THE BANK OF JAPAN'S INTERVENTION IN EXCHANGE-TRADED FUNDS AS AN EFFECTIVE MONETARY POLICY TOOL

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Master of Commerce in Development Finance degree

by

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ABSTRACT

Since the end of October 2010, the Bank of Japan has been pursuing a new Asset Purchase Programme, which includes, among other things, direct intervention in the domestic stock market through the purchase of exchange-traded funds.

This research study evaluated the impact of the Bank of Japan's exchange-traded fund purchase programme on market returns using an event study methodology. An investigation into a sample of 33 intervention events in the Nikkei 400 exchange-traded fund and 303 intervention events in the Nikkei 225 exchange-traded fund, found that the average abnormal one-day return is -1.36% for the Nikkei 400 exchange-traded fund and -1.39% for the Nikkei 225 exchange-traded fund, while the average abnormal five-day return is -0.63% and -1.11% for each exchange-traded fund respectively.

Due to the high volatility, statistically the returns are indistinguishable from zero. However, this study presents evidence that the Bank of Japan intervenes predominantly during large decreases in the market. Hence, there is suggestive evidence that the Bank of Japan's policy is effective at reducing market losses, but is not extensive enough to significantly increase returns.

KEY WORDS:

Quantitative easing, inflation, deflation, asset purchase programme, exchange-traded funds, zero-interest rate policy, monetary policy, abnormal return, event study, intervention, Abenomics, Bank of Japan, Nikkei 400, Nikkei 225.

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DEFINITIONS AND TERMS

In this research report, unless the context indicates otherwise, the words in the first column (below) have the meanings assigned to them in the second column, the singular includes the plural and vice versa, an expression which denotes one gender includes the other genders, a natural person includes a juristic person and vice versa, and cognate expressions shall bear corresponding meanings.

APP	refers to the Asset Purchase Programme, implemented by the Bank of Japan on 28 October 2010 and introduced as a temporary measure to encourage a decline in longer-term interest rates and various risk premiums, with a view to further enhance monetary easing;
billions	refers to the number equivalent to the product of a thousand and a million;
Basel III	refers to an international regulatory accord that introduced a set of reforms designed to improve the regulation, supervision and risk management within the banking sector. The Basel Committee on Banking Supervision published the first version of Basel III in late 2009, giving banks approximately three years to satisfy all requirements. Largely in response to the credit crisis, banks are required to maintain proper leverage ratios and meet certain minimum capital requirements;
BoE or Bank of England	refers to the central Bank of England;
BoJ or Bank of Japan or the Bank	refers to the central Bank of Japan;
central bank	refers to an institution that manages the currency, money supply, and interest rates of a sovereign entity or state;
CPI	refers to the rate of inflation based on the consumer price index of Japan;
$ or USD or dollar	refers to the US dollar, the official currency of the United States of America;
DEFIC	refers to the Development Finance Centre of the University of Cape Town (UCT);
ECB	refers to the European Central Bank, the central bank of the European Union;
ETFs	exchange-traded funds refer to listed investment products that track the performance of a group or basket of shares;

European Union	refers to the politico-economic union of twenty eight member states that are located primarily in Europe;
FED	refers to the US Federal Reserve, the central bank of the USA;
GDP	refers to gross domestic product, the total value of goods produced and services provided in a country during one year;
HICP	refers to the Harmonised Index of Consumer Prices;
JASDAQ	refers to the JASDAQ Securities Exchange which was an exchange headquartered in Tokyo, Japan, now the name of the market by the Osaka Securities Exchange in Kitahama, Osaka; JASDAQ is not related to NASDAQ in the United States, but operated an electronic trading system similar to NASDAQ;
JGBs	refer to Japanese Government Bonds;
JPX	refers to the Japan Exchange Group Inc., a Japanese financial services corporation, that operates multiple securities exchanges including Tokyo Stock Exchange and Osaka Securities Exchange. It was formed by the merger of the two companies on 1 January 2013.
J-REITs	refer to Japanese real estate investment trusts;
NAV	refers to net asset value;
Nikkei 225	refers to the Nikkei-225 Stock Average, a price-weighted average of the 225 top-rated Japanese companies listed in the First Section of the Tokyo Stock Exchange;
Nikkei 400	refers to the JPX-Nikkei Index 400, a capitalisation-weighted index of 400 companies selected based on return on equity etc. from the First Section, Second Section, JASDAQ and Mothers of the Tokyo Stock Exchange;
Nikkei 225 ETF	refers to the iShares Nikkei 225 UCITS ETF, an ETF which tracks the Nikkei 225;
Nikkei 400 ETF	refers to the iShares JPX-Nikkei 400 ETF, an ETF which tracks the JPX-Nikkei Index 400;
OECD	refers to the Organisation for Economic Co-operation and Development, an intergovernmental economic organisation with 35 member countries, founded in 1961 to stimulate economic progress and world trade;

OMT	Refers to an Outright Monetary Transaction;
Quantitative easing or QE	refers to the unconventional method of pumping money into an economy, in an aim to lower long-term interest rates, in order to combat a recession;
RSA or SA	Refers to the Republic of South Africa;
SMC or Subprime Mortgage Crisis	refers to the United States subprime mortgage crises, a nationwide banking emergency that coincided with the United States recession during the period December 2007 to June 2009;
trillions	refers to the number equivalent to a million million;
UCITS	refer to the Undertakings for the Collective Investment of Transferable Securities, which is a regulatory framework of the European Commission that creates a harmonised regime throughout Europe for the management and sale of mutual funds; UCITS funds can be registered in Europe and sold to investors worldwide using unified regulatory and investor protection requirements. UCITS fund providers who meet the standards are exempt from national regulation in individual European countries;
UCT	refers to the University of Cape Town;
UK	refers to the United Kingdom;
US	refers to the United States of America; and
VAT	refers to value-added tax;
¥ or yen	refers to Japanese yen, the official currency of Japan.

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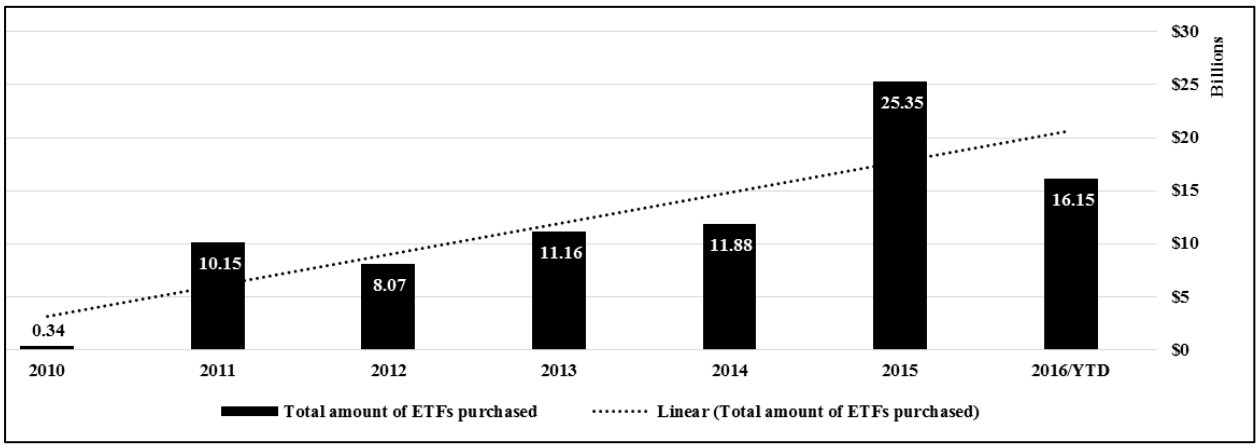
CHAPTER 1:
INTRODUCTION

1.1 SIGNIFICANCE AND CONTEXT OF RESEARCH

During 2010, in an effort to address lingering deflation and a flagging economy, the Bank of Japan (BoJ) adopted an unorthodox monetary policy tool of direct intervention in the Japanese stock market through direct purchases of exchange-traded funds (ETFs). At the start of its ETF buying programme in 2010, the BoJ was limited to making purchases of just ¥450bn ($4.44bn) per year (Figure 1.1). At its current buying programme of ¥6tn (c. $60bn) per year, the BoJ is by far the largest of any investor block on the Japanese market (Lewis & Colback, 2016).



Note: Yen amount converted to USD using daily JPY/USD spot exchange rate

Figure 1.1: ETFs purchased by the BoJ

Source: Bank of Japan (2016).

Between the end of 2010 and mid-2016, the BoJ had made 303 purchases of Nikkei 225 ETFs and 33 purchases of Nikkei 400 ETFs respectively, totalling 336 purchases over roughly a six-year period.

During this period, the BoJ also increased the frequency of its interventions (Figure 1.2). In 2011, the average number of monthly ETF purchases made was 3.41. By the end of 2015, this figure had increased to an average of 7.7 ETF purchases per month. This is a clear reflection of how increasingly aggressive the BoJ have been at adopting its Asset Purchase Programme (APP) since its implementation.

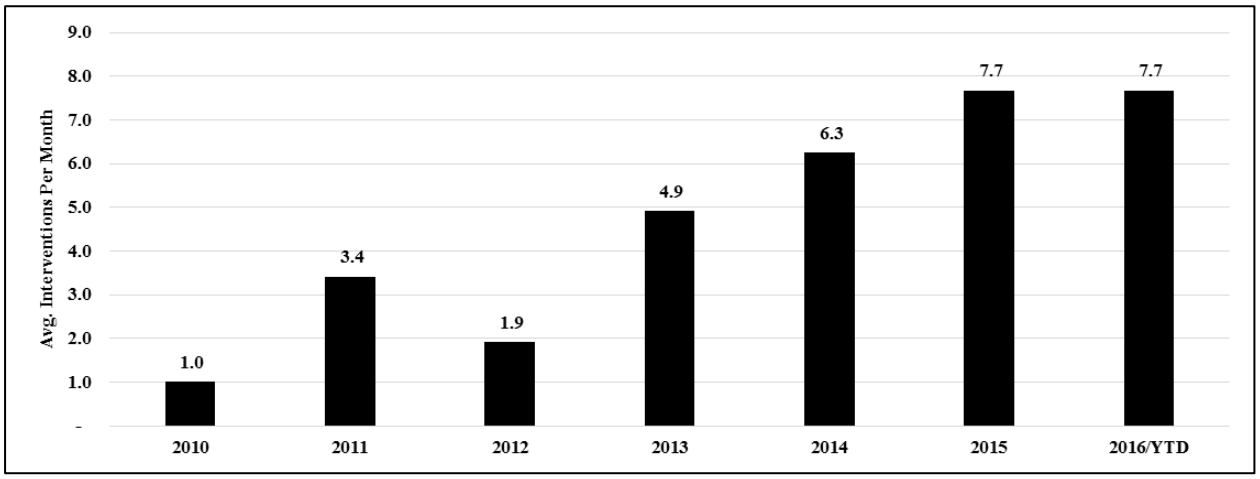


Figure 1.2: BoJ's frequency of interventions in ETFs

Source: Bank of Japan (2016).

Lam (2011) provided the first rigorous examination of the new BoJ policy; however, his analysis is limited to the first year when the policy was still in its infancy. Since Lam's (2011) study, the policy has been substantially expanded, which calls for another evaluation. This research utilised the event study methodology and examined the impact of the BoJ's intervention on the returns of the Japanese equity market.

It was found that the BoJ's intervention in ETFs, has failed to yield the much sought-after results of boosting domestic demand and stimulating economic growth. Its effectiveness, as measured by an event study of daily abnormal returns, has been limited to small, albeit negative returns for the market on average. The point of the BoJ's timing with regards to its intervention is also argued. The analysis shows that such intervention is not a random event, but a premeditated one.

To the best of the researcher's knowledge, this is the first study to perform a detailed analysis of the BoJ's intervention in ETFs, post that of Lam (2011). Lam (2011) argued that the BoJ's Asset Purchase Programme (which includes the purchase of ETFs) has had a positive effect on the Japanese economy. The findings of this study are in contrast with those presented by Lam (2011) and instead offer evidence of a lack of credibility in the BoJ's current monetary policy. Additionally, this study provides further insight into the BoJ's fight against deflation and whether they are succeeding. Finally, this study might be of interest to scholars of quantitative easing (QE), as this remains a very relevant issue amongst economists and central bankers around the world.

1.2 PROBLEM STATEMENT

The research question that this research aimed to answer is:

Can the BoJ's intervention in ETFs, in the period post December 2010, be seen as an effective monetary policy tool used to counter the effects of persistent deflation on the Japanese economy?

1.3 RESEARCH OBJECTIVES

The research objective was to test the hypothesis, of whether the BoJ's intervention in ETFs since 2010, by way of purchases, has had a positive impact on the Japanese economy through inflationary growth.

1.4 BENEFITS OF THE STUDY

This study set out to prove whether a positive link could be established between the BoJ's intervention in ETFs and its monetary policy objectives. Failure to do so may discourage the extension thereof as an effective monetary policy tool. A clear transmission into economic performance as an outcome of the BoJ's APP, is critical to the financial stability of the Japanese economy. It will also underscore the independence of the BoJ as far as it being conducive to maintaining stability of Japan's financial system. In doing so, this study could have far-reaching effects on the adoption of the BoJ's APP (specifically the intervention in ETFs) by other central banks around the world, which face similar challenges in their respective economies.

1.5 CHAPTER OUTLINE

Chapter 1 Introduction: This chapter provides a brief history and outline of the theme that was researched as well as the problem statement and research objectives.

Chapter 2 Literature review: The literature review provides a brief overview of the BoJ's monetary policy in recent years. It also surveys the available material on central bank monetary policy programmes implemented by the US Federal Reserve (FED), the European Central bank (ECB) and the Bank of England (BoE) and the effectiveness of these programmes.

Chapter 3 Research methodology: This chapter validates the research methodology and research design used in the research report. This includes describing the data collected for the relevant period under research and certain event studies conducted. It also provides an overview of the assumptions used to construct the database.

Chapter 4 Results: This chapter corroborates the results achieved through the application of the applicable data analysis.

Chapter 5 Summary, conclusion and recommendations: This chapter presents the main findings of this research report.

Chapter 6 Conclusion: A conclusion and closing remarks is given regarding the results obtained.

Chapter 7 Recommendations and future research: Recommendations for further research are presented.

CHAPTER 2:
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter seeks to answer the question: Has the adoption of the BoJ's APP been effective in stimulating economic growth and combatting deflation?

It starts off by providing a brief overview of exchange-traded funds, the instrument adopted by the BoJ in executing its unconventional monetary policy programme. It proceeds to survey the available material on unconventional monetary policy programmes, implemented by the US Federal Reserve (FED), the European Central bank (ECB) and the Bank of England (BoE). Lastly, the available literature on the BoJ's monetary easing policy measures since the 1990s, with a specific focus on the introduction of a new APP from October 2010 and the emergence of Abenomics are presented. This chapter is important, because it lays the foundation for justification of the research objective.

2.2 EXCHANGE-TRADED FUNDS

An exchange-traded fund is an open-ended fund listed on a stock exchange and traded like an ordinary share. It enables investors to gain exposure to an index or a specific group of assets through the purchase of one security (Investopedia, 2018).

One of the key characteristics of ETFs, is that they provide the returns of a tracker fund (such as a unit trust), while also providing the liquidity of a listed security. ETFs are usually traded at prevailing market prices which are approximately the same price as the net asset value of their underlying assets over the course of a trading day.

Some of the principal benefits of investing in an ETF include the following:

- ETFs provide investors with exposure to a variety of underlying instruments;
- Units in an ETF can be bought and sold quickly at a relatively low cost (as a result of it being classified as a passive instrument); and
- Although the price of an ETF and its underlying instruments may fluctuate, the risk of financial losses is reduced given the diversification of the underlying instruments that the ETF invests in.

