Teaching Courses in Macroeconomics and Monetary Policy with Bloomberg Analytics

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In this paper, we illustrate the use of Bloomberg for analyzing topics in macroeconomics and monetary policy in economics and finance courses. The hands-on experience that students gain from such a course has many benefits, including deeper learning and clearer understanding of data.

Keywords: experiential learning, macroeconomics, monetary policy

Students learn about data and about economic events better when they can put their hands on the data or manipulate it. For that reason, we find it valuable to give students hands-on experience with macroeconomic data in the classroom by utilizing Bloomberg data. Though students learn about macroeconomic data by looking at graphs of data, they are more fully engaged when they create such graphs themselves. Making them do this helps to reinforce in their minds the economic relationships they see in the data. They also develop a deeper understanding of both data and theory. Our work in the classroom suggests that such hands-on experiences lead to better retention of classroom material by students, which in turn generates improved test results. We also believe that such learning is of value to the students in later internships and jobs. Thus, we

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believe that using Bloomberg in the classroom enhances student learning and gives students a better real-life understanding of economics.

Our objective in this paper is to demonstrate how to teach an experiential-learning-based course on macroeconomics and monetary policy by utilizing real-time data and analytical tools available in Bloomberg. Students are engaged in a laboratory setting to analyze issues at the forefront of macroeconomics and monetary policy.

In the paper, we first briefly discuss the economics literature on the benefits of experiential learning. Then, we illustrate some examples of how to use Bloomberg. In the following section, we do some sector analysis. After that, we show how to use Bloomberg for analyzing monetary policy. Then, we examine Bloomberg's extensive coverage of financial markets. Finally, we look at a few case studies.

I. Economics literature on experiential learning

Our use of Bloomberg as an experiential learning device is motivated by the notion in the literature that experiential learning improves student outcomes. McGoldrick and Ziegert (2012) note that "preparing students for active participation in the world after graduation is a key motivation for incorporating experience into the learning process."[1] Hawtrey (2007) notes that "Students remember only a fraction of what they hear but a majority of what they actively do....real learning occurs when students apply concepts by having to work them out in different situations and experience the issues first hand. Experiential learning makes the student a stakeholder, and that alone significantly improves the ability to absorb knowledge."[2] As Hoyt (2003) notes, "The ability to apply economic tools to significant happenings in the world empowers students and makes them partners in an important enterprise."[3] Salemi (2002) argues that "Active learning provides students with opportunities to work with concepts at higher cognitive levels. .

[1] See McGoldrick and Ziegert (2012), p. 87.
[2] See Hawtrey (2007), p. 145.
[3] See Hoyt (2003), p. 222.

. . Active learning practitioners report that students think harder during class because they spend time trying to make ideas work rather than trying to understand what the teacher is saying. Many point to the power of learning by doing, arguing that students will be better able to use important concepts if they have opportunities to practice using them in a controlled environment. Others point out that students benefit from seeing and participating in problem solving that goes on during active learning. Practitioners also believe that students benefit from being pushed beyond their initial answers to revisions that are more complete, precise, and correct."[4]

II. Examples of how to use Bloomberg

One of the best ways to use Bloomberg is to analyze current economic events.[5] In this section, we supply two examples of such analysis: (1) the effects of quantitative easing on financial markets, and (2) the response of financial markets to the Fed's tapering plans.

A. Effect of quantitative easing on financial markets

Suppose that you wish to discuss the effects of the Federal Reserve's quantitative easing programs, as well as the program known as Operation Twist. How did such programs affect financial markets? Rather than just stating the impact of such policies in summary, students find it much more interesting to do more of a case study, examining the short-run and longer-run impacts of the policy changes.

To analyze QE1, the Fed's first quantitative easing program, you can go to Bloomberg and pull up a chart of the Dow Jones Industrial Average from November 25, 2008 to March 31, 2010, which is the period in which the Fed engaged in its first round of quantitative easing, as shown in Figure 1. The white horizontal lines show the level of the Dow at the beginning and end of the period, and the

[4]See Salemi (2002), p. 723.
[5]See Kazemi (2015).

numbers in the upper left show that the Dow went up 28.63 percent over the period, which is an annualized increase of 20.63 percent per year. Of course, you cannot attribute the rise in the Dow to the Fed's quantitative easing program, but you can note the rise in the stock market during the QE1 period.

FIGURE 1. DOW AND QE1: 11/25/2008 TO 3/31/2010

Note: The graph shows the daily value of the Dow Jones Industrial Average from November 25, 2008 to March 31, 2010, which is the period in which the Fed engaged in its first round of quantitative easing. The white horizontal lines show the level of the Dow at the beginning and end of the period, and the numbers in the upper left show that the Dow went up 28.63 percent over the period, which is an annualized increase of 20.63 percent per year.

The Fed tried to reduce long-term interest rates by selling short-term Treasury securities and buying long-term Treasury securities from September 2011 to December 2012. The program was known inside the Fed as the Maturity Extension Program, and outside the Fed as Operation Twist.

