



Heterogeneous impacts of Abenomics on the stock market: A Fund flow analysis[☆]



Yoshihiro Kondo, Yoshiyuki Nakazono^{*}, Rui Ota, Qing-Yuan Sui

Yokohama City University Japan

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ABSTRACT

This study examines the heterogeneous impacts of Abenomics on the Japanese stock market using fund flow data. While Fukuda (2015) identifies changes in foreign investors' expectations from *price* changes in financial markets, we focus on changes in the *quantity* demanded of Japanese stocks. We obtain three findings. First, only foreign investors aggressively and immediately purchased Japanese stocks at the onset of Abenomics. Second, since the two years following the launch of Abenomics, foreign investment inflows into Japanese stocks have changed due to external factors originating in the United States. Third, a VAR analysis shows the heterogeneous impacts of Abenomics among investors inside and outside Japan. However, the changes in foreign investors' expectations are short-lived in the sense that signs of permanent shifts as a result of Abenomics cannot be identified after 2014.

1. Introduction

The only effective way for policy makers to stimulate aggregate demand under a *liquidity trap* is to drastically change market expectations. However, limited knowledge exists on how to induce changes in public expectations. As Fujiwara et al. (2015) notes, the conventional wisdom of macroeconomics is that policy regime change can change a sluggish economic situation by managing expectations *a la* Eggertsson and Woodford (2003). Although the proposition that expectation matters is widely accepted, we do not necessarily have a comprehensive understanding of whether and how policy makers could drastically influence public expectations concerning economies' fundamentals.

To investigate whether Abenomics is successful in the sense that it can cause an abrupt change in expectations, we re-examine whether there have been impacts on domestic and foreign investors in the Japanese stock markets during Abenomics by analyzing the quantity demanded of Japanese stocks rather than price data. The past studies that conduct policy evaluations use asset prices or forecast data to detect structural changes. For example, Fukuda (2015) identifies changes

in foreign investors' expectations by *price* changes in financial markets.¹ Instead of using price data, we focus on the change in the *quantity* demanded of Japanese stocks because we believe that the investment amount from domestic and foreign investors indicates the expectation changes among these investment groups more directly than the price movements in different time zones.

There are three findings in this paper. First, we find that only foreign investors are statistically aggressive in purchasing Japanese stocks and immediately respond to the onset of Abenomics. We find that the flow from foreign investors into Japanese stocks structurally changed immediately after the start of Abenomics, but no such changes occurred for domestic investors in the corresponding period. Second, two years after the onset of Abenomics, the changes in flows into Japanese stock markets reflect external factors from the United States rather than domestic factors. We detect structural breaks in foreign flows on the dates when major events occurred in the United States. Third, a VAR analysis shows that the impact of Abenomics on investors' flows is only transitory: there is no permanent effect. Our estimation results suggest that the underlying trends of stagnated and stable returns from Japanese stocks during the day and night, which we have experienced over the

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^{*} Corresponding author.

E-mail addresses: i160286a@yokohama-cu.ac.jp (Y. Kondo), nakazono@yokohama-cu.ac.jp (Y. Nakazono), rota@yokohama-cu.ac.jp (R. Ota), usui@yokohama-cu.ac.jp (Q.-Y. Sui).

¹ Fukuda (2015) succeeds in identifying investors' heterogeneous expectations by analyzing the difference between stock returns and foreign exchange rates during the day and night.

last three decades, changed slightly for two years when Abenomics was first introduced. In fact, the upward trend of stock returns at night accelerates, and the tendency of sluggish returns during the day is mitigated in the first two years of Abenomics. However, the changes in expectations are short-lived in the sense that the sign of a permanent shift in market expectations, which is seen just after the beginning of Abenomics, vanishes after 2014.

This study examines whether Abenomics policy packages can change market expectations for policy evaluation. Specifically, we examine (1) who purchases Japanese stocks in response to Abenomics? (2) What causes changes in investment flows into the Japanese stock markets? (3) After the first two years of Abenomics, did the “bullish” expectations for Abenomics explain the subsequent rise in returns of Japanese stocks? Most previous studies on transmission mechanisms focus on monetary policy. While the large-scale quantitative easing of monetary policy constitutes the main component of Abenomics, other policies, such as fiscal expansion and growth strategies, are also included in policy packages. This paper focuses on the effects of the general policy packages on the Japanese financial markets. Additionally, instead of tracking potential transmission channels, we concentrate our attention on a well-known fact; that is, initial policies largely influence some financial measures, such as the stock price index and the exchange rate, while they seem to have a minimal influence on the real economy.

The structure of this paper is as follows. Section 2 introduces the basic features of Abenomics and discusses some related previous studies. Section 3 discusses the flow data used in our study. Section 4 investigates who purchases Japanese stocks and what events affect investment flows into Japan. Section 5 examines whether two years after the start of Abenomics, the policy packages had a persistent effect on the Japanese stock markets, and Section 6 concludes.

2. Abenomics and market expectations

The policy package introduced by the newly appointed Prime Minister Shinzo Abe in late 2012, seems to have had some positive effects on the Japanese economy. The Abenomics policy is composed of *three arrows*: aggressive monetary easing; large-scale fiscal spending; and a growth-enhancing strategy.² Fig. 1 plots the chronological developments in the annual GDP growth rate, nominal foreign exchange rates (USDJPY), and the Nikkei 225 index from January 2011 to December 2018. The vertical line reflects November 2012 when Abenomics was launched. While the increase in the year-on-year growth rate of real GDP moves sluggishly³, the financial variables drastically change. The Japanese yen depreciates sharply against the US dollar after mid-2012. The stock index abruptly surges and more than doubles compared to the onset of Abenomics. While the macroeconomic variables seem to react less drastically, the financial variables appear to change abruptly after the launch of Abenomics.

The literature, however, does not fully explain the background behind the phenomena. It is not easy to examine this subject because the current macroeconomic theories cannot completely explain the drastic changes under the zero lower bound (ZLB) of nominal interest rates. Under the ZLB, there is only a limited way to boost aggregate demand. Particularly, Japan faced the ZLB of short-term and long-term nominal interest rates after 2012. The long-term interest rates (the Japanese government bond 10-year yield) have been almost zero; that is, below 1.0% since 2012 and even fell into negative territory in 2016. In a situation where even long-term nominal interest rates remain extremely small, traditional monetary policies, such as decreasing a short-term rate, and also non-traditional monetary policy, such as the

