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journal homepage: www.elsevier.com/locate/jmeMonetary policy, bond returns and debt dynamics[☆]Antje Berndt^{a,b}, Şevin Yeltekin^{c,*}^a Poole College of Management, NC State University, 2801 Founders Drive, Raleigh, NC 27695, United States^b RSFAS, Australian National University, Australia^c Tepper School of Business, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, United States

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ABSTRACT

Using the government's intertemporal budget constraint, we quantify the contribution of returns paid on the U.S. government's debt portfolio to the evolution of the debt-to-GDP ratio. We show that announcements of unconventional monetary policy measures by the Federal Reserve between 2008.IV and 2012, as a part of macro-economic stabilization, were associated with a sizable increase in returns and debt-to-GDP ratios and contributed to fiscal imbalances. We use the Federal Reserve's portfolio composition as a proxy for unconventional monetary policy measures and show that it is significantly related to future bond returns and fiscal balances.

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1. Introduction

The 2007–2008 financial crisis and subsequent recession have led to unprecedented efforts by the Federal Reserve to stabilize the financial sector and real economy. After driving short-term interest rates to record lows in 2008, the Federal Reserve employed unconventional monetary policy measures such as Quantitative Easing (QE) and Operation Twist (OT) to aid in financial and economic recovery. Just like any other major policy choices, these unconventional measures were associated with important trade-offs: the benefit of financial and economic stabilization versus the potential exposure of the Federal Reserve to income and balance-sheet risks, amongst others.

A growing literature has been investigating certain aspects of these trade-offs. While some papers concentrate on the benefit side and assess whether unconventional monetary policy succeeded in reducing borrowing costs for households and firms, others explore the income and balance-sheet risks facing the Federal Reserve, after its unprecedented large-scale asset purchases.¹ Our contribution is to evaluate the impact of unconventional monetary policy on fiscal balances, an

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¹ See Section 2 for a discussion of this literature and specific references.

issue that has not been addressed in the literature. Such an analysis is particularly relevant as the recent unconventional monetary policy actions have been coincident with large government deficits, rapid increases in debt and concerns over fiscal limits.

Fiscal limits are not only relevant for future government spending and tax policies, but also impose constraints on the Federal Reserve's ability to control inflation and effectively conduct monetary policy. Such arguments are presented by [Leeper \(2009\)](#), [Cochrane \(2011\)](#), and [Davig et al. \(2011\)](#). They are reminiscent of the "unpleasant monetarist arithmetic" of [Sargent and Wallace \(1981\)](#), in which growing fiscal imbalances near fiscal limits put unremitting pressure on inflation to reduce the real liabilities of the federal government, even when monetary policy is tight. Our focus is on understanding how monetary policy itself, especially unconventional monetary policy, may contribute to fiscal imbalances, which in turn could limit the effectiveness of monetary policy in the future via the unpleasant monetarist arithmetic.

The impact of unconventional monetary policy on fiscal balances has not been addressed in the literature, perhaps because the resulting low long-term bond yields are generally believed to deliver a reduction in the U.S. government's borrowing costs. More specifically, it has been argued that by lowering long-term yields, the Federal Reserve not only helps stimulate the economy, but also lowers the interest expenditures on the Treasury's liabilities, hitting two birds with one stone.

Most of this misconception stems from the fact that the Treasury's interest payment series, as recorded in the National Income and Product Accounts (NIPA), is based on a cash accounting scheme that includes coupons paid on Treasury notes and bonds and cash needed to roll over Treasury bills, but excludes the capital gains and losses associated with the government's outstanding long-term obligations. While coupon rates for newly issued debt tend to be lower when yields are lower, prices of existing notes and bonds increase as yields decrease. During the Great Recession and its aftermath, when long-term yields declined dramatically, ignoring the increase in value of outstanding notes and bonds resulted in official interest payment estimates that were substantially lower than the Treasury's actual borrowing cost.

In line with [Hall and Sargent \(2011\)](#), we use the term nominal interest cost and define it as the per-period change in the market value of beginning-of-period government debt, measured as a fraction of GDP, due to changes in nominal bond prices over the period. As a result, our interest cost measure accounts for capital gains and losses associated with obligations of all maturities. We use the government's intertemporal budget constraint to link the nominal interest cost to debt dynamics. Specifically, we show that the change in the debt-to-GDP ratio is the sum of the nominal interest cost, an adjustment for inflation, an adjustment for real GDP growth and the deficit-to-GDP ratio. Using quarterly data from 1960 to 2012, we show that debt-to-GDP increased at an average quarterly rate of 0.52% of GDP, or 0.13% when GDP is annualized. The average quarterly rate of 0.52% is the sum of an average quarterly nominal interest cost of 1.73%, an average inflation adjustment of -0.81% , an average adjustment for real GDP growth of -0.86% and an average deficit-to-GDP ratio of 0.46%.

The unconventional monetary policy regime of 2008.IV–2012 stands out in that average quarterly debt-to-GDP ratios were dramatically higher at 6.03% than the full-sample average. Much of this fast growth in debt-to-GDP was driven by large primary deficits. We show, however, that the average nominal interest cost was also abnormally high at 1.58%, even though bond yields were at an unprecedented low. We argue that 0.34% of the 1.58% interest cost were due to the flattening of the yield curve actively pursued by the Federal Open Market Committee (FOMC) through its QE and OT programs. This is in stark contrast to the conventional monetary policy regime of 1960–2008.III, during which low short-term yields were generally associated with a steep yield curve.

Since the period between 2008.IV and 2012 was exceptional in many other aspects besides monetary policy actions—including low GDP growth, low inflation, high unemployment, and the European debt crisis—we perform an event study designed to more directly link unconventional monetary policy actions to high conditional interest costs. Similar to [Krishnamurthy and Vissing-Jorgensen \(2011\)](#), we identify announcements related to long-term asset purchases by the Federal Reserve between 2008.IV and 2012. For QE1, QE2 and OT announcements, the nominal interest cost due to changes in yields during the 2-day period around the event dates is sizable. It amounts to 2.94% of quarterly GDP for QE1 announcements, 1.77% for QE2 announcements and 1.79% for OT announcements. Much of the announcement effect is due to a decrease in the slope of the yield curve, consistent with large increases in the demand for long-term Treasury securities by the Federal Reserve.

Motivated by our finding that unconventional monetary policy impacts interest cost and hence debt dynamics, we develop a prediction model for changes in the debt-to-GDP ratio and its components. Our prediction model is transparent, parsimonious and relies only on publicly available data. We use the Federal Reserve's portfolio composition as a proxy for unconventional monetary policy measures and show that it is significantly related to future interest cost and debt dynamics, even after controlling for yield curve effects, inflation and the state of the economy. We construct one-quarter-ahead and one-year-ahead forecasts of debt-to-GDP ratios which can be used by policy makers to assess the impact of current monetary policy decisions on future fiscal imbalances.

In summary, we stress that there are costs to unconventional monetary policy actions, and that they should be weighed against benefits in policy discussions. We offer a framework for quantifying the fiscal cost of unconventional monetary policy actions as an increase in value of outstanding Treasury liabilities, and provide policy makers with a statistical model to forecast these costs. Our findings underscore that fiscal costs may be sizable and that they should be incorporated into a forward-looking cost–benefit analysis of unconventional monetary policy initiatives in the future.

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