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# Quantifying QE: Fed's Medicine Did the Trick in 2009, New Measures Won't Work Long-Term

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Since the 2008 financial panic, central banks in the U.S., UK, Europe and Japan have experimented with the aggressive use of their balance sheets to stabilize their financial markets and encourage a return to higher rates of economic activity. These activities have become known as quantitative easing, or QE. This report focuses mostly on balance sheet activities employed by the U.S. Federal Reserve (Fed), and distinguishes between the initial round of quantitative easing (QE1) in late 2008 and 2009, with later rounds of balance sheet activity to purchase more U.S. Treasury securities (QE2) and to adopt the maturity extension program (i.e., Operation Twist). With respect to certain of the ideas presented here, in a few cases we also consider European Central Bank (ECB) activities where relevant to the discussion.

Our first priority is to present a generalized set of theoretical ideas to guide our assessment of quantitative easing and to identify the conditions under which it is likely to achieve the desired economic and financial market results. We recognize that some of these ideas may be controversial. We believe there is considerable value, however, in explicitly recognizing the embedded assumptions in models designed to assess the impacts of quantitative easing. By making key assumptions explicit, we can better understand why different quantitative models see quantitative easing in such varying light, and we can better interpret their likely robustness as a tool to guide either policy decisions or market participant actions. Finally, as we link our theoretical ideas with the actual quantitative easing that has occurred, we want to draw some tentative conclusions about when it is most appropriate to use QE and, in addition, to evaluate whether future QE policies are likely to achieve their objectives.

To highlight our conclusions, our research suggests the following:

- Quantitative easing is a very effective tool for central banks to use when combatting a failing banking system facing systematic solvency and liquidity challenges.
- Moreover, central bank purchases of securities held by a weakened or failing banking system may be more effective in encouraging a more rapid return to economic growth than other forms of QE such as outright loans to the banking system.
- In the context of a relatively sound, profitable, and well capitalized banking system, quantitative easing may have little to no positive impact on economic activity or labor markets despite its impact on interest rates. Indeed, using QE when the likely effects are centered on rates and not on economic activity has the distinct potential to be counterproductive in terms of

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achieving the objectives of the central bank due to the fact that the use of QE sends a powerful signal from the central bank of economic pessimism to market participants.

- Quantitative easing in the form of purchases of securities with long-term maturities can have a meaningful effect in terms of lowering long-term interest rates. The opposite effect on rates will occur, however, if and when central banks unwind their expanded portfolios and return to normal monetary policies.
- Exit strategies from QE by central banks may be extremely challenging to implement and have the potential, if not the certainty, to delay a return to the normal conduct of monetary policy to the detriment of longer-term economic growth, currency values, and potential future inflation. That is, the long-term costs to economic activity and financial market stability of QE have the potential to be quite large.

## Quantitative Easing and the Case of a Failing Banking System

Whether they explicitly recognize the embedded assumption or not, virtually all equilibrium models of economic activity and market behavior start from the presumption that money is fungible, and that the domestic money and credit markets, generally characterized as the banking system, are functioning normally. What we mean by functioning normally is that banks are willing to pay and receive payments from each other and to make and take short-term loans from each other on essentially a no-name basis.

The financial panic of 2008, triggered by the bankruptcy of Lehman Brothers and the next day's relatively messy bailout of AIG, so scared bankers that they were, in many cases, afraid to take each other's credit risk, even overnight. The interbank market nearly froze, and spreads for interbank loans rose dramatically relative to similar maturity Treasury bills. That is, the sharp widening of the TED spread (LIBOR minus Treasury bill rates) was a reflection of a failing banking system.

As thoroughly examined by the economists Carmen Reinhart and Kenneth Rogoff (2009), recessions triggered by a financial crisis are fundamentally different from cyclical recessions that do not involve a breakdown of the banking system. Recessions related to banking system breakdowns are characterized by a sharp drop in asset values which puts bank solvency into question and leads to extensive deleveraging by consumers, corporations, and local governments. Consumers seek to reduce their liabilities to better match the lower value of their assets. Corporations seek to rapidly shed costs, including workers, to better match future production with the likely lower demand. Local governments face a sharp drop in tax and fee revenue and also seek to cut costs by reducing services, laying-off workers, and avoiding new projects that would require additional debt issuance.

