11 July 2014 │ 13 pages

U.S. Economics Market and Policy Comments

Fed Chiefs Debate Monetary Normalization While Yellen Passes Off Financial Stability

William Lee
+1-212-816-2621
william.lee@citi.com

Peter D'Antonio
peter.dantonio@citi.com

Dana M Peterson
dana.peterson@citi.com

Benjamin R Mandel
benjamin.mandel@citi.com

Malcolm D Spittler
malcolm.d.spittler@citi.com

Joe Seydl
joseph.seydl@citi.com

- The 2008 global financial crisis challenged central banks to modify their accepted policy framework to include a mandate for financial stability. Nevertheless, the Fed has downplayed financial stability as a direct mandate for formulating monetary policy.

- The Bank for International Settlements (BIS) admonished many central banks for succumbing to asymmetric policies over successive business cycles where interest rates are lowered aggressively during downturns, but not raised adequately during expansions. In place of such downward bias for rates, the BIS advocated tightening whenever financial imbalances accumulate, even if inflation appears under control. Chair Yellen rejected the use of monetary policy to limit financial imbalances and incipient asset bubbles because she considers monetary policy to be too blunt an instrument.

- An extreme asymmetric approach to conducting macroprudential policy would be to ignore asset bubbles, and only act to address the fallout if the asset bubble ruptures. Such an approach is most closely associated with former Chairman Greenspan's successful efforts to mitigating the harmful real effects of the burst tech bubble. By contrast, embracing the importance of financial stability as a policy goal, and incorporating it into the monetary policy framework has been emphasized by former Fed Governor Jeremy Stein.

- Chair Yellen has consistently stated that financial stability considerations should be left to macroprudential policies. Such policies would be geared toward increasing the resilience of financial institutions against exogenous shocks. This entails bolstering loss-absorbing capital and liquidity buffers. Their adequacy is measured by the Tier-1 capital ratio and the more demanding leverage ratio. Countercyclical capital buffers under Basel III would provide additional loss absorbing capacity.

- It is uncertain whether quantitative easing leads to more debt and higher leverage, which may induce unintended macroprudential tightening that can dampen real activity. However, macroprudential policy has been conducted in a purely discretionary manner, and subject to the pitfalls of time inconsistency.

- It may be preferable to assign to the Financial Stability Oversight Council (FSOC) all financial stability responsibilities along with appropriate powers to implement and enforce comprehensive macroprudential policies for all financial institutions and markets.

Fed Chiefs Debate Monetary Normalization While Yellen Passes Off Financial Stability

William Lee
(1-212) 816-2621
william.lee@citi.com

Chair Yellen has declared that "…monetary policy faces significant limitations as a tool to promote financial stability."

To paraphrase President Kennedy: Much has been expected from the Fed because much power and independence has been granted to it. Notwithstanding pressures for the Fed to add financial stability as a "main course" in its policy menu, Chair Yellen has pushed back and declared that "…monetary policy faces significant limitations as a tool to promote financial stability."[1] Indeed, Chair Yellen noted that she "…[does] not presently see a need for monetary policy to deviate from a primary focus on attaining price stability and maximum employment…[to] address financial stability concerns." Instead of monetary policy, a macroprudential approach to supervision and regulation has had and will retain primary responsibility for financial stability matters. Consequently, the minutes of the last Federal Open Market Committee (FOMC) meeting show a focus on forging the tools for an exit from the current low-rate policy stance with minimal attention for possibly accelerating the timing of rate increases because of financial imbalances induced by the Fed's use of unconventional monetary measures.

FOMC: Minutes Enlighten Still-Opaque Monetary Normalization and Exit Strategies

We have been expecting more clarity about the Fed's exit strategy in the minutes.

We have been expecting more clarity about the Fed's exit strategy since we published our own best guess about how the Fed will implement its exit strategy.[2] This week's release of the June FOMC minutes ratified most of our guesses about the supremacy of rates as the Fed's primary policy tool. However, the minutes also raise questions about how rates will be adjusted as policy normalizes.

The FOMC has not agreed to important details about its new operating framework.

The FOMC continues to discuss how to achieve all of the following requirements:(1) the interest on excess reserves (IOER) will "play a central role during the normalization process;" (2) the rate on overnight reverse repurchase agreements (ONRRP) "could play a useful supporting role by helping to firm the floor under money market rates…" and "…that a relatively wide spread…near or above the current level of 20 basis points…would support trading in the federal funds market and provide adequate control over market interest rates;" (3) "…the federal funds rate should continue to play a role in the Committee's operating framework and communications during normalization;" and (4) while the "…ONRRP facility could play an important role ...[during] policy normalization...[several of the FOMC members] did not anticipate that [the ONRRP facility] would be a permanent part of the …longer-run operating framework."

With the banking system flooded with reserves ($2.7 trillion), controlling the federal funds rate will be problematic even with the Fed's recently developed capability of paying interest on excess reserves (IOER). That is because Government Sponsored Enterprises (GSEs), such as the Federal Home Loan Banks, can lend into the fed funds markets but are not eligible to deposit at the Fed. Consequently, fed funds currently trade well below IOER (at around 9bps), and is not as tightly linked with other money market rates such as the ONRRP rate.

FOMC discussions implying that the ONRRP rate would play a secondary support role was surprising. This may require the Fed to tighten up the fed funds market to control the fed funds rate, which may entail substantial reserve draining. Yet the

---

[1] Janet Yellen, "Monetary Policy and Financial Stability" IMF 2014 Michel Camdessus Central Banking Lecture, July 2, 2014 http://www.federalreserve.gov/newsevents/speech/yellen20140702a.pdf.