We show the impact of Operation Twist by looking at yield curves on different dates, as shown in Figure 2. The white line shows the yield curve as of September 2011, when Operation Twist began. By March 2012 (yellow line), the entire yield curve had risen very slightly, perhaps for other reasons. But by December 2012

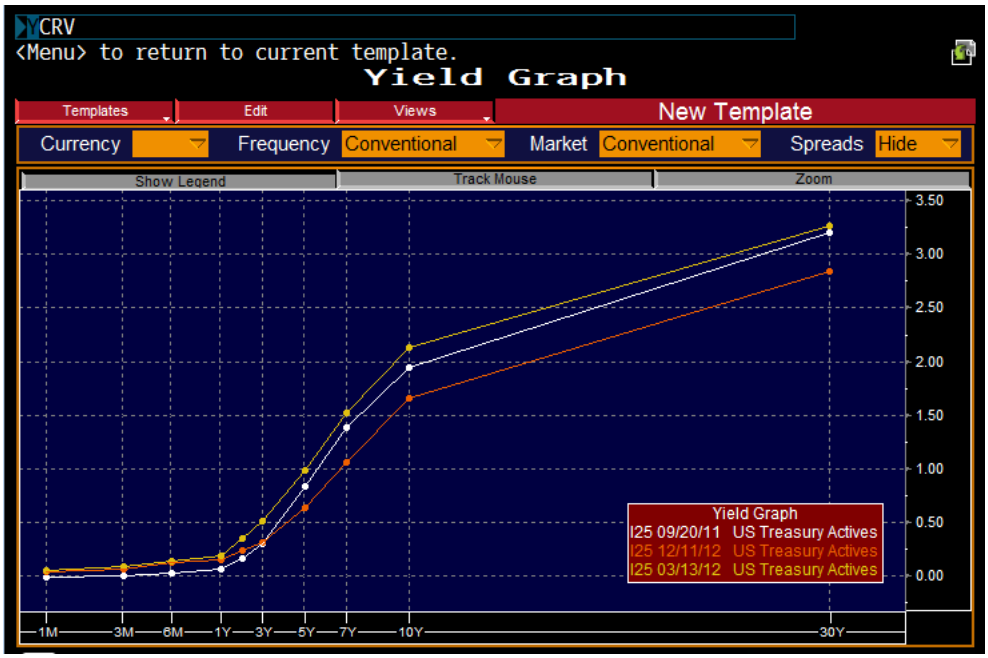

FIGURE 2. YIELD CURVE CHANGES AS THE FED ENGAGES IN OPERATION TWIST

Note: The graph shows the yield curve on three different dates as the Fed engages in Operation Twist. The program began in September 2011 (white line). By March 2012 (yellow line) the program seemed to have little effect. But by December 2012 (red line) the program was successful, as long-term interest rates declined from their original levels.

(red line), the twist is observable. as short-term interest rates are slightly higher and long-term interest rates are lower than they were earlier. Of course, economic events other than Operation Twist may have also affected the yield curve over this period.

B. Response of financial markets to Fed tapering plans

In 2013, when the Fed began to consider tapering its quantitative easing program, the effects on financial markets were substantial and clear to see using charts from Bloomberg. From May to August 2013, the price of the 30-year Treasury bond fell by 13 percent, as investors expected the Fed to reduce its demand for the bond, driving interest rates up. Figure 3 shows the steady decline in the bond price over this period.

When the Fed meeting ended on June 19th, the Fed confirmed that it would begin tapering soon, leading to a 4.3 percent drop in the Dow in five days, as shown in Figure 4.

The Fed surprised investors in September 2013 when it decided not to taper its asset purchases because of the threat of a government shutdown and slightly weaker economic activity. As a result, the price of the 30-year Treasury bond increased sharply, as shown in Figure 5. The announcement also led to a sharp rise in the Dow, as Figure 6 shows.

FIGURE 3. 30-YEAR TREASURY BOND, 5/22/2013 TO 8/21/2013

Note: From May 22, 2013 to August 21, 2013, the price of the 30-Year Treasury Bond that matures in May 15, 2043 and pays an interest rate of 2 7/8, fell by 13 percent (an annualized rate of 43 percent), as investors expected that the Fed would soon begin to scale back its asset purchases, leading long-term interest rates to rise.

FIGURE 4. DOW RESPONDS TO EXPECTED TAPERING ANNOUNCEMENT AFTER JUNE 2013 FOMC MEETING

Note: The Dow stock index fell after the Fed announced that it would begin to taper its asset purchases soon, following the June 2013 FOMC meeting.

FIGURE 5. 30-YEAR BOND PRICE RESPONDS TO FED'S "NO-TAPERING" ANNOUNCEMENT IN SEPTEMBER 2013

Note: The price of the 30-year Treasury bond jumped up sharply when the Fed surprised markets by not announcing tapering at its September 2013 meeting.

FIGURE 6. THE DOW JUMPED UP IN RESPONSE TO THE FED'S "NO-TAPERING" ANNOUNCEMENT IN SEPTEMBER 2013

Note: The Dow stock index jumped up sharply when the Fed surprised markets by not announcing tapering at its September 2013 meeting.