In a financial crisis, the banking system faced liquidity and/or solvency challenges because it was widely perceived as being vastly over-extended. In the face of a failing banking system, central banks can use their balance sheets to make loans to the banks to ease the liquidity issues or to purchase securities from the banks which potentially allows for a smoother reduction in banking assets. We note historically that the Federal Reserve System was established in 1913, following a series of financial panics of which one in 1907 was especially severe. The Fed was specifically given extensive powers to use its balance sheet and serve as a lender of last resort to prevent financial panics turning into severe recessions or depressions. Virtually all central banks that control their own currencies have similar powers, even if they have been given different long-term economic objectives regarding inflation, currency stability, or economic growth and job creation. Note here that the national central banks inside the eurozone no longer control their own currencies and can lend to their domestic banking system only in so far as the ECB lends to them – which the ECB has done in considerable size in the 2009-2012 period.

In terms of economic modeling, there are several points to note here. Reinhart and Rogoff's contention is that there is a regime shift involved which depends on whether the banking system is functioning normally or breaking down. Economies with failing banking systems are likely to undergo severe deleveraging by all sectors. During the period of deleveraging, interest rates largely do not matter to the decision process of consumers, corporations, and local governments (i.e., governments without access to a printing press). That is, the need for consumers to reduce liabilities, for corporations to reduce costs and shed workers, and for local government to cut services dominates any potential stimulatory effect implied by equilibrium macro-economic models from near-zero short-term interest rates. Decisions by consumers

to spend, by corporations to invest in new plant and equipment or to hire new workers, by local governments to expand services, are no longer interest rate sensitive.

The path back to a regime involving market equilibrium depends critically on the banking system and its recovery as well as the time it takes for consumers, corporations, and local governments to deleverage. Analyzing the recovery of the banking system, interestingly, is one place where the different forms of QE as practiced by the Fed in the U.S. and the ECB in Europe appear to have had varying impacts.

The Fed bought assets from the banking system, and this did two things. It provided liquidity and it allowed the banks to shed assets without a fire sale into an imploding market. In turn, shedding assets reduced the banks need to raise new capital, so that the amounts of new capital required for the now smaller bank balance sheets was manageable in a reasonably rapid fashion. The U.S. financial sector returned to profitability relatively quickly, as shown in Figure 1.

By contrast, initially as the financial panic developed in 2008 and in the first stages of the European sovereign debt crisis in 2010 and 2011, the ECB focused on long-term liquidity facilities rather than asset purchases, although there were some asset purchases. The loans from the ECB relieved the immediately liquidity issues, but did not assist in helping banks to shed assets and raise capital, so solvency challenges remained in play. The result has been that the European banking system is far behind the U.S. banking system in adjusting its capital ratios and returning to a reasonable level of profitability. Moreover, the use of bank loans rather than asset purchases kept the pressure on banks to sell assets to reduce their own balance sheets to meet required capital ratios. Asset sales by banks, including sales of sovereign debt, tended to keep downward pressure on the prices (and upward pressure on the yields), such that government fiscal solutions to the sovereign debt crisis were more complex, challenged and drawn-out than might have been the case had the ECB aggressively purchased sovereign debt.

