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International Transmission of the 2008-09 Financial Crisis: Evidence from Japan

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International Transmission of the 2008-09 Financial Crisis: Evidence from Japan[1]

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Abstract

We investigate the international transmission of the financial crisis in 2008-2009 to Japanese firms by examining both the stock price responses to the crisis events and the changes in operating performance subsequent to the crisis. Both the stock price responses and ex-post operating performance consistently indicate that the crisis hit Japanese firms through the trade and liquidity channels. The quantitative effects of the two channels, however, differ between the two performance measures—the stock market weighed more on the liquidity channel than the trade channel, while ex-post operating performance indicate that the latter played a more important role than the former in transmitting the crisis to Japanese firms.

Keywords: International transmission, Financial crisis, Japan, Event study, Operating performance

JEL Classification: F30; F40; G15

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1. Introduction

The US financial crisis triggered by the subprime loan debacle in 2007 and culminated by the Lehman default in September 2008 was quickly transmitted beyond borders, becoming the global crisis. Foreign financial institutions, especially those European banks that held US toxic assets were severely affected by the sharp drop in their prices. However, the transmission was far wider and deeper than just through the asset price collapse or the liquidity dry-up in the financial markets.

Japanese financial institutions incurred relatively small losses from the subprime-related assets. Total realized losses of depository institutions from sub-prime mortgage securities over the period from April 2007 through March 2009 were just 2.1% of total Tier 1 capital.[2] Nonetheless, as Figure 1 depicts, Japan's stock market index (TOPIX) fell as much as the US, Euro, and Asian stock market indices (the Standard and Poor's 500, its Euro, and its Asia 50, respectively). Japan's real GDP dropped in 2009 by 5.2%, which was one of the largest rates in the world. In particular, the decline in exports was predominant in Japan. It reached 14.0% in the fourth quarter of 2008 and 25.3% in the first quarter of 2009, much larger than the decline in total exports of OECD countries (6.7% and 8.2% in the same quarters).[3] We investigate the transmission of the financial crisis in 2008-2009 to Japanese firms.

Various transmission mechanisms of financial crises can be classified into trade and financial linkages. Trade linkages include the bilateral trade with the crisis-hit area and the competition in the third market through the change in exchange rates. Financial linkages work through the liquidity dry-up in financial markets and the credit crunches by financial intermediaries. The aim of this paper is to disentangle these effects by exploiting firm-level variations in the exposures to trade and financial shocks. Specifically, we investigate what types of firms were severely affected by the 2008 crisis in terms of stock market performance and operational performance.

As a measure of stock market performance, we use the cumulative abnormal returns (CARs), which are adjusted for the market risk, rather than the market-risk-unadjusted cumulative returns. We thus can capture the crisis-specific effects on stock market performance. For example, because exports are more volatile than GDP even in normal times due to a larger share of durable goods in trade than in

[2]Realized losses and Tier 1 capital are 1.0 and 4.8 trillion yen, respectively. Total valuation losses and realized losses from securitized products, including sub-prime mortgage securities, CLO, CDO, RMBS, CMBS, and leveraged loans, are 3.3 trillion yen, or 6.9% of Tier 1 capital. (Financial Service Agency, 2009)

[3]Data source is OECD stat. All the figures are changes in seasonally-adjusted real exports from the previous quarter.

GDP, risk-unadjusted returns would be lower for exporters than non-exporters during the crisis as well. However, it does not necessarily mean that CARs would also be lower for exporters during the crisis because CARs are controlled for the market or aggregate risk.[4] If, nonetheless, we find lower CARs for exporters, then it suggests that exporters were adversely hit by the financial crisis to the extent beyond normal times. For example, some studies point out that global demand shifted away from durables to nondurables during the crisis (Eaton et al., 2011; Levchenko et al, 2010; Bricogne et al., 2012). In addition, fragmentation of global supply chains (Tanaka, 2009), a decline in trade credit (Chor and Manova, 2010; Amiti and Weinstein, 2012), and fiscal stimulus packages that were oriented mostly toward nontradables such as construction could account for the unusual drop in trade relative to GDP during the crisis. Similarly, although liquid assets may not matter for listed firms that can access to well-developed financial markets in normal times, it may play an important role during financial crises, when firms may face financial constraints. We can capture such crisis-specific effects of liquidity by examining CARs.

Furthermore, the event-study methodology that relates CARs with various firm characteristics is expected to distinguish the importance of the various channels of financial crises (Forbes, 2004). If abnormal returns of exporting firms were lower than non-exporting firms, trade channels are of special importance during the crisis. On the other hand, if firms with abundant liquid assets or small amounts of loans see higher abnormal returns, then liquidity and credit channels are of special relevance.

Although the event-study methodology can capture the long run effects of financial crises on firm profits, it depends on the assumptions of market efficiency and rational investor behavior, both of which may be dubious in the case of unprecedentedly severe crises like the financial crisis in 2008-2009. This leads to our attention to operational performance as well. Specifically, we investigate how firms' operational performance measured by return on assets (ROA) and sales growth changed after the crisis depending on the pre-crisis firm characteristics.

Our results indicate that exporters were hit more severely than non-exporters both in terms of stock market performance measured by CARs and operational performance measured by ROA and sales growth. Our results also show that firms with abundant liquid assets were less severely affected than firms with scarce liquidity assets. Quantitatively, while the stock market weighed more on the liquidity channel than the trade channel, ex-post operating performance indicate that the trade channel played a more important role than the liquidity channel in transmitting the crisis to Japanese

[4]Engel and Wang (2011) show that exports are about three times as volatile as GDP.

firms.

There is vast literature on the international transmission of financial crises. One strand of literature examines the correlation among different economies in interest rates, stock prices and sovereign spreads to see whether the correlation increases in the wake of a crisis (see Forbes and Rigobon (2001) for a survey). Although most of the studies in this literature find an increase in correlation in asset returns after the crisis, it is often difficult to distinguish between the international transmission of crises and the correlation of economic fundamentals using time series data (Dornbusch et al., 2000).[5] Another strand of literature, introduced by Eichgengreen et al. (1996) and Sachs et al. (1996), examines whether the likelihood of a crisis in a country is higher after a crisis in other countries (see Dornbusch et al. (2000) for surveys). Although, in principle, those studies can identify trade and financial channels by exploiting country-level variations in the exposures to trade and financial shocks, it is actually difficult to do so, since countries are often closely connected both by trade and financial ties. Partly because of such a high correlation between trade and financial ties, previous studies obtain mixed results about the relative importance of trade and financial channels.[6] To identify the transmission mechanism, it is useful to use firm-level data, which contain a large variation in the exposures to trade and financial shocks. Forbes (2004) utilizes firm-level data during the Asian and Russian crises and finds that trade linkages are important factors.[7] Chava and Purnanandam (2011) analyze the US firm-level data during the Russian crisis of 1998 and suggest that the financial linkage through the bank health is an important propagation mechanism of financial shocks. Schnabl (2012) also analyze the transmission of the Russian crisis to Peru using loan-, bank-, and firm-level data, finding that international banks transmit liquidity shocks across countries.

A number of papers study the international transmission of the financial crisis in

[5]Forbes and Rigobon (2002) also point out the heteroskedasticity-driven bias associated with the correlation coefficient. For a recent study, see Dungey and Martin (2007), among others.
[6]Eichengreen et al. (1996) examine 20 industrial economies from 1959 through 1993 and show that trade linkages were important. Glick and Rose (1998) also find that trade linkages were important by examining five episodes of currency crises and 161 countries. On the other hand, Baig and Goldfajn (1998) find that trade linkages among East Asian countries were weak. Mason (1998) also claims that trade was not a significant transmission mechanism in the Mexican and Thai crises. Kaminski and Reinhart (2000) support the financial channel in the Asian crisis (through Japanese major banks as a common creditor). Frankel and Schmukler, 1998) analyze the closed-end country funds data and find that the Mexican crisis produced spillover effects which were less strong in Asia than in Latin America.
[7]Some other studies examine capital flows (e.g., Froot et al., 2001) or the portfolio of mutual funds (e.g., Kaminsky et al., 2004) to investigate the financial linkages.

