Policy Uncertainty and Foreign Direct Investment: Evidence from the China-Japan Island Dispute*

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Abstract

Can a temporary negative shock generate long-lasting effects on economic activities? To show causal evidence, we utilize data from Japanese multinational corporations (MNCs) and explore the economic impact of the unexpected escalation of an island dispute between China and Japan in 2012. Our difference-in-differences (DID) estimation substantiates that a sharp, but temporary fall in local sales of Japanese MNCs in China led to persistent downward deviation of foreign direct investment (FDI) from its trend. Moreover, despite the quick recovery of local sales, Japanese MNCs in China have continued to underestimate their local sales, which generates pessimistic and more dispersed forecast errors after the island crisis. We view this as evidence for a belief-driven channel through which a large and unexpected negative shock leads agents to revise their beliefs and start tail risk hedging.

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1. Introduction

"... in practice the process of revision of short-term expectation is a gradual and continuous one, carried on largely in the light of realized results; ... producers' forecasts are more often gradually modified in the light of results than in anticipation of prospective changes."

— Keynes, 1936

The literature has extensively investigated the relationship between uncertainty and firm-level activities. One stylized fact emerging from the literature is the negative uncertainty-investment relationship. Various theories have been proposed to explain how increased uncertainty adversely affects firm investment.[1] A large body of empirical work has also tried to show this negative relationship.[2] Moreover, the effects of this relationship are also found to be greater in developing countries due to political instability and geopolitical conflicts.

Despite the extensive research on uncertainty and its relationship with investment, there is still a lack of causal evidence on how increased uncertainty affects firm-level activities for two reasons.[3] First, in periods during which uncertainty increases, other economic factors are also likely to vary, such as economic policies. Second, there is a lack of high-quality firm-level data that can be used to obtain direct measures on firm-level uncertainty (e.g., forecast errors) at high frequency levels.[4] In this paper, we use the sudden escalation of the dispute over the Senkaku Islands (between China and Japan) in 2012 to explore the impact of increased uncertainty on economic activities. Specifically, we use this "island shock" which is arguably exogenous to solve the first problem mentioned above. Furthermore, we utilize data from Japanese multinational corporations (MNCs) and their foreign affiliates to deal with the second problem. These data include both qualitative and quantitative measures of firm-level uncertainty at quarterly and annual frequencies.

Using data from Japanese MNCs and their foreign affiliates, we show how increased uncertainty (due to geopolitical conflicts) has variously affected sales and capital investment of Japanese MNCs in China, forecast errors (FEs) of Japanese firms in

[1] For example, existing theories have shown that increased uncertainty raises the option value of waiting (to undertake investment) in the presence of nonconvex adjustment costs (Bernanke 1983; Dixit and Pindyck 1994; Abel and Eberly 1996; Bloom 2009), which makes firms delay their investment and hiring.

[2] Various measures of uncertainty are under development, including the stock-price volatility (Leahy and Whited 1996), the frequency of appearance of words such as "uncertain" in news articles (Baker et al. 2012), and disagreement among forecasters (Backmann et al. 2013). These proxies are used for their panel analysis and show that investment is negatively associated with uncertainty at the firm level.

[3] A notable exception is Baker and Bloom (2013), who use natural disasters as experiments to investigate the relationship between uncertainty and growth.

[4] An exception is Bachmann et al. (2013), who utilize quarterly data on firm-level uncertainty to study the impact of increased uncertainty on firm-level outcomes. Using market information, Senga (2015) constructs firm-level uncertainty measures to study how firms' learning in the aftermath of recessions affects economic recoveries during business cycles.

China, and foreign direct investment (FDI) flows from Japan to China.[5] We document three sets of empirical findings. First, we look at the impact of the island shock on sales of Japanese affiliates in China. The data show that local sales of Japanese affiliates in China plummeted immediately after the sudden escalation of the island crisis (i.e., 2012/Q3). However, these sales recovered quickly and substantially surpassed their pre-crisis levels not long after the crisis. Taken together, this evidence implies that the negative demand shock on Japanese goods (sold in China) was temporary and does not seem to have generated long-term impact on Chinese consumers' confidence in Japanese goods.[6]

However, the impact of the island crisis on FDI and capital investment differs substantially from our first finding. The data substantiate that FDI flows from Japan to China started to drop significantly when the island dispute suddenly escalated, although FDI had continually increased before the island shock. Figure 1 shows the evolution of the share of FDI inflows from Japan to China in total FDI inflows into China. When we implement difference-in-differences (DID) analysis by comparing FDI flows from Japan to China with them from Japan to other countries, this pattern becomes even more pronounced. We have also looked at channels through which the island shock reduced FDI flows from Japan to China and find that the extensive margin plays the dominant role. That is, compared with the pre-crisis time, more affiliates of Japanese MNCs' exited from and fewer Japanese affiliates entered into China after the island crisis. Moreover, the fraction of existing Japanese affiliates that increased FDI in China dropped significantly, as did those reporting zero FDI flows after the island shock. In addition, capital investment of Japanese affiliates in China, which is a part of FDI, displays a similar pattern. We conclude that FDI flows from Japan to China were substantially reduced by the unexpected island shock, even in the long run, despite that demand for Japanese goods recovered quickly and strongly after the shock. A natural question to ask is which factor is responsible for this difference.

Third, we show that Japanese affiliates' forecasts of their sales in China became significantly pessimistic after the outbreak of the island crisis and have not returned to pre-event levels, even three years after the island shock. First, we show that our data of firm-level forecasts are reliable and make sense economically.[7] Next, we find that this pessimistic belief holds more strongly for local sales, which are the most important part of total sales of Japanese affiliates in China. In addition, when we implement difference-in-differences (DID) regressions by comparing FEs of Japanese affiliates in China with FEs in other countries, the above two findings become even more pro-

[5] In this paper, China refers to mainland China (i.e., excluding Hong Kong).

[6] Our data also show that exports from Japan to China featured a similar pattern. Namely, they fell substantially in the short run after the event but recovered very quickly.

[7] For instance, our data show that firm-level forecasts for local demand and total demand are highly positively correlated. Moreover, forecasts for local demand (in a given quarter) made at different (previous) quarters are positively correlated, and have smaller errors (on average) for those made at later (previous) quarters.

nounced. Together, this suggests that local demand shock played a role in triggering the pessimistic forecast. Putting findings two and three together, we conjecture that the long-lasting pessimistic belief in local demand led to the sudden and persistent drop in FDI flows from Japan to China. In addition, we also present evidence on how the forecast error of sales affects capital investment of Japanese MNCs in China. The results shows that conditional on other firm-level characteristics (including realized sales and employment), underestimation of sales has a negative and quantitatively sizable impact on firm-level investment. This finding substantiates that firm's belief (about future demand) has real effect on firm's investment.

Finally, we show that underestimation of firm sales has a negative and quantitatively sizable impact on firm-level investment by regressing log capital investment on forecast errors of sales and other firm-level characteristics. In addition, we also find that imprecise forecast for future demand (i.e., higher absolute value of FEs) also negatively impacts firm-level investment. Moreover, this negative impact appears mainly at the extensive margin (i.e., investing or not).[8] Of course, we cannot claim these relationships are causal. However, these new findings uncover some interesting correlations between firm's belief, sentiment, and investment.

In this paper, we focus on subjective uncertainty measures (i.e., forecast errors), and mainly look at how a change in the first-order moment of these measures (average of forecast errors across firms) affects firm investment and FDI. In other words, our paper does not focus on riskiness or volatility of market demand. Instead, we are mainly interested in a type of uncertainty called "unknown unknown" (i.e., unknown distribution of economic variable and ex post learning), and our paper can be seen as providing supporting evidence for a recent literature on tail risk (e.g., Kozlowski et al. 2015; Orlik and Veldkamp 2015) and economic fluctuation. Interestingly, our annual data show that the standard deviation of FEs for sales increased substantially from 2011 to 2013. This hints that local demand for Japanese goods in China probably has become more volatile and difficult to predict after the island crisis, and accordingly dampened Japanese firms' investment in China.

To empirically isolate the relationship between uncertainty and firm actions such as investment and R&D, many authors have conducted various excellent panel analysis. For example, Leahy and Whited (1996) and Bloom et al. (2007) use realized volatilities of stock prices as proxies for uncertainty and show a negative relationship between uncertainty and firm investment. Stein and Stone (2013) use the option price to create forward-looking measures of uncertainty and arrive at a similar result on the uncertainty-investment relationship and a different result on the uncertainty-R&D relationship. Using information on the subjective probability distribution from an Italian manufacturing firm survey, Guiso and Parigi (1999) also find a negative relationship

[8]The first-order movement in the forecast error such as pessimism can also trigger imprecise forecast. Thus, we cannot identify the pure effect of increased variance of forecast error on firm investment, as we do not have a distribution of FEs for each firm in a given time.

between uncertainty and investment. Our paper, to the best of our knowledge, is the first to show a causal relationship between uncertainty and FDI.

An increasing number of studies examine the economics impact of one specific type of uncertainty: policy uncertainty. For instance, by using the policy uncertainty index developed by Baker et al. (2013), Gulen and Ion (2015) show that firm-level capital investment is negatively affected by uncertainty associated with future policies. Furthermore, Morikawa (2013, 2016) explore the type(s) of policy uncertainty affecting business behavior and find that uncertainty related to tax systems and trade policy affects capital investment and overseas activities of Japanese firms. Among various factors regarding policy uncertainty, our paper sheds light on economic consequences of government's geopolitical actions. We will quantify the role of this type of uncertainty in our future work.

This paper finds that increased uncertainty due to a short-term event plays an important role in generating persistent impact on long-run economic activities such as investment. This has not been studied very much in the literature that looks at various effects of sudden and short-term events. For instance, event studies in international trade fail to find long-run impact of sudden events on trade variables (e.g., Fuchs and Klann 2013; Boehm et al. 2014). On the contrary, our paper finds a long-run negative impact of a geopolitical conflict on FDI and MNEs' capital investment. This finding points out an important channel through which sudden events can affect international trade and investment in the long run. That is, agents face increased uncertainty due to sudden events, and they revise their beliefs gradually, even after the end of the event. This in turn has long-lasting effects on real economic activities, similarly explored by Kozlowski et al. (2015) in the study of business cycles. We view our finding on the long-run revision of beliefs as a mechanism behind the long-run effects of the island crisis studied by Fisman et al. (2014).[9]

Studies of uncertainty involve dynamics analysis. Research in international trade has just started to investigate how uncertainty affects exports and FDI in a dynamic setting (Handley 2014; Handley and Limao 2014, 2015; Novy and Taylor 2014; Carballo 2015) in a dynamic setting. However, due to the lack of high-quality firm-level data and exogenous events, there is little evidence on how increased uncertainty affects FDI causally. Our work tries to fill this gap by using high-quality Japanese data and studying the impact of an unexpected geopolitical event.

