

**Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.**

**Let's close the gap: Revising teaching materials to reflect how the
Federal Reserve implements monetary policy**

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2020-092

Please cite this paper as:

Ihrig, Jane, and Scott Wolla (2020). "Let's close the gap: Revising teaching materials to reflect how the Federal Reserve implements monetary policy," Finance and Economics Discussion Series 2020-092. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2020.092>.

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Let's close the gap: Revising teaching materials to reflect how the Federal Reserve implements monetary policy

Jane Ihrig and Scott Wolla*

October 9, 2020

Abstract The topic of the Federal Reserve's (the Fed's) implementation of monetary policy has a significant presence in economics textbooks as well as standards and guidelines for economics instruction. This presence likely reflects the fact that it is the implementation framework that helps ensure that the Fed's desired level of its policy interest rate is transmitted to financial markets, which helps it steer the economy toward the Congressional dual mandate of maximum employment and price stability. Over the past decade or so, the Fed has purposefully shifted the way it implements monetary policy to an environment with ample reserves in the banking system, and it has introduced new policy tools along the way. This paper shows that, unfortunately, many teaching resources are not in sync with the Fed's current framework. We review six, 2020 or 2021 edition, principles of economics textbooks, and we find they vary greatly in their coverage of the concepts associated with the way the Fed implements policy today and in the longer run. We provide recommendations on how the authors can improve the next editions of their textbooks. We also review standards and guidelines used by secondary-school educators. All of these are out of date, and we provide proposals for how these materials can be updated.

Keywords: Federal Reserve, monetary policy, economic education, introductory economics, macroeconomics

JEL codes: A22, E43, E52, E58

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Analysis and conclusions set forth in this paper are those of the authors and do not indicate concurrence by other members of the staff of the Federal Reserve Board or the Federal Reserve Bank of St. Louis.

Introduction

The topic of the Federal Reserve's (the Fed's) implementation of monetary policy has a significant presence in economics textbooks as well as standards and guidelines for economics instruction. This presence likely reflects the fact that it is the implementation framework that helps ensure that the Fed's desired level of its policy interest rate is transmitted to financial markets, which helps it steer the economy toward the Congressional dual mandate of maximum employment and price stability. Over the past decade or so, the Fed has purposefully changed the way it implements monetary policy. Unfortunately, many teaching resources have not been updated. Before the financial crisis of 2007-2008, the Fed implemented policy with *limited* reserves in the banking system and relied on the daily use of open market operations as its key tool. Today and over the longer run, the Fed has stated that it plans to implement policy with *ample* reserves and rely on its administered interest rates.¹ These changes, along with a few others, seem subtle, but the current framework is very different from the previous one. And, these changes are not well reflected in teaching resources.

Textbooks both shape and reflect instruction, and the content should evolve over time. Mankiw (2020) posits that introductory textbooks evolve because the world changes. However, this change often occurs at a slow and measured pace. Colander (2003) suggests that the content of a major principles text can only deviate 15 percent from the standard mainstream text. He suggests that changes greater than 15 percent require professors to modify their notes and presentations more than the majority of professors are willing to do. Resistance may also reflect two processes. First, a *new textbook* will be sent to at least 60 reviewers, many of whom are teaching professors whose understanding is intertwined with the current textbooks on the market.

¹See the Statement Regarding Monetary Policy Implementation and Balance Sheet Normalization <https://www.federalreserve.gov/newsevents/pressreleases/monetary20190130c.htm>

Many of them will have an expertise in a specific field of economics and might only be slightly acquainted with topics in the area where there are new developments. Second, later editions are affected by the “textbook convergence rule”-- a market test that positions sales of revised versions of text to the previous versions -- which Colander suggests will result in each edition deviating less and less from a common standard. While this convergence might lend itself to consistency in instruction across courses and institutions, it can inhibit the flexibility necessary to ensure that materials reflect current realities in the field.

Incorporating new developments is particularly important for the introductory course. These are the courses that focus on economic literacy and shape understanding of economic systems and decision-making. About 40 percent of undergraduates take an introductory course in economics (Siegfried and Walstad, 2014). Bowles and Carlin (2020) estimate that roughly two million undergraduate students take some sort of introductory economics course every year (or about 600 times the number who enter doctoral programs). Most of these students will never take another economics course (Siegfried, 2000), so it is critically important to ensure that professors provide students with accurate and relevant content. Mankiw (2016) realizes that a majority of students who use his introductory textbooks will not major in the field, and suggests he writes his introductory book for future voters, not future economists. As such, it is vitally important that the information conveyed in introductory courses, with the textbooks and supporting teaching materials, is accurate. This is especially true for monetary policy, which remains one of the least understood topics in large-scale assessments (Walstad et al, 2013).

In this paper, we start by providing the foundational content that should be covered in classroom discussions; in particular, material about how the Fed implements monetary policy in an ample-reserves regime. We lay out a simple supply-demand model, consistent with what is

often presented in principles textbooks, that incorporates the key concepts associated with this framework. With this framing, we next discuss actions the Fed has taken in recent years, showing how they are captured in the model. These two sections provide the needed reference material to teach the basic concepts of how monetary policy is implemented today and over the longer run.

Then, we review how the ample-reserves framework differs from the limited-reserves regime the Fed used prior to the financial crisis of 2007-2009. There are many concepts that are different in these two regimes, including the level of reserves the Fed chooses to supply to the banking system, the principal policy tools it uses, and the mechanics that ensures the target policy rate set by the Federal Open Market Committee (FOMC) transmits to financial markets. This comparison sets the stage for understanding why and where some teaching materials are lagging.

Next, we compare the ample-reserve regime content with what is presented in six, 2020 or 2021 edition, principles of economics textbooks by major publishers and familiar authors. We limited our search to textbooks that have publication dates no earlier than 2020 – which resulted in a small number of books to choose from. We evaluate the textbooks in three areas and across 15 concepts. The three areas are: information related to the Fed’s policy rate, concepts associated with the Fed’s policy tools used for implementation, and the discussion of an interest rate adjustment. The 15 concepts cover factors that should be present in curriculum that is discussing implementing monetary policy with ample reserves. We also include factors that should not be present because they are associated with the pre-2009 framework that is no longer relevant. We create a scoring metric that awards a positive point to those concepts associated

with the current framework and a negative point to those concepts that are holdovers from the pre-2009 framework.

Overall, we find that the textbooks vary greatly in their coverage of the concepts associated with the way the Fed implements policy today and in the longer run. Scores range from -2 to $+6$, with a perfect score being $+12$. Half of the textbooks have negative scores, one scores near zero, and two have positive scores. Those textbooks with negative scores tend to add a discussion of the Fed's current policy tools to content that was previously written to cover policy implementation of times past. Unfortunately, this approach results in some outdated statements, keeping the focus on the discussion in the old, limited-reserves regime. The textbook with the highest positive score, on the other hand, covers the ample-reserves regime quite well. Of note, this textbook is relatively new, and the authors only discuss the Fed's current policy tools. Looking at how each of the 15 concepts was scored allows the authors to see where the textbooks' material is consistent with the current Fed's implementation regime and consider where authors may want to adjust their discussion in future textbook editions. We provide recommended changes for each textbook; all the textbooks miss at least a few concepts that could be added to their discussion.

Next, we examine the economic material on monetary policy implementation from the Voluntary National Content Standards (VNCS) in Economics and the College Board's Advanced Placement Macroeconomics Course and Exam Description. These standards and guidelines provide a baseline for the information being taught in high school economics instruction. We find that both are quite out of date, with neither including any information about the Fed's current, key policy tools—interest on reserves and the overnight reverse repurchase agreement (ON RRP facility). In fact, if we applied our scoring metric to these materials, these standards

and guidelines would score worse than any textbook we evaluated. We provide proposals for how the standards and guidelines should be revised to reflect the Fed's current implementation framework. Updating this material is important because teachers and textbooks authors, to some extent, lean on these resources when considering how to update their own teaching materials.

Overall, by pointing out the “lagged” information in textbooks and guidelines we hope this paper puts a spotlight on an area of economic education that needs a refresh. Our work differs from Neveu (2020), who also highlights the lag in this content area. He however, recommends, at a very high level, using balance sheet mechanics to help students understand the bank-level incentives and decision-making processes that lead to money creation and how that interacts with monetary policy. Our focus, instead, is grounded in standard textbook supply-demand models, and we focus on how to update existing materials to bring them up to date on monetary policy issues. In particular, we provide details of the Fed's key policy tools, including discussion of the economic concepts associated with the tools, and explain how they work in normal times and during periods of severe stress.

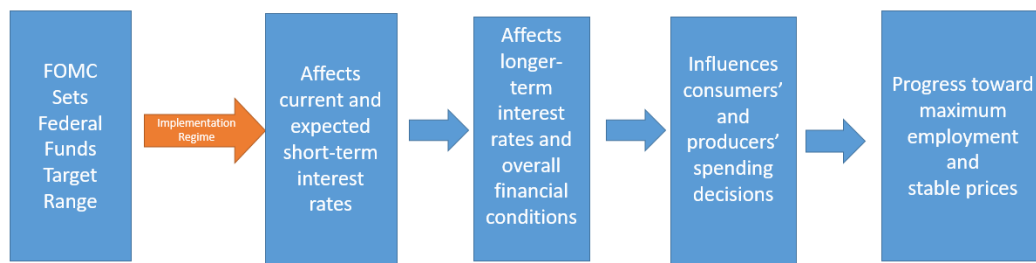
In the next two sections, we review the baseline concepts that should be included in teaching resources about how the Fed implements monetary policy today and in the long run. Then we compare the current, ample-reserves regime to the pre-financial crisis limited-reserves regime so the reader can see some of the stark differences in the key concepts and understand where some of the curriculum are lagging. With this information, we score principles textbooks and review standards and guidelines on their presentation of the Fed's implementation regime. We find some textbooks need substantial updating and some need a few additional points covered. Both standards and guidelines need substantial updates, as their materials focus on the way the Fed implemented policy pre-2009. We propose updated language for each of these

sources. Finally, we discuss why there may be a curriculum lag and end with our recommended summary of how the current ample-reserves regime concepts should be taught. It is only after these materials are updated that we can be sure that students are taught the relevant concepts needed to understand how monetary policy is implemented today and in the future.

