The Impact of Financial Constraints on Exporting Firms' Exit during the Financial Crises*

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Abstract

It is widely accepted that a large number of firms stopped exporting during the global crisis. We study the effect of sector- and country-level credit conditions on the firms' decision on the exit from exporting markets during financial crises by using sector-level unbalanced panel data from 5 developed and 37 developing countries over the period of 1998-2011. Estimating with Rajan and Zingales (1998)'s method and log-odds model, we empirically show that country-level credit condition is one of determinants of exporting firms' exit during the banking and global crises while sector-level financial characteristics might not. Furthermore, it is indicated that the rate of entry is the key determinant of the likelihood of the closure in international markets. As a policy implication, it is suggested that the government and international organisations should target both more competitive sectors and more financially constrained countries for policy interventions during and after the banking and financial crises, although its impact could be small.

***Key words*: Exporting firms, Financial constraints, Financial crises, Sector-level external financial dependence**

***JEL classification*: F10, F14**

*The view contained in this paper are of the author and not neccessarily of College of Economics, Nihon University.

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1 Introduction

During the global crisis in 2008 and 2009, there had been the significant decline in international trade and a large number of firms stopped exporting. According to the World Trade Organisation (WTO), the export growth in 2009 was -12.5 percent, and it is more serious than GDP growth in 2009, which was -2.4 percent (WTO 2013: 67). Bricongne et al. (2012) state that 21 percent of the reduction in trade volume can be explained by firms' exits from export markets, namely dis-extensive margins, in France. Although their results are based on French firms' data, these may give us an overview of the firms' choices regarding their sales in international markets during the crisis. Furthermore, 21 percent seems to be quite high if we apply this value to trade in the world.

After financial crises over 2008-2009, financing constraints have been reconised as one of main determinants of firms' decisions both in domestic industry and export markets. A variety of empirical studies have explored the relationship between credit constraints and firms' choices on entering into or exit the industry (Greenaway 2008, Sweden) and international markets (Girma et al. 2003, UK; Greenaway et al. 2007, UK; Görg and Spaliara 2013, UK). These analyses tend to cover one specific developed country because of the problem with the availability of micro-level data. Furthermore, because of poorer quality of financial development and institution in developing countries, these countries are likely to be excluded from the research on financing constraint (Chor and Manova 2012). However, promoting exports is one of the most important strategies for economic growth in developing economies as they can improve aggregate productivity thorough reallocation effects within industries (Melitz 2003). Furthermore, preventing exporting firms from exit the markets is also significant issues because of the 'Hysteresis' (Baldwin and Krugman 1989, Grg and Spaliara 2013). According to Roberts and Tybout (1997), an exporting experience before one year has a positive impact on the re-entry into the international market while that before 2 years does not , which means that if firms leave export markets more than 1 year it becomes difficult to restart exporting.

In addition to those points, we take into account the idea of industry heterogeneity regarding external capital dependence (Rajan and Zingales 1998, Fisman and Love 2003, Dell' Ariccia et al. 2008). If a firm is in an industry that heavily depends on the external finance, the firm may be more sensitive to the shock from financial crises since it is more difficult to access to the outside funds during the event. Although some previous empirical studies use this framework and sector-level trade data in order to quantify the impact of financial constraints on trade during global crisis (Iacovone and Zavacka 2009, Chor and Manova 2012), they do not focus on firms' exit in their empirical works.

To fill these gaps, we are going to investigate the impact of sector- and country-level credit constraints on the exit decision of exporting firms during the banking and financial crises using unbalanced panel data from 5 developed and 37 developing countries during the period of 1998-2011. In order to clarify the causal relationship between financial conditions and closures in exporting markets, we employ the Rajan and Zingales (1998)'s method in our empirical analysis. Furthermore, since our dependent variable is fractional response data, we use the log-odds model to solve this problem.

Our main findings are twofold. Firstly, after controlling for external shocks, our results show that the probability of export exit increases in the country with poorer credit condition. Furthermore, when a firm exits international market in year *t*, their decision depends more on countries' financial characteristic in year *t-1* than that in *t*. This implies that the firm decides to stop exporting after observing the country-level financial condition in *t-1*. Secondly, export exits may be driven by the force of the new entrants. This could be explained by the idea that more new exporters may lead to higher competitions in the international market and this fact might cause more closures in the market. In addition, the exit rate in *t* was more affected by the rate of entry in *t* than that in *t-1*. After calculating the expected probability of export exit, we suggest that policy interventions should target both more competitive industries and financially constrained countries during and after the financial crises as a policy implication, although the effect might be limited.

The reminder of this paper is as follows. The section 2 will review the previous studies on this area. We are going to introduce our methodology and econometric specification in the section 3 and check the characteristic of our data in the section 4. The section 5 discusses the results from empirical analyses and policy implications. Finally, the section 6 will conclude.

2 Literature review

In recent years, there have been many studies on the effect of financial constraints on economic performances. After the financial crises in United States and European countries, the quality and usefulness of financial institutions have been improved in many countries. However, the impacts of financial reform and development on economic growth and productivity are slightly mixed in both theoretical and empirical studies (Anderson et al. 2012). To understand the connection between financial constraints and trade, we are going to summarise results from related literatures and suggest the topic that can fill the gap between previous studies in this section

2.1 Empirical works

There are two types of studies in this area. Firstly, country- and industry-level researches have been conducted. In this category, the role and quality of bank and institutions are quite important and may change the situation of firm's behavior regarding trade and Foreign Direct Investment (FDI). Furthermore, the effect of credit constraint depends on whether the fund is external or internal, thus the decision of governments may be the key. For instance, it is difficult for private firms to access to external capital in China because of the imperfect rule in banking sectors. Additionally, asymmetric information and uncertainty may be the problem when the government considers new financial policies (Poncet et al. 2010). However, Anderson et al. (2012) argue that the previous country-level analyses have been based on a weak theoretical model and there might be limited connections between financial liberalisation, financial development and growth.

Nevertheless, in the case of trade and financial constraint, their view seems to be inappropriate. Both domestic production and exporting are affected by the degree of access to external capitals since firms may incur upfront costs, which cannot be paid only by internal funds. Furthermore, it is argued that export activities may be more financially constrained than domestic productions for three reasons. Exporting firms should pay additional sunk and fixed costs, which are specific to trade; they face needs for capitals as it takes longer times to sell products via exporting than domestic sales; there are costs of insurance for risks related to trade (Chaney 2005, Chor and Manova 2012, Manova 2013). These facts are embodied in the theoretical models (Manova 2013, Caggese and Cuat 2013).

In addition to country characteristics, industry conditions regarding financial constraints matter for growth and trade. Iacovone and Zavacka (2009) explore whether the shock of 23 banking crises affects the volume of trade using the data from both developed and developing countries over the period of 1980-2000. Since the impact of global financial crisis in 2008 may be quite complex to capture, it seems to be better to use variables such as the date of banking crises when investigate the effect of credit conditions during crises. They follow the specification of Rajan and Zingales (1998) as well as employ the sector-level external financial dependence and country credit conditions as independent variables and control for other external shocks using a set of fixed effects. There are four findings in their empirical analysis. Firstly, their result shows that trade growth in industry more relying on external funds is negatively affected by the banking crisis by 4 percent more than the sector with less dependent on external finance. Secondly, they suggest that the different sources of financial variables should be used in the regression because not all channels are affected by the banking crisis. Thirdly, similar to the second point, the sector with more tangible assets tends to be less affected by the crisis. Finally, it is mentioned that a demand side shock may matter, especially for industries that manufacture durable goods. It seems that they confirm both supply and demand side effects on trade volume during the banking crises.

Chor and Manova (2012) construct an industry-level dataset by aggregating firm-level data for the U.S. global financial crisis. Their sample covers 31 developed and developing countries for which interbank rates can be obtained. They use the data on NAICS three-digit U.S monthly imports from November 2006 to October 2009 as a dependent variable. The purpose of their investigation is twofold. Firstly, they attempt to explain how country's credit conditions matter for exports during the crisis. Secondly, and more importantly, the effect of the sector-level dependence of external funds on trade flows throughout the financial crisis is investigated. They calculate new sector-level external finance dependence variables using their dataset. By conducting an empirical analysis, they find three main features in their paper. Firstly, the volume of exports of the country with high interbank rates decreases more than that of the

country with lower interbank lending rates during the financial crisis. Secondly, the sector that is more sensitive to external capital tends to be negatively affected by the crisis more than less sensitive sectors. Finally, two specific scenarios are considered. In the first one, they assume that the highest level of interbank rate holds during the crisis, and this causes an additional 2.5 percent loss of U.S. imports. In the second case, it is assumed that the lowest interbank rate of August 2009 has been achieved after September 2008. In this scenario, U.S imports are increased by 5.5 percent from the original scenario. These results imply that banks and the government could help firms to promote exporting during the financial crisis by adjusting financial conditions and related policies.

