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The effectiveness of the Fed's quantitative easing policy: New evidence based on international interest rate differentials ☆

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ABSTRACT

This paper explores the effects of non-standard monetary policies on international yield relationships. We first document that long-term rates followed a common global downward trend that had already manifested itself prior to the financial crisis. The bond-buying operations (commonly dubbed Quantitative Easing (QE)) of the US Federal Reserve did not disturb this global co-movement – i.e. the global downward trend in interest rates. We model the relationship between USD and euro (riskless) long-term interest rates using a Cointegrated Vector Autoregressive Model (CVAR) employing recursive estimation methods. We find no evidence that QE1 (or the QE episodes) destabilized the transatlantic interest-rate relationship, nor the relationship between interest rates and the US dollar exchange rate. A robustness test using a Vector Autoregressive Model (VAR) with interest rates, inflation rates and output differentials for 11 countries (relative to US) yielded the same result. There is thus little evidence that central bank bond-buying in the US had an independent, distinct impact on US interest rates.

1. Introduction

Huge adverse shocks generated by the financial crisis caused a deep recession and turmoil in the financial markets in 2008–09. Even reducing policy (short-term) interest rates to zero proved insufficient to stabilize the economy. Central banks around the globe thus resorted to different, so-called 'non-standard measures'.

Regarding the size of the measures undertaken, the Fed was, initially, the most active central bank in implementing several non-standard measures – most notably several rounds of large purchase programs of public sector bonds, which are usually called quantitative easing (QE). The first round of QE (QE1) was announced in November of 2008, mainly with the aim of calming the turmoil on financial markets and thus stabilizing the US economy.[1] After the termination

Abbreviations: BoE, Bank of England; BoJ, Bank of Japan; CVAR, Cointegrated Vector Autoregression Model; VIX, CBOE volatility index; ECB, European Central Bank; FOMC, Federal Open Market Committee; GSE, government sponsored enterprise; MBSs, mortgage backed securities; OT, Operation Twist; QE, quantitative easing; VAR, Vector Autoregression Model.

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[1] The start date of QE1 is subject to different interpretations. It is frequently denoted in the literature as having been launched on March 18, 2009, the actual date on which government paper was first purchased. But we feel justified in starting our analysis on the date of its formal announcement in November 2008, in accordance with the advice of an anonymous referee.

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of QE1 in March 2010, QE2 started in November 2010, followed by Operation Twist in September 2012 and an additional round of QE (QE3) in September 2012. The central banks of many other large industrialized countries also implemented similar asset purchase programs: the Bank of England (since 2009), the Bank of Japan (since 2010) and finally the European Central Bank (since 2015).

The common aim of these variations of QE has been to put pressure on long-term yields, which in turn are expected to stimulate demand.[2] The basic mechanism by which central bank asset purchases lower interest rates is usually supposed to be some portfolio balance effect: as central banks purchase riskless assets, i.e. government bonds, investors who previously held these bonds are forced out of their normal 'habitat' and have to buy other, more risky assets (Borio and Zabai, 2016; Deutsche Bundesbank, 2016). These portfolio balance effects have rarely been modelled explicitly, however, and it is thus difficult to determine the exact channels through which QE should be expected to stimulate demand. As the outgoing Chairman of the Fed, Ben Bernanke, quipped on his last days in office: "The problem with QE is that it works in practice, but it doesn't work in theory" (Financial Times, 2014).

Another channel through which QE might be effective is the exchange rate. The exact channel linking purchases of domestic assets to the exchange rate has rarely been made clear. The implicit assumption is usually that lower interest rates at home should lead to a weaker exchange rate. For the purpose of our discussion later on, we note that QE can be expected to influence the exchange rate only if the impact of the QE operation on domestic interest rates is larger than any reaction of foreign interest rates. In other words, the exchange rate channel should work only if QE affects international interest rate differentials.

A key problem in estimating the impact of QE is that asset markets tend to anticipate future policy actions. Current bond prices (and thereby long-term interest rates) as well as exchange rates are often said to be more affected by expectations about the future than by current economic conditions. The conjecture by Deutsche Bundesbank (2016) therefore, is that the announcement of a program can have a stronger impact than its actual implementation. The announcement effects seem to be large, but if they are not permanent, there is no effect.

Measuring the longer-term impact of QE on interest rates and exchange rates is thus an inherently difficult exercise. One approach used in a number of cases has been to study the behavior of interest rates around the announcement of several QE episodes. For example, Borio and Zabai (2016), Thornton (2013) and Deutsche Bundesbank (2016) provide surveys of these '*event studies*'. These studies have generally concluded that QE did have a significant impact on interest rates in the US in the sense that they find that long-term US interest rates tended to fall by a substantial amount at or around the same time as the announcement dates.

Another, less-often used approach is to construct a macroeconomic *counterfactual*. But in this case one has to make many assumptions about how asset prices such as the exchange rate and the interest rate would have evolved in the absence of QE.[3]

We propose a different approach to test the hypothesis that large-scale asset purchases had a separate, identifiable impact on long-term interest rates in the US. We estimate the cointegrated relationship between US and euro-area interest rates, and then test whether one finds a structural break in this relationship around the time that QE was undertaken in the US.

To our knowledge, this paper is one of the first that tries to test empirically whether QE has changed economic relations in international financial markets (Taylor, 2016). Another rare example is Thornton (2014a), who did this by looking at the effect of QE on the difference between the US 10-year Treasury yields and the 10-year sovereign yields for Germany, France and the UK. Thornton argued that if QE affected US long-term rates, the spread between the sovereign yields of countries that did not engage in QE and those in the US would have increased significantly and persistently following the Fed's first QE announcement in November 2008. He showed that the spreads actually declined, that is, foreign yields fell relative to the US yield. Thornton tested for a structural break in the relationship using the Bai-Perron test. He found no statistically significant break for either Germany or the UK, but did find a statistically significant break for France, which occurred later and coincided with the European financial crisis. He noted that the results could be affected by differentials in these economies' inflation and output performance, so he repeated the test using real rate differentials and found qualitatively similar results. He also showed that these countries did not have significantly poorer economic growth and concluded that QE had no effect on US long-term rates.

Our paper uses a cointegration approach to analyze whether the Fed's QE1 has caused a structural change in the US-European interest-rate relationship.[4] However, we accept that the stochastic properties of interest rates are always an issue (as the discussion of it in our paper illustrates). So some academics may argue that interest rates are I(0), no matter what formal tests may show. This could possibly be the case in the low-interest rate environment that we have faced for several years now and which is part of our estimation period. Hence, strictly speaking, to test whether QE affected interest rate differentials in a particular way does not require the cointegration exercise conducted in this paper. Indeed, when we perform the test on other interest rates in Section 4.2.4, we do not use the cointegration approach, but rather follow the approach of Thornton (2014b). We estimate bilateral VAR models for a large amount of countries, including cross-country differences in real growth, inflation

[2] There is an inherent contradiction here. If QE strongly increased expectations about future inflation and growth, nominal yields should actually increase.

[3] For a counterfactual analysis in macro-econometrics with an empirical application to QE, see Pesaran and Smith (2012).

[4] Assessing QE effects in a cointegration or error-correction framework is not far-fetched. See, for instance, Chen et al. (2015), Cloyne et al. (2015), Troug and Murray (2015), and Saeidinezhad (2015).