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Economics Instruction and the Brave New World of Monetary Policy¹

Good evening and welcome to the Federal Reserve Bank of San Francisco. It's a special pleasure to have you with us. As Chairman Bernanke has noted, economics education is "a critical component of the Federal Reserve's mission."² You are the ones who teach this often confounding subject—not only to those who will follow careers in finance and economics, but also to future engineers, artists, and elementary school teachers.

For our part, we at the Fed have an enormous stake in economics education. The Fed has often appeared to be clouded in mystery. People often misunderstand our mission and what we do. That's been especially true these past few years. In response to the financial crisis and recession, we deployed an array of new monetary policy and lending tools that were not part of our standard playbook and not found in any textbook. That's one of the reasons why we recognize the importance of good communication and transparency, through initiatives such as the Chairman's periodic press conferences. It is essential that the public have a solid base of knowledge about economics and monetary policy that will allow people to make informed judgments about the Federal Reserve. We depend on educators like you to explain how the Fed works and how our policies affect the economy. We all benefit when the public understands what we do and why, so we are very grateful for the work you do.

¹ I want to thank John Fernald, Eric Swanson, and Sam Zuckerman for their assistance in preparing these remarks.

² Bernanke (2006).

This evening I will talk about some of the profound changes that have taken place in central banking and monetary policy over the past half century and what that means for teaching about the Federal Reserve at the collegiate level. I should say here that my comments represent my own views and not necessarily those of my Federal Reserve colleagues.

As I know from personal experience, teaching about monetary policy today can be especially challenging when actual events overtake textbooks and lesson plans. In early 2008, I taught macroeconomics at the Stanford Graduate School of Business. At the time, the Fed was creating new programs and new tools to deal with the burgeoning financial crisis. The textbook descriptions of the traditional monetary policy tools of reserve requirements, open market operations, and the discount window missed much of what was happening in the real world. I took away an appreciation of how difficult it was to keep my lectures up to date with rapidly evolving events. Let me give you an idea of how much things have changed. Today the Board of Governors web site lists 12 monetary policy tools. Nine of them didn't exist four years ago. The good news is that six of those tools are no longer in existence, reflecting the improvement in financial conditions.

To take a notable example of a monetary policy tool that wasn't in the textbooks, the Fed has enormously bulked up its balance sheet in response to the recent financial crisis and recession. We've bought large quantities of Treasury, mortgage-backed, and agency securities, and paid for them by creating bank reserves. Standard textbook treatments of monetary policy imply that such money creation should be highly inflationary. But, as I will explain, the world has changed in ways that undermine the reasoning behind such a conclusion.

When I was an undergraduate at Berkeley in the early 1980s, much of the monetary economics that I learned was based on theories from the 1950s or even earlier. These included

the quantity theory of money, Keynes's LM curve, Milton Friedman's monetarism, and the Baumol-Tobin theory of money demand, to name a few examples. Now, there's no question that Keynes, Friedman, and Tobin were among the greatest monetary theorists of all time. Their theories are elegant statements of fundamental economic principles. As such, they deserve to be taught for a long time to come. But viewing them as definitive in today's world is like thinking that rock and roll stopped with Elvis Presley. The evolution of money and banking since the 1950s is at least as dramatic as what's happened with popular music—not that I want to compare the Fed with Lady Gaga. The theories of that era need to be adapted to the brave new world in which we now live.

Technology and changes in the concept of money

The first major difference between monetary policy today and policy of a generation or so ago is that our decisions have had less and less to do with monetary aggregates, such as M1. This reflects the fact that payments technology has changed so dramatically over the past 50 years. In the 1950s, when June Cleaver went to buy groceries, she probably paid with cash or perhaps a check. If her purse was empty, she had to get to the bank before it closed at three o'clock, wait in line for the next available teller, and then withdraw enough cash to last until her next bank visit. These simple facts of life determined the monetary theories of that day. They even shaped the definition of M1, which has a nostalgic 1950s simplicity about it.

For example, M1, the most liquid measure of money, is defined as cash and coin, traveler's checks, demand deposits, and similar bank balances. These include the measures of money that June Cleaver used for her transactions every day. In terms of understanding how much cash June wanted to hold, the Baumol-Tobin theory of money demand might apply. In that theory, households calculate how many times to go to the bank to withdraw cash and how

much cash to take out based on two things: the inconvenience cost of each trip to the bank and the household's typical monthly shopping needs.

