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**ERASMUS UNIVERSITY ROTTERDAM**

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**The impact of the 2008-2009 financial  
crisis on European firm-level exports:  
a cross-country study**

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# The impact of the 2008-2009 financial crisis on European firm-level exports: a cross-country study

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## **Abstract**

In this paper, I estimate the impact of the 2008-2009 financial crisis on European firm-level exports. I construct a cross-country experiment using data from 5,872 manufacturing firms from the *European Firms in a Global Economy* program (EFIGE). The results show that there is a negative effect of the financial crisis on firm-level exports growth. Firms from countries that are more severely affected by the financial crisis experience a larger decline in value of exports than firms from countries that are less severely affected by the financial crisis. In addition, the results show that importing firms from countries that are more severely affected by the financial crisis experience an increase in value of exports compared to their non-importing counterparts. I find no evidence that the crisis effect of the financial crisis on firm-level exports is different for firms that carry out innovation or for firms that are reliant on external finance for their production activities. The findings of this research suggest that firm characteristics affect the impact of a financial crisis on firm-level exports performance.

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## 1. Introduction

On November 13<sup>th</sup>, 2013 the Spanish firm *Fagor Electrodomésticos* filed for bankruptcy at the Commercial Court of San Sebastian.<sup>1</sup> *Fagor*, at that time the largest producer of household appliances in Spain and the fifth largest in Europe, became one of the many Spanish casualties of the economic crisis. After a decade-long increase in the construction of new property and property sales in Spain and the rest of Europe European home sales decreased significantly in 2008. *Fagor*, producing washing machines, refrigerators and other appliances which are mainly sold to new home owners, faced a substantial decline in sales. Yearly sales dropped two thirds in the period 2007-2009.<sup>2</sup> Attempts to boost *Fagor*'s international sales were not successful; the whole European real estate market had come to a standstill. Even financial help from the *Mondragón* network of 110 cooperatives of which *Fagor* formed part, could not prevent the bankruptcy of the company.<sup>3</sup> The 2008 financial crisis had taken its toll, resulting in the unemployment of 5,630 workers in the northern Spanish region. What caused the demise of this firm, once considered a regional pride in Spain's Basque country? With this research I try to find out why firms such as *Fagor Electrodomésticos* did not manage to survive the 2008-2009 financial crisis, whereas other firms did.

Did the Spanish company *Fagor* go bankrupt because Spain was hit by the financial crisis more severely than other countries, or because this particular firm was more vulnerable to the crisis than other firms? A large body of literature has analysed the effect of financial crises on exports. Scholars find that the 2008-2009 financial crisis has a negative effect on exports growth at the country-level and at the industry-level (Iacovone and Zavacka, 2009; Feenstra *et al.*, 2011; Bems, Johnson and Yi, 2012; Chor and Manova, 2012). So far, little research has been conducted on the effects of the financial crisis on exports at the firm-level. Thus far, research on firm-level exports

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<sup>1</sup> <http://online.wsj.com/news/articles/SB10001424052702303289904579195672652678210> accessed February 18<sup>th</sup>, 2014.

<sup>2</sup> <http://inspanje.nl/economie/6337/faillissement-dreigt-voor-fagor-spanjes-grootste-witgoedproducent/> accessed February 18<sup>th</sup>, 2014.

<sup>3</sup> <http://www.economist.com/news/business/21589469-collapse-spains-fagor-tests-worlds-largest-group-co-operatives-trouble-workers> accessed February 18<sup>th</sup>, 2014.



during the financial crisis is restricted to data on one country. In addition, current literature focuses on the relationship between channels of credit supply and firm-level exports performance (Bricongne *et al.*, 2012; Behrens *et al.*, 2013).

This study aims to fill the gap in the empirical literature on the impact of the 2008-2009 financial crisis on firm-level exports across the European Union. I attempt to provide insight into the effect of the financial crisis on firm-level exports performance. I explore whether the crisis effect on firm-level exports is different for: i) firms that innovate versus firms that do not innovate, ii) firms that import goods and services from abroad versus firms that do not import and iii) firms that are reliant on external finance versus firms that are non-reliant on external finance. I make use of a cross-sectional dataset of 14,480 manufacturing firms from seven European countries. The main research question is:

**Research question:** *What is the effect of the 2008-2009 financial crisis on European firm-level exports in the period 2008-2009?*

The financial crisis and related terms and phrases have dominated the media in the past years.<sup>4</sup> What exactly do economic scholars consider a financial crisis? Reinhart and Rogoff (2009) distinguish two types of financial crises; crises defined by quantitative thresholds and crises defined by qualitative analyses. Among the first type are inflation crises, currency crashes, currency debasement and the bursting of asset bubbles. The second type of crises are banking crises, external debt crises and domestic crises counterparts. Two types of events mark a banking crisis: i) a bank run that leads to closure, merging or takeover of one or more financial institutions, ii) the closure, merging or takeover of a financial institution not preceded by a bank run, but that marks the start of similar outcomes for other financial institutions.

According to Claessens and Kose (2013), financial crises are typically multidimensional events that are hard to be characterized using a single indicator. Eichengreen and Portes (1987) define a financial crisis as “a disturbance to financial markets, associated

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<sup>4</sup> Phrases like “Financial Tsunami, Bailout and the Great Recession” are ranked in the 2008-2010 top words and top phrases of the year by the Global Language Monitor.

<http://www.languagemonitor.com/category/top-words-2/> accessed February 18<sup>th</sup>, 2014.

typically with falling asset prices and insolvency among debtors and intermediaries, which ramifies through the financial system, disrupting the market's capacity to allocate capital within the economy." Mishkin (1992) applies an asymmetric information perspective to the definition of a financial crisis. He defines a financial crisis as "a disruption to financial markets in which adverse selection and moral hazard problems become much worse, so that financial markets are unable to efficiently channel funds to those who have the most productive investment opportunities." I conclude that a financial crisis is a disturbance of the financial markets which is associated with falling asset prices and insolvency among debtors, resulting in an inability to efficiently allocate capital to the most productive investment opportunities.

If we try to understand the concept of a financial crisis by looking at historical examples, we see that financial crises are a phenomenon that appears on a semi-regular basis. The first known financial crisis in modern history is the tulip bulb mania in the Netherlands which took place in the years 1634-1637. Investors – expecting a high profit – speculated in tulip bulbs which were yet to be delivered. They paid prices as high as the price of a canal house for the bulb of a special tulip. The peak reached its full height in the first week of February 1637. A shifting public opinion on the moral responsibility of speculating in tulip bulbs resulted in a Haarlem merchant being unable to get rid of his stock. In less than a week, the bubble burst and tulip bulb prices decimated all across the Netherlands, leaving speculators with large debts (Garber, 1989). With this course of events, the tulip mania had ended and prices again stabilized at much lower levels.

In the following centuries financial crises appear more often. Kindleberger and Aliber (2011) mention that financial crises occurred on average every ten years in the first two thirds of the nineteenth century. However, in the following half century crises occurred less regularly (in the years 1873, 1907, 1921 and 1929). In their studies on the contagion of financial crises Kaminsky and Reinhart (2000) determine 18 post-WWII crises. Reinhart and Rogoff (2008) identify the "Big Five" post-WWII crises: Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1992). These Big Five crises are all long-lasting and large-scale crises that are associated with major

declines in economic performance for an extended period of time. In Japan people refer to the lasting impact of the severe 1980's crisis as "the lost decade."

The 2008-2009 global financial crisis is the greatest financial crisis since the Great Depression (Brunnermeier, 2008).<sup>5</sup> The roots of this financial crisis lay in the U.S. sub-prime mortgage crisis. In the first decade of the new millennium, large financial institutions started selling *collateralized debt obligations* (CDO's) to investors. These CDO's were mortgage bundles, sold as an investment opportunity to investors such as pension funds and insurance companies. Financial institutions - acting on a commission basis - earned money by selling these CDO's. Encouraged by the profitability of this structure, mortgage companies had an incentive to provide mortgages to more and more consumers on increasingly flexible terms. In this way investment banks could continue to supply in the seemingly never-ending demand for investment opportunities. As a result, the CDO's started to include more and more risky mortgages, so-called sub-prime mortgages.

If a mortgager cannot fulfill his mortgage repayments, his house is sold. Normally, the bank gets the largest share of its secured credit recovered. In the months preceding the sub-prime mortgage crisis however, an increasing number of people could not pay their mortgage repayments. Consequently, there were an increasing number of foreclosures and the supply of houses on the housing market increased sharply. Classical economic theory teaches us that as supply increases and demand remains relatively stable, prices drop. This is exactly what happened in the year 2007 (Angelides et al., 2011). Suddenly, investors did not see a return on their investment and in many cases they even lost a large share of their initial investment. As a consequence, the confidence in different types of investments vanished and money flows dried up. People convulsively started to withdraw their investments from the large financial institutions, leading to the stagnation of the global financial system. This process culminated in the bankruptcy of Lehman Brothers - the fourth largest bank in the United States - on September 15<sup>th</sup>

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<sup>5</sup> See Joseph Stiglitz's essay on the global consequences of the financial crisis. Joseph E. Stiglitz, 'Five years in Limbo,' *Blog World Economic Forum October 9<sup>th</sup>, 2013*. <http://forumblog.org/2013/10/five-years-in-limbo/> accessed January 20<sup>th</sup>, 2014.

2008 (Aragon & Strahan, 2012). Many other banks around the world needed government support in order to avoid collapse.