The second type of research in this area is a micro level study, namely firm-level analyses. The main motivation for this area is that the problem of asymmetric information might differ across firms. For example, small and medium enterprises tend to be under constraint while large firms do not. Amiti and Wenstein (2011) explore the impact of the health of bank on exporting using firm-level data of Japan from 1987 to 2010. They find that shocks in the financial sector have a negative effect on Japanese firm's export. Additionally, this negative impact is smaller for multinational enterprises and firms that export by air transportation, which implies that there is heterogeneity among Japanese exporting firms. In addition to the paper, Manova (2013) uses heterogeneous firm model and aggregate trade data in order to clarify the impact of credit constraint on trade. There are two main findings. Firstly, it is pointed out that international trade is quite sensitive to financial constraint and shocks. Secondly, decomposition of trade into intensive and extensive margin, which are newly traded products and continuously traded goods, is conducted. The empirical results clarify the negative effect of financial constraint on the both types of trade. Thus, both of them confirm that there may be the causal relationship between credit condition and trade.

Next, we discuss an empirical research on the link between financial crises, credit conditions and firm's decision of exit exporting markets rather than aggregate trade values. Since Iaconone and Zavacka (2009) and Chor and Manova (2012) use industrial trade volumes and Amiti and Wenstein (2011) and Manova (2013) focus on firm's entry into exporting markets, they cannot explore the dis-extensive margins of trade and firms. Furthermore, the decrease in trade values does not mean firms' exit. If hysteresis effects exist, it is quite difficult for firms to re-enter the export markets after exiting the international markets because of greater sunk and fixed costs of exporting (Baldwin and Krugman 1989, Görg and Spaliara 2013). As exiting export markets may cause negative effects on firms' productivity, employment and output (Girma et al. 2003), the connection between firm's exit and financial conditions should be investigated.

There may have been a limited number of studies on the connection between financial constraint and export exit so far. Görg and SpaliaraKiel (2013) explore the relationship between firm's financial constraint and closures in export markets. They collect the UK's manufacturing firm-level data from 2000 to 2009 and conduct an empirical analysis with the Cox proportional hazard model with discrete time variable. Their main interest variable is threefold. Firstly, the measure of the liquid assets of firms is used. A higher value of this indicates that the firm is less financially constrained. The second measure is a leverage ratio and the higher the value the worse the firm's ability to obtain external finance. Most importantly, the last one is the firm specific interest rate which is calculated as the borrowing ratio. Using these measures, the authors suggest that firm-level financial constraints affect firms' exit and the effects are larger during the crisis than outside the event. This means that financially healthier exporting firms tend to survive with a higher probability in the markets than firms that have worse credit conditions.

Bricongne et al. (2012) examine the link between export growth, exit and financial constraint during the global financial crisis using the French firm-level data on export and financial conditions. Their dataset is based on firm-level quarterly data from 105,310 French firms during the period of 2008-2009. By including product and firm specific characteristics, they investigate the impact of financial constraint and global crisis on the dependent variable, which is the growth of exports. They find that demand shock and product characteristics matter during their sample period. Interestingly, their results suggest that there might be a little negative impact of the crisis on exports, even for small and medium sized firms. This is because that the number of financially constrained companies is quite small in France and it seems not to increase during the financial crises. According to their results, 79 percent of the decline in French firms' exports can be explained by adjustment of their trade volumes, which is intensive margin, while the rest is due to closures from the markets, namely extensive margin. Although its impact was limited, small

firms were negatively affected by the crisis and some of them exit exporting markets due to the lack of external finance.

From the previous studies, now we can know that there may be the relationship between financial constraint and exporter dynamics. However, there seems have been no research that attempts to use the specification such that we can test the effect of sector-level external finance dependence and country-level credit condition on export exiters during financial crises. As described above, when hysteresis exists, it is difficult for firms to re-start exporting once they exit the market. According to Roberts and Tybout (1997), which is an empirical work using Colombian manufacturing exporting firm ' s data, if firms are absent from export markets for 2 years after exiting, they should pay the amount costs same as a new entrant. Furthermore, results from previous studies depend on the data from firms in developed countries, UK and France. To fill the gap, we are going to conduct an empirical work on the connection between sector- and country level credit conditions and exit exporting markets, especially during the financial crisis using the data from both developed and developing economies.

2.2 Theoretical works

Now, we are going to discuss theoretical studies regarding exporting firms and financial constraints. Manova (2013) studies the connection between financial constraint and exporting both theoretically and empirically. In the model, also in the real world, exporters face additional capital needs due to trade specific fixed and variable costs and this fact causes the change in the external finance dependence. For example, trade specific fixed costs include searching new exporting markets, checking the preference of consumers in the market, connecting with local distribution networks, etc. Additionally, variable costs are additional costs due to the variation in the exchange rate, shipping cost and insurance that are specific to exporting activities. For these reasons, exporting firms tend to borrow additional capital from outside the companies. Furthermore, the quality of banks and financial institutions is one of main factors of exporting patterns as exporting firms may rely on those external funds. Thus, healthier banks and financial organisations result in a larger value of exports in the country.

In addition to these points, sector-level external finance dependence is discussed in the model. It is mentioned that more external funds dependent industries export more in the countries with higher quality of financial institutions since exporting firms can access to external capital more easily than other countries. This also implies that firms export more in the sector with less external capital dependent in financially undeveloped countries. Hence, now we can state that the sector that depends on external finance exports less in the country with lower quality of banks and financial institutions. It should be noted that these predictions are based on industry- and country-level characteristics. When we consider firm heterogeneity in terms of productivity and internal funding, the outcome from the model may change.

Caggese and Cuñat (2013) theoretically show that the firms stop exporting when their technology becomes useless or they cannot finance the costs in terms of trade due to the default. There are two key assumptions in addition to the Melitz (2003)'s model. Firstly, it is assumed that the access to external finance is limited for firms in this model. Secondly, they assume different fixed costs among firms as a part of firm heterogeneity and that there is risks regarding their profits from exporting. Under these conditions, financial constraint affects firm's behavior in the following ways. Firstly, since it takes time to obtain the profit from exporting, the risk for their revenue will increase. This risk is larger for more productive firms since their sales tend to be higher than less productive firms. Furthermore, the financial condition of exporting firms may become worse after paying the fixed costs. Secondly, credit conditions also affect the firm's decision on domestic productions. Finally, those effects lead to a less efficient allocation of firms in the market as exporting is less risky for smaller firms.

Since our empirical work is based on industry- and country-level conditions, we are going to employ the predictions from previous studies as follows. Firstly, we hypothesise that lower domestic capital, which means less healthy financial institutions, positively affect firm's exit due to unavailability of capital during the financial crisis. Secondly, it is predicted that firms in the sector that needs more external capital export less and exit more. Finally, companies export less in more external funding dependent industries when the country's credit condition is worse. In order to test these predictions, we are going to conduct an empirical analysis using industry- and country-level financial characteristics and exit rate. The next section intends to explain the methodology and specifications of our estimations.

3 Methodology

In order to explore the impact of credit constraints on firms' decision on exit export markets, we follow the specification of Chor and Manova (2012), which is originally introduced by Rajan and Zingales (1998). Since our dependent variable is fractional data, we should explain the solution, which is the log-odds model[1]. Now, we are going to address our empirical specifications in this section.

3.1 Log-odds model using grouped data

In the case such that the dependent variable is fractional response data, the estimated coefficients of OLS tend to be incorrect for the following reasons. Since the fact that the range of the dependent variable is between 0 and 1, the marginal effect of independent variables cannot be hold through its whole range. Furthermore, the predicted value is likely to be outside the interval between 0 and 1 (Papke and Wooldridge 1996: 619-620). As an alternative method, the log-odds model is introduced. The log-odds model is to use the log-odds ratio as a linear function:

$$E\left(log[\frac{y}{1-y}] \,\middle|\, \mathbf{x}\right) = \beta\mathbf{x} \tag{1}$$

where y is the probability and $\mathbf{x}$ is a $1 \times K$ vector of independent variables . The equation (3) is quite useful as the dependent variable can take any value in this model. However, there are two main issues with this approach. Firstly, we cannot use the variable that exactly takes the value of 0 and 1 as y unless we make some arbitrage adjustment. It is obvious that if we use such values, we cannot calculate *log[y/(1-y)]*. Secondly, it is quite difficult to interpret the coefficients from OLS estimation, even if y is strictly inside the range between 0 and 1. Since the effect of explanatory variables is on *log[y/(1-y)]*, we need an additional calculation to understand their impact on y. In order to check these, we employ the smearing method, which is introduced by Duan (1983).

So as to use the Duan (1983)'s smearing estimator, it should be assumed that the error term is independent from explanatory variables as we do. Now, we can calculate the predicted value of y using the following equation:

$$E(y|\mathbf{x}) = N^{-1}\sum_{j=1}^{N} exp(x\beta+\varepsilon)/[1+exp(x\beta+\varepsilon)] \tag{2}$$

where ε =log[y/(1-y)]-x β, which is the residual from OLS regression. Then, we can obtain the predicted variable from OLS and interpret the effect of independent variable on y[2]. After conducting OLS regression with log-odds dependent variable, we intend to calculate the effect of one- and ten-unit change in our main interests keeping other variables at their mean value.