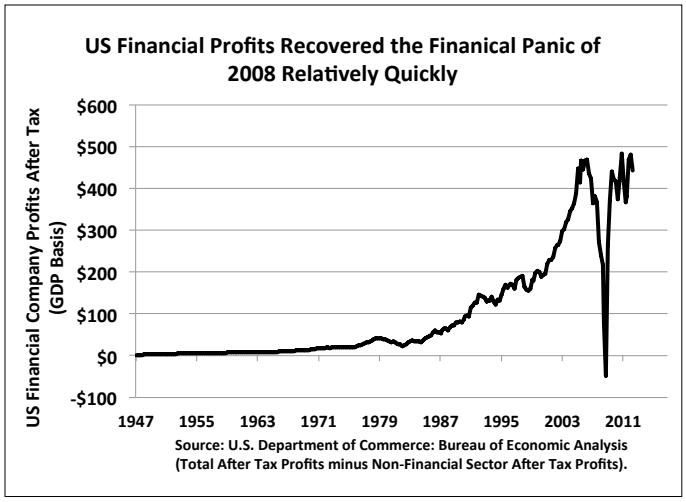


*Figure 1. US Financial System Profitability*

Our conclusions about quantitative easing under conditions of banking system failure are that QE is extremely effective medicine, and secondarily that asset purchases may work better than direct loans to the banking system. While we are sure that academic economists and policy makers will try to put a number on the quantity of jobs saved, this will not be easy. We would argue that the balance sheet expansion from September 2008 through December 2009 by the Fed, known as QE1, stabilized a failing US banking system and prevented the recession from spiraling downward into a very deep depression. The U.S. economy still had to go through a multi-year deleveraging phase, but at least the return to a normally functioning banking system was relatively rapid. We would also argue that the ECB's bank lending approach tackled bank liquidity issues but not solvency challenges, and thus was not nearly as effective in containing the sovereign debt crisis as asset purchases would have been. Since the ECB decided in September 2012 to expand sovereign debt purchases, this hypothesis can be reevaluated in a few years after more experience has been gained.

## Quantitative Easing when the Banking System is Functioning Normally

Once the banking system is back on its feet, by which we mean consistently profitable and well capitalized, then the analysis of quantitative easing shifts to the linkages from asset purchases by the central bank to questions of the impact on longer-term interest rates and to the interest rate sensitivity of the economy. The portfolio balance linkage from asset purchases (and later asset sales when QE is unwound) is relatively straightforward, while the macro-economic transmission process from interest rates to real GDP growth, job creation, and potential inflation is highly controversial.

As Fed Chairman Ben Bernanke described in his speech and accompanying research paper, "Monetary Policy since the Onset of the Crisis", presented at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming, on 31 August 2012, the mechanism from QE to market interest rates and also stock prices runs through the portfolio balance effect. As noted above, this is not the controversial part of QE. There is little doubt in anyone's mind that the Fed's purchases of trillions of dollars of U.S. Treasuries and mortgage-backed securities raised debt prices, lowered rates, and supported stock prices. Studies cited by Bernanke (2012) have attempted to quantify the interest rate effects. These studies include Canlin Li and Min Wei (2012), both economists at the Federal Reserve Board in Washington, and Jens Christensen and Glenn Rudebusch (2012), economists at the Federal Reserve Bank of San Francisco. The Li and Wei estimate is that the first and second large-scale asset purchase programs had a combined effect of pushing the 10-Year Treasury yield about 100 basis points lower than it otherwise would have been.

The next bit is the tricky part. Did the reduction in Treasury yields have any impact on economic activity or job creation? The asset purchases as part of QE1, as discussed in the section above, are definitely thought to have saved jobs and prevented a much worse recession or depression by the stabilization of the banking system. But did further asset purchases that occurred after the banking system was stabilized and had returned to substantial profitability have any further impact in terms of actually increasing job creation, as opposed to preventing job losses as in the QE1 phase of a failing banking system?

The answer to this question depends on assumptions about the interest rate sensitivity of various sectors of the economy, especially consumers and corporations. There are several issues to address.

First, if consumers and corporations are still in a deleveraging phase caused by the drop in asset values that also sunk the banking system, then it is highly unlikely that they are interest rate sensitive. That is, when deleveraging is the order of the day, near-zero short-term rates and reduced long-term rates would probably not make any difference to economic decision making by consumers, corporations, and local governments.

Second, even after the deleveraging phase has ended (See Figure 2), if consumers and corporations have little confidence in the likelihood of future economic progress, regardless of the reasons for their lack of confidence, it is also likely that the lack of confidence would trump lower rates in any decision about future consumption or corporate expansion. Put another way, for there to be a material link between lower bond yields and economic activity, there needs to be a strong expectation that consumer and corporate decisions will be impacted by the lower rates, given the state of the economy, banking system, and confidence in the future.