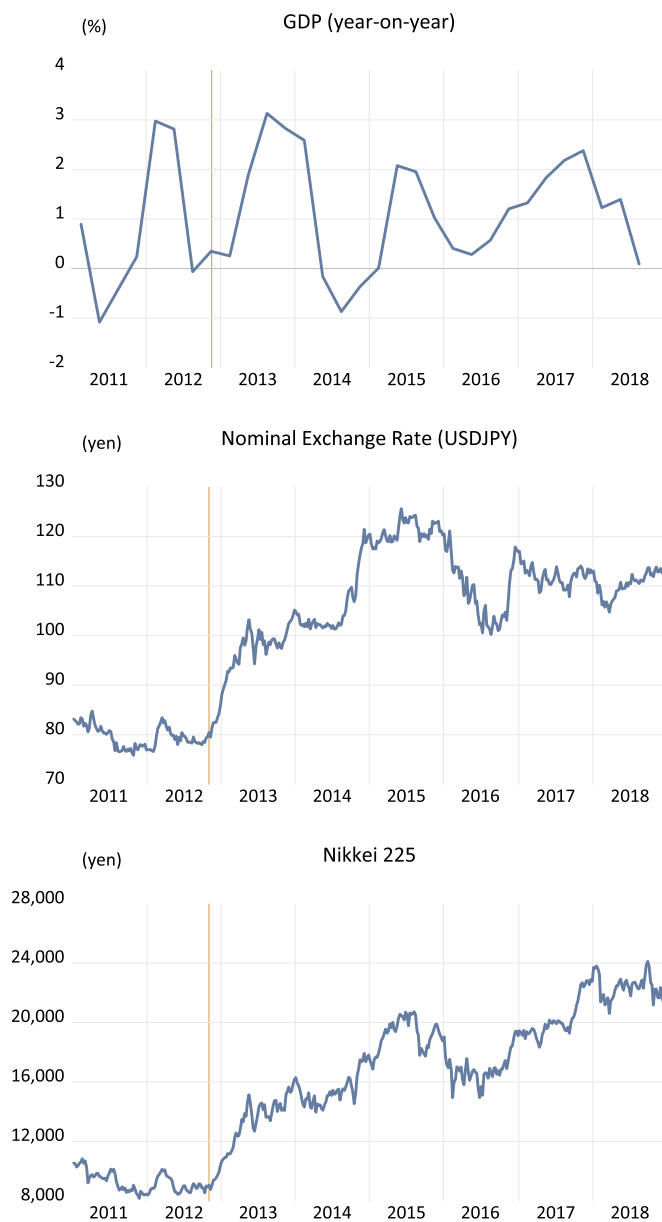


Fig. 1. Developments in economic and financial variables. The vertical line is drawn from November 2012 when Abenomics launches.

enhancement of commitment policy to further decline longer-term nominal interest, can no longer play central roles in economic stimulus. Fujiwara et al. (2015) calls this situation a *long-term liquidity trap*.

The literature that provides Abenomics with policy assessment shows mixed evidences. Fukuda (2015) is the first paper to show the role of change in foreign investor's expectations on the devaluation of the Japanese yen and the surge in the Japanese stock markets. Fukuda (2015) shows that foreign investors react to a new unconventional economic policy regime, Abenomics.⁴ Hausman, Wieland, 2014 argue that the policy packages are half-forward in the sense that they achieve higher inflation expectations while the real effects are modest. Fujiwara et al. (2015) provide Abenomics with a negative assessment. Using forecast data by professional forecasters, Fujiwara et al. (2015) show that there are no drastic changes in market expectations.

The research question in this study addresses whether Abenomics is

² Fukuda (2015) describes Abenomics in more detail.

³ Fukuda and Doita (2016) shows that Japan's exports did not recovery in spite of the yen depreciation during Abenomics.

⁴ Shioji (2015), Ono (2017), Baak (2017), and Kano and Wada (2017) also note the role of foreign investors on yen depreciation during Abenomics.

successful in the sense that it can cause an abrupt change in expectations in the Japanese stock markets. If the answer is yes, how does the policy regime shift drastically change public expectations? This study investigates whether there are any different reactions among investors when they respond to news shocks from Abenomics. To tackle these questions, we focus on *flow* data to capture change in investors' expectations. The literature measures the impacts of Abenomics on the financial markets using *price* data. However, what matters when identifying a change in investors' expectations is not *price* data but the *quantity* demanded. First, investment flow is followed by a change in stock prices. The flow into Japan's stock markets should directly reflect changes in investors' expectations concerning the effects of macroeconomic policies and the future course of the Japanese economy. Second, a fund flow analysis allows us to investigate gross trades in stock markets. Because *price* is the record of the matching of buy and sell orders, the price data conveys only information on the net impact of purchases and sales. On the other hand, a flow analysis recodes gross trades; it allows us to identify who buys and sells and how much.⁵ Thus, we focus on the flows from domestic and foreign investors into Japanese equity funds to investigate whose expectations change and what events affect their expectations. To our knowledge, this is the first study that uses high-frequency fund flow data to investigate policy effects in recent Japan.

3. Data

We use daily data on investment flows to Japanese equity markets from January 4, 2010 to December 28, 2018, compiled by Emerging Portfolio Fund Research (EPFR). The dataset contains daily flows for 100,000 funds and approximately 33 trillion dollars (as of January 2018) of publicly offered investment trusts and global ETFs in terms of assets under management (AUM). Compared with the dataset compiled by the International Investment Funds Association, this dataset contains approximately 65% of that dataset in terms of monetary amounts. EPFR calculates fund flows using changes in AUM excluding the effect of fund performance and currency conversion. We use the percentage of fund flows to AUM; that is, flows divided by AUM.⁶

In recent years, high-frequency fund flow data are increasingly used to analyze the impacts of economic policy. For example, Fratzscher et al. (2016) use the data provided by EPFR to analyze the effects of the Federal Reserve's quantitative easing (QE) on global portfolio allocations. Guo (2016) and Jotikasthira et al. (2012) use the same data to directly examine the changes in investors' decision-making.

There is an important advantage in using the flow data when analyzing investors' decision-making or their expectations. Price data on financial assets can provide useful information on the fundamental values of the underlying assets in a timely manner. However, prices reflect the results of interactions between demanders and suppliers. Using fund flow data, we can more directly and more precisely identify the investment behaviors of different groups. This advantage allows us to examine the heterogeneous impacts of the policy packages, Abenomics, on Japanese stock markets.

We can classify the flows under four subjects for domiciles and fund targets: (1) domestic retail investors, (2) domestic institutional investors, (3) foreign retail investors, and (4) foreign institutional

⁵ From another perspective, a flow analysis also becomes an important issue. For example, Engel (2016) provides a comprehensive survey on international capital flows and their control policies emphasizing the significance of international macroprudential regulation. This approach reflects the growing attention to policy analysis considering capital flows after the global financial turmoil of 2008.

⁶ We exclude the Bank of Japan's (BOJ) purchases of ETFs from the domestic fund flow data.

investors.

- Retail domestic investors: the fund flows domiciled in Japan and targeting retail investors.
- Institutional domestic investors: the fund flows domiciled in Japan and targeting institutional investors with a minimum purchase amount of \$100,000.
- Retail foreign investors: the fund flows domiciled in the rest of the world and targeting retail investors.
- Institutional foreign investors: the fund flows domiciled in the rest of the world and targeting institutional investors with a minimum purchase amount of \$100,000.

Table 1 reports the basic statistics of the flow data that we use.⁷ The table shows the investors flow from home and foreign countries in the first two years after the onset of Abenomics from November 1, 2012 to October 31, 2014. The table shows that the mean and median inflows from foreign institutional investors are higher than those of Japanese stocks during the period. We will carefully check this point later.