3.2 Empirical specification

There are mainly two steps in the empirical section, which are industry- and country-level analyses. In the first part, we test the hypothesis that firms in the industry with relatively high dependence of external funds in more financially constrained countries face higher risks regarding the closures in export markets. In other words, the rate of exit is positively correlated with poorer country credit condition and higher external finance dependence. Our baseline specification is:

$$\begin{aligned} Exitrate_{ikt} =& \beta_1 DF_{it} \times EXTFIN_k + \beta_2 DCrisis_{it} \times DF_{it} \times EXTFIN_k \\ &+ D_{it} + D_{kt} + D_{ik} + \varepsilon_{ikt} \end{aligned} \tag{3}$$

where i, k and t denote country, industry and year respectively. Since our main interest is sector-level variables, we should aggregate firm-level data. In our paper, grouped data, which is $Exitrate_{ikt}$, is defined as the share of the number of exit firms in a sector k of country i in year t over that of exporters in the

[1] See Wagner (2003) and Wagner (2008) for this issue

[2] We can calculate this in Stata using predict command and smearing option. See Cameron and Trivedi (2010) for more details.

same sector and country in *t-1*. In addition, there are two types of $DCrisis_{it}$ in this specification. Firstly, $DBank_{it}$ is equal to 1 if country *i* faces a banking crisis in year *t*. Secondly, $DGlobal_{it}$ is equal to 1 during the period of the crisis (2008 and 2009). The latter may include many effects thus it seems difficult to capture a pure impact of financial crisis. However, we are going to use both of them since the fact that our dataset only covers three banking crises.

One of our main interest variables is the first term of the right hand side of the equation (3), which is an interaction of country-level credit constraint and each sector-level financial condition variable. The coefficient on this variable captures the effect of the change in country's capital costs on their sector-level exit rate over time. For sector-level external dependence variables, we employ three measures. The first one is the external finance dependence variable (RZEX) that reflects the dependence of external capital. This variable is constructed by measuring the proportion of capital expenditure funded by external finance and obtained from Rajan and Zingales (1998). The second one is also sectoral external credit conditions (FLEX), but these are collected from Fisman and Love (2003). By using different measures of external credit condition, we can check the measurement error problem. Finally, we employ the tangible assets variable (TANG), which is measured as " the median level of the ratio of the fixed assets to total assets " (Kronszner et al. 2007: 222). The firms with more tangible assets can easily access to external finance since they can use the assets as collateral for a loan (Chor and Manova 2012: 121). The expected sign of β_1 for RZEX and FLEX is positive and that for TANG is negative.

It should be noted that these variables may be different among countries. However, we are going to use them for the following reasons. Firstly, due to the problem with data availability, we cannot access to data on sector- and firm-level external credit dependence for a large number of countries. Secondly, these measures are based on the information from US firms whose behavior may reflect the optimal choice and relationship between external financial constraint and internal funds. Finally, our main motivation is to rank the sectors according to the relative degree of external credit dependence. In other words, we only need to know the order of industries by the financial condition in our estimation (Chor and Manova 2012: 121).

The second term of the right hand side of the equation (3) is a triple interaction of domestic financial condition, sectoral credit condition variables and financial crisis dummies. This variable reflects the effect of country- and sector-level credit constraints during the banking or global crisis. Again, the expected sign of β_2 for RZEX and FLEX is positive and that for TANG is negative. The interpretation of β_2 is same as β_1 except the point that the coefficient on this term reflects the impact of financial condition during the crises. Nevertheless, these coefficients from OLS regression might be biased if our estimation includes the omitted variable bias.

The omitted variable problem arises when a variable that is not included in the regression model is correlated with some of the explanatory variables that are included. This means that the explanatory variables are correlated with the error term. Additionally, this implies that the vector of coefficients associated to x is biased (Wooldridge 2010: 66-67). Specifically, we employ three series of variables to remove the omitted variable bias. Firstly, we include country-year fixed effects. These account for fluctuation in exchange rate as well as the effect of year specific shocks to production and domestic credit conditions. Secondly, industry-year fixed effects are added into the estimation. They control for the change in industry-level import demands in the world and yearly seasonality in the samples. Finally, we employ country-industry fixed effects. These take into account for time-invariant factors, for instance comparative advantage that is one of the main determinants of country's industry-level export pattern. Because of these three fixed effects, we can only include the variables that vary by year, country and industry simultaneously.

Before we use the equation (3), the dependent variable, which is the industry-level exit rate, should be transformed as it can take value only within [0,1]. One could employ the Generalised Linear Model (GLM) with panel data using glm command in Stata to solve this problem. According to Papke and Wooldridge (2008), we can control for time-invariant unobserved effects, which might cause omitted variable bias by including the time average of independent variables in the estimation, even for the study with a panel dataset. However, there are two issues in our dataset. Firstly, our sample is based on unbalanced panel data and it is difficult to extend this approach to the empirical work with unbalanced panel data (Papke and Wooldridge 2008: 127). We could reconstruct a balanced panel dataset, but this adjustment drops a significant number of samples from our dataset (around 40 percent of our sample).

Furthermore, we cannot include a variety of dummies in the specification of GLM with balanced panel dataset and this might cause the omitted variable bias, which is one of our main concerns. Thus, we calculate the log-odds of exit rate to use it as the dependent variable. Now, our specification can be written as:

$$ln\Big(\frac{Exitrate_{ikt}}{1-Exitrate_{ikt}}\Big) = \beta_1 DF_{it} \times EXTFIN_k + \beta_2 DCrisis_{it} \times DF_{it} \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \varepsilon_{ikt} \quad (4)$$

There are 4 stages in the first part of the empirical section. Firstly, we estimate the equation (4) and using OLS with robust standard errors. In the second step, we conduct robustness tests using various techniques. The first one is to use initial country-level factor endowments, size and income variables in order to control for comparative advantage and catch-up effects. For the first measure, we construct the product of the capital per labour and each industry dummy[3]. Additionally, we calculate the interaction of initial GDP and each industry dummy as well as that of GDP per capita, which accounts for convergence effects.

The second test is to divide the samples into developed and developing countries. As our sample has a large fraction of developing countries, we need to check whether results from baseline estimations are driven by the specific group of countries. The third one is to use the different definition of industrial external finance dependence. In our sample, there are many developing countries and its share is quite large in the dataset. As firms in developing countries may be smaller and have different characteristics, we are going to employ the different measure of industrial external funds dependence, which is Rajan and Zingales (1998)'s one for young companies. Fourthly, we check the demand side effect by estimating the following specification:

$$ln\Big(\frac{Exitrate_{ikt}}{1-Exitrate_{ikt}}\Big) = \beta_1 DF_{it} \times EXTFIN_k + \beta_2 DCrisis_{it} \times DF_{it} \times EXTFIN_k + \beta_3 Demand_{ikt} + \beta_4 Demand_{ikt} \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \varepsilon_{ikt} \quad (5)$$

where $Demand_{ikt}$ is the demand shock for the exporting firms in the sector k of country i in year t. This explains the circumstance that the demand for imports in importing countries decreased during the crisis and exporters might be harmed by this fact. Follow the specification of Iacovone and Zavacka (2009), we define the importer demand shock as growth rate of GDP of the partner j weighted by trade share of this partner in the total exports of country i in industry k in period t and summed over all partners. As the Exporter Dynamics Database does not include the information on partner countries for HS-4 digit level data, we use trade data from United Nations (UN) comtrade as an alternative. The procedure of data cleaning is same as the method for the exit rate, which will be explained in the next section. In addition, we include the product of the demand shock and sectoral external finance dependence variables. Using this term, we can check which industry was more affected when demand shock is larger.

The fifth sensitive test it to include entry rate in the regression to control for dynamics of exporters and competitiveness of the market. It may be reasonable to assume that entry rate positively affects exit rate for two reasons. Firstly, it is obvious that there is no exiter in the exporting markets in which no entrants exist. Secondly, more entrants may lead to more competitive markets and this might force more exporting firms to exit. Finally, we intend to test the problem with simultaneity by including lagged independent variables in our estimation. There is a possibility that exporting firms decide to exit markets before one year they actually stop exporting. For instance, sometimes firms need to obtain external finance in advance thus lagged independent variables matter (Chor and Manova 2012).

In the second part, we are going to conduct a cross-country analysis by focusing on the country level credit condition as well as by estimating the following equation using OLS with robust standard errors:

$$ln\Big(\frac{Exitrate_{ikt}}{1-Exitrate_{ikt}}\Big) = \gamma_1 DF_{it} + \gamma_2 DCrisis_{it} \times DF_{it} + \gamma_3 Exchangerate_{it} + D_{kt} + \varepsilon_{ikt} \quad (6)$$

[3]The definitions of these control variables are reported in table C in Appendix. We use the value of 2001 for Laos while that for other countries is based on 1998.

In this specification, we only include the industry-year fixed effect. Also, we add the exchange rate for each country[4]. Now, γ_1 and γ_2 capture the impact of the change in financial conditions across countries in a given year. Finally, as we mentioned above, we are going to use entry rate and lagged independent variables in the country-level analysis. After explaining results from those specifications, we will check the effect of one- and ten-unit changes in explanatory variables on the expected probability of export exit using the Duan (1983)'s smearing method. In the next section, we are going to explain an overview of our dataset, especially exit rate and credit conditions before conducting empirical works.