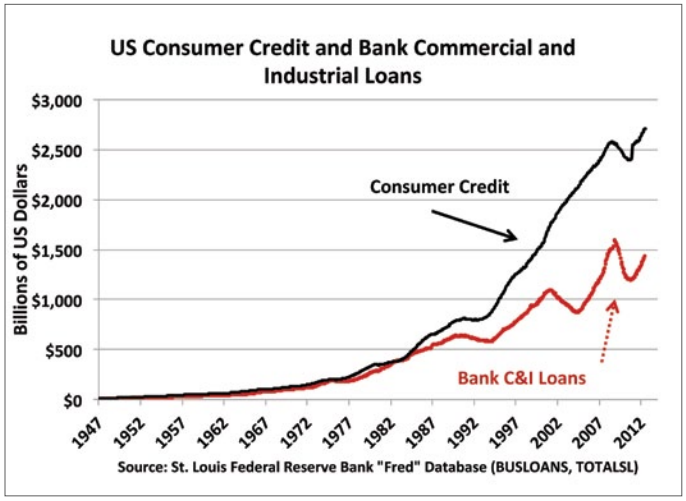


*Figure 2. US Consumer Credit and Bank C&I Loans*

Most domestic large country macro-economic equilibrium models are extremely comfortable with assuming a constant and material degree of interest rate sensitivity for consumers and corporations through all phases of the business cycle. This assumption is not nearly so obviously appropriate in the aftermath of a financial crisis with significant deleveraging activity. Tellingly, Bernanke (2012, p. 7) makes the cautionary statement: "If we are willing to take as a working assumption that the effects of easier financial conditions on the economy are similar to those observed historically, then econometric models can be used to estimate the effects of LSAPs (large scale asset purchases) on the economy." Bernanke displays his apparent willingness to make this critical assumption since he goes on to cite several research studies that follow this path. There are many in the economic analysis fraternity, however, who would refer to Reinhart and Rogoff's 2009 study, and emphatically assert that "this time is different"! Michael Kiley (2012), an economist at the Federal Reserve Board in Washington, DC, for example, in a paper cited by Bernanke, notes in his research that "the analysis herein stops before" the period of zero rates "because it is likely that the binding zero-lower bound on nominal interest rates implies that the linear rational expectations structure of the model ... may be problematic."

Our suggestion and intuition is that there are four phases involved in analyzing a financial panic and the recovery process, as follows:

Phase one is about outright financial panic with a failing banking system (September 2008 – March 2009), with the shift into recession coming abruptly and much more sharply than with typical business cycle recessions.

Phase two sees the recovery of banking profitability and return to normal functioning, but consumers, corporations, and local governments are still in a deleveraging phase brought on by the initial decline in asset values (April 2009 – June 2011, perhaps).

Phase three (July 2011 – present) is the involves a functioning banking system, but economic growth remains constrained because economic confidence is missing or if there are long-lasting changes to risk preferences from the shock of the earlier financial panic.

Phase four completes the return to some form of economic equilibrium in which the standard macro-economic assumptions about interest rate sensitivity might begin to apply again.

That is, even if the an economy is in phase three with deleveraging being completed and the banking system functioning normally, this is only a necessary and not a sufficient condition to re-apply assumptions about the interest rate sensitivity of consumption and investment. The reason is confidence or the potential lack of it. We have to remember that financial panics, even those that do not spiral into depression, can leave a lasting and negative impression on confidence that is not necessarily easily or quickly restored. Take corporations for example, if they are unsure about tax policies, fiscal spending policies, new regulations, etc., coming out of a financial crisis, they may well hold back on expansion and hiring plans due to their lack of confidence in the future. What this means in terms of traditional macro-economic econometric models is that the historical parameters associated with interest rate sensitivity for consumption and investment may be much too high, causing the models to erroneously suggest the possibility of much higher growth rates and job creation rates than are actually likely to occur.

In short, in evaluating the efficacy of quantitative easing we would not be willing "to take as a working assumption that the effects of easier financial conditions on the economy are similar to those observed historically," and we would expect econometric models using historically estimated constant parameters to materially overestimate the effects of LSAPs (large scale asset purchases) on the economy. Practically speaking, we would strongly suggest that the estimation models need to use dynamic techniques with time-varying parameters or at least regime-shifting approaches to have even a fighting chance of producing relevant estimates of the potential effects of quantitative easing on economic activity and job creation in the various phases of recovery after a severe financial shock and deleveraging episode.

## Impact of Economic Headwinds from Europe and Emerging Markets

Global context matters when evaluating the impact of any policy action. The question of evaluating quantitative easing in terms of its impact on real GDP growth and job creation is whether there have been significant changes in the structure of the world economy compared to the period during which the baseline econometric model was developed relative to the current global environment. This takes us into issues related to the nature of an interconnected global economy and whether simplified domestic-oriented economic models from the 1950-2000 period are still robust enough to use in this new age.