[2] See William Lee, Global Economics View - How Will The New Fed Exit Strategy Work? June 16, 2014.

FOMC minutes suggest reserve draining tools such as term deposits and term repo facilities will only be used "if necessary."

It is puzzling that the ONRRP will not be one of the Fed's primary policy rates along with the IOER.

Also, with the ONRRP more tightly connected to longer-term interest rates than the federal funds rate, it is puzzling that it will not become the Fed's primary policy rate along with the IOER. The FOMC expressed concerns that its presence in the ONRRP market may distort an important short-term funding facility for financial and nonfinancial corporations.

However, we do not believe it is necessary that the Fed must be in the repo markets in size to influence its rate. Continued preference for targeting the fed funds market reflects surprising conservatism among some FOMC members in light of their radical use of unconventional monetary policy tools since the crisis.

There were no surprises about the prospective end to asset purchases, nor to the FOMC's assessment of economic conditions (even in light of the surprisingly weak first quarter GDP revision). The Fed's exit tools and tactics are clearly a "work in progress," and discussions within the FOMC will continue. The sooner market participants are informed about the new operating framework, the less uncertainty and speculation there will be about how prospective tightening moves will be implemented.

Chair Yellen: Financial Stability Is Not a Monetary Policy Target

The 2008 global financial crisis challenged central banks to modify their accepted policy framework to include a mandate for financial stability.

The 2008 global financial crisis challenged central banks to modify their accepted policy framework to include a mandate for financial stability. Events showed that targeting price stability and full employment were not enough to ensure macroeconomic stability when financial imbalances undermined the integrity of the financial system. It became obvious that central bank toolkits had to be redesigned to include macroprudential tools, and policy strategies expanded to incorporate intermediate targets addressing financial stability.

Nevertheless, the Fed has downplayed financial stability as a direct mandate for formulating monetary policy.

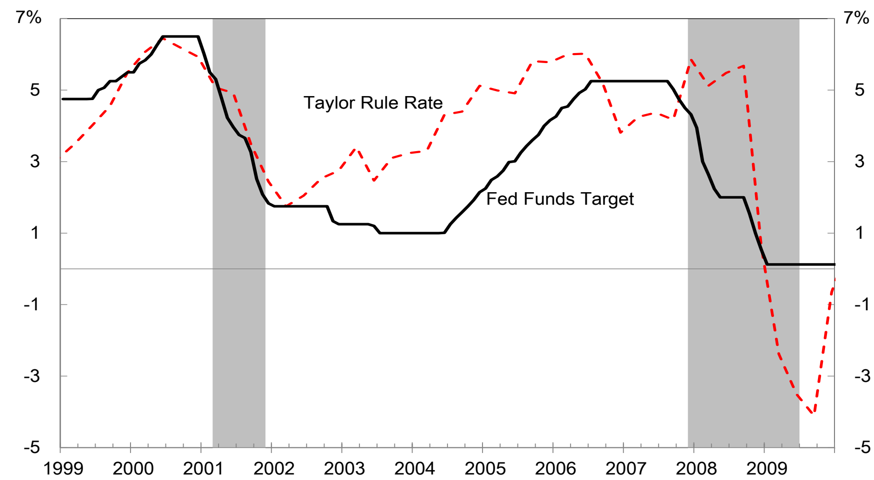
Nevertheless, the Fed has downplayed financial stability as a direct mandate for formulating monetary policy. To be sure, there has been growing recognition of ever-greater harmful externalities from the interactions of financial cycles and business cycles. For example, the prolonged period of low policy rates to spur growth following the bursting of the tech bubble in 2000 allowed leverage to grow substantially, which amplified financial market risks that led to the great financial crisis of 2008.

The following section explores several ways in which financial stability considerations may enter into central bank mandates. It also assesses Chair Yellen's reasons for favoring one over the others.[3]

[3] Chair Yellen's analysis is found in her IMF lecture, Ibid.

Figure 1. Fed Policy Rate Was Too Low for Too Long and Was Not Raised Enough to Stop Ballooning of Housing Bubble

Taylor rule would have raised fed funds rate in 2002 and kept it higher for longer than the FOMC



Source: Citi Research.

Ex-Ante Strategies: Forestalling Financial Imbalances

The Fed had been unaware of the buildup in financial imbalances and risks during the prolonged period of low interest rates that eventually led to the 2008 financial crisis.

A strong case can be made that the Fed had been unaware of the buildup in financial imbalances and risks during the prolonged period of low interest rates for the years after 2000, which eventually led to the 2008 financial crisis. **Figure** 1 shows that following the bursting of the tech bubble in 2000, the fed funds target rate could have been raised as early as 2002 when GDP began to rebound steadily. Such a trajectory is what the Taylor rule would have prescribed.

Chair Yellen admitted that the Fed failed to anticipate the severe impact on the real economy resulting from a bursting of the housing bubble.