2008-2009 using cross-country data. Interestingly, they do not find evidence of significant transmission that was often observed in previous crises. Evidences from Rose and Spiegel (2009) do not support trade or finance linkages. Kamin and Demarco (2010) do not find a financial channel on CDS spreads, suggesting that the US subprime crisis may have been a mere trigger for a global bank run. On the other hand, some recent studies use firm-level data to examine the international transmission of the global financial crisis. Using Peruvian firm-level data, Paravisini et al. (2011) study the role of bank credit in exports and find its significant effect. Using a dataset of French firms, Bricogne et al. (2012) explore the reasons for the trade collapse during the global crisis and find that the trade collapse was mainly due to unprecedented demand shock and to product characteristics. Finally, using accounting data for non-financial firms in 42 countries, Claessens et al. (2012) examine how the crisis affected firm performance, finding that the crisis had a bigger negative impact on firms with greater sensitivity to business cycle and trade development, while financial openness made limited difference.

We contribute to the literature on the international transmission of financial crises in a number of ways. First, we examine both the trade and financial transmission channels rather focusing on either of the channels by exploiting the firm-level variation in the exposures to trade and financial shocks. Second, we investigate both the stock market performance and operating performance and see if we obtain consistent results between these different performance measures. Finally, this paper is the first that examines the transmission of the financial crisis in 2008-2009 to Japan, one of the most severely affected countries in the developed economies.

The composition of the rest of the paper is as follows. In Section 2, we present our hypotheses on the transmission mechanism of financial crises. In Section 3, we describe our dataset. In Sections 4 and 5, we present our estimation results for stock market performance and operational performance, respectively. Section 6 concludes.

2. Hypotheses

Transmission mechanisms of financial crises can be classified into trade and financial linkages. We find it useful to further divide the financial channels into liquidity and credit effects, though they are often interrelated with each other. In this section, we describe the hypotheses that we test and the variables that we use to test the hypotheses.

A. Trade linkages

Trade linkages work through the following four channels. First, as the crisis-hit foreign market falls into recession, import demand in that market decreases through the income effect. Second, if the currency of crisis-hit area depreciates, import demand both in the crisis-hit market and the third markets decreases through the price effect. Third, devaluation in the crisis-hit country may put devaluating pressure on those currencies that do not float freely, especially when those countries compete in the third markets.[8] Such competitive devaluations may result in the loss of price competitiveness of the third countries. Finally, trade barriers may be raised by crisis-hit countries and repress exports to those countries. Preceding studies find evidence supporting some kinds of trade linkages (e.g., Eichengreen, et al., 1996; Glick and Rose, 1998; Forbes, 2004; Eaton et al., 2011; Bricongne et al., 2012).[9]

We use several variables to capture the trade linkages. The simplest one we use is the export dummy that takes one if the firm exports and zero otherwise. Next, we use the share of exports in total sales to distinguish the degree of the exposure to trade shocks among exporting firms. Finally, to investigate the effects of the composition of export destination on firm performance, we use the shares of major export destinations, i.e., North America, Europe, and Asia, in total exports.[10] Figure 2 shows that although all major currencies depreciated substantially against yen in the wake of the financial crisis, the degree of depreciation differed among currencies. This fact, together with different impacts of the global crisis on GDP across countries, may result in different impacts of the crisis on Japanese exporters depending on export destinations.

B. Financial linkages through liquidity dry-up

The liquidity linkages work if financial institutions that incur losses from foreign assets may be forced to sell illiquid assets at an unusually low price (Adrian and Shin, 2008). Such a fire-sale dries up domestic asset markets, depresses asset prices further, and makes firm funding difficult. The liquidity shortage and asset price falls will reduce firm investment and thus profits. Some empirical studies find evidence of increased correlation in asset returns after financial crises, suggesting the existence of liquidity linkages (Calvo and Reinhart, 1996; Baig and Goldfajn, 1999). In Japan, the issuance of commercial papers and corporate bonds decreased sharply after the Lehman default,

[8]Lahiri and Vegh (2003), however, point out the possibility that that central banks may try to delay a balance-of-payment crisis by raising interest rates.
[9]Eaton et al. (2011) point out that during the 2008-2009 recession, increased trade impediments reduced trade in some countries including Japan, but globally the impact of these changes largely cancelled out.
[10]The other minor areas are Central and Southern America, Middle East, Africa, and Oceania.

indicating that liquidity in those markets temporarily dried up.[11]

We use the ratio of liquid assets to total assets as a measure of the resilience to the shortage in funding liquidity.

C. Financial linkages through credit crunches

If financial intermediaries that incurred losses from problem assets shrink their lending, their client firms will be adversely affected. Even non-hit intermediaries may cut lending if the market liquidity is dried up and they face difficulty in raising short-term debt, especially dollar-denominated debt. There are a number of evidences that support a negative international transmission of financial crises through foreign banks' deteriorated assets (e.g., Peek and Rosengren, 1997; Van Rijckeghem and Weder, 2001; Chava and Purnanandam, 2011; Cetorelli and Goldberg, 2012; Ivashina et al., 2012; Popov and Udell, 2010; Schnabl, 2012).

In Japan, however, credits from foreign lenders are scarce, so that direct credit crunches from foreign crisis-hit intermediaries were not likely to affect Japanese firms severely.[12] In addition, Japanese banks incurred little losses from sub-prime-related securities and other securitized products (Bank of Japan, 2009), although they incurred losses from the domestic stocks they held.[13] In fact, they increased loans after the Lehman default in response to the increase in demand for bank loans caused by the liquidity dry-up in commercial paper and corporate bond markets.[14]

We use the loan-to-asset ratio to capture the effects through bank loans. As the loan ratio is higher, firms are more likely to be negatively affected by credit crunches if they happen. On the other hand, if bank-dependent firms are less susceptible to the liquidity dry-up in financial markets, their performance will be better.

To identify demands for external finance that arise from industry-specific

[11]The amount of straight corporate bonds issued decreased by 35.4% in the two months of September and October in 2008 on the year-to-year basis (Data source is Japan Securities Dealers Association). The amount of commercial paper outstanding decreased by 12.6% during the same period on the year-to-year basis (Data source is Bank of Japan). Bank of Japan (2009) report the increasing spreads on corporate bonds and CPs in the latter half of 2008.

[12]The share of foreign bank branches in Japanese loan markets, i.e., the sum of loans outstanding by foreign bank branches and domestic banks, was only 2.0% in 2006 (data source is Bank of Japan).

[13]The cumulative return (CR) of the banking industry during the event window (September 10 to October 10) is -21.8%, which is almost the same as that of TOPIX (-23.6%). As the banking industry index, we used Nomura ETF Banks index (security code: 1615) from Stock Price CD-ROM published by Toyo Keizai Shimpo-sha.

[14]The amount of loans outstanding increased by 2.3% during September and October in 2008 and continued to increase until November 2009 on the year-to-year basis (data source is Bank of Japan).

technological factors, Rajan and Zingales (1998) use the external finance dependence ratio for the U.S. listed firms based on the assumption that U.S. listed firms are not likely to be financially constrained given the well-developed U.S. financial system. Since the Japanese financial system was also well developed and stable at least before the crisis, Japanese listed firms were not likely to be financially constrained as well at that time. This is why we use the loan-to-asset ratio of the Japanese listed firms in the pre-crisis period.

Recently, many empirical studies show that a shrink in trade finance during financial crises reduce exports. Chor and Manova (2010), among others, point out the importance of trade finance in influencing international trade patterns during the global crisis.[15] Since, unfortunately, no direct measure of trade credit was available, we cannot test the trade finance channel. Our test for trade channels, however, encompasses the test for the effects of trade finance on exports.

3. Data

We combine stock return data with financial statements and firm activity data. For the stock return, we refer to the *Stock Price CD-ROM* published by Toyo Keizai Shimpo-sha. Financial statements are obtained from NEEDS-CGES published by Nikkei Media Marketing and the Corporate Financial Databank published by Development Bank of Japan. Information on firm activities, including exports, is obtained from the Basic Survey of Japanese Business Structures and Activities (BSJBSA), published by Ministry of Economy, Trade, and Industry.

The number of the observations on stock returns obtained from the *Stock Price CD-ROM* is 3215. After the stock return data is matched with firm's export status data and financial statement from the *BSJBSA* and the *Corporate Financial Databank*, the size of sample becomes 2470. Data Appendix provides a more detailed description of our data set.

