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USING THE FEDERAL RESERVE'S BALANCE SHEET TO PREDICT MACROECONOMIC OUTCOMES

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Abstract

This study investigates whether the U.S. Federal Reserve's balance sheet can be used to predict macroeconomic outcomes. The Federal Reserve writes its own accounting standards, and I recast portions of the Federal Reserve's weekly balance sheet as if it more closely followed Generally Accepted Accounting Principles. Specifically, I estimate the fair value of the Federal Reserve's U.S. Treasury notes and bonds and calculate the associated unrealized gains and losses. I demonstrate that unrealized gains (losses) on the Federal Reserve's U.S. Treasury notes and bonds are associated with lower (higher) one-quarter ahead inflation and real gross domestic product growth. Additionally, I show that modifying proxies for macroeconomic news to incorporate the predictive value of unrealized gains and losses on the Federal Reserve's U.S. Treasury notes and bonds helps explain equity returns around the release of macroeconomic data.

Keywords

Financial Reporting, Macroeconomic Forecasting, Federal Reserve, Monetary Policy

JEL Classifications: M41, E47, E52

I. Introduction

This study investigates whether the U.S. Federal Reserve's balance sheet can be used to predict macroeconomic outcomes. One of the Federal Reserve's responsibilities as mandated by Congress is to promote output and employment while maintaining stable prices (i.e. limiting inflation). One way the Federal Reserve (Fed) influences output and inflation is by purchasing and selling securities in order to influence the money supply. As of January 24, 2018, the Federal Reserve owned an economically significant $2.4 Trillion of U.S. Treasury securities (see Appendix). For perspective, nominal U.S. gross domestic product (GDP) totaled $19.4 Trillion for 2017. Thus, the Fed's U.S. Treasury portfolio was approximately 13% of the size of the entire U.S. economy. Additionally, the Fed earns significant amounts of interest on its U.S. Treasury portfolio and remits the majority of the profits back to the U.S. Treasury (i.e. taxpayers). The Fed remitted $80 Billion to the U.S. Treasury in 2017 which reduced the federal budget deficit by approximately 11% (Board of Governors of the Federal Reserve System 2017).

Pursuant to federal law, the Federal Reserve discloses Release H.4.1 *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks* each week which includes a consolidated balance sheet for the regional Federal Reserve Banks. I demonstrate that aggregate equity market volume and return volatility are abnormally high on days the Federal Reserve issues Release H.4.1, consistent with the Fed's balance sheet conveying useful information to market participants. The Fed's balance sheet is unique because unlike publicly traded companies (including the banks that the Fed regulates), the regional Federal Reserve Banks do not follow Generally Accepted Accounting Principles (GAAP). Instead, the regional Federal Reserve Banks follow standards created by the Federal Reserve Board of Governors which materially differ from GAAP (Board of Governors of the Federal Reserve System 2015). For example, the Fed reports the value of its U.S. Treasury portfolio at cost and only recognizes gains and losses when securities are sold. In contrast, GAAP would require such securities to be presented at fair value with unrealized gains and losses recognized in income.

I recast portions of the Federal Reserve's weekly balance sheet as if it more closely followed GAAP. Specifically, I estimate the fair value of the Fed's U.S. Treasury notes and bonds and calculate the associated unrealized gains and losses. Unrealized gains and losses on the Fed's U.S. Treasury portfolio may identify periods where the Fed is constrained by political costs and help predict future macroeconomic outcomes. For example, the

Fed dramatically increased its U.S. Treasury holdings to stimulate the economy during the financial crisis. As the economy recovers, the Fed faces pressure to sell securities to fight inflation. However, the Fed faces a risk of selling securities at a loss (Carpenter et al. 2015, Greenlaw et al. 2013, Christensen et al. 2015). Selling at a loss would force the Fed to recognize realized losses. If these losses are large enough, then the Fed may fail to remit any profits back to the U.S. Treasury. Failure to make remittances to the U.S. Treasury could increase the national deficit, disrupt financial markets, invite negative press, and result in increased political oversight of the Federal Reserve by Congress (Rudebusch 2011, Archer and Moser-Boehm 2013, Bilkre 2016). Thus, central bankers could face a principal-agent conflict where they are forced to choose between socially optimal monetary policy action and avoiding political costs (Kluh and Stella 2008). If the Fed sells fewer securities than it otherwise would have in order to reduce the risk of political costs, then the federal funds rate may remain below the socially optimal level. In turn, the stimulative effect may increase inflation in future periods.

I find that unrealized gains (losses) on the Federal Reserve's U.S. Treasury notes and bonds are associated with lower (higher) one-quarter ahead inflation and real GDP growth. Additionally, I show that modifying proxies for macroeconomic news to incorporate the predictive value of unrealized gains and losses on the Fed's U.S. Treasury notes and bonds helps explain equity returns around the release of macroeconomic data. Collectively, my results suggest that market participants understand the predictive power of unrealized gains and losses on the Fed's U.S. Treasury portfolio and use that information when forming their expectations about inflation and real GDP growth.

My study contributes to literatures in both macroeconomics and accounting. First, a large body of "Fed watching" research shows that market participants closely follow Fed data releases and statements which may be used to update their beliefs about future monetary policy and the path of the economy (Board of Governors of the Federal Reserve System 2017). This literature generally focuses on relatively infrequent high-profile Fed releases. For example, the release of Fed meeting minutes can move markets, but these releases only occur eight times per year (Rosa 2013). I contribute to this literature by showing that the market also reacts to high frequency (and lower profile) Fed disclosures.

Second, a vast forecasting literature in macroeconomics attempts to predict inflation and real GDP growth (see Chauvet and Potter 2013 and Faust and Wright 2013 for reviews). Maximizing macroeconomic forecast accuracy is important because expectations about future states of the economy can influence decisions made by firms, governments, central banks, investors, and households. A complimentary and growing literature in accounting examines interactions between earnings, asset returns, and the macroeconomy (Ball and Sadka 2015). For example, prior research shows that the earnings and management forecasts of bellwether firms provide timely information about the macroeconomy (Anilowski et al. 2007, Bonsall et al. 2013, Konchitchki and Patatoukas 2014b). Additionally, aggregations of firm-level earnings are associated with future GDP growth (Konchitchki and Patatoukas 2014a. Abdalla and Carabias 2022, Gaertner et al. 2020, Kalay et al. 2018, Ball et al. 2019), future inflation (Cready and Gurun 2010, Patatoukas 2014, Shivakumar and Urcan 2017), future labor market conditions (Hann et al. 2021), revisions to macroeconomic indicators (Nallareddy and Ogneva 2017), monetary policy actions (Crawley 2015, Gallo et al. 2016), aggregate equity market returns (Ball et al. 2009, Jorgensen et al. 2012), and corporate bond returns (Gkougkousi 2014). I contribute to these literatures by demonstrating that financial reporting outputs from a single prominent centralized economic decision maker (the Fed) can be used to improve predictions of future inflation and real GDP growth, even after controlling for professional macroeconomic forecasts, a variety of leading economic indicators, and growth in aggregate earnings.

Finally, my study has implications for the ongoing political debate about the Federal Reserve. The Fed has faced a long history of political criticism, particularly in times of economic distress (see Binder and Spindel 2015 for a review). Recently, critiques of the Fed's policies have led Congress to consider altering the Fed's mandate to include only minimizing inflation (i.e. abandoning the Fed's other mandate to stimulate output), limiting Fed independence through Congressional audits of monetary policy, and reducing Fed discretion (e.g. forcing the Fed to follow a mathematical formula when setting interest rates) (Applebaum 2015). My study provides empirical evidence consistent with the Fed considering political costs when making monetary policy decisions.

II. Federal Reserve Overview

This section provides a brief overview of the Federal Reserve's structure and monetary policy operations. For a more complete description, see "*The Federal Reserve System: Purposes and Functions*" (Board of Governors of the Federal Reserve System 2005). The Federal Reserve System was created by the Federal Reserve Act of 1913 in response to bank runs and financial crises (U.S. House of Representatives 1913). The Federal Reserve has numerous responsibilities including supervising and regulating banks, maintaining the stability of the financial system, operating the nation's payment system, and conducting monetary policy.

The Federal Reserve System consists of four components. First, the Board of Governors (the Board) is a governmental agency that oversees the Federal Reserve System as a whole. The Board consists of seven members appointed by the President and confirmed by the U.S. Senate. Second, the Federal Open Market Committee

(FOMC) oversees open market operations (the Fed's primary monetary policy tool described in further detail below). The FOMC consists of 12 members (the president of the Federal Reserve Bank of New York, four presidents from the other regional Federal Reserve Banks which serve on a rotating basis, and the seven members from the Board of Governors). The FOMC has held eight meetings per year since 1981. Third, there are 12 regional Federal Reserve Banks which serve geographic areas. Unlike the Board of Governors, regional Federal Reserve Banks are not governmental agencies (i.e. they are privately owned by the member banks described below). Regional Federal Reserve Banks (1) operate the nationwide system of payments, (2) distribute currency, (3) supervise member banks in its area, (4) publish information about the state of the economy in their area (the "Beige Book"), and (5) serve as a depository for the member banks in its area (i.e. the regional Federal Reserve Banks are "bankers' banks"). Each regional Federal Reserve Bank has a president who is nominated by a board of directors and approved by the Board of Governors. Fourth, private institutions (i.e. all national banks and many state-chartered banks) are "member banks". Member banks hold common stock issued by their regional Federal Reserve Bank. Member banks receive a fixed stock dividend, and stock ownership entitles the member banks to elect a portion of the regional Federal Reserve Bank's board of directors.

Section 2a of the Federal Reserve Act of 1913 outlines the Fed's "dual mandate" with respect to monetary policy. The Fed is tasked to "*promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates*." The difficulty lies in achieving these potentially opposing objectives. For example, the Fed may wish stimulate the economy by easing monetary policy when output slows or unemployment increases. However, increasing the money supply too much or too fast could increase inflation, decrease asset values, reduce incentives for saving, and distort signals used by the market when allocating resources.

The Fed executes monetary policy using three primary tools. First, member banks may borrow directly from the Fed's discount window. However, discount window lending is rare because investors and depositors may view the need to borrow directly from the Fed as a negative signal about a bank's financial health (Haltom 2011). Second, member banks must keep a percentage of their customers' deposits (the "reserve ratio") as vault cash or as deposits with their regional Federal Reserve Bank. The Fed rarely changes the reserve ratio, but member banks' required reserves vary daily as individuals and businesses deposit and withdrawal cash. Member banks with deposits at their regional Federal Reserve Bank that exceed their reserve requirement may lend reserves to other banks whose reserves are below their reserve requirement. The interest rate that banks charge one another for overnight loans to meet reserve requirements is known as the federal funds rate.