III. Sector Analysis

In teaching a macroeconomics course, a useful assignment is to have each student study a sector of the economy over the course of a semester.[6] The students can use Bloomberg to provide a nice view of the recent movements of variables in each sector. We will illustrate the use of Bloomberg by showing some variables from the household sector and labor markets. Of course, Bloomberg contains variables on many other sectors of the economy, including the business sector, the government sector, and the international sector, as well as key indicators of the economy, such as the inflation rate.

A. Household sector

The household sector's strength is measured using data on consumer spending and its main influences, as well as spending on housing. Bloomberg contains data on numerous household variables, including personal consumption expenditures, consumer confidence, housing prices, and home sales.

The most useful general variable for the household sector is personal consumption expenditures, which represents about 70 percent of GDP. Consumption growth, as shown in Figure 7, tends to be fairly stable over the business cycle, except in a major downturn, as was the case in 2008 and 2009. The loss of wealth in the financial crisis also led to a lower rate of growth of consumer spending in the recovery following the recession.

One of the driving forces of consumer spending is the confidence that consumers have about the economy, so measures of consumer sentiment are followed very closely by economic policymakers. The Conference Board's measure of consumer confidence can provide insight into consumer's feelings about spending, as Figure 8 suggests. In the graph, we can see the very steep decline in consumer confidence in the recession and its very slow rise in the recovery. The rise in confidence from

[6]For an example of how to use such assignments in an economics capstone sourse, see Croushore (2015).

2008 to 2017 was marked by a number of periods in which it declined sharply, thanks to weak economic news, increases in oil prices, threats to the economy from a potential government shutdown, and other negative events for the economy.

To a great extent, the last recession was initiated by a decline in home prices. Bloomberg contains a number of measures of housing prices. Figure 9 shows one such measure, the S&P/Case-Shiller 20-city home price index. As the graph shows, the home price index rose substantially from 2003 to 2006, then declined very sharply in 2007 and 2008. After the recession ended, home prices moved erratically until 2012, when they finally began to increase. As of the early half of 2017 the index has increased by 47% since its low in 2012. However it has yet to regain its high of 206.52 set back in July of 2006.

The decline in home prices led to a very sharp decline in the number of homes being sold, as Figure 10 illustrates. Sales of existing homes peaked in 2005, dropped slightly in 2006, then began plummeting in 2006 and 2007, leading to the financial crisis. Government policy (a home-buyer tax credit) boosted home sales in 2009 and early 2010, but the end of the program caused sales to hit a low point later in 2010. Sales climbed steadily from 2010 to 2013 and gradually increased through May 2017 but remain far below their levels in 2005.

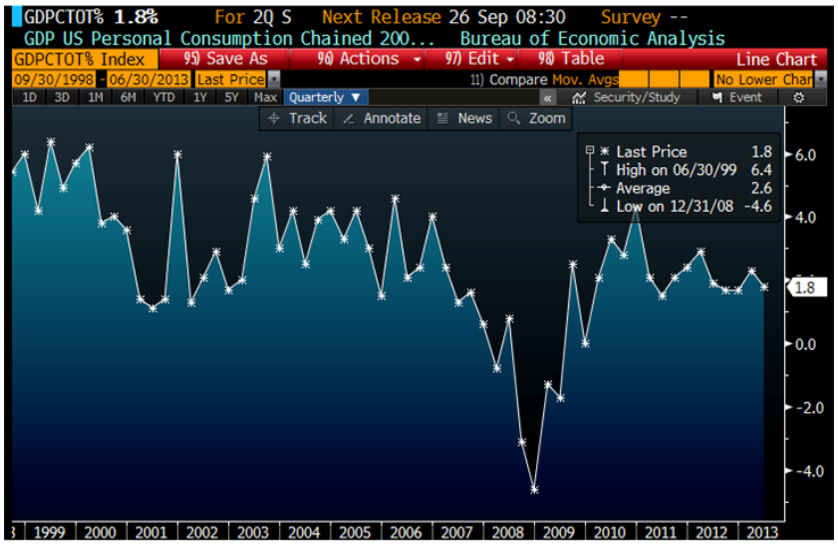

FIGURE 7. PERSONAL CONSUMPTION EXPENDITURES, QUARTERLY GROWTH RATE, 1998 TO 2017

Note: Quarterly consumption spending growth has been generally positive, but became negative during the financial crisis in 2008. It reversed its course starting in 2009 through the end of 2010 and since has become positive, varying within a range of .7% and 4.6%.