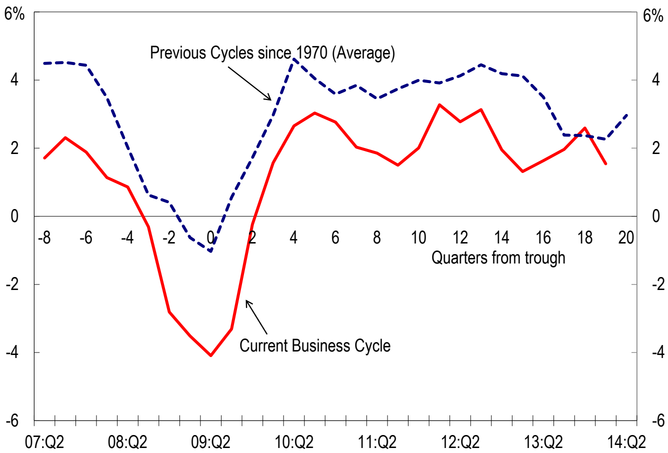
In retrospect, Chair Yellen admitted that the Fed failed to anticipate the severe impact on the real economy resulting from a bursting of the housing bubble **(Figure** 2**)**. She noted that they recognized the growing overvaluation of homes at the time, and presumably the accompanying high leverage and lax underwriting standards that led to unsustainably high levels of home ownership **(Figure** 3**)**. Indeed, the housing bubble was exacerbated and overinflated through the extensive use of exotic financial instruments designed to redistribute the risks from lenders to investors who did not realize the nature of risks they were taking on because these complex derivative products traded in nontransparent and often illiquid markets.[4]

The BIS admonished many central banks for succumbing to asymmetric policies over successive business cycles where interest rates were lowered aggressively during downturns, but not raised enough during expansions.

In its recent annual report, the Bank for International Settlements (BIS) admonished many central banks for succumbing to asymmetric policies over successive business cycles where interest rates were lowered aggressively during downturns, but not raised enough during expansions. A Wicksellian perspective would have predicted an outcome with excess leverage, expanded balance sheets, and inflated asset prices if monetary policy held interest rates below their equilibrium rate for a prolonged period.

[4] Such risk transfers created incentives for lenders to extend loans to even the most unqualified borrowers because the risks were passed on to investors who unknowingly assumed a portfolio of loans with higher-than-expected default risk.

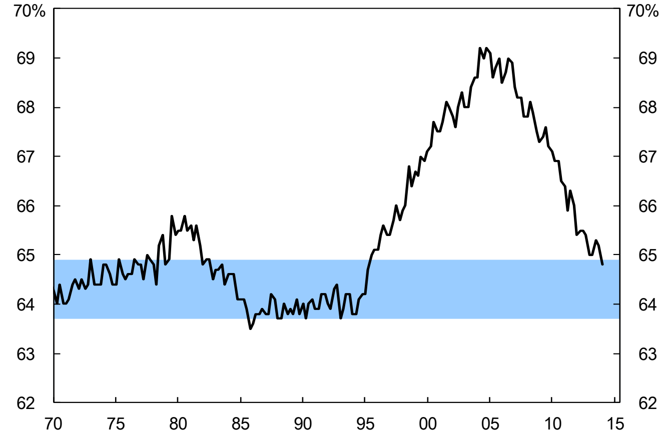
Figure 2. Protracted Slow Growth Is An Unintended Consequence of Deleveraging and Other Fallout Following Real Estate Bust



Sources: Haver, Citi Research.

Figure 3. Low Rates and Lax Lending Standards Boosted Ownership Share to Unsustainable Levels Before Crisis

Shaded area is one standard deviation around ownership mean, 1970 to 1995



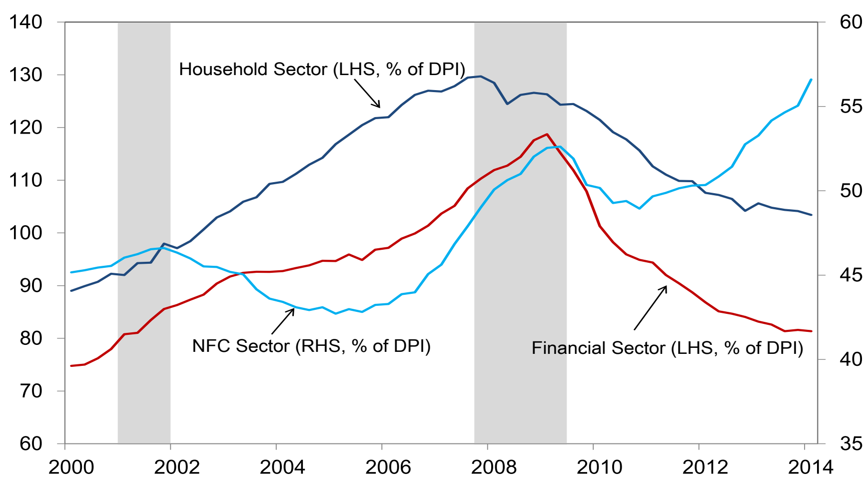
Sources: Haver, Citi Research.

In place of such downward bias for rates, the BIS advocated tightening whenever financial imbalances accumulate, even if inflation appears under control.

In place of such a downward bias for rates, the BIS advocated tightening whenever financial imbalances accumulate, even if inflation appears under control. They reasoned that imparting a downward bias in interest rates would raise debt levels and leverage, which distorts production and investment patterns **(Figure 4)**. The BIS concluded that a cyclical downward bias in interest rates results in a "debt trap," wherein high debt levels may prevent interest rates from rising back toward their equilibrium rate.[5]

Figure 4. Pre-Crisis Rise in Leverage Reverses for All But Corporate Sector

Corporate share buy-backs dissipate impact of Fed Quantitative Easing on boosting investment



Sources: Haver, Federal Reserve, Citi Research.