Overview of the Ample-Reserves Regime

The Fed implements monetary policy with the aim of keeping the market-determined federal funds rate (FFR) in the FOMC’s target range. The federal funds rate is the interest rate at which depository institutions, or what we term “banks,” borrow reserves from and lend reserves to one another on an overnight basis to meet short-term funding needs.² The FOMC, knowing the linkages from the setting of their policy rate to economic activity, as highlighted in figure 1, decides the appropriate target range of the FFR knowing it will affect the current level and expected path of short-term interest rates, which influences long-term interest rates and overall financial conditions. These financial conditions, in turn, influence the decisions of consumers and producers, thus affecting overall spending, investment, production, employment, and inflation in the United States.

Figure 1 - Transmission of Monetary Policy

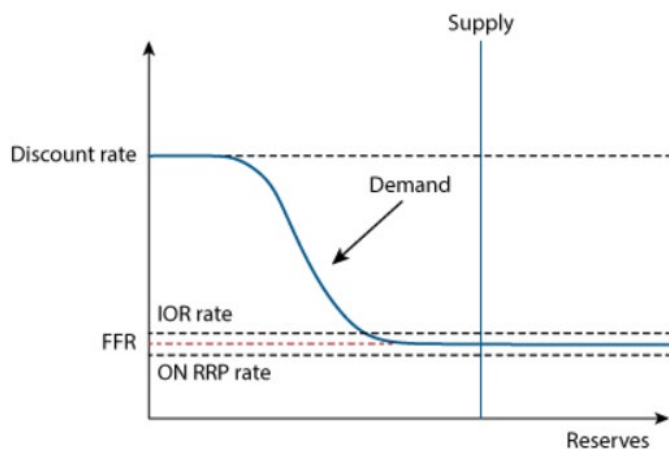


² Banks and a few other government-sponsored entities bilaterally conduct federal funds trades at different rates and quantities. The FRBNY publishes the effective FFR, the volume weighted median of all fed funds trades, each day. When the FOMC sets a target for the FFR, its goal is to have trades occur near the target so that the effective FFR is within the target range.

Once the FOMC determines the appropriate stance of policy, or position of the policy rate target range, the implementation framework (represented as the orange arrow in figure 1) ensures that target transmits to market interest rates, from the FFR to broader interest rates as well. Today, the Federal Reserve is operating with ample reserves in the banking system and is relying on its administered rates—primarily interest on reserves—to steer the market FFR into the FOMC target range.

To understand the Fed’s implementation framework it is easiest to consider the stylized model of the demand for and supply of reserves shown in figure 2. The blue, downward-sloping curve represents banks’ demand for reserves. Banks demand reserves for a variety of reasons, including meeting intraday payment needs, earning interest on this high-quality liquid asset, and meeting internal as well as regulatory liquidity risk management constraints.

Figure 2 – Ample-Reserves Regime



There are three segments of the demand curve. First, the top of the curve, which is truncated by the Fed’s discount rate. This flat portion incorporates the fact that banks should not be willing to pay more for reserves in the market than the interest rate charged by the Federal

Reserve to banks for loans they can obtain through the Federal Reserve's discount window. Hence, the discount rate sets a ceiling on fed funds transactions. Second, the middle of the demand curve that is steeply downward-sloping. This portion of the curve captures the idea that the lower the cost of overnight borrowing in the federal funds market, the more reserves banks are generally inclined to hold. That is, the opportunity cost of holding funds declines and having more reserves helps them not be caught short of funds. Third, the bottom of the curve is where the quantity of reserves in the banking system is significantly large and the demand curve is nearly flat, as indicated by the horizontal region. The transition from the steep portion of the curve to the nearly flat portion illustrates that as the quantity of reserves in the banking system increases, at some point, banks do not find much benefit from holding additional reserves other than earning the interest the Fed pays on these balances. As a result, the demand curve flattens out at a level that is close to the interest rate earned on reserves the IOR rate (or the interest rate paid on excess reserves). This is a key interest rate that the Fed administers.³

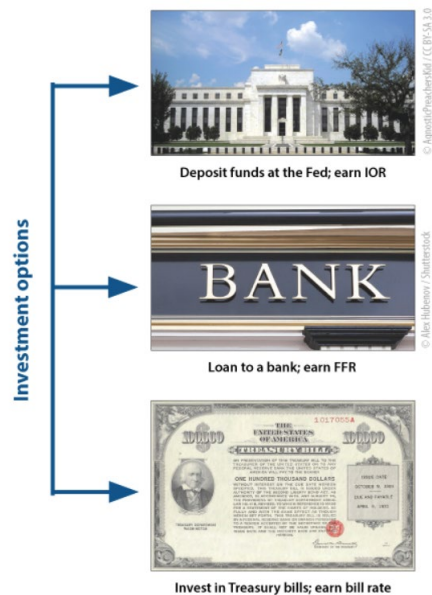
To be “ample” the supply curve must intersect the demand curve where it is flat. This location is consistent with the key feature of an ample regime, which is one where a central bank does not need to actively react to small movements in the supply of reserves to keep the level of the FFR in the FOMC’s desired target range. That is, if the supply curve shifts a little to the left or right because of factors outside the Fed’s control, it will remain on the horizontal region of the demand curve and, therefore, achieve nearly the same FFR.

³ Federal Reserve Banks pay interest on required reserves and excess reserves balances. Since March 2020 reserve requirement ratios have been set to zero, so banks do not have any required reserves. With this new policy, all banks’ reserves are excess balances. For more information on reserve balances see: <https://www.federalreserve.gov/monetarypolicy/reqresbalances.htm>

When supply is ample, the Fed relies on the settings of two of its administered interest rates— and in particular IOR – to control the level of federal funds rate. Looking at that bottom of the demand curve in figure 2, one sees the two critical administered rates: the IOR rate and the overnight reverse repurchase agreement (ON RRP) offering rate. Each rate is available to a specific set of counterparties on particular funds deposits held at the Fed. The counterparties can decide if they want to deposit their funds at the Fed and earn the relevant standing rate or lend it instead to another market participant at a negotiated rate in one of the various money markets for funds. Because of this tradeoff, one can think of the Fed’s administered rates as reservation rates—the lowest rate that counterparties are willing to accept for lending out their funds. And, they (the IOR rate and the ON RRP rate) set a lower bar on the return a counterparty is willing to accept from others in money markets. Hence, movements in the Fed’s administered rates directly help steer money market interest rates.

The Fed’s key administered rate is IOR, which is the interest rate that the Fed can pay banks on their reserve balances held at the Fed. While banks have several short-term investment options for their money (see figure 3), the IOR rate offers a safe overnight option to banks. Because IOR is a risk-free, liquid, investment option, banks will not lend reserves in the federal funds market for less than the IOR rate. In other words, the IOR serves as a reservation rate for banks. And, if the FFR were to fall very far below the IOR rate, banks would borrow in the federal funds market and deposit those reserves at the Fed, earning a profit on the difference. This activity, known as arbitrage, is an important aspect of the way financial markets, and monetary policy implementation, work. Arbitrage ensures that the FFR does not fall much below the IOR rate.

Figure 3 – How IOR acts as a reservation rate for banks to arbitrage across money markets



These financial incentives (i.e., reservation rates and arbitrage) ensure that when the Fed raises or lowers the IOR rate that the FFR also moves up or down. As such, the Federal Reserve steers the FFR into the target range set by the FOMC by adjusting the IOR rate. And, because the Fed sets IOR directly, it serves as an effective monetary policy tool. In fact, IOR is the primary tool used by the Fed for influencing the FFR.

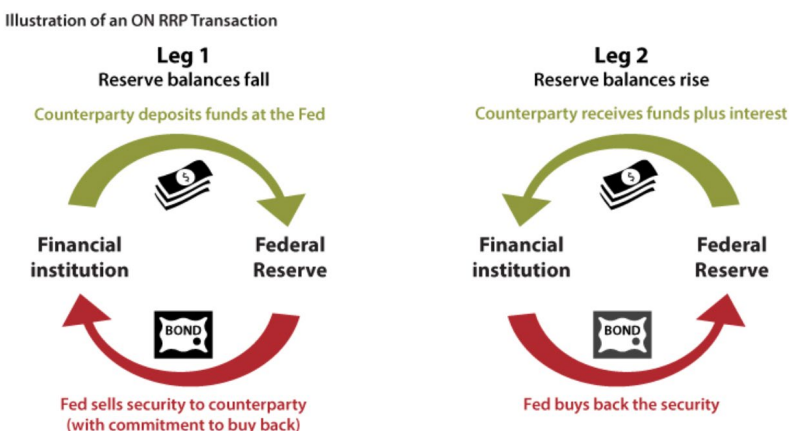
However, not all institutions with reserve accounts can earn interest on their deposits at the Federal Reserve, and not all important institutions in financial markets have access to Fed accounts, which means that important short-term rates (including FFR) might drop below the IOR. So, in 2014, the FOMC announced that it intended to use an ON RRP facility to help control the FFR.⁴ The ON RRP facility is a form of open market operation where the Fed interacts with many nonbank financial institutions, such as large money market funds and

⁴ Board of Governors of the Federal Reserve System, “Overnight Reverse Repurchase Agreement Facility.” <https://www.federalreserve.gov/monetarypolicy/overnight-reverse-repurchase-agreements.htm>

government-sponsored enterprises.⁵ As highlighted in figure 4, when one of these institutions uses the ON RRP facility it essentially deposits reserves at the Fed overnight, receiving a security as collateral. The next day the transaction is unwound and the institution earns the ON RRP rate (which the Fed sets) on the funds it deposited at the Fed.⁶

Because it is a risk-free option, these institutions will never be willing to lend funds for lower than the ON RRP rate. As such, the ON RRP rate acts as a reservation rate, and institutions can use it to arbitrage other short-term rates. Thus, the rate paid on ON RRP transactions, which the Fed chooses to set below IOR, acts like a floor for the FFR and serves as supplementary tool.