The Fed cannot unilaterally control the federal funds rate, but the FOMC influences the federal funds rate through "open market operations". For example, if the FOMC would like to stimulate the economy, the FOMC will instruct one of the regional Federal Reserve Banks to purchase securities (typically U.S. Treasuries) from a member bank. Instead of paying cash, the Fed increases the member bank's deposit account at its regional Federal Reserve Bank. Member banks' deposits are liabilities on their regional Federal Reserve Bank's balance sheet (just as customer deposits are treated as liabilities on a member bank's balance sheet). Thus, the Fed's journal entry is a debit to an Investment account and a credit to a Liability account. As a practical matter, the Fed has electronically "printed" money because the increase in the member bank's asset account is not offset by a decrease in any other asset for any other institution.

Furthermore, the member bank is now more likely to have deposits at its regional Federal Reserve Bank that exceed its reserve requirement. Thus, the member bank may lend out its excess reserves to other banks to earn short-term interest. The increased supply in the market for reserves should put downward pressure on the federal funds rate, thereby reducing the amount of interest that banks can earn from lending their excess reserves and increasing the relative attractiveness of investing or making loans. Increased loan activity should reduce the cost of capital, thereby increasing corporate and personal spending and stimulating economic growth.[1]

III. Market Response to Federal Reserve Balance Sheet

Section 11(a)(1) of the Federal Reserve Act requires the Fed to release a consolidated balance sheet for the regional Federal Reserve Banks each week. The Federal Reserve discloses Release H.4.1 *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks* each week which includes a consolidated balance sheet for the regional Federal Reserve Banks and various supporting schedules.[2] See the Appendix for excerpts from Federal Reserve Release H.4.1 issued on January 25, 2018.

[1] Changes in the federal funds rate can also impact other interest rates, currency exchange rates, and stock and bond prices, which also affect the real economy. The "transmission mechanisms" through which monetary policy affects the real economy are complex, see Bernanke and Blinder (1992), Bernanke and Gertler (1995), Bernanke and Kuttner (2005), and Board of Governors of the Federal Reserve System (2005) for further discussion.

[2] When I use the term "balance sheet" herein, I'm referring to the consolidated balance sheet for the regional Federal Reserve Banks (not the balance sheet for the Board of Governors). I focus on the consolidated balance sheet for the regional Federal Reserve Banks for multiple reasons. First, the Board's balance sheet does not include the impact of monetary policy operations like the balance sheet for the regional Federal Reserve Banks. Thus, thus the economic magnitude of the Board's balance sheet

I begin the empirical tests by examining the market response to the release of Federal Reserve Release H.4.1. Identifying a market response to the release of Federal Reserve Release H.4.1 is an important prerequisite to investigating how market participants use the information within the release.[3] I examine whether equity market participants use the Fed's balance sheet by adapting Beaver's (1968) approach to measuring the information content of firm-level earnings announcements. Adapting Beaver's (1968) approach has multiple advantages in my setting. First, the approach avoids normative questions (e.g. whether the market should react to the Fed's balance sheet). Second, the approach does not require the specification of an expectations model for market participants. I begin by estimating the following time series regression:

$$Vol_t = \delta_0 + \delta_1 RELEASE_t + \delta_t YEAR_t + e_t \quad \textbf{(1)}$$

Where Vol_t is the volume of shares traded for all firms on day *t* from the Center for Research in Securities Prices (CRSP) daily stock file in billions. $RELEASE_t$ is a dummy variable that equals 1 if the Fed published Release H.4.1 on day *t*, and $RELEASE_t$ equals 0 otherwise.[4] $YEAR_t$ are yearly fixed effect variables which control for time trends in overall volume.

Next, I examine whether aggregate stock return volatility is higher on days the Federal Reserve issues Release H.4.1. I calculate the variance of the return on the CRSP value weighted index for all days when $RELEASE_t$ equals 1. Similarly, I calculate the variance of aggregate returns for all days when $RELEASE_t$ equals 0. I use an *F*-test to test the null hypothesis that the variances are the same in each sub-sample.

Table 1 presents the results for the volume and return volatility tests. The sample begins on June 26, 1996 (the first date that Release H.4.1 is available on the Fed's website) and ends on June 30, 2018. I also examine two subperiods because the Fed dramatically increased the size of its balance sheet during the financial crisis, thereby potentially altering the decision usefulness of Release H.4.1.[5] The pre-financial crisis subperiod begins on June 26, 1996 and ends on November 30, 2007. The post-financial crisis begins on December 1, 2007 (the start of the recession as defined by the National Bureau of Economic Research) and ends on June 30, 2018.

In Table 1 Panel A, the coefficient for the *RELEASE* variable is positive and significant at the 1% level in the full sample. The magnitude of the coefficient suggests that an economically meaningful 104 million more shares are traded on days the Federal Reserve issues Release H.4.1. The coefficient on *RELEASE* is also positive in both the pre-financial crisis subsample (significant at the 1% level) and the post-financial crisis subsample (significant at the 10% level). Overall, the results in Table 1 Panel A suggest that aggregate equity market volume is abnormally high on days the Federal Reserve issues Release H.4.1, consistent with the Fed's balance sheet conveying useful information to market participants.

Turning to return volatility, Table 1 Panel B shows that the *F*-statistic is statistically significant at the 5% level in the full sample. This suggests rejection of the null hypothesis that the variances are the same across release dates and non-release dates in favor of the alternative hypothesis that the variance of aggregate equity market returns is higher on days the Federal Reserve issues Release H.4.1. The *F*-statistic is also significant during the post-financial crisis period but not during the pre-financial crisis period. Overall, the results in Table 1 Panel B suggest that aggregate equity market return volatility is abnormally high on days the Federal Reserve issues Release H.4.1, consistent with the Fed's balance sheet conveying useful information to market participants.

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is much less than the balance sheet for the regional Federal Reserve Banks. Second, the balance sheet for the regional Federal Reserve Banks is disclosed weekly within Release H.4.1 while the Board's balance sheet is released only annually in a separate disclosure to Congress.

[3] Using seminal papers from the accounting literature as an analogy, Beaver (1968) shows that equity volume and return volatility are higher in the short-window around the release of firm-level earnings. This finding helped answer the binary question of "Do market participants use firm-level earnings information?" and led researchers to ask the more nuanced question of "How do market participants use such information?". For example, subsequent research shows that firm-level earnings can provide new information to equity investors (Kothari 2001), facilitate efficient contracting (Watts and Zimmerman 1986; Ball 2001), discipline managers' disclosure behavior (Gigler and Hemmer 1998; Stocken 2000), and improve managerial decision making (Waymire 2009).

[4] See https://www.federalreserve.gov/releases/h41/ for H.4.1 release dates. H.4.1 is most commonly released on Thursdays, but other release days occur (e.g. due to holidays, quarter ends, government shutdowns, etc.). The Fed does not time stamp historical releases making isolating the exact minute of release difficult. Therefore, I use daily (rather than intra-day) data when calculating volume and return volatility.

[5] For example, when analyzing the Fed's balance sheet in a blog post dated October 25, 2008, James Hamilton, Professor of Economics at the University of California San Diego, noted "*Once upon a time, [Federal Reserve Release H.4.1] was one of the least interesting of the government's many releases of data. These days, it's become one of the most exciting.*" (Hamilton 2008).

Table 1

Equity Market Response to Federal Reserve Release H.4.1

Panel A: Volume

	Full Sample		Pre-Financial Crisis		Post-Financial Crisis	
N	5,541		2,878		2,663	
R^2	0.80		0.82		0.35	
Intercept	7.002	***	6.005	***	6.997	***
	(55.48)		(53.58)		(55.06)	
RELEASE	0.104	***	0.081	***	0.127	*
	(2.76)		(2.71)		(1.80)	
Year Fixed Effects	Yes		Yes		Yes	

Panel B: Return Volatility

Period	Full Sample		Pre-Financial Crisis		Post-Financial Crisis	
RELEASE =1	1.435		1.187		1.705	
RELEASE =0	1.404		1.219		1.606	
F -Statistic	1.02	**	0.97		1.06	***

This table describes the equity market response to Federal Reserve Release H.4.1 *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks* which includes the weekly consolidated balance sheet for the regional Federal Reserve Banks.

Panel A presents the results of regression model (1): $Vol_t = \delta_0 + \delta_1 RELEASE_t + \delta_t YEAR_t + e_t$ where Vol_t denotes the total number of shares traded for all firms on day t from the Center for Research in Securities Prices (CRSP) daily stock file (in billions). $RELEASE_t$ is a dummy variable that equals 1 if the Fed published Release H.4.1 on day t, and $RELEASE_t$ equals 0 otherwise. $YEAR_t$ are year fixed effect variables to control for overall time trends in volume.

Panel B presents the variance of daily returns on the CRSP value weighted index during the release period (i.e. all days when *RELEASE* = 1) and the non-release period (i.e. all days when *RELEASE* = 0). The *F* -statistic tests the null hypothesis that the variances are the same in each sample.

The full sample period begins on June 26, 1996 and ends on June 30, 2018. The pre-financial crisis sub-period begins on June 26, 1996 and ends on November 30, 2007. The post-financial crisis sub-period begins on December 1, 2007 and ends on June 30, 2018.

t -statistics are based on Newey-West (1987) standard errors to control for potential autocorrelation in the residuals. ***, **, and * represent two-tailed significance at the 1%, 5%, and 10% levels, respectively.

In summary, the results in Table 1 show that equity market volume and return volatility are abnormally high on days the Fed issues Release H.4.1. These results contribute to the economics and accounting literatures. First, a large body of "Fed watching" research shows that market participants closely follow Fed data releases and statements which may be used to update their beliefs about future monetary policy and the path of the economy (Board of Governors of the Federal Reserve System 2017). This literature generally focuses on relatively infrequent high-profile Fed releases. For example, the release of Fed meeting minutes can move markets, but these releases only occur eight times per year (Rosa 2013). I contribute to this literature by showing that the market also reacts to high frequency (and lower profile) Fed disclosures. Second, I contribute to accounting literature by demonstrating that the Fed's balance sheet conveys useful information to market participants.