In a policy statement released on 15 March 2016, the BoJ updated its criteria for its ETF purchase programme. These included: (i) the eligibility criteria for indices; and (ii) eligibility criteria for ETFs to be purchased.

The criteria for eligible indices are the following:

- Evaluation of firms' investment in physical and human capital (including their growth potential);
- Credit worthiness and diversification;
- Marketability; and
- Other criteria.

Furthermore, the BoJ announced the management of ETFs tracking of the Nikkei 400 index, in addition to the Nikkei 225 index, up to that point in time (March 2016).

The BoJ typically announces new monetary policy measures in a monetary policy statement. This is followed about a month later by an operational framework, which provides guidelines on the primary terms and conditions. Under its asset purchase programme, the BoJ conducts multiple auctions with fixed schedules for government securities, commercial papers, and corporate bonds.

Purchases of ETFs and Japanese real estate investment trusts (J-REITs) are under flexible dates. The exits of previous outright purchases are usually pre-announced and contingent on macro-economic conditions. In doing so, the event study (which is also used as the basis of this study's research design) is augmented by focusing on the effects of each announcement, expansion or exit, and actual purchases (Lam, 2011).

The BoJ's ETF purchase programme relies on the no arbitrage condition which links the net asset value (NAV) of the ETF (which is just the value of all the underlying stocks in an ETF) to its price. On average, a vanilla ETF (an ETF that physically replicates the underlying portfolio) does not deviate at all from its NAV as any mispricing is immediately taken up by the arbitrageurs. Hence, instead of purchasing all the stocks individually in the Japanese stock market, the BoJ makes a large purchase of an ETF, which, all else being equal, should push up its price relative to the underlying stocks. The arbitrage mechanism than kicks in. If the ETF price is higher than the portfolio of the underlying stocks, it makes sense for the market players to buy up the portfolio of the underlying stocks and to deliver it to the ETF provider who creates an ETF that can

be sold at a higher price. The demand for the underlying stocks brings the two instruments into parity.

A recent article published by Bloomberg, highlighted the BoJ's ever increasing presence in the domestic ETF market (Nakamura, Kitanaka, & Sano, 2016). Up to April 2016, the BoJ's ETF purchases have made it a top-ten shareholder in about 90% of the Nikkei 225 index, according to estimates compiled by Bloomberg from public data. This has lead the BoJ to surpass both BlackRock Inc. (the world's largest money manager), and the Vanguard Group, which oversees the management of more than $3 trillion in funds worldwide (Nakamura et al., 2016).

On the 29 July 2016, the Bank of Japan announced that it would nearly double its annual purchases of exchange-traded funds from ¥3.3 trillion ($32 billion) to ¥6 trillion. As a result of this, Lewis and Colback (2016) noted that brokers in Tokyo have been found selling stocks, with the aim of buying fund flows instead of the fundamentals. Lewis and Colback (2016) further noted that this so-called "fund flow trade", "plays on the warping effects that the central bank's ETF buying programme are having on equity, bond, currency and real estate investment trust markets".

Day traders experience a sort-term phenomenon of guessing when the BoJ will enter the market, and buying moments before that happens. However, for the long-term players, market distortions created by the negative interest rate environment currently experienced in the Japanese economy, are being overwhelmed by the unintended consequences of the BoJ's moves (Lewis & Colback, 2016).

The BoJ's ETF programme is designed to boost stocks, stimulate economic growth and encourage the public to invest in the domestic market. Lately, however, its application has become increasingly viewed as a sign of worsening desperation for the BoJ, given the government's (failed) adoption of Abenomics.

2.3 USE OF UNCONVENTIONAL MONETARY POLICIES BY CENTRAL BANKS

The recent financial crisis posed many challenges for monetary policies and central banks. Even though conventional monetary policy was able to achieve low and stable inflation, it did not prevent these asset market bubbles from occurring (Joyce, Miles, Scott, & Vayanos, 2012). Since the financial crisis, central banks started focusing on achieving and maintaining financial stability, in addition to targeting inflation. This prompted central banks to include macro prudential tools and a strengthening of capital

adequacy and liquidity rules through Basel III, in their arsenal of policy instruments (Joyce et al., 2012).

A challenge facing central banks today is the ability of conventional monetary policy tools to restore the economy to a climate of normality.

2.3.1 The US Federal Reserve Bank

In its normal course of business, the FED conducts monetary policy by setting a target for the federal funds rate, i.e., the rate at which banks borrow and lend reserves on an overnight basis. It conducts this through the following policy tools, discussed in detail below:

- Open market operations;
- Changing reserve requirements; and
- Changing the two interest rates it administers directly by authorisation, which then influences market rates.

Market operations involve the FED buying existing US Treasury securities in the secondary market. This is done through newly-issued currency, which expands the reserve base and increases the ability of depository institutions to make loans and expand money and credit. In order to sell securities from its portfolio, the reverse would apply. Traditionally the FED makes use of repurchase agreements (or reverse repurchase agreements) when it wishes to add (or remove) liquidity to (or from) the banking system. A deviation from this method occurred between 2009 and 2014, whereby the FED resorted to the outright purchases of securities as part of its quantitative easing programme.

Changing reserve requirements, specifies which portion of customer deposits banks must hold on deposit at the FED. This tool affects the liquidity available in the federal funds market. Currently the reserve requirements are set between zero percent and ten percent of liabilities. However, this tool is rarely used, as the last percentage change recorded was in 1992 (Labonte, 2018).

The FED’s third policy tool, permits depository institutions to discount at the FED some of their own assets to provide a temporary means for obtaining reserves (Labonte, 2018). Discounts are usually on an overnight basis and are set at a small mark-up over the federal funds rate.

At the end of 2007, the federal funds rate was set at 5.02%. Because of the financial crisis, the federal funds target was reduced from 5.25% to a range of zero percent to 0.25% in December 2008 (Figure 2.1).

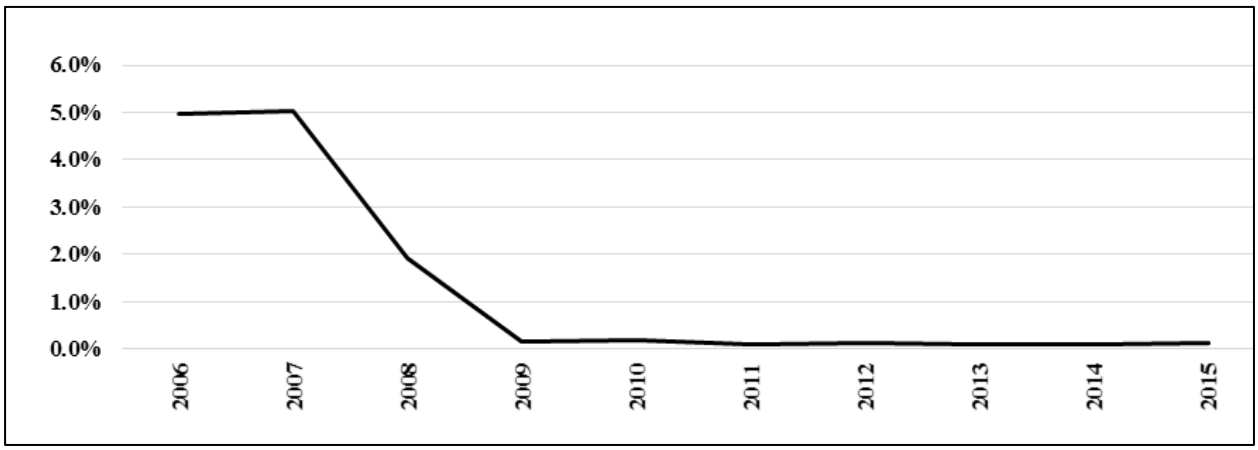


Figure 2.1: US Federal Funds Rate: 2006-2015

Source: US Federal Reserve Data Releases (2016).

During this period of zero lower bound rates, the FED attempted to provide additional stimulus through its own version of quantitative easing. This was conducted through the unsterilised purchases of Treasury and mortgage-backed securities. By October 2014, the FED had conducted three rounds of quantitative easing (starting in 2009), at which point its balance sheet had increased to $4.5 trillion, i.e. five times its pre-crisis level.

In September 2014, the FED announced a framework for normalising monetary policy after quantitative easing. This included raising interest rates in the presence of a large balance sheet mainly by raising the rate of interest paid to banks on reserves and by engaging in reverse repurchase agreements (reverse repos) (Labonte, 2018).

In anticipation of a global economic recovery, led by the US, the FED increased interest rates for the first time in December 2015. In its statement, the FED stated that it expected “economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run”.

2.3.2 The European Central Bank

The eurosystem is characterised by monetary policy inflexibility. Unlike its American, English and Japanese counterparts, the ECB faces the difficulty of managing several diverse economies under one monetary policy. Consequently, the ECB's main focus is bank lending, which unlike other central banks, have a wider range of monetary policy tools at their disposal.

The ECB was originally set up to pursue price stability as its main objective. As secondary goals, it had the task of facilitating economic growth and financial stability.

As part of the ECB's monetary policy strategy, it sets out the required interest rate appropriate for achieving price stability. This is defined by the ECB as "a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%" (European Central Bank, 2016). The target refers to the year-on-year increase in the HICP, an index that has been synchronised across the Eurozone countries to closely estimate the price of a representative basket of consumer expenditure (Micossi, 2015). Whilst inflation forecasting is at the core of the ECB's monetary policy, the ECB does not adhere to a formal inflation targeting strategy. Instead, it involves quasi-automatic reactions to deviations of forecast inflation from the target over a predetermined time horizon (Micossi, 2015).

The ECB's operational framework, involves a set of instruments and procedures to achieve the desired interest rate. This includes: (i) "buying and selling outright (spot and forward) or under repurchase agreement and by lending or borrowing claims and marketable instruments, whether in Community or in non-Community currencies, as well as precious metals"; and (ii) "conducting credit operations with credit institutions and other market participants, with lending being based on adequate collateral" (European Central Bank, 2003).

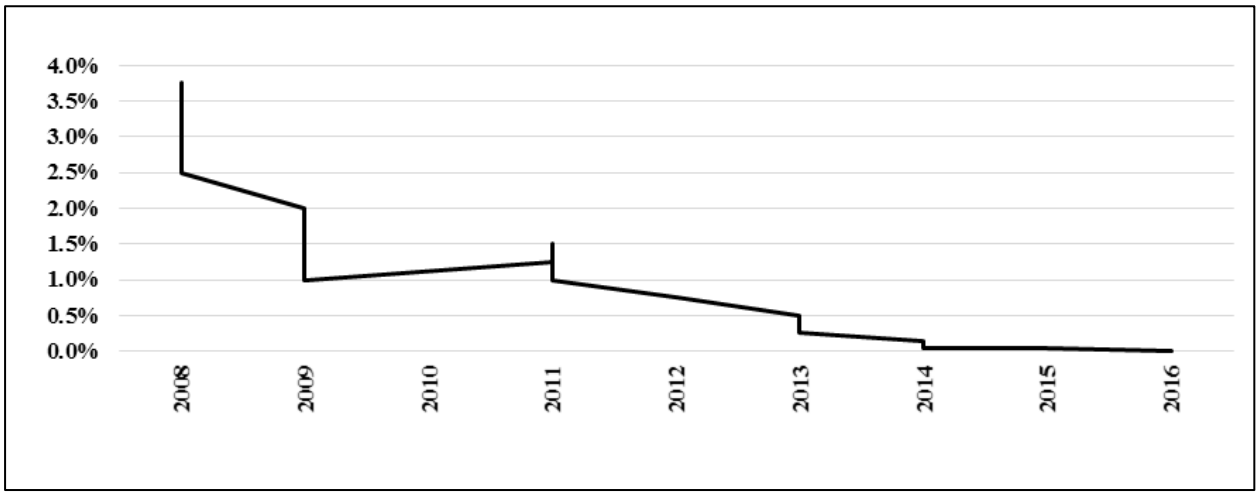


Figure 2.2: ECB main refinancing operations fixed-rate tenders: 2008-2016

Source: Statistical Data Warehouse (2016).

Up to 2008, the ECB's interest on main refinancing operations, which provide the bulk of liquidity to the banking system, were measured through variable rate tenders. Halfway through 2008, this figure stood at 4.25% (Figure 2.2). As the collapse of Lehman Brothers across the Atlantic struck, the ECB acted accordingly, aggressively lowering interest rates. This resulted in the lowering of its fixed rate tenders from 3.75% on 15 October 2008, to 2.50% by the end of that year (Figure 2.2**Error! Reference source not found.**). As the economic crisis persisted, rates were lowered further to 1% by mid-2009. During this period, the ECB also launched its first Covered Bond Purchase Programme. By doing so, the ECB represented a primary source of funding for European banks, which had dried up in terms of both liquidity and issuance (Micossi, 2015). Under this programme, the ECB purchased roughly €60 billion worth of securities, increasing its balance to over €2 trillion.

Due to distressed market conditions, the ECB launched its Securities Market Programme in May 2010. This involved the purchase of unspecified amounts of distressed sovereign bonds in the secondary market during the periods May to June 2010 and August to November 2011. In 2012, against the backdrop of Greece's sovereign crisis and the possible collapse of the entire Eurozone, the ECB abandoned this programme in favour of its Outright Monetary Transaction (OMT). Under this programme, the ECB would "be prepared to intervene for unlimited amounts in secondary sovereign-bond markets of specific Eurozone members, with no pre-specified time limit" (Micossi, 2015).

The programme led to the gradual decline of spreads of distressed sovereign nations, restoring cross-border funding flows back for peripheral (Micossi, 2015). Micossi (2015) noted that the success of the OMT proved that the banking crisis post-2010, had been a product of ill-designed monetary institutions, as opposed to reckless budgetary policies of some member states.

In the latter part of 2014, the Eurozone economy unexpectedly slowed down, due to some peripheral countries falling back into recession. As inflation continued to decline, and negative rates started to spread to more Eurozone nations, the fear of deflation was on the rise. This prompted the ECB to launch an asset-backed securities purchase programme and a new covered bond purchase programme in the fall of 2014. “In both cases, the purpose was to encourage greater lending to the private sector by strengthening the incentive to supply loans that could be securitised at attractive conditions (in markets still largely impaired) and by facilitating bank funding at comparable terms” (Micossi, 2015).

These programmes did little to stem the rising tide of deflation. By the end of 2014, both inflation and the gross domestic product (GDP) deflator for the Eurozone had fallen from 2.5% and 1.5% in 2012, to 0.4% and 0.8% respectively (Figure 2.3**Error! Reference s ource not found.**). On 22 January 2015, like its Japanese counterpart, the ECB was forced to adopt quantitative easing. This involved an extension of its asset purchase programme, under which the ECB would purchase €60 billion of private and government securities every month, beginning March 2015 (up to September 2016).