Figure 4: ON RRP Transaction



The last administered rate, also featured in figure 2, is the discount rate. As noted above, the discount rate is set above the target range; it tends to be set 50 basis points ($\frac{1}{2}$ percentage point) above the top of the target range. This tool is intended to serve as a ceiling for the traded level of the federal funds rate. Of course, the stigma associated with borrowing from the Fed

⁵ Federal Reserve Bank of New York. “Reverse Repo Counterparties.”

https://www.newyorkfed.org/markets/rrp_counterparties

⁶ Board of Governors of the Federal Reserve System. “Overnight Reverse Repurchase Agreement Facility.”

<https://www.federalreserve.gov/monetarypolicy/overnight-reverse-repurchase-agreements.htm>

dampens the discount rate's effectiveness as a ceiling. Since the discount window serves more as a safety net for banks to borrow when there are stresses in markets, this administered rate is not directly influencing the FFR and so is not featured as one of the key rates to ensure day-to-day implementation of policy.

For the Fed's administered interest rates to be the key tool for interest rate control, reserves must remain ample. Over time, there are forces in the economy that slowly drain reserves from the banking system.⁷ The Fed maintains an ample supply by monitoring the level and conducting, when deemed appropriate, open market operations (OMOs) where it purchases securities and injects reserves into the banking system.⁸ This type of open market operation is a long-standing tool of the Fed; it was the key tool used before the crisis when implementing policy with limited reserves. Today and going forward, periodic open market operations are an important tool used to ensure that reserves remain ample so that the administered rates can continue to steer the FFR into the target range.

To summarize, as presented in table 1, the Fed chooses an implementation regime to ensure that when the FOMC sets a target range for the federal funds rate, that this setting is transmitted to financial markets. The current regime choice is an ample-reserves regime. In this regime, the supply of reserves is large enough that small shifts in this level have minimal impact

⁷ Demand for currency grows at a rate of about 6 percent per year. When a bank requests currency for its customers, an armored truck comes to a regional Federal Reserve Bank, picks up the cash that was ordered, and delivers it to the ordering bank. The Fed decreases the ordering bank's reserve account to take payment for the cash. See Ihrig, Senyuz and Weinbach (2020b) for a discussion of key factors that naturally drain reserves from the banking system.

⁸ Some call the Fed's purchases of securities a standard or traditional OMO. The ON RRP facility, which was fully established in 2015, is another form of an OMO. The traditional OMO is where the Fed determined the quantity of government securities it wants to buy (or sell) from primary dealers (i.e., securities dealers who are active in the market for U.S. government securities and have agreed to do operations with the Fed). When the Fed initiates a purchase, it pays for the securities by crediting the reserve accounts of the banks used by the primary dealers and, hence, boost reserves in the banking system. The ON RRP facility, on the other hand, stands ready to purchase the quantity of securities that a broader set of counterparties determine they want to place at the Fed.

on the FFR. This ample level means the Fed does not need to actively monitor and adjust the supply of reserves with daily open market operations. Instead, in this regime, the Fed relies on its administered rates, with IOR being the primary tool and the rate associated with the ON RRP facility being a supplementary tool. Because reserves are ample, these administered rates act as reservation rates for banks and other key non-bank financial counterparties that influence market rates when they are deciding where to invest their marginal excess funds. Arbitrage between alternative short-term investment options ensures money market interest rates converge and are related to the Fed's administered rate, and the ON RRP serves as a floor for the FFR. Finally, the Fed monitors the level of reserves because there is a gradual drain in reserves by factors outside the Fed's control. When reserves are judged to be getting close to not being ample, the Fed will purchase securities through open market operations, which injects reserves in the banking system, to boost their level.

Table 1 - Key concepts of an ample-reserves regime

Concept	Fed’s Choice	Role and Description
Policy Rate	Federal Funds Rate (FFR)	The way the Fed conducts monetary policy. The FOMC sets the target range (or the stance of policy) with the goal of moving the economy toward its dual mandate, as depicted in figure 1.
Reserve Level	Ample	Level of reserves in the banking system. The Fed supplies a level of reserves large enough so that small movements in this level do not influence the FFR. This level of reserves intersects the horizontal region of the demand curve in the money market diagram. This relatively high level implies the tools the Fed relies on for control of interest rates are its administered rates.
Policy Tools	Interest on Reserves (IOR)	Primary tool of monetary policy implementation. IOR is an administered rate that acts like a reservation rate for banks and, through arbitrage, helps steer the FFR into the FOMC’s target range.
	Overnight Reverse Repurchase Agreement (ON RRP) rate	Supplemental tool of monetary policy implementation. The ON RRP rate is an administered rate that acts like a reservation rate for a large number of financial institutions and helps set a floor for the FFR.
	Discount rate	Tool of monetary policy implementation. The discount rate is an administered rate that is set above the target range, with the intention to serve as a ceiling for the FFR. “Stigma” of borrowing from the Fed may dampen the effect of being a firm ceiling.
	Open Market Operations (OMO)	Tool of monetary policy implementation. OMO are conducted periodically to maintain ample reserves. ⁹

Implementing Policy in the Ample-Reserves Regime

We now turn to examples of the Fed implementing policy in an ample-reserve regime.

First, we review a standard cut to the policy rate to provide more monetary policy

accommodation to the economy. Here the FOMC announces that it lowers the policy target

range. Along with this announcement, the Fed lowers its administered rates, which encourages

⁹ OMOs can be used in other ways during times of stress. For example, large-scale purchases were conducted during the COVID-19 pandemic to stabilize financial markets.

market rates to decline as well. Second, we discuss, at a high level, some actions the Fed takes when faced with severe stresses in the economy and the policy rate is dropped to what is termed the effective lower bound (i.e., near zero). In these extraordinary circumstances, such as during the 2007-2009 financial crisis and the 2020 COVID-19 pandemic, the Fed turns to nontraditional policy tools.

Normal times means Standard Tools

As the economy moves through a normal business cycle, with output ebbing and flowing, the FOMC may lower or raise the federal funds target range to steer the economy toward the FOMC's dual mandate. For example, suppose the economy weakens, with unemployment starting to rise and inflation averaging below the Committee's 2 percent target. The FOMC might decide to make monetary policy more accommodative. If so, the FOMC would lower its target range for the federal funds rate. And, to encourage this lower policy rate to transmit to financial markets, the Fed would lower its administered rates (the IOR rate, the ON RRP rate and the discount rate) accordingly.

Lowering the administered interest rates is what encourages the policy accommodation to transmit to money markets, broader financial conditions, and the economy more generally.¹⁰ As depicted in figure 1, the lower federal funds rate would rapidly be reflected in the interest rates that banks and other lenders charge on short-term loans to one another, households, nonfinancial businesses, and government entities. Similarly, the lower federal funds rates would be reflected in the rates applied to floating-rate loans, including floating-rate mortgages as well as many personal and commercial credit lines. Longer-term interest rates move with short-term interest

¹⁰ For more discussion of how changes in the federal funds rate affect the broader economy, see this overview on the Board's website: <https://www.federalreserve.gov/monetarypolicy/monetary-policy-what-are-its-goals-how-does-it-work.htm>

rates as well as expectations for future short-term rates. When long-term rates decline, they will spur economic activity and job creation because many key economic decisions--such as consumers' purchases of houses, cars, and other big-ticket items or businesses' investments in structures, machinery, and equipment--involve long planning horizons.

Over the past several years, the FOMC has raised and then lowered the target range of the federal funds rate to move the economy toward its dual mandate. Figure 5 shows the FOMC's target range, grey shaded area, over time. When the FOMC decides to make any change to the policy target range, the Fed adjusts its administered rates. The black line shows the Fed's chosen setting of the IOR rate, the interest rate paid on excess reserves. In most instances, the administered rates will be decreased or increased by the exact same basis points as the target range. However, the administered rates can be moved by more or less to offset current market pressures that may be pulling the federal funds rate towards the top or bottom of the target range. Ultimately, the setting of IOR is such that the market-determined federal funds rate (the effective FFR), the red line, remains in the target range.

Figure 5 – Federal Funds Rate and Interest on Reserves

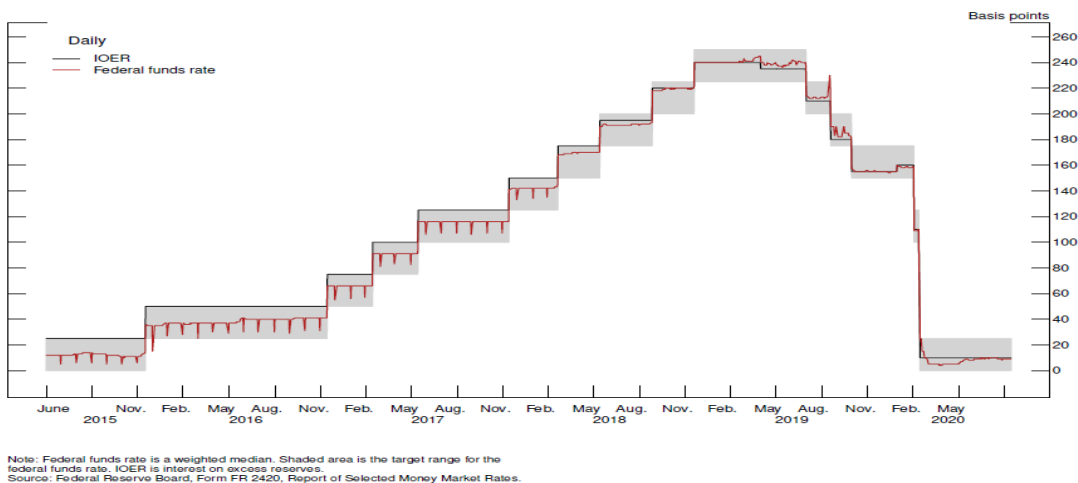
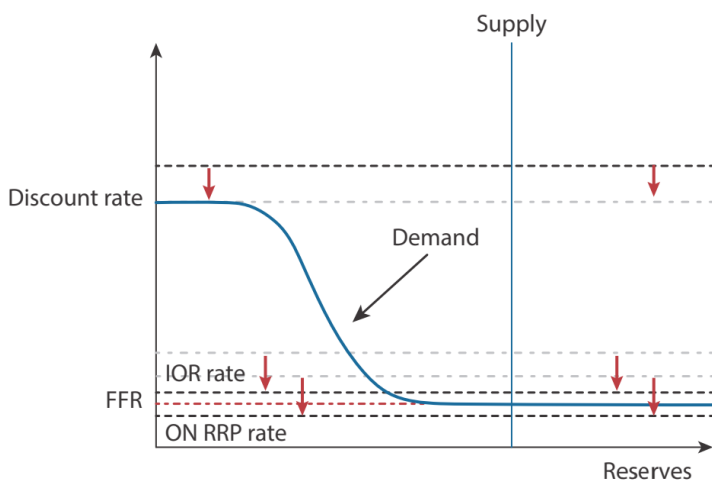