4 Data

Our main goal is to quantify the effect of credit condition and financial crisis on firms' exit in exporting markets. To do so, we have collected unbalanced panel data on the number of exporting and exiting companies from Exporter Dynamics Database, the World Bank as well as calculate the industry level exit rates for 5 developed and 37 developing countries over the period of 1998-2011[5]. Before checking the data, we need to clean the dataset to conduct an empirical work appropriately.

4.1 Data cleaning

Since our trade data is based on Harmonised System (HS) classification while industry external finance dependence is established according to International Standard Industry Classification (ISIC), we need to convert trade data from HS to ISIC. Specifically, the classification of trade data from Exporter Dynamics Database is HS 4-digit level and that of external credit dependence is ISIC revision 2. To map the data, we use the convert table of UN. Firstly, we aggregate trade data according to ISIC revision 3.1 as we cannot directly map HS and ISIC revision 2. Secondly, we transfer aggregate trade data from ISIC revision 3.1 to 2. At that time we cannot find any value in 6 categories, thus we exclude these sectors from our sample[6]. Furthermore, to avoid the problem of double count, we remove HS categories that are in more than two classifications in ISIC when we map them. Then, due to the specification of our estimation, we omit the values that take 0 or 1 from our samples. This could cause some bias in our estimation but we exclude them because the share of the sum of 1 and 0 are 4percent in our dataset, which seem not to be a significant fraction. Finally, we remove the samples in the 1 percent from the upper and lower tails in order to control for the possible influence of outliers (Greene 2011: 99-102). Now, there are 7,573 firms and 30 sectors over the period of 1998-2011 in our sample after data cleaning. In the next subsection, we will explain the basic characteristics of our data.

4.2 Descriptive data

To illustrate the feature of our data regarding exit rate, entry rate and financial conditions, we calculate each rate and compare them to external financial dependence variables[7]. The definition of exit rate is defined as the number of exiters of sector *k* in country *i* in period *t* over that of exporters in sector *k* of country *i* in *t-1*. In addition, the entry rate is calculated as the share of the number of entrants in sector *k* of country *i* in *t* divided by that of exporters of sector *k* in country *i* in *t*. Using these measures, we check the details of the samples.

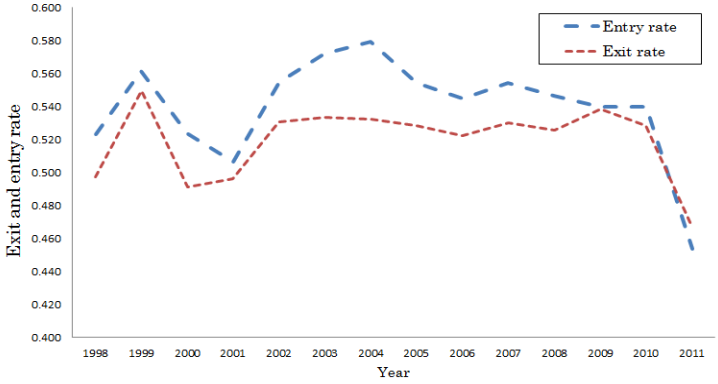
[4]The exchange rate is collected from Heston et al. (2012).

[5]See Cebeci et al. (2012) for more details.

[6]Removed industries from our sample are as follows: Pulp and Paper (3411), Synthetic Resins (3513), Drugs (3522), Petroleum Refineries (353), Professional Goods (385) and Other ind. (390).

[7]See table B in appendix for sectoral financial conditions.

Figure 1 Average exit and entry rates by year



Source: Exporter Dynamics Database, *the World Bank*.

Figure 1 summarises basic information on the industry level exit and entry rates, which give us an overview of the trend in both rates from 1998 to 2011. First of all, it seems that there has been a co-movement of exit and entry rates in our data. This feature can be explained by the prediction from Melitz and Ottaviano (2008). They theoretically state that country size and churning rate are positively correlated, which means that many firms try to enter the market while a large number of companies exit the market at the same time in a big market. Thus, it is reasonable to use entry rate as an independent variable in our estimation to control for and check its impact on the exit rate. Secondly, we can observe the reduction in entry rate and the increase in exit rate after the global crisis in 2008. This might express the circumstance that exporting firms were affected by the crisis but we cannot mention through which mechanism the companies were harmed by the event. In order to find a possible channel, we intend to see the exit rate in the sectors that were more or less affected by the financial crisis. Before that, we will check the basic industry-level exit rate and sector-level credit conditions.

Table 1 Exit rate by industry (all years)

Top 5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
3841	Ship	0.654	46	83	65
3825	Office, Computing	0.607	106	89	61
361	Pottery	0.601	-15	66	60
384	Transportation Equipment	0.598	31	71	60
382	Machinery	0.576	45	73	58
Average		0.607	43	76	61

Bottom 5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
352	Other Chemicals	0.483	22	63	27
3511	Basic Chemical excluding Fertil.	0.477	25	68	43
314	Tobacco	0.464	-45	63	19
311	Food Products	0.458	14	72	37
313	Beverages	0.418	8	61	40
Average		0.460	4.8	65.4	33.2

Source: Exporter Dynamics Database, *the World Bank*, Rajan and Zingles (1998), Fisman and Love (2003) and Kronszner et al. (2007).

Note: This table is based on our sample. The average values of each sector-level external finance dependence in parentheses. .

Table 1 explains the information on the rate of exit in the sector with the highest or lowest value for all years and on industry-level external credit dependence variables. For the top 5 industries, we can see the fact that these sectors are more dependent with external funds and have higher values regarding tangibility on average. On the other hand, in the bottom 5 industries, they tend to be more independent from external finance and have approximately the average value in terms of the tangible assets measure. This means that higher external funds dependence might positively affect exit rate, which is consist with our prediction. However, tangibility variables also seem to be positively correlated with the exit rate and this is inconsistent with the expectation of our model. Now, we should check these features over 2007-2009 since the relationships can be changed during the global crisis. To do so, we will see two

tables, which are the difference in the exit rate between 2007 and 2008-2009 as well as the exit rate and sector-level financial condition in 2008 and 2009.

Table 2 Exit rate by industry (differece of 2008-2009 and 2007)

Top5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
3841	Ship	0.155	46	83	28
384	Transportation Equipment	0.088	31	71	23
342	Printing and Publishing	0.082	20	64	21
331	Wood Products	0.066	28	75	32
3825	Office, Computing	0.066	106	89	14
Average		0.091	46	76	24

Bottom 5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
382	Machinery	-0.054	45	73	22
3832	Radio	-0.064	104	83	14
352	Other Chemicals	-0.089	22	63	27
332	Furniture	-0.108	24	64	28
356	Plastic Products	-0.168	114	80	38
Average		-0.096	62	73	26

Source: Exporter Dynamics Database, *the World Bank*, Rajan and Zingles (1998), Fisman and Love (2003) and Kronszner et al. (2007).

Note: This table is based on our sample. The difference in exit rates is calculated as the average exit rate during 2008-2009 minus the rate of exit in 2007. The average values of each sector-level external finance dependence in parentheses.

Table 2 shows the change in sector-level exit rates between 2007 and the average value of 2008-2009. First of all, it seems that the industries which are more external finance dependent and with more tangible assets may be less affected by the financial crisis in 2008 and 2009 when we see RZEX and TANG measures. Nevertheless, if we check FLEX variable, we can state that there might be a positive effect of industrial external finance dependence on exit rate. This is the reason why we employ the different types of external funding dependence variables.

The characteristics of industrial exit rate and financial condition during 2008-2009 are summariesd in table 3. Now, the situation has changed and the relationship between exit rate and each sector-level finance condition from 2008 to 2009 is consistent with the prediction from the theoretical model. These facts imply that there are two main features during the global crisis in our dataset. Firstly, when exporting firms faced the global crisis in 2008, the connection between exit rate and sector-level external finance dependence might be mixed in our sample dataset. Secondly, the relationship between them during the period seems to be consistent with the prediction from our model. Now we have the reason for checking the impact of industry- and country-level credit conditions on firm's death in exporting markets during the financial crises using our dataset.

Table 3 Exit rate by industry (2008 and 2009)

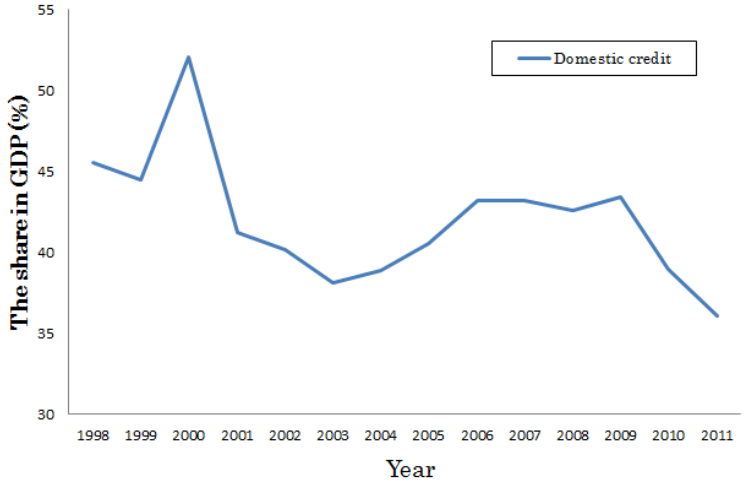
Top5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
3841	Ship	0.682	46	83	28
361	Pottery	0.632	-15	66	28
384	Transportation Equipment	0.607	31	71	23
3825	Office, Computing	0.604	106	89	14
362	Glass	0.598	53	66	42
Average		0.624	44	75	27

Bottom 5			External finance dependence (%)		
ISIC code	Industry	Exit rate	RZ (av. 27.4)	FL (av. 70.0)	TANG (av. 30.6)
355	Rubber Products	0.462	23	66	36
356	Plastic Products	0.458	114	80	38
352	Other Chemicals	0.457	22	63	27
311	Food Products	0.446	14	72	37
313	Beverages	0.413	8	61	40
Average		0.447	36	68	36

Source: Exporter Dynamics Database, *the World Bank*.