4. Do investors' flows into Japan change?

4.1. Who aggressively purchases Japanese stocks?

First, we examine who aggressively purchases Japanese stocks in response to Abenomics. Fig. 3 depicts the accumulated changes in the Nikkei 225 in the daytime and nighttime sessions from November 2012 to December 2014. The returns in the daytime and nighttime sessions are defined as the differences in (log) price between the opening price at 9:00 in Tokyo to the closing price at 15:00 in Tokyo and from the closing price to the opening price at 9:00 the next morning.⁸ Fig. 4 shows net purchases in terms of dollar amounts in Japanese equity funds from 2012 to 2014. The figure implies that institutional overseas investors dominate Japanese equity purchases during the period. The evidence suggests that foreign investors reacted more strongly to the launch of Abenomics than domestic investors.

4.2. Structural break test

To examine whether investors' flows into Japanese stocks changes in response to Abenomics, we conduct three types of statistical tests. The first test is a structural break test when a break point is unknown (Quandt-Andrews unknown breakpoint test). The estimation equation is the following:

$$y_{j,t} = c + \alpha_j y_{j,t-1} + \sum_{i=0}^1 \beta_{ji} \Delta X_{t-i} + \sum_{i=0}^1 \gamma_i \Delta Y_{t-i} + \varepsilon_{j,t}, \quad (1)$$

where $y_{j,t}$ is the flow in terms of the percentage of AUM from each investor⁹, X_t is denoted as a vector of the (logged) stock indices: NY Dow, FTSE 100, Hang Seng Index, and Nikkei 225. ΔY_t is a daily change of the US long-term (five-year) interest rate. Here, j indicates four categories of fund flows: retail investors' and institutional investors' flows into Japanese equity funds from home and foreign countries, respectively. Here, X and Y we use in Eq. (1) are the latest returns or changes

⁷ We check the correlation matrix among the four fund flows and find that the correlation is low. When the sum of the flows equals zero, their correlation may not be small. We find that they are not very dependent: the absolute value of the correlation among the four variables is at most 0.2. The fact that the correlation is not so high is partly because the flows are calculated based on the percentage of AUM and excludes the BOJ's purchases from the flow data.

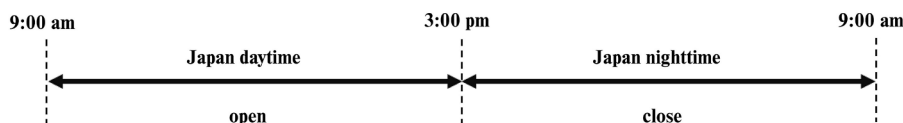
⁸ Fig. 2 summarizes the time zones we use for Japan for daytime and nighttime.

⁹ As Table 2 shows, the null hypotheses that the fund flow has a unit root are all rejected. Thus, the variables in Eq. (1) are all stationary.

Table 1
Summary statistics of investors' flow from November 2012 to October 2014.

Domestic	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Obs.
Retail	0.020%	0.000%	1.209%	- 1.173%	0.235	0.777	8.413	445
Institutional	0.070%	0.022%	7.474%	- 1.680%	0.506	7.997	110.810	518
Foreign	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Obs.
Retail	0.012%	0.004%	0.649%	- 0.510%	0.090	0.516	11.117	518
Institutional	0.080%	0.059%	1.455%	- 0.265%	0.137	2.455	22.547	518

(1) Nikkei 225



(2) Nikkei 225 Futures

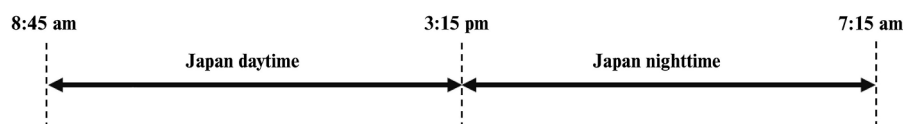


Fig. 2. Japan daytime and nighttime.

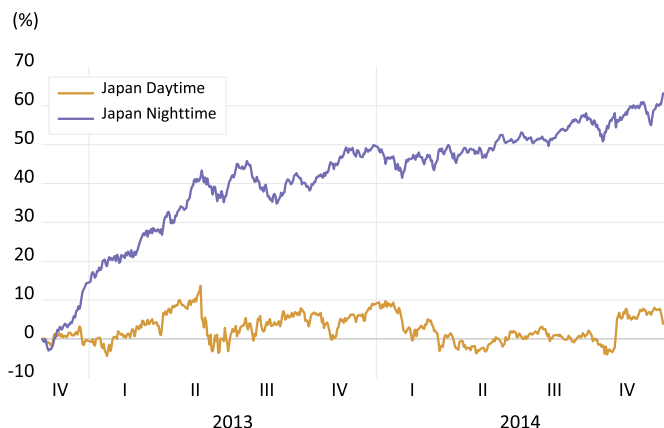


Fig. 3. Accumulated changes of daytime and nighttime Nikkei 225 from November 2012 to December 2014.

of NY Dow, FTSE 100, and Hang Seng Index and US long-term (five-year) interest rate, respectively. Thus, the stock and bond returns (X and Y) in the right-hand side precede the flow (y) in the left-hand side.

Table 3 summarizes the estimation results. First, the retail and institutional investors' flows from overseas change statistically in mid-December 2012. The change in the flows from retail foreign investors is detected on December 14, 2012 while the flow from institutional foreign investors structurally changes on December 18, 2012. The breakpoints of the foreign flows correspond to the onset of Abenomics. On the other hand, retail domestic investors' flows change in May 2013. In May 2013, Japanese stocks suffered their worst single-month drop since the beginning of Abenomics. The change in Japanese retail investors' flows reflects the sharp drop in the stock market. Furthermore, it is the date of the second board meeting after Mr. Kuroda becomes the BOJ governor. The BOJ' announcement of no extra monetary easing in the meeting disappoints the financial markets. Also on May 22, 2013, FRB Chairman Bernanke refers to the tapering at the US congress. It is likely

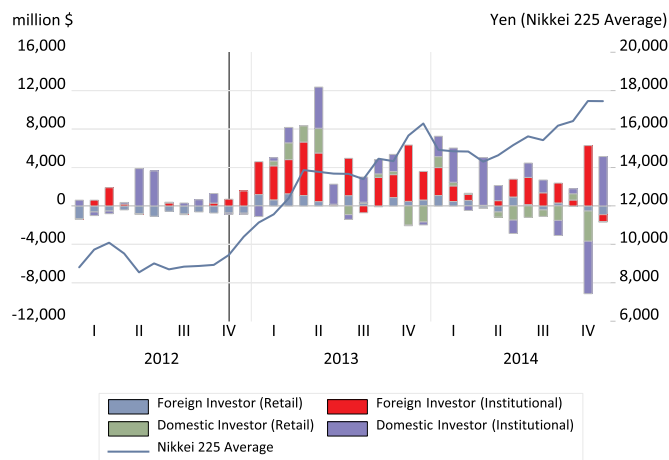


Fig. 4. Monthly flow into Japanese equity funds from January 2012 to December 2014. (Source: EPFR).

Table 2
Augmented Dickey-Fuller (ADF) unit root test.