Figure 6 graphically illustrates how a cut to the FOMC’s policy target, with the associated decline in Fed administered rates, transmits to the market federal funds rate. The demand curve shifts down, but only at its endpoints where the Fed’s administered rates interact with banks’ decisions to hold reserves. At the y-axis, a lower discount rate implies that banks will no longer pay rates in the market higher than the new, lower discount rate. And, the flat portion of the curve also moved down along with the new, lower IOR rate because this is the new interest rate is the marginal benefit banks get from holding additional reserves. With these changes, the FFR moves lower. That is, the lower administered rates, working through market forces, moves the FFR into the target range.

Figure 6– Lower Administered Rates translate into a lower FFR



This discussion focuses on how the Fed’s administered rates transmit the FOMC’s FFR target directly to market interest rates. Then consumer and business behavior, which is affected by the level of interest rates, is captured in standard macroeconomic textbook models of saving, investment and, ultimately, aggregate supply and demand. Of course, the Fed’s actions

endogenously affect money demand and money supply, as the adjustments to interest rates affect banks', consumers' and businesses' behavior. However, the Fed does not implement policy by setting a target for a particular level of the money supply in the economy. Discussions of this fashion are a holdover of how the Fed conducted and implemented policy in the past. First, the Fed conducted monetary policy with explicit money supply targets in the 1970s and 1980s, but has long moved away from this practice as the link between growth in the money supply and economic activity became unstable.¹¹ Second, the Fed implemented policy with limited reserves before the 2007-2009 financial crisis. Within this old, limited-reserves regime, the Fed provided daily estimates of the supply of reserves—or money quantities—that were needed to transmit the FOMC's target to market interest rates.¹² In the current, ample-reserves regime, however, the FOMC does not influence short-term rates through quantities nor consciously target a particular monetary quantity.

Extraordinary Circumstances means Nontraditional Tools

Twice in recent history the U.S. economy faced severe economic stress. The first was the 2007-2009 financial crisis and the second was the 2020 coronavirus pandemic. Though the trigger for each of these events was very different, each resulted in extreme hardships for U.S. households and businesses that moved employment and inflation away from the Fed's dual mandate. At the

¹¹ In the 1970s and 1980s, money supply growth was seen as a key factor influencing economic activity and the price level. As a result, the Full Employment and Balanced Growth Act of 1978, known as the Humphrey-Hawkins Act, required the Federal Reserve to set one-year target ranges for money supply growth and to report to Congress on the behavior of the money supply relative to those target ranges. However, because the historical relationships among these variables were not stable, the FOMC gradually shifted away from a focus on the monetary aggregates as a key guide for monetary policy over time. By the mid-1990s, the FOMC increasingly focused on adjusting a target for the level of short-term interest rates with the goal of influencing overall financial conditions in a way that would attain the Committee's dual mandate.

¹² Many textbooks present the limited-reserves framework where the Fed uses OMOs to achieve a desired level of the money supply to move market interest rates to the FOMC's target and ultimately steer the economy toward the Committee's dual mandate. Today, in an ample-reserves regime, the Fed must ensure the quantity of reserves is ample, but targeting a particular the level of reserves (or money supply) is not the focus for policy implementation.

onset of each of these events, the FOMC lowered the target range for the federal funds rate to 0 to 25 basis points. It also used “forward guidance” about the likely future setting of the policy rate and announced balance-sheet programs where it purchased sizable quantities of government securities.¹³ To ensure this stance of policy was transmitted through the economy, the Fed leaned on many tools-- some standard tools used in different ways and other, nontraditional tools that are reserved for unusual and exigent circumstances and need the approval of the Secretary of the Treasury.¹⁴ These tools tend to be used to support the smooth functioning of financial markets, help foster accommodative financial conditions or, more directly, support the flow of credit to households, businesses, and communities.¹⁵

As these tools were used, reserves in the banking system increased. For example, during both crises, the Fed conducted large-scale asset purchases to either deliberately push down longer-term interest rates (the motive during the 2007-2009 financial crisis and subsequent recession) or aid market functioning and help foster accommodative financial conditions (the motive during the COVID-19 pandemic). As a traditional open market operation, when the Fed purchases securities it pays for these securities by adding reserves to the banking sector. The Fed

¹³ When central banks provide forward guidance, individuals and businesses will use this information in making decisions about spending and investments. Thus, forward guidance about future policy can influence financial and economic conditions today. A timeline of the FOMC’s setting of the policy rate and use of forward guidance is found here:

<https://www.federalreserve.gov/monetarypolicy/timeline-forward-guidance-about-the-federal-funds-rate.htm>

¹⁴ In an emergency, the Federal Reserve has the power to provide liquidity to depository institutions using standard, traditional tools, like open market operations and discount window lending. Under section 13(3) of the Federal Reserve Act, the U.S. central bank also has authority to provide liquidity to nondepository institutions in “unusual and exigent circumstances.” Since the passage of the Dodd-Frank Act in 2010, the Board's authority to engage in emergency lending has been limited to programs and facilities with "broad-based eligibility" that have been established with the approval of the Secretary of the Treasury. For a detailed discussion of the Federal Reserve's response to the 2007-2009 financial crisis see:

https://www.federalreserve.gov/monetarypolicy/bst_crisisresponse.htm

Similarity, the extensive measures taken by the Fed during the COVID-19 pandemic are found here:

<https://www.federalreserve.gov/covid-19.htm>

¹⁵ See Ihrig, Weinbach, and Wolla (2020) for a discussion of the Fed’s early monetary policy response to the COVID-19 shock.

also made adjustments to existing lending facilities and introduced new, emergency lending facilities to help provide short-term liquidity to banks and other financial institutions.¹⁶ For example, the Fed expanded its currency swap program where it loans dollars to foreign central banks to alleviate dollar funding stresses abroad. It also introduced the Primary Dealer Credit Facility during both stress events, which provided overnight loans to primary dealers and helped foster improved conditions in financial markets. As these counterparties use the Fed's tools, the lending boosts reserves in the banking system.

In the 2007-2009 financial crisis and subsequent recession, the Fed's measures resulted in reserve balances rising from their pre-crisis \$20 billion level to about \$2.7 trillion at their peak in October 2014; it was during this time that the Fed had to abandon the limited-reserves regime. In 2020, in response to the COVID shock, reserve balances rose from \$1.6 trillion in early March to \$3.3 trillion in mid-May. This latter pace of securities purchases had never been seen before, and the level of reserves that resulted from it was about a 35 percent share of GDP, a share that had not been recorded since World War II.

In terms of our supply-demand diagram, figure 2, when faced with these shocks, the Fed's actions shift the supply curve far to the right. Some have termed the level of reserves at these times as abundant or super abundant. Since the supply curve remains on the flat portion of the demand curve, the ample-reserve regime remains in place. The administered rates do their job to keep short-term interest rates near zero. Then the Fed's other tools, which are introduced

¹⁶ Section 13.3 of the Federal Reserve Act lays out actions the Fed can take in unusual and existent circumstances. And, the Dodd-Frank Act of 2010 includes additional requirements, among them the approval of the Secretary of the Treasury.

to help stabilize markets and more directly help credit flow through the economy, are able to quickly be implemented.

Ultimately, when the economy improves and no longer needs support through these additional measures, the Fed puts the nontraditional tools “back on the shelf” and takes actions to slowly reduce the supply of reserves to a more efficient and effective level.¹⁷ Between late 2014 and early 2020, for example, as the economy grew, the Fed began to lower the level of reserve balances from their October 2014 peak in an action they termed “normalizing” the balance sheet.¹⁸ This same, slow lowering of reserve balances will most likely occur after the economy recovers from the COVID-19 shock. But in both cases, the level of reserves will be such that the Fed continues to implement policy with an ample level of reserves; that is, one where small movements in the level of reserves do not affect the federal funds rate.