The rest of the paper is organized as follows. Section 2 describes the escalation of the island crisis. Section 3 presents our empirical results, starting with some stylized facts, followed by DID estimation. Section 4 concludes.

[9]Fisman et al. (2014) study the effect of shocks to political tension between China and Japan on stock market valuation of individual firms.

2. The Island Crisis

China and Japan have been arguing for the sovereignty of the Senkaku islands (or Diaoyu Islands) for many years, and the most serious conflict between the two countries by far is the one that happened in the third quarter of 2012. On July/7th., Japanese prime minister, Yoshihiko Noda, expressed his consideration for the Japanese government to buy the disputed islands, which triggered the first wave of anti-Japanese protests in several cities of China on Aug./19th. On Sep./10th., Japanese government said that it has decided to purchase the disputed islands from a private Japanese owner in an effort, Tokyo claims, aimed at diffusing territorial tensions. However, much larger scale anti-Japanese demonstrations happened afterwards. In the weekend of Sep./15th.-16th., citizens in mainland China participated in protest marches and called for a boycott of Japanese products in as many as 85 Chinese cities. Moreover, on Sep./18th., people in over 180 cities of China attended protests against Japan on the 81st. anniversary of the Mukden Incident.[10]

The severity of the island dispute during July-Sep./2012 is unprecedented, and it was unexpected by Japanese firms in China. The anti-Japanese movements within the three months of 2012 had generated significant impact on Sino-Japan economic relationship. As Figure 1 shows, the share of imports from Japan (in China's total imports) fell from 8% to 4.8% within three month after the outbreak of the island crisis. As Figure 2 shows, the share of manufacturing FDI flows from Japan in China's total manufacturing FDI inflows plummeted from 22% (the third quarter of 2012) to 9% (the third quarter of 2014) in two years. One survey done by Teikoku Databank in Oct./2012 shows that the sudden escalation of the island dispute was unexpected by Japanese firms, and one third of firms surveyed think the unexpected anti-Japanese demonstrations are going to negatively affect their sales in China.[11] Moreover, one sixth of them plan to withdraw or reduce their investment in China.[12]

3. Empirical Findings: Differences-in-Differences Estimation

3.1. Data Description

We use two data sets to implement our analysis. The first one is the annual parent-affiliate-level data and the second one is affiliate-level data at quarterly frequency.

[10] For details, see https://en.wikipedia.org/wiki/2012_China_anti-Japanese_demonstrations.

[11] For details, see https://www.tdb.co.jp/report/watching/press/pdf/keiki_w1210.pdf.

[12] It was reported that the substantial scale-up of anti-Japan protests was related to problems associated with the transition of political power in China around the same time. This further shows that the escalation of the island dispute was exogenous to Sino-Japan economic relationship. For details, see http://www.cnn.com/2012/09/18/world/asia/china-protests-japan-fury/index.html.

3.1.1. Annual Data of Japanese MNCs and Affiliates

We use the parent-affiliate-level data of the Basic Survey of Overseas Business Activities (BSOBA, Kaigai Jigyo Katsudo Kihon Chosa) prepared by the Ministry of Economy, Trade and Industry (METI). This survey covers two types of overseas subsidiaries of Japanese MNCs: (1) direct subsidiaries with the ratio of investment by Japanese enterprises' being 10% or higher as of the end of the fiscal year (March 31) (2) second-generation subsidiaries with the ratio of investment by Japanese subsidiaries' being 50% or higher as of the end of the fiscal year (March 31). This survey is conducted annually by a questionnaire based on self-declaration survey forms (one for parent firm and another one for each foreign affiliate) sent to the parent firm, and each year refers to the period from April/1 of that year to March/31st. of the next year. The survey form for parent firms includes variables on parent's sales, capital, employment, industry classification etc. The survey form for the foreign affiliates reports their capital, sales, investment, number of employees, country and industry information, the date of establishment or capital participation, and operation status including dissolution or withdrawal. Since the dataset also reports the fraction of direct invested by the Japanese parental firm each year, we can calculate the FDI inflow from Japan to China at the firm level.[13]

Importantly, regarding sales and capital investment, foreign affiliates report both the realized value and the projected value. These variables allow us to calculate quantitative FEs at the affiliate-year-level. Specifically, FE for sales and investment is calculated as (realized value-projected value)/projected value. Based on this annual cross-section survey, we constructed a panel dataset of foreign affiliates from 2003 to 2013. Each parent-affiliate pair is traced throughout the period using the identification code. To obtain real sales and investment, parent and affiliate's sales and investment are deflated by GDP deflators of Japan and each destination country, respectively. Summary statistics of this dataset is reported in Figure 14, and the total number of observations across 11 years is roughly 220,000.

3.1.2. Quarterly Data of Foreign Affiliates

Our quarterly data of foreign affiliates collected by the Ministry of Economy, Trade and Industry (METI) is called the Quarterly Survey of Overseas Subsidiaries (QSOS, Kaigai Genchi Hojin Shihanki Chosa). This survey is conducted every quarter in order to trace out trends of Japanese foreign affiliates' business activities. It includes overseas subsidiaries above certain size in manufacturing sectors[14] The Number of foreign

[13]Specifically, the FDI flow from Japan into affiliate j in year t equals $s_{jt} * K_{jt} - s_{j,t-1} * K_{j,t-1}$, where s_{jt} is the fraction of investment by the Japanese parental firm in affiliate j in year t, and K_{jt} is the total investment in affiliate j in year t. Note that $s_{j,t-1} * K_{j,t-1}$ equals zero for FDI entrants in year t and $s_{jt} * K_{jt}$ equals zero for firms that withdraw their FDI from China in year t.

[14]Firms included in this survey have to have (1) at least 50 employees; (2) the value of capital bigger than or equal to 100 million JPY; (3) at least 50% of the total capital coming from the Japanese parental firms (including both direct and indirect funds, such as funds provided via local subsidiaries).

subsidiaries covered by this survey is around 5,000 every year and the response rate is about 80%. Compared with the first survey, the key advantage of the second one is that it reports realized and predicted value of various sales, investment, and employment at quarterly level. Moreover, in this survey, sales are decomposed into local sales, sales to Japan, sales to countries other than Japan. The high frequency of the data and the finer division of sales are crucial for our empirical analysis. Based this quarterly cross-section survey, we constructed a panel dataset of foreign affiliates from 2006/Q4 to 2015/Q2. In order to obtain real sales and investment, we deflate affiliate's sales and investment using GDP deflators of destination countries.

Variables appearing in this survey are defined as follows. Capital investment is the acquisition of tangible fixed assets excluding land and depreciation. The number of employees is measured at the end of each quarter. Regarding the forecast, subsidiaries report its value on various sales (e.g., local sales, sales back to Japan etc.), capital investment and the number of employees for the next quarter and the next next quarter. Specifically, for each item "A", subsidiaries are requested to compare the predicted value of "A" (for the next quarter and the next next quarter) with its current value and choose one from the following three options: "Increase (1)", "Unchanged (0)", and "Decrease (-1)". With the information of forecast in hand, we construct FE which is the difference between the realized value and the predicted value. FE is defined over the grid of [-2, -1, 0, +1, +2]. For instance, if both the realized and predicted local sales increase, FE is 0(=1-1). However, if the realized local sales increase while the predicted local sales is "Decrease", FE is 2(=1-(-1)). Summary statistics of this dataset is reported in Figure 15, and the total number of observations across 35 quarters is roughly 180,000.

3.1.3. Validation of our Forecast Errors

In order to ensure the reliability of firm-level forecasts and FEs we have constructed, we implement the following several checks using the quarterly data. First, Table 1 shows that forecasts for total sales and local sales are highly and positively correlated at the firm level. This excludes a potential concern that firms randomly report their forecasts, as local sales are the most import part of total sales. Second, as Table 2 shows, error of forecast (for local sales) made one quarter before is highly and positively correlated with error of forecast (for local sales) made two quarters before. This again shows that firms are reporting their forecasts consistently. Of course, firms update their information set when time goes by. Thus, the two types of errors are not perfectly correlated. Third, Table 3 shows forecast for local sales becomes more precise when time elapses, as the average of absolute value of FE made one quarter before is smaller than the average of absolute value of FE made two quarter before. This is the key evidence that firms are using their best knowledge to forecast, as it is (and should be) easier for the firm to forecast one period before than two periods before. Taken together, the above three empirical checks validate the use of FEs in our following

analysis.

Since there is a reasonable amount of observations (roughly 45%) that did not report their forecasts in the quarterly data , we check whether the existence of observations that did not report their forecasts affect our results. First, Figures 16 and 17 show that non-reporting observations have higher levels of employment and sales on average. However, this pattern is the same for Japanese affiliates in China as for all Japanese affiliates. Thus, this difference should not affect our DID results. Second, we have checked whether the characteristics (i.e., employment and real sales) of observations with missing forecasts and without missing forecasts have changed after the island crisis. As a result, we have found no systematic differences (before and after the island crisis) for both Japanese affiliates in China and for all Japanese affiliates. Finally, we found that before the island crisis, 33% of observations that reported their forecasts are from China. This number for quarters after the island shock is 34% which barely changed compared with before. Taken together, we conclude that the existence of observations that did not report their forecasts should not affect our following empirical findings.

3.2. Stylized facts

In this section, we empirically explore how the outbreak of the island dispute in the summer of 2012 affected Japanese multinational firms that serve Chinese local markets through vertical integration. Our findings are summarized by the following four stylized facts. First, local sales of Japanese affiliates in China dropped sharply but rebounded quickly. Second, FDI flows of Japanese MNCs into China started to deviate downward from its previous trend and remain at a lower level persistently after the island shock. In addition, capital investment of Japanese affiliates in China began to drop after the island crisis as well. Third, Japanese MNCs in China kept reporting negative FE of local sales. That is, even after their local sales rebounded quickly, they kept underestimating their local sales. Finally, underestimation of sales (i.e., positive FE) and imprecise forecast (measured by bigger absolute value of FE) have a negative and quantitatively sizable impact on firm-level investment (especially at the extensive margin). The first three stylized facts are more pronounced when we compare activities of Japanese affiliates in China with those in other countries. Since we want to tease out common shocks to all Japanese affiliates abroad, we implement DID regressions and add country-specific time trends (i.e., China and non-China) into our regressions when possible. DID analysis suggests that the third quarter of 2012 is indeed a turning point for Japanese MNCs' affiliates in China, and we point out an explanation for these documented facts: a belief-driven relationship between subjective uncertainty and investment.

3.2.1. Finding One: Big and Transitory Demand Shock to Sales of Japanese Goods in China

In this subsection, we present evidence that local demand faced by Japanese affiliates in China fell only temporarily after the island shock. Figure 3 compares historical cyclical series of local sales reported by Japanese subsidiaries in China and in other countries. While both lines exhibit a large drop in the first two quarters of 2009 during the financial crisis, only the blue solid line hits the lowest level in the fourth quarter of 2012. Local sales in China bounced back from the trough quickly starting from the 1st. quarter of 2013.

