Lee Honors College Thesis presentation on

By Aneesha Rai
Outline

• Introduction
• Importance of Quantitative Easing
• Operation Twist (1960) and its effects
• Quantitative Easing 1
• Quantitative Easing 2(a) and (b)
• Operation Twist Vs. Quantitative Easing 2
• Data and Research Methodology
• Channels
• Empirical findings
• Limitations of event studies
• Conclusion
Introduction

• This study analyzes the effect of Operation Twists, and the large scale asset purchases (LSAPs) by the Fed; and tries to measure its effectiveness with a focus on its effect on:

1. Long-term Interest Rates
2. Real interest rates and unemployment
3. Economic activity (Real growth rate of the economy)
Size of Central Banking

- Central banking has become a global growth industry.

Balance sheet size

- ECB: 31%
- Bank of Japan: 29%
- Bank of England: 21%
- Federal Reserve: 19%
US Treasury maturities

Old Standard
U.S. Federal Reserve holdings of Treasurys, by maturity

$800 billion

Source: Federal Reserve
Operation Twist (1961-65)

- Launched during the Kennedy administration
- First round of Quantitative easing
- Named after the Chubby Checker hit, previously called “Operation Nudge”
Operation Twist (cont’d)

- **Objective:** “To bring down long-term rates of securities to increase capital inflows with no change to short-term interest rates.” (Swanson, 2011)

- Treasury issuing short-term debt while the Fed bought back longer-term debt, thereby “twisting” the yield curve.

- Implemented during period of the Bretton Woods system

- Balance of payments problem

- Abandoned in 1965

- Was it considered successful? - Different perspectives
Effects of Operation Twist

- Event study approach used.
- Mangla (2012) has summarized the effect as follows:

1) Yield on long-term 5-30 year maturities fell between 6-14 basis points, which is highly statistically significant.
2) Yield on 3-month treasury bills increased by 11-16 basis points.
3) U.S. Treasury reversal on March 15 increased long-term rates by 8 basis points.
4) The cumulative effect of these 6 announcements for all maturities was between 13-16 basis points at both ends of the yield curve.
Effect of Operation Twist on securities (*Source: Balik, Mangla, 2012*)
Was Operation Twist successful?

Source: Mitchell, 2010
Global Financial Crisis (2007)

- Quantitative Easing 1

November 25, 2008: Fed would purchase up to $600 billion in MBS

December 16, 2008: FOMC formally announced the program

March 18, 2009, FOMC announced the program would be expanded by an additional $850 billion in MBS and $300 billion in treasury securities

Late 2010 - June 2011: Quantitative Easing 2(a) – Purchase of $400 billion in long term bonds
Measures by the Fed

• According to the Fed, its short-term liquidity and credit programs fell into three broad categories: –

1. Addressing severe liquidity strains in the key financial markets
2. Aim at providing credit to troubled systemically important institutions, and
3. Aim at fostering economic recovery
Results of Quantitative Easing 1

• Succeeded in providing liquidity to the market.
• Offset by-
  2. U.S. Treasury’s Supplementary Financing Program
• Economy remained sluggish
• High unemployment
• Banks reluctant to lend.
• Decline in demand for lending
Quantitative Easing 2(a)

- Fed tried to spur the economy
- Fed purchased $600 billion of longer-term securities
- Substantial impact on Treasury rates
- Not much impact on MBS rates
Quantitative Easing 2(b)

- Launched on September 22\textsuperscript{nd} 2011
- Additional stimulus to flatten the yield curve
- Buy $400 billion in short-term Treasury bills in exchange for long-term bonds
- Started in October 2011 and ends in June 2012
Results of Quantitative Easing 2

- Lowered 10-year Treasury yields by roughly 25 basis points.
- Reduced unemployment
- Inflation

**Criticism**
- Many economists view the policy as a failure
- Too much monetary stimulus could derail the economy.
- Future asset bubbles could endanger economic stability over the long term.
- Not an aggressive measure
- Predictable
Operation Twist (1960) Vs. Quantitative Easing 2

• **Similarities**
  
  1) The two operations were similar in size.
  2) Financial markets were not exceptionally dysfunctional at the time of QE1.