In this paper, there are two types of country credit conditions, which are the share of domestic credit to private sector and that provided by banks in GDP. These measures are collected from World Development Indicators, the WTO. We only use the fraction of capital in the private sector provided by the banking sector as country-level credit condition in the empirical analysis. Indeed, we can use both variables but there is a little variation between them. The basic information of this variable is illustrated by figure 2.

Figure 2 Domestic credits in private sectors provided by banks (percentage of GDP)



Source: World Development Indicators, *the WTO*.

It seems that there was the reduction in the domestic credit condition variable in 2008, although it is a quite minor change. After 2008, the value increased and the finance condition had improved in 2009. Since we would like to check positive impact of country credit condition on exit rate, we use the reverse value of this variable. The mean value for developed countries is 0.014 (72.644 percent of GDP) while that for developing countries is 0.045 (22.422 percent of GDP) in our dataset. This may explain the difference in the country-level credit condition among our samples.

The date of banking crises is obtained from Laeven and Valencia (2013) and there are 3 banking crises in our sample. They define the banking crisis as the event that has two characteristics. The first one is distress sign in the banking system, for instance a significant loss in bank liquidity. The second one is the government's intervention regarding banking systems (Laeven and Valencia 2013: 228). The start and end dates for each banking crisis is in table 4. We are going to use these dates as the banking crisis dummy in our regression.

Table 4 The data of banking crises

Country	Start	End
Belgium	2008	Ongoing
Dominican Republic	2003	2004
Spain	2008	Ongoing

Source: Exporter Dynamics Database, *the World Bank*.

The descriptive statistics of main variables for all years and during the financial crisis as well as for developed and developed countries are reported in table 5. For the exit rate, it is found that the average exit rate of developed countries is lower than that of developing countries in both all years and in 2008-2009. Also, the mean of rate of exit in all years is larger than that in the crisis when we separate the sample into developed and developing economies. For the domestic financial condition, on average, it seems that developing countries tend to be more financially constrained than developed countries. In addition, the mean value of country's credit condition in all years is larger than that in 2008-2009 while the standard

deviation of the latter period is smaller than that during the crisis. These imply that there may be more country heterogeneity regarding financial constraint among countries during the global crisis. Next, in terms of demand shock, we can observe that there was a decrease in import demand shock during the financial crisis. Furthermore, developed countries seem to face a deeper reduction of import demand than developing countries in 2008-2009. Finally, the mean value of entry rate in developing countries is smaller than that of developing countries, which implies that exporter dynamics may be more active in developing countries. This might be because that there tends to be a large number of small- and medium-sized firms in developing countries and they exit export markets quite quickly, basically after one year from their entrance.

Table 5 Summary statistics of the key variables

	Total sample	Total sample, during the crisis in 2008-2009	Developed countries	Developed countries, during the crisis in 2008-2009	Developing countries	Developing countries, during the crisis in 2008-2009
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Exit rate	0.593 (0.130)	0.603 (0.137)	0.495 (0.108)	0.432 (0.096)	0.610 (0.126)	0.613 (0.132)
Log (exit rate/(1- exit rate))	0.412 (0.591)	0.459 (0.627)	-0.023 (0.451)	-0.284 (0.402)	0.487 (0.580)	0.504 (0.610)
Domestic credit condition	42.837 (34.327)	44.136 (37.788)	95.277 (45.564)	154.468 (56.117)	34.055 (22.149)	37.439 (23.256)
DF = 1/domestic credit condition	0.040 (0.031)	0.036 (0.024)	0.014 (0.009)	0.007 (0.003)	0.045 (0.032)	0.038 (0.0234)
Demand shock	3.599 (2.821)	1.748 (2.776)	2.762 (1.560)	-0.426 (2.278)	3.731 (2.950)	1.854 (2.755)
Entry rate	0.608 (0.135)	0.611 (0.138)	0.508 (0.107)	0.449 (0.085)	0.626 (0.132)	0.621 (0.135)
Observations	7,573	1,992	1,112	114	6,461	1,878

Note: The table reports the mean value of variables. Standard deviations are reported in parentheses.

This section summarises the characteristics of our dataset, mainly in terms of exit rate and financial conditions. Our dataset suggests that there may be the connection between those variables and this relationship might vary during the financial crisis. To test this, we are going to conduct empirical analyses using these data in the next section.

5 Empirical results

In order to quantify the effect of financial crises on firm's export exit, there are two stages in our empirical work. In the first step of our empirical analysis, we conduct industry-level estimation with sector-and country-level credit condition measures. After that, the country-level empirical specification is used to check only country-level conditions regarding financial constraint.

5.1 Industry-level analysis

In this sub section, we are focusing on the financial aspects of both industries and countries to check our prediction that is based on the theoretical models. To test how exit rate is sensitive to sector- and country-level financial conditions, we estimate the equation (6), with initial factor endowment, country size and income level by OLS with robust standard error[8].

[8]We also use exit rate as the dependent variable in the same specifications but their predicted value can be outside the range [1,0] when we include the value 1 and 0 in our sample. Furthermore, we estimate the equation (4) without initial factor endowment, country size and income level, but there seems to be no difference between this result and results in table 6.

Table 6 The result from the baseline regression with initial factor endowment, country size and income level

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN	-3.378*	-3.307*	-3.741**	-0.148+	-0.149+	-0.171*	-6.177	-6.053	-7.115
	(1.354)	(1.353)	(1.376)	(0.080)	(0.080)	(0.081)	(4.655)	(4.667)	(4.765)
DF×EXTFIN×DBank		**2.715**			**-0.060**			**5.009**	
		(2.821)			**(0.172)**			**(8.611)**	
DF×EXTFIN×DGlobal			**-2.118+**			**-0.130***			**-4.874**
			(1.145)			**(0.063)**			**(3.837)**
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,572	7,572	7,572	7,572	7,572	7,572	7,572	7,572	7,572
R-squared	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Table 6 summarises the results from the baseline regressions. R-squared for these regressions is 0.852 on average, which indicates that this specification can explain around 85percent of the behaviour of the sector-level exiters. First of all, the coefficient on DF $\times$ EXTFIN for RZEX and FLEX is statistically significant while its sign is negative. This means that exporting firms in the sector more dependent with external funds tends not to exit more in countries with more poor credit condition. Furthermore, the coefficient for TANG is minus, which is consistent with the prediction, but is statistically insignificant. The coefficient on the triple interaction with global crisis dummy for RZEX and FLEX is same as that on DF $\times$ EXTFIN while the coefficient for banking crisis is insignificant. The results for the triple interaction term with both banking crisis and global crisis for TANG are statistically significant but its sign is positive. Note that these results do not indicate that both industry- and country-level financial condition do not have a direct impact on the dependent variable. From now, we should check whether these findings are not biased by conducting further analyses mentioned in the section 5. Even though an inclusion of a set of fixed effect dummies might solve the omitted bias problem, we need to check the robustness of these results.

Table 7 Baseline results for 5 developed countries

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN	-0.173	-0.041	-0.041	0.113	0.120	0.120	-8.720	-9.437	-9.437
	(3.034)	(3.040)	(3.040)	(0.158)	(0.158)	(0.158)	(8.799)	(8.795)	(8.795)
DF×EXTFIN×DBank		**-11.740**			**-0.571**			**56.34+**	
		(10.310)			**(0.603)**			**(32.71)**	
DF×EXTFIN×DGlobal			**-11.740**			**-0.571**			**56.34+**
			(10.310)			**(0.603)**			**(32.71)**
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111
R-squared	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.967	0.967

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Firstly, we are going to try to check whether the results are driven by the specific group of countries such as developed or developing countries. To do so, we divide our sample into two clusters, namely developed and developing economies, and use them in the baseline regression separately. The results are presented in Table 7 and 8. For the regression with developed counties' data, all coefficients are statistically insignificant except those on the triple interaction with banking crisis and financial crisis dummies for TANG, whose sign is positive and inconsistent with our prediction. Although an interpretation of this term is quite sensitive, we can state that exporting companies in the sector with more tangible assets may

exit more in the country with worse financial conditions. On the other hand, the results for developing countries are approximately same as those in the table 5. This can be explained by a higher share of the number of developing countries in our sample. Since our sample includes many developing countries, our results could be affected by the country status, namely being developing countries.