We use quarterly data to further examine this large but transitory fluctuation of local sales of Japanese goods in China. Figure 4 presents the distribution of growth rate of local sales across firms for quarters around the outbreak of the island crisis (from 2012/Q2 to 2013/Q1). The figure shows a significant drop in average growth rate in the third quarter and the fourth quarter of 2012. As we saw in the aggregate series, the plummet in the average sales growth rate disappeared in the first quarter of 2013 and reverted to the level of the second quarter of 2012. If we turn our attention to the dispersion of local sales, it gets larger when the average level goes down. However, it remains more dispersed in the first quarter of 2013 relative to the second quarter of 2012. This heterogeneity suggests that some are behind the average recovery pace of local sales in China even though the aggregate series displayed a quick recovery. Using the annual data, we document a similar pattern. Specifically, Figure 5 verifies that average annual growth rate of local sales did fall substantially in 2012 (i.e., compared with 2010 and 2011), although it recovered and surpassed its pre-crisis level in 2013.

3.2.2. Finding Two: Persistently Negative Impact on FDI Flows and Capital Investment

In this subsection, we show that FDI flows (from Japan to China) started to drop after the outbreak of the island crisis. In addition, when we look at capital investment of Japanese affiliates in China which is a part of FDI, it displays a similar pattern at both the annual frequency and the quarterly frequency. Furthermore, evidence suggests that the extensive margin plays an dominant role in shaping the change in FDI flows and capital investment.

To this end, we start off presenting evidence on aggregate FDI flows. As in the left panel of Figure 6, there is a clear sign that FDI inflows from Japan to China started to drop after the island shock and remained lower than its pre-shock trend even in 2016. The right panel of Figure 6 shows the four-quarter change rate of FDI flows which removes seasonal components. It is evident that FDI flows from Japan to China stayed in the negative region, the level of which was lower than the one during the financial crisis. Furthermore, the duration of the decline was also longer compared to the financial crisis. This is distinctive relative to FDI inflows to other countries during

the same period. In fact, FDI flows into countries other than China kept growing, as shown by the dashed lines in both panels of Figure 6. In order to present this different pattern more clearly, we plot series of FDI flows into China and into other countries in Figure 7.[15] After the island shock which happens in late 2012, the two series started to diverge. Specifically, FDI flows into China dropped substantially while those to other countries continued stable growth.

To isolate the channels through which the island shock negatively affected the aggregate FDI flows from Japan to China, we use our annual data. Figure 8 shows that the fraction of inactive Japanese affiliates (i.e., firm that did not change the amount of their FDI) increased from 2012 (the year when the island shock happened) to 2013, while the fraction of Japanese affiliates that increased the amount of FDI in China dropped substantially during the same period. Furthermore, if we look at the entry-exit margin, a similar pattern shows up. Figure 9 substantiates that there are more Japanese firms that withdrew FDI from China and fewer Japanese affiliates that newly entered into China after the island shock's happening in late 2012. In short, we argue that the extensive margin is the most important factor for us to understand the collapse of FDI flows from Japan to China after the island crisis.

Regression analysis using firm-level data further confirms our above findings. We use DID approach to tease out the differential impact of the island crisis on FDI flows from Japan to China relative them from Japan to other countries. Specifically, the regression equation we run is[16]

$$\begin{aligned}\frac{FDI\ Flows}{FDI\ Stock}_{ft} &= \beta_0 + \beta_1 Shock_t * China_f + \beta_2 \ln(Sales)_{ft} + \beta_3 \ln(Capital)_{p(f)t} \\ &\quad + \beta_4 \ln(Sales)_{p(f)t} + year_t + country_j + firm_f + \epsilon_{ft}, \end{aligned} \tag{1}$$

where f represents the firm, and t and j denote the year and the destination country respectively. Subscript $p(f)$ is the ID of the parental firm of affiliate f.[17] Dummy variable, $Shock_t$, takes the value of one if the year is 2013 and zero otherwise. Dummy variable, *China*, equals one if the affiliate is located in China and zero otherwise. We focus on years after the financial crisis (2010-2013 or 2011-2013) and set 2013 as the first year after the island crisis.[18] Following the literature on firm investment, we treat the investment ratio (i.e., $\frac{FDI\ Flows}{FDI\ Stock}$) as our dependent variable. Finally, standard errors are clustered at the country level, since we are exploiting the cross-country difference in the impact of the island shock.

Regression results are reported in Table 4. In the first two columns, we focus on

[15] the level at the first quarter of 2012 is normalized to one.

[16] Note that the shock dummy, $Shock_t$, is absorbed by the year fixed effectss.

[17] Since there is a very small amount of affiliates that did not change their IDs when they moved from one country to another, we are still able to identify some country fixed effects.

[18] Since FDI decisions are probably made in advance, we assume that most FDI inflows in 2012 were not affected by the island shock.

how value of FDI flows (i.e., the intensive margin) was affected the island crisis. It is clear that FDI inflows into China dropped relative to the flows into other countries after the island shock. Furthermore, this drop (2% to 2.2%) is quantitatively significant, given that China was already a maturing market for Japanese firms in 2013. In Columns three and six, we focus on the extensive margin of FDI inflows (i.e., whether or not making FDI inflows). Both the Probit model and the linear probability model yield the same qualitative result: After 2012, Japanese MNEs are less likely to increase their FDI stock in China relative to in other countries.[19] In short, the regression results using the annual data support our argument. Annual capital investment which is a part of FDI displays a similar pattern to FDI flows. For this variable, we run a similar regression to equation 1 and replace log FDI flows by log capital investment. The regression results are reported in Table 5. Depending on the specification, the island shock decreased capital investment of Japanese affiliates in China by 16% to 20% relative to other countries.

Finally, we use the our quarterly data to show the differential impact of the island shock on capital investment. We basically follow the regression equation (1) except for the following three modifications. First, the shock dummy we use here equals one for quarters starting from 2012/Q4 or 2013/Q1, as we think investment decisions are made in advance. Second, we use observations from 2011/Q1 in order to avoid the effect of the financial crisis on capital investment. As a result, we have 18 quarters in our regressions, and China and non-China specific time trends are included into the regressions. Finally, as there is no information about the parental firm in the quarterly data, we drop $\ln(Capital)_{p(f)t}$ and $\ln(Sales)_{p(f)t}$ from equation (1) and add $\log(Employment)_{ft}$ as one of the explanatory variables into equation (1) instead. Standard errors are still clustered at the country level.

Regression results for using the quarterly data are reported in Table 6 and confirm our previous findings. Depending on the specification, the island shock reduced capital investment of Japanese affiliates in China by 5% to 11% relative to the investment made in other countries. Taken all above results together, we conjecture that it is the island shock that reduced FDI flows from Japan to China and capital investment of Japanese affiliates in China.

3.2.3. Finding Three: Persistent Effects on Forecast Errors

Our third finding is that forecasts of Japanese affiliates in China became pessimistic after the outbreak of the island dispute. We use our annual data to substantiate this finding first. As shown by Figure 10, the distribution of FEs in 2013 changed from the distribution in 2012 dramatically. Average value of FE increased and the dispersion of it also became larger, suggesting that realized sales were substantially higher than projected sales for many firms in 2013, and the degree of miscasts was quite hetero-

[19] These results are robust to the inclusion of country-specific time trends (i.e., China and non-China). Results are available upon request.

geneous. As shown by our first finding, realized sales in 2013 were much higher than in 2012 and the dispersion of sales distribution was also larger than in 2013. Overall, the quick recovery in sales appears to be unanticipated by the Japanese affiliates in China, and the recovery pace seems to be heterogeneous across firms as well. As a result, many projections ended up being less accurate, which suggests the existence of increased uncertainty when firms made projections in the recovery phase from the island shock.

Interestingly, the distribution of FEs in 2012 is not too much different from those in 2011 and 2010, as shown by Figure 10 as well. Although Japanese subsidiaries in China experienced a large drop in local sales in the third and fourth quarter of 2012, local sales bounced back and exceeded their pre-crisis level in the first quarter of 2013 already. This reduced the size of drop in annual sales which makes the distribution of FEs in 2012 not too much different from those in 2011 and 2010. Therefore, the large positive values of FEs in 2013 do not necessarily come from the fact that many firms missed their forecasts in the previous year, rather they adjusted their forecasts conservatively after the crisis. This implies that Japanese firms in China tried erring on the side of caution.

Since the fluctuation in local sales turned out to be transitory and did not last for more than half a year, we use the quarterly data to confirm our previous findings. Using forecasts made one quarter or two quarters before, Figures 11 and 12 show the fraction of pessimistic firms (i.e., firms that had underestimation for their local sales) and the fraction of optimistic firms (firms that had overestimation for their local sales) across time. Both figures reveal that after the outbreak of the island crisis, Japanese firms in China began to underestimate their local demand and this pessimism lasts until the end of our sample.[20] When we look at the evolution of the mean of FEs, the same result is obtained which is shown by Figure 13. Moreover, the increase in the mean of FE (after the island shock) holds for both local sales and sales back to Japan, and is more pronounced for local sales (especially in the short run). This suggests that the underestimation and pessimism hold for both demand (i.e., worries for declining demand of Chinese consumers in the future) and supply (worries for sabotage by and low work morale of Chinese employees in the future) in China.

In order to further confirm our previous findings, we run DID regressions now. Specifically, using the annual data, we run the following regression:

$$\begin{aligned} \log(FE)_{ft} &= \beta_0 + \beta_1 Shock_t * China_f + \beta_2 \ln(Sales)_{ft} + \beta_3 \ln(Capital)_{p(f)t} \\ &\quad + \beta_4 \ln(Sales)_{p(f)t} + year_t + country_j + firm_f + \epsilon_{ft}, \end{aligned} \tag{2}$$

[20] In Figure (11), firms forecast their local sales on quarter before. Since Japanese firms did not anticipate the island shock, there were many (and few) firms that overestimated their local sales (and underestimated their local sales) in 2012/Q3. However, after the shock came in 2012/Q3, the opposite pattern began to appear which is shown by the pattern of FE after 2012/Q4. The reversal of the pattern is more pronounced in Figure (12) (note the change from 2012/Q4 to 2013/Q1).

where f represents the firm, and t and j denote the year and the country respectively. Subscript $p(f)$ is the ID of the parental firm of affiliate f. Dummy variable, *Shock*, takes the value of one if the year is 2013 and zero otherwise. Dummy variable, *China*, is one if the affiliate is located in China and zero otherwise. Similar to before, we focus on years after the financial crisis and set 2013 as the first year after the island crisis, and standard errors are clustered at the country level as before. Regression results in the first four columns of Table 7 show that after the island shock, Japanese affiliates in China became more pessimistic about their local sales and investment in China, which verifies our findings in Figure 10. Interestingly, the last three columns show that the forecast for sales and investment also become less accurate.