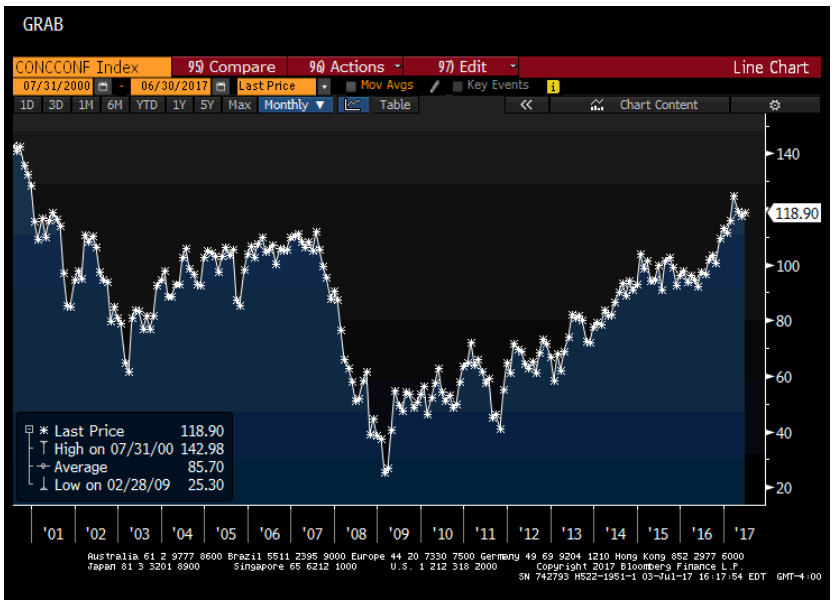

FIGURE 8. CONSUMER CONFIDENCE, CONFERENCE BOARD, 2000 TO 2017

Note: Consumer confidence plummeted during the financial crisis, then increased in fits and starts from 2009 to 2017. It was at 118.90 in June 2017, which is lower than its high of 142.98 set in July 2000.

FIGURE 9. HOUSE PRICE INDEX, S&P CASE-SHILLER, 20-CITY AVERAGE, 2003 TO 2017

Note: Home prices rose dramatically from 2003 to 2006, then fell very sharply in 2007 and 2008. They moved erratically through early 2012, hitting a 10-year low, before increasing at the end of the year. Since March 2012 the index has increased by 47% which translates to an annual increase rate of 7.75%.

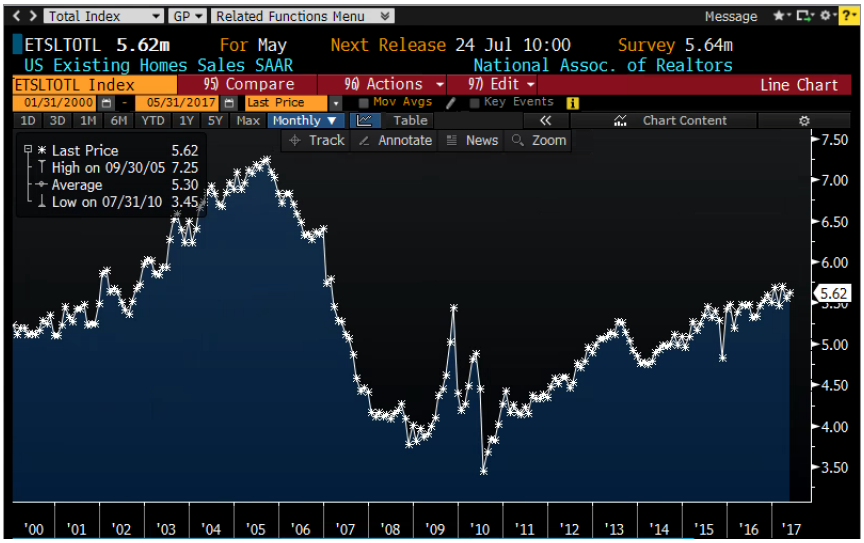

FIGURE 10. EXISTING HOME SALES, 2000 TO 2017

Note: Sales of existing homes peaked in 2005, dropped slightly in 2006, then began plummeting in 2006 and 2007, leading to the financial crisis. As of May 2017 it has recouped only about half of its loss since that time.

B. Labor markets

Students studying the labor market might be interested in using data on nonfarm payroll employment, the unemployment rate, initial claims for unemployment insurance, and the labor-force participation rate.

Macroeconomists generally regard the monthly change in nonfarm payroll employment as providing the most useful monthly data on the overall state of the economy, so the monthly employment report is the most watched variable on Wall Street. In a typical month in an economic expansion, the monthly change in payrolls will range from 100,000 to 300,000 net new jobs per month. But in a recession, the economy might lose several hundred thousand jobs per month, as it did in the most recent recession. Figure 11 shows the data on this variable from 2003 to 2017. You can see that in the depths of the recession, the economy lost as many as 800,000 jobs per month for six months straight. In the recovery, payrolls increased by 100,000 to 200,000 net new jobs per month in most months from 2011 to 2017.

The most well known variable measuring labor markets is the civilian unemployment rate, shown in Figure 12. After rising dramatically from 2007 to 2009, the unemployment rate began a steady but slow decline that continues today. The sharp rise in the recession occurred quickly and the slow decline means that millions of Americans remain unemployed long after the recession ended.

A useful guide to the strength of the economy in the short run is initial claims for unemployment insurance, which is released on a weekly basis, providing timely insight into the strength of labor markets. As Figure 13 shows, labor markets deteriorated very rapidly in 2008, with initial claims peaking in early 2009 at 670,000 claims. As the recovery occurred, many workers were still being laid off, so initial claims continued at a high level from 2009 to 2012, before finally returning to more normal levels in 2013. This measure was slightly uder 250,000 at the end of June, 2017.

One of the major surprises in the recession and its aftermath was the decline

in the labor-force participation rate in the recession. Figure 14 shows the steady decline in the participation rate in the recession and recovery. Depressed economic conditions led large numbers of workers to drop out of the labor force entirely, especially younger workers. Since September 2015 this figure has seen only a slight increase and is at 62.8% as of June 2017.

