 0.1, 0.15, 0.2$.

The attached set of 4 figures shows how the probability that both banks have losses below 2 varies with different capital injections for the two approaches across different shares of ambiguous assets. The x axis shows the level of aggregate capital injection. It starts at zero for the capital only plan and at negative values for the capital+insurance to represent the cost to the bank paying the insurance premium. Thus for the capital+insurance scheme the zero value represents a capital injection equal to the insurance premium against losses higher than the expected value. The y axis shows various levels of α, the probability that the loss is less than 2 for both banks.

The figures also show the the effects of the capital injection in the case of lowest possible standard deviation in state D for assets x_2, that is if private agents assumed the best about the ambiguous assets. The difference between the probability schedule for this "low standard deviation" capital injection and the one under the worst case gives one measure of the importance of ambiguity. It is difficult to work out how much of the benefit of insurance comes from the ability to inject capital in an efficient manner so a further schedule was produced for capital plus insurance but assuming f was integrated out using the most optimistic distribution. The gap between this schedule and the capital only schedule with low standard deviation gives a measure of the ability of insurance to inject capital in an efficient manner. The gap between the capital+insurance schedule with the "optimistic" distribution and the one with the "pessimistic" distribution gives a measure of extra option value from the ambuigity.

The results indicate that with a high share of ambiguous assets insurance has large efficiency advantages. For example, in figure 3 the insurance by itself (ie no capital injection) with a premium of 0.165 per bank provides similar protection to a capital injection equal to the expected capital hole. If the attachment point is breached the government has to payout about 0.15 per bank over and above the premium. This would be equivalent to an ex post capital injection of 0.3.

Next the ring-fencing form of the insurance is compared with two alternatives. Again it is assumed that the alternatives also include capital injections.

The first is where an Aggregator Bank buys the legacy assets from the banks; the second is where banks are offered an insurance contract based on the aggregate losses on legacy assets. To be more specific the aggregator bank buys the legacy assets from the private banks at their value in state D. The private banks agree to take the first loss position in the aggregator bank. The first loss position is $(1-\pi)(1-\lambda)\mu(D)$. The aggregator bank charges a fee for taking on the tail risk. For example, if the private banks receive all the upside at the Aggregator bank the fee is the same as the insurance premium above. If the government through the Aggregator bank gets to share in the profit the fee is reduced. Again assume that the government averages across values of δ in constructing the new fee schedule. Figure 5 compares ring-fencing with the Aggregator Bank for 30% ambiguous assets with two types of profit sharing: 50% and 90% to the government. In both cases ring-fencing dominates but the Aggregator bank is clearly preferable to capital alones insurance as can be seen by comparing to Figure 3.

The aggregate insurance contract has the same premium and first loss position as the ring-fencing contract. The only difference is that payoffs are triggered not by individual losses but by average losses across the two banks. We consider two cases: 10% and 40% amibiguous assets. These are shown in Figures 6 and 7 respectively. For the smaller share of ambiguous assets the aggregate contract dominates and this is reversed as the share of ambiguous assets increases. A reasonable explanation is that for small shares the aggregate contract is capturing the general macro risk which is the dominant risk. With larger shares of legacy assets, the uncertainty over their value starts to dominate.