Let's now fast-forward 50 years. Instead of driving to the bank and waiting in line, many of us do most of our banking online or at ATMs. And purchases today can be made using a dizzying array of payment options, including credit cards, debit cards, gift cards, and PayPal, to name just a few. Debit cards and PayPal have many similarities to traditional checking accounts and can be fitted into traditional monetary theories. But credit cards present a much greater challenge. Credit card balances are nowhere to be found in the monetary aggregates, even though they make up a large fraction of total U.S. transactions. If you or I drained our bank accounts, we could still shop until we dropped by running up our credit card balances.

How do 1950s theories of cash and checks apply in a world in which you and I can instantly take out a loan of several thousand dollars with the swipe of a card at the cash register? When Milton Friedman first advocated slow and stable growth of the money supply, he didn't write a word about credit cards, checkable brokerage accounts, or checkable home-equity loan accounts. In the 1950s, these innovations hadn't been invented or existed only in the most rudimentary form.

Let's take a closer look at the classic quantity theory of money: $MV = PY$. It becomes very tenuous when traditional measures of M make up a smaller and smaller fraction of the value of transactions. For example, the velocity of $M1$ was around three or four in the 1950s. Now it is about eight—and that's down from a peak of about $10\frac{1}{2}$ a few years ago. Today's economy uses cash and checking accounts much more efficiently.³

There have been a number of attempts to find a broader measure of "money" that has a stable relationship with nominal spending—that is, a constant velocity. These include $M2$ and

³ See Goldfeld (1976).

variants of M2 that incorporate the latest financial innovations.⁴ But, despite repeated efforts, like the mythical city of El Dorado, this ideal measure of money has proven elusive. It is precisely because of the volatility of velocity (V) that the Fed has moved away from targeting the monetary aggregates in conducting monetary policy. Instead, for the past few decades, the Fed has targeted short-term interest rates, in particular the federal funds rate and the interest rate on bank reserves. By targeting these rates directly, the Fed bypasses the uncertain and unpredictable link between money and the economy. Other major central banks target short-term interest rates as well.

The money multiplier during the crisis and recession

The breakdown of the standard money multiplier has been especially pronounced during the crisis and recession. Banks typically have a very large incentive to put excess reserves to work by lending them out. Thus, our traditional textbook theories predict that banks will hold reserves only to the extent that they have to do so to satisfy regulatory requirements and transactions needs. If a bank were suddenly to find itself with a million dollars in excess reserves in its account, it would quickly try to find a creditworthy borrower and earn a return on that one million dollars. If the banking system as a whole found itself with excess reserves, then it would try to lend the money out. That would increase the availability of credit in the economy, drive private-sector borrowing rates lower, and spur economic activity. Precisely this reasoning lies behind the classical monetary theories of multiple deposit creation and the money multiplier.

But, this hasn't happened—not at all. The Federal Reserve has added \$1.5 trillion to the quantity of reserves in the banking system since December 2007. Despite a 200 percent increase in the monetary base—that is, reserves plus currency—measures of the money supply have

⁴ See Small and Porter (1989) and Duca (1995).

grown only moderately. Over this period, M1 increased 38 percent, while M2 increased merely 19 percent. In other words, the money multiplier has declined dramatically. Indeed, despite all the headlines proclaiming that the Fed is printing huge amounts of money, since the end of 2007 M2 has grown at a 5½ percent annual rate on average. That's only slightly above the 5 percent growth rate of the preceding 20 years.

Why has the money multiplier broken down? Well, one reason is that banks would rather hold reserves safely at the Fed instead of lending them out in the still struggling and risky economy. But, once the economy improves sufficiently, won't banks start lending more actively in order to earn greater profits on their funds? And won't that get the money multiplier going again? And can't the resulting huge increase in the money supply overheat the economy, leading to higher inflation? The answer is no, and the reason for this is a profound, but largely unappreciated change in the inner workings of monetary policy.

Interest on bank reserves

I'm referring to the 2008 legislation that allowed the Fed to pay interest on bank reserves. These reserves consist almost entirely of bank balances held electronically at the Fed. Until just a few years ago, bank reserves and cash were the same in many respects. Both were part of the monetary base. Both earned no interest. And both could be used to satisfy reserve requirements and settle payments between banks.

But now banks earn interest on their reserves at the Fed and the Fed can periodically change that interest rate. This fundamental change in the nature of reserves is not yet addressed in our textbook models of money supply and the money multiplier. Let's think this through. At zero interest, bankers feel considerable pressure to lend out excess reserves. But, if the interest rate paid on bank reserves is high enough, then banks no longer feel such a pressing need to "put

those reserves to work.” In fact, banks could be happy to hold those reserves as a risk-free interest-bearing asset, essentially a perfect substitute for holding a Treasury security. If banks are happy to hold excess reserves as an interest-bearing asset, then the marginal money multiplier on those reserves can be close to zero.