I acknowledge multiple caveats to the results in Table 1. First, I cannot rule out the possibility that the market is reacting to other macroeconomic indicators released at the same time as Federal Reserve Release H.4.1. However, I believe this possibility is low because other releases are generally lower frequency. For example, high profile macroeconomic indicators tend to be quarterly (e.g. GDP, inflation, consumer confidence, housing starts,

and manufacturing inventories) or monthly (e.g. unemployment claims, index of leading economic indicators) rather than weekly like Federal Reserve Release H.4.1.

Second, I cannot isolate the weekly consolidated balance sheet for the regional Federal Reserve Banks as the source of the market's response to Federal Reserve Release H.4.1 (e.g. market participants may be responding other data items contained in the release). However, the results in Sections IV and V suggest that modifications to the consolidated balance sheet for the regional Federal Reserve banks can predict macroeconomic outcomes, thereby helping to explain the market's reaction to Federal Reserve Release H.4.1.

IV. Recasting The Fed's Balance Sheet

The results in Section III show that equity market volume and return volatility are abnormally high on days that the Federal Reserve issues Release H.4.1, consistent with market participants using the Fed's consolidated balance sheet in some capacity. The Fed's balance sheet is unique because unlike publicly traded companies (including the member banks that the Fed regulates), the regional Federal Reserve Banks do not follow Generally Accepted Accounting Principles (GAAP). Instead, the regional Federal Reserve Banks follow standards created by the Board of Governors. The Financial Accounting Manual (FAM) explains the Fed's decision to write its own accounting standards by stating "*accounting principles for entities with the unique powers and responsibilities of the nation's central bank have not been formulated by accounting standard-setting bodies.*" (Board of Governors of the Federal Reserve System 2015). This section (1) examines key differences between FAM and GAAP, (2) motivates why modifications to the Fed's balance sheet may improve predictions of macroeconomic outcomes, and (3) recasts portions of the Fed's balance sheet as if it more closely followed GAAP.

Federal Reserve Accounting

The largest difference between the Fed's accounting standards and GAAP relates to the measurement and presentation of investment securities.[6] As discussed in Section II, the Fed purchases (sells) securities to increase (decrease) the rate of the economic growth. The Fed presents its securities, known as its System Open Market Account (SOMA), at cost and only recognizes gains or losses when securities are sold. In contrast, GAAP would require such securities to be presented at fair value with unrealized gains and losses recognized in income.[7]

The Fed claims that presenting investments at cost is appropriate because "*unrealized changes in value have no direct effect on the quantity of reserves available to the banking system or on the prospects for future Reserve Bank earnings or capital…Accordingly, fair values, earnings, and gains or losses resulting from the sale of such securities and currencies are incidental to the open market operations and do not motivate decisions related to policy or open market activities*".[8] Fed officials also point out that it invests primarily in U.S. Treasury securities with little or no default risk. Moreover, even if the value of the Fed's assets declines to zero, then the Fed can "print" money to satisfy its liabilities and pay dividends to its member banks. Thus, Fed officials (e.g. Ben Bernanke) have publicly stated that monetary policy operations should be (and are) independent of Fed accounting policies and financial reporting outcomes and that any questions about Fed insolvency are misguided (Rudebusch 2011).

However, a growing literature in economics suggests that central bank financial reporting outcomes may be associated with the effectiveness of monetary policy actions (see Hall and Reis 2015 for a review). For example, theoretical models show that credibility is a necessary condition for monetary policy success, and central banks require a certain degree of financial strength in order to credibly commit to a policy objective (Stella 2005, Kluh and Stella 2008, Berriel and Bhattarai 2009, Archer and Moser-Boehm 2013, and Del Negro and Sims 2015).

Moreover, the Fed generates significant interest income from its securities portfolio. While not required by law, the Fed historically remits any profits back to taxpayers via the U.S. Treasury (Carpenter et al. 2015). The Fed dramatically increased its security holdings to stimulate the economy during the financial crisis. Once the economy recovers, the Fed may face pressure to sell securities to fight inflation. However, the Fed faces a risk of selling securities at a loss (Carpenter et al. 2015, Greenlaw et al. 2013, Christensen et al. 2015). Selling at a loss would force the Fed to recognize realized losses. If these losses are large enough, then the Fed may fail to remit any profits back to the U.S. Treasury. Failure to make remittances to the U.S. Treasury could increase the national deficit, disrupt financial markets, invite negative press, and result in increased political oversight of the Federal Reserve by Congress (Rudebusch 2011, Archer and Moser-Boehm 2013, Bilkre 2016). Thus, central bankers could

[6] Other significant differences between U.S. GAAP and the Fed's accounting policies exist. For example, the Fed lacks a conceptual framework which outlines the objectives of financial reporting, defines measurement constructs, and forms a theoretical basis for determining how transactions should be measured. Additionally, Federal Reserve Release H.4.1 contains only a balance sheet and omits an income statement and statement of cash flows because "*the liquidity and cash position of the Reserve Banks are not a primary concern given the Reserve Banks' unique powers and responsibilities as a central bank*." (Board of Governors of the Federal Reserve System 2015).

[7] See Topic 320 of the Financial Accounting Standards Board's Accounting Standards Codification at https://asc.fasb.org/

[8] See discussion on the Fed's website at http://www.federalreserve.gov/monetarypolicy/bst_fedfinancials.htm

face a principal-agent conflict where they are forced to choose between socially optimal monetary policy action and avoiding political costs (Kluh and Stella 2008).[9]

I empirically identify periods where the Fed is potentially constrained by political costs by recasting portions of the Fed's balance sheet as if it more closely followed GAAP. Specifically, I estimate the unrealized gains and losses on the Fed's U.S. Treasury notes and bonds. Quantifying unrealized gains and losses on the Fed's U.S. Treasury notes and bonds may help predict macroeconomic outcomes. For example, as described above, the Fed may be reluctant to sell securities that are in an unrealized loss position because recognition of the loss on sale could reduce or eliminate remittances to the U.S. Treasury, increase the national deficit, disrupt financial markets, invite negative press, and result in increased political oversight of the Fed. If the Fed sells fewer securities than it otherwise would have in order to reduce the risk of political costs, then the federal funds rate may remain below the socially optimal level. In turn, the stimulative effect may increase inflation and GDP growth in future periods.

Recasting the Fed's Balance Sheet

I begin to recast the Fed's balance sheet by estimating the fair value of the Fed's U.S. Treasury notes and bonds.[10] I require four parameters to estimate the fair value of the Fed's U.S. Treasury notes and bonds for each H.4.1 release date (the book value, duration, yield to maturity, and coupon rate). First, the Fed discloses the book value of its U.S. Treasury notes and bonds in Release H.4.1 (*TREASBV*). For example, the Appendix shows that the book value of the Fed's U.S. Treasury notes and bonds in the H.4.1 release dated January 25, 2018 was $2.320 Trillion.

Second, each H.4.1 release provides a maturity distribution of the Fed's U.S. Treasury securities. For example, the Appendix shows that in Release H.4.1 issued on January 25, 2018, the Fed had $27.8 Billion of U.S. Treasury securities with a remaining duration between 0 and 15 days, $80.0 Billion with a remaining duration between 16 and 90 days, $317.2 Billion with a remaining duration between 91 days and 1 year, $1.084 Trillion with a remaining duration between 1 year and 5 years, etc. I estimate the weighted-average duration in years (*DURATION*) using the midpoint of each duration bucket (e.g. I assume that all securities with a duration between 0 and 15 days have a duration of (0+15)/2=7.5 days). For the example in the Appendix, the weighted-average duration for the Fed's U.S. Treasury notes and bonds is 6.19 years.

Third, the U.S. Treasury publishes a daily yield curve containing the yield to maturity for U.S. Treasuries of various durations.[11] I estimate the weighted-average yield to maturity on the Fed's U.S. Treasury notes and bonds (*YTM*) using a linear interpolation. For example, as described above, the weighted-average duration of the Fed's U.S. Treasury securities was 6.19 years in Release H.4.1 issued on January 25, 2018. The U.S. Treasury yield curve on January 25, 2018 shows that 5-year (7-year) U.S. Treasuries had a yield to maturity of 2.41% (2.55%). A linear interpolation generates a weighted-average yield to maturity on the Fed's U.S. Treasury securities on January 25, 2018 of 2.41% + ((6.19-5)*(2.55%-2.41%)/(7-5)) = 2.49%.

Fourth and finally, I require the weighted-average coupon rate of the Fed's U.S. Treasury notes and bonds. Unfortunately, the Fed does not publish the coupon rates of its securities within Release H.4.1. However, the Fed does publish the weekly amount of profits remitted to the U.S. Treasury after covering operating expenses, paying dividends on the regional Federal Reserve Banks' common stock, and maintaining a level of surplus (i.e. retained earnings) at least as large as capital paid-in on its balance sheet. For example, the Appendix shows that weekly remittances to the U.S. Treasury were $1.5 Billion and total assets were $4.441 Trillion in Release H.4.1 issued on January 25, 2018. Annualizing the weekly return generates an estimate of the weighted-average coupon rate (*COUPON*) of ((1+($1.5B/$4.441T))^52)-1 = 1.77%.[12]

[9] Commentary by current and former Fed officials also suggests that Fed accounting policies and financial reporting outcomes could affect the execution of monetary policy. For example, Mr. William Ford, former president of the Federal Reserve Bank of Atlanta, claims that requiring the banks it regulates to follow GAAP while simultaneously circumventing GAAP for its own financial statements calls the Fed's credibility and commitment to transparency into question (Ford and Todd 2011). Mr. Ford also noted in 2011 that a 1% increase in interest rates could lower the value of the Fed's security portfolio by $100 Billion. If such a decline were recognized in income, then the loss could cause retained earnings to be negative and raise questions about the Fed's solvency (Melloan 2011). Furthermore, FOMC meeting minutes show that multiple Fed officials discussed how a substantial decline in remittances to the U.S. Treasury could lead to adverse public opinion and harm Fed credibility and effectiveness (Christensen et al 2015, Irwin 2015).

[10] I focus on the Fed's U.S. Treasury notes and bonds for multiple reasons. First, Fed holdings of other U.S. Treasury securities including U.S. Treasury bills and Treasury Inflation Protected Securities (TIPS) are minimal (see Appendix). Similarly, I do not consider the Fed's portfolio of mortgage backed securities (MBS) because the Fed did not possess any such securities for the 55% of my sample before the financial crisis. Second, U.S. Treasury bills, TIPS, and MBS are differentially sensitive to changes in interest rates compared to U.S. Treasury notes and bonds due to different durations, convexity, and inflation compensation features.

[11] See the daily U.S. Treasury yield curve at http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield.