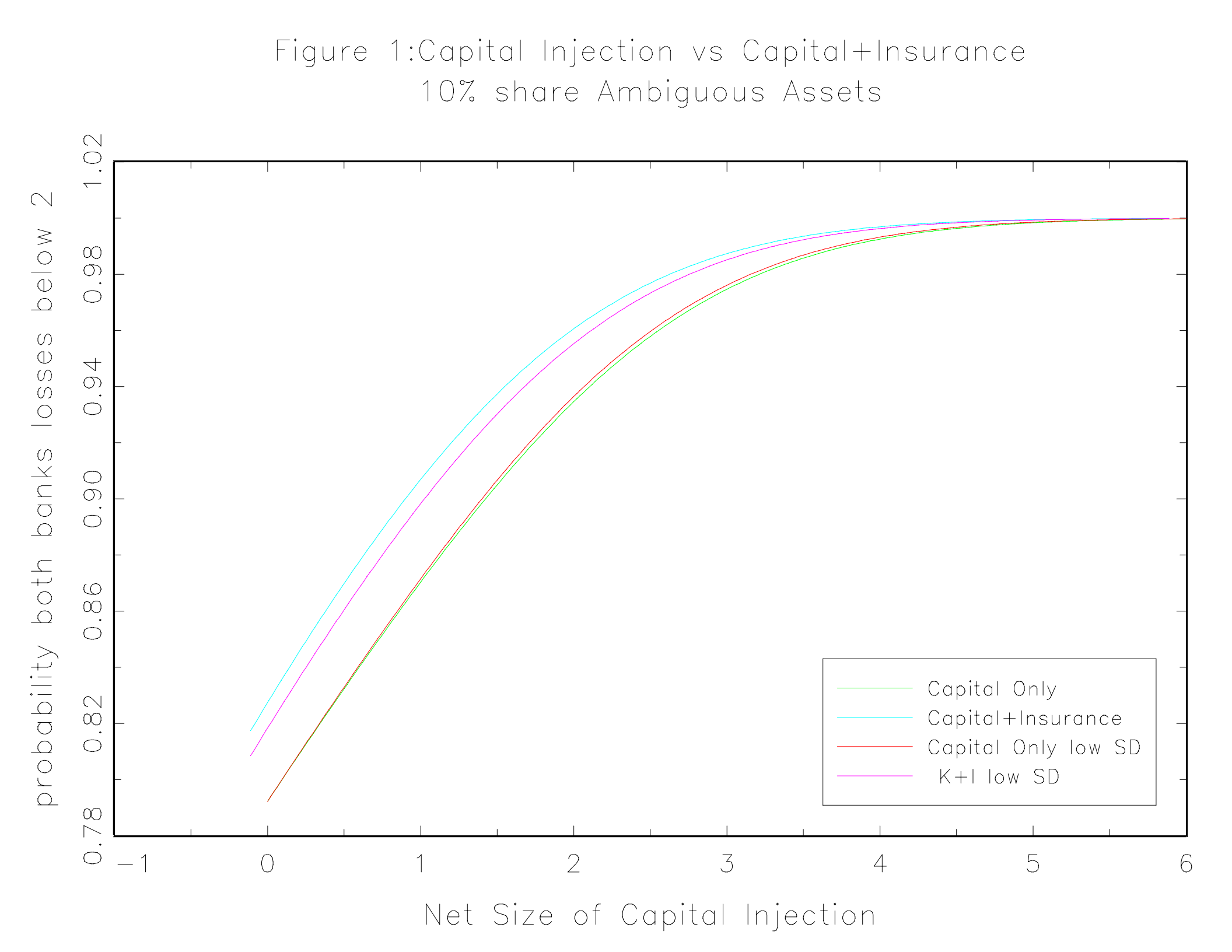


Figure 1:Capital Injection vs Capital+Insurance
10% share Ambiguous Assets
probability both banks losses below 2
0.78
0.82
0.86
0.90
0.94
0.98
1.02
−1
0
1
2
3
4
5
6
Net Size of Capital Injection
Capital Only
Capital+Insurance
Capital Only low SD
K+I low SD