In other words, in a world where the Fed pays interest on bank reserves, traditional theories that tell of a mechanical link between reserves, money supply, and ultimately inflation no longer hold.⁵ In particular, the world changes if the Fed is willing to pay a high enough interest rate on reserves. In that case, the quantity of reserves held by U.S. banks could be extremely large and have only small effects on, say, M1, M2, or bank lending. So what about excess reserves and inflation? Classical monetary theory would take it as given that the enormous growth of excess reserves of the past few years would spur inflation. But if all those reserves aren't lent out, and all they do is sit at the Fed gathering interest, then the classical conclusion no longer holds water.

Understanding the Federal Reserve's asset purchase programs

This raises another question: If those reserves aren't circulating, why has the Fed boosted them so dramatically in the first place? The most important reason has been a deliberate move to support financial markets and stimulate the economy. By mid-December 2008, the Fed had lowered the federal funds rate essentially to zero. Yet the economy was still contracting very rapidly. Standard rules of thumb and a range of model simulations recommended setting the fed funds rate below zero starting in late 2008 or early 2009, an obvious impossibility.⁶

⁵ Martin et al. (2011).

⁶ See Chung et al. (2011a) and Rudebusch (2010).

Instead, the Fed provided additional stimulus by purchasing longer-term securities, another policy tool absent from standard textbooks. From late 2008 through March 2010, the Fed bought \$1.7 trillion in such instruments. Then, in November 2010, we announced we would purchase an additional \$600 billion in longer-term Treasury securities by the end of June 2011. We created bank reserves to pay for the securities. These purchases increased the demand for longer-term Treasuries and similar securities, which pushed up the prices of these assets, and thereby reduced longer-term interest rates. Lower interest rates, in turn, have improved financial conditions and helped stimulate real economic activity. Based on econometric analysis and model simulations, I estimate that these longer-term securities purchase programs will raise the level of GDP by about 3 percent and add about 3 million jobs by the second half of 2012. This stimulus also probably prevented the U.S. economy from falling into deflation.⁷

The important point is that the additional stimulus to the economy from our asset purchases is primarily a result of lower interest rates, rather than through a textbook process of reserve creation leading to an increased money supply. It is through its effects on interest rates and other financial conditions that monetary policy affects the economy. Of course, once the economy improves sufficiently, the Fed will need to raise interest rates to keep the economy from overheating and excessive inflation from emerging. It can do this in two ways: by raising the interest rate paid on reserves along with the target federal funds rate; and by reducing its holdings of these securities, which will reverse the effects of the asset purchase programs on interest rates.

Lender of last resort

⁷ See Chung et al. (2011a, b).

Finally, the Fed is not only the nation's monetary authority. It is also the lender of last resort. This too is a function that has undergone momentous changes in recent decades. Traditionally, during bank panics or times of financial distress, the Fed would use the discount window to lend cash to banks against illiquid collateral. These emergency loans kept sound banks from falling victim to a lack of liquidity during bank runs.

In the most recent financial crisis, liquidity all but vanished across an unprecedented spectrum of assets and markets. In response, the Fed carried out a slew of unconventional measures to try to prevent fundamentally sound institutions from failing and economically important asset classes from disappearing. To accomplish this, the Fed extended the discount window to nonbank institutions. And it lent cash against an extremely wide variety of fundamentally sound but illiquid assets.

The novelty here is not so much in the loans that the Fed made, but rather in the universe of borrowers. The extension of discount window-type loans to investment banks and even an insurance company was a major departure from past practices and it wasn't always popular. Here again though is a case of perception not catching up with the reality of the new financial order. When the Fed was assigned the role of lender of last resort, the financial system was far simpler. Securitized mortgages didn't exist. Commercial paper was a tiny fraction of corporate finance, while today it is one of the most important ways corporations finance their short-term needs for cash. In addition, the walls between traditional banking and other financial market activities have crumbled. More of what we traditionally regarded as commercial banking activity is now carried out in the shadow banking system than in the world of regulated banks

and thrifts.⁸ The explosive growth of the shadow banking system has meant that we have had to think about the lender-of-last-resort function in new ways.

Conclusion

I've tried to highlight some of the challenges faced by traditional monetary theory in light of the dramatic changes in the economy and monetary policy. I said at the beginning of my talk that those changes represent a challenge for economics instructors. When you read the commentary in blogs and the news media, you sometimes find confusion and misinformation about what the Fed is doing. There is no question that, at the Fed, we have to do a better job explaining the theoretical and practical bases for our policies. At the same time, we depend on you to educate citizens who can make sense of the world as it is today. Thank you very much.

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⁸ See Pozsar et al. (2010).

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