

# Fifty Shades of QE: Robust Evidence

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The effectiveness of unconventional monetary policy ("QE" for short) has been a subject of intense debate in both academic and policy circles. A significant part of QE research originates in central banks (Martin and Milas, 2012). Central banks evaluating their own policies is not unlike pharmaceutical firms evaluating their own drugs. Both have skin in the game.

Fabo et al. (2021; henceforth "FJKP") compare the findings of central bank researchers and academics regarding the effectiveness of QE. They examine 54 studies that analyze the effects of QE on output or inflation in the U.S., UK, and the euro area. FJKP's main finding is that papers written by central bankers find QE to be more effective than papers written by academics. Specifically, central bank papers (i) report larger effects of QE on output and inflation; (ii) are more likely to report significant QE effects on output, and (iii) use more favorable language in their abstracts. Moreover, central bank researchers who report larger QE effects on output experience more favorable career outcomes.

Weale and Wieladek (2022) reexamine FJKP's analysis. First, they reject the hypothesis that the residuals in FJKP's OLS regressions are normally distributed. Second, they rerun parts of FJKP's analysis using two "robust regression" methods, the median regression and the MM/MS regression, which downweight the influence of large residuals compared to OLS. Based on these methods, Weale and Wieladek (2022) obtain the same conclusions as FJKP regarding language sentiment but they cannot reject the hypothesis that central bankers and

academics report the same quantitative effects of QE on output and inflation. They do not use robust regressions to reexamine FJKP's evidence on significance reporting or career progression.

In our new paper (Fabo et al., 2023), we build on Weale and Wieladek (2022) to shed more light on the robustness of FJKP's results. We disagree with Weale and Wieladek (2022) on the need to downweight outliers in light of non-normally distributed residuals. We show that several papers reporting the largest effects on output and inflation have been very influential in the academic literature. In addition, these “outlier” papers have supported policy communication by the world's leading central banks and shaped the public perception of the effectiveness of QE. Finally, we present new evidence from quantile regressions, assessing the effect of central bank affiliation not only at the median but across the full conditional distribution.

### **Normality**

The OLS estimation method, used by FJKP, does not assume normally distributed residuals. The normality of the residuals is neither necessary nor sufficient for OLS estimates to be consistent. In other words, there is nothing inherently wrong with using OLS estimates when the residuals are not normally distributed.

Normality is not needed to conduct inference about OLS estimates, either. Given their relatively small sample, FJKP do not rely on asymptotic standard errors; instead, they use a wild cluster bootstrap. Bootstrapping methods are based on the empirical distribution of the residuals. Therefore, Weale and Wieladek (2022)'s rejection of the normality of the residuals in some of FJKP's OLS regressions does not invalidate the OLS estimates or the inference about them.

### **Outliers and OLS**

Nonetheless, Weale and Wieladek (2022)'s evidence of non-normality is useful because it suggests that some of the datapoints could potentially be interpreted as outliers. In general, OLS regression estimates can be sensitive to outlying residuals because the quadratic loss function inherent to OLS increases sharply with the magnitude of the residuals. To moderate this sensitivity, robust regressions use different loss functions that are less responsive to

outliers. For example, the median regression, which is used by Weale and Wieladek (2022), minimizes the sum of absolute residuals rather than their squares.

However, it is not clear that downweighting the outliers compared to OLS is the right thing to do. After all, OLS regressions are used far more frequently than robust regressions. Whether one wants to downweight the outlying observations should depend on one's belief regarding the validity of these observations. If one believes that the outliers are credible observations (as opposed to, say, data errors) coming from the same data-generating process as the remaining observations, then there is no need to downweight them.

In fact, downweighting the outliers can be the wrong thing to do. For example, a scientist analyzing seismic activity would be ill-advised to downweight major earthquakes, because these outliers are the most important observations. Similarly, outliers are likely to be of particular interest to a doctor analyzing a patient's heart rate history. In our context, we show that papers reporting large effects of QE are important in forming the perception of the effectiveness of QE among academics, policy makers, and the general public.

### **The Impact of Outliers in FJKP**

We find that the outliers in FJKP's regressions have been highly influential. All of them come from studies that appear to be competent, written by credible authors. Many of these studies have been published in respectable academic journals, such as the *American Economic Journal: Macroeconomics*, *Economic Policy*, *Journal of Monetary Economics*, and *Journal of Money, Credit and Banking*. They tend to be highly cited---for example, two of the five papers that report the largest peak effect of QE on output have been cited 741 and 316 times, respectively, as of 30 December 2022.

The outliers in FJKP have been influential not only among academics but also among prominent central bankers. For example, in one of his speeches, former Chair of the Federal Reserve Ben Bernanke bases his statement about securities purchase programs having provided "significant help for the economy" on the findings of one of the outlier studies in FJKP (Bernanke (2012)). Huw Pill, member of the Bank of England's Monetary Policy Committee, cites one of the outlier papers as having influenced policy analysis at the Bank of England (Pill (2022)). Our study also offers examples of outlier studies being mentioned in speeches by the

Fed's Janet Yellen, the ECB's Benoît Cœuré and Isabel Schnabel, and the Bank of England's Andy Haldane.

Papers reporting large effects of QE also help form the public perception of the effectiveness of QE, via their media coverage. For example, the Financial Times (2015) cites two studies that report some of the largest effects of QE. Both studies are written by central bankers---one by a member of the Bank of England's Monetary Policy Committee and one by the president of the San Francisco Fed. Another article in the Financial Times (2017) suggests that the findings from one of the outlier studies, which was also cited prominently by Janet Yellen, were "*near the consensus of Fed thinking on the subject*" at the time.

Overall, it is far from clear to us that downweighting these highly influential papers, which is what robust regressions do, is appropriate. In fact, one might argue that such studies should be overweighted, given their disproportionate influence.

### **New Evidence from Quantile Regressions**

We extend Weale and Wieladek (2022)'s analysis by estimating quantile regressions. These assess the effect of central-bank affiliation not only at the median but also across a wide range of quantiles.

For the effects of QE on both output and inflation, we find positive coefficients on central-bank affiliation at every quantile. While the point estimates are mostly statistically insignificant, they are always positive and generally larger at higher quintiles. In that sense, FJKP's results are qualitatively robust.

### **Conclusions**

We examine the outliers in FJKP's data and find no reason to downweight them. They come from credible papers, most of which have been published in respectable academic journals and highly cited by researchers. They have also been cited in leading media outlets and in public speeches of prominent central bankers. We do not find it desirable to put less weight on estimates from influential papers that have impacted the perception of the effectiveness of QE in the eyes of top central bank officials and the general public.

In quantile regressions, the difference between the QE effects estimated by central bankers and academics is consistently positive. FJKP's findings thus emerge not only from OLS regressions but also from quantile regressions. The point estimate tends to be larger at the top quantiles. Further research is needed to understand this variation across the conditional distribution.

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