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Abstract

This paper studies the effectiveness of unconventional monetary policy on the labor market. By using the Japan's data, we estimate structural vector autoregressive models. Our empirical analysis demonstrates that while unconventional monetary policy boosts output and employment significantly, its effects on inflation and nominal wages are limited.

Keywords: Quantitative easing; unemployment; wages; Japanese economy

JEL Classification codes: E24, E52, J60

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1 Introduction

In the aftermath of the 2007-2009 financial crisis, many central banks in advanced economies adopted unconventional monetary policies – often referred to as quantitative easing (QE). A number of studies have investigated the impact of unconventional monetary policy on real activity and inflation. However, little attention has been paid to the effects of unconventional monetary policy on the labor market although the labor market is central to the conduct of monetary policy.

The purpose of this paper is to examine the effects of unconventional monetary policy on the labor market. By using Japanese data, we estimate a structural vector autoregressive (SVAR) model. Since Japan has a much longer and earlier experience in adopting unconventional monetary policy than the U.S., the U.K., and the Euro area, the Japanese data are a valuable source to quantify the effects of unconventional monetary policy on the labor market. Examining the Japanese case enables us to assess indirectly the effectiveness of unconventional monetary policies conducted by other countries' central banks.

This paper finds that unconventional monetary policy boosts output and employment significantly. Unconventional monetary policy boosts inflation, but the effect is not strong. We also find some evidence that the effect of unconventional monetary policy on nominal wages is limited.

A number of studies examined the effectiveness of unconventional monetary policy on economic activity and inflation in Japan and found mixed results (Kimura et al. 2002; Fujiwara, 2006; Honda et al. 2007; Berkmen, 2012; Honda, 2014). While these studies focused on the effects of unconventional monetary policy on output and inflation, our paper focuses on the labor market variables. Thus, our paper can be viewed as a complement to the previous studies. The point that this paper extends the period of analysis to capture the Bank of Japan (BOJ)'s quantitative and qualitative easing (QQE) is also new.¹

2 BOJ's monetary policy

The BOJ first introduced QE in March 2001 and has a long experience with the unconventional monetary policy.² Under this policy, the BOJ changed its main operating target from the uncollateralized overnight call rate (hereafter, the call rate) to the current account balance (CAB) at the BOJ, which is the account that financial institutions have their required and excess reserves. In order to achieve the targeted volume in the CAB, the BOJ purchased Japanese Government bonds (JGBs). Within the first two years, the BOJ increased its monetary base by roughly 60 percent. The BOJ continued QE until March 2006 and then switched its operating target back to

¹See the next section for a brief history of the BOJ's monetary policies which includes QQE.

²Ito (2014) describes the details of the BOJ's quantitative easing with chronology.

the call rate, which was effectively close to zero, though.

The second QE program was implemented in October 2010. The BOJ introduced the "Comprehensive Monetary Easing (CMB)" policy and started to expand its balance sheet. The CMB is a temporary asset purchasing program involving government securities as well as private assets.

In April 2013, the BOJ introduced a new type of unconventional monetary policy, dubbed as "Quantitative and Qualitative Easing (QQE)", to achieve the 2% inflation target rate at the earliest possible time. From the quantitative aspect, this new monetary easing program aimed at doubling the monetary base and the amounts of outstanding JGBs as well as exchange-traded funds (ETFs) in two years. From the qualitative aspect, the goal of QQE is to induce a even lower long-term rate by doubling the average maturity of JGBs, held by the BOJ. In sum, during the QE periods, the monetary base was chosen as a main operating target.

3 SVAR analysis

To investigate the effects of unconventional monetary policy on economic activity in Japan, we estimate a structural vector autoregressive (SVAR) model.³ We consider SVAR models consisting of indices of industrial production, the unemployment rate, the inflation rate, nominal wages, and monetary policy measures. This study does not specify the transmission channel of QE, but rather broadly measures the effect of QE on Japan's labor market.⁴ This approach avoids underestimating the policy effect resulting from narrowing the transmission channel in advance. It also enables us to gauge the comprehensive effect of QE.