4. Stock market performance

4.1 Methodology

Because we are interested in the special effect of the crisis on stock returns, we look

[15]Amiti and Weinstein (2011) find that trade finance accounts for about one-third of the decline in Japanese exports in the financial crises of the 1990s.Paravisini et al. (2011) also find that credit shortage at banks account for 15% of the Peruvian exports decline during the global crisis.

at cumulative abnormal returns (CARs), which are adjusted for the market risk. Specifically, CAR is the accumulated differences between the stock returns and their predicted values from the standard market model:

(1) $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$, for each $i = 1,...N$,

where R_{it} denotes the period-t return for stock i, R_{mt} the period-t market return, ε_{it} the disturbance term, and N the number of firms. Denoting the predicted value of R_{it} by $\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_{it} R_{mt}$, we define $CAR_i = \sum_{\tau=1}^{c} R_{it} \quad _i - \sum_{\tau=1}^{c} \hat{R}_{it}$, where c denotes the window length.[16]

We estimate (1) for the pre-crisis period, which we deliberately set to avoid the effect of the crisis on stock returns. While the banking system and capital markets in Japan were stable in 2007, the banking systems in Europe and the U.S. began to be unstable in the summer of 2007 with the dry-up of the interbank markets. To avoid possible adverse effects of the unstable European and U.S. banking systems on stock returns of Japanese firms, we set the pre-crisis period to the 248 operating days from January 4 to December 29, 2006.

Following the standard event-study methodology (e.g., MacKinlay, 1997), CAR is regressed on firm characteristics variables. In our specification,

(2) $CAR_i = \beta_0 + \beta_1 TRADE_i + \beta_2 LIQUIDITY_i + \beta_3 CREDIT_i + \beta_4 Industry_s + \nu_i$

for $i = 1,...n$,

where $TRADE_i$ is the export dummy or other trade variables that we described above, $LIQUIDITY_i$ the ratio of liquid assets to total assets, $CREDIT_i$ the loan-to-asset ratio,

[16] In practice, we replace $\sum_{\tau=1}^{c} R_{it}$ with $\frac{P_{ic}}{P_{i0}} - 1$, where P_{it} denotes the stock price of firm i at period t, and period 0 denotes one day prior to the window for two reasons. First, data on dividend or other cash flow to shareholders during the event window is not available. Since many Japanese firms pay dividends in June and December, our treatment does not seem to yield any serious biases. Second, price data are missing for some stocks on the days when no trade occurred. Another way to handle the missing data would be to assume that the missing day's price were the same as the price on the last day when actual data is available. This alternative method yields almost the same result as we obtained below.

and $Industry_s$ the industry dummy that takes one if the firm i falls in sector s. v_i is the disturbance term. We need to decide the timing of the explanatory variables so that the explanatory variables are not affected by the crisis. Given that the European and U.S. financial systems were in turmoil in 2007, as we discussed above, we set the timing of the explanatory variables to the accounting year of 2006, typically beginning from April 2006 and ending in March 2007.

One may concern about the possibility that firms may have anticipated the crisis and adjusted their liquidity assets and leverage. If, for example, more risk-averse firms were more likely to take such preventive actions, and they were also more likely to take safer actions in the wake of the crisis, then the coefficients on the liquidity and loan ratios would partly reflect such risk-averse actions. Given the fact that the Japanese economy was expanding in 2006, however, such anticipation was not likely to be formed at that time. This is why we use the explanatory variables as of the accounting year 2006.[17]

Although the OLS regression of (2) yields consistent estimator of the coefficients β's, their standard errors may be biased, because the disturbances may not be homoscedastic or independent across firms. The latter assumption is especially problematic given that the crisis is a common shock across firms. To correct for the bias to the standard errors caused by these possibilities, we use an estimator developed by Sefcik and Thompson (1986) and applied, e.g., by Forbes (2004).[18] Their methodology yields unbiased and consistent coefficient estimates and standard errors. The detailed methodology is described in Appendix.

4.2Event windows

Two major events occurred in the fall of 2008. On September 15 (September 16 in Japan) Lehman Brother Holdings announced that it would file for Chapter 11 bankruptcy protection. On September 29 (September 30 in Japan), the legislation of bailout (Emergency Economic Stabilization Act of 2008) failed at the United State House of Representatives.

If the market fully understood the impacts of those events instantaneously, we

[17]The annual real GDP growth rates were 1.9%, 1.8%, and 1.8% in fiscal years 2005, 2006, and 2007, respectively. These figures show good performance of the Japanese economy during this period given that the average growth rate over the preceding ten years (from fiscal year 1995 to fiscal year 2004) was 1.1%.

[18]We estimated (2) using OLS and obtained similar results as we report below. See the discussion paper, Hosono et al. (2011).

should choose each one day as an event window. However, in the case of unprecedented events like the crisis, market participants may understand them gradually. In addition, new information on the severity of a crisis is likely to be continuously provided during the crisis (Forbes, 2004).

Figure 1 depicts S&P 500, showing that while Lehman's failure induced only a temporary fall in US stock prices, the bill failure caused a persistent drop, which continued until the US government announced revisions in TARP (Troubled Asset Relief Program) to warrant the nine US major financial institutions on October 14. The persistent declining trend after the bill failure suggests that markets realized the impacts and severity of the crisis gradually.

To take into consideration this possibility, we choose a relatively long window. Specifically, we choose 18 operating days from the day of the Lehman default (September 16 (date 1) to October 10 (date 18) in Japan). We chose the ending day considering that news about TARP equity plan was leaked on October 13, though it was formally released on the following day.[19] We also divide the window into the first 9 operating days (September 16 to September 29) and the last 9 operating days (September 30 to October 10).

Figure 3 depicts CARs during the entire window for each of the two subsamples classified by (1) the export status, (2) the liquid asset ratio, and (3) the debt-to-asset ratio, where the export dummy and the median values of the liquid asset ratio and the debt-to-asset ratio are used to split the sample, respectively. Figure 3 indicates that exporters and firms with lower liquid asset ratios went through a lower CAR than other firms, while firms with higher loan-to-asset ratios did not necessarily perform worse than other firms. Table 1 shows descriptive sample statistics for the variables that we use in the following analysis.

4.3 Results for the entire window

Table 2 presents the estimation results of CARs for the entire window. Column 1 shows the baseline specification result. The export dummy takes a negative and significant coefficient, supporting the trade channel. The liquid asset ratio takes a positive and significant coefficient, consistent with the liquidity channel hypothesis. On the other hand, the coefficient of the loan-to-asset ratio is not significant, not supporting

[19]See, e.g., Reuter news. Beltratti and Stultz (2009) also examine cumulative stock returns of financial institutions for the periods of the entire credit crisis from July 1, 2007 to December 31, 2008 and the Lehman bankruptcy month from September 12 to October 10, 2008. Erkens et al. (2009) investigate cumulative stock returns of financial institutions around the world from the first quarter of 2007 to the third quarter of 2008.

the credit channel hypothesis. Log (Asset) takes a positive and significant coefficient, suggesting that a smaller firm was more severely affected.

In column 2, we add the interaction term of the export dummy and the share of exports in total sales to take into account the variation in the exposure to export demand among exporters. The coefficient of the export dummy is still significant, but the coefficient of the intersection term is not, suggesting that investors did not differentiate firms according to the exposure to export demand.

We further explore whether the composition of export destinations matters. Specifically, in column 3, we add the interaction term of the export dummy and the shares of major export destinations, i.e., North America, Europe, and Asia, in total exports. While the export dummy turns to be insignificant, the interaction term of the export dummy and the share of exports to Europe is negative and significant, suggesting that investors anticipated a decline in exports to Europe.

Finally, in column 4, we see whether ownership by foreign investors affected CARs in the wake of the crisis. Foreign shareholders were most likely to be damaged by the crisis and to sell stocks and other risky assets either to reduce asset risk or to obtain liquidity for collateral or haircuts.[20] Such portfolio-rebalance or fire-sales may have directly depressed stock prices even if firm operating performance was not affected. In fact, foreigners continued to be net sellers over the six months after the Lehman bankruptcy.[21] Adding the foreign investor share to the explanatory variables, however, we find that it is not significant.

4.4 Quantitative comparison

Now we compare the quantitative impacts of the trade and liquidity channels based on column (1) in Table 2. To this aim we use two alternative approaches. The results are shown in column (1) in Table 3.