Finally, when we use the quarterly data to run regression equation (2), the same pattern shows up. We basically follow the regression equation (2) except for the following three modifications. First, the shock dummy we use here equals one for quarters starting from 2012/Q4 or 2013/Q1, as we think belief adjustment might takes some time after the crisis. Second, we use observations from 2011/Q1 in order to avoid the effect of the financial crisis on capital investment. As a result, we have 18 quarters in our regressions, and China and non-China specific time trends are included into the regressions. Finally, as there is no information about the parental firm in the quarterly data, we drop $\ln(Capital)_{p(f)t}$ and $\ln(Sales)_{p(f)t}$ from equation (2) and use $\log(Employment)_{ft}$ or $\ln(Sales)_{ft}$ as the explanatory variable. Standard errors are still clustered at the country level. Regression results for using the quarterly data are reported in Table 8 and confirm our previous findings.

3.2.4. Finding Four: Impact of Forecasts on Firm Investment

The final finding of this paper is that underestimation of firm sales (i.e., positive forecast error) has a negative and quantitatively sizable impact on firm-level investment. In order to substantiate this point, we run regressions of log capital investment on forecast error of total sales and other firm-level characteristics. In order to alleviate the endogeneity problem, we purposely use the forecast error of firm sales (instead of capital investment) or one-period lag of it in our regressions. We cluster standard errors at the firm level, as the variation we explore now is at the firm level. For both the annual data and the quarterly data, we use the whole time span (i.e., 2003-2013 for the annual data and 2006Q4-2015Q2 for the quarterly data).

Tables 9 and 10 present our results for using the annual data and the quarterly data and support the hypothesis that a pessimistic belief reduces capital investment. In the annual data, if the firm underestimates its total sales in the future, the probability of doing positive investment and the amount of investment in the current year go down, as shown by Tables 9. In the quarterly data, if the forecast error changes from 2 (extremely pessimistic) to -2 (extremely optimistic), the capital investment goes up by 6% to 8%, as shown by Tables 10.

In addition, we also run regressions of firm-level investment on the absolute value of FE and explore the impact of imprecise forecast on firm investment. In our regressions, imprecise forecast for future demand is measured by a bigger absolute value of FEs. Tables 11 and 12 show that imprecise forecast of firm sales negatively impacts firm-level investment. Moreover, this negative impact seems to work at the extensive margin mainly.[21] Of course, we cannot claim these relationships are causal. However, these new findings uncover some interesting correlations between firm's belief, sentiment, and investment.

4. Concluding Remarks

Using data of Japanese MNCs and the sudden escalation of the island dispute between China and Japan in 2012, we provide causal evidence on the effect of a temporary uncertainty shock on long-term business activities. Specifically, we find that a sharp, but temporary fall in local sales of Japanese MNCs in China led to a persistent downward deviation of FDI flows from Japan to China from its pre-crisis trend. Moreover, despite the quick recovery of local sales, Japanese MNCs in China persistently underestimated their local sales which generated pessimism. We view this as evidence for a belief-driven channel through which an unexpected temporary shock leads agents to revise their beliefs and start tail risk hedging.

Nevertheless, much remains to be done. Currently, we are modeling the belief-driven channel proposed above theoretically and exploring its quantitative impact on the drop of FDI inflows and capital investment of Japanese MNCs in China. In addition, other effects of the island crisis on Sino-Japan economic relationship (e.g., the impact on the location choice of global value chains) also wait to be explored.

[21] The first-order movement in the forecast error such as pessimism can also trigger imprecise forecast. Thus, we cannot identify the pure effect of increased variance of forecast error on firm investment, as we do not have a distribution of FEs for each firm in a given time.

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7. Tables and figures

Table 1. *Correlation between different forecasts*

	$F1_{sales}$	$F2_{sales}$
$F1_{local\ sales}$	0.816	
$F2_{local\ sales}$		0.821

F1: Forecast made one quarter before.
F2: Forecast made two quarters before.

Table 2. *Correlation between FEs made in different quarters*

	$FE2_{local\ sales}$
$FE1_{local\ sales}$	0.380

FE1: Error of forecast made one quarter before.
FE2: Error of forecast made two quarters before.

Table 3. *Forecast becomes more precise when time elapses*

	obs.	Mean
$\lvert FE1_{local\ sales}\rvert$	89615	0.669
$\lvert FE2_{local\ sales}\rvert$	85027	0.768

FE1: Error of forecast made one quarter before.
FE2: Error of forecast made two quarters before.

Table 4. *Annual FDI Flows and the Island Shock: Negative Impact*

	OLS		Probit		LPM	
	$\frac{FDI\ Flows}{FDI\ Stock}$		$I_{FDI>0}$		$I_{FDI>0}$	
$Shock_t * China_f$	-0.0229***	-0.0203***	-0.113***	-0.118***	-0.0168***	-0.0184***
	(-3.93)	(-3.49)	(-5.11)	(-5.15)	(-3.23)	(-3.86)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	No	No	Yes	Yes
Industry F.E.	No	No	Yes	Yes	No	No
Time span	2011-2013	2010-2013	2011-2013	2010-2013	2011-2013	2010-2013
Year after shock	2013	2013	2013	2013	2013	2013
N	45527	59360	46970	61179	47242	61473
adj. R^2	0.087	0.074	-	-	0.238	0.209

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the country level.

Top and bottom one percent obs. of $\frac{FDI\ Flows}{FDI\ Stock}$ are winsored.

Unit for investment and sales: one million JPY.

Parent-level Control: log(sales) and log(capital).

Affiliate-level Control: log(sales).

Table 5. *Annual Capital Investment and the Island Shock: Negative Impact*

	OLS		Probit		LPM	
	$Log(investment)$		$I_{Investment>0}$		$I_{Investment>0}$	
$Shock_t * China_f$	-0.164***	-0.200***	-0.128***	-0.147***	-0.0199***	-0.0264***
	(-2.82)	(-4.08)	(-9.67)	(-10.59)	(-4.24)	(-5.31)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	No	No	Yes	Yes
Industry F.E.	No	No	Yes	Yes	No	No
Time span	2011-2013	2010-2013	2011-2013	2010-2013	2011-2013	2010-2013
Year after shock	2013	2013	2013	2013	2013	2013
N	28022	36278	40180	52036	40268	52133
adj. R^2	0.799	0.786	-	-	0.680	0.658

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the country level.

Top and bottom one percent obs. of $Log(investment)$ are winsored.

Unit for investment and sales: one million JPY.

Parent-level Control: log(sales) and log(capital).

Affiliate-level Control: log(sales).

Table 6. *Quarterly Capital Investment and the Island Shock: Negative Impact*

	(1)	(2)	(3)	(4)	(5)	(6)
	linv1	linv1	linv1	linv1	linv	linv
$Shock_t * China_f$	-0.0529**	-0.0555**	-0.105***	-0.105***	-0.114***	-0.107***
	(-2.20)	(-2.26)	(-4.89)	(-5.05)	(-3.12)	(-2.95)
$log(sales)$	0.252***	0.167***	0.252***	0.167***	0.298***	0.168***
	(13.59)	(8.05)	(13.57)	(8.03)	(9.70)	(6.13)
$log(employment)$		0.460***		0.459***		0.555***
		(7.79)		(7.79)		(7.78)
Quarterly F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time after shock	2012Q4-	2012Q4-	2013Q1-	2013Q1-	2013Q1-	2013Q1-
N	82215	82103	82215	82103	48890	48890
adj. R^2	0.696	0.697	0.696	0.697	0.644	0.647

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the country level.

linv=log(capital investment); linv1=log(capital investment+1)

Unit for investment and sales: one million JPY.

Top and bottom one percent obs. are winsored.

China and non-China specific linear time trends are included.

Time span: 2011/Q1-2015/Q2.

Table 7. *Forecast Errors of Annual Sales and Investment: More Pessimistic and Less Accurate after the Island Crisis*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$FEsales$		$FEinv$		$\|FEinv\|$		$\|FEsales\|$
$Shock_t * China_f$	0.0385**	0.0378***	0.141***	0.177**	0.128**	0.159**	0.0106
	(2.22)	(2.68)	(2.65)	(2.39)	(2.45)	(2.23)	(1.03)
Affiliate Control	-	-	log(sales)	log(sales)	log(sales)	log(sales)	-
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time span	2010-2013	2011-2013	2010-2013	2011-2013	2010-2013	2011-2013	2010-2013
Year after shock	2013	2013	2013	2013	2013	2013	2013
N	40627	31054	20660	15707	20660	15707	40627
adj. R^2	0.229	0.251	0.117	0.090	0.119	0.089	0.304

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the country level.

Top and bottom one percent obs. are winsored.

FEsales=(realized sale-projected sales)/projected sales.

FEinv=(realized capital investment-projected capital investment)/projected capital investment.

Parent Control: log(sales) and log(capital).

Table 8. *Forecast Errors of Local Sales and the Island Shock: More Pessimistic After Shock*

	(1)	(2)	(3)	(4)	(5)	(6)
	$FE1$	$FE1$	$FE2$	$FE2$	$FE2$	$FE2$
$Shock_t * China_f$	0.147***	0.0582	0.274***	0.257***	0.353***	0.308***
	(2.72)	(1.37)	(2.79)	(2.99)	(3.27)	(3.55)
Quarterly F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level Control	log(sales)	log(sales)	log(sales)	log(sales)	log(emp)	log(emp)
Belief adjusts from	2013Q1-	2012Q4-	2013Q1-	2012Q4-	2013Q1-	2012Q4-
N	49666	49666	48257	48257	48506	48506
adj. R^2	0.065	0.065	0.112	0.112	0.069	0.069

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the country level.

Top and bottom one percent obs. are winsored.

China and non-China specific linear time trends are included.

Time span: 2011/Q1-2015/Q2.

$FE1$: error of forecast made one period before.

$FE2$: error of forecast made two periods before.

Table 9. *Forecast Error and Annual Capital Investment: Negative Impact*

	Probit		OLS	
	$I_{investment>0}$		linv1	
$FEsales$	-0.117***	-0.113***	-0.0382**	-0.0375**
	(-9.31)	(-9.03)	(-2.32)	(-2.29)
Affiliate Control	log(sales)	log(sales)	log(sales)	log(sales)
Parent Control	log(sales)	-	log(sales)	-
Year F.E.	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes
Firm F.E.	-	-	Yes	Yes
Industry F.E.	Yes	Yes	-	-
N	86953	87405	87063	87516
adj. R^2	-	-	0.766	0.766

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered at the firm level.

linv1=log(capital investment+1)

FEsales=(realized sale-projected sales)/projected sales.

Time span: 2003-2013.