Table 8 Baseline results for 37 developing countries

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN	-3.352*	-3.229*	-3.683*	-0.150+	-0.153+	-0.175*	-5.934	-5.806	-6.827
	(1.414)	(1.418)	(1.432)	(0.083)	(0.083)	(0.084)	(4.800)	(4.838)	(4.897)
DF×EXTFIN×DBank		**3.093**			**-0.073**			**3.298**	
		(3.130)			**(0.193)**			**(9.586)**	
DF×EXTFIN×DGlobal			**-2.158+**			**-0.149***			**-5.133**
			(1.224)			**(0.067)**			**(4.092)**
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,461	6,461	6,461	6,461	6,461	6,461	6,461	6,461	6,461
R-squared	0.827	0.827	0.827	0.827	0.827	0.827	0.827	0.827	0.827

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

The next sensitive test is to use a different measure of industrial external finance dependence as financial condition variable in our model. We collect the external funds dependence variable for young firms, *RZEX-Y*, from Rajan and Zingales (1998) for checking the robustness of baseline regressions. It is reasonable to employ this variable since the fact that there is a difference between RZEX and *RZEX-Y* (see table B in Appendix). Table 9 summarises the result from the regression with the new sectorral credit condition variable. Now, the coefficients on DF × EXTFIN become insignificant while the coefficient on the triple interaction with DGlobal is significant and negative. However, these results are still inconsistent with our expected sign, thus we cannot confirm that our expectation is correct at this moment.

Table 9 Results for the different sector-level external funds dependence

Dependent variable: log [exit rate/(1-exit rate)]			
Financial condition variable:	*RZEX_YOUNG*		
	(1)	(2)	(3)
DF×EXTFIN	-1.025	-1.028	-1.215
	(0.786)	(0.786)	(0.788)
DF×EXTFIN×DBank		**-0.092**	
		(1.693)	
DF×EXTFIN×DGlobal			**-1.302+**
			(0.771)
Factor endowment	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes
Observations	7,115	7,115	7,115
R-squared	0.858	0.858	0.859

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

So far, we have been mainly focusing on supply side effects of financial conditions and crisis on export market exiters. In the next sensitive test, we also include demand side impacts in our specification in order to control for its effect on the exit rate. So as to do so, we put demand shock variable and the product of it and industrial external credit conditions in the regression. The results are reported in table 10 and they suggest that there is only one variable that can explain the behavior of exiting firms, which is the triple interaction term with global crisis dummy for FLEX. Additionally, the sign of coefficient on this term is negative as in the previous estimations. This implies that the financial conditions and external shocks in the same year of firm's exit may not affect the firm's decision on export exit in our sample and this specification. In order to discuss this, we are going to test the hypothesis that exporting

firms decide their exits after observing the conditions of one year before they stop exporting after the next specification.

In the next test, we include the entry rate as an independent variable in our specification to control for exporter dynamics and the change in the tightness of exporting markets. Since no firms can exit exporting market unless they enter it, it is reasonable to assume a positive relationship between exit and entry rates. Furthermore, a large fraction of entrants can be seen as the increase in the competitiveness in the market. The results for these regressions are summarised in table 11. Again, coefficients on the all independent variables are statistically insignificant except for the same variable in the previous specification. However, the entry rate variable is significant and has a positive sign, which is consistent with our prediction. This result may indicate that the increase in the rate of entry in *t* positively affects the log-odds of exit rate in *t*. Furthermore, this could imply that the firm's exit might be driven by these forces rather than financial conditions. This relationship could be explained by the prediction from Melitz and Ottaviano (2008), which state that country size, entry rate and entry rate are positively correlated. In addition, Eaton et al. (2007) explore the exporters dynamics using the custom transaction data of Columbia over the period 1996-2005. They decompose trade growth into entrants, exiters and survivors, and conclude that small and medium entrants are highly likely to exit next year and tend to have little impacts on trade growth. These results imply that encouraging small and medium sized firms to start exporting may have only a little impact on the trade growth. Thus, our result could be driven by small and medium sized firms in developing countries.

Table 10 Demand shocks

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN	-2.284	-2.180	-2.537	-0.047	-0.050	-0.066	-2.029	-1.703	-2.692
	(1.677)	(1.678)	(1.700)	(0.095)	(0.095)	(0.095)	(6.047)	(6.087)	(6.126)
DF×EXTFIN×DBank		**2.371**			**-0.070**			**7.532**	
		(3.046)			**(0.183)**			**(9.309)**	
DF×EXTFIN×DGlobal			**-1.755**			**-0.154***			**-4.176**
			(1.413)			**(0.076)**			**(4.985)**
Demand	-0.001	-0.001	-0.001	-0.019	-0.019	-0.020	0.013	0.013	0.012
	(0.004)	(0.004)	(0.004)	(0.025)	(0.025)	(0.025)	(0.009)	(0.009)	(0.009)
Demand×EXTFIN	0.011	0.011	0.011	0.000	0.000	0.000	-0.034	-0.033	-0.032
	(0.007)	(0.007)	(0.007)	(0.000)	(0.000)	(0.000)	(0.025)	(0.025)	(0.025)
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,736	5,736	5,736	5,736	5,736	5,736	5,736	5,736	5,736
R-squared	0.863	0.863	0.863	0.862	0.862	0.863	0.862	0.862	0.862

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Finally, we test the hypothesis that the exporting firm exit in *t* is more influenced by the conditions and shocks in *t-1* than those in *t*. To check this, we employ one year lagged independent variables in our estimation. The results of the regressions are reported in Table 12. Firstly, the triple interaction terms are statistically insignificant for all financial crises dummies and for all EXTFIN variables while the results for the product of DF $\times$ EXTFIN for RZEX and FLEX are same as those of the baseline regression in table 6. This means that exporting firms may exit more in the sector less dependent with external capital in more financially constrained countries. This could be explained by a possibility that the number of firms might be larger in the sector with less external finance since the financial system may be poorer in developing countries than developed countries. However, we cannot interpret these results in the way like that in this specification. Secondly, demand shock and its interaction term with sectoral financial characteristics are statistically significant in the regression with RZEX and FLEX. The sign for import demand is positive and for its interaction is negative. Normally, the improvement in demand may be seen as a good chance to expand their sales. However, this can be also recognised as the increase in the competition because other firms are also sensitive to the change in demand in the marked. Finally, the coefficient on the lagged entry rate is significant and positive, which is consistent with our prediction as well as there is a difference between the results from table 11 and 12 regarding this term. Those

regressions illustrate that exit rate may be more sensitive to the rate of entry in *t* than that in *t-1*. This fact will be discussed in the next section after conducting country-level analysis.

Table 11 Entry rate

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN	-2.237	-2.154	-2.491	-0.068	-0.069	-0.084	-1.807	-1.502	-2.332
	(1.678)	(1.679)	(1.705)	(0.093)	(0.093)	(0.094)	(5.604)	(5.637)	(5.680)
DF×EXTFIN×DBank		**1.898**			**-0.023**			**7.039**	
		(2.878)			**(0.171)**			**(8.595)**	
DF×EXTFIN×DGlobal			**-1.766**			**-0.128+**			**-3.308**
			(1.237)			**(0.068)**			**(4.367)**
Demand	-0.001	-0.001	-0.001	-0.012	-0.012	-0.013	0.009	0.009	0.009
	(0.004)	(0.004)	(0.004)	(0.025)	(0.025)	(0.024)	(0.009)	(0.009)	(0.009)
Demand×EXTFIN	0.008	0.008	0.008	0.000	0.000	0.000	-0.025	-0.025	-0.024
	(0.008)	(0.008)	(0.008)	(0.000)	(0.000)	(0.000)	(0.025)	(0.025)	(0.025)
Entryrate	**1.459****	**1.459****	**1.459****	**1.462****	**1.462****	**1.460****	**1.460****	**1.460****	**1.459****
	(0.111)	**(0.111)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.111)**
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,736	5,736	5,736	5,736	5,736	5,736	5,736	5,736	5,736
R-squared	0.880	0.880	0.880	0.879	0.879	0.879	0.879	0.879	0.879

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Table 12 Lagged variables

Dependent variable: log [exit rate/(1-exit rate)]									
Financial condition variable:	*RZEX*			*FLEX*			*TANG*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF×EXTFIN t-1	-3.214*	-3.148*	-3.228*	-0.141+	-0.142+	-0.141+	-3.869	-3.981	-3.749
	(1.298)	(1.300)	(1.300)	(0.077)	(0.077)	(0.077)	(4.458)	(4.463)	(4.498)
DF×EXTFIN×DBankt-1		**4.896**			**-0.058**			**-7.995**	
		(3.008)			**(0.255)**			**(9.351)**	
DF×EXTFIN×DGlobal t-1			**-0.157**			**-0.000**			**1.111**
			(1.475)			**(0.077)**			**(4.956)**
Demand t-1	0.005**	0.005**	0.005**	0.032*	0.032*	0.032*	0.011	0.011	0.011
	(0.002)	(0.002)	(0.002)	(0.014)	(0.014)	(0.014)	(0.007)	(0.007)	(0.007)
Demand×EXTFIN t-1	-0.006+	-0.006+	-0.006+	-0.000*	-0.000*	-0.000*	-0.020	-0.021	-0.020
	(0.004)	(0.004)	(0.004)	(0.000)	(0.000)	(0.000)	(0.017)	(0.017)	(0.017)
Entryrate t-1	**0.448****	**0.446****	**0.448****	**0.449****	**0.449****	**0.449****	**0.443****	**0.443****	**0.443****
	(0.092)	**(0.092)**	**(0.092)**	**(0.092)**	**(0.092)**	**(0.092)**	**(0.093)**	**(0.093)**	**(0.093)**
Factor endowment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry-Year, Ind-Year, Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,813	6,813	6,813	6,813	6,813	6,813	6,813	6,813	6,813
R-squared	0.859	0.859	0.859	0.859	0.859	0.859	0.859	0.859	0.859

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

In the results from industry-level regressions, our main finding is twofold. Firstly, it is suggested that lagged DF × EXTFIN term for RZEX and FLEX may have a negative impact on the log-odds of exit rate, which implies that firms in less external credit dependent industries exit more in the country with poor financial conditions. The point here is that firm might decide their exit in *t* after realising the financial conditions in *t-1*. Secondly, both entry rate in *t* and *t-1* may be one of the main determinants of export exit in *t*, although that of period *t* has more impacts. In order to check these facts in the framework of country-level analysis, we are going to focus on country-level financial conditions in the next subsection.