One of the major consequences of the failure of the financial system was that real final expenditure changed (Baldwin, 2009). In other words, people tightened the grip on their wallets. In the decline of real final expenditure scholars find the cause of the collapse in international trade in the period 2008Q1-2009Q1. Within a period of one year (2008Q1-2009Q1), real world trade dropped by approximately 15%. The trade collapse was unique compared to other post-WWII trade crises in terms of magnitude, abruptness and synchronization across countries (Bems, Johnson and Yi, 2012). All seven of the largest month-on-month drops - out of a total of 533 months measured by the Organization for Economic Cooperation and Development (OECD) - occurred in the period following November 2008 (Araújo & Oliveira Martens, 2009). The substantial decline in trade affected all major emerging markets and developing countries simultaneously. Each of the 104 nations on which the WTO publishes data, reported a reduction in both imports and exports during 2008Q3-2009Q2, showing the worldwide synchronization of the trade collapse (Baldwin, 2009).

Although the trade collapse took place simultaneously geographically, its impact varied largely across sectors. Imports from durable goods fell substantially more than import from non-durable goods. Levchenko et al. (2010) find a 47 percent decline of imports in the automotive industry and a 34 percent decline of imports in the industrial supplies sector. Trade in non-durable goods such as consumer goods faced a much smaller decline, 12 percent in the same period.

The consequences of the financial crisis and the subsequent trade collapse affect citizens in most countries across the globe. As shown by the *Fagor Electrodomésticos* example, many firms faced a decline in both domestic and foreign sales, leading to severe managerial challenges and in many cases bankruptcy. In the Netherlands, for example, bankruptcy figures rose to an all-time high in the aftermath of the financial crisis.<sup>6</sup>

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<sup>6</sup> Statistics Netherlands (CBS) recorded a number of 10,559 bankruptcies in 2009, as compared to 6,847 in 2008. <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37463&D1=3,7-9&D2=0&D3=a&HD=080811-1029&HDR=G1,T&STB=G2> accessed February 11<sup>th</sup>, 2014.

Unemployment correspondingly jumped, rising by 26 percent in 2009.<sup>7</sup> To this day, policy makers are dealing with the consequences of the 2008-2009 financial crisis, both with respect to unemployment and internal budgetary issues. These budgetary issues result from the billion-dollar government support of large financial institutions during the peak of the crisis.

The insights obtained by this research can help government policy makers, in times of financial crisis, to allocate their resources to those firms that need these resources most. For example, it can support the development of programs which focus on the protection and conservation of the most vulnerable firms. In addition, it can help decision makers in companies gain awareness on their firm's competitiveness during economically harder times and to wisely distribute assets in order to maintain growth.

The remainder of this paper is organized as follows. Section 2 gives a theoretical background on the causes and consequences of past financial crises. I also discuss the relationship between firm characteristics and firm exports performance, from which I derive the hypotheses. Section 3 provides a description of the employed data and the methodology of the research. Section 4 shows the descriptive statistics and the empirical results. In section 6, I draw the main conclusions from this research and provide recommendations for further research.

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<sup>7</sup> Statistics Netherlands (CBS) recorded a number of 377,000 unemployed persons in 2009, as compared to 300,000 in 2008. Unemployed means that a person is willing to work but is not employed for more than 12 hours per week.  
<http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=71738NED&D1=22,26&D2=a&D3=0&D4=0&D5=6,11,16,21,26,31,36,41,46,51,60,I&HD=130311-0953&HDR=T,G1&STB=G3,G2,G4> accessed February 11<sup>th</sup>, 2014.

## 2. Theoretical Background and Hypotheses

This section provides an overview of theory regarding financial crises and the impact of financial crises on society. First, I discuss the theoretical background on the emergence of financial crises. After that, I give a description of possible consequences of financial crises. In addition, I provide an overview of theory regarding firm dynamics and firm performance during times of financial crises.

### 2.1 Causes of financial crises

Over the years many theories have been developed regarding the underlying causes of financial crises. Scholars distinguish two main types of causes of financial crises. On the one hand they consider asset price booms and busts as a major possible cause of a financial crisis; on the other hand they argue that credit price booms and busts have the potential to evolve into a financial crisis. Asset price bubbles and credit price booms do not necessarily have to induce a large-scale financial crisis, but they are possible causes and amplifiers of financial distortions (Schularik and Taylor, 2009).

#### 2.1.1 Asset price bubbles

An asset price boom and bust is a possible cause of financial crises. As the tulip bulb mania example in the introduction shows, sharp increases in prices followed by sharp decreases in prices of the same good is a century-old phenomenon. Scholars refer to such a sharp rise and crash in asset prices as *bubbles*. Kindleberger (1978) describes a bubble as an “upward price movement over an extended range that then implodes.” Garber (2001) believes that this definition lacks the necessary conclusion that the bubble pattern reflects a form of irrational behavior. His definition of a bubble is: “a bubble is the part of a grossly upward asset price movement that is unexplainable based on fundamentals.” Scherbina (2013) considers a price movement a bubble when an asset’s trading price exceeds the sum of the future discounted cash flows, as equation 1 shows.

$$P_t > E_t \left[ \sum_{\tau=t+1}^{\infty} \frac{CF_{\tau}}{(1+r)^{\tau-t}} \right] \quad (1)$$

$P_t$  denotes the trading price and  $E_t$  the fundamental price of the asset. The fundamental price consists of all expected future cash flows discounted by the appropriate interest rate  $r$ , as shown between brackets. The interest rate should include risk. Since it is difficult to estimate the compensation for risk in practice, an alternative definition replaces the appropriate interest rate with the risk-free rate  $r_f$ , such that the formula changes into:

$$P_t > E_t \left[ \sum_{\tau=t+1}^{\infty} \frac{CF_{\tau}}{(1+r_f)^{\tau-t}} \right] \quad (2)$$

For most firms, the asset's cash flows have a positive correlation with market risk. Therefore, the required rate of return is greater than the risk-free rate and equation 2 represents the upper limit of the asset's fair value.

Scholars have designed different models that explain asset bubbles. I make a trichotomy in these models: i) models that consider individual rational behavior as the cause of collective mispricing, ii) models that consider micro-economic distortions as the cause of mispricing and iii) models that consider irrational behavior of investors as the cause mispricing (Claessens and Kose, 2013).

Blanchard and Watson (1983) develop a model that considers individual rational behavior as the cause asset price bubbles. They argue that rationality of both behavior and expectations does not imply that the trading price of an asset has to be equal to its fundamental value. This model requires a number of conditions. First of all agents have to be rational and all information should be common knowledge. Secondly, the asset has to have an infinite lifetime and the rate of growth has to be equal to the discount rate, as is proven by equation 3. The trading price  $P_t$  consists of the discounted value of all future cash flows and a bubble component in addition to the fundamental value  $P_t^{fundamental}$ , so that  $P_t = P_t^{fundamental} + B_t$ .

$$P_t = E_t \left[ \sum_{\tau=t+1}^{\infty} \frac{CF_{\tau}}{(1+r_f)^{\tau-t}} \right] + \lim_{T \rightarrow \infty} E_t \left[ \frac{B_T}{(1+r)^{T-t}} \right] \quad (3)$$

$B_T$  is the total bubble component, which we assume to grow at rate  $r_B$ , such that  $B_T = B_t(1+r_B)^{T-t}$ . If  $r_B < r$ , which means that if the bubble growth rate is lower than the discount rate, the present value of the bubble is zero and therefore the bubble cannot exist. On the other hand, if  $r_B > r$ , which means that if the bubble growth rate is higher than the discount rate, the value of the bubble is infinite and therefore it cannot exist. The bubble is deemed to burst, unless the condition  $r_B = r$  holds.

If an asset does not have an infinite lifetime, the bubble will definitely burst at the end of the asset's lifetime when the asset is liquidated at its fundamental and fair value. Backward induction – suggesting that if one knows that the bubble will burst at  $T$  an agent will not be willing to buy it at  $T - 1$ , neither at  $T - 2$  and so on – leads to the conclusion that a bubble cannot exist for an asset with a limited lifespan (Scherbina, 2013). Other scholars, among them Allen, Morris and Postlewaite (1993), argue that a bubble can exist for a finitely-lived asset if agents have asymmetrical information and they cannot sell the asset short.

The second category of models explaining asset price bubbles are micro-economic models. This category includes the 'new generation rational models' which account for factors such as personal incentives, non-standard market preferences and market frictions. These models consider the effects of the herding in investment decisions by investors, the limited liability of most market players and perverse incentives. DeMarzo, Kaniel and Kremer (2008) design a relative wealth model in which investors participate in bubbles as long as others do to maintain their relative. Allen and Gale (2007) relate bubbles to agency issues. Due to risk shifting from the agent to the money-lender agents drive up prices.

Rajan (2005) states that the limited liability of fund managers – who receive higher rewards on the upside than punishments on the downside – bias their portfolios towards risky assets, which may trigger an asset price bubble. Micro-economic and fiscal factors



such as the deductibility of interest rates for corporate debts and household mortgages can also contribute to the emergence of asset price bubbles (Claessens and Kose, 2013).