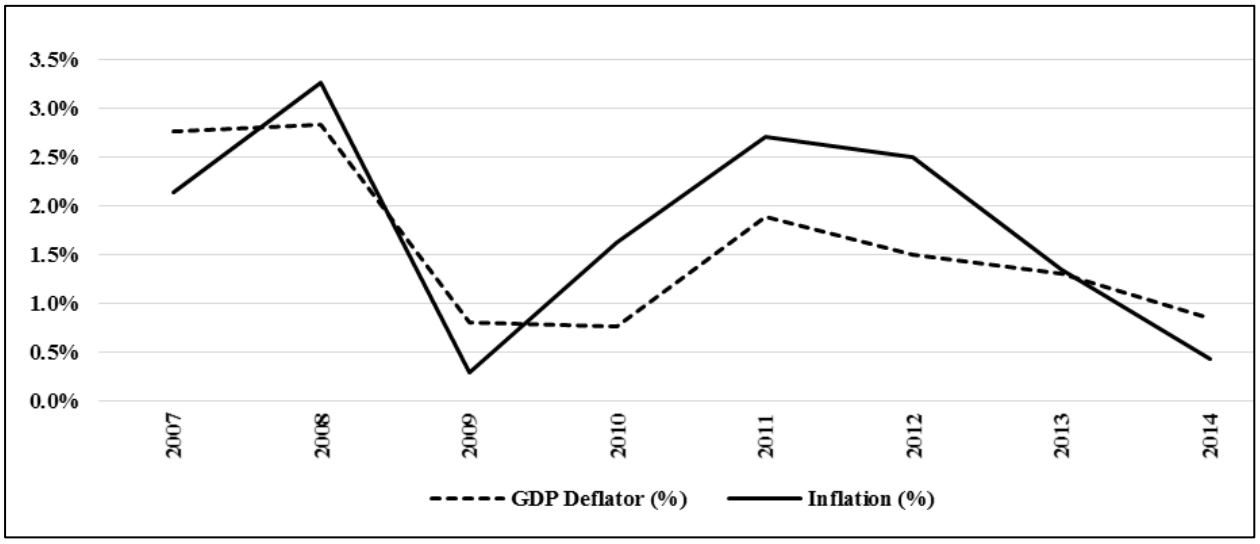


Figure 2.3: Euro area inflation and GDP deflator: 2007-2014

Source: The World Bank (2014).

2.3.3 The Bank of England

The failure of Lehman Brothers in 2008, triggered a collapse in the performance of most economies around the world. Consequently, international financial markets became dysfunctional and credit conditions tightened. England was no exception.

These factors prompted the BoE to adopt loosening monetary policies. During this period, the BoE revised interest rates sharply downward, starting with 300 basis points in the latter part of 2008. Rates were revised downward again in early 2009 to 0.50% (Figure 2.4)Figure **Error! Reference source not found.**.

Figure 2.4: UK overnight interbank rate: 2006-2015

Source: Organisation for Economic Co-operation and Development (OECD) (2017).

At the time it was clear that lower-bound interest rates would do little to help the BoE achieve its targeted inflation rate of 2% over the medium term. Thus, additional measures were needed. To this end, the BoE announced a large-scale asset purchasing programme of public and private assets using central bank money. By expanding its balance sheet, the BoE would pump money into the economy, thus encouraging spending in order to achieve its targeted inflation rate of 2% (i.e. quantitative easing).

The majority of the BoE's asset purchase programme was predominantly focused on United Kingdom (UK) government bonds. Between March 2009 and January 2010, the BoE purchased £200 billion of assets. These represented roughly 30% of the amount of outstanding UK government bonds held by the private sector, which at the time, accounted for roughly 14% of annual nominal GDP (Joyce, Tong, & Woods, 2011).

Joyce et al. (2011) noted that there was indeed circumstantial evidence that the purchasing of government bonds had improved confidence in financial markets. These authors found this evidence by analysing distributions around future asset prices implied by options markets. They noted that “the option-implied distribution around the Financial Times Stock Exchange 100 Index (FTSE 100) twelve months ahead did not just shift horizontally in line with the increase in the index in the period following QE purchases, but also narrowed markedly”. These findings suggested that investors placed much less weight on large downside risks. In addition hereto, the shape of the derived distribution was consistent with investors being more confident about the outlook for future equity prices (Joyce et al., 2011).

In their analysis of confidence for households and firms, Joyce et al. (2011) found that the declines in confidence levels for both consumers and firms post the financial crisis, were completely reversed in 2009, as the UK government entered into its quantitative easing programme. Although Joyce et al. (2011) acknowledged that it is difficult to determine how much of those increases were directly attributable to QE (as a result of the recovery of the global economy), they noted that “movements are consistent with QE having reduced the perceptions of large downside risks and uncertainty in the economy as a whole during 2009”.

2.4 THE CURIOUS CASE OF THE BANK OF JAPAN AND ABENOMICS

2.4.1 Overview

The root of Japan’s current dilemma of persistent deflation can largely be attributable to exceptionally poor monetary policy-making decisions, in the period leading up to the 1990s. These monetary policy-mistakes included (Bernanke, 2000):

- Failure to tighten policy from 1987 to 1989, despite evidence of growing inflationary pressure;
- The apparent attempt to deflate the market bubble in 1989 to 1991; and
- The failure to apply adequate monetary easing from 1991 to 1994.

Japan's economy has been in stagnation following the collapse of the real estate and stock market bubble in the early 1990s (with a few exceptions). Growth in GDP between the period 1992 to 2002 averaged 0.8% per annum (Figure 2.5). This was significantly lower than the average GDP growth of 4.5% achieved in the preceding decade. Also, during this period 1992 to 2002, inflation (consumer prices) fell by roughly 176.8%, and has remained predominantly negative since then. This era is commonly referred to as "the lost decade" by economists.

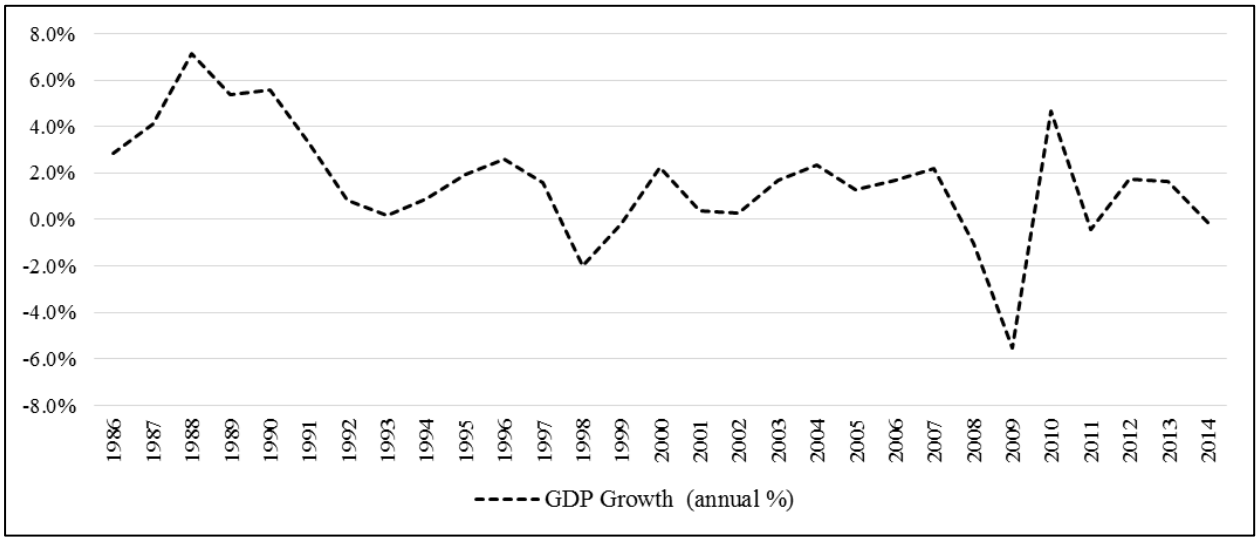


Figure 2.5: The Lost Decade: 1992-2002

Source: OECD (2017).

After quasi-stagnation between 1992 and 1993, the economy recovered between 1994 and 1997. However, the economy fell back into a recession following Japan's value-added tax (VAT) rate increase in 1997:Q2, from 3% to 5% (Figure 2.6) It should be noted that private consumption started to grow in 1997:Q3, only one quarter post the tax increase, and that the effects of the Asian financial crisis and a weakening bank sector, were arguably more significant.

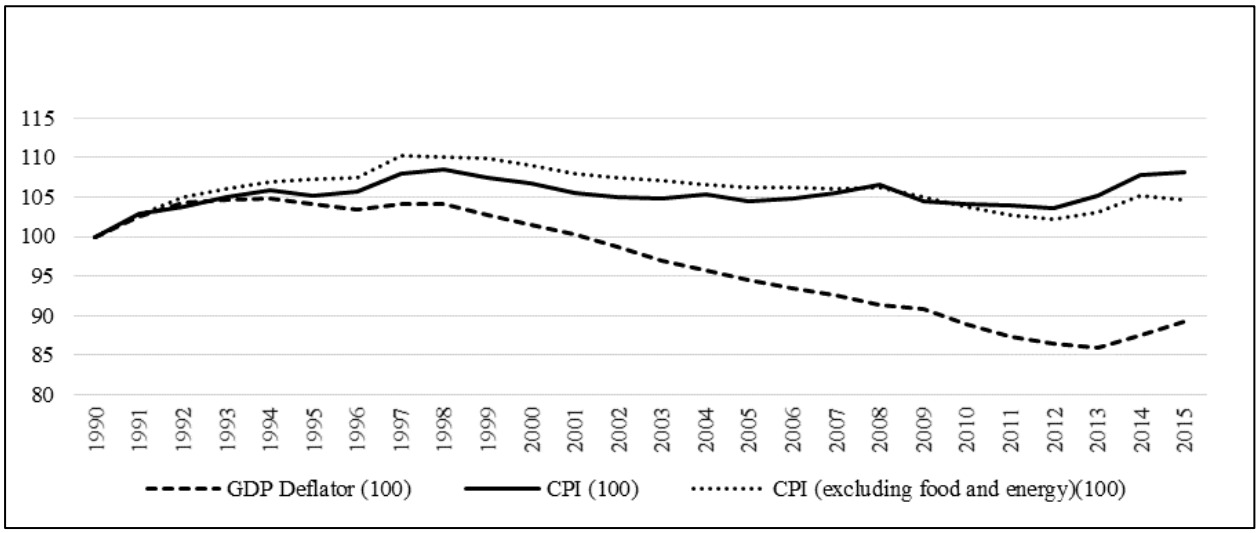


Figure 2.6: Japan CPI: 1990-2015

Source: OECD (2017).

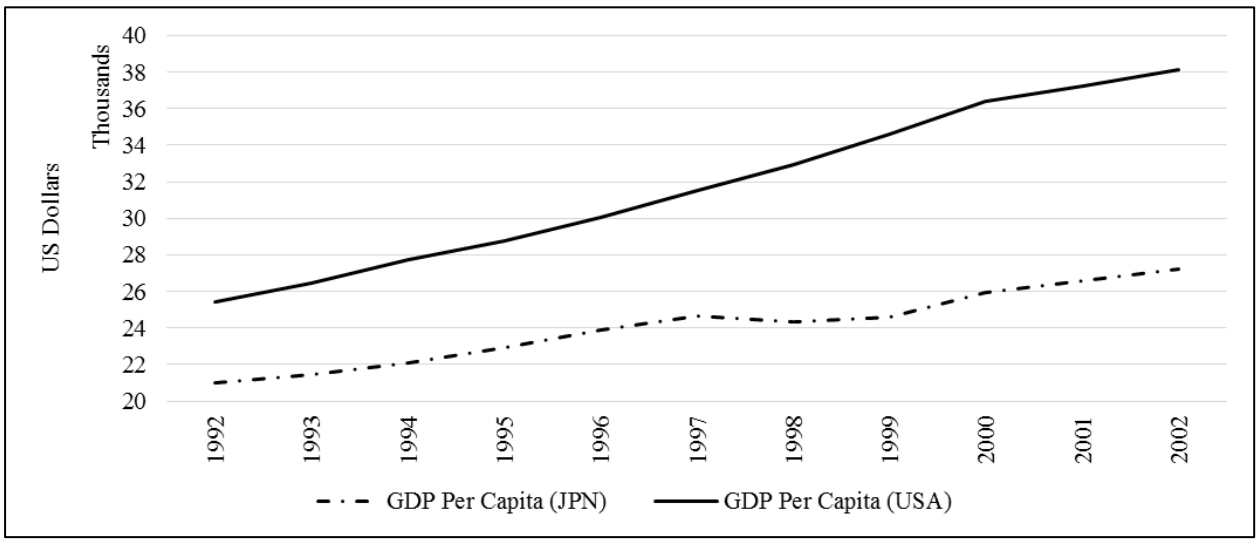


Figure 2.7: Relative GDP per capita analysis: 1992-2002

Source: OECD (2017).

The impact of Japan's lost decade is best illustrated by the decline in the country's GDP per capita figure. From 1992 to 2002, GDP per capita for the US increased by roughly 49.8%, whilst Japan's GDP per capita increased by 29.8% over the same period (Figure 2.7).

Price indicators such as core consumer price index (CPI) (excluding food and energy), overall CPI and the GDP deflator started to decline, following the economic shocks in the early 1990s. The appearance of excess capacity and negative output were largely

responsible for the decline in prices since the mid-1990s. Van der Putten (2013) noted that the extended duration of overcapacity can be explained by the wave of adverse shocks that hit the Japanese economy during this period. These include the asset price bubble in the early 1990s, the Japanese financial crisis and the Asian financial crisis in the latter half of the 1990s, the dotcom bubble in the early 2000, and the global financial crisis in 2008 (Van der Putten, 2013).

2.4.2 BoJ's movement to zero-interest rates

Macro-economic and financial policy failures contributed largely to the underperformance of the Japanese economy during the lost decade. These entailed insufficient budgetary stimulus and wasteful spending, a lack of proactive monetary policy, and the monetary authorities' late response to the banking crisis (Van der Putten, 2013). In an attempt to revive the economy during the lost decade, the government reverted to the application of fiscal stimulus. In 1995, general government debt as a percentage of GDP was roughly 93.7%. By 2002 this figure had increased to roughly 161.8% (Figure 2.8).

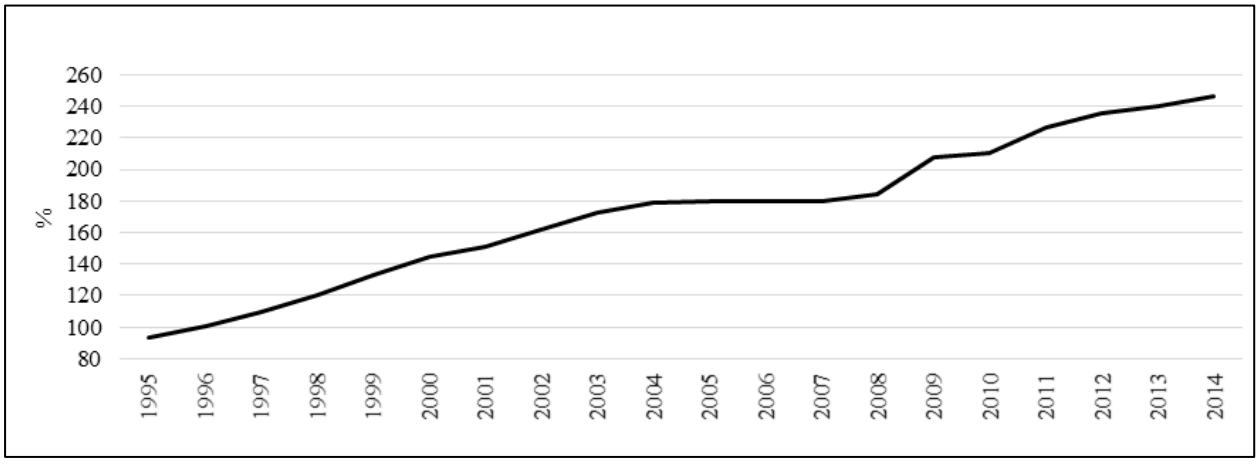


Figure 2.8: Japan's gross debt as percentage of GDP: 1995-2014

Source: OECD (2017).

Van der Putten (2013) highlighted disappointing tax receipts, the inefficient use of fiscal stimulus and the recapitalisation of the banking sector by the government as reasons for the significant increase in this figure. Furthermore, the BoJ waited too long to intervene through monetary policy measures. This was exacerbated by the blocking of some transmission channels, due to the problems faced by the banking sector (Van der

Putten, 2013). The culmination of these events meant that the monetary authorities were facing a very stark reality – falling prices and close to zero-interest rates. This left the economy of Japan in a liquidity trap, with the BoJ unable to lower interest rates any further.

