

Yoshino, Naoyuki; Taghizadeh-Hesary, Farhad

Working Paper

Decline in oil prices and the negative interest rate policy in Japan

ADB Working Paper, No. 600

Provided in Cooperation with:

Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Yoshino, Naoyuki; Taghizadeh-Hesary, Farhad (2016) : Decline in oil prices and the negative interest rate policy in Japan, ADB Working Paper, No. 600, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:

<https://hdl.handle.net/10419/163099>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/3.0/igo/>



ADB Working Paper Series

**DECLINE IN OIL PRICES AND THE
NEGATIVE INTEREST RATE POLICY
IN JAPAN**

Naoyuki Yoshino and
Farhad Taghizadeh-Hesary

No. 600
October 2016

Asian Development Bank Institute

Naoyuki Yoshino is the dean of the Asian Development Bank Institute.

Farhad Taghizadeh-Hesary is an assistant professor of economics at Keio University and a visiting professor at the Graduate School of Economics, University of Tokyo, Japan.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

Working papers are subject to formal revision and correction before they are finalized and considered published.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

Suggested citation:

Yoshino, N., and F. Taghizadeh-Hesary. 2016. Decline in Oil Prices and the Negative Interest Rate Policy in Japan. ADBI Working Paper 600. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/decline-oil-prices-and-negative-interest-rate-policy-japan/>

Please contact the authors for information about this paper.

Email: nyoshino@adbi.org
farhadth@gmail.com

Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

© 2016 Asian Development Bank Institute

Abstract

In April 2013, the Bank of Japan (BOJ) introduced an inflation target of 2% with the aim of overcoming deflation and achieving sustainable economic growth. But due to lower international oil prices it was unable to achieve this target and was forced to take further measures. Hence, in February 2016, the BOJ adopted a negative interest rate policy by massively increasing the money supply through purchasing long-term Japanese government bonds (JGBs). The BOJ had previously only purchased short-term government bonds, a policy that flattened the yield curve of JGBs. On the one hand, banks reduced the number of government bonds they purchased because short-term bond yields had become negative. Even the interest rates of long-term government bonds up to 15 years became negative. On the other hand, bank loans to the corporate sector did not increase, due to the Japanese economy's vertical investment–saving (IS) curve. This paper firstly explains why, in the view of the authors, the BOJ has to reduce its 2% inflation target in the present low oil price era. Secondly, it argues that Japan cannot make a sustainable recovery from its long-lasting recession and tackle its long-standing deflation problem by means of its current monetary policy and its negative interest policy in particular. It is of key importance to make the IS curve downward rather than vertical. That means the rate of return on investment must be positive and companies must be willing to invest even if interest rates are set too low. Japan's long-term recession is due to structural problems that cannot be solved by its current monetary policy.

JEL Classification: E52, E63, Q43

Contents

| | | |
|-----|--|----|
| 1. | INTRODUCTION | 1 |
| 2. | RECENT GLOBAL OIL PRICE MOVEMENTS | 1 |
| 2.1 | Supply Side..... | 2 |
| 2.2 | Demand Side | 2 |
| 3. | OIL PRICES AND THE JAPANESE ECONOMY | 4 |
| 4. | LOWER OIL PRICES AND THE NEGATIVE INTEREST RATE POLICY OF THE BOJ | 8 |
| 5. | CONCLUDING REMARKS | 14 |
| | REFERENCES | 15 |

1. INTRODUCTION

On 22 January 2013, the Government of Japan and the Bank of Japan (BOJ) delivered a joint statement on overcoming deflation and achieving sustainable economic growth. The BOJ set the price stability target at 2% (year-on-year rate of change in the consumer price index). Since then, in order to achieve this target, the BOJ started to implement aggressive monetary easing through buying long-term government bonds and increasing the monetary base, in contrast to previous attempts at an expansionary monetary policy which mainly focused on buying short-term government bonds. For some short periods in 2014, inflation did reach the 2% target, mainly caused by higher energy prices, especially oil prices, and because the consumption tax rate was raised from 5% to 8%. Following the start of the oil price decline in June 2014 in the global market, general price levels in Japan also started to decline. Oil prices dropped from above \$100 per barrel in June 2014 to less than \$30 per barrel in February 2016. Oil and other petroleum products make up a significant portion of total Japanese imports. That is why the price fluctuation of oil has a significant impact on Japanese macroeconomic variables, including on the inflation rate.

Although the price of oil is now less than half the price in early 2014, the BOJ is still keeping the same inflation target at 2%. When the price of oil decreases, production becomes cheaper and the aggregate supply curve shifts to the right, which decreases the equilibrium price level. That means the target inflation rate needs to be reviewed and should be lower.

On the other hand, the BOJ could not achieve a stable 2% inflation rate and hence further eased the interest rate. At the monetary policy meeting held on 29 January 2016, the BOJ policy board decided to introduce "quantitative and qualitative monetary easing (QQE) with a negative interest rate" to achieve the price stability target of 2% at the earliest possible time. This policy started by increasing money supply through purchasing long-term Japanese government bonds (JGB). This policy has flattened the yield curve of JGBs. Banks began to reduce the amount of government bonds they purchased because yields up to 15 years became negative.

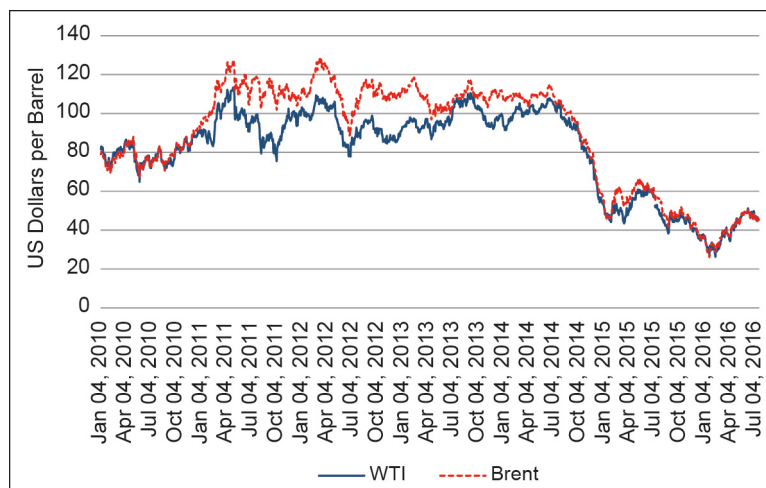
This paper first sheds light on the role of oil prices in the Japanese economy and in the price determination in Japan. It shows that, in the current low oil price era, the BOJ needs to deflate the inflation target. Moreover, the paper investigates whether the recent negative interest rate policy of the BOJ was effective, and provides suggestions to overcome deflation and achieve sustainable economic growth.

The paper is structured as follows. Section 2 discusses the recent movement in global oil prices. Section 3 examines oil prices and the Japanese economy. Section 4 discusses the drop in oil prices and the negative interest rate policy of the BOJ, while Section 5 is for concluding remarks.