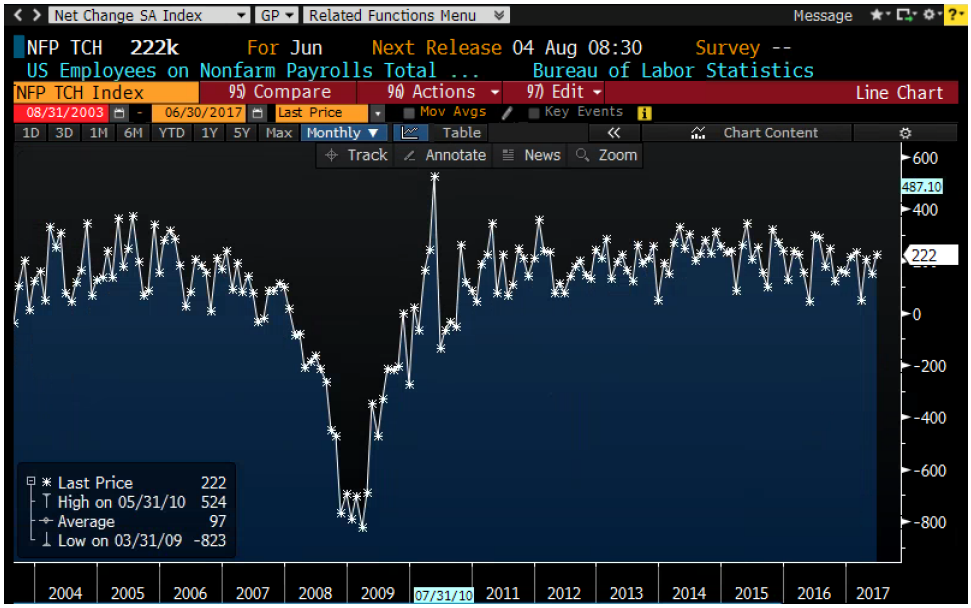

Figure 11. Monthly Change in Nonfarm Payroll Employment, 2003 to 2017

Note: The graph shows the net monthly change in nonfarm payroll employment. The damage to the labor market from the financial crisis is readily apparent.

FIGURE 12. UNEMPLOYMENT RATE, 2007 TO 2017

Note: The graph shows the civilian unemployment rate from 2007 to 2017, illustrating the sharp rise in unemployment during the financial crisis and its slow decline in the recovery.

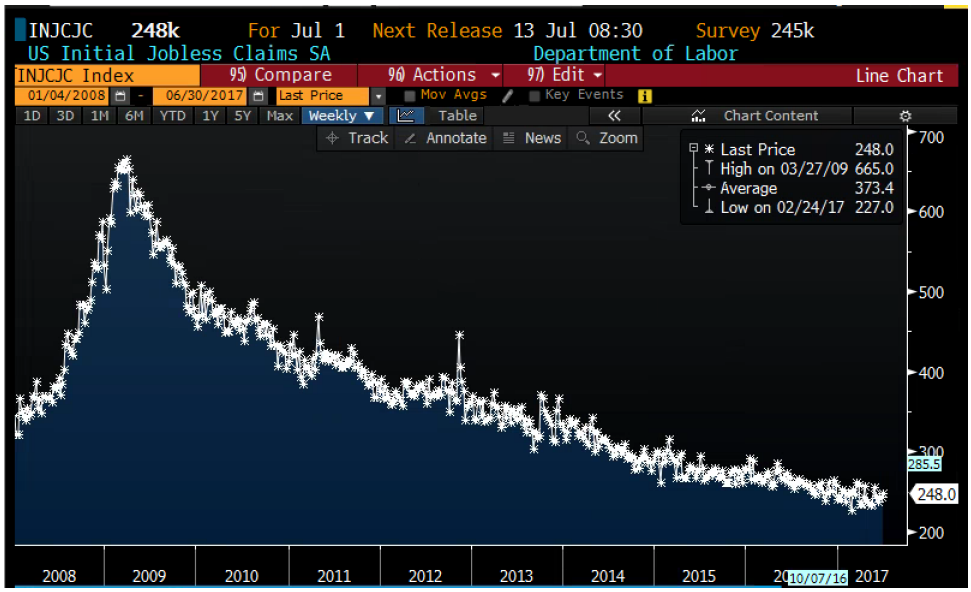

FIGURE 13. INITIAL CLAIMS FOR UNEMPLOYMENT BENEFITS, 2008 TO 2017

Note: The graph shows the number of initial jobless claims for unemployment insurance benefits from 2008 to 2017, showing the sharp runup in claims in the recession and the slow decline in the recovery.

Figure 14. Labor Force Participation Rate, 2003 to 2017

Note: The graph shows the labor force participation rate from 2003 to 2017, showing the steady decline that began in 2008 through September of 2015 that hit its lowest since October 1977 at 62.4%. Since September of 2015 this figure has seen only a slight increase to 62.8% as of the end of June 2017.