First, we compare the impacts of the difference in the trade and liquidity variables on CARs holding constant the estimated parameters of the other variables. More specifically, we first note that exporters saw a larger decline in CAR than non-exporters by 1.9%. Because the mean and standard error of the export dummy are both approximately 0.5 (Table 1), an exporter is a firm with the export dummy more than the average by one standard error and a non-exporter corresponds to the export dummy lower than the average by one standard error. To compute the quantitative effects of the

[20]Kaminsky et al. (2004), among others, show that capital outflow by mutual funds was attributed to the international transmission of the Asian financial crisis.
[21]The data is taken from the Tokyo Stock Exchange.

liquidity channel on the same basis as the trade channel, we compare a firm with its liquid asset ratio less than the average by one standard deviation (0.123) and a firm with its liquid asset ratio more than the average by one standard error, finding that the former saw a larger decline in CAR than the latter by 2.2%. Although both of these impacts are economically significant, given that the average CAR is 4.0%, the liquidity channel had a slightly larger impact on CARs than the trade channel.

As an alternative way of comparison, we drop the export dummy and the liquidity dummy one by one from the explanatory variables and see how the goodness of fit in terms of R squared decreases. Note that in this approach the estimated coefficients of the other variables than the trade and liquidity variables change from the original regression (with both the trade and liquidity variables included in the explanatory variables).We find that dropping the export dummy decreases R squared by 0.22 %, while dropping the liquidity ratio decreases R squared by 0.33 %. This approach also suggests that the liquidity channel had larger impact on CARs.

4.5 Results for the two sub-periods

Tables 4 and 5 show the estimation results for the two sub-windows. We see that the export dummy is significant only for the first half window, while the liquidity ratio is significant for both of the sub-windows. Moreover, Log (Asset) takes a negative and significant coefficient in the first half window, while it takes a positive and significant coefficient in the latter half window. The loan-to-asset ratio, the interaction term of the export dummy and the share of exports in total sales, and the share of foreign ownership are not significant in either sub-window. As for the composition of the export destinations, the interaction term of the export dummy and the share of exports to Europe takes a negative and significant coefficient in the first half window.

In sum, both the trade and liquidity channel hypotheses are supported by the sub-sample estimation: trade channel was observed after the Lehman failure, while the liquidity channel was seen after the legislation failure as well as after the Lehman default.

5. Operating performance

5.1 Methodology

To investigate how the effects of the financial crisis on the firms' operating performance varied across firms depending on the pre-crisis characteristics, we estimate the following equations:

(3)

$$\Delta ROA_{it} = \beta_0 + \beta_1 ROA_i + \beta_2 TRADE_i + \beta_3 LIQUIDITY_i + \beta_4 CREDIT_i + \beta_5 Industry_s + \nu_i ,$$

and

(4)

$$\Delta \log(Sales)_{it} = \beta_0 + \beta_1 \log(Sales)_i + \beta_2 TRADE_i + \beta_3 LIQUIDITY_i + \beta_4 CREDIT_i + \beta_5 Industry_s + \nu_i$$

, for $i = 1,...n$, and for $t = 2008, 2009$,

where ΔROA_{it} and $\Delta \log(Sales_{it})$ are the changes in returns on assets (ROA) and the logarithm of sales, respectively, from 2007 to either2008 or 2009. We examine the change from 2007 because, as we discussed above, the Japanese financial system was stable in 2007. On the other hand, we examine the changes to 2008, when the crisis was culminated in fall, and to 2009, when the global financial markets were still unstable at least until the first quarter. Because the Japanese economy reached the trough in March 2009 (the Cabinet Office), which corresponds to the end of the accounting year in 2008 for most Japanese firms, most of the negative impacts of the crisis seems to have appeared by the end of accounting year 2009.

We include ROA_i and $\log(Sales_i)$ to take into account a possible mean reversion of profitability and sales for each equation. We use all the explanatory variables, including ROA_i and $\log(Sales_i)$, as of year 2006 to avoid possible endogeneity problems.

5.2 Results for one-year window

Table 6 shows the results for ΔROA over the period of 2007-2008.In column (1), the export dummy takes a negative and significant coefficient, and the liquidity ratio takes a positive and significant coefficient. On the other hand, the loan-to-asset ratio does not take a significant coefficient. These results are consistent with those of the stock market performance presented in the previous section. Log (Asset) does not take a significant coefficient. ROA as of year 2006 takes a negative and significant coefficient, suggesting that firms that earned larger profits before the crisis saw a relatively larger decline in ROA after the crisis. Next, in column (2), we examine how the change in ROA depended on the exposure to foreign markets, finding that the more firms depended on exports,

the more sharply their profits decreased, which cannot be observed for CARs. Finally, we examine the effects of the composition of the export destination on exporters' ROA. Column (3) shows that the shares of the three major destinations take negative and significant coefficients with almost the same absolute values among the three. This contrasts with the results for CARs, showing that only the share of exports to Europe was negative and significant.

Now we turn to Table 7, which shows the results of $\Delta \log(Sales)$ over the period of 2007-2008. In column (1), the export dummy takes a negative and significant coefficient. On the other hand, the liquidity asset ratio, the loan-to-asset ratio, or log (Asset) does not take a significant coefficient. Log (Sales) as of year 2006 takes a negative and significant coefficient, suggesting that firms that sold more before the crisis saw a larger decline in sales after the crisis. In column (2), we add the interaction term of the export dummy and the share of exports in total sales, finding that the more firms depended on exports, the less they sold after the crisis. Finally, in column (3), we see the effects of the composition of the export destination among exporters. The export shares of Asia and the North America both take negative and significant coefficients, with the coefficient on the former being larger in absolute values, while the share of Europe does not take a significant coefficient. This result is not consistent with the result for CARs.

5.3 Quantitative Comparison

Using column (1) in Tables6 and 7, we compare the quantitative effects of the trade and liquidity channels on operating performance following the same two alternative approaches as we used for CARs in the previous section. The results for ΔROA and $\Delta \log(Sales)$ are shown in columns (2) and (3), respectively, in Table 3.

First, exporters saw a larger decline in ROA than non-exporters by 0.7%. On the other hand, comparing ΔROA for a firm with its liquid asset ratio less than the average by one standard error and a firm with its liquid asset ratio more than the average by one standard error, we find that the former saw a larger decline in ROA and by 0.5%. Both the trade and liquidity channels are economically significant, given that the average decline in ROA from 2007 to 2008 is 2.4%. However, the trade channel had a larger impact on ROA than the liquidity channel.

As for $\Delta \log(Sales)$, exporters saw a larger decline in log (sales) than non-exporters by 3.4%, which is economically significant as compared with the average decline in log (Sales) (5.5%). On the other hand, the liquid asset ratio is not significant. Nonetheless, if we mechanically compute the difference between a firm with its liquid asset ratio less than the mean by one standard error and a firm with its liquid asset ratio more than the

mean by one standard error, we find that the former saw a decline on log (Sales) by 0.3 percent points. The trade channel had a much larger impact on the sales growth than the liquidity channel.

Next, dropping the export dummy and the liquid asset ratio respectively from the ΔROA_{it} regression decreases R squared by 0.28% and 0.12%. Similarly, dropping the export dummy and the liquid asset ratio respectively from the ΔROA_{it} regression decreases R squared by 0.52 % and 0.00%.The comparison based on the goodness-of-fit also suggests that the trade channel had a larger impact on both the change in ROA and sales growth than the liquidity channel.

5.4 Results for two-year window

In this subsection, we examine the effects of the crisis on operating performance by investigating the change in ROA and Log (Sales) from 2007 to 2009.

Table 8 shows the results for ΔROA_{it} .The results for this two-year window are qualitatively similar to the results for the one-year window shown in Table 6. An exception is that the effect of the liquidity ratio on ΔROA_{it} is not significant for the two-year window. The coefficients of the export dummy in the regression of ΔROA_{it} show that the decline in ROA for exporters almost doubled for the two-year windows (1.4%) as compared with the one-year window (0.7%), although the average decline in ROA for the two-year window (2.6%) is only slightly higher than that for the one-year window (2.4%), suggesting that the trade channel had a persistent impact on profits until 2009.