The third category of models finds explanations for asset price bubbles in irrational behavior of agents involved in the investment in these assets. Scholars have found deviations of the actual prices or returns as compared to the predicted prices and returns across various markets, time periods and institutional contexts. A whole new research area, *behavioral finance*, tries to explain the patterns of prices deviating from the predicted price in an efficient market. The unifying feature behind behavioral models is that at least one group of agents is assumed to act in an irrational way. Shleifer (2000) describes the possible reactions of investors on an Initial Public Offering (IPO), which can result in over- or under-valuation of the stock depending on the ‘mood’ that is often highlighted and amplified by the media. Schwert (2003) describes how some effects that in the past explained deviations of actual prices from predicted prices, seem to disappear over time but still influence investor’s decisions. This lagged knowledge pushes investors into irrational behavior. An example is the so-called size effect that argues that small firms earn a higher average return than is predicted. This effect has proven to vanish over time.

As Diba and Grossmann (1987) point out, rational models do not explain the creation of a bubble; the bubble must already be present when the trading of the asset starts. In behavioral models, bubbles may arise when agents overreact to certain informative signals about fundamental issues concerning the value of the asset. The “financial accelerator,” a model describing the ongoing acceleration in credit borrowing and the corresponding development of higher-valued firms (Bernanke, Gertler and Gilchrist (1999), amplifies an initial positive shock to the fundamentals which leads to higher asset prices.

In which situations does the asset price bubble burst or deflate? Several shocks can lead to the burst or deflation of an asset price bubble. One such shock can be when the uncertainty about future earnings declines or when short sale constraints become less binding. The highest price declines of assets appear around the announcement of earnings, therewith declining the uncertainty of future earnings. (Scherbina, 2008; Ofek

and Richardson, 2003). Another shock consists of the exhaustion of the supply of new capital, most commonly caused by a change in sentiment or a change in credit restrictions. These circumstances lead to a reversal of the positive sentiment, the slowing of the bubble's growth and consequently to a decline in the asset's price. The result is a downward spiral and possibly a "fire sale" of institutions trying to get rid of the asset. Such a strong negative signal against the positive sentiment can turn the positive spirit to a freeze in any asset class (Scherbina, 2013). The burst of an asset bubble causes part of the initial investment to evaporate and the trade in the asset to decline.

### **2.1.2 Credit booms**

The second cause of financial crises can be the bust of a credit boom. Mendoza and Terrones (2008) describe a credit boom as an "episode in which credit supply to the private sector rises significantly above its long-run trend." A wide range of scenarios can trigger credit booms, ranging from short- and long-term economic performance to macro-economic and financial factors.

The first type of shocks that can lead to a credit boom is an extended period of economic growth. A positive investment sentiment can cause an upward spiral in the supply of credit to consumers and companies. Dell'Ariccia *et al.* (2013) find empirical evidence that a credit boom is positively associated with lagged Gross Domestic Product (GDP) growth. In the average three-year period preceding a credit boom, the average real GDP growth rate is 5.1 percent, as compared to an average real GDP growth of 3.4 percent in an average tranquil three-year period.

A second shock that can lead to a credit boom is a large increase in international financial inflows (Claessens *et al.*, 2010). As a consequence of the increase in financial inflows, funds for local banks increase. This results in more relaxed credit constraints for corporations and households. An expansion of credit for households and businesses does not form a problem as long as the economy keeps expanding. However, when the economy slips into a recession, the leveraging of these households and businesses - by the banks which relaxed their credit constraints - can lead to a more severe recession (Kaminsky and Reinhart, 1999). Scholars find evidence for a rapid expansion of credit

and a sharp growth in real estate and asset prices with large capital inflows in many countries before the 2008-2009 financial crisis (Claessens and Kose, 2013).

The third and last type of shocks that can cause credit booms are financial reforms. These reforms can be both short-term and long-term. Structural changes in financial landscape are financial liberalization and financial innovation. Poorly designed and sequenced financial liberalization can lead to excessive increases in leverage of borrowers. More short-term financial reforms can be accommodative monetary policies. For example, low interest rates are associated with more risk-taking. Lansing (2008) and Hirata *et al.* (2012) find that the relatively low interest rates in the United States in the years 2001-2004 are a main factor behind the soaring house prices and household leverage. Increasingly easy supply of credit to borrowers facilitates more risk-taking and consequently increases the risk of over-investment.

Credit booms have appeared in both industrial economies and emerging economies. There are differences between credit booms in industrial economies and in emerging economies. First, macro- and micro-economic fluctuations are larger in emerging economies compared to industrial economies. Second, a higher degree of credit booms in emerging markets are associated with crises than in industrial economies. Third, credit booms in an emerging economy appear more often when preceded by periods of large capital inflows but not when preceded by gains in Total Factor Productivity (TFP) and domestic financial reforms. In industrial economies an opposite pattern is shown (Mendoza and Torres, 2008).

## 2.2 Macro-scale impact of financial crises

If asset price bubbles or credit booms trigger a financial crisis, this leads to the devaluation of certain financial assets. In some cases a financial crisis only results in the loss of monetary value, but not to changes in the real economy. In most cases however, a financial crisis affects the real economy in a number of ways. In this section I discuss the possible macro-scale effects of financial crises on society. Paragraph 2.2.1 discusses the possible impact of a financial crisis on GDP; paragraph 2.2.2 discusses other related issues such as unemployment and a decrease in value of assets. Paragraph 2.3 discusses firm exports performance during financial crises.

### 2.2.1 Effect of a financial crisis on GDP

A financial crisis can drag a country or even the whole world into a recession (Allen, 1999). The most common definition of a recession is a consecutive 2-quarter decline in GDP (Filardo, 1999). Recessions surrounded by financial crises last unusually long compared to normal recessions (IMF, 2002). Equation 4 defines GDP from an expenditure perspective, which gives the following equation:

$$Y = C + I + G + (X - M) \quad (4)$$

Where  $Y$  denotes the GDP which consists of  $C$  (private consumption),  $I$  (business investment),  $G$  (government expenditures on final goods and services) and  $(X - M)$  the difference between gross exports and gross imports.

A financial crisis can affect all components of GDP. Most scholars presuppose that a financial crisis has a negative impact on private consumption. The decline in consumption can be widespread across different sectors, ranging from housing improvement to tourist activities (Mian and Sufi, 2009; Papatheodorou, Rosello and Xiao, 2010). There are several reasons for a drop in household consumption as a consequence of a financial crisis. The main reason is that the supply of capital by banks becomes scarce: as banks face challenges in their investment returns they are stricter towards loaners. This makes it harder for the average man to get a loan in order to finance expenses such as a house or a car. In addition to the rising difficulties of credit

supply, the uncertainty that comes along with a financial crisis makes consumers prudent. Instead of spending money, households keep a nest egg for worse times which might be ahead.

Investment – the second component of GDP – shows a similar pattern as consumption; the difficulty of obtaining credit from financial institutions restricts firms in their investments. Campello, Graham and Harvey (2010) find that financially constrained firms plan to cut more investment, technology, marketing and employment relative to financially unconstrained firms during the recent global financial crisis. Nearly 90% of the financially constrained companies say that financial constraints limit their investment in attractive projects, whereas more than half of these firms cancel valuable investment opportunities. In addition to that, constrained firms show a higher propensity towards selling productive assets in order to generate funds during the crisis.<sup>8</sup>

The impact of a financial crisis on government spending depends on the monetary policy of the government. Most countries follow a counter-cyclical monetary policy as imposed by John Maynard Keynes (1936). By increasing government spending during times of crisis, governments try to boost the economy and to increase consumption and investment. Governments intend to ‘turn the tide’ as soon as possible. The idea of a government spending multiplier lies at base of a countercyclical policy; some economists and policy makers think that government spending has an effect on aggregate demand that exceeds the initial spending (Romer and Bernstein, 2009). Other scholars question the existence and the magnitude of such a multiplier effect (Cogan *et al.*, 2010). Reinhart and Rogoff (2009) find evidence that real government debts tend to explode as a consequence of a financial crisis. On average, real government debt increased 86 percent during the 18 major post-WWII financial crises. Often countercyclical fiscal policies contribute to this large increase in real government debt. Another factor which accounts for the increase in real government debt in the aftermath of a financial crisis is the collapse in tax revenues. As a consequence of the decline in

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<sup>8</sup> These authors fail to give a definition of when a firm is financially constrained and when it is unconstrained. One could argue that all firms are in some manner financially constrained. Therefore, the expressiveness of this research can be doubted.

output, tax revenues decline significantly in times of financial crises. (Reinhart and Rogoff, 2009).

A financial crisis often leads to a decline in trade, both in imports and in exports. The 2008-2009 financial crisis caused the biggest trade collapse ever registered; all World Trade Organization (WTO) countries faced a decline in both imports and exports (Bems, Johnson and Yi, 2012). Explanations for a decline in trade are twofold. On the producer side, the reduction in availability of external finance reduces a firm's production and export capacities. Because of long cash flow circles and payment uncertainty, international trade tends to be finance intensive relative to domestic trade. Companies tend to focus on production for the internal market in times of crisis. Financing disruptions can hit international trade harder than domestic trade (Feenstra *et al.*, 2011). On the consumer side of the trade story, the negative economic prospects related to a financial crisis lead to a slowdown in consumer demand in general and for imports in particular. Chor and Manova (2012) find that credit conditions were an important channel through which the global financial crisis affected trade volumes over time; countries with higher interbank rates and thus tighter credit markets exported less to the United States during the peak of the 2008-2009 financial crisis.

### **2.2.2 Other consequences of financial crises**

There are several other possible macro-scale impacts of financial crises. These consequences are associated with a recession, but not directly accounted for by the expenditure approach of GDP.