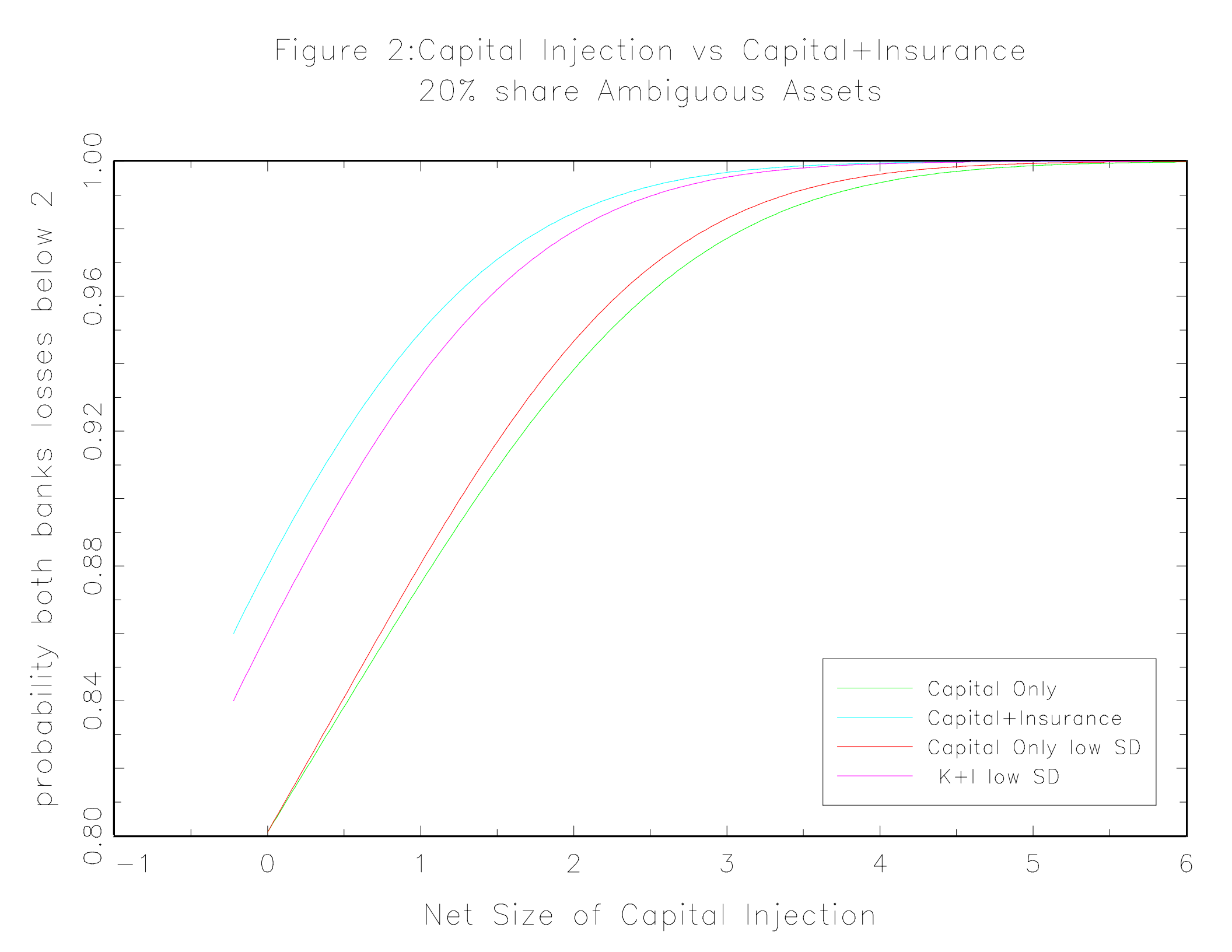


Figure 2:Capital Injection vs Capital+Insurance
20% share Ambiguous Assets
probability both banks losses below 2
1.00
0.96
0.92
0.88
0.84
0.80
−1
0
1
2
3
4
5
6
Net Size of Capital Injection
Capital Only
Capital+Insurance
Capital Only low SD
K+I low SD