Domestic investors	ADF test statistic	p-value
Retail investors	- 7.947***	0.0000
Institutional investors	- 26.724***	0.0000
Foreign investors	ADF test statistic	p-value
Retail investors	- 16.459***	0.0000
Institutional investors	- 7.335***	0.0000

Note: *** indicates 1% significance.

that these policy changes causes a structural break on May 22, 2013. As for domestic institutional investors, the flows does not change statistically after the introduction of Abenomics. Although the breakpoint is

Table 3
Quandt-Andrews unknown breakpoint test.

Domestic investors	Statistic	Break day	Value	p-value
Retail investors	Maximum LR F-statistic	May 22, 2013	5.482***	0.0000
	Exp LR F-statistic		1.541***	0.0004
	Ave LR F-statistic		2.625***	0.0000
Institutional investors	Maximum LR F-statistic	August 3, 2011	2.511*	0.0524
	Exp LR F-statistic		0.388	0.9417
	Ave LR F-statistic		0.751	0.8222
Foreign investors	Statistic	Break day	Value	p-value
Retail investors	Maximum LR F-statistic	December 14, 2012	4.914***	0.0000
	Exp LR F-statistic		1.546***	0.0003
	Ave LR F-statistic		2.820***	0.0000
Institutional investors	Maximum LR F-statistic	December 18, 2012	7.455***	0.0000
	Exp LR F-statistic		2.416***	0.0000
	Ave LR F-statistic		3.881***	0.0000

Note: *** and * indicate 1% and 10% significance, respectively.

detected on August 3, 2011, it occurs well before Abenomics begins.¹⁰

4.3. Multiple structural breaks

In this subsection, we further investigate the changes in investors' flows by allowing for multiple structural breaks. Using Eq. (1), we conduct the Bai-Perron test to investigate how many breakpoints are detected. Table 4 summarizes the estimation results and supports the Quandt-Andrews breakpoint test in the previous subsection. Table 4 shows that foreign investors change their flows into Japanese stocks in December 2012. For retail and institutional foreign investors, structural breaks are detected on December 28, 2012 and on December 14, 2012, respectively. The breaks occur immediately after the launch of Abenomics. While other breakpoints are detected, they occur either before Abenomics or after the market crash in late May 2013. On the other hand, Table 4 shows that the flows from domestic investors do not immediately change in response to the onset of Abenomics. It is not until May 2013 that the domestic flows from retail investors structurally change, and the Bai-Perron test suggests that the first breakpoints in the case of Japanese retail investors are after the stock market plunge in late May 2013. These results confirm that only foreign investors' flows promptly responded to the launch of Abenomics.

5. Are foreign investor expectations still bullish?

5.1. The influence of external factors on stock flow into Japan

The BOJ introduced quantitative and qualitative easing (QQE) in

¹⁰ We terminate the sample period at December 2014, while we admit that the sample period we employ here may ignore the end of October 2014 as an important structural break point not only because BOJ expands QQE but FRB terminates QE3 in the U.S. The first reason why we terminate the sample at December 2014 is that our motivation is to examine the impact of Abenomics for the first two years just after the launch of the policy packages. Because Abenomics starts in the late 2012, the sample from November 2012 to December 2014 covers the first two years of Abenomics. The second reason is the BOJ's announcement. In March 2013, Haruhiko Kuroda is appointed as Governor of the Bank of Japan. Then, the bank introduces the Quantitative and Qualitative Monetary Easing and commits to achieve 2% inflation target in 2 years. Our study focuses on the period just after the beginning of QQE. The third reason is to match the sample period with Fukuda (2015) for comparison. Fukuda (2015) is the seminal paper to investigate the reason why Abenomics is successful in changing market expectations by focusing on asymmetric behavior of domestic and foreign investors. Because our approach with the flow data is similar to Fukuda (2015) with the price data, we would like to compare our benchmark results with those of Fukuda (2015).

Table 4
Multiple breakpoint test.

Domestic investors	Break date(s)	F-statistic
Retail investors	1 May 22, 2013	50.598**
	2 September 30, 2013	52.959**
Institutional investors	1 July 29, 2011	42.757**
Foreign investors	Break date(s)	F-statistic
Retail investors	1 August 10, 2011	46.652**
	2 December 28, 2012	57.354**
	3 August 8, 2013	42.607**
Institutional investors	1 December 14, 2012	45.535**
	2 July 26, 2013	35.027**
	3 February 24, 2014	37.805**

Note: ** indicates 5% significance.

April 2013 and announced that it would achieve a target of 2 percent growth in the consumer price index (CPI) within a time horizon of two years. Although market participants who are bullish on the country's economic outlook may believe that the goal of the first arrow of Abenomics was realized by early 2014, it is obvious that the BOJ failed to reach the inflation target in two years. Then, a question arises: Are foreign investors' expectations for Abenomics still bullish two years after the start of Abenomics?

Fig. 5 depicts that the (accumulative) returns in the nighttime session in Japanese stock markets outperformed the returns of the daytime session even after 2014. The bullish expectations of foreign investors for Abenomics may remain. However, external factors may also be pushing Japanese stock prices higher. To examine whether the foreign investor in Japanese stock purchases were still aggressive two years following the launch of Abenomics, we conduct the Bai-Perron test using the flow data from foreign investors into Japanese equity funds from November 2014 to December 2018. Table 5 shows the multiple breakpoints after November 2014 and implies that the news shocks from the United States account for the changes in the equity flows from overseas.

The first breakpoint detected by the test occurs on December 9, 2015. This date is the day after Donald Trump won the presidential election. Throughout the election campaign, the candidate vowed to introduce drastic policies such as huge tax cuts and the construction of a "Great Wall" along the border between the United States and Mexico. The policy packages are called "Trumponomics."¹¹ Our estimation result suggests that the detected changes in flows into Japanese equity

¹¹ See Moore and Laffer (2018).

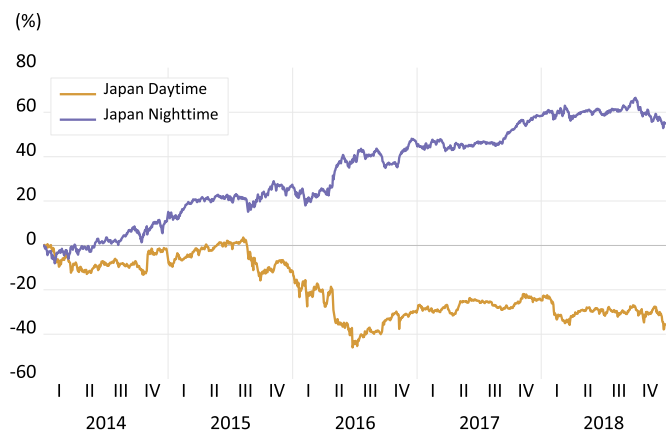


Fig. 5. Accumulated changes in returns of Nikkei 225 during the day and night for the past five years from 2014 to 2018.

Table 5
Multiple breakpoint test for institutional investors in foreign countries.

Foreign investors	Break dates	F-statistic
Institutional investors	(1) December 9, 2015	50.183**
	(2) November 16, 2016	32.975**
	(3) February 28, 2018	83.137**

Note: ** indicates 5% significance.

funds from overseas were caused by the spillover effects from the United States: the structural changes in the flows were affected by the harbinger of an abrupt change in economic policies announced by the new president in the United States.