Table 10. *Pessimistic Forecast Leads to Lower Level of Investment*

	(1) linv	(2) linv1	(3) linv	(4) linv1	(5) linv	(6) linv1
$sales\_fr\_l1$	-0.0174***	-0.0163***				
	(-2.92)	(-2.78)				
$sales\_fr\_l2$			-0.0148**	-0.0159***		
			(-2.45)	(-2.71)		
$lag\ sales\_fr\_l1$					-0.0193***	-0.0125**
					(-3.33)	(-2.38)
Quarterly F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
N	64269	88717	60276	83874	69357	103312
adj. R^2	0.580	0.610	0.579	0.607	0.593	0.630

t statistics in parentheses

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Standard errors are clustered at the firm level.

Top and bottom one percent obs. are winsored.

Time span: 2006/Q4-2015/Q2.

linv=log(capital investment); linv1=log(capital investment+1)

Firm-level controls: log(sales) and log(employment).

$sales\_fr\_l1$: error of forecast (of total sales) made one period before.

$lag\ sales\_fr\_l1$: lagged forecast error (one period ahead)

Table 11. *Imprecise Forecast and Capital Investment (Annual Data): Negative Impact at the Extensive Margin*

	Probit		LPM	
	$I_{investment>0}$			
$Abs.(FEsales)$	-0.163***	-0.159***	-0.00753*	-0.00697
	(-10.77)	(-10.60)	(-1.65)	(-1.53)
Affiliate Control	log(sales)	log(sales)	log(sales)	log(sales)
Parent Control	log(sales)	-	log(sales)	-
Year F.E.	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes
Firm F.E.	-	-	Yes	Yes
Industry F.E.	Yes	Yes	-	-
N	86953	87405	87066	87519
adj. R^2	-	-	0.591	0.591

t statistics in parentheses

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Standard errors are clustered at the firm level.

FEsales=(realized sale-projected sales)/projected sales.

Time span: 2003-2013.

Table 12. *Imprecise Forecast and Capital Investment (Quarterly Data): Negative Impact at the Extensive Margin*

	(1) linv1	(2) linv1	(3) linv1	(4) linv1
$abs(sales\_fr\_l1)$	-0.0366***			
	(-4.23)			
$abs(sales\_fr\_l2)$		-0.0282***		
		(-3.20)		
$lag\ abs(sales\_fr\_l1)$			-0.0167*	
			(-1.95)	
$lag\ abs(sales\_fr\_l2)$				-0.0215**
				(-2.40)
Quarterly F.E.	Yes	Yes	Yes	Yes
Country F.E.	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes
N	88717	83874	84940	80214
adj. R^2	0.610	0.607	0.609	0.604

t statistics in parentheses

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Standard errors are clustered at the firm level.

Top and bottom one percent obs. are winsored.

Time span: 2006/Q4-2015/Q2.

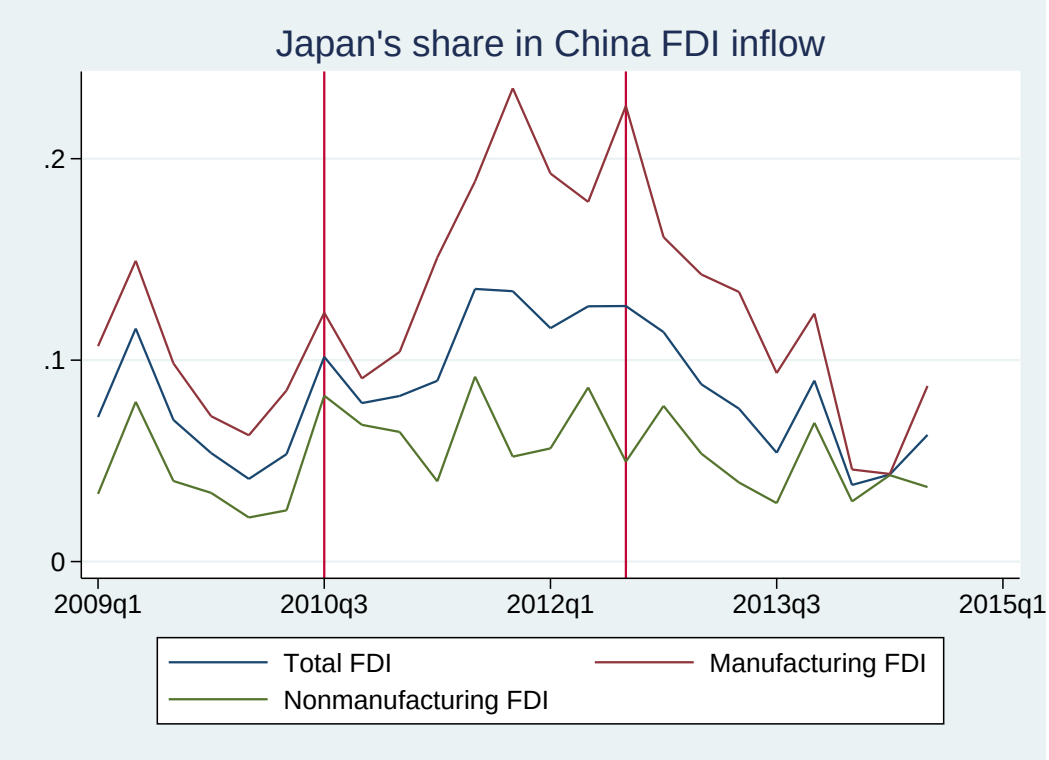
linv1=log(capital investment+1)

Firm-level controls: log(sales) and log(employment).

*sales_fr_l*1: error of forecast (of total sales) made one period before.

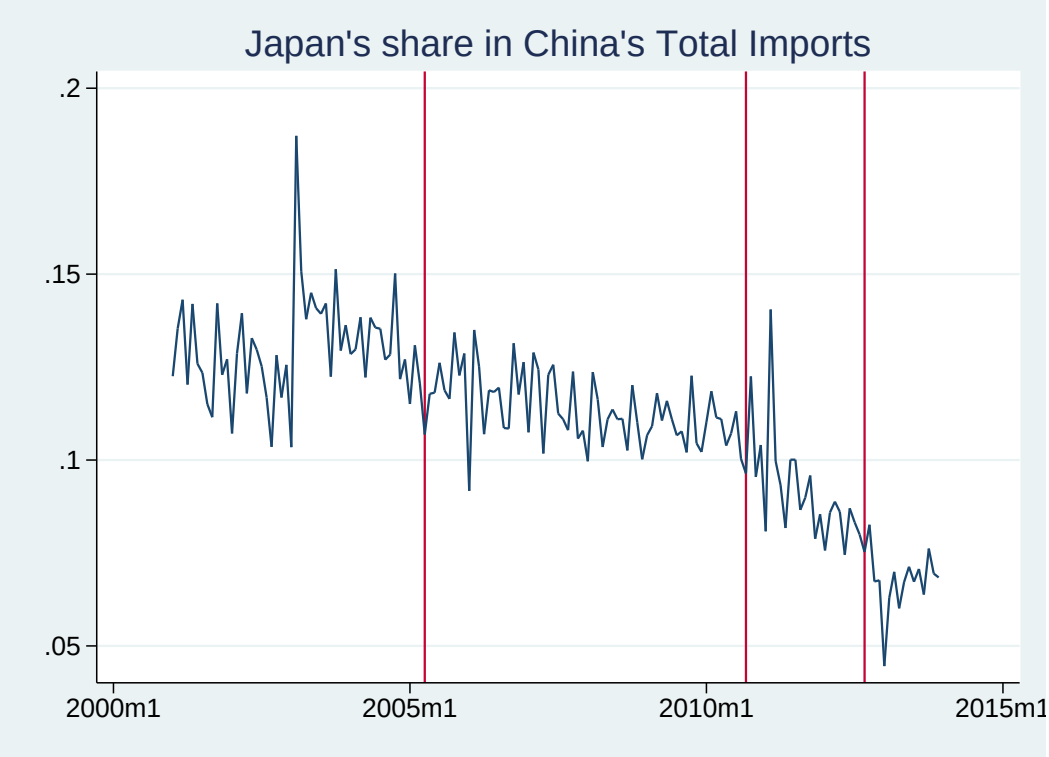
*lag sales_fr_l*1: lagged forecast Error (one period ahead)

Figure 1. *Share of FDI Flows from Japan*



The island shock happened in the third quarter of 2012 (i.e., the second red vertical line). Data are obtained from the Bank of Japan.

Figure 2. *Share of Japanese Imports*

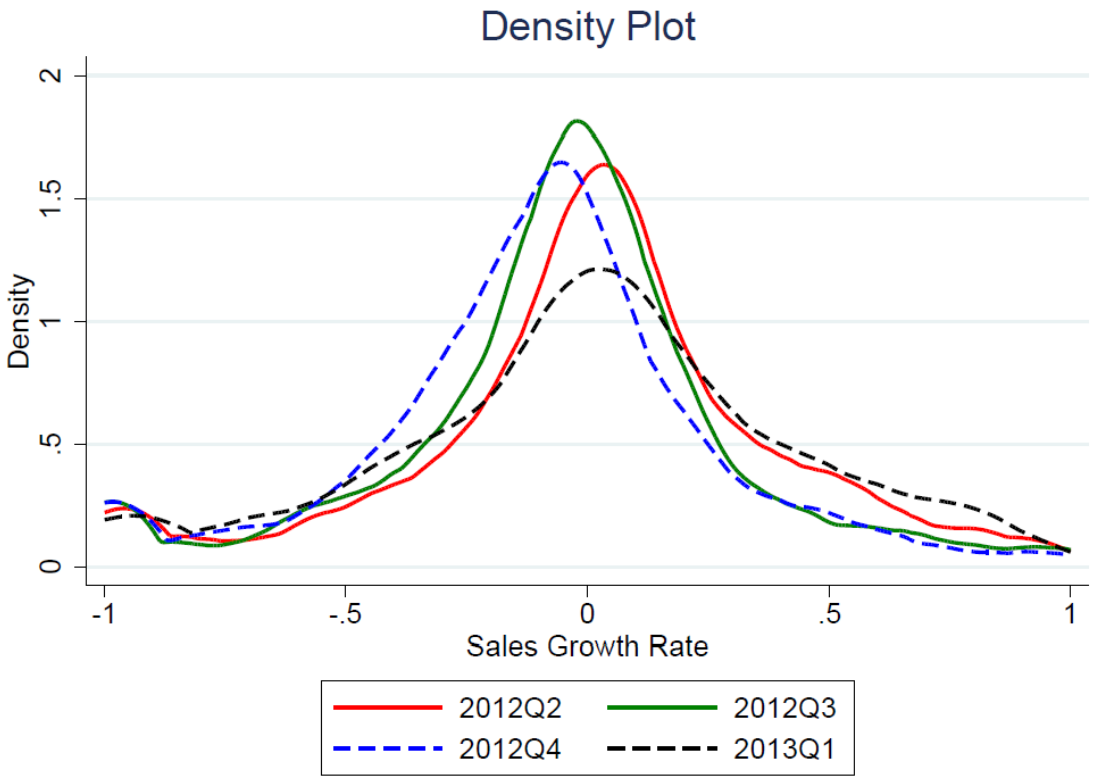


The last red vertical line corresponds to the month when the large scale anti-Japanese demonstrations happened. Data are obtained from Japanese customs.