Ample-Reserves Regime is different than a Limited-Reserves Regime

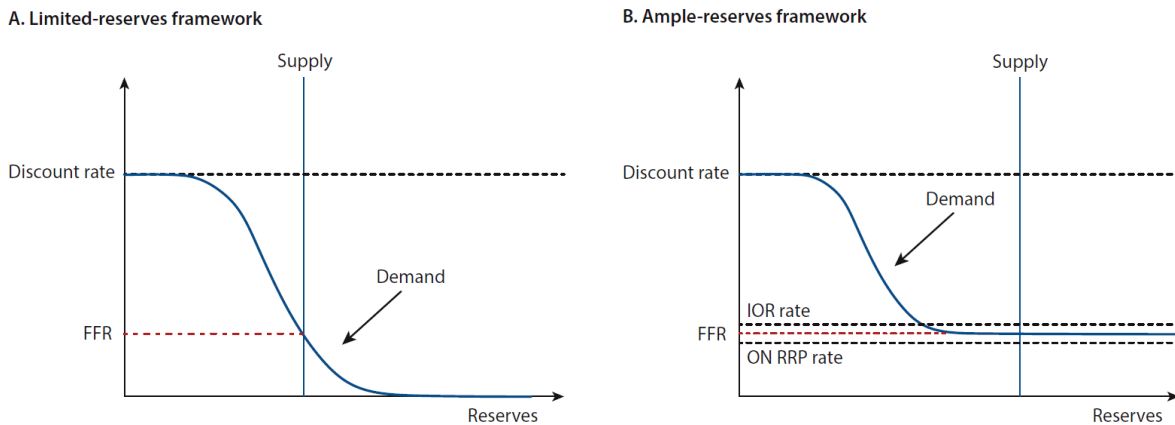
The ample-reserves implementation regime described above should be reflected in the way the topic is taught in the classroom, with aid from teaching materials. This regime is different than the pre-2009, limited-reserves regime. This section highlights key differences in the two regimes, which provides the background for understanding where some textbooks might be out of date.

¹⁷ The FOMC has made statements through the years that it wants, in the longer run, to hold no more securities than necessary to implement monetary policy efficiently and effectively. Holding other parts of the Fed’s balance sheet constant, an increase (decrease) in securities will increase (decrease) reserves. So a statement about “holding no more securities than necessary” is also saying the Fed plans to hold no more reserves than necessary to implement policy efficiently and effectively. More information about the Federal Reserve’s discussion of efficient and effective is summarized at the following link: <https://www.federalreserve.gov/monetarypolicy/policy-normalization-discussions-communications-history.htm>

¹⁸ Over the years the FOMC has released multiple statements related to policy normalization. A summary of these communications is found here: <https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm>

Figure 7 presents the standard money market diagram under a limited-reserves regime (left side) to the same model under the ample-reserves regime (right). The important differences in how the Fed operates in each of these regimes is embedded in these diagrams. We also summarize the differences in table 2.

Figure 7 – Graphical Comparison of Limited and Ample-Reserves Frameworks



A key difference across these diagrams is where the supply curve intersects the demand curve. In the limited-reserves regime (left image), the supply curve intersects the demand curve on the downward sloping part of the demand curve. This position implies the Fed supplies a “limited” amount of reserves to the banking system. That is, it targets a particular supply of reserves so that the market FFR hits the FOMC’s target. And, since relatively small shifts of the supply curve to the right or left move the FFR rate higher and lower, respectively, the Fed has to carefully monitor the level of reserves. In the ample-reserves regime (right image), the supply curve intersects the demand curve on the flat portion of the demand curve. In this region, the Fed has chosen to offer a sizable level of reserves to the banking system and, since small shifts of the supply curve have little or no effect on the FFR rate, the level does not need to be monitored as closely.

This difference in location of the supply curve has important implications for the tools the Fed uses for interest rate control. To solidify this point, let's consider an expansionary monetary policy action of lowering the policy rate. In the limited-reserves regime, the Fed would need to purchase securities in the open market. This means the New York Fed Trading Desk would purchase securities from primary dealers and pay for those securities by crediting the reserve accounts of the bank used by the primary dealers. The banks, in turn, would credit the dealer's bank accounts. This open market purchase results in an increase in reserve balances (which then boosts the money supply), and that shifts the supply curve to the right, resulting in a lower FFR. This series of steps, which are quite abstract, can be difficult for students to follow.

In the ample regime, as shown in figure 6, the Fed no longer relies on OMOs as the principal policy tool to target the policy rate in its day-to-day, normal operations because small shifts in the supply of reserves have no impact on the FFR, by design. Instead, the Fed would lower its administered rates, shifting the bottom of the demand curve down, which induces market rates, including the FFR, to move in the same direction and by a similar amount. To be clear, the lowering of the administered rates puts downward pressure on the federal funds rate and other market rates by lowering the incentive to hold reserves at the Fed. The interest rates are adjusting through arbitrage. Conceptually, these actions are less abstract – the Fed lowers the administered rates it controls which encourages market rates, including the FFR, to follow.

A tool that was dropped in the transition from the old toolbox to the new toolbox is reserve requirements. In the limited-reserves framework, the Fed used reserve requirement ratios—the fraction of banks net transaction deposits that needed to be held in very safe, secure assets like reserves—as an important tool for driving the demand for bank reserves, keeping the downward sloping portion of that curve somewhat steady. In the ample-reserves framework,

banks hold excess reserves, making reserve requirements largely non-binding. Effective March 2020, the Federal Reserve announced that it was reducing reserve requirement ratios to zero. In short, reserve requirements are now a non-operational tool.

Table 2 – A Comparison of the Limited and Ample Reserve Regimes

	Limited-Reserves Regime	Ample-Reserves Regime
Level of Reserves	Limited; banks manage levels, in part, to meet reserve requirements	Ample; banks tend to have plenty of reserves for all operational needs
Key policy tools	Open Market Operations (OMO) Reserve Requirements	Interest on Reserves (IOR) is primary tool Overnight Reverse Repo Facility (ON RRP rate) is supplemental tool.
Reserve requirements	Reserve requirements are one factor that cause banks to demand reserves. Banks pay attention to their level of reserves relative to their reserve requirement. Banks that are short (long) of their requirement can turn to the federal funds market to borrow (lend) funds.	Because of a high level of reserves in the banking system, most banks hold excess reserves and so reserve requirements are not a significant factor in their decision-making. As of March 2020, reserve requirement ratios were set to zero.
Supporting policy tools	Discount window ¹⁹	Open market operations Discount window
Graphing: Where Supply intersects Demand	Supply intersects demand on the steep, downward sloping, part of the demand curve.	Supply intersects demand on the flat part of the demand curve.
Graphing: Change in Policy Rate	The Fed affects the FFR by using OMOs to shift the supply curve left or right.	The Fed affects the FFR by raising or lowering the IOR and ON RRP rates to shift the flat portion of the demand curve up or down.
Example: Key tools' action to implement expansionary monetary policy	FOMC lowers the FFR target. Fed purchases U.S. Treasury Securities using open market operations to increase the supply of reserves.	FOMC lowers the FFR target range. The Fed lowers its administered rates.

¹⁹ Note that we are focusing this discussion on the limited-reserves regime that the Fed had in place prior to 2008, as this is the focus of textbooks' discussion of the limited-reserves regime. If the Fed chose to implement policy in a limited-reserves regime from now on, IOR and the ON RRP facility would be available tools. However, in 2019, the Fed stated that it intends to implement policy using an ample-reserves regime in the longer-run.

What is the State of Teaching Materials?

Given the above discussion of the ample-reserves implementation framework and how that differs from the pre-2009 limited-reserves regime, we are now set to review teaching materials for the key concepts they cover. Our analysis adds to the rich literature analyzing the textbook treatment of topics and concepts. Several studies focus on the treatment of specific content, such as sunk costs (Colander, 2004), consumption possibility frontiers (Olson, 1997), diminishing marginal utility (Dittmer, 2005), public choice and government failure (Fike and Gwartney, 2015), international economics (Lee, 1992), consumer choice (Holmgren, 2017), entrepreneurship (Kent, 1989), perfectly competitive markets (Hill and Myatt, 20017), the financial crisis (Madsen, 2013), and the GDP expenditures equation (Wolla, 2018). Other authors have focused on the degree of consensus in the textbook coverage of content. Stiglitz (1988) found textbooks to be clones of Samuelson's and suggested market forces had led to standardization. Colander (2003) discussed the potential forces that have led to textbook convergence. Peter-Wim Zuidhof (2014) wrote about the shift from the Samuelsonian approach to one that emphasized core concepts and encouraged students to "think like an economist." Walstad, Watts, and Bosshardt (1998) found a "surprising degree of consensus" among textbook content but criticized textbook length and inadequate coverage of certain topics. We hope to add to this body of work in this assessment of textbook coverage of how the Fed implements monetary policy in ordinary times.

To assess whether the ample-reserves regime is reflected in economics classrooms, we examine three aspects of the economics curriculum. First, we review six prominent principles of economics textbooks for their coverage of the topic. Because textbooks both guide and reflect instruction, they have a big influence on student learning outcomes. Next, we examine the

Voluntary National Content Standards (VNCS) in Economics, which serves as a guide to high school textbook authors and curriculum developers. In addition, the VNCS in Economics serves as a model for many committees that design state and district-level content standards. Finally, we examine the AP Macroeconomics Course and Exam Description, which is used by teachers to design their syllabi – which must be approved by the College Board in order to teach a sanctioned AP course. These guidelines determine the specific content that AP Macro teachers are expected to cover and reflect what will be assessed on the AP Macroeconomics exam.

Principles of Economics Textbooks

We focus our examination on prominent principles of economics textbooks for their coverage of the Fed’s implementation of monetary policy. We limited our search to textbooks that have publications dates of at least 2020. These include industry-leading textbooks, major publishers, and familiar authors: Case, Fair, and Oster (2020), Hubbard and O’Brien (2021), Mankiw (2021), Mateer and Coppock (2021), McConnell, Brue, and Flynn (2021), and Stevenson and Wolfers (2020). We chose principles-level books because these classes have the largest enrollment, and because these are often students’ first, and sometimes last, exposure to economics. In fact, most of the 40 percent of undergraduate students who take an introductory economics course will never take another economics course (Sigfried, 2000; Sigfried and Walstad, 2014), so it is important that their exposure to this content reflects current practices. More generally, all students should expect to be taught material that accurately reflects current practices.