The first major consequence of a large financial crisis is the increase in poverty across the countries affected by that crisis. A 2010 World Bank report finds that the great recession following the 2008-2009 global financial crisis turned 64 million people into poverty. According to a survey carried out by Hurd and Rohwedder (2010) among American households, nearly 40 percent of the households have been affected either by unemployment, negative home equity, arrears on mortgage payments or foreclosure.

The prolonged decline in prices of certain assets or the devaluation of savings is another consequence of a financial crisis. Reinhart and Rogoff (2009) find that on average over

18 post-WWII financial crises, real housing prices declined 35 percent stretched over six years and real equity prices declined 55 percent over three and a half. A quarter of the respondents between 50-59 years old in the survey carried out by Hurd and Rohwedder (2010) reported that they had lost more than 35 percent of their retirement savings as a result of the 2008-2009 global financial crisis. Bricker *et al.* (2011) find that 60 percent of US households saw their wealth decline in the period 2007-2009, and 25 percent of the households lost more than half of their wealth in that period.

The rise of unemployment is arguably the consequence of a financial crisis with the largest social impact. On average over a period of four years, unemployment increases with 7 percentage points as a result of a financial crisis (Reinhart and Rogoff, 2009). In their study on several financial crises in the 1990's, Fallon and Lucas (2002) find that employment fell much less than production; employment even increased in some situations. However, these numbers are country aggregates which mask considerable rises in unemployment in several sectors, regions and employment status. Another consequence of financial crises can be a decline in real wages due to inflation. In Indonesia real wages declined by 44 percent in one year and Turkey by 31 percent as a result of different financial crises. In addition to a decline in real wage and a rise of unemployment, a financial crisis leads to job insecurity among those who still have a job (Adkins *et al.*, 2001). This uncertainty leads to organizational turbulence, which can cause the most capable and competent workers to leave organizations. As a result the less competent and capable workers are left to lead the organization through uncertainties (Bedeian and Armenakis, 1998).

From a social standpoint, the change in financial perspective as a consequence of a financial crisis can also influence the well-being of a person. Deaton (2011), studying US data on self-reported well-being, finds that Americans reported sharp declines in their life evaluation and sharp increases in worry and stress in the period 2008-2009. In Greece, in the period 2007-2009 suicide rates rose considerably and the national suicide helpline reported that a quarter of the callers faced financial difficulties (Kentikelenis *et al.*, 2011). Concluding, I argue that financial crises can have a large impact on society, both economically and socially.

## 2.3 Firm exports performance

A financial crisis can lead to a substantial decline in aggregate. The 2008-2009 financial crisis caused the largest trade collapse in history, contributing to the emergence of a long-lasting global recession which some scholars refer to as the Great Recession (Bems, Johnson and Yi, 2012). Economists mainly research the impact of the 2008-2009 financial crisis on exports at the country-level and at the industry-level. Research on the impact of the financial crisis on firm-level exports is underrepresented. In this section I give an overview of literature on firm-level exports performance. Based on this literature I derive the hypotheses which are tested in the empirical analyses of this paper.

### 2.3.1 The crisis effect

Scholars agree upon the fact that a financial crisis can have a negative effect on trade. A financial crisis can affect both imports and exports (Feenstra *et al.*, 2011; Bems, Johnson and Yi, 2012; Chor and Manova, 2012). Iacovone and Zavacka (2009) find that there is a negative effect of banking crises on exports growth at the country-level and at the industry-level. The baseline hypothesis of my research is that this *crisis effect* on exports also holds at the firm-level. I make the assumption that the severity of the financial crisis is a determinant for the decline in value of firm-level exports. The main hypothesis reads as follows:

**Hypothesis 1:** *Firms that are more severely hit by the financial crisis experience a greater decline in value of exports in the period 2008-2009 as compared to firms that are less severely hit by the financial crisis.*

### 2.3.2 The innovation moderation effect

According to Posner (1961), technical changes and innovations lie at the base of international trade. Temporary monopolies for a technical method or a product are an incentive for companies to imitate the inventor of the method or the product. This imitation leads to international interaction and trade. Moreover, according to the



Schumpeterian view, innovation should be the main factor driving export flows in advanced economies (Ebling and Janz, 1999).

In principle, decision makers at the firm-level – not at the country-level – make investment decisions on innovation. It is also primarily the firms that enjoy the benefits of innovation; cost reductions, new markets and potential monopoly rents (Wakelin, 1998). In a study on UK manufacturing firms, Wakelin (1998) finds that innovative firms are found to be more likely to export than non-innovative firms of the same size. In addition, the number of past innovations has a positive impact on the probability of an innovative firm exporting. Pla-Barber and Alegre (2007) find similar results among firms from the French biotechnology industry. They find that there is a positive and significant link between innovation and export intensity. Roper and Love (2002) find for UK and German manufacturing firms that being innovative has a strong effect on the probability and propensity to export. The degree of innovation and export propensity differs across countries; the scale of plants' innovation activity is positively related to export propensity in the UK, whereas in Germany there is a negative relationship between the scale of innovation activity and exports performance.

Little research has been carried out on the relationship between innovation and firm-level exports during a financial crisis. Basile (2001) studies the exports performance of Italian firms during different exchange rates. The results suggest that innovation capabilities are very important competitive factors that help explain heterogeneity in export behavior among Italian firms. In times of exchange rate devaluation, the importance of technological competitiveness in affecting exports declines. This follows from the fact that non-innovating firms can enter foreign markets more easily when the exchange rate is low. In economically more favorable times the advantage of innovative over non-innovative firms in terms of export probability and export propensity decreases.

Opposing rationale suggests that in economically harder times the advantage of innovative firms over non-innovative firms increases. A financial crisis affects exports performance of innovative firms less than it affects exports performance of non-innovative firms. Price and quality gain importance in times of restriction of credit, in

which case innovative firms outperform non-innovative firms in terms of exports. Innovative firms are able to sell higher quality products or the same quality products at lower prices than their non-innovating competitors. Hypothesis 2 assumes that there is an *innovation moderation effect*, in other words that innovation moderates the negative impact of a financial crisis on firm-level exports. The hypothesis reads as follows:

**Hypothesis 2:** *Innovative firms are less affected by the financial crisis in terms of a decline in value of exports in the period 2008-2009 than non-innovative firms.*

### 2.3.3 The import moderation effect

International trade can stimulate the introduction of new products in a country, as producers get access to new input varieties from abroad (Rivera-Batiz & Romer, 1991; Backus *et al.*, 1992). The question is whether this increased productivity also holds at the firm-level. Colantone and Crino (2014) find evidence that for European firm new imported outputs lead to product creation. They also find that these new imported inputs are an important stimulus to output growth in manufacturing at the country-level. Imports of intermediate products and capital equipment are important vehicles of international knowledge spillovers according to Damijan *et al.*, (2003).

Literature on exports performance of importing firms in times of a financial crisis is virtually non-existent. Therefore, I make the assumption that importing firms have access to the highest quality of goods and services available. I hypothesize that importing firms are more capable of dealing with financial drawbacks than non-importing firms. Therefore, these firms are less affected by a financial crisis in terms of exports performance than non-importing firms. I call this the *import moderation effect*.

**Hypothesis 3:** *Firms that import raw materials, goods or services from abroad are less affected by the financial crisis in terms of decline in value of exports in the period 2008-2009 than non-importing firms.*

### 2.3.4 The external finance severity effect

Whereas literature on the relationship between import, innovation and exports performance during financial crises is virtually non-existent, many scholars have

researched the relationship between firms' credit supply channels and exports performance.

Rajan & Zingales (1996) find that industrial sectors that are more in need of external finance (for example the drug industry) develop disproportionately faster in countries with more developed financial markets than in countries with less developed financial markets. Chor & Manova (2012) find that, in the 2008-2009 financial crisis, sectors with a high degree of external finance experience a larger decline in exports compared to other sectors.

Empirical literature suggests that at the firm-level credit restrictions explain at least partially the decline in production and exports during financial crises. Concerning the trade collapse in 2008Q3-2009Q2, Behrens *et al.* (2013) find that Belgian firms with shorter debt maturities and larger shares of financial debt in total liabilities tend to see a larger decline in exports. Bricongne *et al.* (2012) show similar results for French firms. In industries that are highly dependent on external finance, firms that are subject to tighter credit constraints experience larger declines in exports than other firms. Outside Europe, Coulibaly *et al.* (2013) find that Asian firms with higher working capital requirements and greater dependence on external finance experience a larger decline in total sales during the 2008-2009 financial crisis.

In this research, I test whether the hypothesis that firms that are more reliant on external finance face a larger decline in value of exports also holds across several European countries. Based on the empirical literature I hypothesize that there is an *external finance severity effect*. This means that firms that are reliant on external finance face a larger decline in value of exports compared to their counterparts that solely rely on internal sources of finance. This results in the following hypothesis:

**Hypothesis 4:** *Firms that are reliant on external finance are more affected by the financial crisis in terms of decline in value of export in the period 2008-2009 than firms that are non-reliant on external finance.*

### 3. Data and Methodology

This chapter discusses the construction of the data and the applied methodology. In section 3.1, I describe the data. In section 3.2, I discuss the first step of the analysis; the need for a cross-country experiment. Section 3.3 discusses the second step of the analysis; the design of the experiment.