• **Differences**
  
  1) Start dates
  2) Funding of programs
  3) Type of policy
  4) Effects of implementation
## Operation Twist (1960) Vs. Quantitative Easing 2

### Table 1: Size of Operation Twist in Comparison to QE2

<table>
<thead>
<tr>
<th></th>
<th>Operation Twist</th>
<th>QE2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Federal Reserve Program ($B nominal)</td>
<td>8.8</td>
<td>600</td>
</tr>
<tr>
<td>U.S. GDP ($B nominal)</td>
<td>528</td>
<td>14730</td>
</tr>
<tr>
<td>U.S. Treasury marketable debt ($B nominal)</td>
<td>189.3</td>
<td>8543</td>
</tr>
<tr>
<td>U.S. Agency Debt ($B nominal)</td>
<td>7.4</td>
<td>6449</td>
</tr>
<tr>
<td>Size of Federal Reserve program:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>As % of GDP</td>
<td>1.7</td>
<td>4.1</td>
</tr>
<tr>
<td>As % of U.S. Treasury Debt</td>
<td>4.7</td>
<td>7.0</td>
</tr>
<tr>
<td>As % of U.S. Treasury-guaranteed Debt</td>
<td>4.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Additional supporting program by U.S. Treasury</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*Source: Swanson 2011*
Impact of Quantitative Easing
- Interest rates

• Large and significant drop in interest rates on long-term assets.
• Small effects on nominal interest rates on less safe assets.
• Impact on MBS is large
• Not so large impact on Treasury purchases
Data and Research Methodology

- Data is analyzed through event studies.
- It rests on two assumptions:
  
  1. Only unanticipated policy changes matter
  2. The news of the policy change is immediately incorporated in prices and its effect is permanent.
For Quantitative Easing I, Balik and Mangla (2012) use 103 trading days starting on 31 October 2008 and ending on 31 March 2009.

These 103 data days are used to calculate daily percentages of the interest rate on 10 year US Government yields and the MOVE index.

The 102 percentage changes are divided into 63 non-event days or the estimation period and 39 days for the test period.

For each day during the test period the daily abnormal percentage change is calculated which is the actual percentage change minus the expected percentage change.

The test period was nine test days, which is four trading days before and after the announcement.
## Important Announcement Dates used in event studies for Quantitative Easing I

<table>
<thead>
<tr>
<th>Number</th>
<th>Announcement Date</th>
<th>Event/Announcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25 November 2008</td>
<td>Initial large scale asset purchase announcement</td>
</tr>
<tr>
<td>2</td>
<td>01 December 2008</td>
<td>Chairman speech</td>
</tr>
<tr>
<td>3</td>
<td>16 December 2008</td>
<td>Federal Open Market Committee Statement</td>
</tr>
<tr>
<td>4</td>
<td>28 January 2009</td>
<td>Federal Open Market Committee Statement</td>
</tr>
<tr>
<td>5</td>
<td>18 March 2009</td>
<td>Federal Open Market Committee Statement</td>
</tr>
</tbody>
</table>

Source: GRRS (2011, page 49)
Why these dates?

• To increase the confidence that QE1 announcements were the dominant news, the following figure presents graphs of intraday movements in treasury yields and trading volume for each of the event dates. The data is graphed for on-the-run 10-year Treasury bonds at each date.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Treasuries yields (constant maturity)</th>
<th>Agency yields</th>
<th>Agency MBS yields</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30 year</td>
<td>10 year</td>
<td>5 year</td>
</tr>
<tr>
<td>11/25/2008</td>
<td>Initial announcement</td>
<td>-24</td>
<td>-36</td>
<td>-23</td>
</tr>
<tr>
<td>1/28/2009</td>
<td>FOMC statement</td>
<td>31</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

Source: Balik, Mangla, 2012
Results

• The results of the Balik and Mangla study show that four of the five announcement dates have cumulative abnormal returns that resemble a persisting fall, which coincides with the Krishnamurthy-Vissering-Jorgensson studies.