IV. Analyzing Monetary Policy

The Taylor rule, originally proposed by Taylor (1993), has been the focus of a large amount of research over the past 20 years. The rule provides a useful benchmark for setting monetary policy and has been widely used to understand the behavior of central banks around the world. Bloomberg provides a nice facility for examining the Taylor rule and looking at alternative versions of it. The basic equation of the Taylor rule is

$$i_t = r_t^* + \pi_t + w_1 ygap_t + w_2(\pi_t - \pi^T). \tag{1}$$

where i_t is the central bank's nominal interest rate instrument (the federal funds rate in the United States) at time t, r_t^* is the equilibrium real interest rate at time t, π_t is an inflation measure at time t, $ygap_t$ is a measure of the output gap (or unemployment gap) at time t, and π^T is the inflation target. The rule can be backward-looking, if the inflation measure and output gap measure are based on recent history, or forward-looking, if the inflation measure and output gap measure are forecasts of the future. A number of different variables can be used to measure inflation, including the GDP price index, the PCE price index, or the CPI.

An alternative version of the model allows for inertia in changing the interest rate by including a lagged interest rate term on the right-hand side of the equation. The result is

$$i_t = \rho i_{t-1} + (1-\rho)[r_t^* + \pi_t + w_1 ygap_t + w_2(\pi_t - \pi^T)]. \tag{2}$$

In this equation, ρ determines the degree of inertia in setting monetary policy. In equation (1), ρ is implicitly equal to zero, so there is no inertia.

Bloomberg allows a user to set most of the parameters of the Taylor rule for the United States and then to compare the implied rate to the actual federal funds

rate over time. In Figure 15, we see the Taylor rule setup in Bloomberg. The user can set ρ, r_t^*, w_1, w_2, π^T, and the variables used to measure inflation and the output gap. Bloomberg then plots the actual federal funds rate against the rate that would have been set using the rule.

FIGURE 15. TAYLOR RULE, JULY 1987 TO JULY 2017

Note: The graph shows the Baseline Taylor Rule model from July 1987 to July 2017 with the actual components used to calculate the rate in the formula right at the lower portion of the figure.

V. Financial markets

A unique advantage of Bloomberg is in its coverage of financial markets, which is especially helpful in covering the short-run responses of financial markets to shocks. Bloomberg has a very complete set of coverage of financial instruments, allowing a student to dig much deeper into financial market outcomes.

On Bloomberg, it is easy to see what exchange rates are of one currency against others, as shown in Figure 16. A student can also find forward exchange rates as well as the exchange rates of countries whose currencies trade less frequently than the major ones shown in the table.

Bloomberg also provides very deep coverage of government and corporate bonds, showing prices and yields of all tradable securities. The main Treasury screen, shown in Figure 17, gives an example of the type of coverage available through the use of Bloomberg. You can see the amount of detail on securities of a variety of times to maturity, along with comparisons to other returns shown in the lower right half of the table.

If a student wishes to examine a security in more complete detail, Bloomberg allows for that as well. On the detailed screen for a particular bond, as shown in Figure 18, you can see all the details about a security, including information on its return and risk characteristics.

Bloomberg also helps students see useful graphs based on conceptual ideas, such as the yield curve (a plot of the yields on securities with differing times to maturity). For example, a student could look at how the yield curve has changed over time, to see the impact of major economic changes on interest rates. For example, Figure 19 shows the yield curve on four different dates from May to October 2013, which illustrates how the yields on bonds with different times to maturity changed over time as the Fed began to discuss tapering of its asset purchases. As the market began to realize that tapering was more and more likely, yields on longer-term bonds increased substantially.

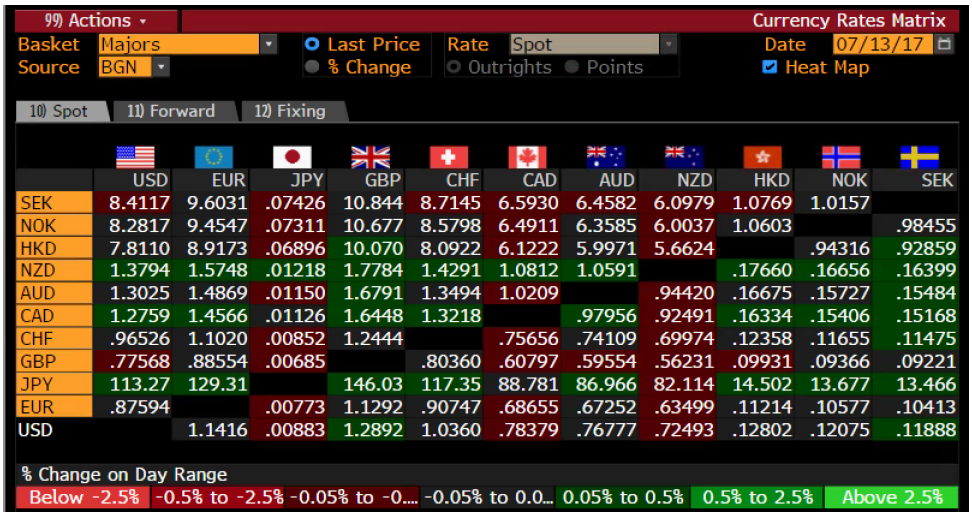

FIGURE 16. CURRENCY CROSS RATES

Note: This table shows the exchange rates listed on a particular day, showing the exchange rates of each of 11 currencies against the other 10.