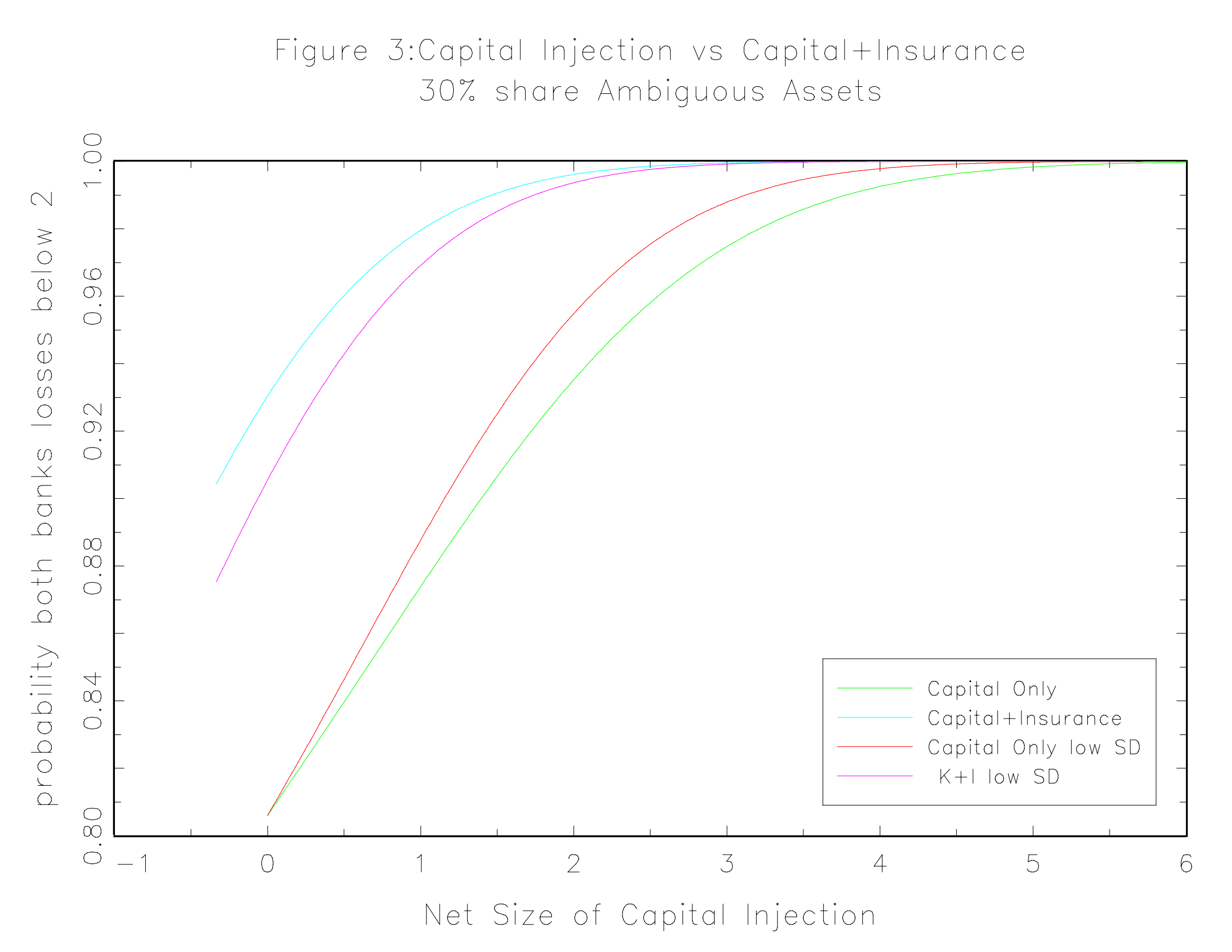


Figure 3:Capital Injection vs Capital+Insurance
30% share Ambiguous Assets
probability both banks losses below 2
0.80
0.84
0.88
0.92
0.96
1.00
−1
0
1
2
3
4
5
6
Net Size of Capital Injection
Capital Only
Capital+Insurance
Capital Only low SD
K+I low SD