[5] See BIS "In Search of a New Compass," 2014 Annual Report, Chapter 1 http://www.bis.org/publ/arpdf/ar2014e1.pdf.

Chair Yellen rejected the use of monetary policy to limit financial imbalances and incipient asset bubbles because she considers monetary policy to be too blunt an instrument.

Chair Yellen rejected the use of monetary policy to limit financial imbalances and incipient asset bubbles because she considers monetary policy to be too blunt an instrument.[6] In her judgment, there would be sizable adverse effects, such as higher unemployment, if interest rates were used to mitigate emerging financial vulnerabilities, e.g., dampening house price increases or limiting leverage. Moreover, higher unemployment rates would reduce the ability of households to service or repay existing debt, possibly exacerbating the downside effects of a burst bubble.

Ex-Post Strategies: Mopping Up Burst Bubbles

An extremely asymmetric approach to conducting macroprudential policy would be to ignore asset bubbles, and only act to address the fallout if the asset bubble ruptures.

An extremely asymmetric and "anti-Wicksell" approach to conducting macroprudential policy would be to ignore asset bubbles, and only act to address the fallout if the asset bubble ruptures. One rationale for this approach is that it recognizes the difficulties in identifying incipient asset bubbles—indeed the almost impossibility of identifying all but the most flagrant full-blown bubbles. So, monetary policy would be mobilized only when it is not possible to achieve inflation and unemployment targets.

Such an approach is most closely associated with former Chairman Greenspan's successful efforts to mitigating the harmful real effects of the burst tech bubble.

Such an approach is most closely associated with former Chairman Greenspan's successful efforts to mitigating the harmful real effects of the burst tech bubble in late 1999, with a substantial (400 bps) decline in the policy rate between 1999Q4 and 2001Q4. Unfortunately, some believe that the seeds of the housing bubble were sown during this period because the policy rate was maintained at relatively low levels (e.g., below 2 percent) for almost two years.

Proactive Strategy: Balance Macro and Financial Stability Goals

Embracing the importance of financial stability as a policy goal and incorporating it into the monetary policy framework has been emphasized by former Fed Governor Jeremy Stein.

Embracing the importance of financial stability as a policy goal and incorporating it into the monetary policy framework has been emphasized by former Fed Governor Jeremy Stein.[7] Operationally, the key question to be resolved would be how large a shortfall in the traditional macro mandate (e.g., full employment and price stability) would be tolerated to address a change in financial sector vulnerability? This presumes there are transparent unambiguous metrics available for gauging important financial vulnerabilities.

Stein championed using monetary policy for financial stability and macro objectives because its effects are broad and influence all financial institutions and capital markets.

Stein championed using monetary policy for financial stability and macro objectives because its effects are broad and influence all financial institutions and capital markets. Specifically, he proposed using credit risk and term premia as measures of financial market vulnerability for guiding monetary policy changes. When such spreads are "low," the possibility of disruptive spikes (reversions) reduces the incentive for monetary policy to reduce such spreads further to achieve reductions in the other macro objectives. **Consequently this implies a less dovish monetary policy stance when such financial stability considerations are in play.**

[6] Janet Yellen, op. cit.

[7] This section draws from the discussion in Jeremy Stein "Incorporating Financial Stability Considerations in a Macroeconomic Policy Framework," March 21, 2014, http://www.federalreserve.gov/newsevents/speech/stein20140321a.pdf.

The ability to conduct financial market surveillance—to detect the buildup of systemic risk and understand its threat to financial stability—is a vital prerequisite for engaging proactive monetary policy.

The ability to conduct financial market surveillance—to detect the buildup of systemic risk and understand its threat to financial stability—is a vital prerequisite for engaging in proactive monetary policy. When she was Vice-Chair of the Federal Reserve Board, Janet Yellen advocated more surveillance-enhancing research into preconditions and alignments that lead to systemic events that impair the financial sector's ability to intermediate.

For Chair Yellen, accumulation of high levels of risk and leverage, excessive reliance on unstable short-term funding, and correlated risk exposures across a wide array of institutions (e.g., commercial banks, investment banks, insurance companies, and other financial institutions) constitute an important constellation of risk factors. Unfortunately, Yellen's measures have an institutional bias—they apply largely to banks and intermediaries. Yet many financial crises have originated in the capital markets (e.g. LTCM and the Asian crisis), and detecting a buildup of systemic risk there is much more difficult because there are no measures that can proxy for systemic risk in capital markets as there are for banks and financial institutions.

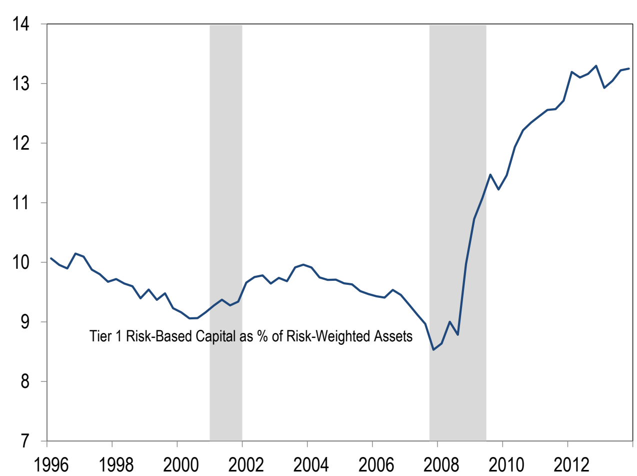
Passive Strategy: Bolster Financial Institutions and Market Infrastructure

Chair Yellen has consistently stated that financial stability considerations should be left to macroprudential policies.