2. RECENT GLOBAL OIL PRICE MOVEMENTS

Oil prices dropped from above \$100 per barrel in June 2014 to less than \$30 per barrel in February 2016 (Figure 1). Since early April 2016, prices have started to increase again because of a fragile improvement in demand, but prices are still less than half compared to 2014. There are several reasons for this sharp drop relating to the supply and demand conditions and expectations in the oil market (for more information, refer to Yoshino and Taghizadeh-Hesary 2016a). In this section we shed light on the reasons for the sharp drop.

Figure 1: Recent Global Spot Oil Price Movements
(4 January 2010–18 July 2016)



Note: WTI price is Cushing, OK West Texas Intermediate (WTI) Spot Price Free on Board (FOB) (US dollars per barrel); Brent price is Europe Brent Spot Price FOB (US dollars per barrel).

Source: Thomson Reuters. Spot Prices for Crude Oil and Petroleum Products. Release date: 20 July 2016.

2.1 Supply Side

The price of oil is determined partly by actual supply and demand, and partly by expectations. The recent price collapse can be attributed partly to a new glut in oil supply. Unconventional energy resources, such as shale oil, shale gas, and oil sands, have raised the global oil supply. Massive discoveries of oil in North Dakota and Texas in the United States (US) have driven down prices, and even amid tensions in the Middle East roughly 3 million more barrels a day are being produced now than in 2011.

In addition to this, while oil prices were falling, the Organization of Petroleum Exporting Countries (OPEC), which controls nearly 40% of the world market, has failed to reach an agreement on production curbs at their recent meetings, thus sending prices down even further.

In 2014 and 2015 supply exceeded demand by massive margins—0.9 million barrels per day (mb/d) and 2 mb/d, respectively—and in 2016 a further increase in supply of 1.1 mb/d is expected (IEA 2016).

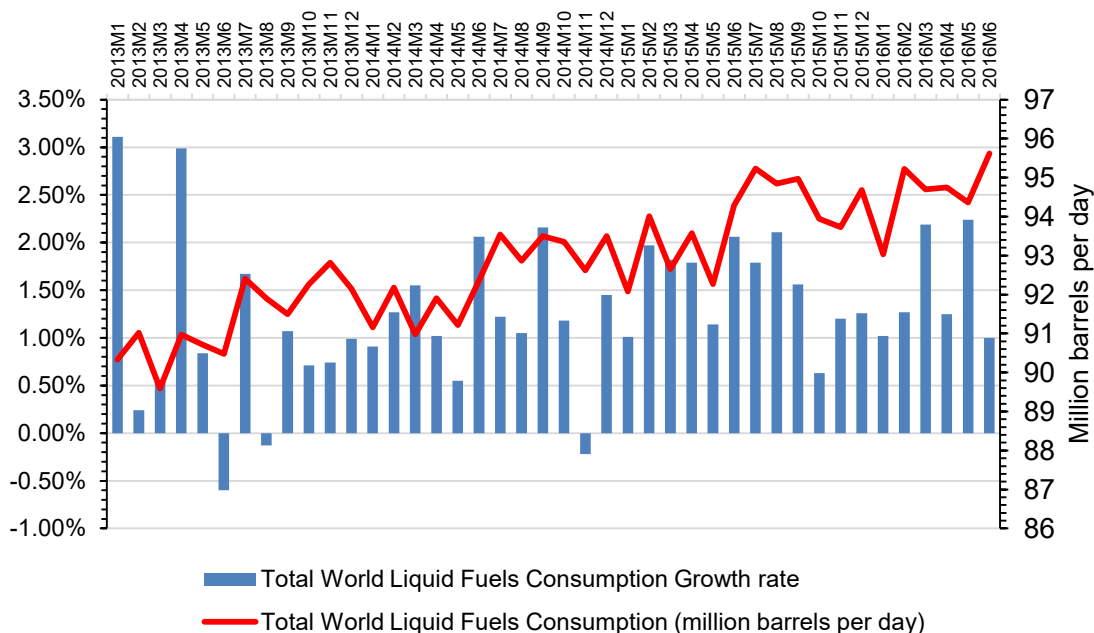
2.2 Demand Side

In 2014, global economic activity was subdued. The International Monetary Fund (IMF) reported 3.4% growth for the global gross domestic product (GDP) in constant prices. Growth in emerging markets and developing economies—while still accounting for over 70% of global growth—declined for the fourth consecutive year, mostly from the People's Republic of China, Brazil, and Russia. In 2015, global economic activity depressed further and world GDP growth stood at 3.1%. The IMF has downgraded the global growth outlook for 2016, by 0.2% to 3.2%, broadly in line with 2015. Although the recovery is projected to strengthen in 2017, the situation in 2016 is expected to be as in 2015. In addition, the IMF mentioned that uncertainty has increased, and risks of weaker growth scenarios are becoming more tangible.

Figure 2 shows the total world liquid fuel consumption values and the growth rates (year-on-year rate of change). In June 2013, August 2013, and November 2014 the

average growth rate was negative and for several months during the above period, the global market experienced fragile oil consumption growth, due to slow economic growth and also monetary policy. (For more information regarding the role of monetary policy in the oil market see Taghizadeh-Hesary and Yoshino 2014, Yoshino and Taghizadeh-Hesary 2014a, and Yoshino and Taghizadeh-Hesary 2016a.)

Figure 2: Total World Liquid Fuels Consumption
(January 2013–June 2016)



Source: Energy Information Administration. 2016. International Energy Statistics. <https://www.eia.gov/forecasts/steo/tables/?tableNumber=30#> (accessed 5 August 2016).

Before discussing how monetary policy was behind the oil price drop, let us look further back to the subprime mortgage crisis of 2008–2009 and review what happened to the US money market and global oil prices at that time.

After the subprime mortgage crisis, the weak exchange rate of the US dollar caused by quantitative easing pushed oil prices upward over 2009–2012, causing investors to invest in the oil market and other commodity markets while the world economy was in recession. As a result, huge amounts of capital entered the crude oil market as investors found it safer than capital markets, which had collapsed (Yoshino and Taghizadeh-Hesary 2014a). Because of this new demand, oil prices started to rise sharply in 2009 when the US and many other economies were in recession. This trend had the effect of imposing a longer recovery time on the global economy, as oil has been shown to be one of the most important production inputs.

Let us move to the second half of 2014 to see what has happened more recently. In 2014, financial conditions eased compared to 2013. In particular, long-term interest rates have declined in developed economies because of the economic recovery and expectations of a lower neutral policy rate in the US over the medium term.

Equity prices rose and risk premiums declined in developed economies and emerging markets. In the US, both the Dow Jones Industrial Average and Standard and Poor's (S&P) 500 powered to record highs, boosted by the strengthening US economy and liquidity provided by the Federal Reserve's quantitative easing. The Dow, up 8.5%, surpassed two key psychological levels in 2014—17,000 and 18,000—and the S&P 500 surpassed the 2,000 milestone, closing 12.8% higher than the previous year.

This means that the liquidity provided mainly by the Federal Reserve, especially during the 2008–2009 financial crisis, transferred to the oil market and created huge speculative demand, causing a surge in oil prices. In 2014, because the US and some other developed and emerging capital markets were recovering, liquidity moved back to the capital markets. This is the reason for the depressed growth rate in global oil demand, resulting in the price collapse in the market. This factor may have played a stronger role than supply and lower economic growth (Yoshino and Taghizadeh-Hesary 2016a).