The second breakpoint occurred on November 16, 2016. On the same day, the Federal Reserve raised the fed fund rate by 0.25% for the first time since the great recession. The detected breakpoint perfectly corresponds to the day when the central bank escaped the ZLB of the short-term nominal interest rate. The estimation result implies that the change in equity flows from overseas may reflect the end of the quantitative easing and the start of a new round of rate hikes. The second breakpoint also seems to be affected by a spillover effect from the United States.

The third breakpoint was on February 28, 2018. From early February, the US stock market plummeted. Specifically, on February 5, 2018, the Dow Jones index fell sharply by 1175 and recorded the biggest one-day loss. The storm from the U.S. market sparked the sell-off of Japanese stocks, which plummeted by 1500 yen on February 5, 2018. Our breakpoint test suggests that global market turmoil caused the equity flow from foreign investors.

Our estimation results from the multiple breakpoint tests from November 2014 show that the flows from foreign investors changed not because of domestic factors but because of external factors. Specifically, the factors influencing overseas investors' flows are explained by news shocks from the United States. We suggest that the majority of the accumulative rise in Japanese stocks two years after the onset of Abenomics is induced by external factors rather than domestic factors.

5.2. Underlying trends of the flows into Japanese stock markets for the last three decades

The previous subsection implies that external shocks matter in determining flows from overseas, and foreign investors were the dominant players in Japanese stock markets after November 2014. Is this the only case of this dynamic in recent years, or was this the underlying trend even before the beginning of Abenomics? To examine whether foreign investor dominance is a transitory or persistent phenomenon, we depict the accumulative change in the Nikkei 225 on a daily basis for the past

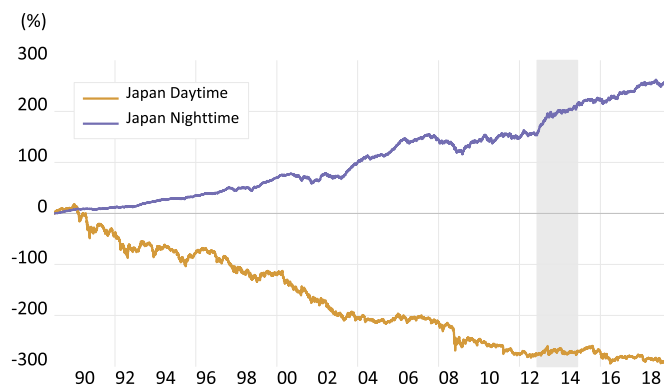


Fig. 6. Accumulated changes in returns of Nikkei 225 during the day and over the last three decades.

30 years.

Fig. 6 shows the contrasting development of the daytime and nighttime stock returns on the Nikkei 225 from 1989 to 2018. The cumulative returns for Japan nighttime trading show an upward trend for the three decades. While dipping after the bursting of the IT bubble in 2000 and the global financial crisis in 2008, the nighttime return has basically remained elevated. On the other hand, regarding daytime returns, the opposite has happened. The cumulative returns for daytime trading have continued to fall. Although cumulative returns increased just before the bursting of the bubble economy in 1989, they have persistently declined since 1990.¹²

This fact suggests that foreign investors have been the dominant players in the Japanese stock markets for a long time.¹³ Moreover, this is not a transitory phenomenon as shown in Section 4, and it is not a phenomenon seen only after the introduction of Abenomics. Rather, this is a mega trend lasting over the last three decades.¹⁴ We show that stock returns at nighttime spike immediately after the beginning of Abenomics because of the massive flows from foreign investors. This might be true, but the salient fact is that foreign investor purchases are only the continuation of an underlying trend that has continued over the last 30 years. Fig. 6 suggests that night trading returns jump in late 2012 but then return to the trendline. Thus, the sharp rise in stock returns after the launch of Abenomics may be a short-lived deviation from a steady increase for the last 30 years.¹⁵

The lackluster performance of Japanese daytime stock returns has also been an underlying trend for the past 30 years. Fig. 3 gives a misleading impression that the gloomy market in Japan daytime trading, which is partly due to a slow flow of domestic investors into Japanese equities, may be a temporary phenomenon during this period. However, Fig. 6 suggests that the poor returns for Japanese daytime stocks during Abenomics is just a short period of daytime doldrums over the three decades. In fact, daytime returns in Japanese stock

¹²The unit root test, which examines whether the cumulative returns during the day and night show trends, fails to reject the null hypotheses.

¹³Fig. 7 also supports the view that foreigners have become the dominant players in the Japanese stock markets. The figure presents the development of the ratio of total trading values by foreigners over the last three decades. The fraction was only 10% in 1989, but it increased to 70% at the end of 2018. The flows from foreign investors have had substantial impacts on the Japanese stock markets over the last three decades. The trend corresponds with the cumulative returns of the Nikkei 225 for night trading, as shown in Fig. 6.

¹⁴The literature shows asymmetric changes in financial markets during the day and night. For example, Tsutsui (2003) also notes the fact that stock prices in Japan rise at night. Fukuda (2016) shows asymmetric changes in yen/dollar exchange rates in the daytime and at night.

¹⁵The mega trends during the daytime and at night in the Japanese stock markets over the three decades are worth analysis. Kondo et al. (2019) investigate trends' backgrounds using panel data from global equity markets.

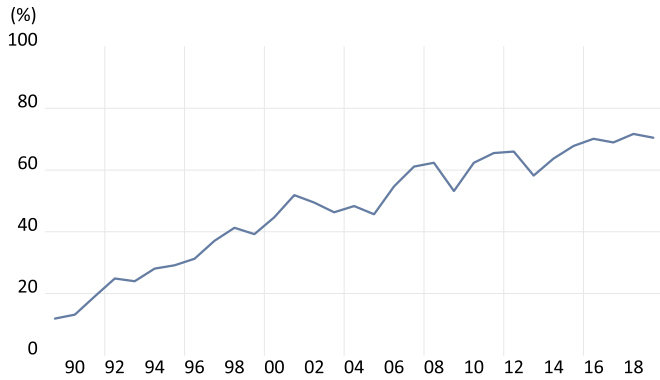


Fig. 7. Ratio of total trading value of foreigners to total brokerage trading from 1989 to 2018. (Source: Tokyo Stock Exchange).

markets have chronically underperformed nighttime returns since 1990. Again, the daytime returns adversely changed to a downward trend two years after the launch of Abenomics. Therefore, the sluggishness of daytime stock returns from late 2012 to 2014 may be a temporary halt in the long-term stagnation of daytime stock market trading over the three decades.

5.3. A VAR analysis

5.3.1. Identification strategy

The stark contrast between the day and night returns during Abenomics is not a temporal phenomenon but is thought to be a part of an underlying trend for the past 30 years. Is this phenomenon caused by domestic and foreign investors' flows? To answer this question, we examine who drives brilliant returns at night and disappointing returns during the day. We analyze the interdependence between price and flow in the Japanese stock markets. Specifically, we use a vector autoregressive model to investigate the mutual dependence between returns during the day and night and flows from domestic and foreign investors.

