OPENING UP OPEN MARKET OPERATIONS

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Abstract

In this paper I peak behind the curtain into the channels through which Open Market Operations is conducted. By doing so, I find that there are three primary avenues through which Open Market Operations impacts the economy. These three avenues are: (1) Changes in the availability of credit, (2) Changes in the performance of securities' markets, and (3) Changes in the expectations of investors and consumers. The degree of impact each of these avenues has on the broader economy depends entirely on the type of policy being implemented (QE or QT) and the economic environment at the time of the policy's enactment.

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Open Market Operations is a phrase that describes the process of a central bank swapping its currency (which was not in circulation prior) for securities. By doing this, a central bank changes the Monetary Base (MB) or total supply of money in a nation. This can have significant implications on the public securities markets which Open Market Operations is conducted through as well as the speed and direction of the economy in general. In the following pages, I will review the process of Open Market Operations and its theoretical implications for markets and the broader economy.

In the United States, there are two forms of Open Market Operations. The first is Quantitative Easing (QE) which consists of the Federal Reserve Bank (FED) purchasing new bonds that are sold in an auction facilitated by commercial banks. Historically these have been treasury bonds (loans demanded by the Treasury Department for the US Government's budget). However, in the past decade, the FED has ventured into the mortgage-backed security (MBS) market as well. When the FED purchases these bonds, it receives a promissory note stating that it will receive the amount the FED has loaned (principal) plus interest payments (which vary depending on the interest rate on the specific bond type at that moment of purchase). The FED pays for these bonds by increasing the Bank's (who they bought the security from) cash reserves that it holds in an account with the FED. The cash the FED uses to purchase the bond is essentially created out of thin air and is recorded on the Federal Reserve's Balance Sheet. During quantitative easing, the FED continues to purchase new treasury and MBS bonds from the primary market with the principal amounts of bonds when the original bonds come to maturity. On top of this, the FED also purchases additional securities in the secondary market using the interest payments it receives from its bonds. This slowly grows the amount of bonds the FED

holds on its balance sheet and subsequently the Monetary Base or total supply of Dollars in the economy.

The second form of Open Market Operations is Quantitative Tightening (QT). Quantitative Tightening is the opposite of Quantitative Easing in that the fundamental goal of the policy is to slow the broader economy rather than encourage its growth. To do this, the Federal Reserve reduces the assets it holds on its balance sheet by allowing the Treasury and/or MBS Bonds to roll off. The phrase "rolling off" refers to the FED allowing the bonds to come to maturity without reinvesting the principal and interest payments from the original bond into new bonds which would upkeep or grow the size of the Federal Reserve's Balance Sheet like in QE. Instead, by allowing the bonds to "roll-off", the Federal Reserve is slowly reducing the assets it holds on its balance sheet. Of course, this act has implications for the broader market. When the FED collects the principal and interest on its maturing bonds but fails to reinvest the funds, it is essentially pulling those Dollars paid to the FED out of the Monetary Base (total supply of US Dollars) while also shrinking the assets on the FED's Balance Sheet. For this and the other implications QT has on the liquidity of securities markets, demand in said markets, the ease of bank lending, the expectations of market participants, and the general economy, QT is reserved for central banks to take a contractionary stance.

Before we continue discussing the forms of Open Market Operations and the various ways they influence an economy, we must first take a step back and refresh ourselves on the medium which facilitates the transactions for this policy: Reserve Accounts.

All "Depository Institutions" (such as commercial banks, savings banks, credit unions, savings and loan associations, ect.) are required to hold reserves against their liabilities in the

case of a crisis[1]. The FED sets reserve ratios which guide the amount these institutions must set aside as reserves against their liabilities in different economic environments. These reserves can be held in cash on sight at the bank that owns them or in an account at the regional Federal Reserve Bank which governs their territory. Reserves held at the Federal Reserve are given unique benefits including earning interest at a rate which mirrors the FED Funds Rate. Banks with accounts held at their regional Federal Reserve Bank can demand physical cash in exchange for its reserves whenever the bank requires excess liquidity. However, these depository institutions must ensure that the FED's current reserve requirements are met by the end of each working day. The Federal Reserve uses a monthly average balance taken at the end of each working day to ensure that depository institutions are adhering to policy guidelines[2]. Of course, the reserves a bank currently holds in relation to the FED's reserve requirement policy allow or restrict a bank from its investment activities. If a bank currently holds excess reserves, it will oftentimes be incentivized to lend or invest more capital so long as the market's rate of return is greater than the interest rate the Federal Reserve is paying banks for reserves held at the FED at that time. Now that we have a basic understanding of the reserve accounts at the Federal Reserve which act as the doorway for this "new money" to enter the United States economy, we can continue unpacking how Quantitative Tightening and Quantitative Easing influence the speed and direction of the broader American economy.