Next, we turn to the results for $\Delta \log(Sales_{it})$ over the two-year window, shown in Table 9. The qualitative results for the two-year window are again similar to the results for the one-year window shown in Table 7. In contrast with the results for ΔROA_{i}, however, the coefficient on the liquidity ratio is positive and significant for the two-year window. Moreover, the comparison of the coefficients of the export dummy between the one-year window (3.4% in column (1) of Table 7) and the two-year window (8.5% in column (1) of Table 9) again suggest that the trade channel had a persistent impact on

sales until 2009.

The quantitative comparison of the trade and liquidity channels for the two-year window, shown in column (4) for ΔROA and column (5) for $\Delta \log(Sales)$ in Table 3, yields results similar to the comparison for the one-year window: the trade channel had larger impacts both on ΔROA and $\Delta \log(Sales)$ than the liquidity channel.

In sum, we obtain the results for changes in operating performance that are qualitatively consistent with the results for CARs in most of the variables. That is, the results for operating performance suggest that the crisis hit the Japanese firms through the decline in export demand and liquidity shortage. On the other hand, the quantitative impacts of the trade and liquidity channels are different between the stock market performance and operating performance. While the stock market predicted that the liquidity channel would have a greater impact on future profitability, the ex-post operating performance indicates that the trade channel had a larger impact on operating performance.

6. Conclusion

We investigate the international transmission of the financial crisis in 2008-2009 to the Japanese economy by examining both the stock price responses to the crisis events and the changes in operating performance in one- and two-year windows after the crisis.

Our results indicate that the financial crisis in 2008-2009 transmitted to the Japanese economy through the trade and liquidity channels. That is one reason Japan was severely hit by the Lehman default. Our results also show that the stock market performance was qualitatively consistent with the subsequent operating performance. This suggests that the stock market predicted operating performance to some extent even in the crisis, when uncertainty about the severity of the crisis itself and of policy responses to the crisis was unprecedentedly heightened and thus made forecasts difficult. Quantitatively, however, the stock market weighed more on the liquidity channel than the trade channel, while ex-post operating performance indicate that the trade channel played a more important role than the liquidity channel in transmitting the crisis to Japanese firms. With hindsight, the stock market undervalued the trade channel relative to the liquidity channel. Although exports declined 25% in the first quarter of 2009 as compared to the previous quarter in Japan, such a severe trade collapse in the wake of the crisis seems to have been difficult to be foreseen. On the other hand, the financial market turmoil, especially at the corporate bond and commercial paper markets, turned out to be settled down by the first quarter of 2009, which was quicker than market participants had anticipated possibly due to the Bank

of Japan's unconventional monetary easing and government supports for corporate finance.

Data Appendix

Variables	Constructions	Sources
Export dummy	Export dummy takes on the value 1 if the firm exports and 0 if the firm doesn't export.	Basic Survey of Japanese Business Structure and Activities (BSJBSA), Ministry of Economy, Trade and Industry
Liquid Asset Ratio	(Cash + Deposits + Securities) / Total Assets	NEEDS-Cges, Nikkei Media Marketing
Loan-to-Asset Ratio	(Short-term Loans + Long-term Loans) / Total Assets	Corporate Financial Databank (CFD), Development Bank of Japan
Log (Asset)	Logarithm of Total Assets	CFD
Share of Foreigners	Shareholdings by foreign investors	NEEDS-Cges
Share of exports in total sales	Total Exports / Total Sales	BSJBSA
Shares of exports in total exports(North America)	Exports to North America / Total Exports	BSJBSA
Shares of exports in total exports(Europe)	Exports to Europe / Total Exports	BSJBSA
Shares of exports in total exports(Asia)	Exports to Asia / Total Exports	BSJBSA
ROA	Return on Assets (=Current Profit/Total Assets)	NEEDS-Cges
Log (Sales)	Logarithm of Total Sales	CFD

Appendix: Sefcik and Thompson's estimation methodology

The detail of the estimation strategy by Sefcik and Thompson (1986) is described in that paper and Forbes (2004). We just sketch it here.

1. We estimate the following market model using OLS over the entire period, T(the sum of the pre-crisis P and crisis period C)[22].

(A1) $R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \delta_t + \mu_{it}$, for each $i = 1,...N$ and $t = 1,...T$

where R_{it} denotes the period-t return for stock i, R_{mt} the period-t market return, δ_t the crisis period dummy, and μ_{it} the disturbance term with $E(\mu_{it}) = 0$ and $Var(\mu_{it}) = \sigma^2_{\mu_i}$. Denoting the market index as of period t by P_{mt}, we construct the market return as $R_{mt} = \frac{P_{mt}}{P_{m,t-1}} - 1$.

2. We use OLS to regress the estimated coefficient on δ_t in (A1), $\hat{\gamma}_i$, on the firm characteristics $(1 \times K)$ vector, F_i,

[22]In case when the stock return data is missing, we replaced them with the stock return predicted by the market model (1) estimated during the pre-crisis period. That is, we assumed that CAR was zero on the day when the data is missing. This treatment is conservative in that it underestimates, if any, the effects of firm characteristics on CAR.

(A2) $\hat{\gamma}_i = F_i\psi + \eta_i$,

where η_i is the disturbance term with $E(\eta_i) = 0$ and $Var(\eta_i) = \sigma^2_{\eta_i}$. The estimated coefficient vector, $\hat{\psi}$, is obtained by

(A3) $\hat{\psi} = (F'F)^{-1}F'\hat{\gamma} = X\hat{\gamma}$,

where $\hat{\gamma} \equiv [\hat{\gamma}_1,...,\hat{\gamma}_n]'$ and $X \equiv (F'F)^{-1}F'$. Note that X is $(K \times N)$ for which each row can be interpreted as an estimated weight of the impact of the firm characteristics *k*.

3. We form K portfolios using the weights implied in $X$and calculate returns for each portfolio as

(A4) $\hat{R}_k = XR_N$,

where $\hat{R}_k = \begin{bmatrix} \hat{R}_{11},...\hat{R}_{1T} \\ . \\ . \\ \hat{R}_{K1},...\hat{R}_{KT} \end{bmatrix}$ and $R_N = \begin{bmatrix} R_{11},...R_{1T} \\ . \\ . \\ R_{N1},...R_{NT} \end{bmatrix}$.

4. Use OLS to regress $\hat{R}_{it}$ on the constant, R_{mt}, and $\delta_t$and obtain the coefficients $\hat{\hat{\alpha}}, \hat{\hat{\beta}},$ and $\hat{\hat{\gamma}}$and variance-covariance matrix. The parameters $\hat{\hat{\gamma}}$ provide unbiased and consistent estimates of the impact of the K firm characteristics on CAR and the variance-covariance matrix is also consistent and unbiased.