Finally, although the global demand for oil in 2015 improved, there was still excess supply in the market (Table 1). In 2015, excess supply reached more than 2 million barrels per day. In 2016, following the lifting of economic sanctions against Iran, a fresh oil glut is pumping oil into the market. Non-OPEC supply is expected to shrink in 2016 and 2017. A significant portion of non-OPEC supply comes from shale oil in the US, which is costlier to produce than conventional resources. Hence, in the current low price era, shale oil output is expected to shrink. According to the International Energy Agency (IEA) (IEA 2016), in 2017 global oil supply and demand will become aligned, but the enormous stocks being accumulated will act as a dampener on the pace of recovery in oil prices when the market, having balanced, then starts to draw down those stocks. Unless we see a larger than expected fall in non-OPEC oil production in 2016 and/or a major demand growth spurt, it is hard to see oil prices recovering significantly in the short term from the current low levels.

Table 1: Global Balance Summary*
(million barrels per day)

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------|------|------|------|------|------|-------|-------|
| World Demand | 94.4 | 95.6 | 96.9 | 98.2 | 99.3 | 100.5 | 101.6 |
| Non-OPEC Supply | 57.7 | 57.1 | 57.0 | 57.6 | 58.3 | 58.9 | 59.7 |
| OPEC Crude** | 32.8 | 33.0 | 33.0 | 33.2 | 33.5 | 33.6 | 32.0 |
| OPEC NGLs, etc. | 6.9 | 7.0 | 7.1 | 7.1 | 7.1 | 7.2 | 6.7 |
| Total World Supply* | 96.4 | 96.7 | 97.0 | 97.8 | 98.7 | 99.5 | 100.5 |
| Implied Stock Change | 2.0 | 1.1 | 0.1 | -0.4 | -0.7 | -1.0 | -1.1 |

NGLs = natural gas liquids; OPEC = Organization of Petroleum Exporting Countries.

Notes: *Table shows actual output in 2015 and IEA forecasts for 2016 onward. **OPEC actual output in 2015. Assumes a post-sanctions increase for Iran in 2016 and adjusts for OPEC capacity changes thereafter.

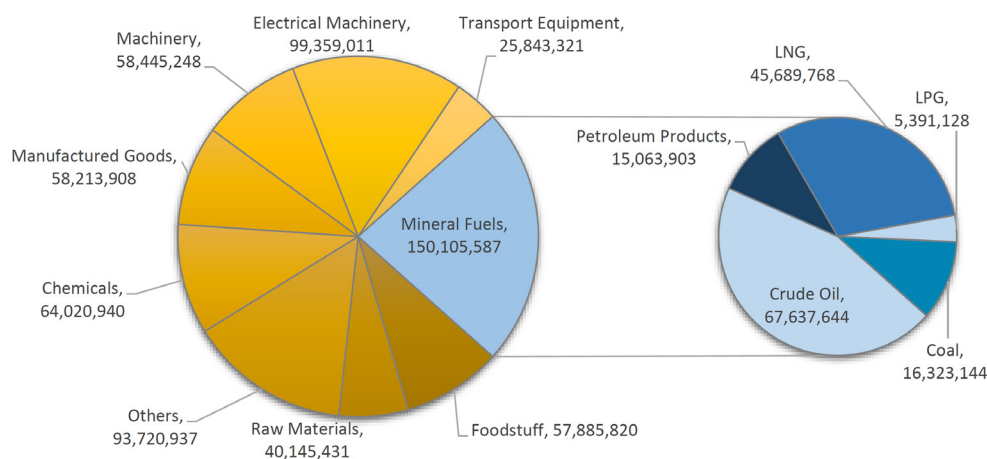
Source: IEA (2016).

3. OIL PRICES AND THE JAPANESE ECONOMY

In 2015, the total value of Japan's imports amounted to \$648 billion, 23% of which (\$150 billion) was mineral fuels, \$67 billion petroleum, \$46 billion liquid natural gas (LNG), \$16 billion coal, \$15 billion petroleum products, and \$5 billion liquefied petroleum gas (LPG). Although Japan's crude oil imports in 2015 fell to the lowest level since 1988, as demand weakened amid a declining population, slower economic growth, and more energy efficient vehicles and industries, oil is still the main mover of

the Japanese economy. Japan is the third largest consumer of crude oil behind the US and the People’s Republic of China.

Figure 3: Japan Imports by Principal Commodity, 2015
(\$ thousands)



LNG = liquefied natural gas; LPG = liquefied petroleum gas.

Source: JETRO (2016).

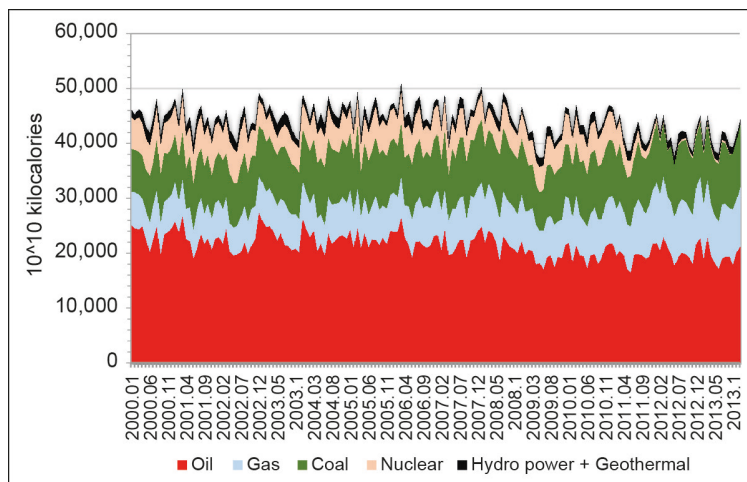
Japan is dependent on imports for 91.4% of its energy supply. Since the Fukushima nuclear disaster in 2011, the percentage of fossil fuels for power generation has been increasing, as a substitute for nuclear power. The level of dependence on petroleum, which had been declining in recent years, increased to 47.2% in fiscal year 2012. In fiscal year 2013, the total primary energy supply in Japan was 21,973 petajoules, up 1.1% from the previous fiscal year. Its breakdown was 45.7% in petroleum, 24.2% in coal, 22.5% in natural gas, 3.1% in hydropower, and 0.4% in nuclear power. Other sources were also used, though only in small quantities, including energy from waste, geothermal, and natural energy (solar photovoltaic, wind power, biomass energy, among others) (MIAC 2015).

The result of eliminating nuclear power generation and substituting it with fossil fuels was that the energy self-sufficiency¹ percentage decreased from 19.6% in fiscal year 2000 to 8.6% in fiscal year 2013 (MIAC 2015). Before the 2011 earthquake, Japan was the third largest consumer of nuclear power in the world, after the US and France. In 2010, nuclear power accounted for about 13% of Japan’s total energy supply (Taghizadeh-Hesary et al. 2016). In 2012, the nuclear energy share fell to 1% of total energy supply (and contributed a similar level to primary energy consumption in 2013 as only two reactors were operating for a little more than half the year). In 2014 Japan did not produce any nuclear power (Taghizadeh-Hesary and Yoshino 2015). Figure 4 shows monthly primary energy consumption in Japan by type based on thermal values from 2000 to 2013.

