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## Are there differences in the effectiveness of quantitative easing at the zero-lower-bound in Japan over time?



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### ABSTRACT

Using a time-varying parameter vector autoregression (TVP-VAR) framework with a new set of sign restrictions, we study the changing effectiveness of the Bank of Japan's Quantitative Easing policies over time. We specifically analyse the so-called Zero-Interest Rate Policy from 1999 to 2000, the Quantitative Easing Policy from 2001 to 2006, and most recently the so-called 'Abenomics' strategy.

Our results indicate important differences of the Quantitative Easing (QE) shocks on the Japanese economy over time. More specifically, we find important time variation in the responses of core CPI and real GDP. With regard to the different monetary policy episodes in Japan we find somewhat more pronounced effects on core CPI during 'Abenomics'. The responses of the price level are generally found to be stronger and more significant than those of real GDP. This holds particularly for the 'Abenomics' period. These results are mirrored by our variance decomposition analysis.

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## 1. Introduction

Using a time-varying parameter vector autoregression (TVP-VAR) framework, we study the changing effectiveness of the Bank of Japan's Quantitative Easing policies over time. It is well known that

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the Japanese economy has been stuck in a liquidity trap since the mid-90s. Since then the Bank of Japan (BoJ) has adopted various different strategies to combat the recession and stimulate the economy. We use a time-varying VAR framework with stochastic volatility to analyse how the effects of a Quantitative Easing (QE) shock have changed over time and when it was particularly effective.

We specifically analyse the so-called Zero-Interest Rate Policy (ZIRP) from 1999 to 2000, the first Quantitative Easing Policy (QE-1) from 2001 to 2006, and most recently the so-called 'Abenomics' monetary policy easing strategy implemented in 2013 under the current BoJ Governor H. Kuroda and carried out under the political leadership of Prime Minister S. Abe. To identify a QE shock, we follow [Schenkelberg and Watzka \(2013\)](#) and use a new sign restriction approach suitable for an economy stuck at the Zero Lower Bound (ZLB). To allow for time variation in the impulse responses, we embed this identification strategy in the TVP-VAR framework of [Primiceri \(2005\)](#). With this approach we are seeking to shed light on the changing effectiveness and nature of the monetary policy transmission mechanism in Japan during those different monetary policy stances.

We first investigate whether the impact of a QE shock has varied over time in Japan through a marginal likelihood estimation which compares a constant coefficient VAR with our TVP-VAR. Our research confirms that the TVP-VAR is indeed a better fit for Japan and that a QE shock does in fact have changing effects over time. In particular, our impulse response analysis shows that the effects on core CPI have become stronger over time. More specifically, the responses of prices in 2014, when 'Abenomics' was under way, stay significant. During the ZIRP and QE-1 the price level responses are smaller and less significant. Regarding real GDP, we do not estimate a significant impact during the time of the 'Abenomics' strategy and the QE-1 period, whereas slightly significant effects, if at all, are found for the ZIRP. Overall, these findings are supported by our variance decomposition analysis. Especially since 'Abenomics', the importance of QE shocks on the price level has increased, whilst it seems to have decreased for real GDP. These effects are likely to be driven to some extent by the current 'Abenomics' programme.

Our results are interesting not only for Japan, but also for other advanced economies with nominal interest rates close to zero or at the ZLB. The recent financial crisis has by now been going on for almost eight years, by now generally referred to as the 'Great Recession'. It started with housing market bubbles bursting in the US, the UK, and some Euro Area countries. Problems in highly leveraged banking sectors followed and policy interest rates were subsequently lowered to historically low levels of virtually zero. A severe deleveraging of the private sector is currently hitting the real economy of most advanced countries. Inflationary pressure has generally been subdued. Hence, the current experiences of most advanced economies pretty closely mirror the Japanese experience. It is against this background that our study on the effectiveness of the QE policy in Japan sheds light on the potential effects of recently implemented QE policies in the US, the UK, and possibly the Euro Area.

The remainder of the paper is organised as follows: [section 2](#) gives an overview of related literature on Japan, [section 3](#) summarises Japanese monetary policy developments, [section 4](#) describes our empirical model and its structural identification and [section 5](#) discusses our results. [Section 6](#) presents our robustness checks and [section 7](#) finally concludes.

## 2. Survey of related literature for Japan

Vector autoregression models (VARs) are a widely used tool for analysing the monetary policy transmission, also for Japan. These include, e.g. [Miyao \(2002\)](#), who introduces the benchmark VAR for estimating the impact of monetary policy during 1975 to 1998. Since it is likely that the transmission mechanism varies over time, more flexible models, accounting for time variation, are becoming increasingly a focus of research. For example, [Kimura et al. \(2003\)](#) estimate a VAR with time-varying coefficients for the period between 1971 and 2002. Still, their approach relies on a constant variance. In contrast, [Nakajima \(2011b\)](#) employs a TVP-VAR and allows for stochastic volatility in the variance-covariance matrix.<sup>1</sup>

<sup>1</sup> His sample ranges from 1977Q1 until 2007Q4. Following an increase in the call rate, he reports a fall in prices until the mid-90s and thereafter a small price puzzle. Further, he finds a visible effect on output.

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