Figure 3. *Local sales in China dropped in 2012 Q3 and 2012 Q4 after the burst of the island dispute*

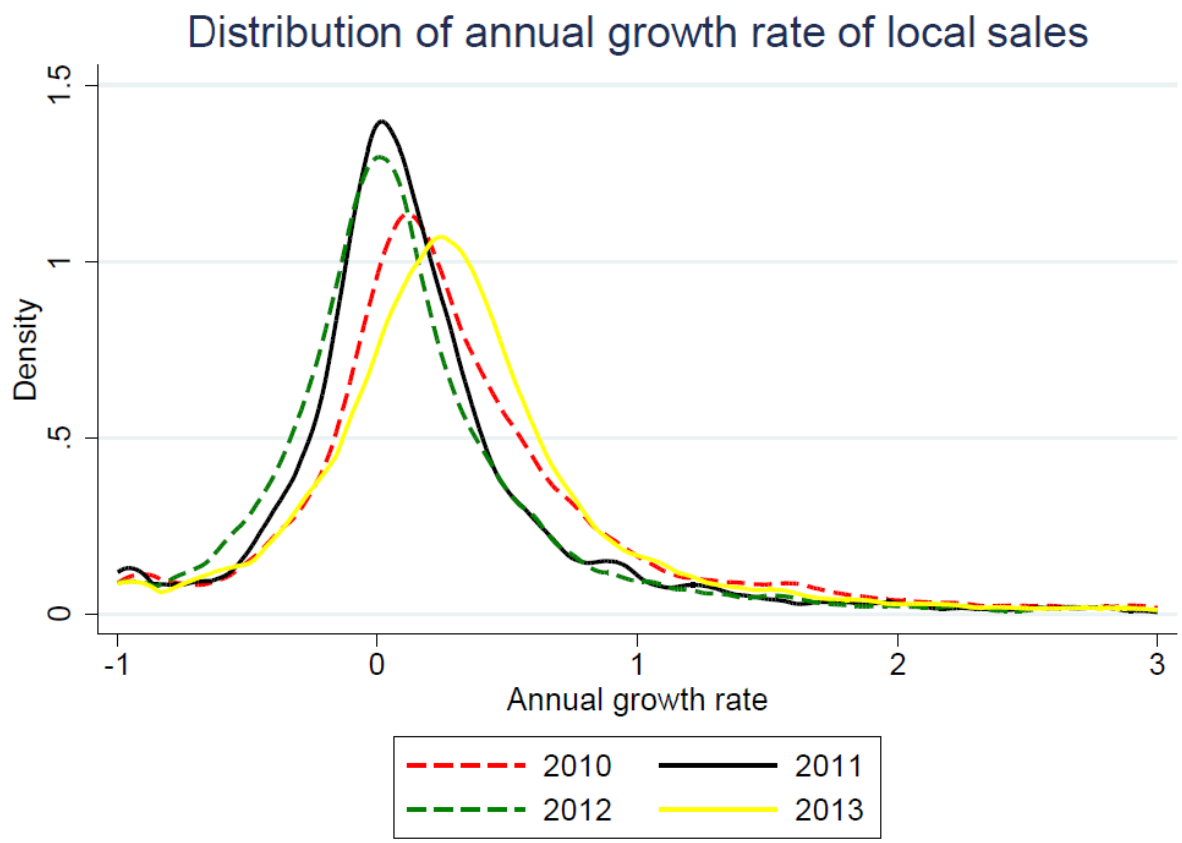
Constructed from the Quarterly Survey of Overseas Subsidiaries released by the Ministry of Economy, Trade and Industry. Two series are HP-filtered log local sales of subsidiaries of Japanese multinational firms: Blue solid line is for China and red dashed line is for all other countries. Both are in US dollars.

Figure 4. *Distribution of Quarterly Growth Rate of Local Sales*



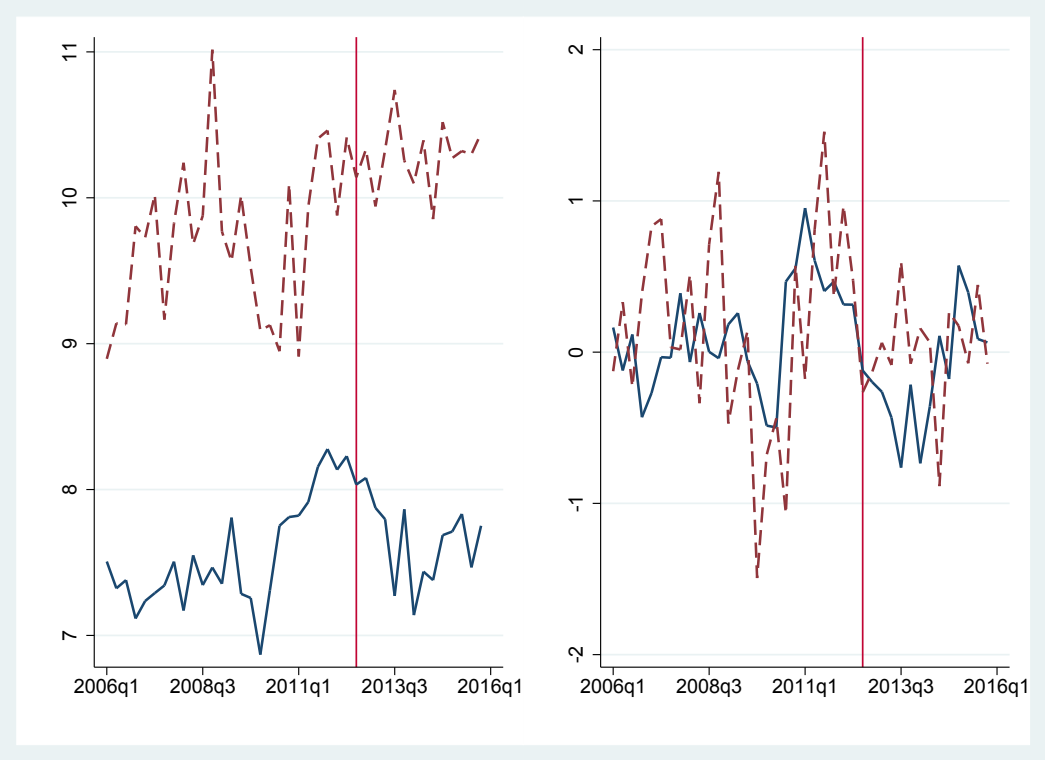
Plotted from our unbalanced panel using the Quarterly Survey of Overseas Subsidiaries released by the Ministry of Economy, Trade and Industry. Observations with growth rate lower than −100% *or higher than* 100% *are excluded.*

Figure 5. *Distribution of Annual Growth Rate of Local Sales*



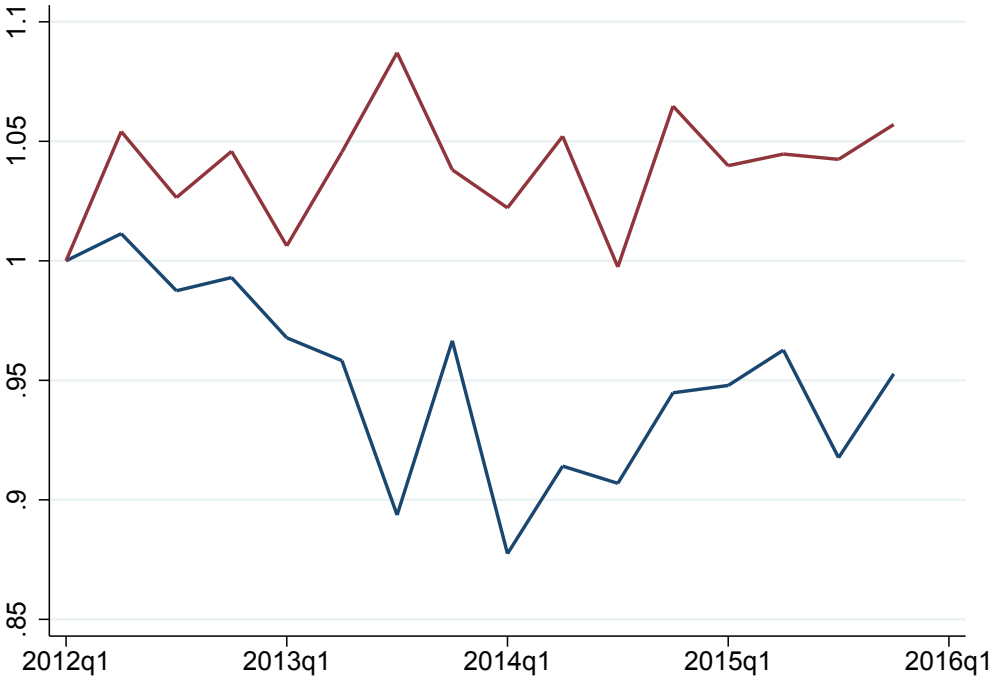
Plotted from our unbalanced panel using the firm-level data of the Basic Survey of Overseas Business Activitiesreleased by the Ministry of Economy, Trade and Industry. Observations with growth rate lower than −100% *or higher than* 300% *are excluded.*