We identify the monetary policy shock by using the standard recursive strategy (Sims, 1986; Bernanke and Blinder, 1992, Christiano et al. 2005). Specifically, we assume that measures of economic activity and inflation do not respond contemporaneously to the monetary shock, implying that decisions regarding output, employment, prices, and wages are made before the realization of the shock.

We obtain monthly data on Indices of Industrial Production from the Ministry of Economy, Trade and Industry. The unemployment rate is taken from the Labour Force Survey, published by the Statistics Bureau. The inflation rate is measured as the year-over-year increase in the consumer price index excluding fresh food (Core CPI).⁵ We obtain the data on the Core CPI from the Statistics Bureau. The data of nominal wages is obtained from the Monthly Labour Survey conducted by the Ministry of Health, Labour and Welfare. We have two different measures

³SVAR models have been used to analyze the effects of conventional monetary policy shocks in the literature (See, for example, Christiano, Eichenbaum, and Evans ,1999). We adopt VAR approach to explore the macroeconomic effects of unconventional monetary policy shocks.

⁴Ugai (2006) points out the merit of the approach that examines the effect of unconventional monetary policy on the economy without specifying its transmission channel.

⁵Inflation rates are adjusted for consumption tax hike in April 2014.

of nominal wages: one is the total cash earnings and the other is scheduled wages. For the monetary policy measures, we use the monetary base and the call rate, which are obtained from the BOJ.

The sample period is between March 2001 and November 2015. This sample covers three distinct episodes of the BOJ's monetary policy: (i) the QE period between 2001 and 2006, (ii) the CMB period in 2010-2011, and (iii) the QQE period, starting in 2013. Except these three periods, the BOJ set its operating target at the short-term interest rate. Since the BOJ used different policy instruments in the sample period, we incorporate the dummy variable that takes the value of one during the QE period and zero otherwise.

Based on information criteria, the lag length of the SVAR model is set equal to one. Variables not expressed as a rate are logged. In addition to a constant term, the SVAR model includes a deterministic time trend up to the second order.

4 Estimation results

For the benchmark specification, we first consider a SVAR model with four endogenous variables: indices of industrial production, the inflation rate, the call rate, and the monetary base. This specification might be the simplest one to examine the effect of the unconventional monetary policy on the economy. Figure 1 shows the impulse responses of output and price to a one-standard-deviation shock to the monetary base with 95% confidence bands, constructed by the bootstrap method. We show the impulse response functions for a horizon of 60 months.

The unconventional monetary policy shock increases output and the inflation rate. Following the monetary policy shock, output rises and reaches its peak about 15 months and gradually returns to its initial level. The response of inflation is slower than that of output. Following the shock, the inflation rate rises with peak after 25 months. While statistical significance is strong for output, it is weak for inflation.

We now add labor market variables in turn to the fixed set of variables. In the first specification, we incorporate the unemployment rate and total cash earnings. Adding these variables does not change the effect of the unconventional monetary policy on output and inflation. The effect of the shock on the unemployment rate and total cash earnings are reported in Figure 1.

Figure 1 shows that a positive unconventional monetary policy shock reduces the unemployment rate. Following the shock, the unemployment rate falls with peak after 22 months and they then gradually return to its initial level. Note that the response of the unemployment rate is statistically significant about four years. The unemployment rate decreases by about 3.4 percent at peak. The shock also increases total cash earnings. At peak, total cash earning rises by about 0.46 percent and its response is statistically significant.

In Japan, total cash earnings consist of scheduled wages, bonus, and overtime payments. While scheduled wages are rigid, firms are able to adjust bonus and overtime payments based

on employees' performance and situations of the economy. Instead of total cash earnings, we now use scheduled wages as the measure of nominal wages. The result is shown in Figure 1. The positive unconventional monetary policy shock does not increase scheduled wages, which is in contrast to the case of total cash earnings. Contrasting with the result based on total cash earnings, this result seems to indicate that the main channel of QE affecting nominal wages is bonus and overtime payments.

Total cash earnings are the money earned by one worker in one month. Thus, total cash earnings are hourly wages times hours worked per employee. In order to examine the effect of the unconventional monetary policy on the wage rate and hours of work, we now incorporate these two variables, instead of total cash earnings, to our SVAR model. The result is presented in Figure 2.