¹ Domestic production of primary energy (including nuclear)/domestic supply of primary energy × 100.

Figure 4 shows how important oil is in the Japanese energy mix; hence, oil price movements will have significant effects on Japanese macroeconomic variables including economic growth and the inflation rate. Several scholars have described this (Hamilton 1996; Lee, Lee, and Ratti 2001; Blanchard and Gali 2007; Kilian 2008; Taghizadeh-Hesary et al. 2013, 2016; Yoshino and Taghizadeh-Hesary 2015a).

Figure 4: Primary Energy Supply in Japan by Type Based on Thermal Values (January 2000 to December 2013)



Notes: Thermal values are based on General Energy Statistics (Agency of Resources and Energy). The data include estimated values.

Sources: Ministry of Economy, Trade and Industry of Japan. Monthly Statistics of Electric Power; Coal Statistics Report; Oil Statistics Report; Monthly Statistics of Demand and Supply of Energy; Trade Statistics.

Yoshino and Taghizadeh-Hesary (2015a), by developing a simultaneous equation model consisting of the Phillips curve (aggregate supply), aggregate demand, and the Taylor rule equations, tried to find out whether the achieved inflation rate in Japan following the QQE policy since 2013 was caused by the monetary policies or whether it was caused by higher oil prices. The results are stated in Table 2.

Table 2: Oil Prices and the Inflation Rate in Japan

| | Q2 1994–Q4 2001 | Q1 2002–Q2 2014 |
|---|-----------------|-----------------|
| Phillips Curve (Inflation rate) | | |
| Lagged inflation rate | 0.89 (4.08)** | -0.36 (-1.12) |
| GDP gap | 0.69 (2.18)* | -0.24 (-0.45) |
| Crude oil price | 0.06 (3.27)** | 0.07 (2.59)** |
| Gas price | 0.03 (0.45) | 0.05 (1.17) |
| Aggregate Demand (GDP gap) | | |
| Long-term real interest rate | -0.02 (-4.71)** | -0.02 (-1.09) |
| Lagged GDP gap | -0.33 (-1.66) | 0.42 (1.52) |
| Exchange rate | 0.09 (2.18)* | 0.07 (1.17) |
| Taylor Rule (Short-term interest rate) | | |
| Inflation rate | 1.21 (0.67) | 1.94 (2.16)* |
| GDP gap | 4.76 (2.72)** | 3.89 (3.01)** |

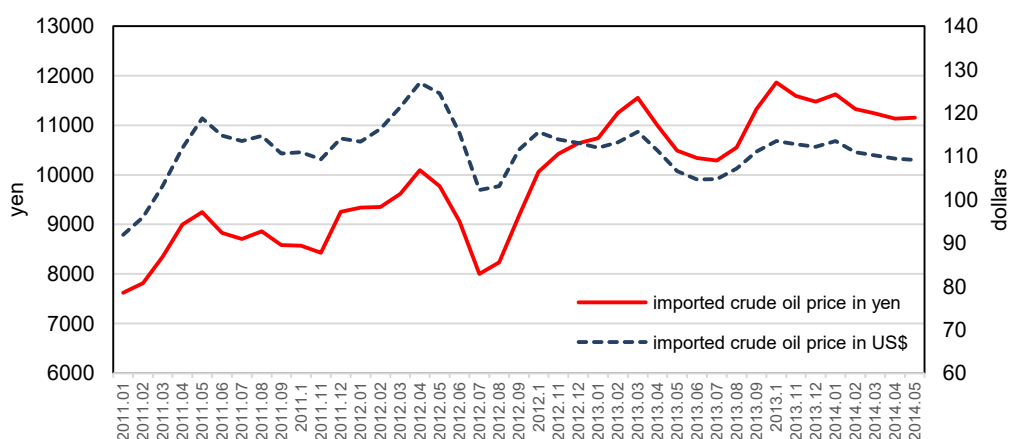
GDP = gross domestic product.

Notes: T-statistics are in parentheses. * indicates significance at 5%. ** indicates significance at 1%.

Source: Yoshino and Taghizadeh-Hesary (2015a).

The first part of Table 2 is the Phillips curve equation, which is the aggregate supply function. The y-axis is the inflation rate and the x-axis is the GDP gap. Usually, the aggregate supply curve is upward sloping, which means the GDP gap and the rate of inflation should be positively related. The results for Q2 1994–Q4 2001 are in accordance with an upward sloping aggregate supply, which means a larger GDP gap tended to lead to a higher inflation rate in the first period. When the economy is in an inflationary environment that will accelerate current inflation even more, so in this situation lagged inflation should have a positive impact on the current inflation rate, which is what happened in the first period of this analysis. However, after 2002, Japan was faced with deflation and a decreasing GDP gap, so the results show that the lagged inflation rate and the GDP gap in the Phillips curve are not significant in the second period of this analysis, which is valid. This means (i) the current year’s inflation was not affected by lagged inflation rates, and (ii) because the economy was in recession, the GDP gap was negative and had no impact on the inflation rate. However, the increasing crude oil price shifted up the aggregate supply curve, because imports of oil created inflationary pressure. Therefore, the positive sign of the crude oil price in both periods is correct. This finding is in accordance with the paper’s hypothesis. Although inflation was created after the launch of the QQE policy, the authors believe this stemmed mainly from other sources, especially from higher oil prices. Following the easy monetary policy of the BOJ, the yen started to depreciate heavily (Figure 5), which raised prices of crude oil and other energy imports, pushing up production costs and creating inflation. Results from Yoshino and Taghizadeh-Hesary (2015a) support this assertion. In the second period, the output gap in the Phillips curve equation was not significant, which means that the economy was in recession and the aggregate demand did not rise enough to have an impact on price levels. However, the higher oil price in yen, which is mainly the result of easy monetary policy, had a significant impact on general price levels, which has been a negative development for Japanese manufacturers.

Figure 5: Crude Oil Import Price of Japan



Note: Import prices are cost, insurance, and freight (CIF) price in Japan. CIF price in Japan is converted into US dollars by the monthly average of the exchange rate.

Source: Japan Ministry of Finance. Japan Exports and Imports.