On 12 February 1999, the BoJ announced its decision to lower interest rates from 0.5% to 0.15%, in what effectively amounted to a zero-interest rate policy. This policy stance was further supported by the BoJ's announcement on 21 September 1999, that it would maintain a zero-interest rate policy "until deflationary concerns subside". By August 2000 the Japanese economy was showing signs of recovery. Growth in GDP increased from minus 0.2% in 1999 to 2.3% in 2000. This prompted the BoJ to lift its zero-interest rate policy and the overnight rate increased to 0.25%. However, the recovery was short-lived as 2000 to 2001 saw the emergence of the dotcom bubble, which resulted in downward pressures on prices, stemming from weak demand.

As noted at the BoJ's Monetary Policy Meeting held on 19 March 2001: "Whereas fiscal policy has repeatedly implemented expansionary measures, the Bank of Japan has adopted a policy of maintaining interest rates at levels unprecedentedly low during the history of central banking at home and abroad, thereby providing ample liquidity".

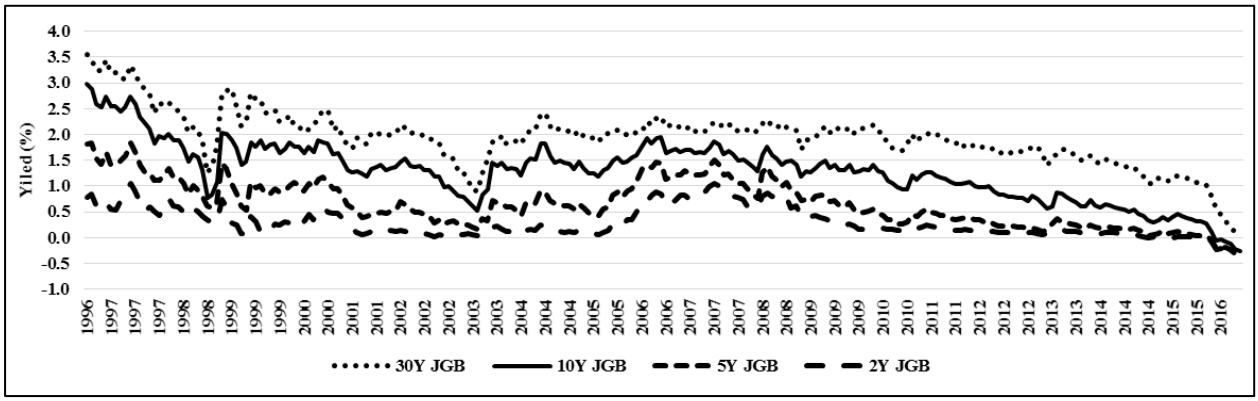
The BoJ was subsequently forced to resort to monetary easing yet again. This included:

- Abandoning the overall call rate in favour of current account balances as the policy target;
- Increasing the current-account balance at the BoJ to ¥5 trillion (a 25% increase);
- Lowering interest rates to virtually zero; and
- Increasing the outright purchase of long-term government bonds.

This policy would be kept in place until such time as the CPI registered stably at zero percent or an increase year-on-year. Increases in the CPI, a gradually narrowing output gap, and higher household expectations regarding inflation and productivity gains spurred on by rising exports, led the BoJ to abandon its quantitative easing policy in March 2006. The question remains whether quantitative easing during this period had been successful? It was noted that during the period 2003 to 2007, the increase in the monetary base had hardly any effect on inflation.

The GDP deflator was still negative and despite the BoJ's expansive monetary easing programme, GDP only increased by 1.2% from 2003 to 2007. However, what is

encouraging to note was the increase in annual GDP growth (an average of 1.8%) and the decrease in the government deficit from 2003 to 2007. During this period, the BoJ's QE programme also had a positive effect on asset prices, including Japanese Government Bonds (JGBs) (Figure 2.9**Error! Reference source not found.**) and the N ikkei 225 (Figure 2.10**Error! Reference source not found.**). The overall consensus by economists however, is that QE up to this point, had failed to move the Japanese economy out of deflation.



** Note: 2016 is for the period 31/01/2016 – 31/07/2016*

Figure 2.9: Japanese Government Bond yields: 1996-2016

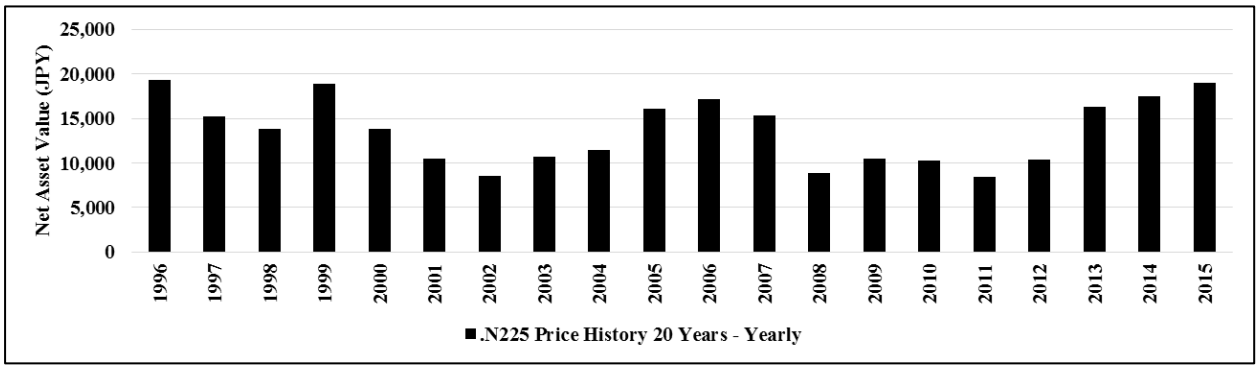


Figure 2.10: Nikkei 225 price history: 1996-2015

Source: Reuters, 2017a.

2.4.3 The 2007-2008 global financial crisis

With inflation on the rise and GDP growth looking encouraging, the Japanese economy was showing signs of recovery. As a result, the BoJ's overnight rate was increased from 0.25% to 0.50% in February 2007. Unfortunately, this soon came to an abrupt halt. The

emergence of the global financial crisis, had a profound effect on most global economies. The collapse of Lehman Brothers sent shockwaves through global markets, causing many to question whether America's "too big to fail" financial institutions, would be able to survive the crisis. Fortunately, Japan's financial institutions were sufficiently capitalised compared to its western counterparts. However, the risk of the Japanese economy falling back into deflation caused the BoJ to lower its policy rate yet again. A reduction of 20 basis points in October 2007 was followed by an additional decrease of 20 basis points, reducing the policy rate to 0.10% by the end of that year. Additional measures included the BoJ's increase in its outright purchases of JGBs (an increase of ¥1.4 trillion per month) and the introduction of measures to facilitate corporate financing (including outright purchases of commercial paper).

2.4.4 The emergence of "Abenomics"

By the end of 2008, Japan's GDP had declined by 1.0%. Persistent weak industrial production and pallid household consumption were largely to blame for Japan's lacklustre economic performance. As a result, the BoJ expanded its monetary policy toolkit through a series of monetary easing measures in early 2009. These measures included a fixed-rate funds-supplying operation, increased purchases of government securities, and a clearer policy commitment to a zero-interest rate policy. These were further enhanced through the introduction of a new funds-supplying operation, to encourage a further decline in longer-term interest rates, towards the end of 2009.

By the end of 2010, the Japanese economy was again showing encouraging signs of recovery. As the growth rate of the global economy started to increase, led by emerging and commodity-exporting economies, Japan's exports and production showed signs of resuming an uptrend. In addition hereto, business fixed investment started to pick up and although the employment and income situation remained severe, housing investment also showed signs of recovery. Meanwhile, financial conditions continued to ease further. The year-on-year rate of decline in the CPI (excluding fresh food) also expected to continue slowing. These figures culminated in GDP growth of 4.7% by the end of 2010. This also saw the extension of the BoJ's APP (introduced in October 2010), which for the first time, included the purchase of risky assets (i.e. ETFs amongst others).

On 11 March 2011, Japan's expected return to an inflationary environment was dealt a severe blow, due to the Great East Japan Earthquake. Several supply-side constraints which ensued from the widespread geographical damage caused by the earthquake, forced the BoJ to adopt additional monetary-easing measures. Consequently, the contribution of ETFs towards the BoJ's APP had increased to ¥1.4 trillion by October 2011.

Following Japan's economic recovery from the 2011 earthquake, the BoJ found itself yet again in familiar territory, namely, that of deflation. Once again, persistent weak industrial production and pallid household consumption were to blame. However, in addition hereto, many economists also blamed Japanese policy-makers for insufficiently aggressive responses to these trends (Hausman & Wieland, 2014). The appointment of Shinzo Abe's government in late 2012, seemed to mark a radical departure from those previously inefficient policies implemented by his predecessors.

Following a landslide victory by the Liberal Democratic Party at the end of 2012, Shinzo Abe was again appointed as the Prime Minister of Japan. Central to his campaign, was the proposition of a forceful strategy to end the period of deflation that had long plagued the Japanese economy since the latter half of the 1990s. In an attempt to jump-start Japan's spluttering economy, the BoJ enacted a monetary regime change in early 2013. This included an inflation target of 2% and specified concrete actions to achieve this goal by 2015. These actions were supported by fiscal policy measures, including planned structural reforms from the government. With the help of aggressive monetary easing measures, this new policy package became known as "Abenomics" (in reference to the government of Shinzo Abe). At the time of its implementation, the BoJ hoped that these new policy measures would put an end to two decades of stagnation and deflation.

2.4.5 Impact on financial markets

Broadly speaking, Abenomics consists of the three strategies: (i) fiscal stimulus; (ii) loose monetary policy; and (iii) a growth strategy aimed at raising potential growth, collectively referred to as "the three arrows". The symbolism of the three arrows is derived from a well-known Japanese story about the 16th century warlord, Mōri Motonari. The essence of the story is that a single arrow (in this case policy) can

easily be broken, but three arrows held together cannot. It was used by the filmmaker Akira Kurosawa for his movie *Ran* (Van der Putten, 2013).

In addition to its APP at the time (which involved a fixed termination date of January 2014), the BoJ introduced an additional open-ended supplementary budget of ¥10 trillion. The second strategy saw the BoJ increasing its inflation objective to 2%, because of increased pressure from the government. Under the new governor, Haruhiko Kuroda, the BoJ pledged to step up its APP by extending it to government bonds with more than three years to maturity, and increasing its purchase of risky assets (including ETFs). Abe's "third arrow" centred on three pillars: (i) enhancing the potential of the private sector; (ii) improving the utilisation of the working-age population; and (iii) developing new markets (Van der Putten, 2013).

Before Abe took office, government bond yields were close to zero percent. Despite a brief rally in 2012 and again in 2013, yields continued this trend, dropping below zero in 2015. This seems to mirror the findings by Hausman and Wieland (2014), that any expectation of increased inflation induced by the BoJ, has not led to higher nominal interest rates (even over long horizons).

As a result of small changes to nominal interest rates, expected inflation has been the primary cause of movements in real interest rates (Hausman & Wieland, 2014). In order to measure Japanese expected inflation, Hausman and Wieland (2014) made use of inflation swap rates, proposed by Mandel and Barnes (2013) and the follow-on work of Krugman (2013), which involve uncovered real interest parity and the purchasing power parity condition using US inflation-linked bonds. Hausman and Wieland (2014) found that during the observed period (between October 2012 and January 2014), ten-year inflation swap rates rose from 1.1% to 1.9%, thus translating into a 100 basis points increase in long-term inflation expectations as a result of Abenomics.

A thorn in the side of Abenomics has been the strong performance of the yen. However, the yen's meteoric rise can be partly attributed to bad luck. Concerns over the dollar's weakness, due to the FED's hesitance on lifting interest rates, is partly to blame. Another factor has been the influx of safe-haven flows into the yen, because of the unwinding of a hugely popular investment strategy by foreign investors: buying Japanese stocks, while shorting the yen, betting that it would decline in value against the dollar (Frangos, 2016). Selling Japanese stocks, whilst simultaneously closing out short yen positions, causes the yen to rise which in turn signals further sale of stocks.

This is largely attributable to most Japanese companies' reliance on a cheap yen, in order to remain profitable.

Not surprisingly, these events are echoing investors' weariness of the effectiveness of Abenomics, its accompanying negative interest rate policy and APP.

2.4.6 Impact on inflation

The three key measures of Japanese inflation are: (i) the CPI; (ii) the CPI (excluding fresh food and energy); and (iii) the GDP deflator. Figure 2.11 shows the movement for these key indicators during the period 2006 to 2015.

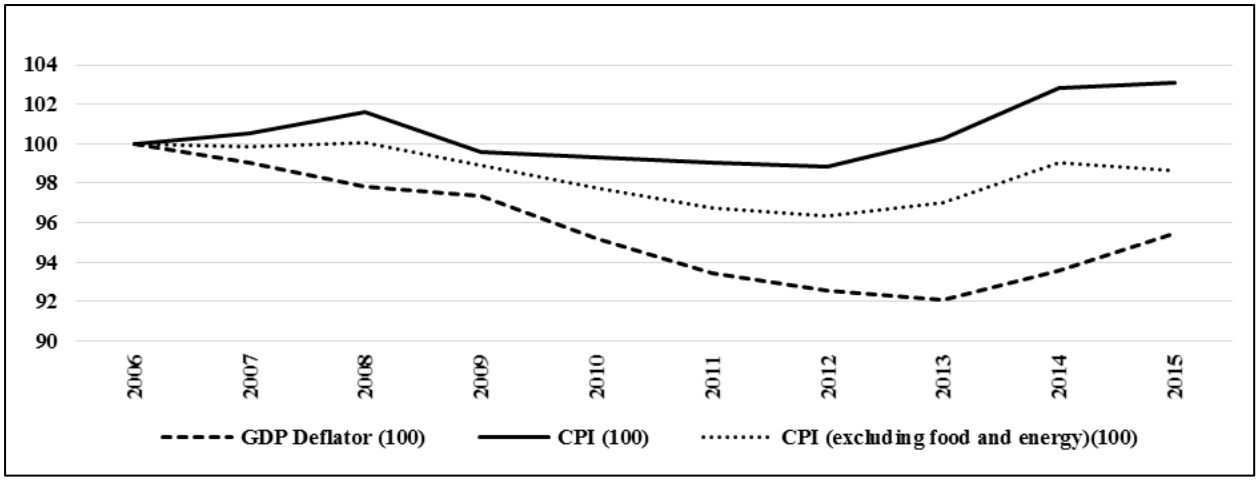


Figure 2.11: Japanese inflation: 2006-2015

Source: OECD (2017).

Overall CPI showed an increase of 1.5% from 2012 to 2013. This trend continued in 2014, with an increase of 2.6%. The constraint of using this benchmark, is that overall CPI takes into consideration energy and fresh food prices, both of which are sensitive to the yen's value (Hausman & Wieland, 2014). Core CPI (i.e. CPI excluding food and energy) excludes these two categories, thus making it a more reliable benchmark in order to ascertain the effect of Abenomics on inflation.

Table 2.1 Japanese Inflation: 2012-2015

	12-month % change		
Period	*GDP Deflator*	*CPI*	*CPI (excluding food and energy)*
Dec. 31, 2012	-0.9%	-0.2%	-0.5%
Dec. 31, 2013	-0.6%	1.5%	0.7%
Dec. 31, 2014	1.7%	2.6%	2.1%
Dec. 31, 2015	2.0%	0.3%	-0.4%

Source: OECD (2017).