[12] My estimate of the weighted-average coupon rate requires multiple assumptions. First, I assume that Fed operating expenses and the amount of Fed earnings retained to ensure a level of retained earnings at least as large as capital paid-in are steady across time. This assumption is reasonable because prior research shows that Fed remittances to the U.S. Treasury as a

I have now condensed the Fed's U.S. Treasury notes and bonds into a single synthetic U.S. Treasury. In the example, the Fed's U.S. Treasury notes and bonds as of January 25, 2018 could be approximated by a single U.S. Treasury security with a face value of $2.320 Trillion, a duration of 6.19 years, a yield to maturity of 2.49%, and a coupon rate of 1.77%. I discount the remaining cash flows on the synthetic U.S. Treasury with semi-annual coupon payments to generate an estimate of the fair value of the Fed's U.S. Treasury notes and bonds on the H.4.1 release date (*TREASFV*) as follows:

$$TREASFV = \left[\frac{TREASBV * COUPON}{2}\right]\left[\frac{1-\left(1+\frac{YTM}{2}\right)^{(-2*DURATION)}}{\frac{YTM}{2}}\right]+\frac{TREASBV}{\left(1+\frac{YTM}{2}\right)^{(2*DURATION)}}$$

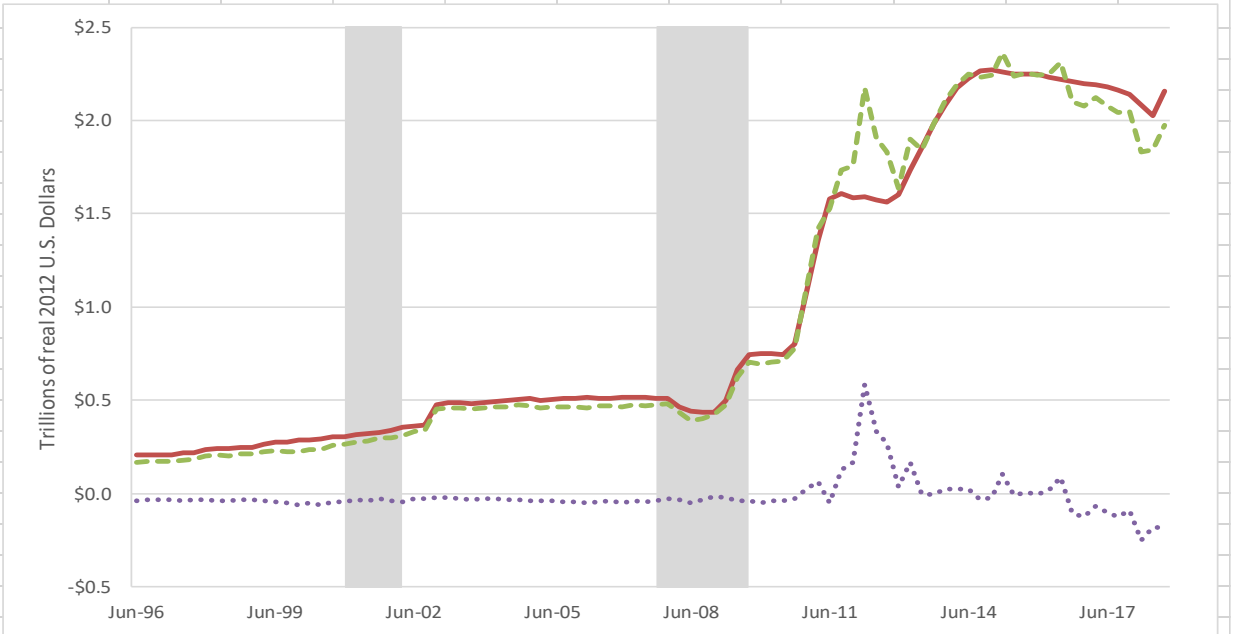
Using the values in the example above, I estimate the fair value of the Fed's U.S. Treasury notes and bonds on January 25, 2018 at $2.225 Trillion. Subtracting *TREASBV* from *TREASFV* yields an estimate of the unrealized gain (loss) on the Fed's U.S. Treasury notes and bonds (*UGLTREAS*). In this example, *UGLTREAS* = *TREASFV* – *TREASBV* = $2.225 Trillion - $2.320 Trillion = ($0.095 Trillion) which indicates the Fed was in an unrealized loss position.

The $0.095 Trillion ($95 Billion) unrealized loss in the example is economically significant. For example, the $95 Billion unrealized loss exceeds the $80 Billion of total Fed profit remittances to the U.S. Treasury during all of 2017 (Board of Governors of the Federal Reserve System 2017). Additionally, the Appendix shows that the Fed is thinly capitalized with retained earnings of only $10 Billion. Thus, if the unrealized loss were to be recognized in earnings, the loss would cause retained earnings to be negative and potentially call the Fed's solvency into question (Rudebusch 2011, Archer and Moser-Boehm 2013, Bilkre 2016).

Descriptive Statistics

Figure 1

The Federal Reserve's Portfolio of U.S. Treasuries



This figure plots variables published in or derived from Federal Reserve Release H.4.1 *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks* . The solid line (*TREASBV*) denotes the book value of the Federal Reserve's holdings of U.S. Treasury notes and bonds disclosed in Federal Reserve Release H.4.1. The dashed line (*TREASFV*) denotes an estimate of the fair value of the Federal Reserve's holdings of U.S. Treasury notes and bonds (see Section IV for further discussion). The dotted line (*UGLTREAS*) denotes unrealized gains (losses) on the Federal Reserve's holdings of U.S. Treasury notes and bonds, i.e. *UGLTREAS* = *TREASFV* - *TREASBV*.

The sample period begins on June 30, 1996 and ends on September 30, 2018. All amounts are in trillions of real 2012 U.S. Dollars. Shaded regions denote recessions as defined by the National Bureau of Economic Research.

percentage of interest income are stable (Carpenter et al. 2015). Second, I assume that rates of return on the Fed's different asset classes are the same because the Fed does not publish income by asset class. Any noise introduced through these assumptions should bias against finding empirical results.

Figure 1 plots the time series behavior of the book value of the Fed's U.S. Treasury notes and bonds (*TREASBV*), the fair value of the Fed's U.S. Treasury notes and bonds (*TREASFV*), and the unrealized gains and losses on the Fed's U.S. Treasury notes and bonds (*UGLTREAS*). Each variable has been converted from trillions of nominal dollars into trillions of real (i.e. inflation adjusted) 2012 dollars dividing by the implicit GDP price deflator from the Bureau of Economic Analysis (BEA).[13] Each variable demonstrates significant time series variation over the sample period. For example, the book value of Fed's U.S. Treasury notes and bonds was relatively stable from 1996 until 2007. However, the Fed's U.S. Treasury portfolio increased rapidly as a result of actions taken during the financial crisis. Specifically, the Fed engaged in significant asset purchases around November 2008 (the first round of quantitative easing known as "QE1") and then again around November 2010 ("QE2") and September 2012 ("QE3"). As of January 24, 2018, the Fed held $2.320 Trillion of U.S. Treasury notes and bonds (see Appendix) which equated to approximately 16% of all U.S. federal debt held by the public.

The fair value of the Fed's U.S. Treasury notes and bonds also exhibits significant time series variation as the book value, the duration, the yield to maturity, and the coupon rates of the Fed's securities all vary over the sample period. *UGLTREAS* varies over the sample as well, particularly in the post-financial crisis period when the book value and average duration of the Fed's U.S. Treasury portfolio was increasing and when interest rates were more volatile. The Fed was generally in an unrealized gain position in the post-financial crisis period until interest rates began to rise in 2016. The increased interest rates induced significant unrealized losses, consistent with academic research and anecdotal evidence warning of possible losses once inflation and interest rates rise as the economy recovers (Carpenter et al. 2015, Greenlaw et al. 2013, Christensen et al. 2015, Bilkre 2016).

Finally, the economic magnitude and variation in *UGLTREAS* suggests that the Fed's policy of reporting U.S. Treasury values at cost significantly reduces income statement volatility for the Fed. Thus, while the Fed claims to report securities at cost because fair values are irrelevant to Fed operations, reporting U.S. Treasury values at cost may also be a strategic choice by the Fed in order to opportunistically avoid political pressure and financial market disturbances from reporting negative income or retained earnings.

The results in this section are subject to caveats. First, constructing counterfactuals (e.g. estimating amounts the Federal Reserve would have reported under financial accounting standards closer to U.S. GAAP) is difficult and requires assumptions. Second, Fed behavior might be different if it followed financial accounting standards closer to GAAP. For example, the Fed may not remit as large of a percentage of its profits to the U.S. Treasury if it suffered the higher income volatility associated with fair value accounting. Thus, my results cannot normatively identify which financial reporting standards are socially optimal for a central bank.

V. Predicting Macroeconimc Outcomes

The results in Section III suggest that equity market volume and return volatility are abnormally high on days that the Federal Reserve issues Release H.4.1, consistent with market participants using the Fed's consolidated balance sheet in some capacity. Additionally, the results in Section IV suggest that the fair values of the Fed's U.S. Treasury securities can differ materially from the cost amounts reported on the Fed's consolidated balance sheet within Release H.4.1. In this section, I examine whether market participants can use unrealized gains and losses on the Fed's U.S. Treasury notes and bonds to improve predictions about future macroeconomic outcomes.

I begin by estimating the following baseline inflation forecasting regression:

$$INF_t = \beta_0 + \beta_1 INF_{t-1} + \beta_2 FORECASTINF_t + \beta_3 LEI_t + \beta_4 EARN_t + \varepsilon_t \quad (2)$$

Where INF_t denotes the annualized percent growth in the BEA GDP price deflator from quarter t-1 to t. $FORECASTINF_t$ denotes the consensus forecast of inflation for quarter t from the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters (SPF).[14] LEI_t denotes the annualized percentage change in the Conference Board's index of leading economic indicators from month j-4 to month j-1 where month j is the month prior to the end of quarter t.[15] $EARN_t$ denotes the percentage change in aggregate Compustat earnings from quarter t-2 to t-1.[16]

[13]GDP price deflator data are available on the Federal Reserve Bank of St. Louis FRED website at https://fred.stlouisfed.org/series/GDPDEF.

[14] SPF data is available at https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/historical-data/mean-forecasts.

[15] Index of leading economic indicators data is available for purchase at https://www.conference-board.org/.