To summarize what we have discussed thus far: In open market operations the United States Federal Reserve Bank purchases Treasury and Mortgage Backed Bonds from commercial banks using money the FED essentially creates out of thin air which it pays to these banks

[1] Board of Governors of the Federal Reserve System. "Monetary Policy: Policy Tools – 'Reserve Requirements'". USA.Gov. 2022.
[2] Board of Governors of the Federal Reserve System. "Compliance Guide to Small Entities: Regulation D 12 CFR 204". USA.Gov. 2018

through reserve accounts held at the bank's regional Federal Reserve Bank. As a result, during Open Market Operations, the Federal Reserve increases or decreases the Monetary Base (total money supply) depending on whether it engages in QE or QT. However, a group of literature such as Rocheteau (2018) has proven that this form of monetary injection is far different from typical lump sum transfers used by governments throughout history[3]. There are three reasons for this which happen to be the three main avenues through which Open Market Operations impacts the general economy. The first reason is the unique forms the "new money" enters the economy in. The second is the impact this policy has on the securities markets through which it is engaging in Open Market Operations. The third and potentially most important is the shift in expectations Open Market Operations causes in market participants. In the following paragraphs we will discuss the reasons for this, various ways this influences markets and the general economy, and how the most recent academic literature quantifies these relationships.

When the Federal Reserve engages in Quantitative Easing it adds to the reserves of commercial banks which facilitate the trade. Thus, "new money" added to the economy in Open Market Operations come through the channel of bank reserves. As you can probably infer, not all money in the economy is treated the same. Depending on the location of the funds and the individual who controls them, the money will be put to work in the economy in different fashions and in varying degrees. Some individuals may choose to spend a large portion of their money while others prefer to save it. Further complicating matters, firms will handle their capital in similarly unique capacities. To accommodate for the different liquidity of money depending on its form and location while analyzing the state of the economy, economists have separated money into 4 basic categories: M0, M1, M2, and M3. According to the Federal Reserve Bank of

[3] Rocheteau, Guillaume, Randall Wright, and Sylvia Xiao. "Open Market Operations". Journal of Monetary Economics. Vol. 98. 2018. 114

Richmond., M0 (the Monetary Base) refers to all money in circulation plus bank reserves kept at the Federal Reserve. M3 (which is no longer reported for its lack of relevance) is everything in M0 minus bank reserves. M2 contains everything in M3 minus large time deposits and institutional money market funds. Finally, M1 is everything in M2 excluding savings accounts, time deposits under $100,000, and retail money market funds. M1, the most liquid money in the economy, contains the sum of currency in circulation, demand deposits at commercial banks, and other similarly liquid assets[4]. Notice that the different categories of money are organized by the liquidity of the money within them in the following order (organized least to most liquid): M0, M3, M2, M1. Thus, the least liquid form of money is what is unique to M0 which happens to be bank reserves. This may seem a bit counterintuitive because, as we have learned, bank reserves in and of themselves are accounts of cash owned by banks. The reason why cash can still be considered illiquid is because the form of money or an investment is not the only determinant of liquidity. The location of funds can also limit a person's ability to use the funds in the market. Bank reserves are a perfect example of this. Because the bank's reserves are legally required to be held as a sort of collateral against the liabilities of the bank, the funds for all intents and purposes are inaccessible and legally unusable until the reserve requirement or reserve-to-liability ratio changes. Of course, during Quantitative Easing, the Federal Reserve purposefully increases the amount of funds banks have in reserve. This directly raises or lowers their reserve-liability ratio which encourages banks to distribute more of their capital to the M1 money supply in the form of loans or investments. This relationship between QE and increased lending from affected banks is well documented in cases such as the United Kingdom (refer to Joyce 2014) and Japan (refer to Bowman 2015). On top of increased availability of credit, QE also

[4] Finnegan, Mike. "Econ Focus – First Quarter 2019: 'Money Supply'". Federal Reserve Bank of Richmond. 2019. 1

incentivizes banks to take on additional risk in their new investments. One research paper by Kurtzman and company from 2022 estimates the effect of the first few quarters of QE on reducing bank lending standards to be equivalent to a 1 percentage point decrease in the FED Funds rate during normal times[5]. After this "new money" is lent to consumers and firms, it oftentimes makes its way into the M1 money supply where it gets used and circulated far more often which has very real effects on the speed of the economy. To summarize, "new money" injected through Quantitative Easing takes a roundabout pathway into the heart of the economy as it enters through the M0 money supply rather than directly into the M1 supply like other monetary injections. This makes its effects a bit delayed but quite unique. Ultimately, despite bank reserves being the most illiquid form of money in the economy, changes in a bank's reserves can have surprisingly quick and impactful side effects on the broad economy through increased credit availability and bank risk taking.