Following the monetary policy shock, hours worked increase and reaches its peak after 16 months. The response of hours worked is statistically significant at peak. Hourly wages initially decrease but turn to increase. However, the response of hourly wages is not statistically significant. This result suggests that increasing the working hours is the main mechanism that the unconventional monetary policy affects earnings.

Finally, we use total cash earnings of full-time and part-time workers rather than aggregate total cash earnings. In Japan, the share of part-time workers has increased in last decades, and part-time employment does provide flexibility and cost reduction for firms. Given this fact, it is important to distinguish full-time workers' wages from part-time workers' ones. The result is shown in Figure 2. While we find that unconventional monetary policy slightly increases total cash earnings of full-time workers, we do not detect any impact on part-time workers' wages.

5 Conclusion

While the effect of unconventional monetary policy on output and inflation has been studied in the literature, little is known about its effect on the labor market. By using SVAR models, this paper studies the effect of unconventional monetary policy on the labor market in Japan. Our analysis shows that quantitative easing boosts employment and earnings. The increase in earnings is due to increases in bonus, overtime payments, and hours of work. Thus, the effect of QE on hourly wages and scheduled wages is limited. We also find that QE does not affect part-time worker's earnings, while it slightly increases full-time workers' earnings.

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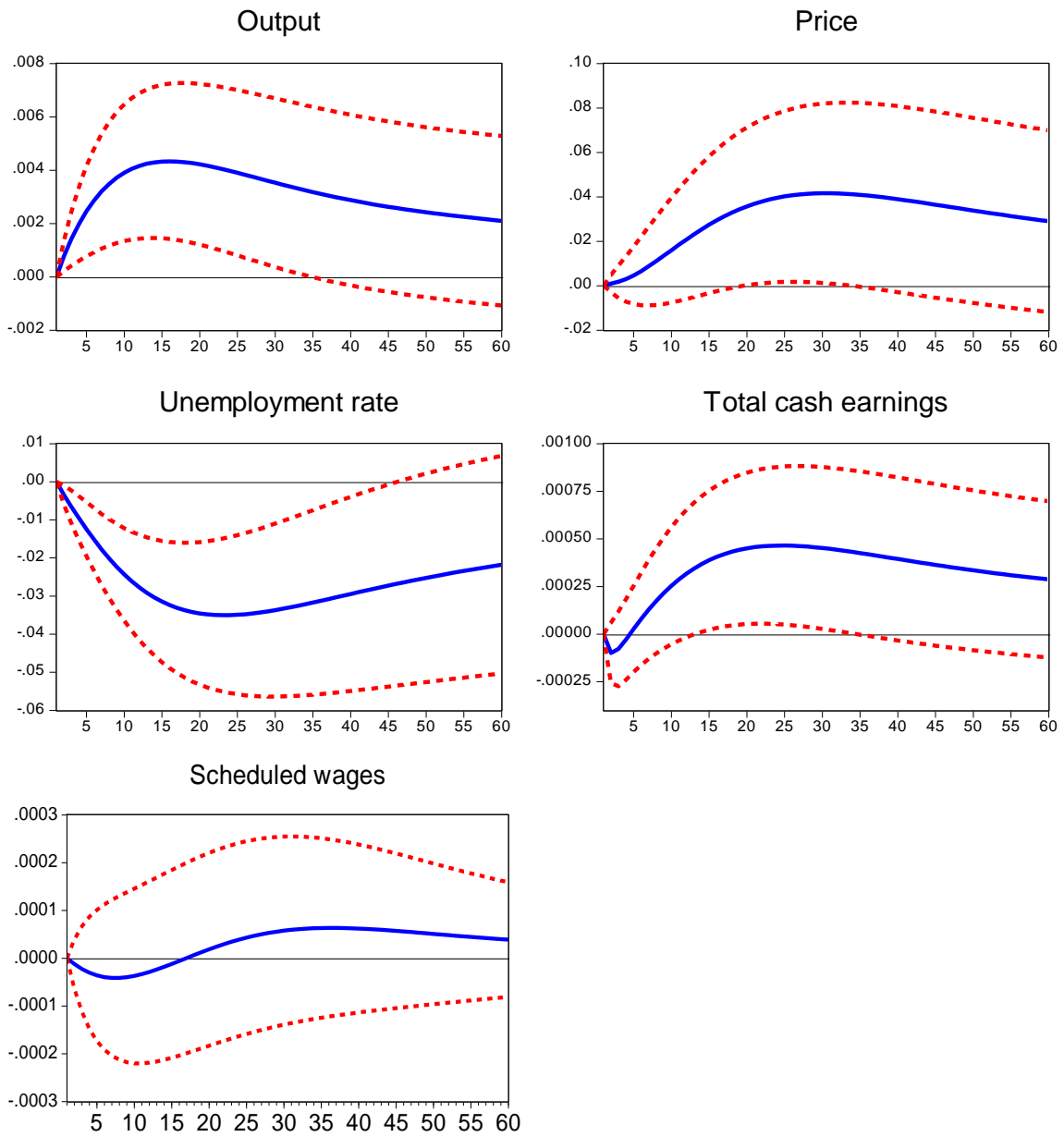