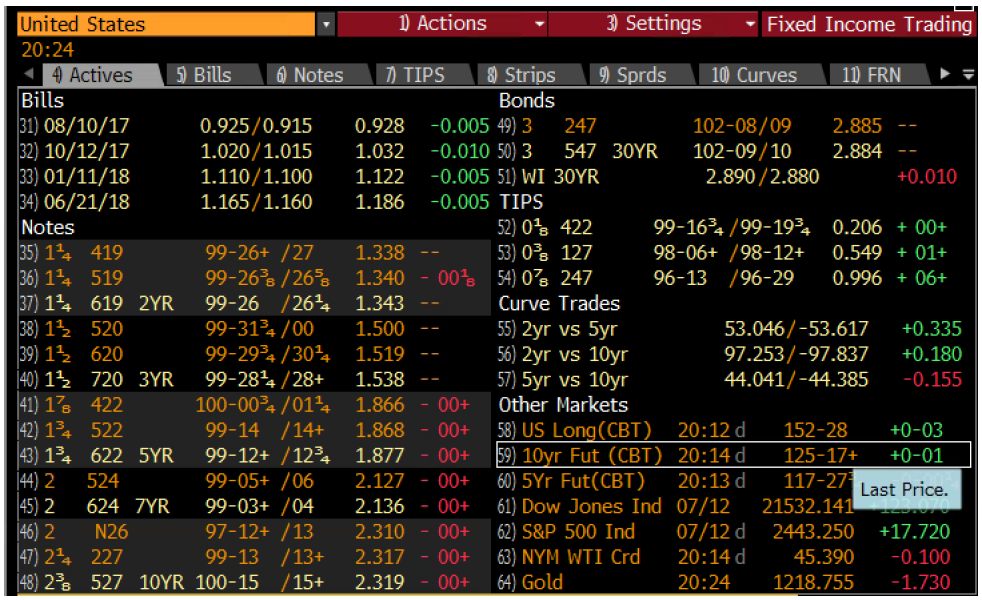

FIGURE 17. TREASURY SECURITIES SCREEN

Note: The table shows a list of actively traded securities on the market, their prices and their yields.

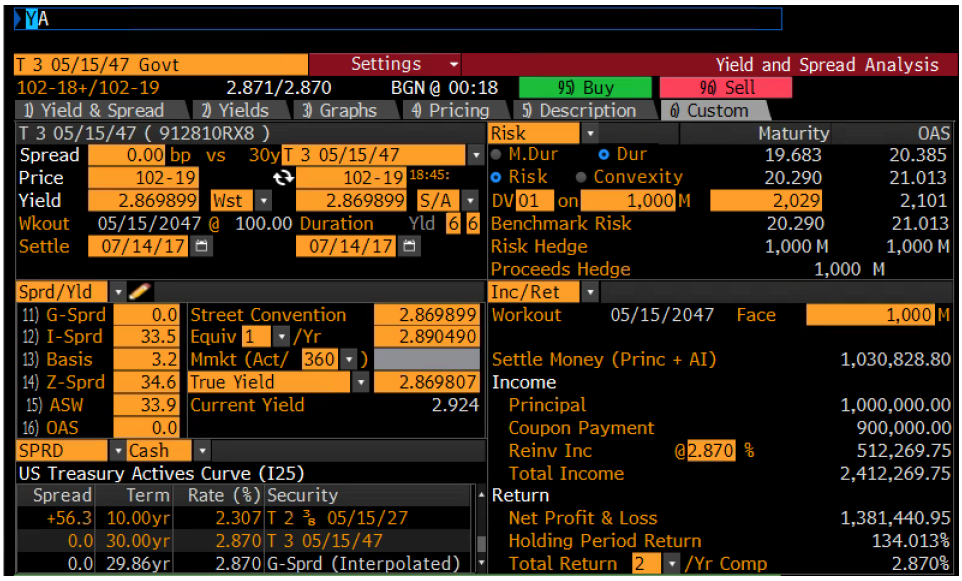

FIGURE 18. TREASURY RETURN CALCULATION SCREEN

Note: The table shows the details on a particular bond, showing its return and risk characteristics, providing additional details beyond those given on the basic Treasury screen.