Although easy monetary policy may create incentives for more risk taking and higher leverage, Chair Yellen has consistently stated that financial stability considerations should be left to macroprudential policies. The primary objective is to limit incentives for excessive risk taking by financial institutions and market participants. Such policies entail the use of non-interest-rate tools to deal with problems arising from the behavior of asset prices. A range of tools are available to target different sources of risk (e.g., use market- or sector-specific policies).

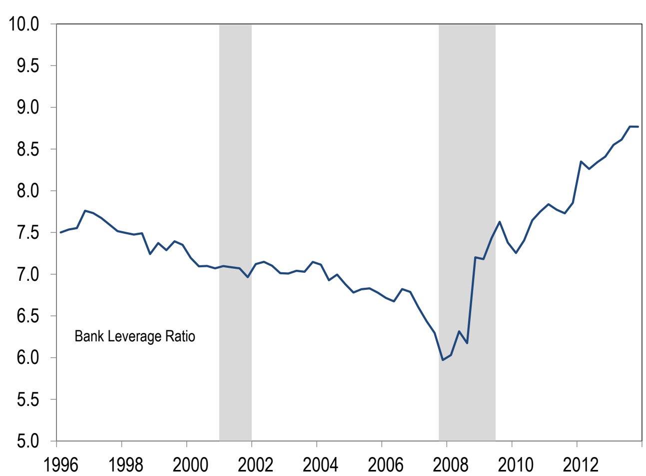
Strategically, Chair Yellen would direct macroprudential tools toward two aspects of increasing financial resilience: (1) increase the resilience of the financial system to withstand adverse shocks and other exogenous developments; (2) increase the resilience of the system against endogenously caused financial excesses. Unfortunately, there has not been any research on developing policy rules to guide the operation of these macroprudential instruments. This leaves their operation entirely at the discretion of regulators and supervisors.

Figure 5. Capital Ratios Rise Sharply



Source: Federal Reserve Bank of New York.

Figure 6. Leverage Ratios Improve



Note: Leverage Ratio is Tier 1 Risk-Based Capital as percent of Average Total Assets.
Source: Federal Reserve Bank of New York.

Tools for Building Resilience:

Increasing the resilience of financial institutions against exogenous shocks includes bolstering loss-absorbing *capital and liquidity buffers.* Their adequacy is measured by the Tier-1 capital ratio and the more demanding leverage ratio.

Increasing the resistance and durability of financial institutions against exogenous shocks begins with bolstering loss-absorbing *capital and liquidity buffers.* Their adequacy would be measured by the Tier-1 capital ratio and the more-demanding leverage ratio ***(*Figure 5 *and* Figure 6*)***. To limit contagion, an effective *resolution regime* could offset the impact of a failure of a systemically important financial institution (SIFI). Moreover, a *broad supervisory and regulatory net* to encompass connected firms and markets, may allow early warning of emerging systemic risks. At this point, the Fed and other US financial regulators make use of *stress tests* of banks (as the presumed nexus of markets and other financial institutions) to detect systemic vulnerabilities. Also, the Fed itself controls (rarely changed) margin requirements that also may limit speculative market excesses.

Countercyclical capital buffers under Basel III provide additional loss absorbing capacity.

Countercyclical capital buffers under Basel III provide additional loss absorbing capacity during periods of rapid credit growth, while limiting incentives for such credit expansion. Similarly, *countercyclical minimum margin requirements* would also serve to limit endogenous excesses. Finally, *moral suasion* from the army of bank supervisors and examiners provides possibilities of fine-tuning idiosyncratic bank exposures and risk over the cycle.

Concluding Thoughts

Chair Yellen has decided to assign monetary and macroprudential policies to macroeconomic and financial stability objectives, respectively. The underlying paradigm acknowledges that each policy instrument has a comparative advantage for achieving its respective goal. In an ideal world, the results from the Mundell assignment problem assure us of an adequate (if not optimal) outcome even without full coordination.

We do not know whether quantitative easing leads to more debt and higher leverage that induces unintended macroprudential tightening.

Also, macroprudential policy has been conducted in a purely discretionary manner, and is subject to the pitfalls of time inconsistency.

In reality, we do not know whether quantitative easing incentivizes acquiring more debt and raises leverage such as to induce unintended macroprudential tightening, which can dampen the economic recovery. Moreover, unlike monetary policy, which has well-researched and well-understood policy rules with which to benchmark performance, macroprudential policy has been conducted in a purely discretionary manner, and is subject to the pitfalls of time inconsistency.

Indeed, since the passage of Basel III and the Dodd-Frank legislation, there has been a large number of regulatory and supervisory adjustments and revisions to the calculation of key supervisory ratios, the arbitrary design of acceptable stress scenarios, and other details of implementing targeted macroprudential policy. This has generated high levels of uncertainty that can hinder efficient intermediation by banks and financial markets.

It may be preferable to assign all financial stability responsibilities to the FSOC along with appropriate powers to implement and enforce comprehensive macroprudential policies for all financial institutions and markets.

It is clear that there is much work facing the Financial Stability Oversight Council (FSOC). It has to coordinate the identification of systemic risks emerging from different corners of financial institutions and markets, and design the appropriate response for each regulator. The Fed's solution to the assignment problem must be judged in the context of all these macroprudential instruments wielded by the various regulatory agencies. It may be preferable to assign all financial stability responsibilities to the FSOC and grant it appropriate powers to implement and enforce comprehensive macroprudential policies for all financial institutions and markets.