The figures presented in Table 2.1 show core CPI increasing in 2013 to 2014, although by far less than overall CPI. However, in the 12 months ending 31 December 2015, core CPI actually fell by 0.4% year-on-year. The GDP inflator is also a reliable benchmark for measuring inflation, as it excludes all imports. Years of steady decline came to a halt in 2013, with year-on-year increases of 1.7% and 2.0% recorded at the end of 2014 and 2015 respectively. Although showing promising signs, these figures suggest that positive inflation has yet to be established.

In a recent policy statement (16 June 2016) the BoJ stated that exports and production are expected to remain sluggish. In addition hereto, risks including: “uncertainties surrounding emerging and commodity-exporting economies, particularly China, developments in the US economy and the influences of its monetary policy response to them on the global financial markets, prospects regarding the European debt problem and the momentum of economic activity and prices in Europe, and geopolitical risks” will continue to negatively impact business confidence of Japanese firms (Funo, 2017, p.2). As a result thereof, the researcher is of the opinion that conversion of the deflationary mind-set in Japan is expected to be delayed for the foreseeable future.

2.4.7 The Bank of Japan

In March 2001, in the wake of a sharp downturn in the global economy and in an attempt to resuscitate the stagnant Japanese economy, the BoJ embarked on a monetary policy colloquially referred to as “quantitative easing” (QE).

The policy, which was unprecedented at the time, resulted in the implementation of the following policy actions (Bank of Japan, 2001):

- A change in the operating target for money market operations;
- A consumer price index (CPI) guideline for the duration of the new procedures;
- An increase in the current-account balance at the BoJ and declines in interest rates; and
- An increase in outright purchase of long-term government bonds.

The main operating target for money market operations was changed from the uncollateralised overnight call rate to the outstanding balance of the current accounts at the BoJ. In addition hereto, the target for current-account balances of commercial banks at the BoJ, was increased significantly above the required reserve levels which the BoJ targeted (from ¥4 trillion to ¥5 trillion) (Bank of Japan, 2001). The BoJ also committed to maintain this policy, until such time as the consumer price index would register stable at zero percent or an increase year-on-year.

The BoJ's argument for a change in its monetary policy approach, was that further nominal interest rate target reductions were constrained to be too small (at the time, nominal interest rates were bounded at zero). As a result, possible stimulus obtained through additional reductions in the interest rate target, would be insignificant. It should also be noted that in the view of the BoJ, the implementation of QE would not be able to return the economy to a sustainable growth path in isolation, but also required progress to be made in structural reforms with respect to the financial system as well as in the areas of economy and industry.

After the incidents of 9/11 on 11 September 2001, balances of current bank accounts held at the BoJ rose as high as ¥12.5 trillion, but was gradually reduced to ¥7 trillion a month later (Spiegel, 2001). This was accompanied by the increase in the BoJ's outright purchase of long-term government bonds from ¥400 billion per month to ¥600 billion per month, as well as an unsterilised intervention against the dollar, in which the BoJ allowed the intervention to increase the money supply (Spiegel, 2001).

From the outset, the BoJ's application of QE drew scepticism from market observers on whether it would have any impact on the real economy. This was largely attributable to the fact that overnight interest rates were already close to zero. Spiegel (2006) also

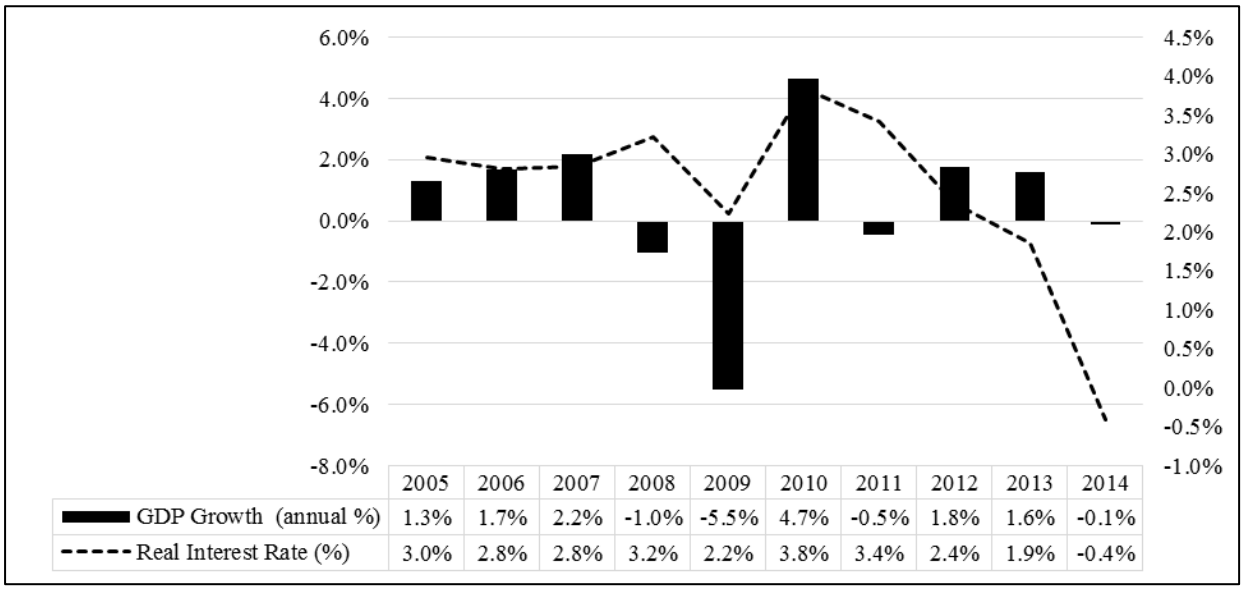
noted that “flooding Japanese commercial banks with excess reserves would only amount to a swap of two assets with close to zero yields”.

The subsequent recovery of the Japanese economy post-2001, was characterised by increased exports, business fixed investment, robust corporate activity, and year-on-year changes in the CPI turning positive. This spurred the BoJ’s decision to change the operating target of money market operations from the outstanding balance of current accounts at the Bank to the uncollateralised overnight call rate (Bank of Japan, 2006). Spiegel (2006) noted that the application of QE aided weaker Japanese banks and generally encouraged greater risk-tolerance in the Japanese financial system.

In the period leading up to the Subprime Mortgage Crisis (SMC), Japanese real interest rates were roughly 2.9% per annum (as measured over a three-year period preceding the SMC), whilst the economy grew at roughly 1.7% per annum (as measured by GDP) over the same period (Figure 2.12). The advent of the financial crisis caused by the SMC in 2008, prompted some of the world’s largest central banks (i.e. the FED, BoE, BoJ and the ECB, amongst others) to embark on programmes of QE.

Prior to the financial crisis, most central banks (BoJ being the exception) kept inflation under control by adjusting the overnight interest rate at which financial institutions can borrow. By lowering the overnight interest rate, financial institution’s funding costs are reduced, thereby encouraging spending in the economy through the issuance of loans, albeit at a lower cost. By contrast, these central banks would raise overnight interest rates to stem rising inflation, thereby curbing economic expenditure. In the wake of the financial crisis, central banks globally significantly lowered the overnight interest rates charged, in an attempt to try and resuscitate their respective economies. These actions, however, failed to spark the required recovery sought (as in the case with Japan leading up to the introduction of its QE programme in 2001), which necessitated central banks to experiment with QE, in an attempt to encourage financial institutes to inject money into their respective economies.

However, in the aftermath of the financial crisis, interest rates of industrial countries declined to near-zero rates. This limited the scope of additional QE through lower policy rates measures. Thus, the argument for QE very much became the exception instead of the rule, and as a result thereof, its application only became encouraged by extraordinary circumstances.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
GDP Growth (annual %)	1.3%	1.7%	2.2%	-1.0%	-5.5%	4.7%	-0.5%	1.8%	1.6%	-0.1%
Real Interest Rate (%)	3.0%	2.8%	2.8%	3.2%	2.2%	3.8%	3.4%	2.4%	1.9%	-0.4%

Figure 2.12: The Japanese economy: 2005-2014

Source: OECD (2017).

The performance of the Japanese economy has been characterised by low and inconsistent economic growth during the period post the financial crisis (Figure 2.12). In recent years, this has been driven mainly by weak domestic industrial production, primarily due to a slowdown in exports to the USA and China, as well as pallid household consumption. In October 2010, due to a slowdown in the pace of the Japanese economy's recovery, in addition to the year-on-year decline in CPI and the adverse effects of the yen's appreciation on business sentiment, the BoJ judged it necessary to further enhance its monetary easing policy by: (i) changing the guideline for money market operations; (ii) clarifying policy time horizons based on the "understanding of medium- to long-term price stability"; and (iii) establishing an APP.

In establishing its APP, the BoJ would embark on an unconventional form of monetary easing. This included the purchase of: (i) commercial paper; (ii) corporate bonds; and (iii) Japanese real estate investment trusts and exchange-traded funds (ETFs).

This study sought to explore and critically evaluate the trend of the BoJ's purchase of ETFs since the launch of its APP, its impact on the Japanese stock market, as well as the effectiveness thereof as a monetary policy tool on the Japanese economy.

2.5 CONCLUSION

Up until 2010, conventional monetary policy consisted of inflation targeting, achieved through the application of short-term interest rates at which central banks provide funds to commercial banks. Within this policy framework, the setting of interest rates is done judgementally, using a wide variety of macro-economic signals, such as inflation, output or other economic conditions. Over the years this has proven to be a reliable and effective use of monetary policy, in the pursuit of low inflation.

The disasterous lasting effects caused by the 2008 global financial crises, however, have prompted central banks globally to adopt various unconventional monetary policies. Although monetary policy up to this point was largely used to target inflation, the BoJ and other central banks faced the additional challenge of achieving financial stability within the confines of their respective policy frameworks. This was hampered by: (i) the presence of zero lower-bound nominal interest rates; and (ii) the disruption of the financial system itself (Joyce et al., 2012). Because of the sheer scale of the financial crisis, many started to question whether conventional monetary policies would be sufficient to restore the world economy to a climate of normality. The problem was exacerbated because of commercial banks choosing to hold on to funds to ensure their viability, instead of on-lending these funds to the private sector.

Due to persistent pallid global economic growth, many central banks have been forced to adopt unconventional monetary policies in recent times. In efforts to resuscitate their flagging economies, the BoE, the FED and the ECB have also stepped up their quantitative easing programmes of late. The persistent lethargic economic growth of Japan and its western counterparts suggests that (Joyce et al., 2012):

- Either their recessionary forces have been extremely strong; or
- QE has not been effective nor applied in sufficient scale; or
- The effects of QE are limited and requires reconsideration.

The facts presented in this literature review, echo the findings by Joyce et al. (2012) and other available literature that in fact QE does work. Asset market purchases have resulted in lower yields and longer-term interest rates, which in turn have resulted in improved economic conditions (in the EU, USA and UK). In the case of Japan, this trend has also been noted, albeit on a very small and limited scale. To date, the Japanese economy is still plagued by low inflation, extending the trend of the last two decades.

This begs the question(s), of whether the scale of the BoJ's APP to date has been sufficient, or whether significant structural reforms are required or both?

CHAPTER 3:
RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides an overview of the research design and methodology applied in this research report. It includes describing financial data sets, benchmark indices and outlining the assumptions used to conduct the analysis. It then concludes by looking at the resulting impact of the BoJ's intervention in ETFs on domestic stock markets. Where there were differences between this study and that of Lam (2011), these are also noted.

3.2 DATA ISSUES

3.2.1 Limitations

For the basis of this research report, daily returns observed during each event of intervention, were limited to the Nikkei 225 and Nikkei 400 indices only. Other financial indicators, *inter alia*, sovereign and corporate bond yields, yen exchange rates and inflation expectations, did not form part of the analysis conducted in this research study.

3.2.2 Financial data

Times series of daily closing values for both the Nikkei 225 and Nikkei 400 indices, were obtained from Thompson Reuters (2017a; 2017b). In addition hereto, the actual quantum/monetary values of ETF purchases by the BoJ were also obtained. This was extracted separately from the BoJ's website (Bank of Japan, 2016).

3.2.3 Data source and sample period

Both the daily closing values for the Nikkei 225 and Nikkei 400 indices (retrieved from Reuters, 2017a; 2017b), as well as the BoJ's ETF purchases (Bank of Japan, 2016) were compiled for the period 14 December 2010 to 22 July 2016. For macro-economic data and other financial indicators, the periods of compilation have been noted accordingly.

3.3 RESEARCH DESIGN AND METHODOLOGY

3.3.1 Overview

Lam (2011) noted that recent monetary policy measures conducted by the BoJ, had a significant and broad-based impact on financial markets. This seems to stem mainly from the announcement of new measures, rather than from subsequent operations or purchases. This would suggest that investors could have already priced-in the expectation of subsequent operations or purchases (Lam, 2011).

The resulting impact has been the easing of financial conditions, through the lowering of long-term interest rates and reduction of downside tail risks (Lam, 2011).

Lam (2011) looked at the quantitative impact of the monetary easing measures using an event study. Based on these results, he illustrated the potential impact from hypothetical additional purchases beyond the target set by the BoJ. His conclusion suggests that "asset purchases, particularly of private risky assets, could be an effective tool for further monetary easing". This research study set out to validate these claims, by analysing data compiled in the period post the publication of Lam's (2011) findings.

The clearest direct impact of quantitative easing, can be found in the reaction of financial markets (Joyce, Lasaosa, Stevens, & Tong, 2010). By looking at the immediate reaction of assets' prices to the BoE's quantitative easing announcements, Joyce et al. (2010) allocated these into separate channels by using event study analysis and survey data.

A shortcoming of this approach, as noted by Lam (2011), "is that it is not able to distinguish between the confluence of other factors, especially those that are beyond the central bank's control, such as external shocks". In addition hereto, "market anticipation before the event may also obscure the true impact, while some indirect effect may take time to develop beyond the event window" (Lam, 2011).

This study's research design is predominantly based on the approach applied by Lam (2011). It was done by analysing the impact of the BoJ's asset purchase programme, specifically focusing on ETFs, as measured by the change in asset returns and volatility. Daily returns generated by both the Nikkei 225 and Nikkei 400 indices, were used as the main financial indicators for this analysis.

3.3.2 Construction of an event study

In order to assess the impact of the BoJ's intervention in ETFs on domestic economic growth, event study methodology was used. This approach is primarily based on the paper by MacKinlay (1997). "The usefulness of such a study comes from the fact that, given rationality in the marketplace, the effects of an event will be reflected immediately in security prices. Thus, a measure of the event's economic impact can be constructed using security prices observed over a relatively short time period. In contrast, direct productivity related measures may require many months or even years of observation." (MacKinlay, 1997).

In order to conduct the event study, one needs to define the event of interest as well as the period over which the security prices of the firms involved in the event will be observed. This is defined by MacKinlay (1997) as the event window. In the case of this research study, the information content of an index with daily observations (i.e. daily closing index values), the event constituted the date of intervention by the BoJ in each respective index. On this basis, the event window included the one day of the intervention (which was defined as t for the purposed of this study).

As noted by MacKinlay (1997), the period of interest is often expanded to multiple days. This includes at least the day of the intervention (t) and the day thereafter. In doing so, the price effects of the intervention are captured, which occur after the stock market closes on the day of intervention. MacKinlay (1997) further noted that the periods prior to and after the event may also be of interest: "In the earnings announcement case, the market may acquire information about the earnings prior to the actual announcement and one can investigate this possibility by examining pre-event returns." However, as noted earlier in this research report, day traders of Japanese ETFs experience a short-term phenomenon of guessing when the BoJ will come into the market, and buying moments before that happens. A modification of MacKinlay's (1997) approach was adopted in this research study, in order to account for this short-term phenomenon.

One noticeable difference between the methodology applied in this research study and that of MacKinlay (1997), is the substitution of firms with the market. For the purpose of analysis, the market herein is represented by both the Nikkei 225 and Nikkei 400 indices.