[16] In order to calculate *EARN*, I begin with the population of calendar year-end firms on the Compustat quarterly file with non-missing net income, sales, shares outstanding, and share price data that announced earnings within 90 days of the quarter end. For each firm, I calculate the change in quarterly net income from four quarters ago and scale the result by the firm's sales from four quarters ago. For a given quarter, I then weight each firm observation by the firm's market value of equity at the end of the prior quarter to arrive at *EARN*.

The independent variables in the baseline specification are motivated by prior research. First, I include the lag of inflation because prior research suggests that complicated macroeconomic forecasting models often fail to outperform simple autoregressive time series models (Chauvet and Potter 2013, Faust and Wright 2013). Second, I include SPF forecasts because prior research shows that macro forecasts are relatively accurate, and human forecasts which involve judgement outperform models which rely strictly on macroeconomic indicators (Konchitchki and Patatoukas 2014a, Gallo et al. 2016, Chauvet and Potter 2013, Faust and Wright 2013). Third, I include the Conference Board's index of leading economic indicators because the index summarizes ten variables which may contain predictive power for the path of the economy while reducing multicollinearity. For example, the index contains the term structure of interest rates (i.e. the spread between the yield on 10-year U.S. Treasuries and the federal funds rate) which can predict inflation and GDP growth (Konchitchki and Patatoukas 2014a, Ang et al. 2006, Haubrich and Dombrosky 1996, Kozicki 1997). The index also contains S&P 500 index levels, and aggregate returns have been shown to explain future macroeconomic outcomes (Konchitchki and Patatoukas 2014a). The index of leading economic indicators also includes other high-profile indicators (e.g. initial unemployment claims, consumer sentiment, and building permits for new houses). Fourth, I include growth in aggregate Compustat earnings because aggregate earnings growth has been shown to predict future monetary policy actions and future real GDP growth (Konchitchki and Patatoukas 2014a, Patatoukas 2015, Gallo et al. 2016).

Note, regression model (2) and all subsequent models are fully implementable (i.e. all independent variables are publicly available before the release of the dependent variable). For example, the "advance" (i.e. first) estimate of inflation and real GDP growth for the quarter ending December 31, 2017 was released by the BEA on January 26, 2018. SPF forecasts of inflation and real GDP growth for the quarter ending December 31, 2017 were released on November 13, 2017. *LEI* was the annualized percentage change in the index of leading economic indicators from August 31, 2017 to November 30, 2017 (both publicly available by December 31, 2017). *EARN* was the annualized percentage change in aggregate Compustat earnings from June 30, 2017 to September 30, 2017 (the last fiscal quarter where earnings are publicly available before the advance BEA release).

Next, I modify the baseline inflation forecasting model to incorporate unrealized gains and losses on the Fed's U.S. Treasury notes and bonds. As described above in Section IV, if Fed accounting policies and financial reporting outcomes are truly irrelevant when making monetary policy decisions as the Fed claims, then unrealized gains and losses on the Fed's U.S. Treasury portfolio may have no predictive power for future macroeconomic outcomes. On the other hand, if unrealized gains or losses on the Fed's U.S. Treasury holdings correspond to periods where the Fed is constrained by political costs, then such unrealized gains and losses may improve predictions about future macroeconomic outcomes. For example, the Fed may be reluctant to sell securities that are in an unrealized loss position because recognition of the loss on sale could reduce or eliminate remittances to the U.S. Treasury, increase the national deficit, disrupt financial markets, invite negative press, and result in increased political oversight of the Fed. If the Fed sells fewer securities than it otherwise would have in order to reduce the risk of political costs, then the federal funds rate may remain below the socially optimal level. In turn, the stimulative effect may increase real GDP growth and inflation in future periods (i.e. a negative association between *UGLTREAS* and future inflation and real GDP growth may exist). The augmented inflation forecasting model is as follows:

$$INF_t = \beta_0 + \beta_1 INF_{t-1} + \beta_2 FORECASTINF_t + \beta_3 LEI_t + \beta_4 EARN_t + \beta_5 UGLTREAS_t + \varepsilon_t \quad (3)$$

Where $UGLTREAS_t$ represents the unrealized gain (loss) on the Fed's U.S. Treasury notes and bonds as of week *i* where week *i* contains the latest Release H.4.1 issued before the BEA's advance release of inflation and real GDP growth for quarter *t*. For example, for the Q4 2017 advance estimate of inflation and real GDP growth released by the BEA on January 26, 2018, *UGLTREAS* was the unrealized gain (loss) on the Fed's U.S. Treasury notes and bonds within Release H.4.1 issued on January 25, 2018.

Finally, I estimate baseline and augmented forecasting regressions for real GDP growth:

$$GDP_t = \beta_0 + \beta_1 GDP_{t-1} + \beta_2 FORECASTGDP_t + \beta_3 LEI_t + \beta_4 EARN_t + \varepsilon_t \quad (4)$$

$$GDP_t = \beta_0 + \beta_1 GDP_{t-1} + \beta_2 FORECASTGDP_t + \beta_3 LEI_t + \beta_4 EARN_t + \beta_5 UGLTREAS_t + \varepsilon_t \quad (5)$$

Where GDP_t denotes the annualized percent growth in real GDP from quarter *t*-1 to *t*.[17] $FORECASTGDP_t$ denotes the consensus SPF forecast of real GDP growth for quarter *t*.

Table 2 presents descriptive statistics for all variables used in regression models (2) through (5). The sample period begins on June 30, 1996 (the first calendar quarter where Federal Release H.4.1 data is available from the Fed's website) and ends on June 30, 2018. Table 2 Panel A shows that inflation averaged 1.886% while SPF forecasts of inflation averaged 1.843%. Real GDP growth averaged 2.483% while SPF forecasts of real GDP

[17] See https://fred.stlouisfed.org/series/A191RL1Q225SBEA

Table 2

Panel A: Descriptive Statistics

Variable	N	Mean	Standard Deviation	Q1	Median	Q3	Phillips-Perron	
INF	90	1.886	0.898	1.359	1.935	2.467	-5.660	***
GDP	90	2.483	2.456	1.500	2.550	3.800	-6.294	***
FORECASTINF	90	1.843	0.444	1.560	1.810	2.150	-4.608	***
FORECASTGDP	90	2.393	1.392	2.160	2.570	3.130	-4.082	***
LEI	90	1.867	7.055	-0.471	2.962	6.537	-3.682	***
EARN	90	0.618	6.088	-0.507	1.216	3.140	-4.613	***
UGLTREAS	90	-0.017	0.100	-0.043	-0.036	-0.024	-3.418	**

Panel B: Univariate Correlations

	INF	*GDP*	*FORECASTINF*	*FORECASTGDP*	*LEI*	*EARN*	*UGLTREAS*
INF		0.03	**0.45**	**0.38**	0.09	**0.25**	**-0.18**
GDP	0.10		0.00	**0.47**	**0.47**	**0.22**	**-0.22**
FORECASTINF	**0.55**	-0.02		0.04	-0.16	0.04	-0.31
FORECASTGDP	**0.42**	**0.64**	0.17		**0.50**	**0.35**	**-0.37**
LEI	0.14	**0.64**	-0.19	**0.74**		**0.37**	-0.09
EARN	0.14	**0.22**	-0.01	**0.34**	**0.41**		**-0.16**
UGLTREAS	-0.06	-0.08	-0.15	-0.08	-0.03	-0.05	

Panel A presents descriptive statistics for the variables included in the regressions predicting inflation and real GDP growth. The Phillips-Perron statistic tests the null hypothesis of a unit root against the alternative hypothesis that the data series is stationary. ***, **, and * represent two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Panel B presents univariate Pearson (Spearman) correlations below (above) the diagonal. Correlations significant at the 5% level are in bold.

The sample begins on June 30, 1996 and ends on June 30, 2018.

INF denotes inflation calculated as the annualized percentage change in the gross domestic product price deflator published by the Bureau of Economic Analysis from quarter t-1 to t.

GDP denotes the annualized percentage change in real gross domestic product published by the Bureau of Economic Analysis from quarter t-1 to t.

FORECASTINF (*FORECASTGDP*) denotes the forecast of inflation (real GDP growth) for quarter t published by the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters.

LEI denotes the annualized percentage change in the index of leading economic indicators published by the Conference Board from month j-4 to month j-1 where month j is the month prior to the end of quarter t.

EARN denotes the percentage change in aggregate Compustat earnings from quarter t-2 to quarter t-1.

UGLTREAS represents the unrealized gain (loss) on the Federal Reserve's portfolio of U.S. Treasury bills, notes, and bonds as of week i where week i contains the latest Federal Reserve balance sheet before the release of inflation and real GDP growth for quarter t.

growth averaged 2.393%. Growth in the index of leading economic indicators (aggregate Compustat earnings) averaged 1.867% (0.618%). The mean *UGLTREAS* value of -0.017 suggests that the Fed was, on average, in an unrealized loss position on its U.S. Treasury notes and bonds of $17 Billion over the sample period. The Phillips-Perron (1988) test statistic is significant for each variable which suggests rejection of the null hypothesis that each variable has a unit root in favor of the alternative hypothesis that each variable is stationary. Table 2 Panel B provides univariate correlations. SPF forecasts, the index of leading economic indicators, and aggregate Compustat earnings are generally pro-cyclical economic indicators. Overall, all descriptive statistics and plots appear reasonable and consistent with prior research.

Table 3 presents the results for the baseline and augmented inflation forecasting models.I generate parameter estimates for models (2) through (5) using a sample period which begins on June 30, 1996 and ends on September 30, 2015. I then use a holdout sample which begins on December 30, 2015 and ends on June 30, 2018 to forecast inflation and real GDP growth out of sample and calculate the root mean squared forecast error. Using a holdout sample is important because macroeconomic forecasting models with high in-sample fit often fail to have predictive power out of sample (e.g. due to data overfitting) (Faust and Wright 2013). My holdout sample contains three full years and includes quarters with high real GDP growth (e.g. Q2 2018 real GDP growth of 4.2%), low real GDP growth (Q4 2015 real GDP growth of 0.4%), high inflation (Q2 2018 inflation of 2.2%) and low inflation (Q1 2016 inflation of 0.4%). Table 3 Panel A shows that three of the four economic indicators within baseline

Table 3

Predicting Inflation

Panel A: In-Sample Coefficients					
	Model (2)			Model (3)	
N	77			77	
R^2	45.5%			46.1%	
INTERCEPT	-0.301			-0.255	
	(-0.87)			(-0.76)	
INF_{t-1}	0.358	***		0.373	***
	(2.65)			(2.76)	
$FORECASTINF_t$	0.785	**		0.738	**
	(2.47)			(2.31)	
LEI_t	0.032	***		0.031	***
	(3.79)			(3.68)	
$EARN_t$	0.001			0.002	
	(0.58)			(0.84)	
$UGLTREAS_t$				-1.006	**
				(-2.45)	
Panel B: Out-of-Sample Predictability					
Root Mean Squared Forecast Error	1.162			1.020	

This table presents the results of regressions where the dependent variable (INF_t) denotes inflation calculated as the annualized percentage change in the gross domestic product price deflator published by the Bureau of Economic Analysis from quarter t-1 to t.