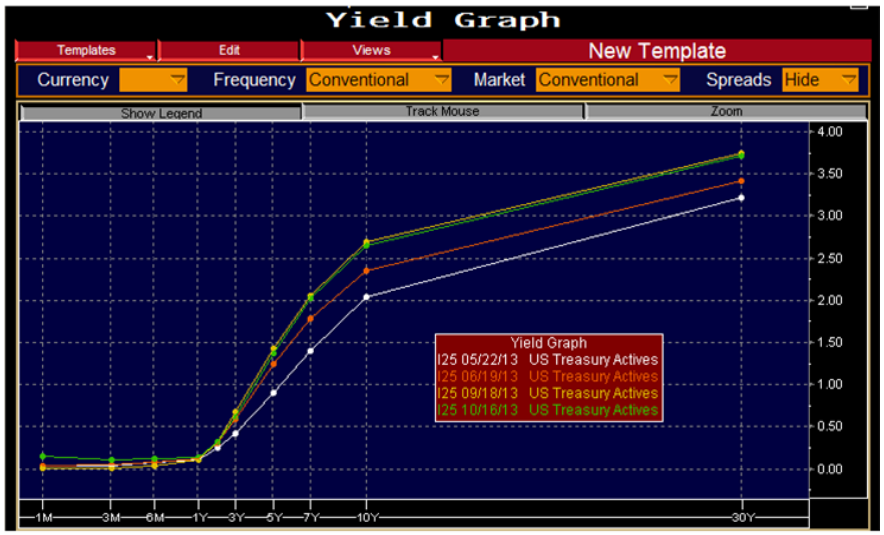

FIGURE 19. YIELD CURVE CHANGES AS THE FED DISCUSSES TAPERING

Note: The graph shows the yield curve on four different dates as the Fed began to consider tapering asset purchases.

VI. Case Study: Government Shutdown in October 2013

In early October 2013, the U.S. government partially shut down because political wrangling over the government budget reached an impasse and the government could not legally spend any additional funds on a large number of its operations. The shutdown had a strong impact on financial markets, which can be seen in a number of data series available on Bloomberg.

When the shutdown began, the likelihood that the government might be forced to default on its debt payments, though still remote, became larger. As a result, interest rates on Treasury securities rose slightly, as you can see in Figure 20. The figure shows the interest rate on a bond maturing on November 14, 2013, from September 9 to October 18, 2013. The interest rate had been 0.05 percent in most of September but began rising as the government shutdown became imminent. It hit a peak on October 16, at 0.35 percent, when it appeared unlikely that a political solution was possible. The surprise political agreement that was proposed later that day caused the interest rate to return to its more normal level by October 18.

During the week of October 14, when the government finally ended the federal government shutdown, the movements of various markets illustrates the impact of news on financial markets. On October 15 and 16, as the shutdown seemed to be continuing, interest rates on 10-year Treasury bonds (Figure 21) and 30-year Treasury bonds (Figure 22) rose. But on October 16 when Congress finally reached an agreement, the interest rates declined sharply and continued to decline for the next few days, as details about the plan were disseminated, suggesting a greatly reduced probability that the U.S. government would default on its debt.

Volatility in financial markets is measured by an index commonly known as VIX (Volatility IndeX).The index measures the amount of volatility implied by the prices of option contracts on the S&P 500 index. A higher measure of volatility suggests that investors are less certain about the future value of stock prices than normal. We can view the VIX over the period of the government shutdown to

see how the shutdown affected investors' expectations about future stock prices. Figure 23 shows the VIX from September 9, 2013 to October 18, 2013. The shutdown led to a substantial increase in uncertainty, reaching a peak on October 9 when the political rhetoric made a long shutdown seem likely. But as the probability of an agreement increased, the VIX declined, dropping sharply on October 16 when the government ended the shutdown. On the days that the shutdown was finally ended, volatility dropped very sharply, as Figure 24 shows.

FIGURE 20. INTEREST RATE ON BOND MATURING IN NOVEMBER 2013

Note: The graph shows the interest rate on a US Treasury bond maturing in November 2013, showing the rise in the yield because of fear that the government might default on its payments.

Figure 21. Ten-Year Bond Yield, Week of Vote to End Government Shutdown, 2013

Note: The graph shows the interest rate on 10-year U.S. government Treasury bonds during the week that the government shutdown ended.

Figure 22. Thirty-Year Bond Yield, Week of Vote to End Government Shutdown, 2013

Note: The graph shows the interest rate on 30-year U.S. government Treasury bonds, illustrating the decline in interest rates during the week that the government shutdown ended.

FIGURE 23. VIX INDEX, SEPTEMBER 9 TO OCTOBER 18, 2013

Note: The graph shows the volatility index (VIX) rising as the threat of a government shutdown increased and falling when the agreement was reached to avert a shutdown.

FIGURE 24. VIX INDEX, OCTOBER 15 TO 18, 2013

Note: The graph shows the volatility index (VIX) from October 15 to 18, 2013, when the government agreed to end the shutdown.

VII. Summary and Conclusions

In addition to the issues we have discussed in this paper, there are a number of additional advantages to using Bloomberg.

1) Access to the International Monetary Fund's data base combined with Bloomberg analytic and graphing tools.

2) Through Bloomberg's "Track" feature, you can easily pick points of significance in any chart.

3) Using Bloomberg's "News" feature, you could move the cursor to any point of interest in a chart and click on it and get news at that point in time.

4) Any part of a chart can be expanded to show more incremental changes. This option is really useful when looking at long-range data.

5) Clickable points in tables and graphs give the user many additional layers of functionality and analytics, making the data more dynamic and interactive.

The goal of this paper was to introduce instructors to the use of Bloomberg for courses in macroeconomics and monetary policy. Bloomberg can be used for many purposes, some of which we have illustrated in this paper. We find Bloomberg particularly useful for analyzing the impact of monetary policy on financial markets, studying particular sectors of the economy, examining the Taylor rule and its implications, looking at the details of numerous financial variables, and doing case studies of economic events.

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