Our focus is to identify the main drivers causing the contrasting returns between day and night. If domestic investors respond to positive stock price shocks during the day, we will find domestic inflows into Japanese stock. On the contrary, if foreign investors react to positive stock price shocks at night, we will see purchases from foreign countries.

The model we use includes the four endogenous variables:

$$y_t = \begin{pmatrix} \text{Flow}_t^H \\ \text{Return}_t^D \\ \text{Flow}_t^F \\ \text{Return}_t^N \end{pmatrix},$$

where y is a vector of four endogenous variables, and $Flow^H$ and $Flow^F$ are denoted as domestic and foreign investors' flows into Japanese equity funds, respectively. $Return^D$ and $Return^N$ are the daytime and nighttime returns of the Nikkei 225.¹⁶ We assume that the true model can be written as:

$$By_t = A(L)y_{t-1} + \varepsilon_t, \tag{2}$$

where A and B are coefficient matrices, ε_t is a vector of structural shocks, and L is the lag operator. A standard VAR method is described

¹⁶ Daytime and nighttime returns are calculated by the percent changes from 9:00 to 15:00 and from 15:00 to 9:00 the next morning, respectively. As discussed later, the results are similar when the calculation of daytime and nighttime returns are modified using Nikkei 225 Futures. Additionally, our baseline results are robust when the foreign investors' flows are defined as flows from the United States or European countries.

by the following reduced form:

$$y_t = \Gamma(L)y_{t-1} + e_t, \tag{3}$$

where $\Gamma = B^{-1}A$ and e_t is a vector of residuals, which is written as $B^{-1}\varepsilon_t$. We impose zero restrictions on B to identify structural shocks, which are described below:

$$\begin{pmatrix} e_t \\ e_t^{Flow^H} \\ e_t^{Return^D} \\ e_t^{Flow^F} \\ e_t^{Return^N} \end{pmatrix} = \begin{pmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix} \begin{pmatrix} \varepsilon_t \\ \varepsilon_t^{Flow^H} \\ \varepsilon_t^{Return^D} \\ \varepsilon_t^{Flow^F} \\ \varepsilon_t^{Return^N} \end{pmatrix}. \tag{4}$$

While Eq. (4) follows the simple recursive restrictions, the ordering of the endogenous variables makes sense.

First, there exists a time lag between day and night. Shocks of domestic investors' flows ($\varepsilon_t^{Flow^H}$) and daytime returns ($\varepsilon_t^{Return^D}$) in the home country may have impacts on foreign investors' flows ($Flow_t^F$) and stock returns at night ($Return_t^N$) on the same day. However, shocks of foreign investors' flows ($\varepsilon_t^{Flow^F}$) and stock returns at night ($\varepsilon_t^{Return^N}$) do not immediately influence domestic investors' flows ($Flow_t^H$) and stock returns during daytime ($Return_t^D$) because of the time lag. The time lag leads to the restrictions so that a_{13} , a_{14} , a_{23} , and a_{24} in the vector B^{-1} must be equal to zero.

Second, we assume unilateral dependence between price and quantity. We allow shocks of equity flow to simultaneously influence stock returns because flow into stock markets can directly affect stock prices through the supply-demand balance of equity funds. On the other hand, we assume that shocks of equity prices have no immediate impacts on stock prices. This reflects the view that investors require time to rebalance their portfolios in response to returns shocks. The portfolio adjustment cost induces one-way dependencies, which impose a_{12} and a_{34} in a vector B^{-1} on zero. The identification strategy allows us to derive the impulse responses and is identical with the recursive restrictions.¹⁷

5.3.2. Impulse responses using the full sample from 2010 to 2018

Using this estimation strategy, we first examine how investors in home and foreign countries react to price shocks during the day and night.¹⁸ Fig. 8 shows the impulse responses of domestic and foreign investors' flows to stock returns shocks during the day and night for nine years from 2010 to 2018.¹⁹

The first row in Fig. 8 shows the impulse responses of domestic flows to returns shocks during the day and night. The responses show significant outflows by domestic investors from Japanese stock markets in response to a returns shock at any time of the day or night. The flows from domestic investors negatively react to a positive shock on daytime returns. We suggest that domestic investors may sell off stocks even when a shock during daytime is positive. The following is the case when a shock arrives at night. In response to a shock to night returns, domestic investors' flows significantly drop into negative territory. We also suggest that domestic investors may sell off stocks even when a shock at night is positive. This evidence implies that the underlying trend in daytime returns over the last nine years is driven by persistent outflows from domestic investors.

The second row in Fig. 8 shows the impulse responses of foreign investors' flows to return shocks during the day and night. The responses of foreigners' flows are in sharp contrast to the responses of domestic flows; there is significant inflows by foreign investors in

¹⁷ While figures are not shown to save space, our estimation results are not sensitive to the ordering of the endogenous variables.

¹⁸ Akaike's Information Criterion is used for the model's lag.

¹⁹ The data cover the last nine years from 2010 to 2018 because of the limitations of the EPFR data.

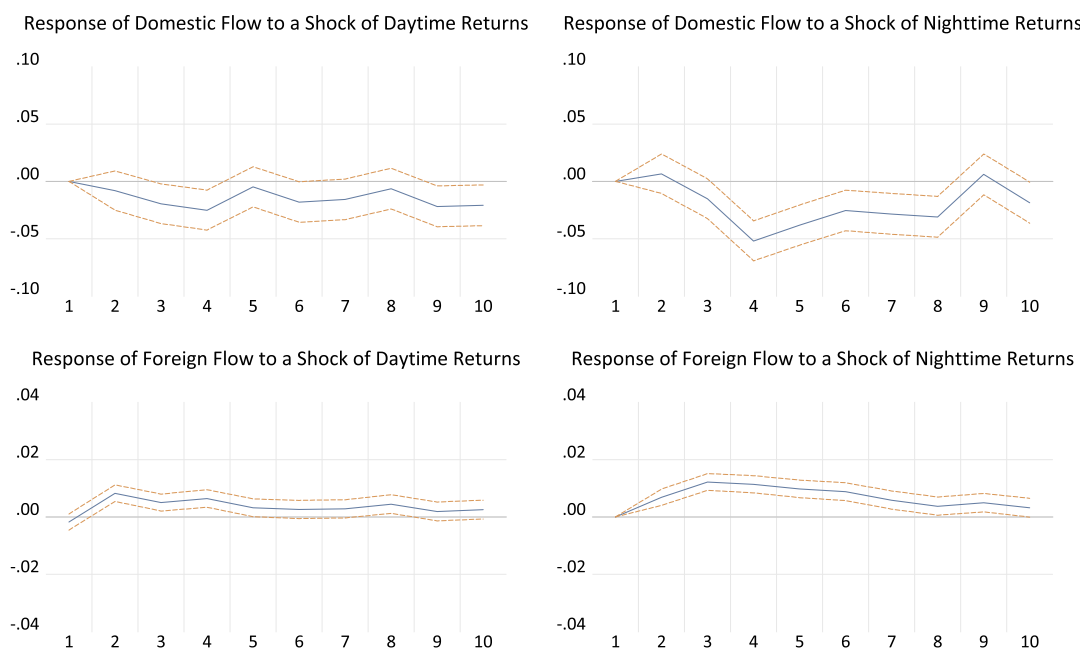


Fig. 8. Impulse responses of domestic and foreign investors' flows to stock returns shocks during the day and night for nine years from 2010 to 2018. A magnitude of shocks is one-standard-error, and solid lines represent the means with the ± 2 standard error bands. The Akaike's Information Criterion is used to determine the lag length.

response to positive return shocks at any time of the day or night. Foreign investors' flows *positively* react to a shock of daytime returns. We find that investors outside Japan purchase stocks in response to a positive daytime shock. The following is the case when a shock arrives at night. Foreign investors' flows significantly and positively respond to a returns shock at night, and the response is persistent: the significant inflows continue for 10 business days. We also suggest that foreign investors buy Japanese stocks in response to a news shock at night. These findings imply that the mega trend in night returns, at least over the last nine years, is caused by continuous inflows from overseas.