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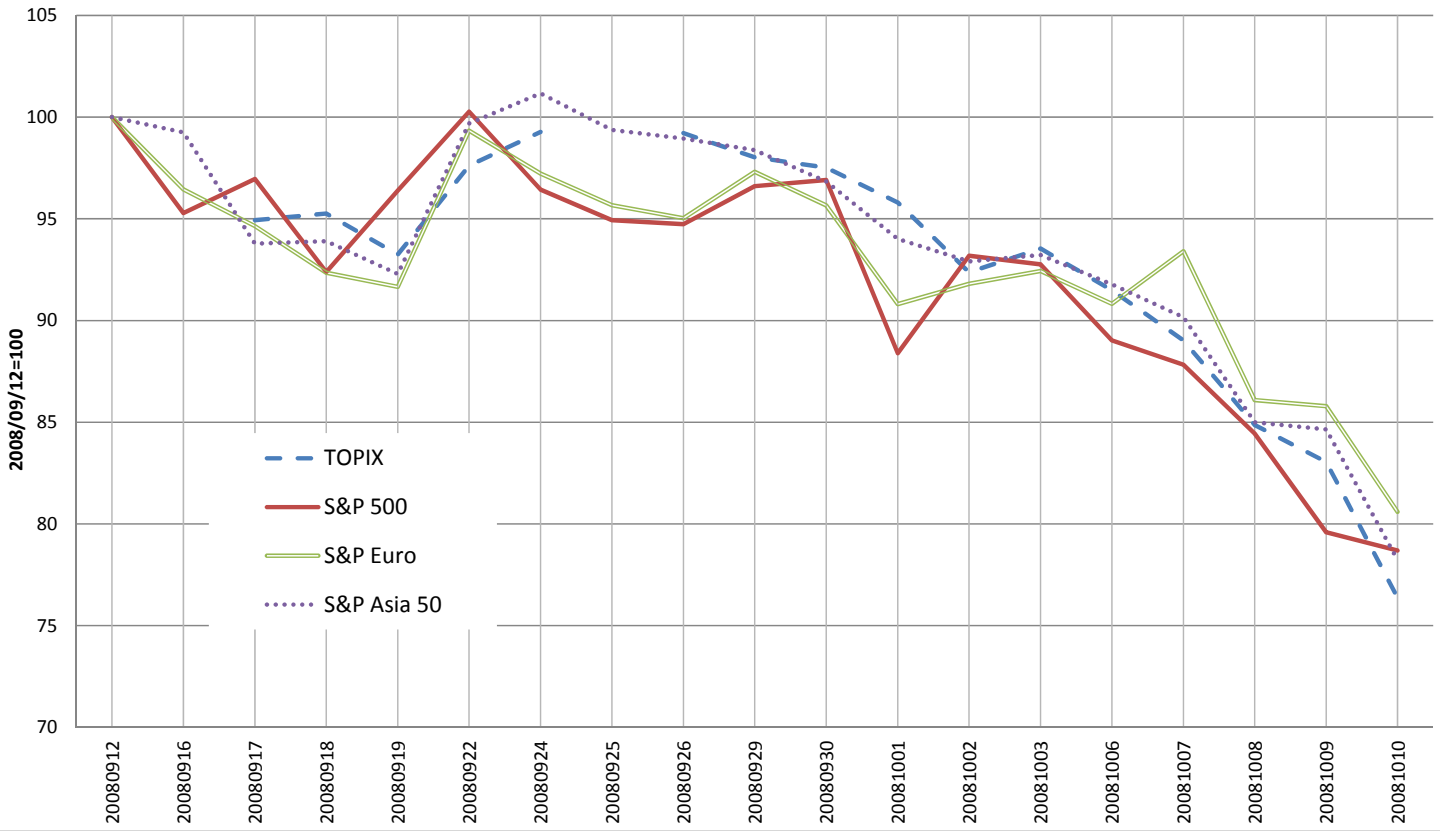
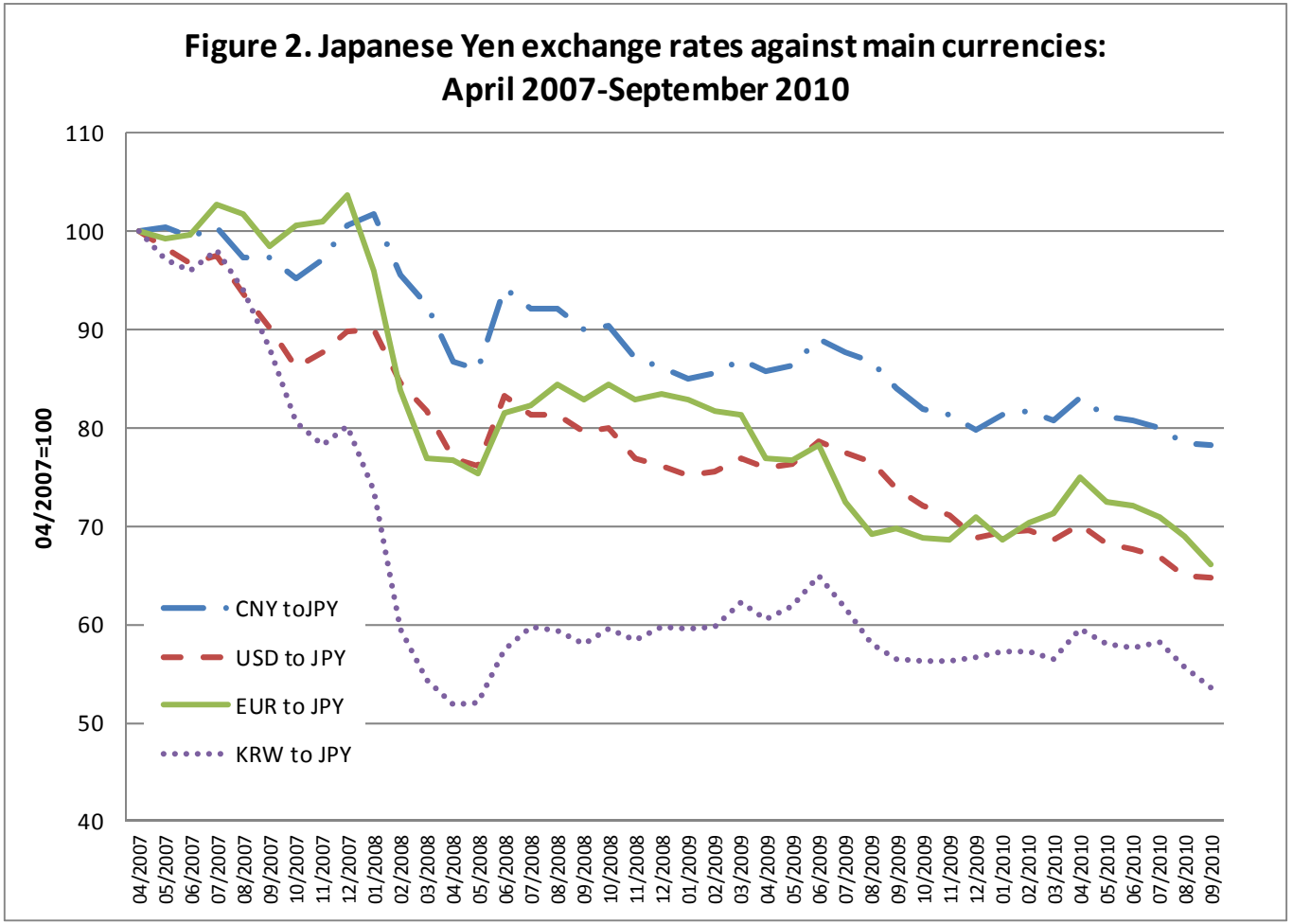
Figure 1. TOPIX, S&P500, S&PEuro and S&PAsia50



Source: Standard & Poor's

Notes: TOPIX is the Tokyo Stock Price Index, a composite stock price index of all stocks listed on the Tokyo Stock Exchange first section.
S&P 500 includes 500 leading companies in leading industries of the U.S. economy, capturing 75% coverage of U.S. equities.
S&P Euro represents the Europe region, including constituents from euro zone countries. It provides geographic and economic diversity over industry sectors.
S&P Asia 50 represents four major economic sectors of Asia equity markets. It includes highly liquid securities from Hong Kong, Korea, Taiwan and Singapore.