#### 3.1 Data

The data I use in the empirical analyses are obtained from the *European Firms in a Global Economy* program (EFIGE). EFIGE is a research program financed by the Seventh Framework Program of the European Union. The aim of the research program is to gain insight in the international competitiveness of European firms. The unit of observation is the individual firm. EFIGE carried out surveys at manufacturing companies from the seven member states of the program (Austria, France, Germany, Hungary, Italy, Spain and the United Kingdom).<sup>9</sup> The questionnaire deals with the following firm-specific topics: A) structure of the firm, B) workforce, C) investment, technological innovation and R&D, D) internationalization, E) market & pricing and F) finance.<sup>10</sup> In addition to this information, the survey includes the location of the firm and the industry, indicated by the 4-digit NACE- code<sup>11</sup>. The data are gathered from January 2010 onwards and the survey includes several questions regarding the financial crisis. One question that deals with the financial crisis is the question which asks for the change in value of exports in 2009 compared to 2008. The results of the questionnaire form a database with cross-sectional data from 14,480 European manufacturing firms from seven countries. There are two major limitations to the data. First of all, the data are cross-sectional and do not measure changes in firm performance over an extended

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<sup>9</sup> <http://www.efige.org/about/> accessed January 20<sup>th</sup>, 2014.

<sup>10</sup> See Appendix 1 for the EFIGE questionnaire as designed by research institute Bruegel.

<sup>11</sup> NACE is a classification framework of economic activities introduced by the European Commission. NACE is the abbreviation for *Nomenclature statistique des activités économiques dans la Communauté européenne*. In this study the 4-digit NACE revision 2 code is converted into a 2-digit NACE revision 2 code to limit the number of industries.

period of time. Second, the data are self-reported and therefore dependent on the understanding and the sincerity of the respondents.

## **3.2 Methodology**

In this section I discuss the methodology of the research in two steps. First, I legitimize the choice for a cross-country experiment. The second step is the design of the experiment. In addition, I provide an overview of the variables that are used in the empirical analyses.

### **3.2.1 Measuring the crisis**

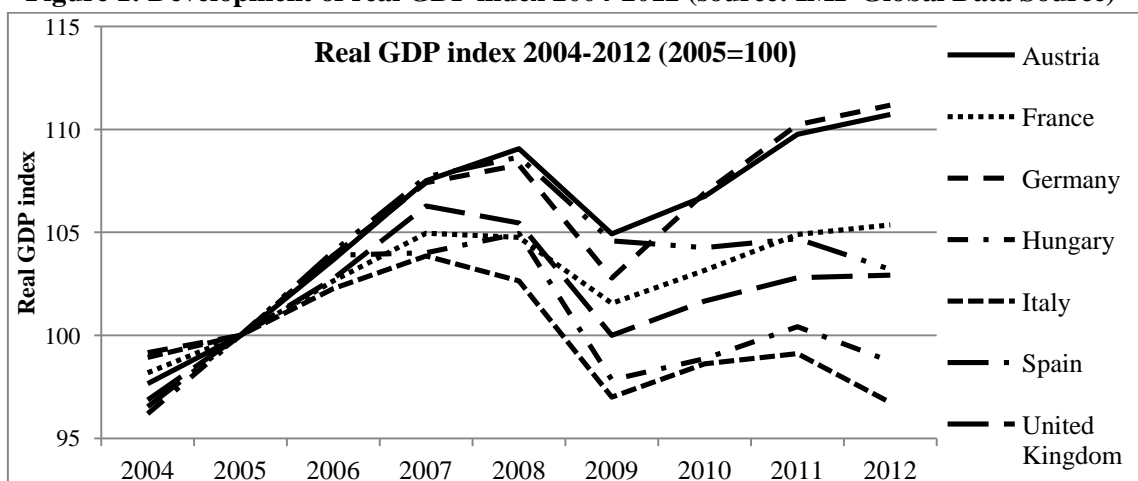
The hypotheses have in common that they investigate the impact of the 2008-2009 financial crisis on the value of exports in 2009 compared to 2008. The challenge is to find an indicator of the “severity of the financial crisis.” In an ideal situation, this degree of severity indicates the causal relationship between the crisis and a firm’s exports performance. Unfortunately, such an objective measure does not exist.

In order to distinguish between different levels of crisis severity, I carry out an experiment. The aim of this experiment is to compare firms that were hit by a more severe financial crisis with firms that were hit by a less severe financial crisis. I distinguish the observations at the country-level for two reasons. First, most macro-economic data focuses on the country as the unit of observation. Second, by choosing a cross-country experiment I preserve the largest possible number of observations for the key part of the empirical analyses in order to maintain explanatory power of the models.

I consider real GDP, unemployment data and average firm characteristics to make a distinction between two groups of countries; countries that are more severely hit by the financial crisis and countries that are less severely hit by the financial crisis. Figure 1 shows the development of the real GDP index in the countries that participate in the EFIGE program. The data originate from the International Monetary Fund Global Data

Source. All seven countries participating in the EFIGE program face a considerable decline in GDP in the period 2008-2009. In the year 2012 Austria and Germany are the two countries with the highest GDP Index. France and the United Kingdom also show a positive trend after the 2009 collapse in real GDP. The sharp drop in real GDP index in United Kingdom can be explained by that fact that this country has a relatively large financial industry compared to the other countries.<sup>12</sup> Spain has not been able to recover the initial growth in GDP level after the 2008-2009 collapse, facing a decline in real GDP to date. Hungary's and Italy's real GDP fall in 2008-2009 was the largest of all countries. Initially the real GDP of these countries seemed to recover, but both countries again showed a decrease in real GDP in the period 2011-2012.

**Figure 1: Development of real GDP index 2004-2012 (source: IMF Global Data Source)**



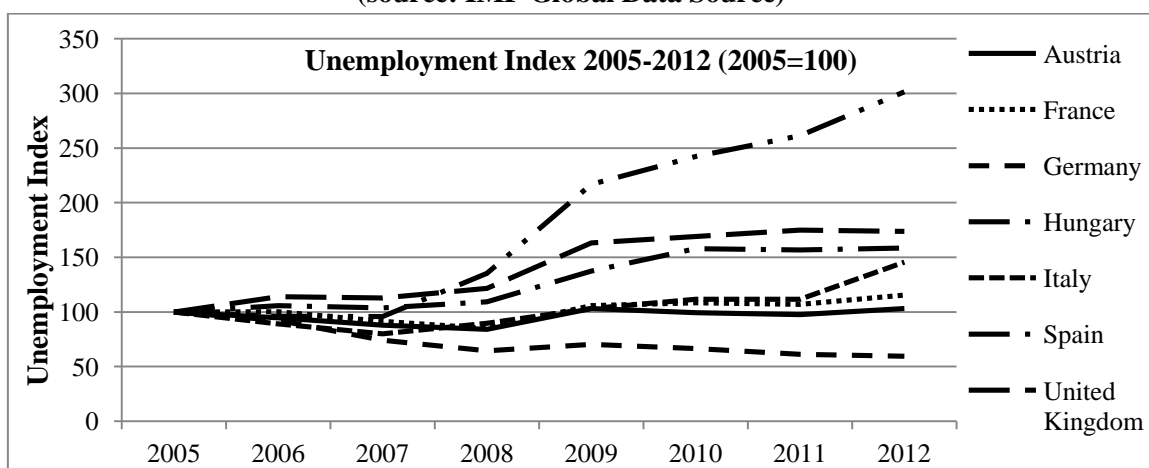
In addition to real GDP, unemployment is another indicator of the severity of the financial crisis. Figure 2 shows the development of the unemployment index for the EFIGE member countries in the period 2005-2012. Unemployment is expressed by the total number of unemployed people in the country in a given year. Germany is the only country with an unemployment index in 2012 which is lower than in 2005. All other countries faced a rise in unemployment index. Austria and France faced relatively limited increases in unemployment. The outlier is Spain, with an unemployment index

<sup>12</sup>

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTGLOBALFINREPORT/0,,contentMDK:23268788~pagePK:64168182~piPK:64168060~theSitePK:8816097,00.html> accessed March 14<sup>th</sup>, 2014. Private credit to GDP ratios in Austria and the United Kingdom exceed 85 percent.

in 2012 of over 300 compared to 2005. The unemployment index of the United Kingdom and Hungary rose considerably in the period 2007-2009 but seems to have stabilized since then. Together with Spain, Italy is the country with the sharpest increase in unemployment in the most recent years, 2011-2012.

**Figure 2: Development of Unemployment Index 2005-2012**  
(source: IMF Global Data Source)



In addition to real GDP and unemployment data, I consider average firm characteristics in the EFIGE countries to make a distinction between two types of countries. The main dependent variables are *external finance*, *importing*, *process innovation* and *product innovation*. The first dependent variable, *external finance* is a binary variable which equals 1 if a firm in the period 2008-2009 relied on any form of funds that were not generated internally. The second dependent variable is the binary variable *importing*. This variable equals 1 if a firm in the year 2008 purchased any raw materials, goods or services from abroad. The third and fourth dependent variable are indicators of innovation; both *process innovation* and *product innovation* are binary variables which equal 1 if a firm carried out any process or product innovation respectively in the period 2007-2009. The definition of process innovation used in the questionnaire is the adoption of a production technology which is either new or significantly improved. The innovation should be new to the firm, not necessarily in the market. The definition of product innovation is the introduction of a good which is either new or significantly improved with respect to its fundamental characteristics. As for process innovation, the

product innovation should be new to the firm, not necessarily to the market. The main independent variables are the country dummies which equal 1 if a firm is located in a given country. I control for industry effects to not pollute the country effects on the dependent variables with differences in spread across industries and firm sizes. For example, Germany has a relatively large automotive industry. Rajan and Zingales (1996) find that companies in the motor vehicle industry have a relatively large dependence on external finance. I control for these industry effects on the propensity to innovate, import or rely on external finance by including industry dummies. These dummies correspond with the two-digit NACE-code of the firm. In addition, I include a control variable for firm size in terms of the number of employees. Large firms arguably have innovative advantage in capital intensive industries compared to small firms (Acs and Audretsch, 1987). To control for these firm size effects I include firm size dummies.