Aside from the changing the monetary base and subsequently growing or restricting growth of the M1 money supply, Open Market Operations can also impact the economy through the securities markets which it conducts this policy through. During Quantitative Easing, the Federal Reserve regularly purchases mass amounts of treasury bonds and MBS bonds. A number of research papers such as Christensen (2022) and Duffie (2007) have proven that this artificial demand has significant effects on the liquidity in the market and the yields of their securities. This reduction in the liquidity premium and boosted demand for bonds typically increases their prices and the subsequent profits of investors selling during QE. Thus, similar to the first avenue (lending effects), the effects QE causes in the security's markets directly funnels extra cash into the M1 money supply. Though, the injection amounts through this market channel are small

[5] Kurtzman, Robert, Stephan Luck, and Tom Zimmermann. "Did QE lead banks to relax their lending standards? Evidence from the Federal Reserve's LSAPs". Journal of Banking and Finance. 2022. 1

compared to the lending effects channel and other types of monetary injections. The reason for this is the spread-out nature of the injection. When QE or QT changes the demand in a securities market and the subsequent changes in prices, yields, and profits of those bonds is felt in marginal changes across all securities in the market. There is no one person receiving a large influx of cash as we see in lump sum transfers and through the first channel of Open Market Operations (changes in credit availability). A paper by Krishnamurthy and Jorgensen (2011) found that the degree of these increase in prices and shrinkage in yields as a result of QE depended on the particular security's market. They found that in the MBS market, the large asset purchases by the FED during the first cycle of QE between 2008 and 2009 directly led to reduced yields of MBS securities and lower yields. Interestingly, they also found that the FEDs involvement in the MBS market reduced corporate bond yields as well because corporate credit risk had decreased as a result of the FED taking a greater share of the MBS risk. During the second cycle of QE between 2010 and 2011, the FED's treasury only purchases had a greater effect on the yields of treasury securities than the previous purchases of MBS securities had on the MBS and corporate markets. They also found that, unlike in the MBS market, the reason for the security's yields shrinking was not so much due to greater demand as it was tied to the market's expectation of future lower federal funds rates and a continued expansionary policy from the Federal Reserve[6]. A study by Ugai (2006) on Open Market Operations in Japan also yielded a similar conclusion. The central bank's commitment to Quantitative Easing signals an expansionary stance to the market which fosters expectations of continued zero to low interest rate environment at least until QE is slowed

[6] Krishnamurthy, Arvind, and Annette Vissing-Jorgensen. "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy". National Bureau of Economic Research. 2011.

or halted[7]. So, Quantitative Easing changes the economy through three primary channels: increased lending, shrinking yields, and expansionary expectations.

Interestingly, Quantitative Tightening, which aims to reduce the FED's balance sheet and subsequently the Monetary Base, has a less dramatic effect on the speed of the economy than QE despite the money leaving the economy in a more direct fashion than it entered through QE. As we have seen, QT entails the Federal Reserve allowing its bonds to "roll off". In this process, the FED accepts the principal and interest payments for the bonds it holds but fails to reinvest the funds into new securities. By doing this, the central bank is essentially taking money out of circulation from either the M1 money supply in the case of MBS bonds or from the M0 money supply in the case of Treasury Bonds. Despite the excess currency exiting the market directly from the M1 money supply in the case of MBS bonds, the process is more drawn out than when the new money enters through QE. This is because loans are given out on lump sums yet are collected in fragments. Thus, borrowers have time to plan and smooth their spending and interest/principal payments over time. Similarly, in the case of treasury bonds, the government is aware of its monthly debt responsibilities and is able to budget around said payments to mitigate the impact of QT in the short run. Of course, we know that Open Market Operations impacts the economy in three primary ways: through changes in the money supply, changes in security's markets, and changes in consumer and investor expectations. While considering these final two avenues, a group of literature including Wei (2022) attempted to quantify the impact of Quantitative Tightening on the yield curve relative to central banks' most common form of monetary policy: the Federal Funds Rate. Wei (2022) concluded that $2.2 Trillion of QT over 3 years in the United States (wherein the Federal Reserve allows treasury bills to passively roll off

[7] Ugai, Hiroshi. "Effects of the Quantitative Easing Policy: A Survey of Empirical Analyses". Monetary Affairs Department, Bank of Japan. 2006.

its balance sheet) was comparable to an increase in the Federal Funds Rate of 29 basis points during "normal times". This estimated impact grows to a 90-basis point comparison when the United States economy is in "crisis periods"[8]. Quantitative Tightening is unlike Quantitative Easing in the form the excess money leaves the money supply as. As a result, its impact on the various channels through which Open Market Operations effects the economy is a bit less significant when compared to Quantitative Easing.

As we have seen, Open Market Operations impacts the economy through three primary avenues: changes in credit availability, changes in various securities' markets, and through shifts in consumer and investor expectations. Each of these channels has unique effects on the broader economy yet the most notable is a increase or decrease in the M1 money supply depending on the policy enacted. Quantitative Easing leads to easier lending conditions for commercial banks, higher prices in securities' markets, and boosted expectations of investors and market participants; all of which lead to growth in the M1 money supply. Thus, Quantitative Easing is typically used as an expansionary policy with the aim of accelerating the broader economy. Quantitative Tightening, on the other hand, pulls money directly out of the M1 and M0 money supplies, reduces prices in securities markets, and lowers expectations of market participants all of which lower the M1 money supply and slow the broader economy.

[8] Wei, Bin. "Quantifying 'Quantitative Tightening' (QT): How Many Rate Hikes is QT Equivalent To?". SSRN. Federal Reserve Bank of Atlanta. 2022

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