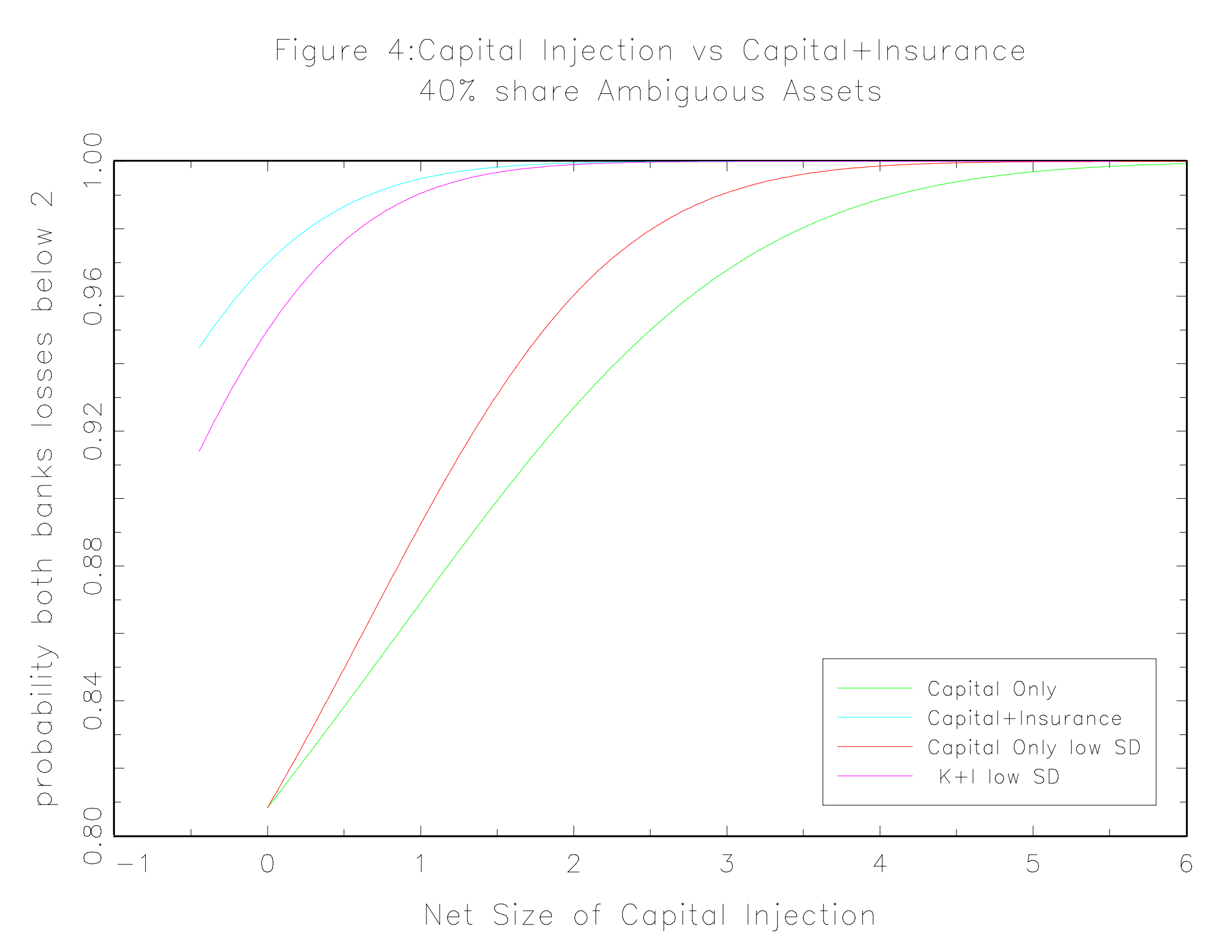


Figure 4:Capital Injection vs Capital+Insurance
40% share Ambiguous Assets
probability both banks losses below 2
1.00
0.96
0.92
0.88
0.84
0.80
−1
0
1
2
3
4
5
6
Net Size of Capital Injection
Capital Only
Capital+Insurance
Capital Only low SD
K+I low SD