As the dependent variables are binary variables, I carry out a Probit regression model to measure the relationship between the dependent variables and the independent variables.<sup>13</sup> The Probit model estimates the relationship of the independent variables with the binary independent variable by restricting the estimates and confidence intervals to values between 0 and 1. I provide the partial effects of the results of the Probit model, as they allow interpretation of the coefficients of the country effects on the propensity towards the dependent variables.

Table 1 provides an overview of firm characteristics in the participating countries. The results show that firms from Italy and Spain have a significant higher propensity towards being reliant on external finance compared to firms from base country France. Italian firms and Spanish firms on average have a propensity to being reliant on external finance which is 20.4, respectively 25.9 percentage points higher than French firms. On the other hand, firms from Austria and Germany have a significant lower propensity to rely on external finance compared to base country France. With respect to importing goods and services from abroad for domestic production, firms from all countries on

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<sup>13</sup> All regression analyses are conducted using the statistical program STATA12.



average have a significant lower propensity towards being an importing firm compared to firms from France. Firms from the United Kingdom, Germany and Austria have a relatively low propensity towards being an importing firm. German firms, on average, have a propensity towards being an importing firm which is 32.8 percentage points lower than French firms. Apart from French firms, Spanish and Italian firms on average have the highest propensity to being an importer of goods and services from abroad.

Austrian and British firms have the highest propensity to carry out process innovation, whereas firms from Hungary, Germany and Spain have the lowest propensity to carry out process innovation. Austrian firms on average have the largest propensity towards carry out product innovation. The fact that a firm is based in Austria compared to in France increases the propensity to be a product innovating firm by 20.4 percentage points. Whereas Spanish firms on average carry out limited process innovation, the results show that they have a relatively high propensity towards being a product innovator compared to firms from all other countries apart from Austria.

**Table 1 – Country effects on the main variables**

<b>Dependent variable</b>	<b>External finance</b>	<b>Importing</b>	<b>Process innovation</b>	<b>Product innovation</b>
<i>Austria</i>	-0.149*** [0.028]	-0.248*** [0.022]	0.179*** [0.028]	0.204*** [0.028]
<i>Germany</i>	-0.184*** [0.013]	-0.328*** [0.011]	0.011 [0.013]	0.006 [0.013]
<i>Hungary</i>	0.054** [0.022]	-0.150*** [0.020]	-0.018 [0.024]	-0.045* [0.025]
<i>Italy</i>	0.204*** [0.012]	-0.021* [0.012]	0.042*** [0.013]	0.095*** [0.013]
<i>Spain</i>	0.259*** [0.012]	-0.043*** [0.012]	0.017 [0.013]	0.159*** [0.013]
<i>United Kingdom</i>	0.004 [0.013]	-0.246*** [0.012]	0.111*** [0.014]	0.082*** [0.014]
Industry fixed effects	yes	yes	yes	yes
Firm size fixed effects	yes	yes	yes	yes
No. Observations	14,480	14,480	14,480	14,480
Overall R <sup>2</sup>	0.092	0.103	0.074	0.042

Notes: (i) Table 1 estimates the country effects on the probability of whether a firm relies on external finance, whether a firm imports goods or services from abroad and whether a firm executed process or product innovation in the years 2007-2009, (ii) the base country is France, (iii)\*\*\*/\*\*/\* represent significance levels at 1%,5% and 10% respectively, (iv) Standard errors between brackets are clustered at the firm level, (v) source: EFIGE 2010.

Based on the results obtained from Table 1 and Figure 1 and 2, I construct an experiment with a treatment group and a control group. The treatment group is deemed to be exposed to the most severe financial crisis and the control group to the least severe financial crisis. I choose Spain and Italy as the treatment group because real GDP figures of these countries show that to date they have not been able to maintain an upward trend after the 2008-2009 real GDP drop. In the years 2011-2012 these countries showed the largest increase in unemployment index. In addition, firms from these countries have the highest propensity to being reliant on external finance. I choose firms from the United Kingdom and Germany as the control group. Both countries have shown a constant recovery in terms of real GDP after the 2008-2009 drop. Austria too, seems recover from the crisis in terms of real GDP. However, only limited data are available in the EFIGE database for Austrian firms. In order to maintain explanatory power of the models, I choose United Kingdom and Germany as the control group. In addition, firms from these countries are relatively similar in terms of propensity to being an importing firm or being an innovating firm.

### **3.2.2 Sample selection**

Of the 14,480 firms that answered the EFIGE survey, 7,736 firms indicated to undertake export activities from their home country to other countries. A number of 7,604 firms out of these 7,736 exporting firms answered the question whether they experienced a reduction or an increase in terms of value of their export activities from their home country in the period 2008-2009. The second part of the analysis makes use of firm data from countries which belong to the control group (Germany and United Kingdom) or the treatment group (Italy and Spain). Firms from Austria, Hungary and France are not taken into account. A total number of 5,872 form the sample of the cross-country experiment. Of the 5,872 firms which answered all relevant questions, 3,352 firms belong to the treatment group and 2,520 firms to the control group. Table 2 shows the geographical spread of the sample firms across the different countries. Most firms are located in Italy (1,945 firms), followed by Spain (1,407 firms). I use data from 1,298 German and 1,222 British firms in the second part of the analysis.

**Table 2 - Distribution of observations from sample across countries**

<b>Group</b>	<b>Country</b>	<b>Observations</b>	<b>Percent</b>	<b>Cum.</b>
<i>Control Group</i>	<i>Germany</i>	1,298	22.10	22.10
	<i>United Kingdom</i>	1,222	20.81	42.91
<i>Treatment Group</i>	<i>Italy</i>	1,945	33.12	76.03
	<i>Spain</i>	1,407	23.96	100.00
<b>Total</b>		<b>5,872</b>	<b>100.00</b>	

Notes: (i) Table 2 provides an overview of the distribution of the firms across the treatment group and the control group and the corresponding countries, (ii) source: EFIGE 2010.

Table 3 provides an overview of the spread of the firms across 22 industries. Most companies are manufacturers of fabricated metal products and equipment and machinery. The industries *manufacture of tobacco products* and *manufacture of coke, refined petroleum products and nuclear fuel* are the least represented industries with 5 and 11 firms.

In most industries the division of the number of observations across the treatment group and the control group is approximately proportional to the total number of observations. Some industries however are over- or underrepresented in the treatment group. The largest outlier is the industry with NACE-code 19, *manufacture of leather and leather products*. This industry only has 12 observations in the control group and 113 in the treatment group. In the manufacture of complicated technical products and instruments more firms originate from the control group than from the treatment group. Examples the industries with NACE-codes 32, *manufacture of radio, television and communication equipment* and NACE-code 33, *manufacture of medial precision and optical instruments, watches and clocks*. This overview confirms – assuming that the firms participating in the EFIGE questionnaire are a random and representative sample – that more firms in Italy and Spain are active in the processing of basic materials and less firms in high-tech industries compared to firms from the United Kingdom and Germany.

**Table 3 - Distribution of observations from sample across industries**

<b>NACE code*</b>	<b>Description of sector</b>	<b>Total obs.</b>	<b>Treatment group</b>	<b>Control group</b>
15	Manufacture of food products and beverages	510	352	158
16	Manufacture of tobacco products	5	3	2
17	Manufacture of textiles and textile products	258	175	83
18	Manufacture of wearing apparel; dressing and dyeing of fur	116	87	29
19	Manufacture of leather and leather products	125	113	12
20	Manufacture of wood and wood products	197	126	71
21	Manufacture of pulp, paper and paper products	124	67	57
22	Publishing, printing and reproduction of recorded media	214	67	147
23	Manufacture of coke, refined petroleum products and nuclear fuel	11	4	7
24	Manufacture of chemicals and chemical products	322	179	143
25	Manufacture of rubber and plastic products	407	223	184
26	Manufacture of other non-metallic mineral products	201	132	69
27	Manufacture of basic metals	166	107	59
28	Manufacture of fabricated metal products, except machinery and equipment	921	556	365
29	Manufacture of machinery and equipment n.e.c.	933	520	413
30	Manufacture of office machinery and computers	24	7	17
31	Manufacture of electrical machinery and apparatus n.e.c.	275	132	143
32	Manufacture of radio, television and communication equipment and apparatus	142	41	101
33	Manufacture of medical, precision and optical instruments, watches and clocks	217	58	159
34	Manufacture of motor vehicles, trailers and semi-trailers	113	75	38
35	Manufacture of other transport equipment	62	39	23
36	Manufacture of furniture; manufacturing n.e.c.	529	289	240
<b>Total</b>		<b>5,872</b>	<b>3,352</b>	<b>2,520</b>

Notes: (i) Table 3 gives an overview of the distribution of the different firms in the treatment group and the control group across 22 industries. Industry is defined at the 2-digit level NACE code, (ii) source: EFIGE 2010.

### 3.2.3 Variables

The main dependent variable in the cross-country experiment is *delta export*. This continuous variable is a percentage that indicates the change in the value of exports in 2009 compared to 2008.