In summary, we find evidence that the underlying trends in stable and stagnated returns during the day and night, which the Japanese stock markets have experience over a decade, may be induced by continuous domestic and foreign investors' outflows and inflows, respectively. Perhaps amplified over the last three decades, the reactions of domestic and foreign investors to shocks may have caused mega trends in returns during the day and night for the last 30 years.

5.3.3. Impulse responses using sub-samples in the first two years following the launch of abenomics and two years and beyond after abenomics

The next question we address is the following: How did the flows of fund investments to equity markets change after the launch of Abenomics? To investigate whether the underlying trends are due to changes in investors' flows during Abenomics, we first estimate a VAR model with the subsample from November 2012 to October 2014. Second, we estimate a VAR model using the subsample from November 2014 to December 2018.

Fig. 9 shows the impulse responses of domestic and foreign investors' flows to stock returns shocks during the day and night using the subsample from November 2012 to October 2014. Overall, the figure suggests that the responses of both domestic and foreign investors in this period change slightly.

In the first two years following the launch of Abenomics: From November 2012 to October 2014

First, we use the data after the beginning of Abenomics from November 2012 to October 2014 and derive the impulse responses of

domestic flows to return shocks during the day and night. The first row in Fig. 9 shows that selling pressure by domestic investors is mitigated in the subsample. The reaction of domestic investors to shock returns in the daytime is negative but insignificant. Compared with a significant decline for the full sample shown in Fig. 8, selling pressure for domestic investors seems to moderate in the first two years after the launch of Abenomics. The following is the case when a shock arrives at night. Domestic investors' flows negatively respond to a positive shock of stock prices at night, but the impact of a shock is more moderate than before. The results imply that the negative response of domestic investors to a price shock is milder in the period from November 2012 to October 2014.

The second row in Fig. 9 shows the responses of foreign investors' flows to returns shocks. The responses of foreigners' flows are similar to those in Fig. 8: there is significant and aggressive *inflow* from foreign investors in response to a shock. Flows from foreign investors react more *positively* to a shock on daytime returns than before. We find that investors outside Japan have more positive impacts on equity flows than domestic investors. The following is also the case when a shock arrives at night. Foreign investors' flows significantly and positively respond to a returns shock at night, and the response is persistent: significant inflows continue for 10 business days. We suggest that foreign investors buy Japanese stocks in response to a news shock at night. The results imply that stock returns at night during the period are accelerated by slight inflows from domestic investors and more aggressive purchases from foreign investors compared to before.

Two years after the launch of Abenomics: From November 2014 to December 2018

Second, we examine domestic and foreign investors' flows two years after the introduction of Abenomics. Our focus is to investigate whether Abenomics has a persistent effect on the equity flows from November 2014 to December 2018.

While they are not shown to save space, the responses are similar to those in Fig. 8. The responses show significant and persistent *outflows* by domestic investors in response to positive returns shocks in the day and at night. The responses of foreigners' flows show a sharp contrast

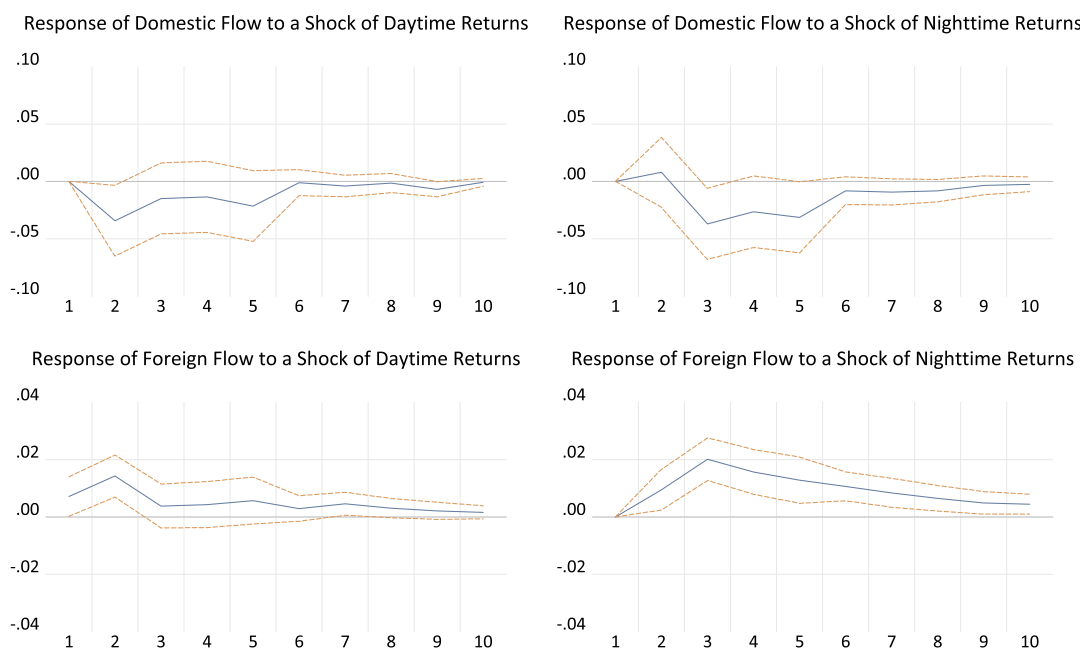


Fig. 9. Impulse responses of domestic and foreign investors' flows to stock returns shocks during the day and night for two years from November 2012 to October 2014 just after the start of Abenomics. A magnitude of shocks is one-standard-error, and solid lines represent the means with the ± 2 standard error bands. The Akaike's Information Criterion is used to determine the lag length.

with those of domestic flows; there are significant *inflows* in response to positive returns shocks at any time of the day or night. The results confirm the sharp contrast between the responses of domestic and foreign investors: domestic investors *sell* and foreign investors *buy* their stocks in response to a positive shock on stock returns.