$FORECASTINF_t$ denotes the forecast of inflation for quarter t published by the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters.

LEI_t denotes the annualized percentage change in the index of leading economic indicators published by the Conference Board from month j-4 to month j-1 where month j is the month prior to the end of quarter t.

$EARN_t$ denotes the percentage change in aggregate Compustat earnings from quarter t-2 to quarter t-1.

$UGLTREAS_t$ represents the unrealized gain (loss) on the Federal Reserve's portfolio of U.S. Treasury bills, notes, and bonds as of week i where week i contains the latest Federal Reserve balance sheet before the release of inflation and real GDP growth for quarter t.

Panel A presents parameter estimates generated using a sample period which begins on June 30, 1996 and ends on September 30, 2015. Panel B presents the root mean squared forecast error from a hold out sample which begins on December 30, 2015 and ends on June 30, 2018.

t-statistics are based on Newey-West (1987) standard errors to control for potential autocorrelation in the residuals. ***, **, and * represent two-tailed significance at the 1%, 5%, and 10% levels, respectively.

regression model (2) contain explanatory power for one-quarter ahead inflation. First, the positive and significant coefficient on the lag of inflation of 0.358 is consistent with inflation following an autoregressive process. Second, the positive and significant coefficient on the SPF forecast of inflation of 0.785 is consistent with prior research that shows that professional macro forecasters demonstrate at least some ability to predict future macroeconomic outcomes (e.g. Konchitchki and Patatoukas 2014a, Gallo et al. 2016). Third, the positive and significant coefficient on *LEI* suggests that growth in the basket of variables summarized by the Conference Board's index of leading economic indicators contains predictive power for one-quarter ahead inflation. Aggregate growth in Compustat earnings is not significant in model (2), which may be due to any explanatory power being subsumed by other higher frequency data in the model. For example, aggregate GAAP earnings are available only quarterly with a lag, whereas the index of leading economic indicators is a monthly variable and available with less of a lag. Relatedly, the predictive power of *LEI* in the presence of SPF forecasts does not necessarily imply that professional macro forecasters fail to fully incorporate publicly available signals into their forecasts because of differences in data frequency and the timing of forecasts (e.g. a realization of the index of leading economic indicators is available after SPF forecasts are made but before advance estimates of inflation and real GDP growth are announced).

Table 3 Panel A shows that lagged inflation, SPF forecasts of inflation, and the index of leading economic indicators continue to predict future inflation within the augmented specification in model (3). Turning to the variable of interest, the coefficient on *UGLTREAS* is negative and significant at the 5% level. The interpretation is that a $1 Trillion unrealized gain (loss) position on the Fed's U.S. Treasury notes and bonds is associated with 1.006% lower (higher) one-quarter ahead inflation. Moreover, Table 3 Panel B shows that the root mean squared forecast error is lower in model (3) compared to model (2). This suggests that incorporating unrealized gains (losses) on the Fed's U.S. Treasury notes and bonds increases in-sample fit and reduces errors from out-of-sample inflation forecasts. Overall, the results in Table 3 suggest that recasting the Fed's balance sheet to incorporate unrealized gains and losses on its U.S. Treasury notes and bonds can help improve forecasts of inflation.

Table 4 presents the results for the baseline and augmented real GDP growth forecasting models. Table 4 Panel A shows that SPF forecasts and growth in the index of leading economic indicators are positively associated with future real GDP growth in the baseline model (similar to the inflation results in Table 3). Turning to the augmented specification in model (5), the coefficient on *UGLTREAS* is negative and significant. The interpretation is that a $1 Trillion unrealized gain (loss) position on the Fed's U.S. Treasury notes and bonds is associated with 5.003% lower (higher) one-quarter ahead real GDP growth. While the results in Table 4 Panel A suggest that incorporating unrealized gains (losses) on the Fed's U.S. Treasury notes and bonds increases in-sample fit for real

GDP growth, Table 4 Panel B suggests that the increased explanatory power fails to translate to more accurate out-of-sample forecasts. Overall, the results in Table 4 suggest that recasting the Fed's balance sheet to incorporate unrealized gains and losses on its U.S. Treasury notes and bonds can help improve forecasts of real GDP growth.

Table 4

Predicting Real GDP Growth

Panel A: In-Sample Coefficients

	Model (4)		Model (5)	
N	77		77	
R^2	49.8%		51.5%	
INTERCEPT	0.798	*	0.795	**
	(1.98)		(2.23)	
GDP_{t-1}	-0.080		-0.097	*
	(-1.28)		(-1.70)	
$FORECASTGDP_t$	0.719	***	0.710	***
	(7.39)		(6.83)	
LEI_t	0.150	***	0.153	***
	(11.23)		(11.06)	
$EARN_t$	-0.031		-0.026	
	(-1.46)		(-1.13)	
$UGLTREAS_t$			-5.003	**
			(-2.08)	

Panel B: Out-of-Sample Predictability

Root Mean Squared Forecast Error	1.190		1.541	

This table presents the results of regressions where the dependent variable (GDP_t) denotes the annualized percentage change in real gross domestic product published by the Bureau of Economic Analysis from quarter t-1 to t.

$FORECASTINF_t$ denotes the forecast of inflation for quarter t published by the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters.

LEI_t denotes the annualized percentage change in the index of leading economic indicators published by the Conference Board from month j-4 to month j-1 where month j is the month prior to the end of quarter t.

$EARN_t$ denotes the percentage change in aggregate Compustat earnings from quarter t-2 to quarter t-1.

$UGLTREAS_t$ represents the unrealized gain (loss) on the Federal Reserve's portfolio of U.S. Treasury bills, notes, and bonds as of week i where week i contains the latest Federal Reserve balance sheet before the release of inflation and real GDP growth for quarter t.

Panel A presents parameter estimates generated using a sample period which begins on June 30, 1996 and ends on September 30, 2015. Panel B presents the root mean squared forecast error from a hold out sample which begins on December 30, 2015 and ends on June 30, 2018.

t-statistics are based on Newey-West (1987) standard errors to control for potential autocorrelation in the residuals. ***, **, and * represent two-tailed significance at the 1%, 5%, and 10% levels, respectively.

In summary, the results in Tables 3 and 4 suggest that unrealized gains (losses) on the Federal Reserve's U.S. Treasury notes and bonds are associated with lower (higher) one-quarter ahead inflation and real GDP growth. These results help explain the abnormal equity market volume and return volatility on days the Fed issues Release 4.1 documented in Section III. For example, equity market volume and return volatility may be abnormally high on days that the Fed issues Release H.4.1 because market participants use the release to recast the Fed's balance sheet

to quantify unrealized gains (losses) on the Fed's U.S. Treasury portfolio and improve their forecasts about inflation and real GDP growth.

These results also contribute to the macroeconomic and accounting literatures. First, I provide empirical evidence to the debate within the theoretical macroeconomic literature as to whether central bank financial strength and financial reporting outcomes are associated with monetary policy (see Hall and Reis 2015 for a review). More importantly, I contribute to the growing literature in accounting that examines interactions between earnings, asset returns, and the macroeconomy by demonstrating that financial reporting outputs from a single prominent centralized economic decision maker (the Fed) can be used to improve predictions of future inflation and real GDP growth, even after controlling for professional macroeconomic forecasts, a variety of leading economic indicators, and growth in aggregate earnings.

These results are subject to caveats. First, I can only demonstrate that unrealized gains (losses) on the Fed's U.S. Treasury notes and bonds contain predictive power for macroeconomic outcomes within the models that I estimate. I cannot demonstrate that the predictive power holds in every class of model from the macroeconomics literature (e.g. neural network models) or in the presence of every possible combination of macroeconomic indicators. Second, I only forecast inflation and real GDP growth for one-quarter ahead. Future research may be able to provide insights over longer horizons. Finally, my sample period contains the financial crisis, and I cannot rule out the unique nature of the crisis period as a contributing factor to the results. However, Table 1 shows that equity market volume was abnormally high on days that the Fed issued Release H.4.1 during the pre-financial crisis period. This result is consistent with the Fed's balance sheet conveying value relevant information even during non-crisis periods. Moreover, the Fed's U.S. Treasury portfolio is likely to remain large by historical standards for years or even decades as a result of security purchases during the financial crisis (Carpenter et al. 2015). Thus, the economic implications of my results are likely to persist (i.e. market participants may use unrealized gains and losses on the Fed's U.S. Treasury portfolio to improve their forecasts of inflation and real GDP growth for many years to come).

VI. Macroeconomic News and Returns

The results in Section V suggest that unrealized gains (losses) on the Federal Reserve's U.S. Treasury notes and bonds contain predictive power for the path of the macroeconomy. A natural follow-up question is whether market participants understand this predictive power. The results in Section III show that equity market volume and return volatility are abnormally high on days that the Fed issues Release H.4.1, consistent with market participants using the release to recast the Fed's consolidated balance sheet to quantify unrealized gains (losses) on the Fed's U.S. Treasury portfolio and improve their forecasts about inflation and real GDP growth. In this section, I further investigate whether market participants understand the predictive power by estimating aggregate analogs to "earnings response coefficient" specifications.

Earnings response coefficient (ERC) tests regress a measure of firm returns in the short window around a firm's earnings announcement on the firm's "unexpected earnings" (e.g. analyst forecast errors or residuals from a time series model). The economics literature has adopted a similar approach by regressing aggregate market returns in the short window around the release of a macroeconomic indicator on the "news" component (i.e. the residual from a forecasting model). Despite theoretical research linking macroeconomic variables with returns, the empirical literature has generally failed to identify positive slope coefficients (e.g. Flannery and Protopapadakis 2002, Patatoukas 2015). In other words, prior research surprisingly fails to find that the equity market reacts when inflation and real GDP growth realizations are higher or lower than expected.