Evaluation of the event's impact requires a measure of the abnormal return (MacKinlay, 1997). "The abnormal return is the actual ex-post return of the security over the event window minus the normal return of the firm over the event window" (MacKinlay, 1997). A similar approach has been applied in this research study, i.e. defining the normal return as the expected return in absence of the event/intervention taking place.

In order to assess the significance of the intervention, the percentage change around each event window, against that of a typical trading day were compared.

The BoJ provided a basis for the classification of events, through the introduction of new monetary easing measures in different stages. These events are classified as one of the following stages:

- New policy;
- Modification of existing policies (either expansion or extension);
- Actual purchases/operations; and
- Exit of policies.

The samples used to conduct the analysis found in this research study, focused exclusively on the BoJ's purchase of ETFs during the period December 2010 to July 2016.

Finally, in order to measure the impact of the BoJ's intervention in ETFs on financial markets, the cumulative change of returns was measured over the event and against the standard errors relative to returns of typical trading days.

3.3.3 Data preparation and formulation

As a first step, the daily closing index value for each event date (i.e. the date on which the BoJ purchased ETFs in the market) was extracted. Index values were then derived for t+1, t+5 and t-1, based on the nearest available trading day post and prior to each event date (t). For the basis of preparation, public holidays and weekends were excluded where applicable. Dividends were ignored in the calculation of returns.

The returns for each of the event windows ((t+1/-1) and (t+5/-1)) were calculated as follow:

$$er_{t+1_i} = \left(\frac{P_{t+1}}{P_{t-1}}\right) - 1 \quad (3.1)$$

and

$$er_{t+5_i} = \left(\frac{P_{t+5}}{P_{t-1}}\right) - 1 \quad (3.2)$$

Where:

$P_{t+1} = Index\ Value$ 1 day after an event

$P_{t+5} = Index\ Value$ 5 days after an event

$er_{t+1_i} = return\ for\ event\ window\ t + 1$/-1

$er_{t+5_i} = return\ for\ event\ window\ t + 5$/-1

In addition hereto, an average daily return prior to each event was calculated for both indices. This was done over a five-year period:

$$\bar{r}_i = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{P_n}{P_{n-1}}\right) - 1 \quad (3.3)$$

Where:

$\bar{r} = 5\ year\ daily\ expected\ return\ prior\ to\ event$

$P_n = daily\ index\ value$

$P_{n-1} = preceding\ daily\ index\ value$

The cumulative abnormal return for each event window was calculated, using the following formula:

$$ar_{t+x_i} = er_{t+x_i} - \bar{r}_{x_i} \quad (3.4)$$

Where:

$ar_{t+x_i} = cumulative\ abnormal\ return\ for\ each\ event\ window$

$er_{t+x_i} = return\ for\ event\ window\ t + x$

$\bar{r}_{x_i} = 5\ year\ average\ daily\ expected\ return\ prior\ to\ event$

In order to test statistically whether these abnormal returns are significant or not, the following formula was used to calculate the standard error for each sample/index.

$$\overline{ar}_{t+x_i} = \frac{\sum_i ar_{t+x_i}}{k} \qquad (3.5)$$

and

$$s_{t+x_i} = \sqrt{\frac{\sum_i \left(ar_{t+x_i} - \overline{ar}_{t+x_i}\right)^2}{k-1}} \qquad (3.6)$$

Where:

$\overline{ar}_{t+x_i} = mean\ cumulative\ abnormal\ return\ for\ each\ event\ window$

$s_{t+x_i} = standard\ error\ of\ the\ cumulative\ abnormal\ return\ for\ each\ event\ window$

$k = amount\ of\ events$

The sample used for the Nikkei 400 index consisted of 33 events, whilst the Nikkei 225 sample consisted of 303 events. Out of these samples two event windows were constructed:

- Two trading days, defined to be t-1 to t+1 (t+1/-1); and
- Five trading days, defined to be t-1 to t+5 (t+5/-1).

This is in line with the methodology applied by Lam (2011), who noted that, by constructing a window of five trading days, one can assess whether the initial two-day effect endures or disappears after a week.

In order to measure the impact of the BoJ's intervention on financial markets, the cumulative change of returns over the events, against the standard errors relative to returns of typical trading days, were measured. In the case of the Nikkei 400 index, this was done for the period 1 April 2016 to 22 July 2016. Financial data collected over the period 15 December 2010 to 9 March 2016, was used for analysis of the Nikkei 225 index sample.

For each of the event windows, t+1/-1 and t+5/-1, a mean cumulative abnormal return was calculated.

As mentioned earlier in this report, short-term traders are usually left guessing when the BoJ will intervene in the market. In order to gain some insight into this short-term phenomenon, the following analysis was conducted:

- Calculation of the daily abnormal return from t-20 to t+20 (t+20/-20) for each of the events of intervention; and
- Calculation of the mean of the daily abnormal return for each trading day within the t+20/-20 event window.

For this part of the analysis the following formulas were used:

$$dar_{t+x_i} = der_{t+x_i} - \bar{dr}_{x_i} \quad (3.7)$$

and

$$\bar{r}_i = \sum_{i=1}^{n} \left(\frac{n}{n-1}\right) - 1 \quad (3.8)$$

and

$$\overline{dar}_{t+x_i} = \frac{\sum_i dar_{t+x_i}}{k} \quad (3.9)$$

Where:

$dar_{t+x_i} = daily\ abnormal\ return$

$der_{t+x_i} = daily\ return$

$\overline{dr}_{x_i} = 5\ year\ average\ daily\ expected\ return\ prior\ to\ event$

$k = amount\ of\ observations$

$n = daily\ index\ value$

$n - 1 = preceding\ daily\ index\ value$

3.4 CONCLUSION

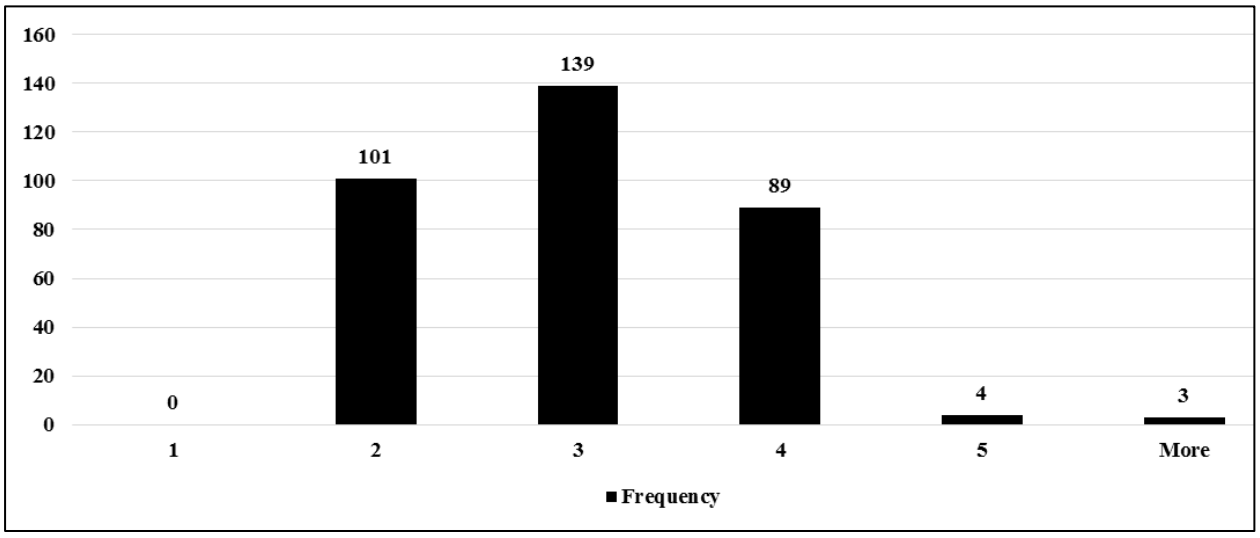
This chapter outlined the methodology and assumptions used to construct the samples for both the Nikkei 225 and Nikkei 400 indices. It also included an explanation of how the data set for each sample was obtained. Further explanation regarding the construction of each of the event windows used in the analysis, was also provided. This was supplemented by the formulation of the cumulative change of returns required, in order to measure the impact of the BoJ's intervention. The financial data was extracted from Thompson Reuters (2017a; 2017b) and the Bank of Japan's (2016) websites respectively.

The differences between this study and those of Lam (2011) and MacKinlay (1997) were also noted in this chapter. The next chapter focuses on the research findings of the BoJ's intervention in the domestic ETF market.

CHAPTER 4:
RESEARCH FINDINGS

4.1 SUMMARY OF RESEARCH FINDINGS

Figure 4.1 illustrates the quantum of ETFs purchased by the BoJ throughout the duration of its APP. To date, the BoJ has entered into the ETF market by executing purchases of roughly $3bn for 139 events of intervention. This was followed by amounts purchased of $2bn (101 events of intervention) and $4bn (89 events of intervention), ranking second and third respectively.



Note: Yen amount converted to USD using daily JPY/USD spot exchange rate

Figure 4.1: Histogram showing BoJ's interventions

Source: Bank of Japan (2016).

Table 4.1 shows a summary of the BoJ's intervention in each of the Nikkei 225 and Nikkei 400 indices. To date, the largest amount of ETF intervention has been roughly $5.1bn. What is interesting to note, is that both the smallest and largest amounts of intervention occurred in the Nikkei 400 index. The results presented in Table 4.1 further supports the notion that the BoJ has become increasingly aggressive in pursuing its APP. This is also evident when looking at both the total amount and average amount of ETFs purchased to date in the case of the Nikkei 400 index, compared to the Nikkei 225 index.

Table 4.1: Summary of Nikkei 225 and Nikkei 400 ETF purchases

	No. of interventions	Total Amount of ETF's purchased (USD'bn)	Max. amount of ETFs puchased (USD'bn)	Min. amount of ETFs puchased (USD'bn)	Mean. amount of ETFs puchased (USD'bn)
Nikkei 400 ETFs	33	105.6	3.4	3.0	3.2
Nikkei 225 ETFs	303	726	5.1	1.1	2.4

Note: Yen amount converted to USD using daily JPY/USD spot exchange rate

Table 4.2: Summary statistics of sample analysis

			(t+1/-1)				(t+5/-1)				
Sample	No. of Events	Total Amount of ETFs Purchased (¥'m)	Mean Cum. Abnormal Return	Mean Cum. Abnormal Return (daily)	Std. Error (daily)	t-Stat (daily)	Mean Cum. Abnormal Return	Mean Cum. Abnormal Return (daily)	Std. Error (daily)	t-Stat (daily)	Mean Daily Abnormal Return (t+20/-20)
Nikkei 400	33	106	-1.36%	-0.68%	0.98%	0.25	-0.63%	-0.10%	0.71%	0.44	-0.05%
Nikkei 225	303	726	-1.39%	-0.70%	1.03%	0.25	-1.11%	-0.19%	0.58%	0.37	-0.04%

Table 4.3: Summary statistics of sample analysis (annualised)

	(t+1/-1)			(t+5/-1)			
Sample	Mean Cum. Abnormal Return	Mean Cum. Abnormal Return (daily)	Std. Error (daily)	Mean Cum. Abnormal Return	Mean Cum. Abnormal Return (daily)	Std. Error (daily)	Mean Daily Abnormal Return (t+20/-20)
Nikkei 400	-343.67%	-171.84%	15.59%	-158.21%	-26.37%	11.26%	-13.49%
Nikkei 225	-350.99%	-175.49%	16.36%	-280.95%	-46.82%	9.27%	-9.75%

The summary statistics for both indices are presented in Table 4.2. In order to obtain the daily mean cumulative abnormal return, the answer derived for formula 3.9 was divided by the number of trading days in each event window (i.e. 6 days in t+5/-1 and 2 days in t+1/-1).

In order to gauge the economic significance of the abnormal returns the annualised figures are presented in Table 4.3. This was done by multiplying the mean and standard error by 252 and the square root of 252 respectively (252 being assumed the average amount of trading days per year).

As part of the analysis, the daily abnormal return for the event window t+20/-20 was also calculated. This calculation was performed for both indices. The results show a mean daily abnormal return of c. -0.04% and c. -0.05% for the Nikkei 225 index and Nikkei 400 index respectively.

In order to validate these results, a two-sample (assuming unequal variances) t-Test was performed on the cumulative abnormal daily return for the t+1/-1 and t+5/-1 event windows. In doing so, the null hypothesis was tested, of whether the respective means in each of the two samples are equal (i.e. whether the BoJ was propping up the market prior to the event of intervention).

Table 4.4: Nikkei 225 t-Test: Two-sample assuming unequal variances

Nikkei 225	***t+1/-1***	***t+5/-1***
Mean	-0.70%	-0.19%
Variance	0.01%	0.00%
Observations	303	303
Hypothesized Mean Difference	0	
df	478	
t Stat	-7.50	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.00	
t Critical two-tail	1.96	

For the Nikkei 225 index, the results show that the t Stat of -7.50 is significantly larger than the t Critical two-tail of -1.96 (Table 4.4). This indicates that the observed difference between the sample means, is convincing enough to say that the cumulative abnormal return between the two event windows differ significantly; therefore, the null hypothesis is rejected.

Table 4.5: Nikkei 400 t-Test: Two-sample assuming unequal variances

Nikkei 400	*t+1/-1*	*t+5/-1*
Mean	-0.68%	-0.10%
Variance	0.01%	0.01%
Observations	33	33
Hypothesized Mean Difference	0	
df	58	
t Stat	-2.74	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.00	

In the case of the Nikkei 400 index, the results are the same (Table 4.5). The t Stat of -2.74 is larger than the t Critical two-tail of -2.0, and as a result, the null hypothesis is also rejected.

The following chapter offers an analysis and discussion of the findings.

CHAPTER 5:
ANALYSIS AND DISCUSSION

5.1 INTRODUCTION

This chapter evaluates the results of the analysis conducted on the Nikkei 225 and Nikkei 400 indices. The results have been plotted for both indices and benchmarked against an investment of ¥100. In doing so, an attempt is made to illustrate the exact point of intervention by the BoJ. The main findings are discussed below.

5.2 DISCUSSION OF MAIN FINDINGS

As can be seen by Figure 5.1, the performance of both the Nikkei 225 and Nikkei 400 indices has been lacklustre in the last decade.

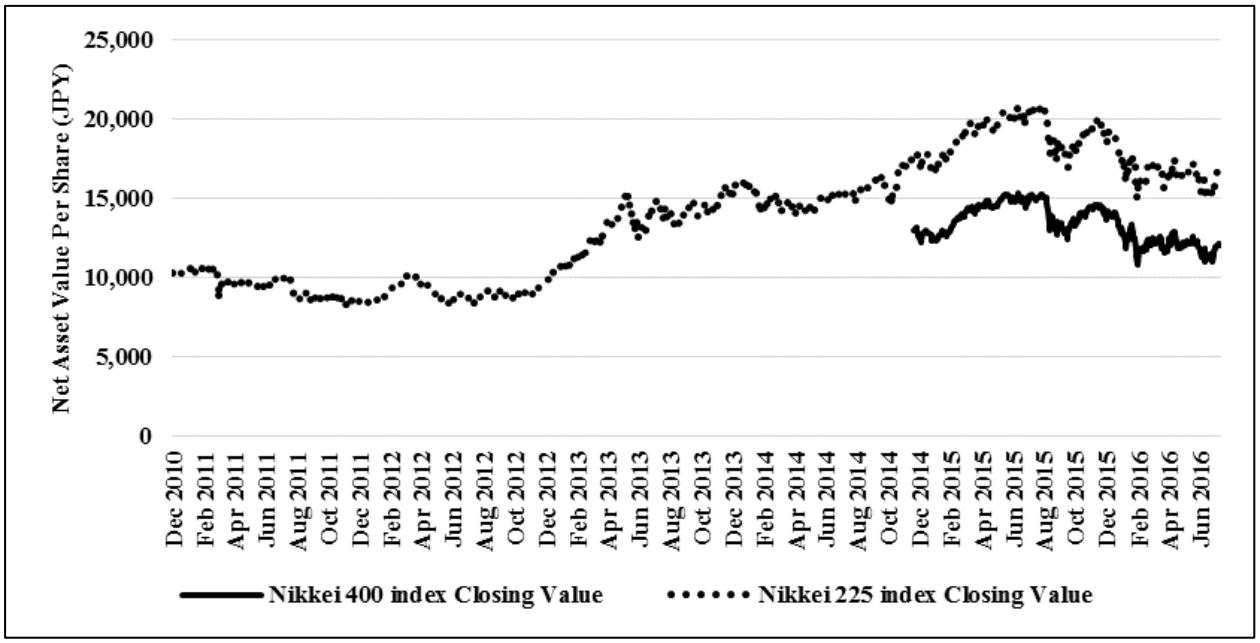


Figure 5.1: Historical performance of the Nikkei 225 and Nikkei 400: 2011-2016

Source: Reuters (2017a; 2017b).