The main independent variables measure the effect of firm characteristics on the impact of the financial crisis on exports performance. The first independent variable is the binary variable *process innovation*, which equals 1 if a firm in the period 2007-2009 carried out any process innovation. The second independent variable is the binary variable *product innovation* which equals 1 if a firm in the period 2007-2009 carried out any product innovation. The third independent variable is the binary variable *importing*. This variable equals 1 if a firm in the year 2008 purchased any raw materials, goods or services from abroad for its domestic production. The fourth independent variable is the binary variable *external finance*, which equals 1 if a firm in the period 2008-2009 relied on any form of funds that were not generated internally.

In addition to these independent variables, I also include the variable *treatment group* in the empirical analysis. This binary variable equals 1 if a firm is based in either the countries Italy or Spain and equals 0 if a firm is based in Germany or the United Kingdom. As I attempt to measure the impact of firm characteristics on the crisis effect on firm-level exports, I include interaction terms between main the independent variables and the variable *treatment group*. These interaction terms measure whether the effect of the independent variables on the dependent variable differs for firms in the treatment group and the control group.

I control for industry effects and firm size effects by including industry dummies and firm size dummies. The industry dummies prevent pollution in deviations in the dependent variable by industry differences. Firm size dummies control for firm effects on exports performance. Table 4 gives an overview of the variables.

Table 4 – List of variables

Variable name	Definition
<b>Dependent variable:</b>	
<i>Delta export</i>	Continuous variable. Percentage that indicates the change in the value of export in 2009 as compared to 2008.
<b>Independent variables:</b>	
<i>External finance</i>	Dummy variable. Equal to 1 if a firm in the period 2008-2009 relied on any form of funds that were not generated internally.
<i>Importing</i>	Dummy variable. Equal to 1 if a firm in the year 2008 purchased any raw materials, goods or services from abroad for its domestic production.
<i>Process innovation</i>	Dummy variable. Equal to 1 if a firm in the period 2007-2009 carried out any process innovation. Process innovation is defined as the adoption of a production technology which is either new or significantly improved; the innovation should be new to the firm, not necessarily in the market.
<i>Product innovation</i>	Dummy variable. Equal to 1 if a firm in the period 2007-2009 carried out any product innovation. Product innovation is defined as introduction of a good which is either new or significantly improved with respect to its fundamental characteristics; the innovation should be new to the firm, not necessarily to the market.
<i>Treatment group</i>	Dummy variable. Equal to 1 if a firm is established in the countries Italy or Spain. Equal to 0 if a firm is established in the countries Germany or the United Kingdom.
<i>Treatment*process innovation</i>	Dummy variable. Interaction term between the treatment group and process innovation. Equal to 1 if a firm is established in either Italy or Spain and if a firm carried out process innovation in the period 2007-2009.
<i>Treatment*product innovation</i>	Dummy variable. Interaction term between the treatment group and product innovation. Equal to 1 if a firm is established in either Italy or Spain and if a firm carried out product innovation in the period 2007-2009.
<i>Treatment*importing</i>	Dummy variable. Interaction term between the treatment group and the variable importing. Equal to 1 if a firm is established in either Italy or Spain and if a firm in the year 2008 purchased any raw materials, goods or services from abroad for its domestic production.
<i>Treatment*external finance</i>	Dummy variable. Interaction term between the treatment group and the variable external finance. Equal to 1 if a firm is established in either Italy or Spain and if a firm in the period 2008-2009 relied on any form of funds that were not generated internally.
<b>Control variables:</b>	
<i>Industry</i>	Industry dummy variable. Equal to 1 if a firm is referenced in particular industry, corresponding with two-digit NACE codes.
<i>Firm size</i>	Firm size dummy variable. Equal to 1 if a firm has a certain number of employees. Firm size 1 corresponds with 10-19 employees, Firm size 2 with 20-49 employees, Firm size 3 with 50-249 employees and Firm size 4 with >250 employees.

### 3.3 Revised hypotheses

The initial hypotheses as stated in section 2.3 assume that there is an objective degree of severity of a financial crisis. However, such an objective measure does not exist. Therefore, I conduct a cross-country experiment with a treatment group and a control group. In this section I rewrite the initial hypotheses in such way that they can be tested with the data from the EFIGE program.

I rewrite hypothesis 1, which indicates the *crisis effect* of the financial crisis, in such way that firms from the treatment group – subject to a more severe financial crisis – experience a larger decline in value of exports than firms in the control group – subject to a less severe financial crisis. The revised hypothesis becomes:

**Revised Hypothesis 1:** *Firms in the treatment group experience a greater decline in value of exports in the period 2008-2009 than firms in the control group.*

I revise the other hypotheses, presupposing an *innovation moderation effect*, an *import moderation effect* and an *external finance severity effect* in the same manner as the first hypothesis. Concerning the experiment, I rewrite these hypotheses in such way that the crisis effect on firm-level exports in the treatment group – subject to a more severe financial crisis – is affected by innovation, importing and external finance. The revised hypotheses read as follows:

**Revised Hypothesis 2:** *The crisis effect is smaller for firms that innovate than for firms that do not innovate.*

**Revised Hypothesis 3:** *The crisis effect is smaller for firms that import than for firms that do not import.*

**Revised Hypothesis 4:** *The crisis effect is larger for firms that are reliant on external finance than for firms that are not reliant on external finance*

### 3.4 Estimation method

The main aim of this research is to measure the impact of the 2008-2009 financial crisis on firm-level exports. The data measure self-reported exports performance at one moment in time. As the data are cross-sectional, it is not possible to apply a difference-in-difference approach. I apply an OLS regression method to measure the relationship of the independent variables on the dependent variable exports growth.

The OLS models estimate the following equation:

$$\begin{aligned}
 \text{delta export} = & \beta_0 + \beta_1 * \text{process innovation} + \beta_2 * \text{product innovation} + \beta_3 \\
 & * \text{external finance} + \beta_4 * \text{importing} + \beta_5 * \text{treatment group} + \beta_6 \\
 & * \text{treatment} * \text{process innovation} + \beta_7 * \text{treatment} \\
 & * \text{product innovation} + \beta_8 * \text{treatment} * \text{importing} + \beta_9 \\
 & * \text{treatment} * \text{external finance} + \sum_{\gamma=15}^{37} \gamma * \text{industry} \\
 & + \sum_{\delta=1}^4 \delta * \text{firm size} \tag{5}
 \end{aligned}$$

Where *delta export* denotes the exports growth in the period 2008-2009, expressed as a percentage. The equation estimates the effect of the binary variables *process innovation*, *product innovation*, *external finance*, *importing* and *treatment group* on exports growth. In addition, interaction terms between the variables *treatment group* and the main independent variables are included in the models. I add control variables for industry and firm size effects on exports growth.



## 4. Results and Discussion

The first part of the following section presents descriptive statistics which give insight in the main features of the data. Thereafter, I present the regression results for the model described in the previous section. In addition, I present the results of several robustness checks. At the end of this section, I discuss the outcomes per hypothesis.

### 4.1 Descriptive statistics

Table 5 gives an overview of average firm characteristics in the treatment group compared to average firm characteristics in the control group. On average, firms located in the United Kingdom and Germany (the control group) faced a decline in value of exports in 2009 compared to 2008 of 7.1 percentage points, whereas firms from either Spain or Italy (the treatment group) faced an average decline of 13.0 percentage points. The standard deviation in *delta export* for firms in the treatment group (30.9%) is larger than the standard deviation in *delta export* for firms in the control group (27.5%).

There is a separation between *process innovation* and *product innovation* in the treatment group and the control group. Nearly two thirds (65.8%) of the firms from the control group reports to have carried out *process innovation* in the period 2007-2009, compared to 57.9% in the treatment group. A slightly higher percentage of firms of the treatment group (51.5%) than in the control group (50.7%) indicated to have carried out *product innovation* in the period 2007-2009.

The differences between firms in the treatment group and the control group in terms of *external finance* and *importing* are larger than the differences in terms of innovation. The percentage of firms in the treatment group that relies on external funds is more than twice as high as in the control group (63.0% compared to 29.7%). A higher degree of Italian and Spanish firms report to import raw materials, goods or services from abroad compared to German and British firms, 88.1% and 62.1% respectively.

**Table 5 – Summary statistics main variables from sample**

Variable	Treatment Group (n=3,352)		Control Group (n=2,520)	
	Mean	Standard deviation	Mean	Standard deviation
<i>Delta export</i>	-12.996	30.884	-7.050	27.499
<i>Process innovation</i>	0.579	0.494	0.658	0.474
<i>Product innovation</i>	0.515	0.500	0.507	0.500
<i>External finance</i>	0.630	0.483	0.297	0.457
<i>Importing</i>	0.881	0.324	0.621	0.485

Notes: (i) Table 5 gives summary statistics of the main variables for both the treatment group and the control group. Delta export is a continuous variable which measures the change in value of exports in 2009 compared to 2008, expressed as a percentage. Process innovation, product innovation, external finance and importing are binary variables. (ii) source: EFIGE 2010.

In Table 6 the average change in value of exports is presented per country. The average decline in value of exports for firms from Italy is the largest of the four countries: 13.3 percentage points. Firms from the United Kingdom on average report the smallest decline in value of exports in 2009 compared to 2008; 6.3 percentage points. The standard deviation of the coefficient of exports growth is smallest for Germany (24.4 percentage points) and largest for Spain (35.3 percentage points). All countries have at least one firm that reported it stopped exporting in 2009, shown by the 100 percentage points decline in value of exports. On the other hand, all countries also have at least one firm that faced a doubling in the value of their exports despite the trade collapse, shown by the 100 percentage points increase in value of exports..