I contribute to the literature examining this empirical puzzle by incorporating the predictive power of unrealized gains and losses on the Fed's U.S. Treasury notes and bonds. The results in Section V suggest that considering unrealized gains and losses on the Fed's U.S. Treasury securities can improve predictions about future inflation and real GDP growth. Using more accurate forecasts should reduce the measurement error in the news term and increase the slope coefficient and explanatory power of the model (Kothari 2001). Accordingly, I estimate the following regressions:

$$\mathbf{RETURN_t = \varphi_0 + \varphi_1 INFNEWS1_t + \varphi_2 GDPNEWS1_t + \varphi_3 INFNEWS1_t * GDPNEWS1_t + \varepsilon_t} \quad \mathbf{(6)}$$

$$\mathbf{RETURN_t = \Theta_0 + \Theta_1 INFNEWS2_t + \Theta_2 GDPNEWS2_t + \Theta_3 INFNEWS2_t * GDPNEWS2_t + \varepsilon_t} \quad \mathbf{(7)}$$

Where $RETURN_t$ denotes the return on the CRSP value weighted index on the day the BEA releases its advance estimate of inflation and real GDP growth for quarter *t*. $INFNEWS1_t$ equals negative one multiplied by the residual for quarter *t* from the baseline inflation forecasting regression in model (2) in Table 3. $INFNEWS2_t$ equals negative one multiplied by the residual for quarter *t* from the augmented inflation forecasting regression in model (3) in Table 3 that incorporates unrealized gains and losses on the Fed's U.S. Treasury notes and bonds. Positive (negative) inflation news denotes good (bad) news, i.e. quarters where inflation was lower (higher) than predicted

by the model. $GDPNEWS1_t$ equals the residual for quarter t from the baseline real GDP growth forecasting regression in model (4) in Table 4. $GDPNEWS2_t$ equals the residual for quarter t from the augmented real GDP growth forecasting regression in model (5) in Table 4 that incorporates unrealized gains and losses on the Fed's U.S. Treasury notes and bonds. Positive (negative) real GDP growth news denotes good (bad) news, i.e. quarters where real GDP growth was higher (lower) than predicted by the model.

Models (6) and (7) include two features of note. First, I include both news about inflation and real GDP simultaneously because the BEA discloses the GDP price deflator (the BEA's measure of inflation) and real GDP growth within the same release. Focusing on only one variable at a time (as is common in the literature) could introduce omitted correlated variable bias. Second, I include an interaction because the market's response to news about inflation and real GDP growth may depend on the state of the economy. For example, Boyd et al. (2005)

Table 5

Equity Market Response to Macroeconomic News

	Model (6)		Model (7)	
N	77		77	
R^2	3.4%		7.6%	
INTERCEPT	0.024		-0.049	
	(0.21)		(-0.43)	
$INFNEWS1_t$	-0.162			
	(-1.29)			
$GDPNEWS1_t$	0.021			
	(0.22)			
$INFNEWS1_t$*$GDPNEWS1_t$	0.063			
	(0.62)			
$INFNEWS2_t$			-0.225	
			(-1.00)	
$GDPNEWS2_t$			0.033	
			(0.39)	
$INFNEWS2_t$*$GDPNEWS2_t$			0.258	**
			(2.05)	
Clarke (2003) Statistic: Model (7) vs. Model (6)			50	**

This table presents the results of regressions of short-window aggregate equity market returns on proxies for macroeconomic news. The sample period begins on June 30, 1996 and ends on September 30, 2015.

The dependent variable $RETURN_t$ denotes the return on the Center for Research in Securities Prices value weighted index on the day the Bureau of Economic Analysis releases its advance estimate of inflation and real gross domestic product growth for quarter t.

$INFNEWS1_t$ equals negative one multiplied by the residual for quarter t from the baseline inflation forecasting regression in model (2) in Table 3. $INFNEWS2_t$ equals negative one multiplied by the residual for quarter t from the augmented inflation forecasting regression in model (3) in Table 3 that incorporates unrealized gains and losses on the Fed's U.S. Treasury portfolio. Positive (negative) inflation news denotes good (bad) news, i.e. quarters where inflation was lower (higher) than predicted by the model.

$GDPNEWS1_t$ equals the residual for quarter t from the baseline real GDP growth forecasting regression in model (4) in Table 4. $GDPNEWS2_t$ equals the residual for quarter t from the augmented real GDP growth forecasting regression in model (5) in Table 4 that incorporates unrealized gains and losses on the Fed's U.S. Treasury portfolio. Positive (negative) real GDP growth news denotes good (bad) news, i.e. quarters where real GDP growth was higher (lower) than predicted by the model.

The Clarke (2003) test statistic reflects the number of observations where the log-likelihood is higher for model (7) compared to model (6). A statistically significant test statistic rejects the null hypothesis that both models are equally close to the true model in favor of the alternative hypothesis that model (7) is closer to the true model than model (6).

t-statistics are based on Newey-West (1987) standard errors to control for potential autocorrelation in the residuals. ***, **, and * represent two-tailed significance at the 1%, 5%, and 10% levels, respectively.

find that rising unemployment can be bad news in recessions (e.g. the economy has not "bottomed out") but good news in expansions (e.g. there is no need for the Fed to raise interest rates).

Table 5 shows that none of the coefficients are statistically significant within model (6). Thus, I fail to find an equity market response to news about inflation, news about real GDP growth, or an interaction between the two when using the baseline forecasting models. These results are consistent with a literature which finds that detecting a market reaction to macroeconomic news is difficult (Flannery and Protopapadakis 2002). Within model (7), neither main effect is statistically significant, but the interaction coefficient is positive and significant. Thus, the market appears to respond favorably (unfavorably) when news about both inflation and real GDP growth was good (bad). The R^2 over doubles from 3.4% in model (6) to 7.6% in model (7), and the significant Clarke (2003) statistic suggests rejection of the null hypothesis that both models are equally close to the true model in favor of the alternative hypothesis that model (7) is closer to the true model than model (6). Overall, these results suggest that modifying proxies for macroeconomic news to incorporate the predictive value of unrealized gains and losses on the Fed's U.S. Treasury notes and bonds helps explain equity returns around the release of macroeconomic data. Collectively, my results suggest that market participants understand the predictive power of unrealized gains and losses on the Fed's U.S. Treasury portfolio with respect to inflation and real GDP growth and use that information when forming their expectations about future macroeconomic outcomes.

These results are subject to caveats. First, I'm unable to determine whether market participants' response to unrealized gains and losses on the Fed's U.S. Treasury portfolio is complete and fully rational. If the market's response is incomplete, then future research may examine whether informed investors can construct a profitable trading rule. Second, I'm only examining short window returns around a single release of two signals (inflation and real GDP growth). Future research may examine return behavior around the release of other macroeconomic indicators and long-window return associations (e.g. whether unrealized gains and losses on the Fed's U.S. Treasury portfolio are correlated with a priced risk factor).

VII. Conclusion

This study investigates whether the U.S. Federal Reserve's balance sheet can be used to predict macroeconomic outcomes. I demonstrate that aggregate equity market volume and return volatility are abnormally high on days the Federal Reserve releases its balance sheet, consistent with the Fed's balance sheet conveying useful information to market participants. The Fed's balance sheet is unique because unlike publicly traded companies (including the banks that the Fed regulates), the regional Federal Reserve Banks do not follow Generally Accepted Accounting Principles (GAAP). Instead, the regional Federal Reserve Banks follow standards created by the Board of Governors which differ from GAAP in material respects. I recast portions of the Federal Reserve's weekly balance sheet as if it more closely followed GAAP. Specifically, I estimate the fair value of the Fed's U.S. Treasury notes and bonds and calculate the associated unrealized gains and losses. I demonstrate that unrealized gains (losses) on the Federal Reserve's U.S. Treasury notes and bonds are associated with lower (higher) one-quarter ahead inflation and real GDP growth. Additionally, I show that modifying proxies for macroeconomic news to incorporate the predictive value of unrealized gains and losses on the Fed's U.S. Treasury notes and bonds helps explain equity returns around the release of macroeconomic data. Collectively, my results suggest that market participants understand the predictive power of unrealized gains and losses on the Fed's U.S. Treasury portfolio and use that information when forming their expectations about inflation and real GDP growth.

These results should be of interest to researchers and capital market participants. First, I contribute to the "Fed watching" literature by demonstrating that high frequency Fed disclosures provide value relevant information for market participants. Second, I contribute to the economic forecasting literature and the growing literature in accounting which examines interactions between earnings, asset returns, and the macroeconomy by demonstrating that financial reporting outputs from a single prominent centralized economic decision maker (the Fed) can be used to improve predictions of future inflation and real GDP growth. Finally, I contribute to the ongoing debate about the Federal Reserve's structure and independence by providing empirical evidence consistent with the Fed considering political costs when making monetary policy decisions.

References

Abdalla, A., and J.M. Carabias. 2022. From Accounting to Economics: The Role of Aggregate Special Items in Gauging the State of the Economy. *The Accounting Review* 97: 1-27.

Ang, A., M. Piazzesi, and M. Wei. 2006. What Does the Yield Curve Tell Us About Real GDP Growth? *Journal of Econometrics* 131: 359-403.

Anilowski, C., M. Feng, and D.J. Skinner. 2007. Does Earnings Guidance Affect Market Returns? The Nature and Information Content of Aggregate Earnings Guidance. *Journal of Accounting and Economics* 44: 36-63.

Applebaum, B. 2015. In Republican Attacks on the Fed, Experts See a Shift. *The New York Times* April 7, 2015.

Archer, D., and P. Moser-Boehm. 2013. Central Bank Finances. *Bank for International Settlement Papers* 71: 1-89.

Ball, R. 2001. Infrastructure Requirements for an Economically Efficient System of Public Financial Reporting and Disclosure. *Brookings-Wharton Papers on Financial Services* 2001: 127–169.

Ball, R., and G. Sadka. 2015. Aggregate Earnings and Why They Matter. *Journal of Accounting Literature* 34: 39-57.

Ball, R., G. Sadka, and R. Sadka. 2009. Aggregate Earnings and Asset Prices. *Journal of Accounting Research* 47: 1097-1133.

Ball, R.T., L.A. Gallo, and E.G. Ghysels. 2019. Tilting the Evidence: The Role of Firm-Level Earnings Attributes in the Relation Between Aggregated Earnings and Gross Domestic Product. *Review of Accounting Studies* 24: 570-592.

Beaver, W.H. 1968. The Information Content of Annual Earnings Announcements. *Journal of Accounting Research* 6: 67-92.

Bernanke, B.S., and A.S. Blinder. 1992. The Federal Funds Rate and the Channels of Monetary Transmission. *American Economic Review* 82: 901-921.

Bernanke, B.S., and M. Gertler. 1995. Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives* 9: 27-48.