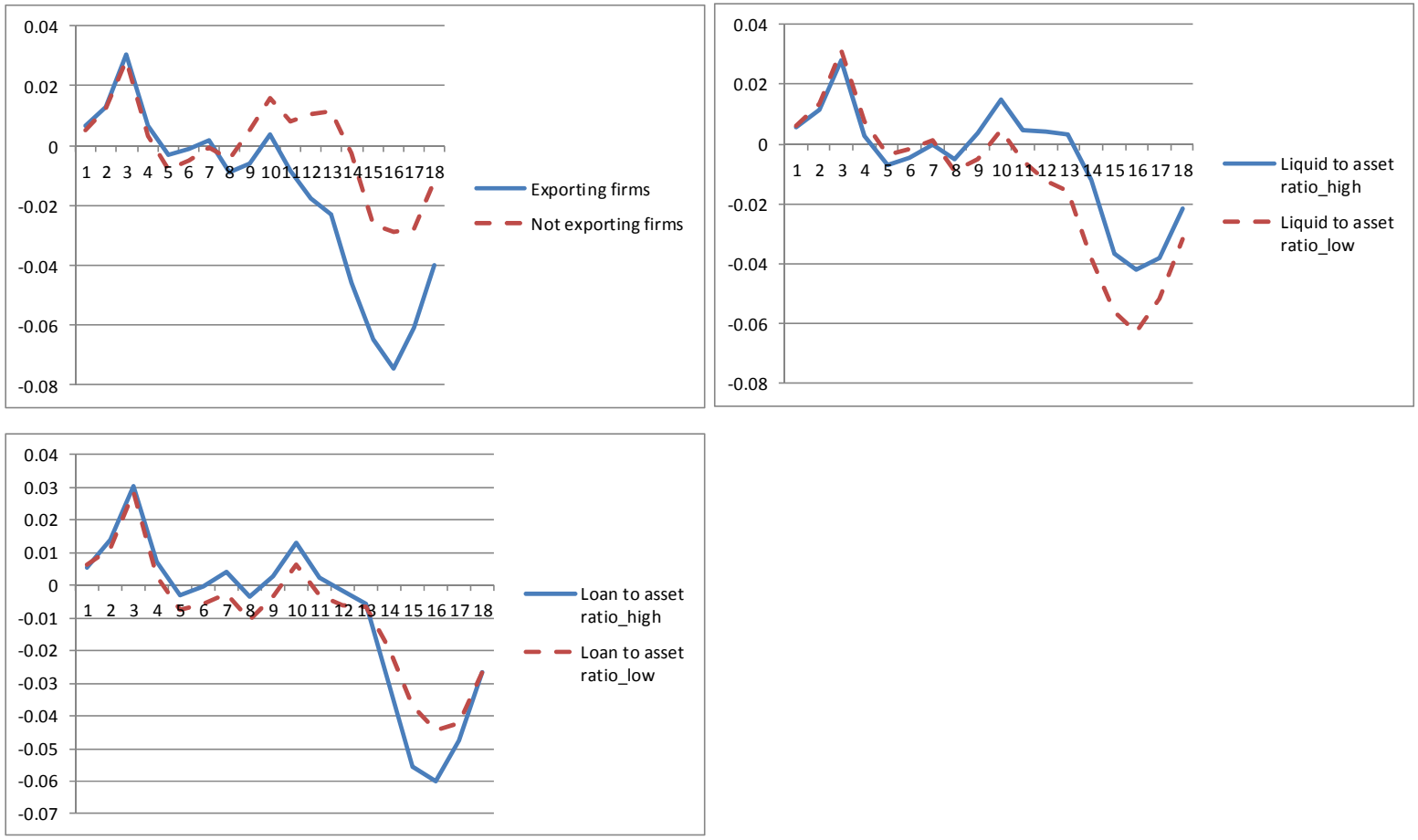


Source: oanda.com

Notes: Rates in home corrency (inter-bank rates)

JPY, CNY, USD, EUR and KRW represent Japanese Yen, Chinese Yuan, U.S. Dollar, EURO and South Korean Won, respectively.

Figure 3. Cumulative abnormal returns (CAR) from September 16, 2008 to October 10, 2008.



Notes: Date 1 denotes September 16, 2008.
Date 10 denotes September 30, 2008.
Date 18 denotes October 10, 2008.

Table 1. Descriptive Statistics

	Mean	Median	Maximum	Minimum	Standard Deviation	Observations
Export dummy	0.485	0	1	0	0.500	2470
Liquid Asset Ratio	0.132	0.098	0.862	0.000	0.123	2470
Loan-to-Asset Ratio	0.125	0.086	0.670	0	0.131	2470
Log (Asset)	17.304	17.119	23.282	13.016	1.485	2470
Export dummy＊share of exports in total sales	0.081	0	0.971	0	0.159	2470
Export dummy＊shares of exports in total exports(North America)	0.092	0	1	0	0.188	2470
Export dummy＊shares of exports in total exports(Europe)	0.065	0	1	0	0.146	2470
Export dummy＊shares of exports in total exports(Asia)	0.302	0	1	0	0.387	2470
Share of Foreigners	0.095	0.052	0.842	0	0.114	2438
ROA2006	0.066	0.056	1.603	-0.587	0.082	2438
Log (Sales2006)	17.261	17.113	23.172	11.337	1.525	2470
CAR (Sept. 16-Oct. 10)	-0.040	-0.050	1.845	-0.665	0.157	1913
CAR (Sept.16-Sept. 29)	0.000	-0.004	1.028	-0.432	0.087	1830
CAR (Sept.20-Oct.10)	-0.040	-0.044	1.651	-0.560	0.134	1900
△ROA (2007-2008)	-0.024	-0.018	0.652	-0.572	0.054	2299
△ROA (2007-2009)	-0.026	-0.018	0.735	-0.605	0.070	2232
△Log (Sales) (2007-2008)	-0.055	-0.042	2.540	-0.954	0.185	2326
△Log (Sales) (2007-2009)	-0.149	-0.150	7.982	-0.995	0.313	2163

Table 2. Estimation results for CAR for the entire window (from September 16, 2008 to October 10, 2008)

	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Export dummy	−0.019	0.009 **	−0.021	0.010 **	0.039	0.038	−0.019	0.009 **
Liquid Asset Ratio	0.091	0.036 **	0.090	0.036 **	0.093	0.036 **	0.087	0.037 **
Loan-to-Asset Ratio	0.008	0.031	0.008	0.031	0.005	0.031	0.012	0.032
Log Asset	0.008	0.003 ***	0.008	0.003 ***	0.009	0.003 ***	0.007	0.003 **
Export dummy * share of exports in total sales			0.019	0.029				
Export dummy * shares of exports in total exports (North America)					−0.061	0.043		
Export dummy * shares of exports in total exports (Europe)					−0.092	0.048 *		
Export dummy * shares of exports in total exports (Asia)					−0.057	0.039		
Share of Foreigners							0.028	0.042
Cons.	−0.215	0.052 ***	−0.208	0.053 **	−0.215	0.052 ***	−0.193	0.062 ***
Industry dummy	Yes		Yes		Yes		Yes	
	Number of obs = 1913		Number of obs = 1913		Number of obs = 1913		Number of obs = 1913	
	F(28, 1884) = 3.31		F(29, 1883) = 3.2		F(31, 1881) = 3.1		F(29, 1883) = 3.21	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000	
	R-squared = 0.0469		R-squared = 0.0471		R-squared = 0.0489		R-squared = 0.0471	
	Adj R-squared = 0.0327		Adj R-squared = 0.0324		Adj R-squared = 0.0332		Adj R-squared = 0.0324	
	Root MSE = .15466		Root MSE = .15469		Root MSE = .15463		Root MSE = .15469	

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 3. Quantitative comparisons of the trade and liquidity channels

Column	(1)	(2)	(3)	(4)	(5)
Explanatory variable	CAR	△ROA	△Log(Sales)	△ROA	△Log(Sales)
Window	Sept. 16, 2008–Oct. 10, 2008	2007–2008	2007–2008	2007–2009	2007–2009
1. Effects of two-standard error difference in					
Export dummy	−1.90%	−0.74%	−3.44%	−1.40%	−8.49%
Liquidity asset ratio	2.26%	0.48%	0.32%	0.37%	4.86%
2. Changes in R sqaured by dropping					
Export dummy	−0.22%	−0.28%	−0.52%	−0.61%	−1.11%
Liquidity asset ratio	−0.33%	−0.12%	0.00%	−0.05%	−0.39%

Table 4. Estimation results for CAR for the first sub-period (from September 16, 2008 to September 29, 2008)

	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Export dummy	−0.010	0.005 *	−0.008	0.005	0.018	0.021	−0.010	0.005 *
Liquid Asset Ratio	0.045	0.020 **	0.046	0.020 **	0.045	0.020 **	0.045	0.021 **
Loan-to-Asset Ratio	0.016	0.018	0.016	0.018	0.014	0.018	0.016	0.018
Log Asset	−0.004	0.002 ***	−0.004	0.002 **	−0.004	0.002 ***	−0.004	0.002 **
Export dummy * share of exports in total sales			−0.015	0.016				
Export dummy * shares of exports in total exports (North America)					−0.015	0.024		
Export dummy * shares of exports in total exports (Europe)					−0.046	0.026 *		
Export dummy * shares of exports in total exports (Asia)					−0.031	0.022		
Share of Foreigners							−0.001	0.023
Cons.	0.058	0.029 **	0.053	0.030 *	0.061	0.029 **	0.057	0.035 *
Industry dummy	Yes		Yes		Yes		Yes	
	Number of obs = 1830		Number of obs = 1830		Number of obs = 1830		Number of obs = 1830	
	F(28, 1801) = 2.85		F(29, 1800) = 2.7		F(31, 1798) = 2.7		F(29, 1800) = 2.75	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000	
	R-squared = 0.0425		R-squared = 0.0430		R-squared = 0.0447		R-squared = 0.0425	
	Adj R-squared = 0.0276		Adj R-squared = 0.0276		Adj R-squared = 0.0282		Adj R-squared = 0.0271	
	Root MSE = .08543		Root MSE = .08543		Root MSE = .0854		Root MSE = .08545	