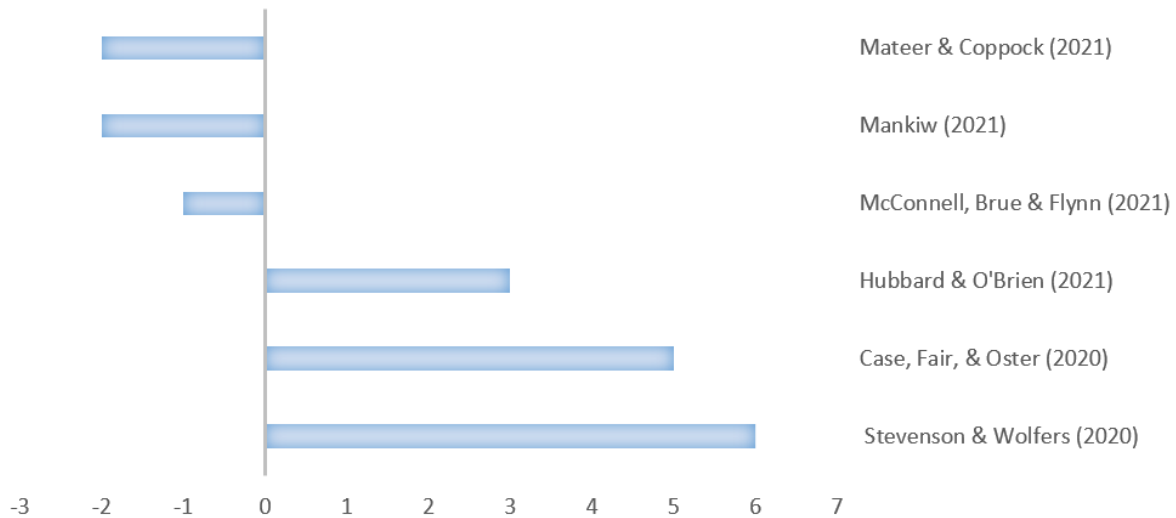
In evaluating these textbooks’ treatment of monetary policy implementation we use a systematic approach where we allocate points to key concepts that should and should not be covered in the Fed’s current regime. We focus the evaluation in three areas: information related

to the Fed's policy rate, concepts associated with the Fed's policy tools used for implementation, and the discussion of an interest rate adjustment. These concepts are reported in the appendix, table A1. If all textbooks covered a give concept, we excluded it from the scoring. For example, all textbooks mentioned IOR is a tool of monetary policy implementation. So, we do not include this fact in the scoring metric. Instead our scoring metric focuses on concepts that varied across the textbooks.

We assign a positive point to a concept that is consistent with an ample-reserve regime. And, we give a negative point to a concept that is covered and out of date because it reflects features of a limited-reserves regime. Some books blend correct information using the current regime with outdated information associated with past implementation practices, so we assign a positive point for each of the concepts that the book accurately covers and subtract a point for each of the concepts that inaccurately portray the current regime. In total, we evaluate the textbooks on 15 different concepts. A textbook that accurately covers all the concepts will receive a score of +12. A textbook that totally misses the mark will have a score of -3.

Figure 8 reports the overall ratings of the six textbooks in our sample. The textbooks' total scores range from -2 to +6. The scores on each of the concepts are reported in the appendix, table A2. There are three textbooks with negative scores. These textbooks are those with the most room for improvement in their content coverage of the Fed's current and long-run ample-reserves implementation regime. The other three textbooks have positive ratings, suggesting that their material more accurately discusses the Fed's current implementation regime. Of course, none of these textbooks received the highest score, suggesting that these latter textbooks have areas for improvement in their content as well.

Figure 8 – Scoring Principle Textbooks for Content on Monetary Policy Implementation



*The higher the score, the more the textbook covers current concept; maximum value +12.

Those textbooks with the lowest scores tended to have their discussion most consistent with the Fed’s pre-2009 implementation framework. This methodology is evident in their presentation of the Fed’s policy tools. In particular, most of these books emphasize OMO as the tool most often used to move market interest rates. In particular, Mateer and Coppock, state “Expansionary monetary policy occurs when a central bank acts to increase the money supply in an effort to stimulate the economy, and it typically expands the money supply through open market purchases: it buys bonds” (p.1003). Mankiw notes that “open market operations are the tool of monetary policy that the Fed uses most often” (p. 603). McConnell, Brue, and Flynn (date) state “open-market operations are the most important of the four monetary policy tools” (p. 714). All three textbooks include discussion and figures that show the Fed increasing the money supply to provide monetary policy accommodation; this story and the associated figures

are grounded in the limited-reserves regime.²⁰ Our recommendation is that these authors update their text to the Fed's current operating regime, where OMO is not the principal tool.

These books largely neglect the Fed's current, ample reserves, tools. None of these textbooks characterize IOR as the primary tool of policy implementation, nor discuss how it is a reservation rate and works through arbitrage to help move the federal funds rate into the FOMC's target range. These textbooks' discussion of IOR focuses on the policy tool as a means for influencing banks' decisions about lending and how this affects the money multiplier and money supply.²¹ Though this connection is valid, it complicates the discussion and could encourage the reader to think that the Fed thinks about implementing policy in terms of monetary quantities instead of interest rates. Our recommendation is that these textbooks adjust their discussions to spend more time on IOR, addressing how it influences market rates, through the key economic concepts as well as illustrating policy accommodation using IOR (instead of OMOs). Adjusting their graphical presentation to something like figure 2 will emphasize that the lower administered rates directly reduce market interest rates. Then the existing textbook discussions can continue, showing lower market rates spur investment and aggregate demand. In addition, these textbooks do not mention the ON RRP facility nor that OMOs are a tool to keep

²⁰ Matter and Coppock figure 31.1 (p. 1004) and Mankiw figure 3 (p. 726) examine the effect of the Fed buying bonds on the money supply and how that translates into the economy. McConnell et al. Figure 36.3 (p. 720) show an increase in the money supply, though it does not explicitly note the Fed action that boosted the supply.

²¹ For example, McConnell, Brue, and Flynn state "The Fed has, however, shown an eagerness in recent years to alter the rate of interest on excess reserves (IOER) as a way of managing bank reserves and the supply of money" (p.714). Mankiw (604) says, "The higher the interest rate on reserves, the more reserves banks will choose to hold. Thus, an increase in the interest rate on reserves will tend to increase the reserve ratio, lower the money multiplier, and lower the money supply" (p. 604). Mateer and Coppock say, "This historic change in policy means that banks now have less incentive to loan out each dollar above the required reserve threshold. The Fed put this policy in place to reduce the opportunity cost of excess reserves. The increase in excess reserves means that the money multiplier is much smaller than our earlier analysis implied. When banks hold more dollars on reserve, fewer are loaned out and multiplied throughout the economy" (p.995).

reserves ample from now on. These two additional concepts can be added to the discussion to round out the Fed’s current implementation framework.

Turning to the textbooks with positive scores, these books more accurately discuss how the Fed’s policy tools transmit the FOMC’s target to market interest rates. Each emphasizes that IOR is the primary tool of the Fed. And, each explains that IOR works through arbitrage or is a reservation rate for market interest rates. Two of the three also cover the ON RRP facility and how its rate acts as a supplemental tool. In these textbooks, the discussion of how the Fed ensures the policy target transmits to market rates is straightforward: increases (decreases) in the Fed’s administered rates move market interest rates up (down).

Based on our assessment, Stevenson and Wolfers—the newest book on the market (first edition, 2020) —is most accurate in its description of the ample-reserves framework. Stevenson and Wolfers focus on the Fed’s use of its administered rates to transmit the FOMC’s target to the federal funds rate. The order in which they introduce the monetary tools is telling. While nearly all books start their discussions with open market operations and make mention of interest on reserves last (as the fourth tool)—consistent with the idea that IOR is simply an extension of the old framework (not an entirely new framework) —Stevenson and Wolfers introduce IOR first and open market operations last, even stating that OMO is “really more of history lesson” (p. 884).²² They describe IOR as the Fed’s primary tool, ON RRP rate as a supplementary tool, and they are the only book in the set that describes the discount rate’s role in setting an effective ceiling for the federal funds rate. To round out the discussion of the current regime, we

²² OMOs have been used quite often in 2019 and 2020 as the Fed addressed different stresses. The authors might consider adjusting their words about OMOs being a historical lesson.

recommend the textbook adds some discussion about what it means for the Fed work operate with ample reserves—what is the appropriate level and how OMOs are used to maintain ample.

Case, Fair, and Oster cover both the limited and ample reserve regimes. They clearly segment their discussion of the Fed’s tools as “tools prior to 2008” then “expanding Fed activities beginning in 2008” and then “tools after 2008.” In doing so, they provide clear segmentation of the key tools used in the past versus today.²³ We recommend that they add to their discussion of today’s regime how IOR acts as a reservation rate and a discussion how the Fed’s other administered rates, ON RRP rate and discount rate, influence the federal funds rate.

Finally, Hubbard and O’Brien can improve their discussion and coverage of IOR. For example, in our scoring, the authors received a point for saying “beginning in 2008, the Fed began paying banks interest on their reserve holds. The interest rate that the Fed pays on reserves sets a floor for the federal funds rate” (p.880).²⁴ But, they lost points for emphasizing OMO over IOR when discussing the Fed’s tools in their section on monetary policy tools (p. 853-855) and in their chapter summary (p. 866). We recommend that they include IOR in their graphical analysis. In addition, like the previous two textbooks, their material can be enhanced by adding a discussion of what it means for the Fed to operate with ample reserves.

Our findings about the treatment of the monetary policy tools across the textbooks is consistent with Colander’s (2003) suggestion that existing textbooks resist change. Most of the textbooks we examined in this study are several editions into publication. It seems that the newest tool (IOR) is simply added as an extension to the old framework which, for many of these

²³ For example, they refer to the limited-reserves tools in the past tense “traditionally the Fed had three tools available to it to control the interest rate via changing the money supply: open market operations, changing the reserve requirement ratio, and changing the discount rate that banks pay to the Fed to borrow reserves” (p. 526).