Figure 1: Impulse responses to a monetary base shock

Note: Dashed-lines indicate the 95% confidence bands, constructed by the bootstrap method.

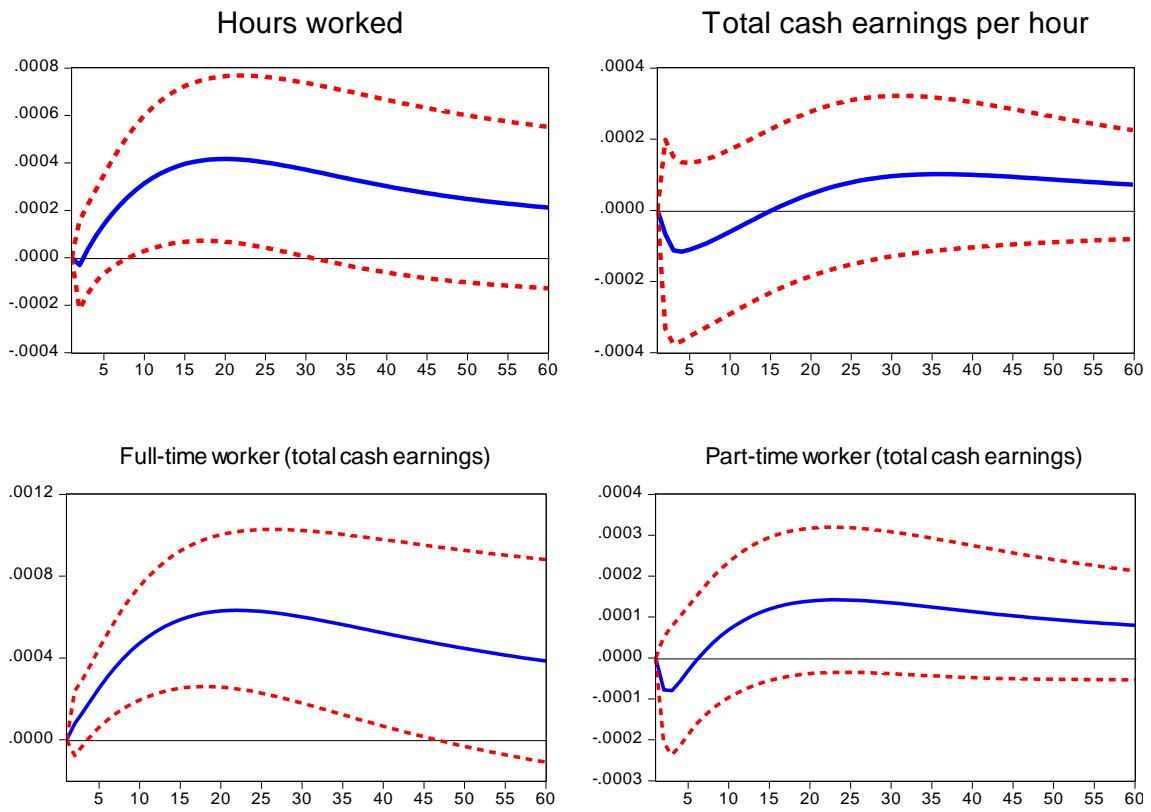


Figure 2: Impulse responses to a monetary base shock

Note: Dashed-lines indicate the 95% confidence bands, constructed by the bootstrap method.