Figure 6. *Aggregate FDI flows from Japan to China and to Other Countries*



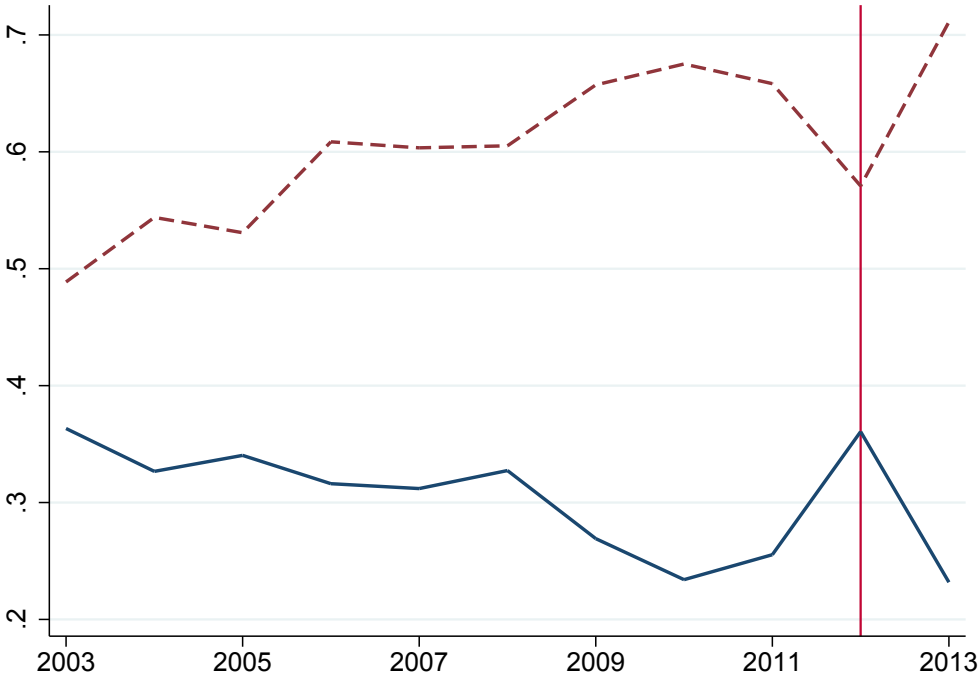
Constructed from the dataset called Japan's Outward and Inward Foreign Direct Investment reported by the The Japan External Trade Organisation. The left panel shows log series of FDI flows from Japan to China (blue solid line) and the other countries (red dashed line). Both are in US dollars. Since the Ministry of Finance and the Bank of Japan revised the balance of payments statistics and thus the data series is disconnected around January 2014. The right panel shows the annual change rate of FDI flows calculated as $log(FDI_t) - log(FDI_{t-4})$ *where t denotes the quarter.*

Figure 7. *Evolution of Log FDI flows*



Constructed from the data called Japan's Outward and Inward Foreign Direct Investment reported by the The Japan External Trade Organisation. Blue solid line plots log series of FDI flows from Japan into China. Red line plots log series of FDI flows from Japan into all other countries. We normalize $\log(FDI)$ *in 2012Q1 to one and both are in US dollars. Since the Ministry of Finance and the Bank of Japan revised the balance of payments statistics and thus the data series is disconnected around January 2014.*

Figure 8. *FDI inaction increases and positive FDI flows decreases*

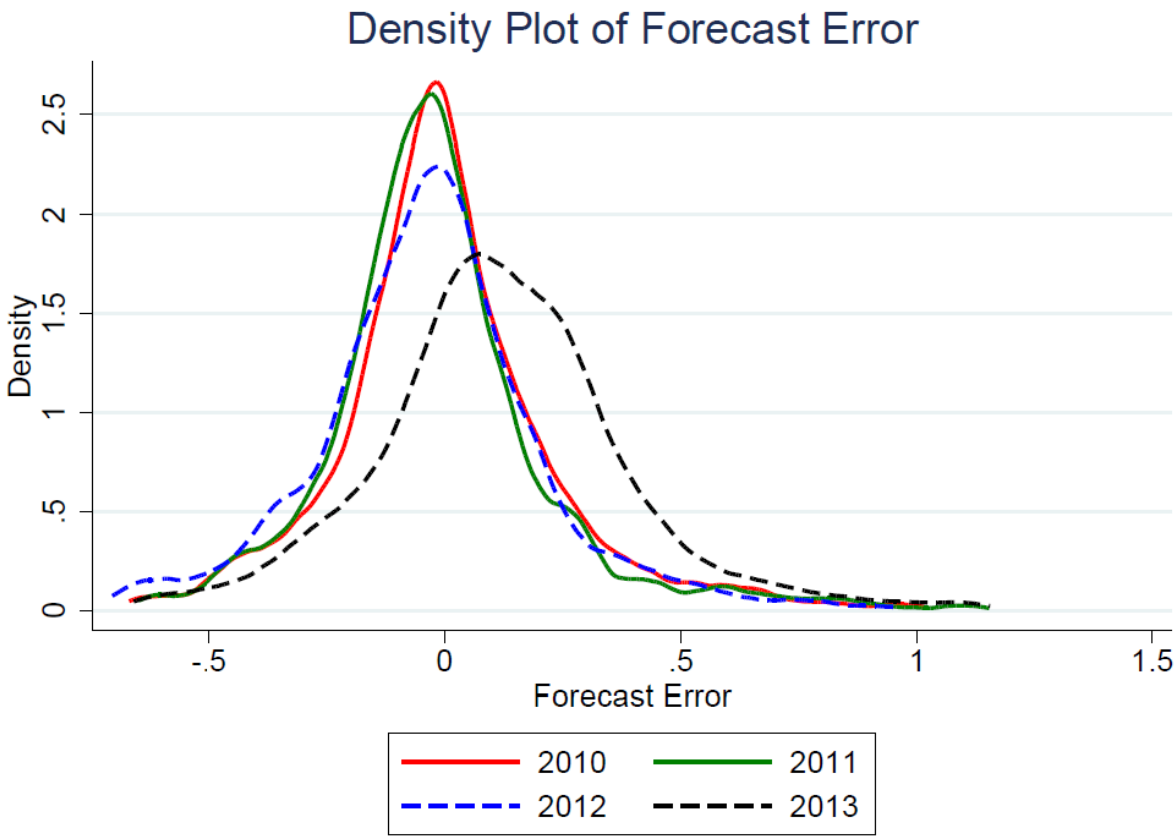


Constructed from our unbalanced panel using the firm-level data of the Basic Survey of Overseas Business Activitiesreleased by the Ministry of Economy, Trade and Industry. Blue solid line plots the population share of firms that undertake positive FDI in China. Red dashed line plots the population share of firms that report zero FDI inflows. The fractions are calculated amongst total number of Japanese subsidiaries in China.

Figure 9. *FDI entry decreases and FDI exit increases*

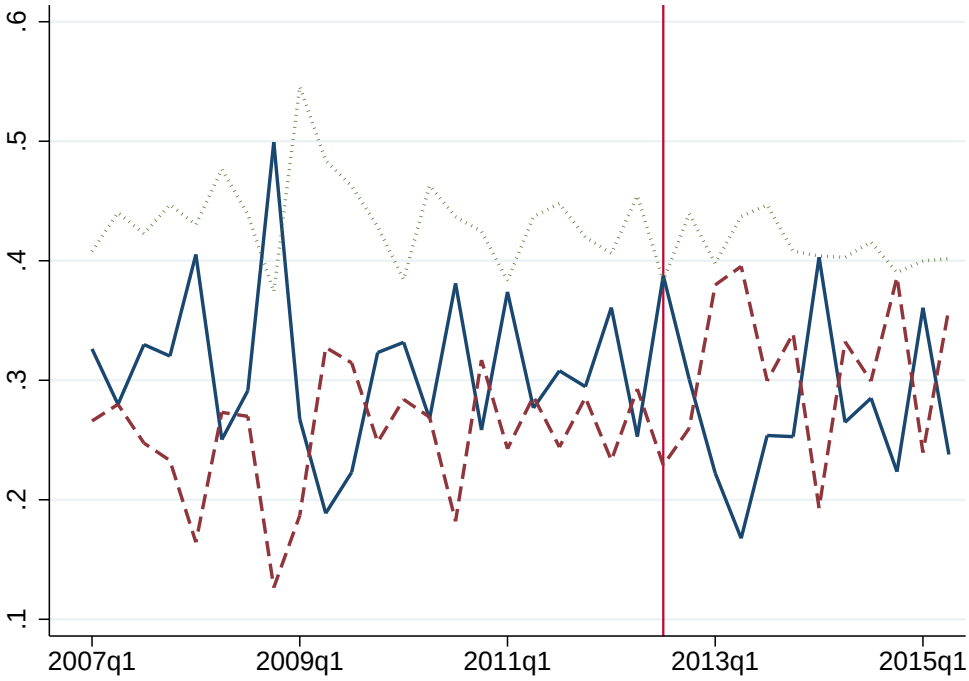
Constructed from our unbalanced panel using the Basic Survey of Overseas Business Activitiesreleased by the Ministry of Economy, Trade and Industry. Blue solid line plots the population share of firms that enter by undertaking the initial FDI into China during each year. Red dashed line plots the population share of firms that report exit in the previous year. The fractions are calculated amongst total number of Japanese subsidiaries in China.

Figure 10. *Distribution of Forecast Errors of Annual Total Sales*



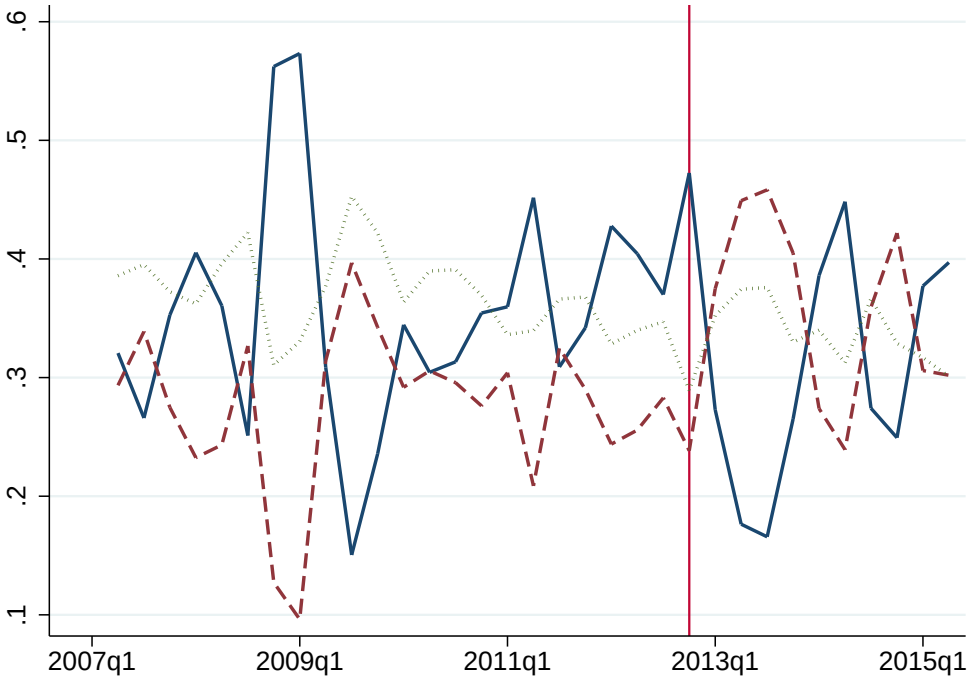
Constructed from our unbalanced panel using the Basic Survey of Overseas Business Activitiesreleased by the Ministry of Economy, Trade and Industry. Forecast error is calculated as $\frac{Realized\ Sales - Projected\ Sales}{Projected\ Sales}$*. Therefore, any positive value of forecast error implies that a firm underestimates its sales and vice versa.*

Figure 11. *Underestimation and Overestimation of Local Sales (Forecast Made One Quarter Before)*