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 5. Estimation results for CAR for the last sub-period (from September 30, 2008 to October 10, 2008)

	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Export dummy	−0.010	0.008	−0.012	0.008	0.013	0.031	−0.010	0.008
Liquid Asset Ratio	0.061	0.031 **	0.059	0.031 *	0.062	0.031 **	0.059	0.031 *
Loan-to-Asset Ratio	−0.022	0.027	−0.023	0.027	−0.023	0.027	−0.020	0.027
Log Asset	0.011	0.002 ***	0.010	0.002 ***	0.011	0.002 ***	0.010	0.003 ***
Export dummy * share of exports in total sales			0.017	0.024				
Export dummy * shares of exports in total exports (North America)					−0.033	0.036		
Export dummy * shares of exports in total exports (Europe)					−0.046	0.040		
Export dummy * shares of exports in total exports (Asia)					−0.018	0.032		
Share of Foreigners							0.014	0.035
Cons.	−0.239	0.044 ***	−0.233	0.045 ***	−0.243	0.044 ***	−0.228	0.052 ***
Industry dummy	Yes		Yes		Yes		Yes	
	Number of obs = 1900		Number of obs = 1900		Number of obs = 1900		Number of obs = 1900	
	F(28, 1871) = 3.06		F(29, 1870) = 2.9		F(31, 1868) = 2.8		F(29, 1870) = 2.96	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000	
	R-squared = 0.0437		R-squared = 0.0440		R-squared = 0.0451		R-squared = 0.0438	
	Adj R-squared = 0.0294		Adj R-squared = 0.0292		Adj R-squared = 0.0293		Adj R-squared = 0.0290	
	Root MSE = .13173		Root MSE = .13175		Root MSE = .13174		Root MSE = .13176	

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 6. Estimation results for ΔROA (from 2007 to 2008)

	(1)		(2)		(3)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Export dummy	−0.007	0.003 ***	−0.001	0.003	0.034	0.011 ***
Liquid Asset Ratio	0.019	0.010 *	0.022	0.010 **	0.021	0.010 **
Loan-to-Asset Ratio	0.004	0.009	0.005	0.009	0.004	0.009
Log Asset	−0.001	0.001	0.000	0.001	0.000	0.001
ROA2006	−0.211	0.014 ***	−0.201	0.013 ***	−0.199	0.013 ***
Export dummy * share of exports in total sales			−0.061	0.008 ***	−0.064	0.008 ***
Export dummy * shares of exports in total exports (North America)					−0.035	0.012 ***
Export dummy * shares of exports in total exports (Europe)					−0.033	0.014 **
Export dummy * shares of exports in total exports (Asia)					−0.038	0.011 ***
Cons.	0.025	0.015 *	0.005	0.015	0.010	0.015
Industry dummy	Yes		Yes		Yes	
	Number of obs = 2299		Number of obs = 2299		Number of obs = 2299	
	F(29, 2269) = 18.9		F(30, 2268) = 20.5		F(33, 2265) = 19.0	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000	
	R-squared = 0.1952		R-squared = 0.2136		R-squared = 0.2175	
	Adj R-squared = 0.1849		Adj R-squared = 0.2032		Adj R-squared = 0.2061	
	Root MSE = .04897		Root MSE = .04842		Root MSE = .04833	

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 7. Estimation results for Δlog(Sales) (from 2007 to 2008)

	(1)			(2)			(3)		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Export dummy	−0.034	0.010	***	−0.021	0.010	**	0.095	0.041	**
Liquid Asset Ratio	0.013	0.037		0.023	0.037		0.020	0.037	
Loan-to-Asset Ratio	−0.012	0.032		−0.011	0.032		−0.016	0.032	
Log Asset	0.011	0.007		0.013	0.007	*	0.010	0.007	
Log Sales2006	−0.020	0.007	***	−0.019	0.007	***	−0.017	0.007	***
Export dummy * share of exports in total sales				−0.129	0.030	***	−0.158	0.031	***
Export dummy * shares of exports in total exports (North America)							−0.082	0.046	*
Export dummy * shares of exports in total exports (Europe)							−0.048	0.051	
Export dummy * shares of exports in total exports (Asia)							−0.139	0.042	***
Cons.	0.189	0.054	***	0.144	0.055	***	0.167	0.055	***
Industry dummy	Yes			Yes			Yes		
	Number of obs = 2326			Number of obs = 2326			Number of obs = 2326		
	F(29, 2296) = 6.4			F(30, 2295) = 6.8			F(33, 2292) = 7.0		
	Prob > F = 0.0000			Prob > F = 0.0000			Prob > F = 0.0000		
	R-squared = 0.0754			R-squared = 0.0827			R-squared = 0.0925		
	Adj R-squared = 0.0638			Adj R-squared = 0.0707			Adj R-squared = 0.0794		
	Root MSE = .17936			Root MSE = .17869			Root MSE = .17785		

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 8. Estimation results for ΔROA (from 2007 to 2009)

	(1)			(2)			(3)		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Export dummy	−0.014	0.003	***	−0.007	0.003	**	0.034	0.014	**
Liquid Asset Ratio	0.015	0.013		0.018	0.013		0.018	0.013	
Loan-to-Asset Ratio	0.014	0.011		0.016	0.011		0.014	0.011	
Log Asset	0.002	0.001	*	0.003	0.001	***	0.003	0.001	***
ROA2006	−0.334	0.017	***	−0.323	0.017	***	−0.322	0.017	***
Export dummy * share of exports in total sales				−0.065	0.010	***	−0.066	0.010	***
Export dummy * shares of exports in total exports (North America)							−0.045	0.015	***
Export dummy * shares of exports in total exports (Europe)							−0.051	0.017	***
Export dummy * shares of exports in total exports (Asia)							−0.041	0.014	***
Cons.	0.002	0.018		−0.021	0.018		−0.018	0.018	
Industry dummy	Yes			Yes			Yes		
	Number of obs = 2232			Number of obs = 2232			Number of obs = 2232		
	F(29, 2202) = 28.2			F(30, 2201) = 29.0			F(33, 2198) = 26.8		
	Prob > F = 0.0000			Prob > F = 0.0000			Prob > F = 0.0000		
	R-squared = 0.2708			R-squared = 0.2839			R-squared = 0.2873		
	Adj R-squared = 0.2612			Adj R-squared = 0.2742			Adj R-squared = 0.2766		
	Root MSE = .05974			Root MSE = .05921			Root MSE = .05911		

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.

Table 9. Estimation results for Δlog(Sales) (from 2007 to 2009)

	(1)			(2)			(3)		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Export dummy	−0.085	0.016	***	−0.065	0.017	***	0.139	0.069	**
Liquid Asset Ratio	0.197	0.064	***	0.209	0.064	***	0.207	0.064	***
Loan-to-Asset Ratio	0.080	0.056		0.080	0.056		0.072	0.055	
Log Asset	0.049	0.012	***	0.052	0.012	***	0.049	0.012	***
Log Sales2006	−0.057	0.011	***	−0.056	0.011	***	−0.055	0.011	***
Export dummy * share of exports in total sales				−0.192	0.051	***	−0.215	0.052	***
Export dummy * shares of exports in total exports (North America)							−0.183	0.078	**
Export dummy * shares of exports in total exports (Europe)							−0.182	0.086	**
Export dummy * shares of exports in total exports (Asia)							−0.224	0.071	***
Cons.	0.142	0.092		0.074	0.093		0.102	0.093	
Industry dummy	Yes			Yes			Yes		
	Number of obs = 2163			Number of obs = 2163			Number of obs = 2163		
	F(28, 2134) = 10.3			F(29, 2133) = 10.4			F(32, 2130) = 9.8		
	Prob > F = 0.0000			Prob > F = 0.0000			Prob > F = 0.0000		
	R-squared = 0.1190			R-squared = 0.1248			R-squared = 0.1294		
	Adj R-squared = 0.1075			Adj R-squared = 0.1129			Adj R-squared = 0.1163		
	Root MSE = .29615			Root MSE = .29525			Root MSE = .29469		

Note: ***, ** and * show statistical significance at the 1%, 5% and 10% level.