July-August 2014

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
7 Auction 3 & 6 Mth. Bills: $48.0B	**8** Small Business (Jun) Consumer Credit Apr $26.1B May $19.6B Auction 3-Yr. Note: $27.0B Auction 1 Mth. Bill: $35.0B	**9** Mortgage Applications **FOMC Minutes Released** Auction 10-Yr. Note(r):$21.0B	**10** Jobless Claims 7/5 304 Thous Wholesale Inventories Apr 1.0% May 0.5% Auction 30-Yr. Bond(r): $13.0B	**11** Federal Budget Balance Jun 13 $116.5B Jun 14(E)
14 Auction 3 & 6 Mth. Bills: $48.0B(E)	**15** Empire State Manufacturing Jun 19.3 Jul Import Price Index <u>Total</u> <u>ExPetro</u> May 0.1% -0.1% Jun(E) Retail Sales <u>Total</u> <u>ExAuto</u> May 0.3% 0.1% Jun(E) 0.7% 0.6% Business Inventories Apr 0.6% May(E) 0.6% Auction 1 Mth. Bill: $40.0B(E)	**16** Mortgage Applications Producer Price Index <u>Final Demand</u> <u>ExF&E</u> May -0.2% -0.1% Jun(E) Industrial Prod. & Cap. Util. May 0.6% 79.1% Jun(E) Housing Market Index Jun 49 Jul **Beige Book**	**17** Jobless Claims 7/12 315 Thous(E) Housing Starts and Permits Jun 1,001K 1,005K Jul(E) 1,025K 1,015K Philly Outlook Survey Jun 17.8% Jul(E) 15.0% Ann. 10-Yr. TIPS: $15.0B(E)	**18** Reuters/Michigan Sentiment JunF 82.5 JulP(E) 81.5 Leading Indicators May 0.5% Jun(E)
21 Auction 3 & 6 Mth. Bills: $48.0B(E)	**22** Consumer Price Index <u>Total</u> <u>ExF&E</u> May 0.4% 0.3% Jun(E) Real Earnings (Jun) FHFA (May) Existing Home Sales May 4.89M Jun(E) Auction 1 Mth. Bill: $40.0B(E)	**23** Mortgage Applications	**24** Jobless Claims 7/19 New Home Sales May 504K Jun(E) Ann. 2-Yr. FRN: $15.0B(E) Ann. 2-Yr. Note: $29.0B(E) Ann. 5-Yr. Note: $35.0B(E) Ann. 7-Yr. Note: $29.0B(E) Auction 10-Yr. TIPS: $15.0B(E)	**25** Durable Goods Orders <u>Total</u> <u>ExTrans</u> May -0.9% 0.0% Jun(E)
28 Pending Home Sales (May) Auction 3 & 6 Mth. Bills: $50.0B(E) Auction 2-Yr. Note: $29.0B(E)	**29** S&P/CaseShiller (May) Consumer Confidence Jun 85.2 Jul(E) **FOMC Meeting** Auction 2-Yr. FRN: $15.0B(E) Auction 5-Yr. Note: $35.0B(E) Auction 1 Mth. Bill: $40.0B(E)	**30** Mortgage Applications ADP Employment (Jul) GDP & Chain Price Index 1Q14F -2.9% 1.3% 2Q14A(E) Farm Prices (Jul) **FOMC Meeting** Auction 7-Yr. Note: $29.0B(E)	**31** Jobless Claims 7/26 Employment Cost Index <u>Q/Q</u> <u>Y/Y</u> 1Q14 0.3% 1.8% 2Q14(E) Chicago Barometer <u>PMI</u> <u>Prices</u> Jun 62.6 65.9 Jul(E)	**Aug 1** Employment <u>Jun</u> <u>Jul(E)</u> Payrolls 288K Unemp. Rate 6.1% Avg. Hrly. Earn. 0.2% Priv. Wrkwk 34.5H Personal Income & Consumption May 0.4% 0.2% Jun(E) Reuters/Michigan Sentiment JulP(E) 81.5 JulF(E) ISM Manufacturing PMI Prices Jun 55.3 58.0 Jul(E) Construction PIP May 0.1% Jun(E) Total Vehicle Sales Jun 16.9M Jul(E)

(E) Indicates Citigroup estimates. (A) Advance. (P) Preliminary. (F) Final. (UNCH) Unchanged. (R) Revised. Contributors: Martha Berasain and Cathy Gaeta.

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

Analysts' compensation is determined based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates ("the Firm"). Like all Firm employees, analysts receive compensation that is impacted by overall firm profitability which includes investment banking revenues.

For important disclosures (including copies of historical disclosures) regarding the companies that are the subject of this Citi Research product ("the Product"), please contact Citi Research, 388 Greenwich Street, 28th Floor, New York, NY, 10013, Attention: Legal/Compliance [E6WYB6412478]. In addition, the same important disclosures, with the exception of the Valuation and Risk assessments and historical disclosures, are contained on the Firm's disclosure website at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. Valuation and Risk assessments can be found in the text of the most recent research note/report regarding the subject company. Historical disclosures (for up to the past three years) will be provided upon request.