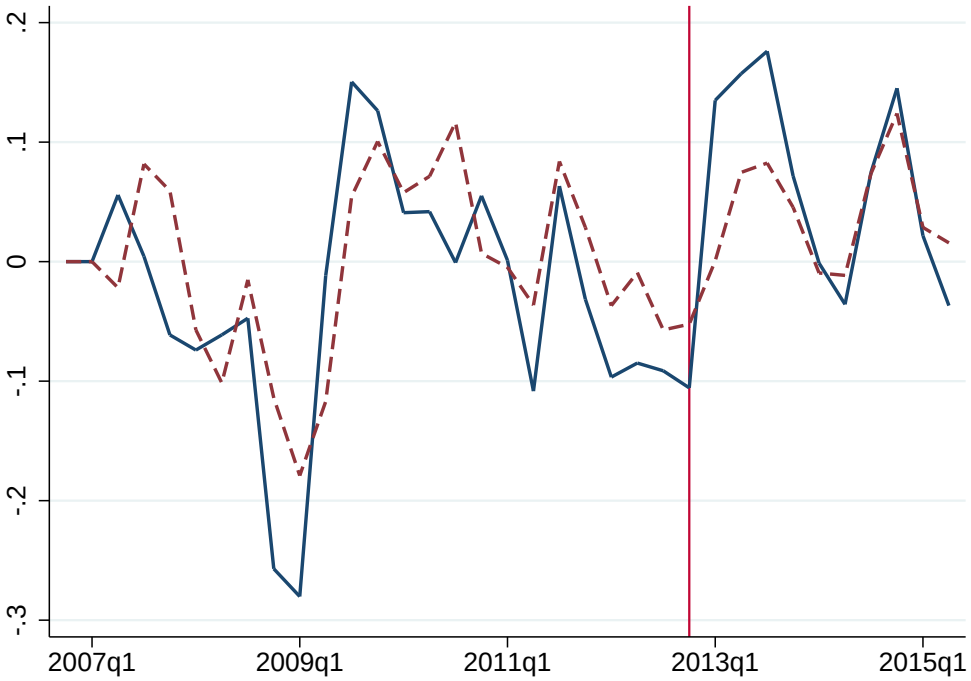
Constructed from our unbalanced panel using the Quarterly Survey of Overseas Subsidiaries released by the Ministry of Economy, Trade and Industry. Forecast errors are defined over the grid points [-2, -1, 0, +1, +2], being calculated as (up(+1), down(-1) or unchanged(0): realized changes in local sales) - (up(+1), down(-1) or unchanged(0): projected changes in local sales). Red dashed line plots the fraction of firms whose forecast error is greater than or equal to +1. Blue solid line plots the fraction of firms whose forecast error is smaller than or equal to -1. White dashed line plots the fraction of firms whose forecast error is zero. The red vertical bar denotes 2012/Q3.

Figure 12. *Underestimation and Overestimation of Local Sales (Forecast Made Two Quarters Before)*



Constructed from our unbalanced panel using the Quarterly Survey of Overseas Subsidiaries released by the Ministry of Economy, Trade and Industry. Forecast errors are defined over the grid points [-2, -1, 0, +1, +2], being calculated as (up(+1), down(-1) or unchanged(0): realized changes in local sales) - (up(+1), down(-1) or unchanged(0): projected changes in local sales). Red dashed line plots the fraction of firms whose forecast error is greater than or equal to +1. Blue solid line plots the fraction of firms whose forecast error is smaller than or equal to -1. White dashed line plots the fraction of firms whose forecast error is zero. The red vertical bar denotes 2012/Q4.

Figure 13. *Cross-sectional Average of Forecast Error for Local Sales and Sales to Japan (Forecast Made Two Quarters Before)*



Constructed from our unbalanced panel using the Quarterly Survey of Overseas Subsidiaries released by the Ministry of Economy, Trade and Industry. Forecast errors are defined over the grid points [-2, -1, 0, +1, +2], being calculated as (up(+1), down(-1) or unchanged(0): realized changes in sales) - (up(+1), down(-1) or unchanged(0): projected changes in sales). Red dashed line plots the evolution of the mean of FE for sales back to Japan. Blue solid line plots the evolution of the mean of FE for local sales. The red vertical bar denotes 2012/Q4.

Figure 14. *Summary Statistics of the Basic Survey of Overseas Business Activities*

Annual Data Summary Statistics (Unit: One Million JPY)

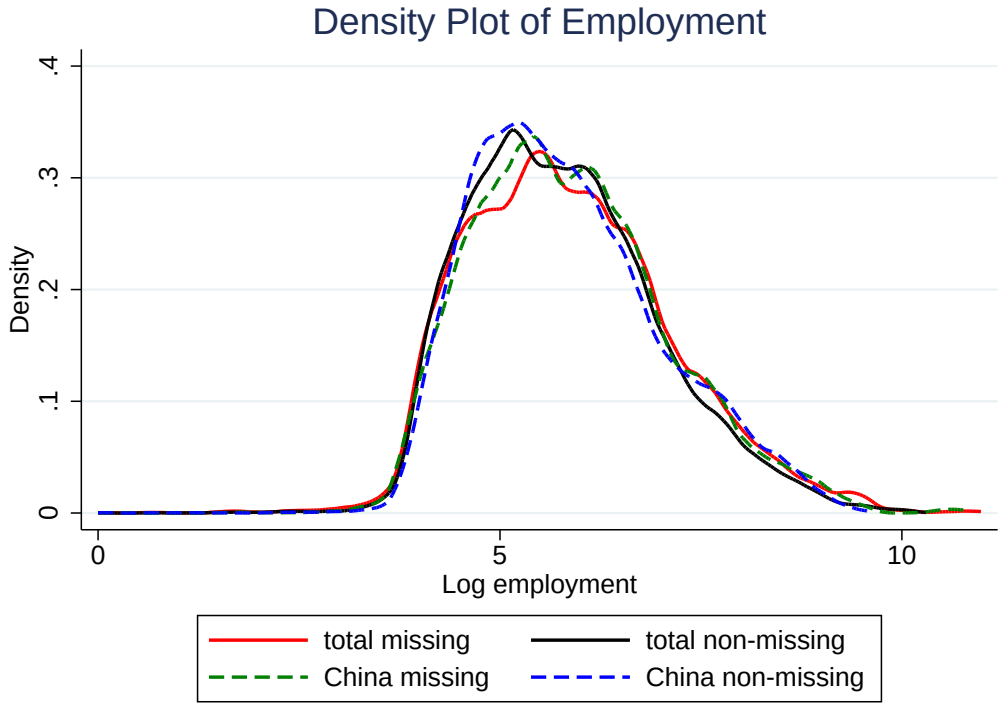
Variable	Obs	Mean	Std. Dev.	Min	Max
FDI flow	166,855	89	8,582	-2,874,730	553,445
Capital investment of foreign affiliate	141,316	388	5,968	-299	1,107,438
Capital of foreign affiliate	210,603	1,924	17,898	-52	4,542,300
Sales of foreign affiliate	182,904	11,591	88,160	-51	7,888,623
Number of employees of foreign affiliate	188,809	277	1,182	0	80,575
Capital of parental firm	213,840	55,217	106,010	0	1,467,840
Sales of parental firm	210,025	1,025,806	2,610,635	0	23,100,000
Number of employees of parental firm	208,566	4,704	11,906	0	210,000

Figure 15. *Summary Statistics of the Quarterly Survey of Overseas Subsidiaries*

Quarterly Data Summary Statistics (Unit: One Million JPY)

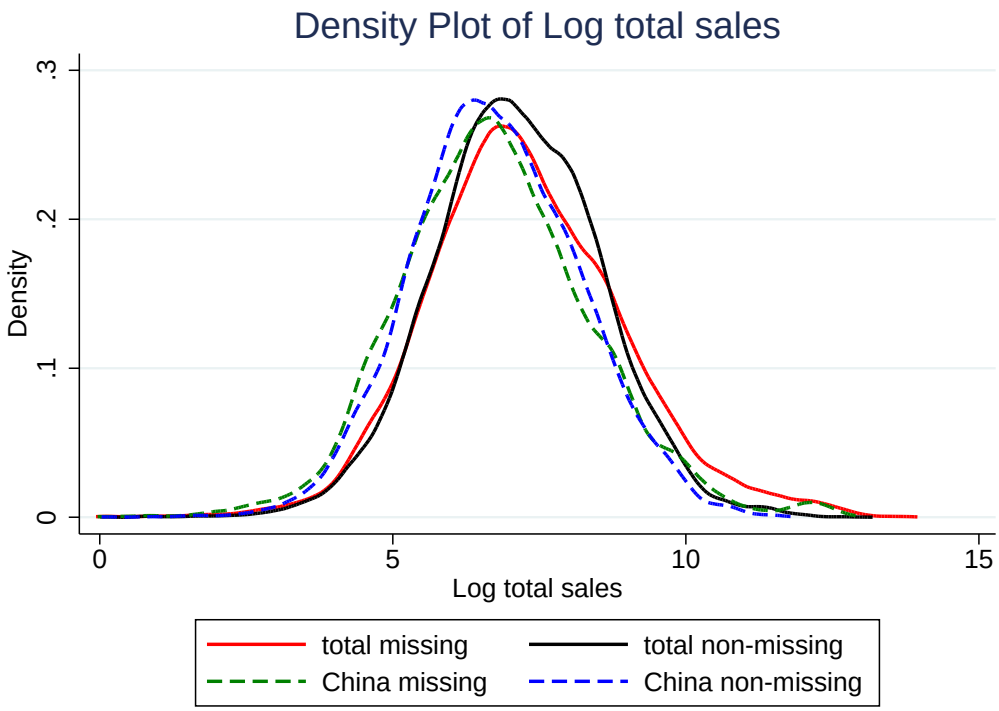
Variable	Obs	Mean	Std. Dev.	Min	Max
Total sales	170,923	4,517	20,384	0	1,194,321
Local sales	170,923	3,174	18,475	-2	1,128,653
Capital investment	170,977	148	982	-1	101,263
Number of employees	170,940	727	1,842	0	58,874
Forecast of total sales in the next quarter	113,061	0.106	0.679	-1	1
Forecast of total sales in the next next quarter	111,307	0.144	0.633	-1	1
Forecast of local sales in the next quarter	93,372	0.094	0.651	-1	1
Forecast of local sales in the next next quarter	92,202	0.135	0.607	-1	1

Figure 16. *Log Employment of Reporting and Non-reporting Observations (for forecasts made two quarters in advance)*



Non-reporting observations have higher levels of employment on average. However, this pattern is the same for Japanese affiliates in China as for all Japanese affiliates abroad.

Figure 17. *Log Sales of Reporting and Non-reporting Observations (for forecasts made two quarters in advance)*



Non-reporting observations have higher levels of (real) sales on average. However, this pattern is the same for Japanese affiliates in China as for all Japanese affiliates abroad.