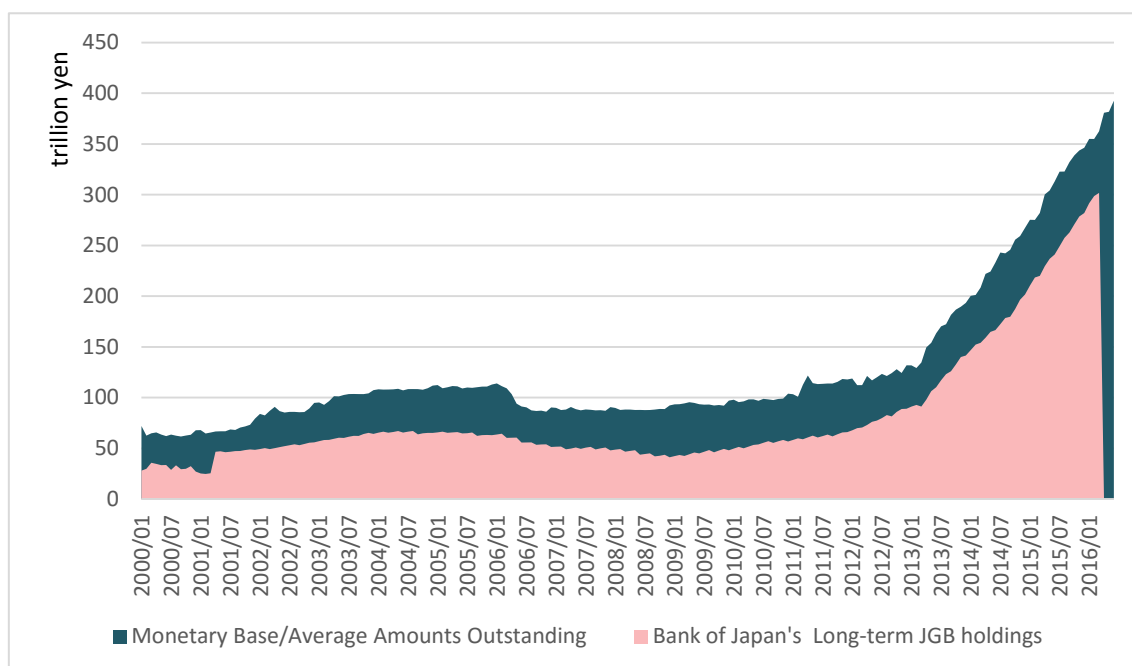
The second part of Table 2 is for aggregate demand. It is clear that in the second period long-term interest rates did not have any significant association with the GDP gap. This means the QQE policy that cut the short-term and long-term interest rates could neither stimulate the economy nor create inflation. And as mentioned above, the general price inflation in that period was due to other factors, mainly the oil price.

4. LOWER OIL PRICES AND THE NEGATIVE INTEREST RATE POLICY OF THE BOJ

In 2013, the BOJ set a price stability target of 2% (year-on-year rate of change in the consumer price index). On 4 April 2013, the BOJ announced that, based on a decision at its monetary policy meeting, it would purchase Japanese government bonds (JGB), starting on 5 April 2013. This decision was taken at the first monetary policy meeting after Haruhiko Kuroda had taken up his post as the new governor of the BOJ.

Figure 6 shows the expansion of the monetary base and JGB holdings by the BOJ. Since 2013 there has been a massive increase in the amount of monetary base by implementation of the QQE policy after Prime Minister Abe came into power for the second time. On the liability side of the BOJ balance sheet, the monetary base increased drastically. Table 3 looks at the asset side of the BOJ balance sheet. In April 2013, the asset side was valued at ¥175 trillion and by May 2016 it had expanded to ¥426 trillion, an increase of 2.5 times in 3 years. In the same period, JGBs, which were the major purchase of the BOJ, went up from ¥98 trillion to ¥319 trillion (Table 3). So in other words, the major part of the asset is the purchase of long-term government bonds. Figure 6 shows that there was a parallel increase in the monetary base and JGB holdings by the BOJ after 2013. As mentioned above, the BOJ is keeping the 2% inflation rate as the target. Only for short periods, and mainly during 2014, did the Japanese inflation rate exceed 2%. In 2014 this was mainly due to an increase in consumption tax and higher oil prices. But after oil prices fell, the consumer price index (CPI) fell and the inflation rate dropped to below 1% (Figure 7).

Figure 6: Expansion in the Monetary Base and JGB Holdings
(January 2000–June 2016)



JGB = Japanese government bond.

Notes: Monetary base is average amounts outstanding in each month. The BOJ's long-term JGB holding data was available up to March 2016.

Source: Bank of Japan Time Series Database (2016). https://www.stat-search.boj.or.jp/index_en.html (accessed 30 July 2016).

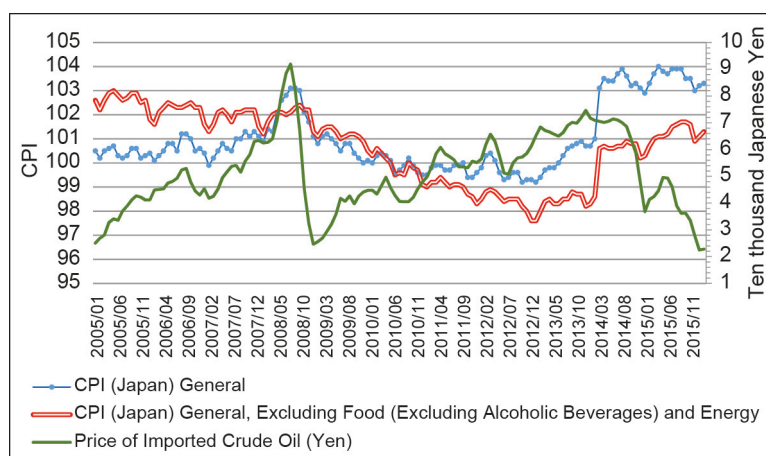
Table 3: Monetary Base and JGB Purchase Data
(comparison between April 2013 and May 2016)
(¥ trillion)

| | April 2013 (actual) | May 2016 (actual) | Pace of Annual Increase |
|-------------------------|------------------------|----------------------|----------------------------------|
| Monetary Base | 155 | 387 | About 80 trillion |
| JGB | 98 | 319 | About 80 trillion |
| CP | 1.4 | 2.3 | Maintain the outstanding balance |
| Corporate Bonds | 2.9 | 3.2 | Maintain the outstanding balance |
| ETFs | 1.7 | 8.0 | About 3 trillion |
| J-REITS | 0.13 | 0.31 | About 90 billion |
| Total Assets of the BOJ | 175 | 426 | NA |

BOJ = Bank of Japan; CP = commercial paper; ETFs = index-linked exchange-traded funds; J-REITS = investment equities issued by real estate investment trusts; JGB = Japanese government bond; NA = not available.

Source: Bank of Japan Time Series Database (2016). https://www.stat-search.boj.or.jp/index_en.html (accessed 30 July 2016).

Figure 7: General Price Level and the Oil Price
(January 2005–March 2016)



CPI = consumer price index.

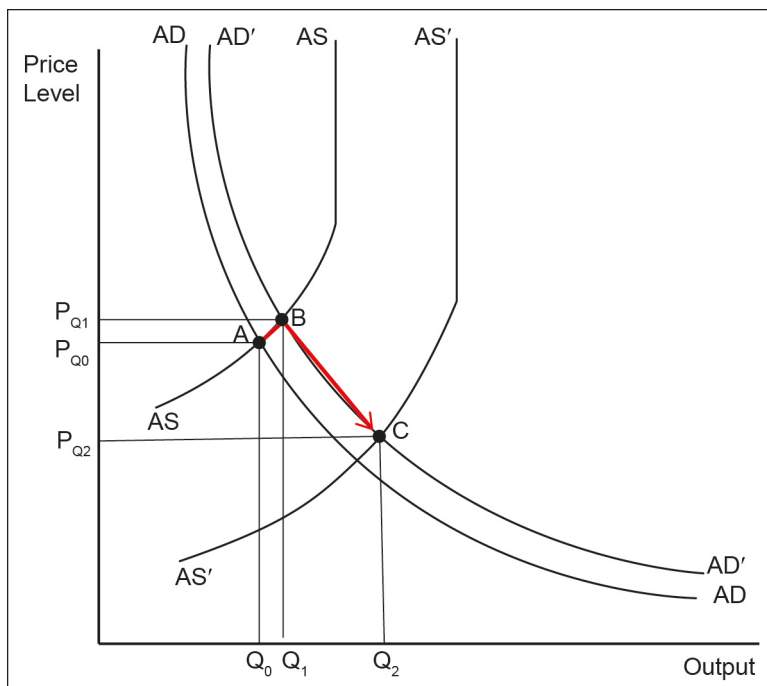
Source: NIKKEI NEEDS Database (2016). <http://www.nikkeieu.com/needs/> (accessed 5 Aug 2016).