Figure 5: Ring Fence vs Aggregator Bank
30% share Ambiguous Assets

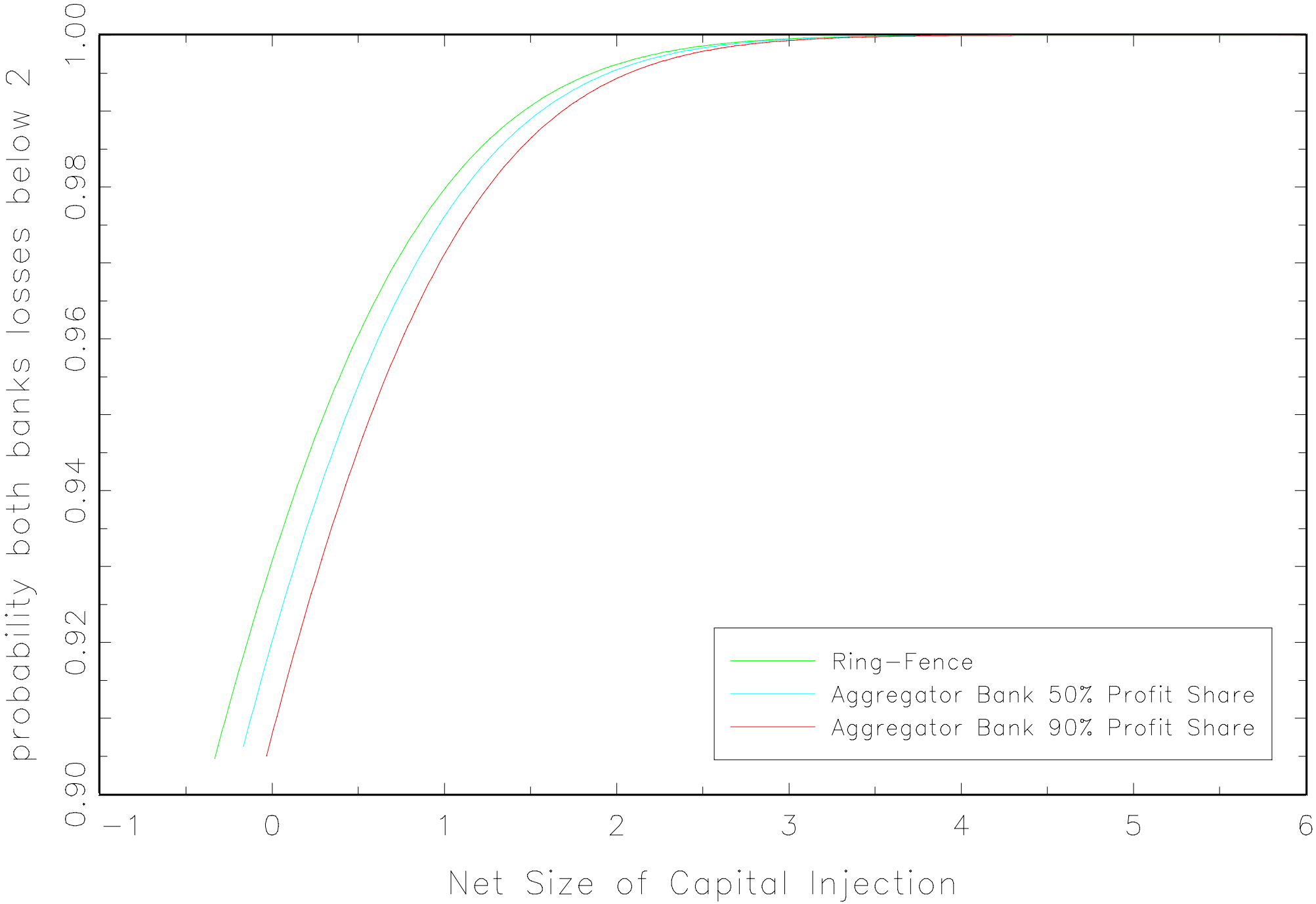


Figure 6: Ring Fence vs