5.3.4. Robustness check

The results from the VAR analysis in the above subsections are all robust. For a robustness check, we change the definition of stock returns during the day and night. As Fig. 2 summarizes, we compute returns using NIKKEI 225 Futures. We define the Japan daytime price change as the logged difference from Osaka open (8:45am in Osaka) to Osaka close (3:15pm in Osaka) while Japanese nighttime price change is defined as logged difference from Osaka close (3:15pm in Osaka) to Chicago close (5:15pm in Chicago, 7:15am in Osaka). We estimate a VAR model and compute the impulse responses. While they are not shown to save space, the responses are similar to those in Figs. 8 to 9. Over the last three decades, domestic investors' flows negatively respond to a positive shock on stock prices at night, but the impact of a shock after the launch of Abenomics becomes more moderate than before. On the other hand, the responses of foreigners' flows are in stark contrast with those of domestic flows; there are significant *inflows* in response to positive returns shocks at any time of the day or night for 30 years. We further check robustness when we add the change in foreign exchange rates as an exogenous variable to the model. The variation of VAR estimations support the robustness of our baseline results.

The above evidence suggests that the underlying trends and effects in stagnated and stable returns during the day and night²⁰ have

²⁰ The trends might reflect spillover effects from the United States as shown in Subsection 5.1 whereby external factors significantly explain structural changes in foreign investors' flows into the Japanese stock markets. For example, the past studies such as Bauer and Neely (2014), Dekle and Koichi (2015), Neely (2015), and Fukuda (2018) show that there are spillover effects of unconventional monetary policy conducted by advanced economies on international stock markets. Guo (2016) also notes that investors in the United States purchase global equity funds in response to positive stock returns in each country. These studies imply that the underlying trends in the Japanese day and night

changed slightly since the two years after the beginning of Abenomics during the past 30 years. However, the impact of Abenomics on investors' flows is only transitory and has had no permanent effect. Thus, investors' expectations are induced by the onset of Abenomics, but the changes in expectations are short-lived. The upward trend in stock returns at night has accelerated, and the sluggish returns during daytime were mitigated in the first two years of Abenomics. According to the estimation results, the change may have been induced by aggressive buying from foreign investors and moderate flows from domestic investors.

6. Conclusion

This study re-examines the heterogeneous impact of Abenomics in the stock market using the trading value of Japanese stocks rather than stock returns. Our motivation is to uncover the background behind the phenomenon whereby the financial variables, such as the Japanese yen and stock prices, drastically changed in late 2012 when the policy package called Abenomics was introduced. To examine the influence of Abenomics on the financial markets in Japan during the period, Fukuda (2015) uses price data to identify the change in foreign investors' expectations. We focus on the change in the *quantity* demanded of Japanese stocks rather than returns *price* data.

We obtain three findings. First, we find that only foreign investors were statistically aggressive in purchasing Japanese stocks and immediately responded to the onset of Abenomics. We show that the flow from foreign investors into Japanese stocks structurally changed in late 2012 while it was not until May 2013 that the structural change in domestic investors' flows was detected. Second, two years and beyond after the launch of Abenomics, the change in the flows into the Japanese stock markets reflect external factors from the United States rather than domestic factors. We detect structural breaks in the inflows from overseas on the dates when major events occurred in the United States. Third, a VAR analysis shows that the impact of Abenomics on

(footnote continued)

sessions may be due to spillover effects from overseas. Although the spillover effects are an important issue, they are beyond the scope of this study.

investors' flows is only transitory and had no permanent effect. Our estimation results suggest that the underlying trends of stagnated and stable returns during the day and night, which have been experienced over the past three decades, slightly changed for two years after the beginning of Abenomics. In fact, the upward trend in stock returns at night accelerated and the sluggish returns during daytime were mitigated in the first two years of Abenomics. However, the changes in expectations were short-lived in the sense that the sign of a permanent shift in market expectations, which is found just after the beginning of Abenomics, vanished after 2014. Although the change in market expectations for the first two years may have been due to aggressive buying from foreign investors and moderate flows from domestic investors, the change was temporary.

An important question that we did not address in this study is why the reactions of domestic and foreign investors to Abenomics are so different although we noted that such differences have existed for decades. It is possible that the bubble and its bursting in Japan significantly affected the psychology of Japanese investors. This possibility and its implications also require further investigation.

References

- Baak, S., 2017. Is the yen misaligned more during the Abenomics period? *Japan World Econ.* 44, 26–34.
- Bauer, M.D., Neely, C.J., 2014. International channels of the Fed's unconventional monetary policy. *J. Int. Money Finance* 44, 24–46.
- Dekle, R., Koichi, H., 2015. Japanese monetary policy and international spillovers. *J. Int. Money Finance* 52, 175–199.
- Eggertsson, G.B., Woodford, M., 2003. The zero bound on interest rates and optimal monetary policy. *Brookings Pap. Econ. Act.* 1, 139–211.
- Engel, C., 2016. Macroprudential policy under high capital mobility: policy implications from an academic perspective. *J. Jpn. Int. Econ.* 37, 59–81.
- Fratzscher, M., Lo Duca, M., Straub, R., 2016. On the international spillovers of US quantitative easing. *Econ. J.* 128, 330–377.
- Fujiwara, I., Nakazono, Y., Ueda, K., 2015. Policy regime change against chronic deflation? policy option under a long-term liquidity trap. *J. Jpn. Int. Econ.* 37, 59–81.
- Fukuda, S., 2015. Abenomics: why was it so successful in changing market expectations? *J. Jpn. Int. Econ.* 37, 1–20.
- Fukuda, S., 2016. On the predictability of daytime and night-time yen/dollar exchange rates. *Appl. Econ. Lett.* 23, 618–622.
- Fukuda, S., 2018. Impacts of Japan's negative interest rate policy on asian financial markets. *Pac. Econ. Rev.* 23, 67–79.
- Fukuda, S., Doita, T., 2016. Unconventional monetary policy and its external effects: evidence from Japan's exports. *Dev. Econ.* 54, 59–79.
- Guo, L., 2016. Are US investors blindly chasing returns in foreign countries. *Int. Rev. Econ. Finance* 41, 309–334.
- Hausman, J.K., Wieland, J.F., 2014. Abenomics: preliminary analysis and outlook. *Brookings Pap. Econ. Act.* 45, 1–76.
- Jotikasthira, C., Lundblad, C., Ramadorai, T., 2012. Asset fire sales and purchases and the international transmission of funding shocks. *J. Finance* 67, 2015–2050.
- Kano, T., Wada, K., 2017. The first arrow hitting the currency target: a long-run risk perspective. *J. Int. Money Finance* 74, 337–352.
- Kondo, Y., Nakazono, Y., Ota, R., Sui, Q.-Y., 2019. *Stock Prices During the Day and Night: An International Comparison*. mimeo.
- Moore, S., Laffer, A.B., 2018. *Trumponomics: Inside the America First Plan to Revive Our Economy*. All Points Books.
- Neely, C.J., 2015. Unconventional monetary policy had large international effects. *J. Bank. Finance* 52, 101–111.
- Ono, M., 2017. Inflation, expectation, and the real economy in Japan. *J. Jpn. Int. Econ.* 45, 13–26.
- Shioji, E., 2015. Time varying pass-through: will the yen depreciation help Japan hit the inflation target? *J. Jpn. Int. Econ.* 37, 43–58.
- Tsutsui, Y., 2003. Stock prices in Japan rise at night. *Japan World Econ.* 15, 391–406.