²⁴ We award Hubbard and O’Brien a point for saying IOR is the primary tool, though this is only implied by the text on page 880. This point could be brought out more forcefully in their next edition.

books, has persisted through several editions. The newest book (first edition in 2020) described the new framework as a different model, not an extension of the old one. In our estimation, relieved of the baggage of previous editions, the authors were free to describe how monetary policy is implemented now, rather than trying to adapt an existing model and text that has deep roots in past editions and the Fed's old policy implementation framework.

Standards and Guidelines

Turning to the standards and guidelines for economic instruction, we find they need updating. Similar to the textbooks that received negative scores, the limited-reserves regime is deeply entrenched in historical concepts. However, worse than the textbooks, these materials do not even mention the Fed's primary tool, IOR. We believe it is a priority to update these materials because many textbooks and teachers lean on these standards and guidelines.

The Voluntary National Content Standards (VNCS) in Economics, includes 20 broad economics content standards with specific benchmarks (expected achievement levels) for grades 4, 8, and 12 for each standard. The VNCS are not government mandates. Rather they are a resource for states, local school districts, individual schools, and for teachers. MacDonald and Siegfried (2012), contributors to the most recent, 2010 revision, tout the influential effect of the standards, including that several high school textbooks incorporate the standards and states often use VNCS as a starting point in developing their curriculums and state-level standards. And, in addition, many commercial and non-profit producers of economics classroom resources align their education resources with these standards.

Due to their influence on what is taught in the classroom, it is important that the benchmarks that describe the Fed's current implementation of monetary policy reflect current

practice. The current benchmarks state that the Federal Reserve System’s “major monetary policy tool is open market purchases and sales of government securities” and that the Federal Reserve’s target for the federal funds rate is “largely reached by buying and selling existing government securities.” (Council for Economic Education, 2010). Other benchmarks are also outdated.

Siegfried and Meszaros (1998) report that one of the five criteria the authors used in creating the VNCS was that the standards should be correct and reflect the best scholarship within the discipline. We agree. Our proposed changes can be found in table 3.

Table 3: Proposed Changes to Voluntary National Content Standards

Standard, Benchmark	Current Benchmark	Proposed	Comment
Standard 20, Benchmark 7	Monetary policies are decisions by the Federal Reserve System that lead to changes in the supply of money, short-term interest rates, and the availability of credit. Changes in the growth rate of the money supply can influence overall levels of spending, employment, and prices in the economy by inducing changes in the levels of personal and business investment spending.	Monetary policy decisions by the Federal Reserve lead to changes in interest rates and broader financial conditions. These changes influence overall levels of spending, employment, and prices in the economy by inducing changes in the levels of personal and business savings and investment spending.	In the Federal Reserve’s current implementation regime, the focus should be on how the Fed’s setting of its policy tools directly influence short-term interest rates and broader financial conditions, which influence employment and prices.
Standard 20, Benchmark 8	The Federal Reserve System’s major monetary policy tool is open market purchases or sales of government securities, which affects the money supply and short-term interest rates.	The Federal Reserve’s major monetary policy tool is interest on reserves. Changes in this rate, along with the Fed’s other administered rates, directly affect short-	1. The key tool in the Federal Reserve’s current implementation regime is its administered interest rates, not open market operations.

	<p>Other policy tools used by the Federal Reserve System include making loans to banks (and charging a rate of interest called the discount rate). In emergency situations, the Federal Reserve may make loans to other institutions. The Federal Reserve can also influence monetary conditions by changing depository institutions' reserve requirements.</p>	<p>term market interest rates. The other administered rates include overnight reverse repurchase agreement (ON RRP) rate (which sets a floor for the federal funds rate), and the discount rate (which helps set a ceiling for the federal funds rate).</p> <p>In normal times, open market operations are used to ensure reserves remain ample.</p> <p>At times, the Federal Reserve uses forward guidance about the expected path of the federal funds target range over the next several months or years.</p> <p>In emergency situations, the Federal Reserve can use the full set of its tools to stabilize financial markets, help put downward pressure on longer-term interest rates, and keep credit flowing. Most of these tools are subject to prior approval of the Secretary of the Treasury.</p>	<ol style="list-style-type: none"> 2. Reserve requirements were never a significant tool in the current implementation regime and have been inoperative since March 2020. 3. OMOs are used in normal times to maintain ample reserves or, in crisis events, to mitigate stresses in financial markets and help put downward pressure on longer-term interest rates. 4. In recent years, the FOMC has used forward guidance on the policy target range when the target range has been near zero. 5. As a result of Dodd-Frank, the Fed cannot directly lend to any individual institution. All lending has to be "broad based" and approved by the Secretary of the Treasury.
<p>Standard 20,</p>	<p>The Federal Reserve targets the level of the federal funds rate, a</p>	<p>The Federal Reserve targets the level of the federal funds rate, a</p>	<p>As with benchmark #8, the text needs to be updated to</p>

Benchmark 9	short-term rate that banks charge one another for the use of excess funds. This target is largely reached by buying and selling existing government securities.	short-term rate that banks charge one another for the overnight use of funds. This target is largely reached by adjusting the rate of interest on reserves.	reflect the current “major” tool used by the Fed.
Standard 20, Benchmark 10	The Federal Reserve tends to increase interest rate targets when it feels the economy is growing too rapidly and/or the inflation rate is accelerating. It tends to lower rate targets when it wants to stimulate the short-term growth of the economy.	The Federal Reserve tends to increase its target for the policy interest rate when it judges there are no employment shortfalls and average inflation is too high. It tends to lower its interest rate target when there are shortfalls in employment or average inflation is too low.	Update the language to reflect the FOMC’s 2020 consensus statement on Longer-Run Goals and Monetary Policy Strategy.

Turning to the Advanced Placement (AP) Macroeconomics Course and Exam

Description, we find its guidelines are similarly outdated. The College Board designs the AP Macroeconomics course to reflect the content of an introductory college-level macroeconomics course. In 2019, 5,595 schools offered AP Macroeconomics courses and 146,091 students took an AP Macroeconomics class.²⁵ The 2019 AP Macroeconomics Course and Exam Description states “the tools of monetary policy include open market operations, the required reserve ratio, and the discount rate. The most frequently-used monetary policy tool is open market operations.” Unlike the college classroom, AP Macroeconomics teachers cannot stray too far from the prescribed curriculum—they must submit a syllabus and receive approval from the College

²⁵ Based on “Program Summary Report,” published by the College Board, 2019, available here: <https://secure-media.collegeboard.org/digitalServices/pdf/research/2019/Program-Summary-Report-2019.pdf>

Board before being approved to teach the course. In other words, the syllabus must align with the AP curriculum. Further, AP teachers spend much of their time preparing students for the AP exam, which assesses student understanding of the AP Macroeconomics curriculum, including monetary policy implementation. As such, outdated concepts in the curriculum are directly reflected in the instruction by teachers and understanding by students. Our proposed changes can be found in table 4.

Table 4: Proposed Changes to AP Macroeconomics Course and Exam Description

	Current Guidelines	Proposed	Comment
POL-1.D.1	Central banks implement monetary policies to achieve macroeconomic goals, such as price stability.	Central banks implement monetary policies to achieve macroeconomic goals such as maximum employment and price stability.	Given the Fed’s congressional dual mandate, one should add maximum employment to the guideline
POL-1.D.2	The tools of monetary policy include open-market operations, the required reserve ratio, and the discount rate. The most frequently used monetary policy tool is open-market operations.	The tools of monetary policy implementation include the central bank's administered interest rates (interest on reserves, ON RRP rate, and the discount rate) as well as open market operations. The key policy tool is interest on reserves.	Redirect teaching to the Fed’s administered rates. Drop mention of reserve requirements, which have been set to zero since March 2020. Should consider adding the point that interest on reserves is the primary tool.
POL-1.D.3	When the central bank conducts an open-market purchase (sale), reserves increase (decrease), thereby increasing (decreasing) the monetary base.	When the central bank raises (lowers) its administered rates, market interest rates increase (decrease).	Redirect teaching to the key policy tool.
POL-1.D.4	The effect of an open-market purchase (sale) on the money supply is greater than the effect on the monetary base because of the money multiplier.	Drop	This issue does not need to be discussed in the current framework.

POL-1.D.5	Many central banks carry out policy to hit a target range for an overnight interbank lending rate. (In the United States, this is the federal funds rate.)	No Change	
POL-1.D.6	Central banks can influence the nominal interest rate in the short run by changing the money supply, which in turn will affect investment and consumption. [See also EK MKT-5.G.2 for the influence on net capital inflows.]	Central banks can influence market interest rates by adjusting their administered interest rates, which transmit to overall financial market conditions and ultimately affect investment and consumption.	Adjusted the text to focus on the Fed’s current implementation regime, where the policy tools directly influence short-term interest rates and broader financial conditions
POL-1.D.7	Expansionary or contractionary monetary policies are used to restore full employment when the economy is in a negative (i.e., recessionary) or positive (i.e., inflationary) output gap.	The Federal Reserve tends to increase its interest rate target when it feels there are no employment shortfalls and average inflation is too high. It tends to lower its interest rate target when there are shortfalls in employment and or average inflation is too low.	First, the guideline should include the Congressional dual mandate of maximum employment and price stability. Second, the language is updated to be consistent with the FOMC’s 2020 consensus statement on Longer-Run Goals and Monetary Policy Strategy.
POL-1.D.8	Monetary policy can influence aggregate demand, real output, the price level, and interest rates. [See also EK MKT-5.E.3 for the effect on exchange rates.]	Monetary policy can influence interest rates, aggregate demand, real output and the price level.	Adjust the list to put interest rates first, as this is the link from the FOMC’s target range to financial markets.
POL-1.D.9	A money market model and/or the AD–AS model are used to demonstrate the short-run effects of monetary policy.	No Change	There should be a change in the way these models depict a change in Fed policy. The standard money market model should be adapted to reflect the ample-reserves framework (see figure 2). In particular, the model should start with changes in the Fed’s administered

			rates that affect market interest rates, which will ultimately affect investment and AD-AS. This linkage does not start from that OMOs affect the supply of money.
POL-1.E.1	In reality, there are lags to monetary policy caused by the time it takes to recognize a problem in the economy and the time it takes the economy to adjust to the policy action.	No Change	

Updating the VNCS will ensure that this content is reflected in state and local standards and included in materials designed by organizations and firms that prepare classroom materials. Updating the AP Macroeconomics curriculum and exam creates incentives for teachers to update their instruction, and for students to be taught the correct information. These high school courses provide some students with the only economics course they will ever take, and for others the classes provide foundational information as they move to college courses. In both cases, it's important that the content reflects current practice. So why are these standards and guidelines out of date? The next subsection looks at this curriculum lag.