The simplest macro-economic models focus on trade linkages, but these approaches do not do justice to international capital flows that swamp trade flows. There are feedback effects from currency markets, bond markets, equity markets, and commodity markets. Large multi-national corporations may have a domicile in one country but get half or more of their cash flow from outside their domestic base. Pension funds, asset managers, and hedge funds manage global portfolios, not domestic ones.

What we can say with confidence is that if large parts of the world are struggling economically in terms of their past performance, then no country is likely to be an island and not feel some of the effects. While there are many possible approaches to modeling international influences and feedback loops from global markets, what is clear is that there is a need for these effects to be tackled directly and not relegated to simplifying assumptions. This is especially true given the changes in the relative size of various economies over the past decade, especially the relative growth of emerging market nations compared to the mature industrial economies (see Figure 3).

For example, in 2000, the BRIC nations of Brazil, Russia, India, and China made up only 8% of global GDP, and by 2010 this had expanded to 25%. While one can argue about the nature of international linkages, it would seem an obvious starting point to take the perspective that the relative influence of emerging market nations, such as China, have dramatically increased. From a modeling point of view, this again points to the need for dynamic estimation approaches that allow for time-varying parameters, and to carefully avoid assuming constant parameters associated with international feedback effects in this ever-changing world.

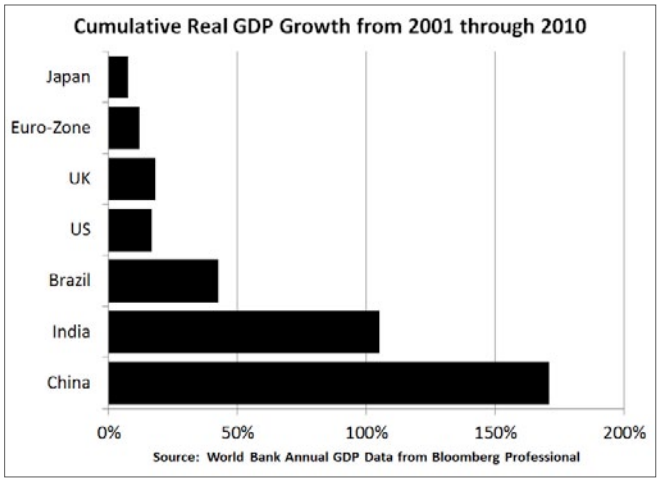


*Figure 3. Cumulative Real GDP Growth of Various Countries from 2000 to 2010*

There are also concerns regarding the impact of the European sovereign debt crisis on evaluating how effect QE2 and Operation Twist were in the U.S. The European crisis has been both a sovereign debt crisis and a banking capital adequacy crisis. As such, the probable impact of the financial uncertainties in Europe may have magnified the more direct trade effects from a region in recession or stagnation. Further study is certainly required in this regard, as the "headwinds" from Europe during 2010-2012 for the rest of the world economy, from the U.S. to China to other emerging market countries may have been much more severe due to the impact on capital markets and risk-taking appetites than the real GDP and trade numbers from the eurozone would initially suggest if these were more normal and cyclical events. That is, in light of the stagnation in Europe and the rapid deceleration of economic growth in emerging markets, one could build a case that the U.S. economic performance from the third quarter of 2009 through now was impressive, even it was only 2.2% average real GDP growth, given the international headwinds.

## Demographics, Technological Progress, and Fiscal Policy Shifts and the Potential for Structural Change in Labor Markets

Observing demographic changes is like watching paint dry, but the effects can be truly huge when taken in decades and not years. This presents a serious problem for quantitative economic modeling, since slow moving, yet potentially tectonic effects do not show up in the month-to-month or quarter-to-quarter variations that are the focus of macro-economic statistical models relying on historical data. Yet we know that the policy choices between young and older countries are likely to be strikingly different. Countries with aging populations or where the number of new retirees equals or exceeds the number of young people entering the work force might focus more on wealth maintenance and health care. Younger countries with rapidly expanding work forces might focus on job creation and exports with less emphasis on pensions and health care systems. An aging nation's policy focus on pensions and health care may well lead to higher labor costs, which possibly develops over time and with the building of a more comprehensive social safety net, partly through mandated charges on workers.