Aggregate Insurance Contract
10% share Ambiguous Assets

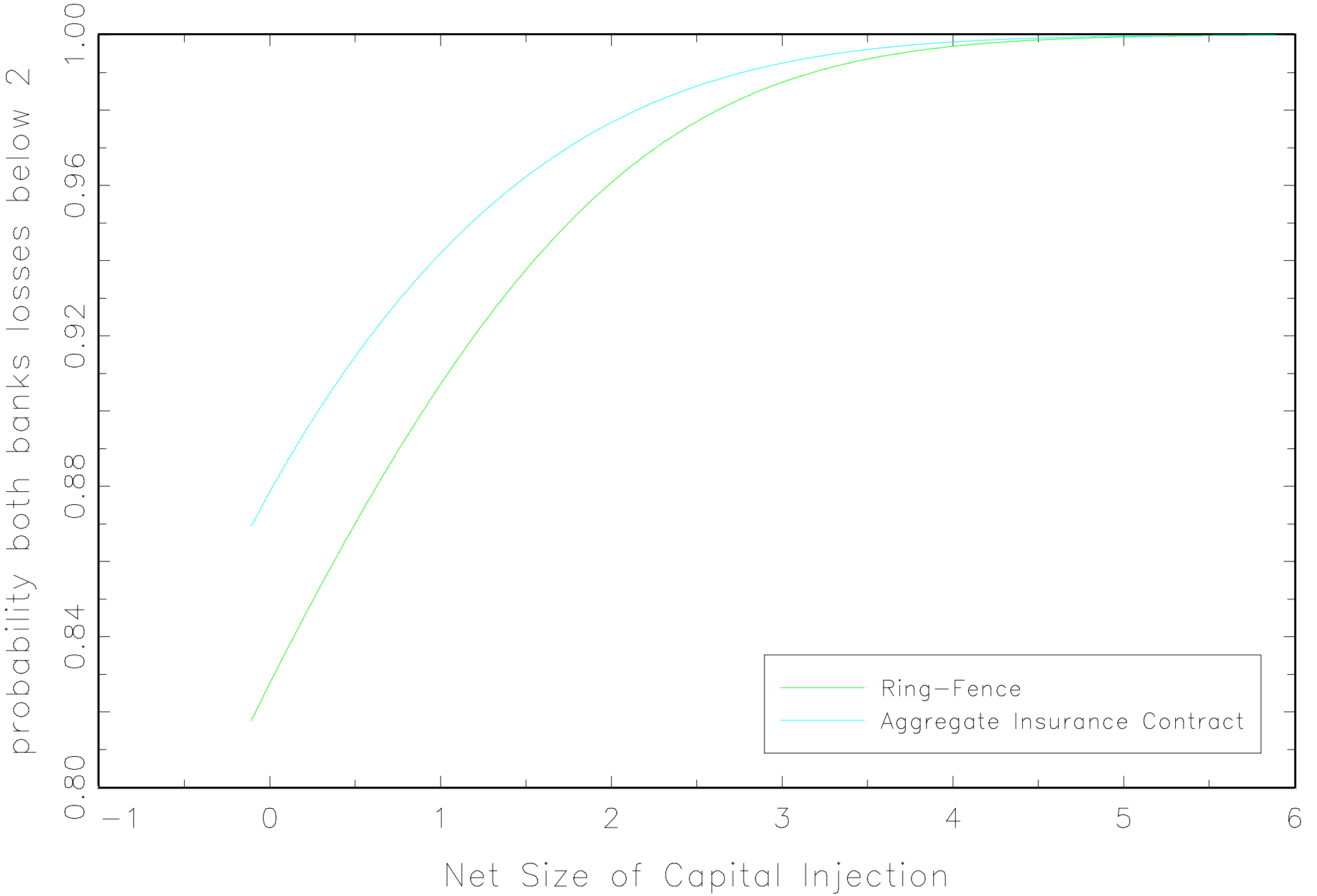
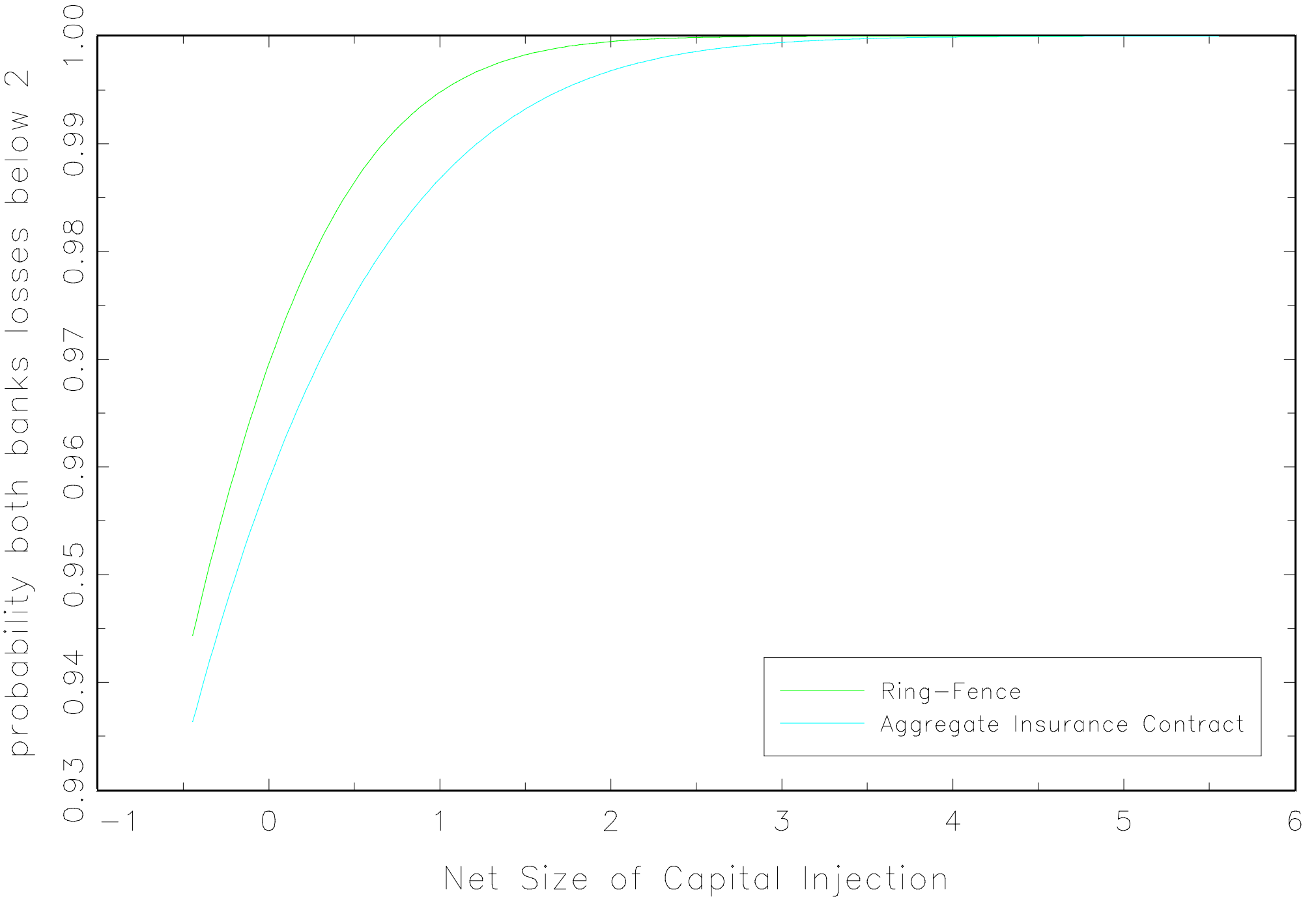