The Curriculum Lag

Given that the Fed has been implementing monetary policy with ample reserves for about a decade, why are academic materials not up to date? Part of this curriculum lag may reflect the fact that the Fed did not formally announce that it will continue in this framework over the longer run until January 2019. So, textbook authors, standards, and guidelines might have been waiting for a formal announcement from the Fed that it was not returning to the limited-reserves

regime. However, the Fed had signaled it was leaning toward adopting this framework for some time, and the Fed had been actively using the current policy tools since raising the federal funds rate target above the effective lower bound in December 2015.

Another reason for the slow response to update economic materials may reflect the fact that there are not a lot of educational materials for educators to lean on for guidance in making accurate changes. Around the time of lifting the policy rate from near zero (fall, 2015), the *Journal of Economic Perspectives* published “Rewriting Monetary Policy 101: What’s the Fed’s Preferred Post-Crisis Approach to Raising Interest Rates?” (Ihrig, Meade & Weinbach). Though a widely-read generalist journal, it is not directly targeted to economic educational outlets. Stepping forward, in 2019, the Federal Reserve Bank of St. Louis published “A New Frontier: Monetary Policy with Ample Reserves” (Wolla); this resource is a short piece that introduced the reader to IOR and the ON RRP rates in the ample-reserves regime, in its *Page One Economics* series, a publication written for economic educators. This educational piece was followed by “The Fed’s New Policy Tools,” (Ihrig and Wolla) in August 2020, also part of the *Page One Economics* series, which provides a discussion of all the policy tools used in the ample-reserves framework. As materials stand today, the most complete discussion of the concepts of policy implementation is found in this paper.²⁶ We provide an overview of the framework and the policy tools, we walk through the mechanics of how the Fed raises or lowers interest rates, and we discuss how the framework works in normal times as well as periods of stress. In addition,

²⁶ In 2020, many additional education resources were posted on the Federal Reserve System’s websites, including “The Fed’s New Monetary Policy Tools” (*Page One Economics*, St. Louis Fed), “How Does the Fed Influence Interest Rates Using Its New Tools” (*Open Vault Blog*, St. Louis Fed), and “Closing the Monetary Policy Curriculum Gap: A Primer for Educators Making the Transition to Teaching the Fed’s Ample-Reserves Framework” (*FEDS Notes*, Federal Reserve Board of Governors). Ihrig, Senyuz, and Weinbach (2020a) have a primer that presents most of the key concepts of an ample regime. However, they do not walk through an interest rate adjustment. Also, their discussion is quite detailed in some areas, making it a good resource for money and banking courses that dive into more details than discussed in a principles textbook.

for those schooled in the limited-reserves regime, the comparison section helps to hit home how existing tools are used differently (or not at all) as well as outlines the new tools.

Recommendations for Teachers, Professors, Curriculum Specialists, and Textbook Authors

The Fed stated it is using an ample-reserve regime now and over the longer run. It is time that teaching materials are updated. In many ways, the Fed’s current ample-reserves framework is easier for students to understand than the limited-reserves framework. For example, focusing on how the Fed influences the federal funds rate with a limited supply of reserves, students used to be required to understand how the New York Fed’s Trading Desk buying and selling of bonds in the open market affected the supply of reserves. Students were introduced to technical details of the operations and accounting concepts. While these details may seem like natural connections to professors, they are often complex and abstract to introductory students—it’s no wonder monetary policy was one of the least understood topics in large-scale assessments (Walstad et al, 2013).

At its most basic level, the ample-reserves framework requires students to know more intuitive concepts. Once the student learns that the Fed uses its administered rates to steer the federal funds rate, the intuition is straight forward. Students can easily grasp how IOR acts as a reservation rate and arbitrage helps keep market interest rates near IOR. These two concepts are discussed in other areas of economics as well. As such, we disagree with Hubbard and O’Brien’s (2021) view that the ample-reserves framework is “a more complicated mechanism” (p. 880).

Further, rather than tying monetary policy implementation to the textbook content of money and banking and the money supply, we recommend focusing directly on the Fed’s ability use these tools to influence the federal funds rate and other market interest rates. These are

demand-side tools that affect business investment and personal consumption decisions. One can discuss monetary policy implementation at the introductory level in the context of aggregate supply and demand. For example, expansionary monetary policy results in lower interest rates that encourages spending and investment by consumers and firms. This additional spending increases aggregate demand and employment, moving the Fed toward its maximum employment and price stability goals.

Conclusion

The Fed has been implementing monetary policy in an ample-reserves regime for nearly a decade. While several statements and articles discussing the current framework were published by the Federal Reserve between 2009 and today, not many were provided for educators, and it wasn't until January of 2019 that the Fed formally announced that it would continue in the ample reserves framework over the longer run. As such, it is not surprising to see the varied textbook treatment of the topic.

We provided a detailed description of the ample-reserves framework using classroom-friendly models and language, and we contrasted it with the limited-reserves framework. Then we assessed the treatment of monetary policy implementation in six principles-level textbooks – all by major publishers and popular authors. Specifically, we scored the textbooks on a total of 15 different concepts grouped into three areas – the policy rate, the policy tools, and interest rate adjustment– assigning both positive and negative points for different concepts. We found half of the textbooks with negative net scores and the other half with varying degrees of net positive scores. We reviewed where the books hit the mark and provided recommendations for where content improvements can be made. Finally, we assessed the Voluntary National Content Standards in Economics and the AP Macroeconomics Course and Exam Description. In both

cases, updates are needed; we proposed specific updates to make these materials consistent with the Fed's current framework.

While the Fed's current framework is not well represented in curriculum materials, we hope that this article encourages and guides a shift away from content that focuses on the limited-reserves framework that was used prior to 2009 and toward the ample-reserves framework the Fed uses today and will do so from now on. This revision is especially important at the principles-level because these classes have large enrollment and, for many students is their first and last exposure to economics. As such, it is important that the content reflects current practices. More generally, all students should expect to be taught material that is accurate and reflects current practice.

Appendix – Textbook Scoring Metric

Table A1 provides the 15 specific concepts used in evaluating the principles textbooks. Each concept that we deemed important to the ample-reserves framework received +1 point. Each concept that was outdated received -1 point. A textbook that covered all the concepts correctly would score +12; whereas, a textbook that covered all the material inaccurately would score – 3.

The concepts are grouped into three areas: information related to the Fed’s policy rate, concepts associated with the Fed’s policy tools used for implementation, and the discussion of an interest rate adjustment. Most of the points are given for explaining the correct policy tools and how they work in the ample-reserves framework.

Table A1 – Scoring Metric

	Awarded Points
Fed’s policy rate	
FOMC determines the target range for FFR	+1
Fed’s policy tools	
IOR is the primary tool the Fed uses to adjust the FFR	+1
IOR is a reservation rate	+1
IOR works through arbitrage	+1
ON RRP facility/rate is a supplementary tool for adjusting the FFR	+1
The discount window/rate sets a ceiling on the FFR	+1
Reserves are classified as ample	+1
OMOs are used to ensure reserves remain ample (not to adjust FFR)	+1
Because reserves are ample, reserve requirements are not a significant tool	+1
Uses some version of ample regime figure	+1
OMO is the Fed’s primary tool for adjusting the FFR	-1
IOR is used to manage the level of reserves / supply of money	-1
Interest rate adjustment	
The Fed adjusts the FFR by moving the administered rates (at least IOR)	+1
Uses some version of ample regime figure	+1
Uses some version of limited regime figure	-1

Table A2 reports the scores for each of the six textbooks in our sample on each of the 15 concepts. The total score is reported at the bottom of the table.

Table A2 – Scoring details for each textbook

	Points Awarded	Mateer and Coppock (2021)	Mankiw (2021)	McConnell, Brue, and Flynn (2021)	Hubbard and O'Brien (2021)	Case, Fair, and Oster (2020)	Stevenson and Woffers (2020)
Fed's policy rate							
FOMC determines the target range for FFR	1	1	1	1	1	0	1
Fed's policy tools							
IOR is the primary tool the Fed uses to adjust the FFR	1	0	0	0	1	1	1
IOR is a reservation rate	1	0	0	0	1	0	1
IOR works through arbitrage	1	0	0	0	0	1	0
ON RRP facility/rate is a supplementary tool for adjusting the FFR	1	0	0	0	1	0	1
The discount window/rate sets a ceiling on the FFR	1	0	0	0	0	0	1
Reserves are classified as ample	1	0	0	0	1	1	0
OMOs are used to ensure reserves remain ample (not to adjust FFR)	1	0	0	0	0	0	0
Because reserves are ample, reserve requirements are not a significant tool	1	0	0	0	0	1	0
Uses some version of ample regime figure	1	0	0	0	0	0	0
OMO is the Fed's primary tool for adjusting the FFR	-1	-1	-1	-1	-1	0	0
IOR is used to manage the quantity of money	-1	-1	-1	-1	-1	0	0
Interest rate adjustment							
The Fed adjusts the FFR by moving the administered rates (at least IOR)	1	0	0	1	1	1	1
Uses some version of ample regime figure	1	0	0	0	0	0	0
Uses some version of limited regime figure	-1	-1	-1	-1	-1	0	0
Total Score		-2	-2	-1	3	5	6

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