5.2 Country-level analysis

In the previous subsection, we have tested the impact of both sector- and country-level credit conditions on the rate of export exits. However, we cannot identify the effect of country-level financial condition

itself since we have used the interaction terms so far. Furthermore, we cannot mention about level effect of financial characteristic variables because of our specifications in the subsection 6.1. In this subsection, we try to find that poorer quality of domestic banks and financial institutions are associated with higher exit rate, especially during the banking and global crisis. Firstly, we estimate the baseline model, which is the equation (6), with OLS using robust standard errors. In this specification, we only include the industry-year fixed effect as now our main interest is country-level variables, which are time-varying measures. Furthermore, we use exchange rate variable to control for the change in the trade specific variable cost.

Table 13 The result from the baseline regression (country-level)

Dependent variable: log [exit rate/(1-exit rate)]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF	6.079**	6.070**	5.472**	4.378**	4.379**	3.686**	4.348**	4.343**	3.762**
	(0.228)	(0.228)	(0.249)	(0.254)	(0.254)	(0.270)	(0.253)	(0.253)	(0.271)
DF×DBank		**-2.441**			**-0.699**			**2.712***	
		(1.700)			**(1.439)**			**(1.254)**	
DF×DGlobal			**4.008****			**4.334****			**3.615****
			(0.680)			**(0.664)**			**(0.648)**
Exchangerate	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Factor endowment	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	No	No	No	No	No	No	Yes	Yes	Yes
Ind-Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,514
R-squared	0.308	0.308	0.314	0.339	0.339	0.346	0.412	0.413	0.417

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Table 13 summarises the baseline results for the country-level analysis. It is noticed that now the coefficient on DF is positive and significant, which means that lower level of domestic credit has a positive impact on the log-odds of exit rate. Furthermore, after controlling for initial factor endowment, country size and income level, the sign of the product of DF and each crisis dummy is also positive and significant. These are consistent with the prediction from theoretical models and now we can mention that poorer financial institutions may have a positive impact on the probability of exit from exporting markets. In the next specification, we intend to include entry rate in the regression as we used it in the previous subsection.

Table 14 The result from the baseline regression with entry rate (country-level)

Dependent variable: log [exit rate/(1-exit rate)]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF	1.738**	1.739**	1.582**	1.459**	1.458**	1.274**	1.606**	1.603**	1.434**
	(0.189)	(0.189)	(0.201)	(0.196)	(0.196)	(0.210)	(0.199)	(0.199)	(0.213)
DF×DBank		**0.646**			**0.958**			**1.819***	
		(0.902)			**(0.877)**			**(0.844)**	
DF×DGlobal			**1.109***			**1.227****			**1.113***
			(0.472)			**(0.474)**			**(0.474)**
Exchangerate	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Entryrate	**3.276****	**3.277****	**3.267****	**3.238****	**3.239****	**3.226****	**3.100****	**3.099****	**3.090****
	(0.059)	**(0.059)**	**(0.059)**	**(0.061)**	**(0.061)**	**(0.061)**	**(0.065)**	**(0.065)**	**(0.066)**
Factor endowment	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	No	No	No	No	No	No	Yes	Yes	Yes
Ind-Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,514
R-squared	0.701	0.701	0.701	0.704	0.704	0.704	0.710	0.710	0.711

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

The results for the country-level regression with entry rate variable are presented in table 14. Same

as industry-level analysis, the coefficient on entry rate variable is statistically significant and positive. In addition, the significance and the sign of other independent variables are same as in table 13 while the value of coefficient on credit condition variables is smaller than that from the previous regression due to the inclusion of entry rate. Again, we can confirm that these results are consistent with our expectation that is based on the theoretical models. In the next specification, we will check this fact using lagged independent variables and compare the results from the estimation with independent variables of period *t* and *t-1*.

Table 15 Lagged variables (country-level)

Dependent variable: log [exit rate/(1-exit rate)]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF t-1	5.163**	5.162**	4.964**	3.567**	3.568**	3.307**	3.520**	3.519**	3.305**
	(0.211)	(0.211)	(0.227)	(0.240)	(0.240)	(0.257)	(0.236)	(0.236)	(0.254)
DF×DBank t-1		**-0.233**			**0.770**			**3.763****	
		(1.570)			**(1.425)**			**(1.346)**	
DF×DGlobal t-1			**1.440***			**1.785****			**1.468***
			(0.646)			**(0.640)**			**(0.627)**
Exchangerate t-1	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Entryrate t-1	**0.363****	**0.364****	**0.359****	**0.344****	**0.344****	**0.338****	**0.294****	**0.294****	**0.290****
	(0.032)	**(0.032)**	**(0.032)**	**(0.031)**	**(0.032)**	**(0.031)**	**(0.030)**	**(0.030)**	**(0.030)**
Factor endowment	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial size and income level	No	No	No	No	No	No	Yes	Yes	Yes
Ind-Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,573	7,573	7,573	7,573	7,573	7,573	7,573	7,573	7,573
R-squared	0.317	0.317	0.318	0.349	0.349	0.350	0.417	0.418	0.418

Note: Robust standard errors in parentheses. Results of fixed effect dummies and control variables are not reported here.

** p<0.01, * p<0.05, + p<0.1.

Table 15 reports the empirical results from the regressions with lagged explanatory variables. Interestingly, the relationship among exit rate, financial condition variables and entry rate has changed now. The significance and sign of each variable are nearly same as those in table 14. However, the results in table 14 and 15 suggest that the country's financial condition in *t-1* is more important than that in *t* for exporting firms in terms of their decision on export exit. Contrary, the log-odds of exit rate was more affected by the entry rate in *t* than that in *t-1*. Therefore, for both types of analyses, namely industry- and country-level empirics, entry rate in the period *t* has more impacts on the dependent variable than that of *t-1* while financial condition variables have an opposite relationship[9]. In the next subsection, we will compute the effect of one- and ten-unit changes in independent variables on the expected exit rate by using Duan (1983)'s smearing estimator in Stata.

5.3 Interpretation of changes in independent variables

So far, we have checked the significance and the sign of coefficients on each independent variable and explored their impacts on the dependent variable. However, we should also interpret their effects on entry rate as we use the log-odds of exit rate in our estimations. In order to check the degree of the effect of increase in one- and ten-unit of domestic financial condition and entry rate variables, we use the Duan (1983)'s method to remove a bias that occurs when we calculate anti-logarithm value from the regression results. Firstly, we calculate the predicted exit rate, not the log-odds of exit rate, keeping the independent variables at their mean values by using the coefficients and residual's mean. Secondly, we increase the value of domestic credit condition and entry rate by 1 and 10 unit from their mean values. For the country-level financial constraint variable, there are two steps in the calculation. Firstly, compute 1 plus the mean of original data, i.e. if the original value was 51.6, we plus 1 and the value becomes 52.6. Secondly, we calculate the inverse value of 52.6, which is 0.019. For entry rate, we use the value that is 0.01 plus the mean of entry rate since entry rate is not presented in percentage. We also do these

[9]We use the log-odds of entry rate as a dependent variable and exit rate as one of independent variables using the same specification in table 11, 12, 14 and 15. The relationship between entry rate and exit rate is approximately same as that in those tables. Now we can mention that entry rate in *t* might be more affected by exit rate in *t* than that in *t-1*.

calculations for ten-unit change in those variables. After calculating the predicted probability of export exit with all independent variables' means and one- and ten-unit increased independent variables, we compute the difference between them. Now, we can check how much country credit condition and entry rate affect the rate of exit. All results from these calculations are summarised in table 16[10].