Looking at these results, it is clear to see the following patterns emerging. In both samples, the analysis indicated a negative immediate and five-day return.

For the event window t+1/-1, immediate negative returns of -1.39% and -1.36% were recorded for the Nikkei 225 and Nikkei 400 indices respectively. At the end of the five-day return period, these figures were -1.11% and -0.63%.

As noted, the results are more profound when converted to a daily figure. This leads one to conclude that in a week's time, the negative return for both samples decreased. However, the effect is still negative.

Additional analysis was done to ascertain the exact entry point of the BoJ's intervention in the market. In order to determine this, the daily abnormal return was calculated for the event window t+20/-20. This was done for each individual event recorded (actual interventions by the BoJ) for both the Nikkei 225 (Figure 5.2) and Nikkei 400 (Figure 5.3) indices. The calculation was then modified to show what the return for a ¥100 would have been, given the daily abnormal return over the t+20/-20 day window. The results are thought-provoking to say the least. The analysis showed that the BoJ's intervention did not have a significant positive effect on returns. What is startling to note, is that the BoJ's intervention was not random, but in fact timed.

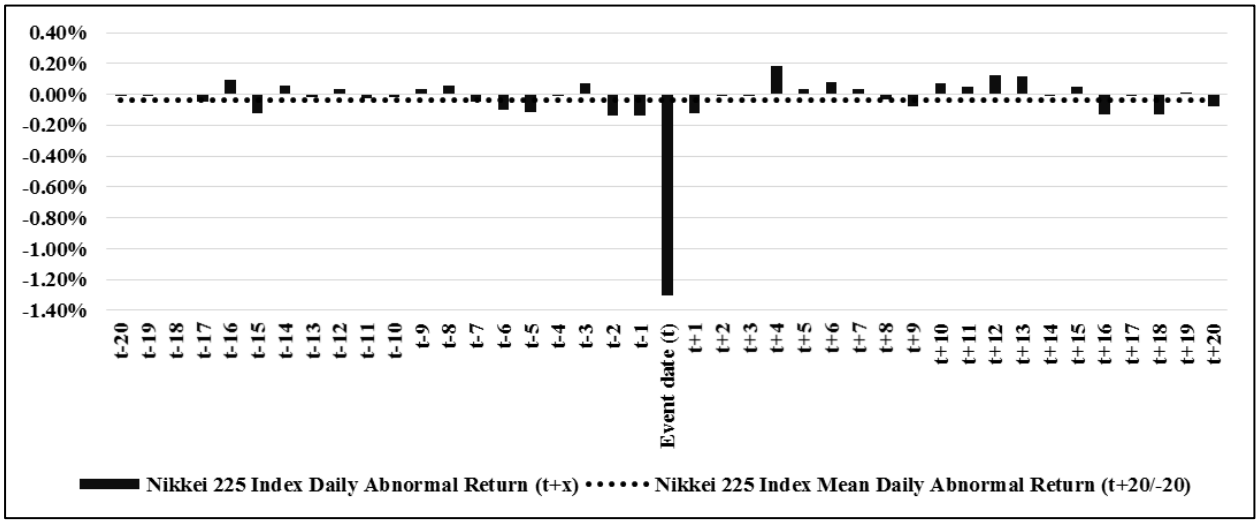


Figure 5.2: Nikkei 225 daily abnormal return

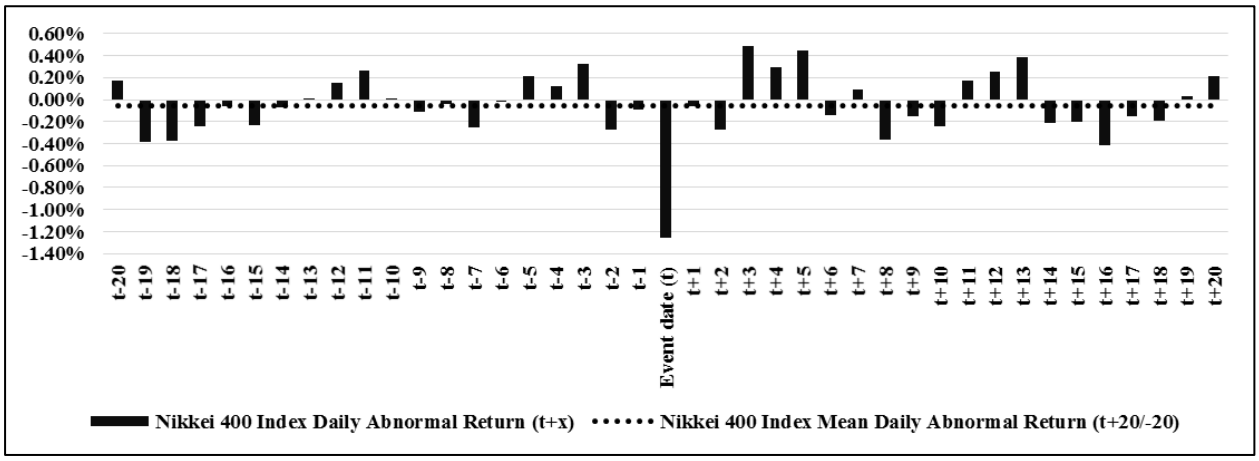


Figure 5.3: Nikkei 400 daily abnormal return

Error! Reference source not found. Figure 5.4 and Figure show the BoJ intervening in t he market after a period of sustained losses (on average).

The downward trend observed is strong, hence the one-day return is negative. However, a few days after the intervention, the returns seem to be reversed. Although it is hard to attribute the reversal entirely to the BoJ's intervention, it does appear that the aforesaid interventions prevented prices from falling further.

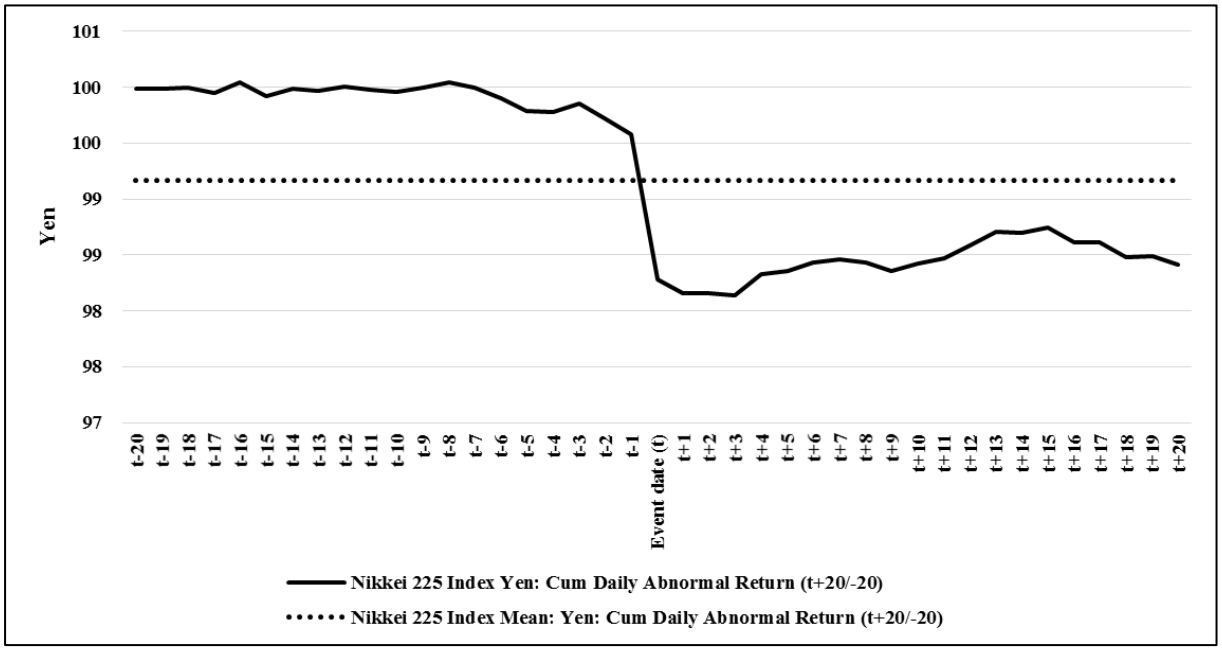


Figure 5.4: Nikkei 225 cumulative daily abnormal return (based to ¥100)

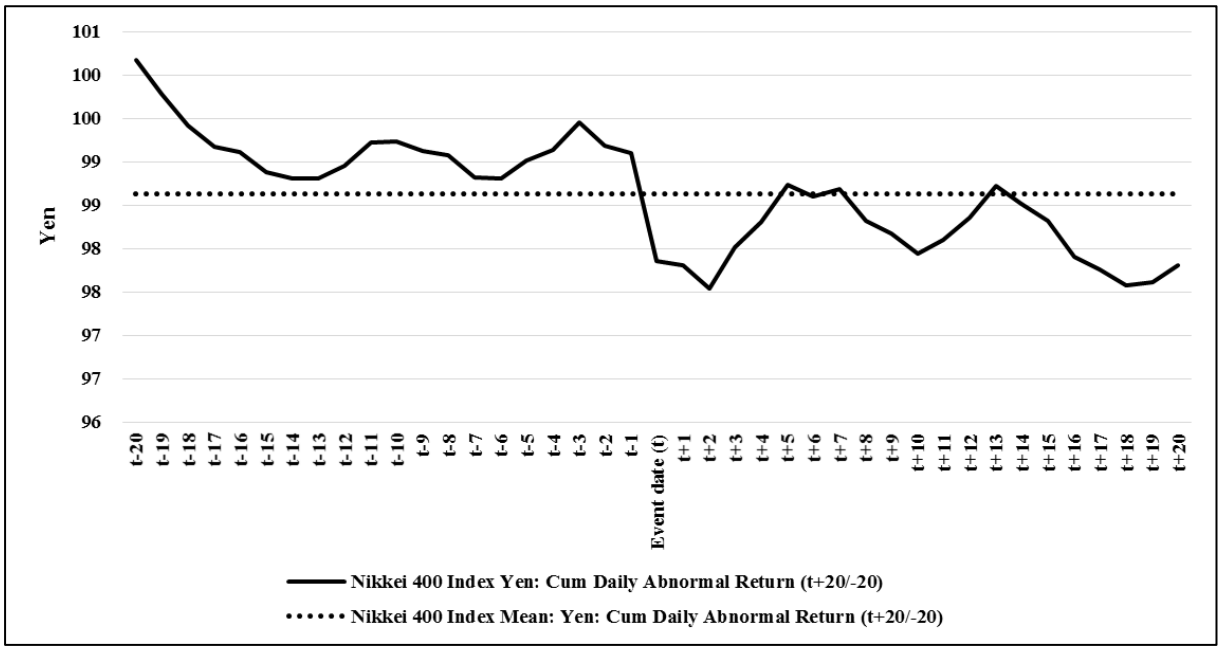


Figure 5.5: Nikkei 400 cumulative daily abnormal return (based to ¥100)

However, given these results, it is still impossible to say by how much the market would have dropped without the BoJ's intervention. What is evident, is that the Bank seemed to intervene during a period of "severe" losses. By comparing the daily means during the two event windows (t+1/-1 vs. t+5/-1), one can conclude that they are statistically different. Thus, the daily return observed during t+1/-1 is more negative than the daily return observed during the longer event window (t+5/-1).

Given a large intervention by the BoJ, the arbitrage mechanism may take a few days to fully absorb the intervention and push the index value prices up. Hence at t+5, one would definitely observe the complete effect. This can also be interpreted as the "BoJ effect", i.e. a reversal of the negative returns observed in the marker prior to the BoJ's intervention, when compared between the two event windows. In doing so the BoJ is also exploiting the transferring mechanism associated with ETFs.

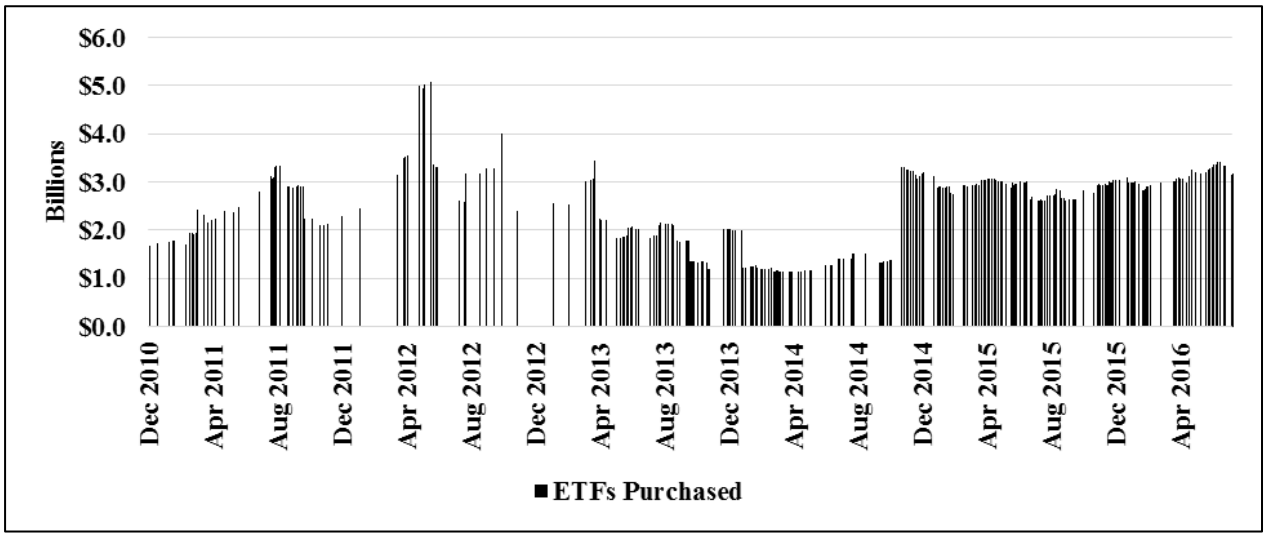
CHAPTER 6:
CONCLUSION

6.1 INTRODUCTION

Lam (2011) concluded that “the BoJ’s easing measures had a statistically significant impact on bond yields and equity prices” and that “the easing measures have contributed to a decline in long-term interest rates and lowered downside tail risks, thereby helping to support investors’ risk appetite”.

What is important to note here, is the timing of Lam’s (2011) work. The year 2010 indeed proved to be successful year for Japan in terms of economic growth. However, the country’s return to economic prominence was to a large extent attributable to the recovery of the global economy post the 2008 financial crisis. As a result, Japanese exports were boosted by resurgence in emerging markets’ economies. Although an argument can be made for the market’s welcomed reception of the BoJ’s APP at the time of its announcement (based on Lam’s (2011) results), this proved to be a short-term phenomenon. As the results presented in this research study show, the BoJ’s purchase of ETFs has failed to yield positive market returns (on average) over the course of its APP.