Demography is not the only issue that is powerful in the long-term and hidden in short-term data. Technology can move in jumps, but progress over the decades has been impressive. In particular, the

advent of the information age has dramatically improved labor productivity for those firms willing to make the investments in new capital and equipment to take advantages of the leaps forward. A period of rapid technological change, especially of the variety that can increase labor productivity as the world has experienced since the 1980s and is still continuing, can alter the job creation cycle associated with recessions. In particular, recessions tend to weed out the weaker firms that have not taken advantage of technology changes. During decades of rapid technological change, the stronger firms coming out of recessions may not need as many workers for a given level of output, due to their enhanced use of improved labor-productivity capital and equipment (see Figure 4).

The quantitative macroeconomic question is whether characterizations of how labor markets perform during economic cycles changes with demographic shifts and technological progress or whether it can be safely assumed that structural change does not to exist in labor markets. This is highly relevant to the QE debate in the U.S. because the Fed's objectives with QE2 and Operation Twist were ultimately to stimulate job creation. If structural changes in labor markets have been important, than these developments need to be taken explicitly into account.

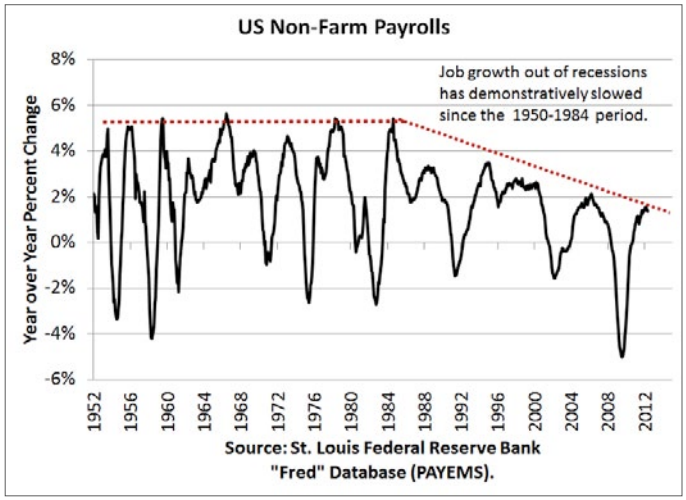


*Figure 4. Slowing Job Growth Out of Successive Recessions Since 1984.*

When we examine the response of job growth after recessions in the U.S. since World War II, we note a consistency in the patterns during the 1950s, 1960s, 1970s and through the recession of 1980-82. From the mid-1980s onward, however, there is a new pattern. After each recession, the growth of employment is slower than in the previous recession. Also, it takes longer and longer to return to the previous, pre-recession peak level of employment. Our interpretation of the historical data is that in the U.S. there has been material and substantial structural change in the amount of job growth that is likely for a given recovery in real GDP after a recession, when financially-induced as in 2008 or of the more cyclical variety.

## The Role of Central Bank Signaling

Central banks can influence rates by signaling their policy intentions and through actual asset purchases. Christensen and Rudebusch (2012) compared interest rate responses to quantitative easing in the UK and U.S., and they explicitly consider central bank signaling. Interestingly, they note that "We find that declines in U.S. Treasury yields mainly reflected lower policy expectations, while declines in UK yields appeared to reflect reduced term premiums. Thus, the relative importance of the signaling and portfolio balance channels of quantitative easing may depend on market institutional structures and central bank communications policies." Certainly, the Fed under Bernanke's chairmanship has made considerable strides to improved communications and signaling.

We note that the signals from the Fed about its intentions for future quantitative easing policies from 2009 through mid-2012 were predicated on the potential for weakness in the U.S. economy and a general view that progress in reducing the unemployment rate was insufficient. That is, QE signals and a relatively pessimistic view of the U.S. economic progress went hand-in-glove. This meant that while the signaling of future QE policies might have caused a more rapid transmission to rates, it came with the potential side-effect of depressing consumer and business confidence. Our contention is that the when QE signals embody a pessimistic view of the economy, that contributes to breaking the link between rates and economic activity because they reduce consumer and investor confidence in the future.