NON-US RESEARCH ANALYST DISCLOSURES

Non-US research analysts who have prepared this report (i.e., all research analysts listed below other than those identified as employed by Citigroup Global Markets Inc.) are not registered/qualified as research analysts with FINRA. Such research analysts may not be associated persons of the member organization and therefore may not be subject to the NYSE Rule 472 and NASD Rule 2711 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account. The legal entities employing the authors of this report are listed below:

Citigroup Global Markets Inc	William Lee; Peter D'Antonio; Dana M Peterson; Benjamin R Mandel; Malcolm D Spittler; Joe Seydl

OTHER DISCLOSURES

For securities recommended in the Product in which the Firm is not a market maker, the Firm is a liquidity provider in the issuers' financial instruments and may act as principal in connection with such transactions. The Firm is a regular issuer of traded financial instruments linked to securities that may have been recommended in the Product. The Firm regularly trades in the securities of the issuer(s) discussed in the Product. The Firm may engage in securities transactions in a manner inconsistent with the Product and, with respect to securities covered by the Product, will buy or sell from customers on a principal basis.

Securities recommended, offered, or sold by the Firm: (i) are not insured by the Federal Deposit Insurance Corporation; (ii) are not deposits or other obligations of any insured depository institution (including Citibank); and (iii) are subject to investment risks, including the possible loss of the principal amount invested. Although information has been obtained from and is based upon sources that the Firm believes to be reliable, we do not guarantee its accuracy and it may be incomplete and condensed. Note, however, that the Firm has taken all reasonable steps to determine the accuracy and completeness of the disclosures made in the Important Disclosures section of the Product. The Firm's research department has received assistance from the subject company(ies) referred to in this Product including, but not limited to, discussions with management of the subject company(ies). Firm policy prohibits research analysts from sending draft research to subject companies. However, it should be presumed that the author of the Product has had discussions with the subject company to ensure factual accuracy prior to publication. All opinions, projections and estimates constitute the judgment of the author as of the date of the Product and these, plus any other information contained in the Product, are subject to change without notice. Prices and availability of financial instruments also are subject to change without notice. Notwithstanding other departments within the Firm advising the companies discussed in this Product, information obtained in such role is not used in the preparation of the Product. Although Citi Research does not set a predetermined frequency for publication, if the Product is a fundamental research report, it is the intention of Citi Research to provide research coverage of the/those issuer(s) mentioned therein, including in response to news affecting this issuer, subject to applicable quiet periods and capacity constraints. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security. Any decision to purchase securities mentioned in the Product must take into account existing public information on such security or any registered prospectus.

Investing in non-U.S. securities, including ADRs, may entail certain risks. The securities of non-U.S. issuers may not be registered with, nor be subject to the reporting requirements of the U.S. Securities and Exchange Commission. There may be limited information available on foreign securities. Foreign companies are generally not subject to uniform audit and reporting standards, practices and requirements comparable to those in the U.S. Securities of some foreign companies may be less liquid and their prices more volatile than securities of comparable U.S. companies. In addition, exchange rate movements may have an adverse effect on the value of an investment in a foreign stock and its corresponding dividend payment for U.S. investors. Net dividends to ADR investors are estimated, using withholding tax rates conventions, deemed accurate, but investors are urged to consult their tax advisor for exact dividend computations. Investors who have received the Product from the Firm may be prohibited in certain states or other jurisdictions from purchasing securities mentioned in the Product from the Firm. Please ask your Financial Consultant for additional details. Citigroup Global Markets Inc. takes responsibility for the Product in the United States. Any orders by US investors resulting from the information contained in the Product may be placed only through Citigroup Global Markets Inc.

Important Disclosures for Bell Potter Customers: Bell Potter is making this Product available to its clients pursuant to an agreement with Citigroup Global Markets Australia Pty Limited. Neither Citigroup Global Markets Australia Pty Limited nor any of its affiliates has made any determination as to the suitability of the information provided herein and clients should consult with their Bell Potter financial advisor before making any investment decision.