Figure 7: Ring Fence vs Aggregate Insurance Contract
40% share Ambiguous Assets



Some Measures of the Current Stance of Monetary Policy

Marco Del Negro and Simon Potter

Three alternative measures of the stance of monetary policy are examined:

1. Prescriptions of contemporaneous feedback rules -- using 2009Q1 data -- with response coefficients to output and inflation gaps taken from Taylor's original work.

2. Prescriptions of forecast based rules -- using 2009Q4 projections -- with response coefficients to output and inflation gaps taken from Taylor's original work. The forecasts are set equal to either the FRBNY central scenario projection or the FRBNY forecast taking into account our risk assessment.

3. Counterfactual simulations from i) a Bayesian vector autoregression with a prior generated by a Dynamic Stochastic General Equilibrium (DSGE-VAR) and ii) a medium-scale DSGE model. The DSGE-VAR model is estimated using data from the last 25 years on GDP and core PCE with the average target FFR in the 3rd month of the quarter as the policy rate. The DSGE is estimated using also data on total hours and the labor share. The counterfactual is constructed by setting the shock to the policy rule to zero after 2007Q3.

These measures are meant as illustrations and are not intended to span the prescription of all policy type rules, optimal policy or robust control.

In Taylor's original formulation the policy rate is moved by 1.5 times the size of the inflation gap and 0.5 times the size of the output gap. We center the inflation gap at 2% for core PCE inflation. This leaves the value of intercept (often called the neutral rate) to be determined. It is difficult to obtain precise estimates of this time varying value. In the past we have assessed the plausible range of values to be between 3.0 to 5.5%. Because of the substantially tightening of financial conditions during the crisis, the neutral rate is likely in the lower part of this range or even well below 3%. Thus we focus on the policy prescriptions obtained using a range of 2.0 to 3.5% for neutral rate. A summary of the results is presented in the Table at the end of this note.

The contemporaneous feedback rule prescribes a policy rate about 350 bps below the neutral rate, mainly as a result of an output gap currently estimated to be larger than 6%. Using the forecast based rule with the FRBNY point projection for 2009, the prescriptions fall to about 600 bps below the neutral rate. Taking into account the balance of risks around the FRBNY projection prescribes an additional 100 bps of easing. Note this takes the nominal rate well below the zero bound even using 3.5% as a measure of the neutral rate.

The calculations above assume the policy rate is not adjusted in an inertial manner. The counterfactuals generated by the estimated vector autoregression and the DSGE capture in its path some of the inertia policy rates observed over the last 25 years, the average neutral rate over this period and estimated response coefficients to inflation and

output gap. The counterfactual prediction for the FFR in 2009Q1 is at 75bps according to the DSGE-VAR and 0bps according to the DSGE model.

Policy Rule	**Rate Prescription**
Contemporaneous Feedback	-1.5 to 0
Forecast Based	-4.0 to -2.5
Forecast Based with Risks	-5.0 to -3.5
Counterfactual with DSGE-VAR	0.75
Counterfactual with DSGE	0