• To substantiate this:
  • Gagnon, Raskin, Remache and Sack (2010) present an event-study of QE1 that documents large reductions in interest rates on dates associated with positive QE announcements.
  • Swanson (2011) presents confirming event-study evidence from Operation Twist (1961) where the Federal Reserve/Treasury purchased a substantial quantity of long-term treasuries.
Channels

• KVJ also discusses the channels through which QE can be expected to impact interest rates in general and yields on government bonds specifically.

1. **Duration risk channel**

By purchasing long-term treasuries, agency debt or agency MBS, policy can reduce the duration risk in the hands of investors and thereby alter the yield curve, particularly reducing long-maturity bond yields relative to short maturity yields. (KVJ, 2011)

There are two principal predictions:

• QE decreases the yield on all long-term nominal assets, including treasuries, corporate bonds and mortgages.
• The effects are proportional to the duration of a bond, with larger effects for longer duration assets.
2) Safety premium channel

- KVJ (2011) present evidence for a channel whereby changes in long-term treasury supply work through altering the safety premiums on near zero-default risk long-term assets.

Source: KVJ, 2011
Channels (cont’d)

• **Liquidity channel**
  • The QE strategy involves purchasing long-term securities and paying by increasing reserve balances. Reserve balances are a more of a liquid asset than long-term securities.
  • The channel predicts:
    • QE raises treasury yields
    • QE produces large effects for liquid assets, and no effects for illiquid assets.
Channels (contd)

- **Signaling channel**

  The signaling channel affects all bond market interest rates, since lower future Federal Fund rates, via the expectations hypothesis, can be expected to affect all interest rates. This channel is examined by measuring changes in the prices of the Federal Funds futures contract, as a guide to market expectations of future Federal Funds rates.
Channels (cont’d)

• **Prepayment risk premium channel**
  • This channel is particularly about QE1 and its effects on MBS yields, which reflect a prepayment risk premium:
  • QE1 lowers MBS yields relative to other bond market yields.
  • QE2, which doesn’t involve MBS purchases, does not affect MBS yields.

Source: KVJ, 2011
Channels (Cont’d)

• **Default risk channels**
  • Lower grade bonds such as Baa bonds carry higher default risk than treasury bonds. QE may affect the quantity of such default risk as well as the price (i.e. risk premium) of the default risk.
  • If QE succeeds in stimulating the economy, we can expect that the default risk of corporations will fall, and hence Baa rates will fall.

• **Inflation channel**
  • The inflation channel predicts:
  • QE increases the rate on inflation swaps as well information expectations as measured by the difference between nominal bond yields and TIPS.
  • QE may increase or decrease interest rate uncertainty as measured by the implied volatility on swap options.
Empirical Findings

- Balik and Mangla (2012) have estimated the effect of QE1 as following. The following figure shows the general four economic and financial variables over 103 trading days from end of October 2008 till March 2009 (through duration of QE1) The variables used are:
  - MOVE bond volatility index
  - S&P’s Total Return Index which includes both price movement and dividends
  - Rates on 10 year U.S. Government bonds
  - Price of West Texas Intermediate crude oil
End of October 2008 through March 2009

Source: Bloomberg, Federal Reserve Bank St Louis, Chicago Board Options Exchange
Effect on 10-year U.S. government bonds

Table 4: Statistics for daily percentage change of interest rate on 10 year U.S. government bonds (Source: Balik, Mangla, 2012)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Non-event days</th>
<th>Event days</th>
<th>Announcement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>63</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>0.1760%</td>
<td>-1.0840%</td>
<td>-6.5819%</td>
</tr>
<tr>
<td>Median</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>-7.1642%</td>
</tr>
<tr>
<td>Max</td>
<td>9.3333%</td>
<td>5.9041%</td>
<td>4.6332%</td>
</tr>
<tr>
<td>Min</td>
<td>-8.6505%</td>
<td>-16.8874%</td>
<td>-16.8874%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>3.3247%</td>
<td>4.6462%</td>
<td>7.6278%</td>
</tr>
</tbody>
</table>
Impact on interest rate volatility