Moreover, in the post-banking crisis phases of a financially-induced recession, rebuilding confidence in the future is critical to reestablishing a link between lower rates and consumption and business decisions. This view has not gone unappreciated, as there have been discussions among FOMC members of extending the

period of guidance about future accommodative policy actions that set time tables without referring to an economic context. That is, some policy makers would prefer not to condition future policies on the economic context, so that market participants would know that the commitment to policy accommodation would continue well into any economic recovery.

## Exiting QE

We now turn to our final set of observations, which is to consider exit strategies. No investment strategy should be entered into without a plan of exit, and the same probably applies to policy approaches. The Fed and the ECB both consider their forays into QE as temporary and that the exit from QE is manageable. While we do not doubt that the exit from QE is manageable, we do think it will be highly challenging and contains the distinct possibility, if not certainty, of delaying a return to normal monetary policies.

To the extent that QE has reduced rates, the exit from QE is equally likely to raise rates. But the economic context will be totally difference. That is, the entry into QE occurs during the deleveraging phase and lack of confidence phase following a severe financially-induce recession. These are the periods during which the interest rate sensitivity of consumers and corporations are likely to be very low and even perhaps non-existent. By contrast, the exit from QE is most likely to occur only when the economy has returned to a stable and positive growth path. This means that the exit from QE is likely to occur when the economy has regained its typical degree of interest rate sensitivity. But in the exit from QE, rates will be rising as assets are sold into the market, and that in turn could spell trouble for a now more interest rate-sensitive economy.

There is a strong possibility, although not a necessity, that central banks will delay the exit from QE or extend its time frame to minimize the impact on the economy from high rates. The potential implication of delays from exiting QE once the economy has regained its strength is a weaker currency and the possibility of feedback effects into inflation. In addition, large scale asset sales have the potential to cause price volatility in bond markets. Central bank signaling may be able to reduce the volatility, but at the cost of having the downward price (upward yield) effects occur even faster. Our conclusion is simply that it is much easier to enter QE than to exit QE, and we fear that the long-term costs of QE for the economy and market volatility are easy to underestimate.

## Evaluating Quantitative Easing is Not a Simple Task

Evaluating QE seems to involve considerable challenges. Quantitative macro-economic models need to explicitly deal with the following issues:

- There is evidence of structural change in labor markets. Can it be safely assumed not to exit? Probably not.
- There has been an historic increase in the role of emerging markets in the world economy since 2000. Can domestic economy models without explicit international linkages be used to evaluate QE in this day and age? Probably not.
- There was a material amount of deleveraging by consumers and corporations from 2008 into 2011. Can one safely assume that the 2008-09 recession was typical of other post-WWII recessions? Certainly not, if one accepts the premises of Reinhart and Rogoff. Even if one rejects the implications of the Reinhart and Rogoff suggestions that "this time is different," one seems obligated to explain why the deleveraging argument did not impact the interest rate sensitivity of the economy.

Our conclusions from our theoretical considerations and our interpretations of Fed and ECB actions from 2008 through mid-2012 yield the following points:

**QE1 was effective –** Quantitative easing is a very effective tool for central banks to use when combatting a failing banking system facing systematic solvency and liquidity challenges.

**Asset purchases are more effective than loans –** Moreover, central bank purchases of securities held by a weakened or failing banking system may be more effective in encouraging a more rapid return to economic growth than other forms of QE, such as outright loans to the banking system.

**QE impacts rates –** Quantitative easing in the form of purchases of securities with long-term maturities can have a meaningful effect in terms of lowering long-term interest rates. The opposite effect on rates will occur, however, if and when central banks unwind their expanded portfolios and return to normal monetary policies.

**QE does not necessarily impact economic activity –** In the context of a relatively sound, profitable, and well capitalized banking system, quantitative easing may have little to no positive

impact on economic activity or labor markets despite its impact on interest rates. Indeed, using QE when the likely effects are centered on rates and not on economic activity has the distinct potential to be counterproductive in terms of achieving the objectives of the central bank due to the fact that the use of QE sends a powerful signal of economic pessimism to market participants.

**QE exit strategies are likely to be exceedingly challenging –**

Exit strategies from QE by central banks may be extremely challenging to implement and have the potential, if not the certainty, to delay a return to the normal conduct of monetary policy to the detriment of longer-term economic growth, currency values, and potential future inflation. That is, the long-term costs to economic activity and financial market stability of QE have the potential to be quite large.

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