Based on declining oil prices, on the one hand, the aggregate supply (AS) curve shifts to the right and will reduce general price levels because oil as the main energy provider is one of the production inputs. Hence, declining oil prices lead to cheaper input prices for production, which is good news for suppliers and manufacturers of commodities. On the other hand, aggregate demand (AD) will also shift to the right, because consumption of oil and derivatives will be cheaper and this will offset part of the earlier price decrease by the shifting of the AS curve. However, the shift in AD in the Japanese case is lower for several reasons, two of the most important being the aging population and more efficient automobiles that reduced the consumption and elasticity of oil and petroleum products with respect to prices. Taghizadeh-Hesary, Rasolinezhad, and Kobayashi (2015) found that among Japanese oil consuming sectors, the commercial and industrial sectors show a significant response to oil price fluctuations. However, the residential sector does not show a significant response to oil price impulses. They also found that in the wake of the Fukushima nuclear incident in

2011, because Japan’s dependency on oil increased, almost all economic sectors had a lower sensitivity to oil price fluctuations.

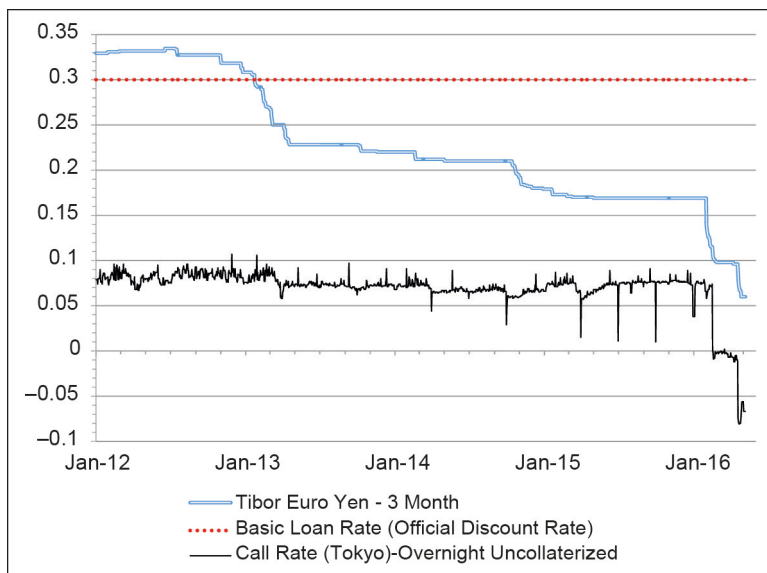
By a simple AD–AS illustration, Figure 8 shows that following the decline in oil prices, the final equilibrium rate of inflation decreases. This means that the 2% inflation target may not necessarily be appropriate in the current cheap oil era.

Figure 8: Lower Oil Prices, Lower Inflation Rate Target



AD = aggregate demand; AS = aggregate supply.
 Source: Taghizadeh-Hesary and Yoshino (2013).

**Figure 9: Short-term Interest Rate in Japan
 (January 2012–May 2016, %)**



Source: Bank of Japan Time Series Database (2016).
https://www.stat-search.boj.or.jp/index_en.htm (accessed 30 July 2016).

At the monetary policy meeting on 29 January 2016, the BOJ policy board introduced quantitative and qualitative monetary easing (QQE) with a negative interest rate in order to achieve the price stability target of 2% at the earliest possible time. Since February 2016, the short-term interest rate (call rate—overnight uncollateralized interest rate) became negative (Figure 9).

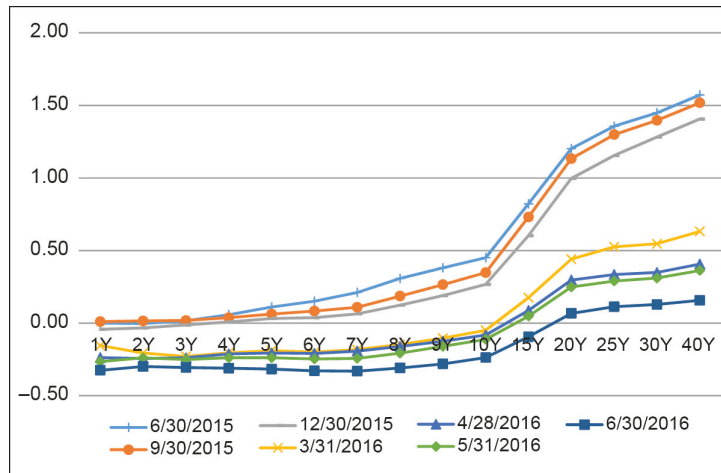
The BOJ decided to pursue monetary easing by making full use of possible measures in terms of three dimensions: i) quantity, ii) quality, and iii) interest rate. In this regard, the BOJ issued the following guideline (BOJ 2016):

- (i) **Quantity Dimension.** “The guideline for money market operations: The BOJ conducts money market operations so that the monetary base increases at an annual pace of about 80 trillion yen.”
- (ii) **Quality Dimension.** “The guidelines for asset purchases: a) The Bank will purchase Japanese government bonds (JGBs) so that their amount outstanding will increase at an annual pace of about 80 trillion yen. With a view to encouraging a decline in interest rates across the entire yield curve, the Bank will conduct purchases in a flexible manner in accordance with financial market conditions. The average remaining maturity of the Bank’s JGB purchases will be about 7–12 years. b) The Bank will purchase exchange-traded funds (ETFs) and Japan real estate investment trusts (J-REITs) so that their amounts outstanding will increase at annual paces of about 6 trillion yen and about 90 billion yen, respectively. c) As for CP and corporate bonds, the Bank will maintain their amounts outstanding at about 2.2 trillion yen and about 3.2 trillion yen, respectively.”
- (iii) **Interest-Rate Dimension.** “The introduction of a negative interest rate: The Bank will apply a negative interest rate of minus 0.1% to current accounts that financial institutions hold at the Bank.” At its 29 January 2016 meeting the BOJ decided it “will cut the interest rate further into negative territory if judged as necessary.” Specifically, BOJ adopted a three-tier system in which the outstanding balance of each financial institution’s current account at the Bank divided into three tiers, to each of which a positive interest rate, a zero interest rate, or a negative interest rate applied, respectively.