The Citigroup legal entity that takes responsibility for the production of the Product is the legal entity which the first named author is employed by. The Product is made available in **Australia** through Citigroup Global Markets Australia Pty Limited. (ABN 64 003 114 832 and AFSL No. 240992), participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in Australia to Private Banking wholesale clients through Citigroup Pty Limited (ABN 88 004 325 080 and AFSL 238098). Citigroup Pty Limited provides all financial product advice to Australian Private Banking wholesale clients through bankers and relationship managers. If there is any doubt about the suitability of investments held in Citigroup Private Bank accounts, investors should contact the Citigroup Private Bank in Australia. Citigroup companies may compensate affiliates and their representatives for providing products and services to clients. The Product is made available in **Brazil** by Citigroup Global Markets Brasil - CCTVM SA, which is regulated by CVM - Comissão de Valores Mobiliários, BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBID - Associação Nacional dos Bancos de Investimento. Av. Paulista, 1111 - 11º andar - CEP. 01311920 - São Paulo - SP. If the Product is being made available in certain provinces of **Canada** by Citigroup Global Markets (Canada) Inc. ("CGM Canada"), CGM Canada has approved the Product. Citigroup Place, 123 Front Street West, Suite 1100, Toronto, Ontario M5J 2M3. This product is available in **Chile** through Banchile Corredores de Bolsa S.A., an indirect subsidiary of Citigroup Inc., which is regulated by the Superintendencia de Valores y Seguros. Agustinas 975, piso 2, Santiago, Chile. The Product is distributed in **Germany** by Citigroup Global Markets Deutschland AG ("CGMD"), which is regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin). CGMD, Reuterweg 16, 60323 Frankfurt am Main. Research which relates to "securities" (as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong)) is issued in **Hong Kong** by, or on behalf of, Citigroup Global Markets Asia Limited which takes full responsibility for its content. Citigroup Global Markets Asia Ltd. is regulated by Hong Kong Securities and Futures Commission. If the Research is made available through Citibank, N.A., Hong Kong Branch, for its clients in Citi Private Bank, it is made available by Citibank N.A., Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citibank N.A. is regulated by the Hong Kong Monetary Authority. Please contact your Private Banker in Citibank N.A., Hong Kong, Branch if you have any queries on or any matters arising from or in connection with this document. The Product is made available in **India** by Citigroup Global Markets India Private Limited, which is regulated by Securities and Exchange Board of India. 1202, 12th Floor, FIFC, G Block, Bandra Kurla Complex, Bandra East, Mumbai - 400051 Corporate Identity Number: U99999MH2000PTC126657 Tel:+9102261759999 Fax:+9102261759961. The Product is made available in **Indonesia** through PT Citigroup Securities Indonesia. 5/F, Citibank Tower, Bapindo Plaza, Jl. Jend. Sudirman Kav. 54-55, Jakarta 12190. Neither this Product nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable capital market laws and regulations. This Product is not an offer of securities in Indonesia. The securities referred to in this Product have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market laws and regulations. The Product is made available in **Israel** through Citibank NA, regulated by the Bank of Israel and the Israeli Securities Authority. Citibank, N.A, Platinum Building, 21 Ha'arba'ah St, Tel Aviv, Israel. The Product is made available in **Italy** by Citigroup Global Markets Limited, which is authorised by the PRA and regulated by the FCA and the PRA. Via dei Mercanti, 12, Milan, 20121, Italy. The Product is made available in **Japan** by Citigroup Global Markets Japan Inc. ("CGMJ"), which is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Shin-Marunouchi Building, 1-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-6520 Japan. If the Product was distributed by SMBC Nikko Securities Inc. it is being so distributed under license. In the event that an error is found in an CGMJ research report, a revised version will be posted on the Firm's Citi Velocity website. If you have questions regarding Citi Velocity, please call (81 3) 6270-3019 for help. The Product is made available in **Korea** by Citigroup Global Markets Korea Securities Ltd., which is regulated by the Financial Services Commission, the Financial Supervisory Service and the Korea Financial Investment Association (KOFIA). Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. KOFIA makes available registration information of research analysts on its website. Please visit the following website if you wish to find KOFIA registration information on research analysts of Citigroup Global Markets Korea Securities Ltd. http://dis.kofia.or.kr/fs/dis2/fundMgr/DISFundMgrAnalystPop.jsp?companyCd2=A03030&pageDiv=02. The Product is made available in Korea by Citibank Korea Inc., which is regulated by the Financial Services Commission and the Financial Supervisory Service. Address is Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. The Product is made available in **Malaysia** by Citigroup Global Markets Malaysia Sdn Bhd (Company No. 460819-D) ("CGMM") to its clients and CGMM takes responsibility for its contents. CGMM is regulated by the Securities Commission of Malaysia. Please contact CGMM at Level 43 Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia in respect of any matters arising from, or in connection with, the Product. The Product is made available in **Mexico** by Acciones y Valores Banamex, S.A. De C. V., Casa de Bolsa, Integrante del Grupo Financiero Banamex ("Accival") which is a wholly owned subsidiary of Citigroup Inc. and is regulated by Comision Nacional Bancaria y de Valores. Reforma 398, Col. Juarez, 06600 Mexico, D.F. In **New Zealand** the Product is made available to 'wholesale clients' only as defined by s5C(1) of the Financial Advisers Act 2008 ('FAA') through Citigroup Global Markets Australia Pty Ltd (ABN 64 003 114 832 and AFSL No. 240992), an overseas financial adviser as defined by the FAA, participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in **Pakistan** by Citibank N.A. Pakistan branch, which is regulated by the State Bank of Pakistan and Securities Exchange Commission, Pakistan. AWT Plaza, 1.1. Chundrigar Road, P.O. Box 4889, Karachi-74200. The Product is made available in the **Philippines** through Citicorp Financial Services and Insurance Brokerage Philippines, Inc., which is regulated by the Philippines Securities and Exchange Commission. 20th Floor Citibank Square Bldg. The Product is made available in the Philippines through Citibank NA Philippines branch, Citibank Tower, 8741 Paseo De Roxas, Makati City, Manila. Citibank NA Philippines NA is regulated by The Bangko Sentral ng Pilipinas. The Product is made available in **Poland** by Dom Maklerski Banku Handlowego SA an indirect subsidiary of Citigroup Inc., which is regulated by Komisja Nadzoru Finansowego. Dom Maklerski Banku Handlowego S.A. ul.Senatorska 16, 00-923 Warszawa. The Product is made available in the **Russian Federation** through ZAO Citibank, which is licensed to carry out banking activities in the Russian Federation in accordance with the general banking license issued by the Central Bank of the Russian Federation and brokerage activities in accordance with the license issued by the Federal Service for Financial Markets. Neither the Product nor any information contained in the Product shall be considered as advertising the securities mentioned in this report within the territory of the Russian Federation or outside the Russian Federation. The Product does not constitute an appraisal within the meaning of the Federal Law of the Russian Federation of 29 July 1998 No. 135-FZ (as amended) On Appraisal Activities in the Russian Federation. 8-10 Gasheka Street, 125047 Moscow. The Product is made available in **Singapore** through Citigroup Global Markets Singapore Pte. Ltd. ("CGMSPL"), a capital markets services license holder, and regulated by Monetary