Table 5: Statistics for daily percentage change of interest rate volatility, MOVE index
(Source: Balik and Mangla, 2012)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Non-event days</th>
<th>Event days</th>
<th>Announcement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>63</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>-0.6985%</td>
<td>-0.0422%</td>
<td>-0.6822%</td>
</tr>
<tr>
<td>Median</td>
<td>-0.7235%</td>
<td>0.0468%</td>
<td>-0.3271%</td>
</tr>
<tr>
<td>Max</td>
<td>10.6227%</td>
<td>10.2165%</td>
<td>9.1005%</td>
</tr>
<tr>
<td>Min</td>
<td>-13.1034%</td>
<td>-12.1064%</td>
<td>-9.1375%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>4.3999%</td>
<td>5.0895%</td>
<td>6.6006%</td>
</tr>
</tbody>
</table>
Findings (Cont’d)

- Cumulative daily abnormal percentage change in interest rates for 10 year government bonds around announcement dates 25 November 2008 and 01 December 2008 (Source: Balik, Mangla, 2012)

Date. First $t = 0$ is 25/11/08 and Second $t = 0$ is 01/12/08
Findings (Cont’d)

- Figure 8: Cumulative daily abnormal percentage change in interest rates for 10 year government bonds around announcement date 16 December 2008 (Source: Balik, Mangla, 2012)
Findings (cont’d)

- Figure 9: Cumulative daily abnormal percentage change in interest rates for 10 year government bonds around announcement date 28 January 2009 (*Source: Balik, Mangla, 2012*)

*Date. t = 0 is 28 January 2009*
Findings (cont’d)

- Cumulative daily abnormal percentage change in interest rates for 10 year government bonds around announcement date 18 March 2009
Results

• Four of the five announcement dates have cumulative abnormal returns that are somewhat like the desired pattern, a fall that persists. The only exception is the QE announcement on 28 January 2009.
## Results

Table 6: Statistics for daily abnormal percentage change of interest rate volatility, MOVE index *(Source: Balik and Mangla, 2012)*

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Event days</th>
<th>Announcement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>0.5358%</td>
<td>-0.1042%</td>
</tr>
<tr>
<td>Median</td>
<td>0.6248%</td>
<td>0.2509%</td>
</tr>
<tr>
<td>Max</td>
<td>10.7945%</td>
<td>9.6785%</td>
</tr>
<tr>
<td>Min</td>
<td>-11.5284%</td>
<td>-8.5595%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>5.0895%</td>
<td>6.6006%</td>
</tr>
</tbody>
</table>
Limitations of event studies

• There was considerable turmoil in financial markets in the period from latter 2008 to the beginning of 2009, which makes inference from an event-study tricky.

• Some of the assets considered are corporate bonds and certificate of deposits (CDs) are less liquid. Thus, during a period of low liquidity the prices of these assets may react slowly in response to an argument.

• We cannot be sure that the identified events are in fact important events.
Conclusion

• In terms of Quantitative Easing I, we derived through the event study method that the announcement dates have a significant impact on the volatility of the interest rates.

• The results of the study show that four of the five announcement dates have cumulative abnormal returns that resemble a persisting fall, which coincides with the Krishnamurthy-Vissing-Jorgensson studies (2011).

• In terms of Quantitative Easing 2, the yields of many longer-term bonds fall more than the yields of shorter maturity bonds. The exception here is the 30-year Treasury bond, where the yield falls less than the 10-year bond.
Conclusion (Cont’d)

• As for Quantitative Easing 2(b), more research needs to be done to correctly detect the impact whether it will be as effective.

• To answer the question whether the Fed should pursue another round of quantitative easing, 81% of economists surveyed said it shouldn’t. (Reuters, 2012)

• The Fed plans to keep rates low until 2014.
Questions?