Looking at Figure 6.1, it is clear to see a significant increase in the BoJ’s purchase programme in recent years. This is evident when looking at both the absolute quantum and frequency of its interventions. The end of 2014 saw a significant increase in both the amount and frequency in which the BoJ executed its mandate. From 2014 to 2015, the total value of ETFs purchased more than doubled, from roughly $11.9bn per annum to $25.4bn per annum. Similarly, the number of monthly purchases on average, increased from 6.3 to 7.7 times per month.



Note: Yen amount converted to USD using daily JPY/USD spot exchange rate

Figure 6.1: BoJ's Asset Purchase Programme

Source: Bank of Japan (2016).

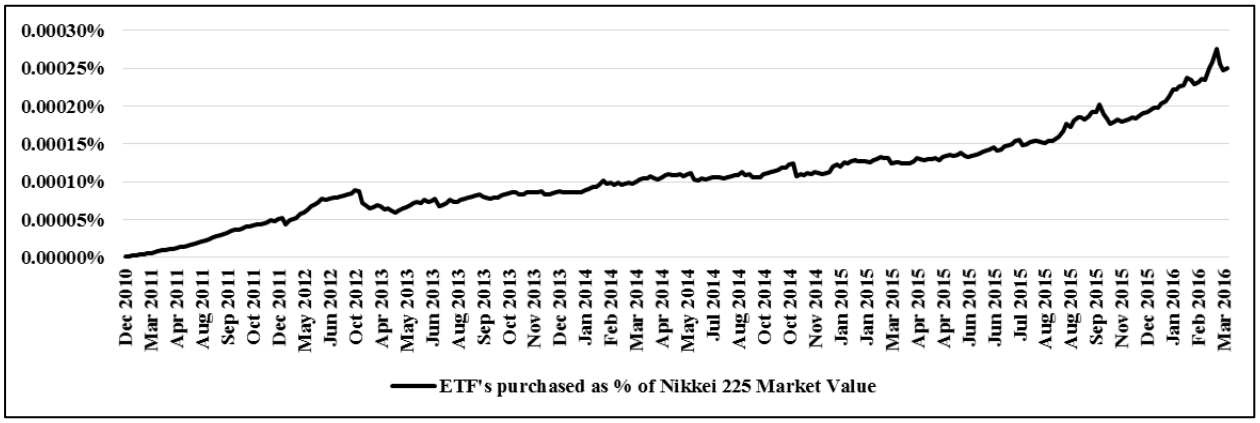


Figure 6.2: ETFs purchased as a percentage of Nikkei 225

Source: Bank of Japan (2016).

Figure 6.2 shows how the BoJ's holdings of ETFs as a percentage of the Nikkei 225 index, have increased since the start of its APP. Lately, this has become a cause of concern for both market observers and policy-makers.

According to its current schedule, the BoJ must buy an average of ¥71bn ($700mm) worth of ETFs every three trading days throughout the year (Lewis & Colback, 2016). In an article posted by the Financial Times, JPMorgan's FX strategist, Tohru Sasaki, noted that the distortions created by this massive programme, include a breakdown of certain long-held assumptions: "Where in the past, a rising yen might batter Japanese

shares, the fact that the BoJ will now buy regardless is suspending that pattern" (Lewis & Colback, 2016). In the article, Sasaki further noted that "with this helicopter money-like policy prevailing over the Japanese stock market, correlation between the Nikkei index and the dollar-yen rate has started to weaken. Even if stock prices decline in the morning, the decline tends to be limited because it is basically known that the BoJ will purchase ¥70.7bn of ETFs in the afternoon" (Lewis & Colback, 2016).

This begs the question of whether the BoJ's APP can still be viewed by the market as a credible policy in the fight against deflation.

6.2 ALTERNATIVE OPTIONS AVAILABLE TO THE BOJ

Japan's dilemma is not an isolated phenomenon. Short-term interest rates have been zero-bound in most of the world's advanced economies since 2009. This has left central banks with little room to reduce rates further to provide needed economic stimulus. There is also reason to believe that this zero-bound problem will be common in decades to come (Ball, Gagnon, Honohan, & Krogstrup, 2016). So, what are the remaining options available to central banks? Ball et al. (2016) noted the following options are available to central banks:

- Push nominal rates below zero (perhaps even as low as 2%);
- Expand the scale and scope of asset purchases; and
- Consider moving – even temporarily – to a higher inflation target.

In the case of Japan, the central bank has already incorporated two of the three options proposed by Ball et al. (2016). It was noted that the BoJ has expanded its ETF buying programme from ¥450bn per year in 2010, to a staggering ¥6tn per year in 2016. The central bank's experiment with negative rates, to date, have not proven to be successful either. In theory, lower interest rates would normally lead a country's currency to depreciate. This in turn provides a boon to exporters – one of the key policy objectives of Abenomics. However, the BoJ's decision to set a negative rate of 0.1% in January 2016 has had the opposite effect: Instead of falling, the yen has rallied against the dollar (Warnock & Negishi, 2016). This is primarily due to foreign investor's increased demand for Japanese bonds due to "rising returns on Japanese-bond trades thanks to the cheaply funded yen" (Warnock & Negishi, 2016).

The strengthening of the yen can be seen as a vote of “no confidence” in the BoJ’s ability to further ease policy. In an interview conducted with Nobuyuki Hirano, president of Mitsubishi UFJ Financial Group Inc., Japan’s biggest bank, Hirano was quoted as saying “There is no guarantee that lowering interest rates encourages corporate capital expenditures or expedites the shift of household financial assets from savings to investment” (Warnock & Negishi, 2016).

As for a higher inflation target, the BoJ’s failure to reach a sustained level of positive inflation growth (since it announced its target of 2% in 2013), leaves one to wonder whether such a target would have any meaningful impact.

6.3 CLOSING REMARKS

For nearly 30 years, Japan’s near catatonic economic state have puzzled both economists and researchers alike. Faced with prolonged stagnant economic growth, the BoJ has implemented radical monetary policy reforms in recent years in an attempt to fend off deflation. Initially hailed as a success, the BoJ’s APP has done little to stimulate economic growth since its implementation.

In the case of ETFs specifically, the results presented in this research study show that its implementation has been ineffective as a tool to be used for further monetary easing. At best, the BoJ’s application thereof has halted further losses from being incurred by the market. This finding stands in contrast to the findings presented by Lam (2011).

This research study also highlights the growing concern surrounding the effectiveness of Abenomics. More specifically, it supports those observers who have stated a lack of credibility by the BoJ – a statement which the BoJ itself has come to admit recently (Mackintosh, 2016). This validates the question: “If a central bank without credibility makes a credible promise to run a non-credible policy, do the double negatives cancel out and create credibility?” Only time will tell.

CHAPTER 7:
RECOMMENDATIONS AND FUTURE RESEARCH

7.1 RECOMMENDATIONS

The results presented in this research report is clearly a cause for concern – both for the BoJ and market observers.

The analysis shows that, to date, the BoJ has been ineffective in influencing stock markets enough to generate positive abnormal returns. However, what is evident, is that the BoJ intervenes each time the market experiences a period of sustained losses. This brings the BoJ's independence into question. Instead of being a neutral monetary stimulation, the BoJ's intervention is a timed one – thus a manipulation of asset pricing.

What does this mean for market participants? The results show a very dangerous position for prospective short-sellers of that market. In addition hereto, it is unclear whether current market prices are efficient or meaningful, given the BoJ's attempt to boost stock prices each time they go down. What is evident from the results presented in this research report, is that the BoJ's attempt to stimulate economic growth is not working. Failure by the BoJ to inject sufficient money supply into domestic stock markets, is hampering economic growth. The results show that abnormal returns generated by the Nikkei 225 and Nikkei 400 indices are either negative or zero – but definitely not positive. Hence, the BoJ's ETF programme has failed its mandate of boosting stocks, stimulating economic growth and encouraging the public to invest in the domestic market.

In propping up falling markets, and thus distorting prices, the BoJ is making markets inefficient. This leads to strange incentives among financial practitioners, who are increasingly trying to time the BoJ's intervention and trading on those announcements. This has put the BoJ squarely on the primrose path. Proceeding with a policy of this nature, has the potential to be very distortionary if allowed to increase in size.

7.2 FUTURE RESEARCH

Further research into this topic is encouraged. This could include a model for forecasting the probability of the BoJ's intervention. In doing so, one could reverse engineer the point of the BoJ's entry into the domestic stock market.

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ANNEXURE A

Nikkei 400 Index		
	Daily Abnormal Return (t+x)	Mean Daily Abnormal Return (t+20/-20)
t-20	0.17%	-0.05%
t-19	-0.39%	-0.05%
t-18	-0.37%	-0.05%
t-17	-0.25%	-0.05%
t-16	-0.06%	-0.05%
t-15	-0.23%	-0.05%
t-14	-0.07%	-0.05%
t-13	0.00%	-0.05%
t-12	0.15%	-0.05%
t-11	0.26%	-0.05%
t-10	0.01%	-0.05%
t-9	-0.11%	-0.05%
t-8	-0.04%	-0.05%
t-7	-0.25%	-0.05%
t-6	-0.02%	-0.05%
t-5	0.22%	-0.05%
t-4	0.12%	-0.05%
t-3	0.33%	-0.05%
t-2	-0.27%	-0.05%
t-1	-0.09%	-0.05%
Event date (t)	-1.25%	-0.05%
t+1	-0.06%	-0.05%
t+2	-0.27%	-0.05%
t+3	0.49%	-0.05%
t+4	0.30%	-0.05%
t+5	0.44%	-0.05%
t+6	-0.15%	-0.05%
t+7	0.09%	-0.05%
t+8	-0.37%	-0.05%
t+9	-0.15%	-0.05%
t+10	-0.24%	-0.05%
t+11	0.17%	-0.05%
t+12	0.25%	-0.05%
t+13	0.38%	-0.05%
t+14	-0.21%	-0.05%
t+15	-0.20%	-0.05%
t+16	-0.42%	-0.05%
t+17	-0.15%	-0.05%
t+18	-0.19%	-0.05%
t+19	0.03%	-0.05%
t+20	0.21%	-0.05%

Nikkei 225 Index		
	Daily Abnormal Return (t+x)	Mean Daily Abnormal Return (t+20/-20)
t-20	-0.01%	-0.04%
t-19	0.00%	-0.04%
t-18	0.01%	-0.04%
t-17	-0.05%	-0.04%
t-16	0.09%	-0.04%
t-15	-0.12%	-0.04%
t-14	0.06%	-0.04%
t-13	-0.02%	-0.04%
t-12	0.04%	-0.04%
t-11	-0.02%	-0.04%
t-10	-0.02%	-0.04%
t-9	0.03%	-0.04%
t-8	0.05%	-0.04%
t-7	-0.05%	-0.04%
t-6	-0.10%	-0.04%
t-5	-0.12%	-0.04%
t-4	0.00%	-0.04%
t-3	0.07%	-0.04%
t-2	-0.13%	-0.04%
t-1	-0.14%	-0.04%
Event date (t)	-1.31%	-0.04%
t+1	-0.12%	-0.04%
t+2	-0.01%	-0.04%
t+3	-0.01%	-0.04%
t+4	0.19%	-0.04%
t+5	0.03%	-0.04%
t+6	0.08%	-0.04%
t+7	0.03%	-0.04%
t+8	-0.03%	-0.04%
t+9	-0.08%	-0.04%
t+10	0.07%	-0.04%
t+11	0.05%	-0.04%
t+12	0.12%	-0.04%
t+13	0.12%	-0.04%
t+14	-0.01%	-0.04%
t+15	0.05%	-0.04%
t+16	-0.13%	-0.04%
t+17	0.00%	-0.04%
t+18	-0.13%	-0.04%
t+19	0.01%	-0.04%
t+20	-0.08%	-0.04%

ANNEXURE B

		Nikkei 400 Index																		
		t-20	**t-19**	**t-18**	**t-17**	**t-16**	**t-15**	**t-14**	**t-13**	**t-12**	**t-11**	**t-10**	**t-9**	**t-8**	**t-7**	**t-6**	**t-5**	**t-4**	**t-3**	**t-2**	**t-1**
Daily abnormal return		0.17%	-0.39%	-0.37%	-0.25%	-0.06%	-0.23%	-0.07%	0.00%	0.15%	0.26%	0.01%	-0.11%	-0.04%	-0.25%	-0.02%	0.22%	0.12%	0.33%	-0.27%	-0.09%
1+ daily abnormal return		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cumulative daily abnormal return		1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Yen	**100.00**	**100.17**	**99.78**	**99.41**	**99.17**	**99.11**	**98.88**	**98.81**	**98.81**	**98.96**	**99.22**	**99.23**	**99.12**	**99.07**	**98.82**	**98.80**	**99.01**	**99.13**	**99.45**	**99.19**	**99.10**
Test		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

		Nikkei 225 Index																		
		t-20	**t-19**	**t-18**	**t-17**	**t-16**	**t-15**	**t-14**	**t-13**	**t-12**	**t-11**	**t-10**	**t-9**	**t-8**	**t-7**	**t-6**	**t-5**	**t-4**	**t-3**	**t-2**	**t-1**
Daily abnormal return		-0.01%	0.00%	0.01%	-0.05%	0.09%	-0.12%	0.06%	-0.02%	0.04%	-0.02%	-0.02%	0.03%	0.05%	-0.05%	-0.10%	-0.12%	0.00%	0.07%	-0.13%	-0.14%
1+ daily abnormal return		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cumulative daily abnormal return		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yen	**100.00**	**99.99**	**99.99**	**100.00**	**99.95**	**100.04**	**99.92**	**99.98**	**99.97**	**100.00**	**99.98**	**99.96**	**99.99**	**100.05**	**100.00**	**99.90**	**99.78**	**99.78**	**99.85**	**99.72**	**99.58**
Test		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Nikkei 400 Index																				
	Event date (t)	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**t+6**	**t+7**	**t+8**	**t+9**	**t+10**	**t+11**	**t+12**	**t+13**	**t+14**	**t+15**	**t+16**	**t+17**	**t+18**	**t+19**	**t+20**
Daily abnormal return	-1.25%	-0.06%	-0.27%	0.49%	0.30%	0.44%	-0.15%	0.09%	-0.37%	-0.15%	-0.24%	0.17%	0.25%	0.38%	-0.21%	-0.20%	-0.42%	-0.15%	-0.19%	0.03%	0.21%
1+ daily abnormal return	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cumulative daily abnormal return	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98
Yen	**97.86**	**97.80**	**97.54**	**98.01**	**98.30**	**98.74**	**98.59**	**98.68**	**98.32**	**98.17**	**97.94**	**98.10**	**98.35**	**98.72**	**98.51**	**98.32**	**97.91**	**97.76**	**97.58**	**97.61**	**97.81**
Test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Nikkei 225 Index																				
	Event date (t)	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**t+6**	**t+7**	**t+8**	**t+9**	**t+10**	**t+11**	**t+12**	**t+13**	**t+14**	**t+15**	**t+16**	**t+17**	**t+18**	**t+19**	**t+20**
Daily abnormal return	-1.31%	-0.12%	-0.01%	-0.01%	0.19%	0.03%	0.08%	0.03%	-0.03%	-0.08%	0.07%	0.05%	0.12%	0.12%	-0.01%	0.05%	-0.13%	0.00%	-0.13%	0.01%	-0.08%
1+ daily abnormal return	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cumulative daily abnormal return	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98
Yen	**98.28**	**98.16**	**98.15**	**98.14**	**98.32**	**98.36**	**98.43**	**98.46**	**98.43**	**98.35**	**98.42**	**98.47**	**98.59**	**98.70**	**98.69**	**98.74**	**98.61**	**98.61**	**98.48**	**98.49**	**98.42**
Test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-