Table 16 Changes in country credit condition and entry rate

Expected exit rate: Country-level analysis					
Type of regression	(A) At mean value of all independent variables	(B) One unit increase in financial variable during crisis	(C) Ten-unit increase in financial variable during crisis	(D) One unit increase in entry rate	(E) Ten-unit increase in entry rate
DF×DBank	0.61437	0.61378	0.60998	0.62168	0.68474
DF×DGlobal	0.61434	0.61379	0.61019	0.62269	0.68451
DF×DBank t-1	0.62735	0.62590	0.61674	0.62803	0.63418
DF×DGlobal t-1	0.62736	0.62598	0.61722	0.62804	0.63410

Type of regression	(B)-(A)	(C)-(A)	(D)-(A)	(E)-(A)
DF×DBank	-0.00059	-0.00439	0.00732	**0.07037**
DF×DGlobal	-0.00055	-0.00415	0.00835	**0.07017**
DF×DBank t-1	-0.00145	**-0.01061**	0.00069	0.00684
DF×DGlobal t-1	-0.00138	**-0.01014**	0.00068	0.00674

Note: These values are computed from results of the regression with entry rate and regression with lagged variables, which are table 14 and 15.

Firstly, the expected values in (A) in table 16 seem to be quite similar to the mean value of exit rate in our dataset, even though the value is closer to the mean of developing counties than all samples. This could imply that our specifications are structured appropriately. Secondly, it is shown that the ten-unit increase in domestic capital variable in *t-1* leads to the 1 percent decrease in the likelihood of export exit both during the banking and financial crises. In this case, ten-unit means ten percent for domestic financial condition variable, i.e. if the ratio of domestic capital in private sectors provided by the banking sector to GDP increase change from 50 to 60, ceteris paribus, the expected exit rate, which was 35 percent, is now 34 percent. Finally, ten-unit growth of entry rate in *t* increases the probability of exit exporting markets by 7 percent during the period of banking and global financial crises. Now, we can know which sector and country policy makers should care about during banking and financial crises.

Unfortunately, we cannot compare the result from domestic credit constraint with that from entry rate since their data do not share the same unit. However, at least we can mention that both conditions are important for the firm's decision on the closure in international markets. As a policy implication, we are going to suggest that policy interventions should target both more competitive sectors and financially constrained countries. For instance, if there are two countries that have the same condition regarding domestic financial characteristics, the country with more competitive markets needs more policy interventions than the others. Thus, those conditions are important factors for both exporting firms and the government.

6 Concluding remarks

It is widely accepted that trade volumes declined and a significant number of firms reduce their exports, or even stopped export activities during the financial crisis in 2008 and 2009. If hysteresis exists, it is difficult for firms to re-enter the international markets once they exit the market. In order to find the determinants of closures in exporting market during the financial crises, we have conducted empirical works using Rajan and Zingales(1998)'s method and log-odds model as well as focusing on sector- and country-level financial constraints.

There are two main findings in the industry-level analysis. Firstly, sector-level external finance dependence seems not to be an important determinant of firm's export exit during the banking and financial

[10]See table D in appendix for the sample commands for the calculation.

crises. It seems that sector-level credit conditions matter outside the periods of financial crises and that firms in the less external finance dependent sectors tend to exit more in the country with poorer financial institutions. This might be because that the share of the number of exporting firms in the sector with less external capital may be larger in developing countries as they are likely to be more financially constrained regarding country-level credit conditions. Secondly, it is illustrated that the rate of entry might be one of key factors of firm's decision on exit exporting markets. This may indicate that the exit rate is highly likely to rise in more competitive markets.

In the country-level analysis, two facts are observed. Firstly, after controlling for other factors, the result showed that the coefficient on country-level credit condition is significant and positive during the crises periods. Furthermore, the dependent variable is more affected by domestic capital in in the private sector provided by banks in *t-1* than that in *t*. This implies that firms decide their closures in exporting markets after observing country's financial constraint of the previous year. Secondly, again the entry rate can be recognised as one of main determinants of exit rates in international markets. After calculating the expected likelihood of exporting exit, we confirmed that ten-unit increase in financial condition variable can reduce the probability of death by 1 percent during the crises periods. Additionally, ten-unit rise in exit rate may cause the increase in the exit rate by 7 percent. As a policy implication, it is suggested that policy makers and international organisations should choose more competitive sectors and credit constrained countries as the target of policy interventions during and after financial crises, although the impact of domestic financial constraints seems small.

Although we have tested many issues that can cause biases, we can conduct additional analyses in further works. Firstly, we assume that industry-level financial conditions are identical for all countries and use the data of U.S. as the common variables. It is state that the sectoral financial characteristics may be the same for all countries and that we only need the rank of external dependence. However, this could cause the measurement error since industrial dependence of external finance might vary across countries, especially in developing countries. In order to check this, we could construct a new variable that represents county heterogeneity in terms of sector-level external finance dependence if it is possible. Secondly, due to the lack of the data we only include one importer, which is the world, and our sample has only a few developed countries. Because of these problems, we cannot include financial conditions in partner countries in our specification and this could cause the sample selection bias in our results. Thirdly, there is a possibility that the country heterogeneity in terms of types of exporting firms matters, especially for developing countries[11]. Furthermore, their size matter because small firms tend to be affected more than large firms (Bricongne et al. 2012). This implies that the fraction of each type or size of firms can be added in the empirical specification. Finally, since we cannot identify the firm's decision on exit, surviving or changing market and product, there might be some bias in our results (Pavcnik 2002, Greenaway et al. 2008). In order to take into account this problem, we should have firm-level data on exporting activities that include the information on destination and product. Totally, it seems that these problems are mainly from the unavailability of the data on trade and financial constraints across countries and over time. Thus, it should be noted that the availability and the quality of those datasets should be improved in order to study our topic more precisely

[11] For instance, according to Poncet et al. (2010), state and foreign owned companies tend not to be financially constrained while private enterprises do in China.

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Appendix

Appendix A List of countries (5 developed and 37 developing countries)

Depeloped Countries
Belgium, Bulgaria, Spain, Norway, Portugal
Developing countries
Albania, Burkina Faso, Bangladesh, Botswana, Chile, Cameroon, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt Arab Rep., Estonia, Guatemala, Iran Islamic Rep., Jordan, Kenya, Cambodia, Kuwait, Lao PDR, Lebanon, Morocco, Mexico, Macedonia FYR, Mali, Mauritius, Malawi, Niger, Nicaragua, Pakistan, Peru, Senegal, El Salvador, Turkey, Tanzania, Uganda, Yemen, Rep. South Africa

Appendix B Sector-level external dependences

		External finance dependence (%)			
ISIC2 code	Industry	RZEX	FLEX	TANG	RZEX_Y
311	Food Products	14	72	37	66
313	Beverages	8	61	40	63
3211	Spinning	-9	69	38	n.a
321	Texitile	40	68	31	66
322	Apparel	3	66	15	27
323	Leather	-14	64	12	-153
331	Wood Products	28	75	32	34
341	Paper and Products	18	67	42	57
342	Printing and Publishing	20	64	21	60
3511	Basic Chemical excluding Fertil.	25	68	43	79
352	Other Chemicals	22	63	27	135
354	Petroleum and Coal Products	33	65	46	-26
355	Rubber Products	23	66	36	50
356	Plastic Products	114	80	38	114
361	Pottery	-15	66	28	-41
362	Glass	53	66	42	152
369	Non-metal Products	6	71	48	-3
371	Iron and Steel	9	72	44	26
372	Non-Ferrous Metal	1	73	32	85
381	Metal Products	24	71	28	87
382	Machinery	45	73	22	75
3825	Office, Computing	106	89	14	116
383	Electrical Machinery	77	80	21	122
3832	Radio	104	83	14	135
384	Transportation Equipment	31	71	23	58
332	Furniture	24	64	28	68
3841	Ship	46	83	28	105
3843	Motor Vehicle	39	75	28	76
324	Footwear	-8	59	13	65
314	Tobacco	-45	63	19	n.a

Source: Rajan and Zingles (1998), Fisman and Love (2003) and Kronszner et al. (2007).

Appendix C The definition of variables

Industry-level variables	Definition	Data source
Exit rate	[(The number of exiters in industry *k* of country *i* in *t*) / (the number of exporters of industry *k* in country *i* in *t-1)*]	Exporters Dynamics Database
Entry rate	[(The number of entrants in industry *k* of country *i* in *t*) / (the number of exporters of industry *k* in country *i* in *t)*]	Exporters Dynamics Database
RZEX	The proportion of capital expenditure funded by external finance	Rajan and Zingales (1998)
FLEX	The proportion of capital expenditure funded by external finance	Fisman and Love (2003)
TANG	The median level of the ratio of the fixed assets to total assets	Kroszner et al. (2007)
RZEX_Young	The proportion of capital expenditure funded by external finance, only for young firms	Rajan and Zingales (1998)
Demand shock	The sum of the growth rate of GDP of the partner *j* weighted by trade share of partner *j* in the total exports of country *i* in industry *k* in period *t*	UN comtrade

Country-level variables	Definition	Data source
DF	Domestic credit to private sector by banks (% of GDP)	World Development Indicators
Banking crisis dummy	*Dbank* = 1 if a country faces the banking crisis and = 0 other wise	Systematic Banking Crises Database
Global crisis dummy	*DGlobal* = 1 when *t* = 2008 or 2009 and = 0 other wise	
Factor endowment	[(Capital in country *i* in 1998) / (labour in country *i* in 1998)]	Heston et al. (2012)
Initial country size	GDP of country *i* in 1998	World Development Indicators
Initial income level	GDP per capita of country *i* in 1998	World Development Indicators
Exchange rate	Exchange rate to UD dollar	Heston et al. (2012)