Although the BOJ published the abovementioned guideline, the short-term negative interest rate also affected the long-term government bond interest rate and the JGB yield curve started to fall and flatten (Figure 10). The BOJ had not expected this to happen. This means it is not rational to hold government bonds until maturity, as the value of 100 at maturity will be less than 100 (i.e., 99, 98, 97, 96, or less). Hence investors, especially overseas investors, are trading bonds rather than keeping them until maturity. The nominal interest rate has dropped, but the volatility of the bond market has increased because of the higher trading of bonds. As for holdings of government bonds, nobody wants to keep bonds that are shorter than 15 years until maturity because the interest rate is negative.

More recently there has been greater demand from overseas investors for short-term bonds (Treasury or T-bills). On the one hand, according to Figure 11(B), 49% of the holders of Treasury bills are foreigners who are buying and selling short-term Japanese government bonds and making a profit. This is the reason that recently the volatility of the Japanese bond market has increased. On the other hand, according to Figure 11(A), the share of households holding JGBs is small (1%) as they are no longer interested in holding these bonds because of negative interest rates.

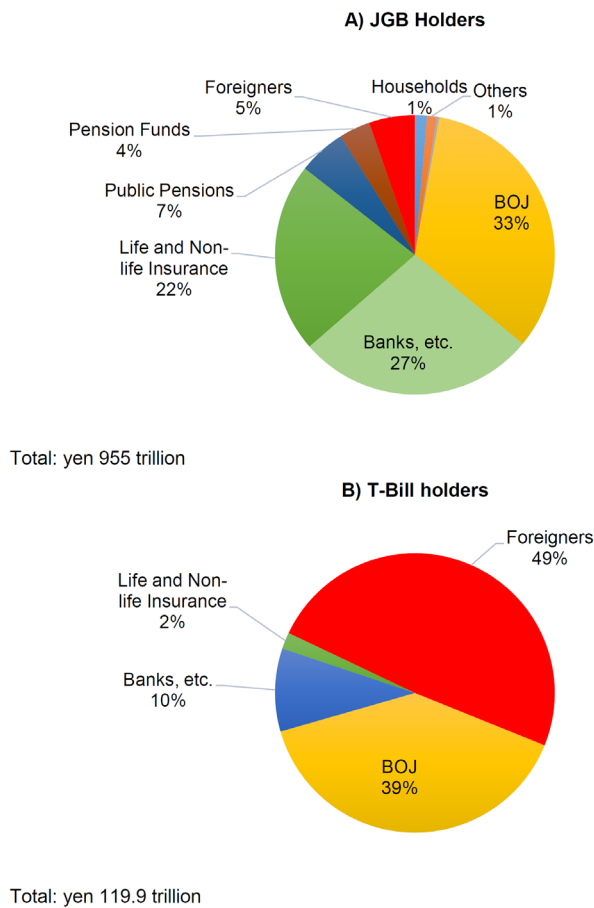
Figure 10: JGB Yield Curves (%)



JGB = Japanese government bond.

Source: Ministry of Finance of Japan. Debt Management Bureau (2016).

Figure 11: Breakdown by JGB and T-bill Holders (March 2016, %)



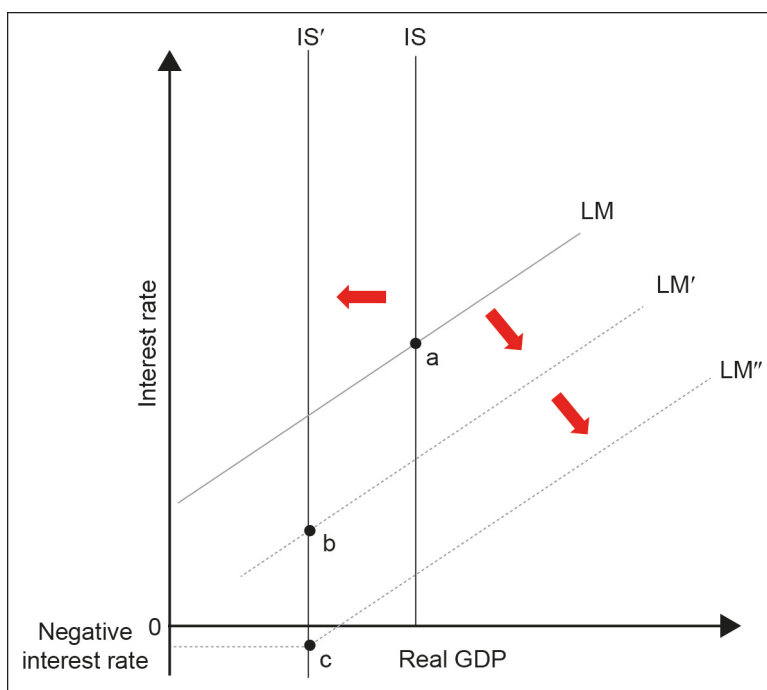
BOJ = Bank of Japan; JGB = Japanese government bond; T-bill = treasury bill.

Source: Ministry of Finance of Japan. Debt Management Bureau (2016).

Among households, the Japanese saving rate is falling because of the aging population and lower economic growth rate, while the corporate sector saves more than households. Corporate savings are going to banks or insurance companies. In conventional cases, banks should lend money; however, because of the decreased demand for loans, bank lending is decreasing. Due to the Japanese economy's vertical investment–saving (IS) curve, the rate of return on investment and companies' willingness to invest became very low. Hence, loans are diminishing and banks are holding government bonds instead. It means if we look at the asset side of Japanese banks, it is accumulated with JGBs.

During the term of the current government in Japan, attention is focused on monetary policy rather than structural issues, but the problem of the Japanese economy is its vertical IS curve (Figure 12). Private investment did not grow despite very low interest rates. Expected rates of return are low and as a consequence not many new technologies are developed in Japan. Even though the central bank's short-term interest rate is now negative, depressed investment in Japan means that the economy is not able to recover (Yoshino and Taghizadeh-Hesary 2016b).

Figure 12: Ineffectiveness of Monetary Policy in Japan



GDP = gross domestic product.

Source: Modified version of the table from Yoshino and Sakakibara (2002).

Corporate restructuring to reduce idle capacity and start new investments was not pursued, with too much importance placed on monetary policy instead of accelerating corporate restructuring (Yoshino and Taghizadeh-Hesary 2015b).

However, recently there has been a change in banking behavior. After 2012, the demand for JGBs reduced both in large city banks and regional banks. Instead, because of higher interest rates on deposits at the BOJ, banks raised their excess reserves at the BOJ. But this new negative interest rate policy forced banks to withdraw their excess reserves from the central bank and spend it in other ways. More recently, especially among regional banks, the demand for investment overseas has been increasing. Because the deposits they are collecting are in yen, they are investing in

Europe in euro or in the US in dollars, creating an exchange rate risk. The suggestion to banks is to keep some portion of deposits in foreign currencies (euro, dollar, among others) in order to minimize the exchange rate risk.

5. CONCLUDING REMARKS

Japan has reached the limits of conventional macroeconomic policies. In order to overcome deflation and achieve sustainable economic growth, in 2013 the BOJ set an inflation target of 2% and implemented an aggressive monetary policy so this target could be achieved as soon as possible.

On 29 January 2016, the BOJ took further steps and in order to reach the 2% inflation target, introduced a negative interest rate policy. From February 2016, the short-term interest rate became negative, which later affected the medium-term and long-term interest rates, which also became negative. This policy has flattened the yield curve of JGBs, which the BOJ did not expect to happen. Banks started to reduce the number of government bonds they purchased because the interest rate for short-term bonds became negative, and even for long-term bonds up to 15 years the interest rate became negative.