Bernanke, B.S., and K.N. Kuttner. 2005. What Explains the Stock Market's Reaction to Federal Reserve Policy? *Journal of Finance* 60: 1221-1257.

Berriel, T.C., and S. Bhattarai. 2009. Monetary Policy and Central Bank Balance Sheet Concerns. *The B.E. Journal of Macroeconomics* 9: 1-31.

Bilkre, J. 2016. The Federal Reserve's $4.3 Trillion Ticking Time Bomb. *Yahoo Finance* May 27, 2016.

Binder, S., and M. Spindel. 2015. Congress and the Federal Reserve: Independence and Accountability. *Congress and Policy Making in the 21st Century* Cambridge University Press.

Board of Governors of the Federal Reserve System. 2005. *The Federal Reserve System: Purposes and Functions*. Washington, D.C.

Board of Governors of the Federal Reserve System. 2015. *Financial Accounting Manual for Federal Reserve Banks*. Washington, D.C.

Board of Governors of the Federal Reserve System. 2017. *104th Annual Report*. Washington, D.C.

Bonsall, S.B., Z. Bozanic, and P.E. Fischer. 2013. What Do Management Earnings Forecasts Convey About the Macroeconomy? *Journal of Accounting Research* 51: 225-266.

Boyd, J.H., J. Hu, and R. Jagannathan. 2005. The Stock Market's Response to Unemployment News: Why Bad News is Usually Good News for Stocks. *Journal of Finance* 60: 649-672.

Carpenter, S., J. Ihrig, E. Klee, D. Quinn, and A. Boote. 2015. The Federal Reserve's Balance Sheet and Earnings: A Primer and Projections. *International Journal of Credit and Banking* 11: 237-283.

Chauvet, M., and S. Potter. 2013. Forecasting Output. *Handbook of Economic Forecasting* 2: 141-194.

Christensen, J.H.E., J.A. Lopez, and G.D. Rudebusch. 2015. A Probability-Based Stress Test of Federal Reserve Assets and Income. *Journal of Monetary Economics* 73: 26-43.

Clarke, K.A. 2003. Nonparametric Model Discrimination in International Relations. *Journal of Conflict Resolution* 47: 72-93.

Crawley, M.J. 2015. Macroeconomic Consequences of Accounting: The Impact of Accounting Conservatism on Macroeconomic Indicators and the Money Supply. *The Accounting Review* 90: 987-1011.

Cready, W.M., and U.G. Gurun. 2010. Aggregate Market Reaction to Earnings Announcements. *Journal of Accounting Research* 36: 289-334.

Del Negro, M., and C.A. Sims. 2015. When Does a Central Bank's Balance Sheet Require Financial Support? *Journal of Monetary Economics* 73: 1-19.

Faust, J., and J.H. Wright. 2013. Forecasting Inflation. *Handbook of Economic Forecasting* 2: 2-56.

Flannery, M.J., and A.A. Protopapadakis. 2002. Macroeconomic Factors Do Influence Aggregate Stock Returns. *Review of Financial Studies* 15: 751-782.

Ford, W.F., and W.F. Todd. 2011. Increasing Transparency at the Federal Reserve. *Forbes* May 6, 2011.

Gaertner, F.B., A. Kausar, and L.B. Steele. 2020. Negative Aggregate Earnings and Gross Domestic Product. *Review of Accounting Studies* 25: 1382-1409.

Gallo, L.A., R.N. Hann, and C. Li. 2016. Aggregate Earnings Surprises, Monetary Policy, and Stock Returns. *Journal of Accounting and Economics* 62: 103-120.

Gigler, F., and T. Hemmer. 1998. On the Frequency, Quality, and Informational Role of Mandatory Financial Reports. *Journal of Accounting Research* 36: 117-147.

Gkougkousi, X. 2014. Aggregate Earnings and Corporate Bond Markets. *Journal of Accounting Research* 52: 75-106.

Greenlaw, J.D., J.D. Hamilton, P. Hooper, and F.S. Mishkin. 2013. Crunch Time: Fiscal Crises and the Role of Monetary Policy. Working Paper, National Bureau of Economic Research.

Hall, R.E., and R. Reis. 2015. Maintaining Central-Bank Financial Stability under New-Style Central Banking. Working Paper, National Bureau of Economic Research.

Haltom, R.C. 2011. Stigma and the Discount Window. *Federal Reserve Bank of Richmond Region Focus* First Quarter 2011: 6-8.

Hamilton, J. 2008. The Federal Reserve's Balance Sheet. [Web log post dated October 25, 2008]. Retrieved from http://econbrowser.com/archives/2008/10/the_federal_res.

Hann, R.N., C. Li, and M. Ogneva. 2021. Another Look at the Macroeconomic Information Content of Aggregate Earnings: Evidence from the Labor Market. *The Accounting Review* 96: 365-390.

Haubrich, J.G., and A.M. Dombrosky. 1996. Predicting Real Growth Using the Yield Curve. *Federal Reserve Bank of Cleveland Economic Review* 1996 Quarter 1: 26-35.

Irwin, N. 2015. The Fed Knew the Economy Was a Disaster in 2009. Here's What They Talked About Instead. *The New York Times* March 4, 2015.

Jorgensen, B., J. Li, and G. Sadka. 2012. Earnings Dispersion and Aggregate Stock Returns *Journal of Accounting and Economics* 53: 1-20.

Kalay, A., S. Nallareddy, and G. Sadka. 2018. Uncertainty and Sectoral Shifts: The Interaction Between Firm-Level and Aggregate-Level Shocks, and Macroeconomic Activity. *Management Science* 64: 198-214.

Kluh, U., and P. Stella. 2008. Central Bank Financial Strength and Policy Performance: An Econometric Evaluation. Working Paper, International Monetary Fund.

Konchitchki, Y., and P.N. Patatoukas. 2014a. Accounting Earnings and Gross Domestic Product. *Journal of Accounting and Economics* 57: 76-88.

Konchitchki, Y., and P.N. Patatoukas. 2014b. Taking the Pulse of the Economy Using Financial Statement Analysis: Implications for Macro Forecasting and Stock Valuation. *The Accounting Review* 89: 669-694.

Kothari, S.P. 2001. Capital Markets Research in Accounting. *Journal of Accounting and Economics* 31: 105-231.

Kozicki, S. 1997. Predicting Real Growth and Inflation With the Yield Spread. *Federal Reserve Bank of Kansas City Economic Review* 1997 Quarter 4: 39-57.

Melloan, G. 2011. The Fed Has Trapped Itself on Interest Rates. *The Wall Street Journal* May 31, 2011.

Nallareddy, S., and M. Ogneva. 2017. Predicting Restatements in Macroeconomic Indicators Using Accounting Information. *The Accounting Review* 92: 151-182.

Newey, W.K., and K.D. West. 1987. A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica* 55: 703-708.

Patatoukas, P. 2014. Detecting News in Aggregate Accounting Earnings: Implications for Stock Market Valuation. *Review of Accounting Studies* 19: 134-160.

Patatoukas, P. 2015. On the Association Between Stock Returns and GDP Growth Forecast Errors: Implications for Interdisciplinary Capital Markets Research in Accounting. Working Paper, University of California at Berkeley.

Phillips, P., and P. Perron. 1988. Testing for a Unit Root in Time Series Regression. *Biometrika* 75: 335-346.

Rosa, C. 2013. The Financial Market Effect of FOMC Minutes. *Federal Reserve Bank of New York Economic Policy Review* December 2013: 67-81.

Rudebusch, G.D. 2011. The Fed's Interest Rate Risk. *Federal Reserve Bank of San Francisco Economic Letter* April 11, 2011: 1-5.

Shivakumar, L., and O. Urcan. 2017. Why Does Aggregate Earnings Growth Reflect Information about Future Inflation? *The Accounting Review* 92: 247-276.

Stella, P. 2005. Central Bank Financial Strength, Transparency, and Policy Credibility. *IMF Staff Papers* 52: 335-365.

Stocken, P.C. 2000. Credibility of Voluntary Disclosure. *RAND Journal of Economics* 31: 359–374.

U.S. House of Representatives. 1913. The Federal Reserve Act [Pub. L. 63–43]. Washington, DC: Government Publishing Office.

Watts, R., and J. Zimmerman. 1986. *Positive Accounting Theory.* Englewood Cliffs, NJ. Prentice Hall.

Waymire, G. 2009. Exchange Guidance is the Fundamental Demand for Accounting. *The Accounting Review* 84: 53-62.

Appendix

Excerpts from Federal Reserve Release H.4.1 Issued January 25, 2018

Item 6: Consolidated Statement of Condition of All Federal Reserve Banks (millions of dollars)

January 24, 2018

Assets		Liabilities	
Gold certificate account	11,037	Federal Reserve notes, net of F.R. Bank holdings	1,559,425
Special drawing rights certificate account	5,200	Reverse repurchase agreements	274,703
Coin	1,923	Deposits	2,559,645
Securities, repurchase agreements, and loans	4,366,351	Term deposits held by depository institutions	0
Securities held outright	4,222,454	Other deposits held by depository institutions	2,182,220
U.S. Treasury securities	2,447,009	U.S. Treasury, General Account	275,963
Bills	0	Foreign official	5,254
Notes and bonds, nominal	2,320,301	Other	96,208
Notes and bonds, inflation-indexed	107,503	Deferred availability cash items	299
Inflation compensation	19,205	Earnings remittances due to the U.S. Treasury	1,500
Federal agency debt securities	4,391	Other liabilities and accrued dividends	4,336
Mortgage-backed securities	1,771,054		
Unamortized premiums on securities held outright	157,925	Total liabilities	4,399,907
Unamortized discounts on securities held outright	-14,082		
Repurchase agreements	0	Capital accounts	
Loans	54	Capital paid in	31,410
Net portfolio holdings of Maiden Lane LLC	1,714	Surplus	10,000
Items in process of collection	81	Other capital accounts	0
Bank premises	2,207		
Central bank liquidity swaps	72	Total capital	41,410
Foreign currency denominated assets	22,071		
Other assets	30,661		
Total assets	4,441,317	Total liabilities and capital	4,441,317

Item 2: Maturity Distribution of U.S. Treasury Securities (millions of dollars)

January 24, 2018

Within 15 Days	27,847
16 Days to 90 Days	80,038
91 Days to 1 Year	317,233
Over 1 Year to 5 Years	1,083,901
Over 5 Years to 10 Years	316,716
Over 10 Years	621,273

This Appendix presents excerpts from Federal Reserve Release H.4.1 *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks* released on January 25, 2018.