Since 2013, on the liability side of the BOJ balance sheet, the monetary base has increased drastically by almost two and a half times as a result of the QQE policy. On the asset side of the BOJ balance sheet, JGB holdings have accumulated and the BOJ holdings in 2016 are more than three times the amount of JGB stock compared to 2013. The total asset size of the BOJ is almost two and a half times the size compared to 2013.

Although the BOJ drastically raised the monetary base during the last 3 years, the 2% inflation target could not be achieved, except for short periods, mainly in 2014. One of the reasons behind the unsuccessfulness of the QQE policy for achieving the 2% inflation target is the drop in oil prices.

Oil prices dropped from above \$100 per barrel in June 2014 to less than \$30 per barrel in February 2016. In 2015 Japan imported over \$80 billion of petroleum and petroleum products. Mineral fuel imports, including oil, made up 23% of total Japanese imports in 2015. This means the price of oil has a significant impact on shaping general price levels in Japan.

Although the price of oil is presently less than half the price it was in 2014, the BOJ is still keeping the inflation target at 2%. While the price of oil is declining because of the downward shift in aggregate supply, the equilibrium price level will be lower, meaning the government needs to adjust the inflation target to lower than the 2% level.

The BOJ introduced a negative interest rate policy, so that banks would withdraw excess reserves from the central bank and increase lending to the corporate sector and households, stimulating aggregate demand, raising prices, and accelerating economic growth. Following the BOJ's negative interest rate policy, banks have indeed withdrawn excess reserves from the BOJ, but lending to the corporate sector did not increase. This is due to the vertical IS curve. Because of the aging population, a shrinking labor force, a conservative banking system, less productive local governments, and low levels of technological development, among others, (Yoshino and Taghizadeh-Hesary 2014b; 2015c), the marginal productivity of capital is low and the corporate sector's interest in investment has decreased, causing the IS curve to become vertical. This means that, although the BOJ is now strictly following the QQE policy, it could neither boost the economy nor raise prices. This means the problems of the Japanese

economy are structural and remedies could not be found in monetary policy. The Japanese government needs to focus more on the growth strategies of Abenomics rather than on monetary policy (for more information on the growth strategies of Abenomics, see Yoshino and Taghizadeh-Hesary 2015b).

REFERENCES

- Bank of Japan (BOJ). 2016. Introduction of Quantitative and Qualitative Monetary Easing with a Negative Interest Rate. 29 January. Tokyo: Bank of Japan. https://www.boj.or.jp/en/announcements/release_2016/k160129a.pdf
- Blanchard O. J., and J. Gali. 2007. The Macroeconomic Effects of Oil Shocks: Why Are the 2000s So Different from the 1970s? NBER Working Paper 13368. Cambridge, MA: National Bureau of Economic Research. DOI:10.3386/w13368
- Hamilton, J. D. 1996. This is What Happened to the Oil Price–Macroeconomy Relationship. *Journal of Monetary Economics* 38(2): 215–220.
- International Energy Agency (IEA). 2016. *Medium-term Oil Market Report 2016*. Paris: International Energy Agency.
- Japan External Trade Organization (JETRO). 2016. *Japanese Trade and Investment Statistics 2016*. Tokyo: Japan External Trade Organization.
- Kilian L. 2008. A Comparison of the Effects of Exogenous Oil Supply Shocks on Output and Inflation in the G7 Countries. *Journal of the European Economic Association* 6(1): 78–121. DOI: 10.1162/jeea.2008.6.1.78
- Lee, B. R., K. Lee, and R. A. Ratti. 2001. Monetary Policy, Oil Price Shocks, and the Japanese Economy. *Japan and the World Economy* 13(3): 321–349.
- Ministry of Internal Affairs and Communication (MIAC). 2015. *Statistical Handbook of Japan 2015*. Tokyo: Statistics Bureau, Ministry of Internal Affairs and Communication.
- Taghizadeh-Hesary, F., E. Rasolinezhad, and Y. Kobayashi. 2015. Oil Price Fluctuations and Oil Consuming Sectors: An Empirical Analysis of Japan. ADBI Working Paper 539. Tokyo: Asian Development Bank Institute.
- Taghizadeh-Hesary, F., and N. Yoshino. 2013. Which Side of the Economy Is Affected More by Oil Prices: Supply or Demand? USAEE Research Paper 13-139. Cleveland, OH: United States Association for Energy Economics.
- . 2014. Monetary Policies and Oil Price Determination: An Empirical Analysis. *OPEC Energy Review* 38(1): 1–20. DOI: 10.1111/opec.1202
- . 2015. Macroeconomic Effects of Oil Price Fluctuations on Emerging and Developed Economies in a Model Incorporating Monetary Variables. *Economics and Policy of Energy and the Environment* 2: 51–75. DOI: 10.3280/EFE2015-002005
- Taghizadeh-Hesary, F., N. Yoshino, M. M. H. Abadi, and R. Farboudmanesh. 2016. The Response of Macro Variables of Emerging and Developed Oil Importers to Oil Price Movements. *Journal of the Asia Pacific Economy* 21(1): 91–102. DOI: 10.1080/13547860.2015.1057955
- Taghizadeh-Hesary F., N. Yoshino, G. Abdoli, and A. Farzinvas. 2013. An Estimation of the Impact of Oil Shocks on Crude Oil Exporting Economies and their Trade

Partners. *Frontiers of Economics in China* 8(4): 571–591. DOI: 10.3868/s060-002-013-0029-3

Yoshino, N., and E. Sakakibara. 2002. The Current State of the Japanese Economy and Remedies. *Asian Economic Papers* 1: 110–126.

Yoshino, N., and F. Taghizadeh-Hesary. 2014a. Monetary Policies and Oil Price Fluctuations Following the Subprime Mortgage Crisis. *International Journal of Monetary Economics and Finance* 7(3): 157–174. DOI: 10.1504/IJMEF.2014.066482

———. 2014b. Analytical Framework on Credit Risks for Financing SMEs in Asia. *Asia–Pacific Development Journal* 21(2): 1–21.

———. 2015a. Effectiveness of the Easing of Monetary Policy in the Japanese Economy, Incorporating Energy Prices. *Journal of Comparative Asian Development* 14(2): 227–248. DOI: 10.1080/15339114.2015.1059059

———. 2015b. An Analysis of Challenges Faced by Japan’s Economy and Abenomics. *The Japanese Political Economy* 40: 1–26. DOI: 10.1080/2329194X.2014.998591

———. 2015c. Analysis of Credit Risk for Small and Medium-Sized Enterprises: Evidence from Asia. *Asian Development Review* 32(2): 18–37.

———. 2016a. Introductory Remarks: What’s Behind the Recent Oil Price Drop? In *Monetary Policy and the Oil Market*, edited by N. Yoshino and F. Taghizadeh-Hesary. Tokyo: Springer. DOI: 10.1007/978-4-431-55797-5_1

———. 2016b. Causes and Remedies of the Japan’s Long-lasting Recession: Lessons for China. *China & World Economy* 24: 23–47. DOI: 10.1111/cwe.12149