**Table 6 - Change in value of exports in 2009 compared to 2008 per country, percent**

Country	Mean	Standard deviation	Min.	Max.	Obs.
<i>Germany</i>	-7.692	24.37	-100	100	1,298
<i>Italy</i>	-13.321	27.274	-100	100	1,945
<i>Spain</i>	-12.547	35.276	-100	100	1,407
<i>United Kingdom</i>	-6.267	30.468	-100	100	1,222
<b>Total</b>	<b>-10.444</b>	<b>29.623</b>	<b>-100</b>	<b>100</b>	<b>5,872</b>

Notes: (i) Table 6 shows the mean, standard deviation and extreme values of the change in value of firm-level exports in 2009 as compared to 2008, expressed as a percentage and presented per country. (ii) source: EFIGE 2010.

## 4.2 Regression results

In this section I present the results of the OLS regression analyses. Table 7 shows that process innovation has a significant positive effect on exports growth and that firms in the treatment group experience a significant decrease in value of exports compared to firms in the control group. Column 1 does not include control variables. Column 2 and column 3 include industry dummies, respectively firm size dummies. Column 4 presents the results for the model including both industry and firm size dummies. On average, firms that carry out process innovation experience a 4.0 percentage points higher exports growth than firms that do not carry out process innovation. If industry dummies are added, this significant positive effect drops to 3.4 percentage points (column 2). Including firm size dummies only slightly changes the coefficients of the independent variables. If control variables are added for both industry and firm size effects, the significant positive effect of process innovation on exports growth is 3.4 percentage points.

Firms that import goods and services from abroad and firms that carry out product innovation tend to have a lower exports growth compared to their non-importing and non-innovative counterparts. The negative effect of product innovation on exports growth is 0.05 percentage points (column 1). If control variables for firm size effects and industry effects are added, the effect of product innovation on exports growth changes to 0.07 percentage points (column 2, 3 and 4). However, the effect of product innovation on exports performance is not statistically significant. External finance has a positive effect of 1.1 percentage points on exports growth in the basic model in column 1. If industry dummies are included, this effect declines to 1.0 percentage points. However, the effect of external finance on exports performance is not statistically significant. The results show that the effect of the variable *importing* on exports growth is -1.3 percentage points (column 1). When controlling for industry effects, this effect drops to -0.4 percentage points (column 2). If I only control for firm size effects, the effect is -1.3 percentage points (column 3). In the model with control variables for both industry effects and firm size effects, the effect drops again to -0.4 percentage points

(column 4). However, the coefficients of the variable importing are not statistically significant in all four models.

Firms in the treatment group experience a significant decrease in value of exports of 5.6 percentage points compared to firms in the control group. Columns 2, 3 and 4 show that if control variables are added for industry and firm size effects, this significant negative effect increases (5.8 percentage points). The explanatory power of the models increases if I control for industry effects, as the value of the  $R^2$  increases from 0.015 to 0.045.

**Table 7 Firm characteristics and firm-level exports (1)**

<b>Dependent variable Delta export</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<i>Process innovation</i>	4.025*** [0.827]	3.432*** [0.823]	4.041*** [0.828]	3.433*** [0.823]
<i>Product innovation</i>	-0.049 [0.786]	-0.069 [0.789]	-0.068 [0.795]	-0.068 [0.789]
<i>External finance</i>	1.079 [0.844]	1.045 [0.840]	1.082 0.847	1.046 [0.840]
<i>Importing</i>	-1.303 [0.918]	-0.419 [0.915]	-1.312 [0.922]	-0.419 [0.915]
<i>Treatment group</i>	-5.648*** [0.869]	-5.800*** [0.869]	-5.773*** [1.131]	-5.800*** [0.904]
Industry dummies	-	yes	-	yes
Firm size dummies	-	-	yes	yes
No. Observations	5,872	5,872	5,872	5,872
$R^2$	0.015	0.045	0.015	0.045

Notes: (i) Table 7 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. Column 1 represents a basic model without any controls for firm size or industry effects. Column 2 includes industry effects based on the 2-digit NACE codes. The model in column 3 includes firm size dummies, which are dependent on the number of employees of the firm. The complete model including both industry and firm size effects is shown in column 4, (ii)\*\*\*/\*\*/\* represent significance levels at 1%,5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

The next stage of the analysis is to include interaction terms between the variable *treatment group* and the independent variables. In this way, I attempt to measure the effect of the independent variables on exports performance for firms in the treatment group. It also gives insight into which firm characteristics moderate or increase the negative effect of the financial crisis on exports performance. The results are presented in Table 8.

Column 1 is the basic model without interaction terms, but including control variables for industry and firm size effects, which corresponds to the model presented in Table 7, column 4. In the columns 2-6, I present the results of models which include interaction terms between the variable *treatment group* and the other independent variables.

The effect of the treatment group on exports performance is negative and significant for all models. In the basic model (column 1), the coefficient is -5.8 percentage points. If interaction terms are included, the magnitude of the negative effect increases. The exception on this rule is the model which includes the interaction term between process innovation and treatment group (column 2). In the most extended model (column 6), there is a significant effect of the variable *treatment group* on exports growth of -9.6 percentage points. This suggests that firms from Italy and Spain on average experience a decline in value of exports of 9.6 percentage points compared to firms from Germany and the United Kingdom. These results support hypothesis 1, which states that firms from the treatment group – more severely affected by the financial crisis – experience a greater decline in value of exports compared to firms from the control group.

For all models including interaction terms, the effect of process innovation on exports growth is positive and significant. In the model including the interaction term between the variables *treatment group* and *process innovation* (column 2), the significant positive effect is 4.1 percentage points. In the models including interaction terms between the variable *treatment group* and the other variables, the coefficient fluctuates around 3.4 percentage points. In the complete model including all interaction terms (column 6) the effect increases to 4.7 percentage points. This suggests that on average firms in the treatment group that carry out process innovation experience an export growth of 3.4-4.7 percentage points compared to non-innovating firms in the treatment group.

The effect of product innovation on exports growth is slightly negative in the basic model (column 1) and becomes more negative as interaction terms between the variable *treatment group* and all independent variables are included. The exception to this rule is

the model which includes the interaction term between importing and treatment group (column 4). In this model, the coefficient of product innovation becomes slightly positive (0.008). However, the effect of product innovation on exports growth is not statistically significant in any of the models presented in table 8.

In the extended model, presented in column 6, we see that the interaction term between the variables *treatment group* and *process innovation* has a coefficient of -2.1 percentage points. These results show that firms in the treatment group that carry out process innovation on average face a decline in value of exports of 2.1 percentage points compared to firms in the treatment group that do not carry out process innovation. The coefficient of the interaction term between the variables *treatment group* and *product innovation* has a positive value of 1.8 percentage points. Whereas the effect of process innovation on exports growth over the whole sample is significant and positive, this effect is negative and not statistically significant in the treatment group. The effect of product innovation on exports growth is negative (-1.1 percentage points) over the whole sample, but positive (1.8 percentage points) in the treatment group. However, both coefficients are not statistically significant. As the coefficients are not statistically significant, I conclude that the results show no support for hypothesis 2. According to the results of the empirical analyses, innovation does not moderate the negative effect of the financial crisis on exports growth.

The results show that the negative effect of *importing* on exports growth is only statistically significant in the model which includes the interaction term between the variables *treatment group* and *importing* (column 4) and in the extended model presented in column 6. The results show that if the model includes the interaction term between the variables *treatment group* and *importing*, there is a significant negative effect of importing on exports growth, -2.4 percentage points. In the extended model presented in column 6, the interaction term is positive and significant with a coefficient of 5.4 percentage points. The results indicate that firms in the treatment group that import on average experience an exports growth of 5.4 percentage points compared to firms in the treatment group that do not import. These results support hypothesis 3

which states that the import of goods and services from abroad moderates the negative effect of the financial crisis on exports growth.

The results suggest that there is a positive effect of external finance on exports performance. However, in none of the presented models is this effect statistically significant. The coefficient of the interaction term between the variables *treatment group* and *external finance* (columns 5 and 6) is positive. For the model which only includes the interaction term between the variables *treatment group* and *external finance* the coefficient is 0.6 percentage points (column 5). These results show that firms in the treatment group that rely on external finance have an exports growth of 0.6 percentage points compared to firms in the treatment group that do not rely on external finance. In the extended model (column 6), this positive effect decreases to 0.2 percentage points. This suggests that instead of an external finance *severity* effect there is an external finance *moderation* effect on the impact of the financial crisis on exports growth. However, both coefficients are not statistically significant. Therefore, I conclude that the results show no support for the hypothesis 4.

**Table 8 Firm characteristics and firm-level exports (2)**

<b>Dependent variable: Delta export</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
<i>Process innovation</i>	3.433*** [0.823]	4.145*** [1.178]	3.474*** [0.819]	3.404*** [0.820]	3.410*** [0.821]	4.709*** [1.186]
<i>Product innovation</i>	-0.068 [0.789]	-0.085 [0.781]	-1.055 [1.093]	0.008 [0.782]	-0.044 [0.782]	-1.108 [1.102]
<i>External finance</i>	1.046 [0.840]	1.079 [0.836]	1.045 [0.827]	1.058 [0.836]	0.728 [1.292]	0.947 [1.292]
<i>Importing</i>	-0.419 [0.915]	-0.441 [0.912]	-0.347 [0.913]	-2.394** [1.094]	-0.399 [0.911]	-2.388** [1.107]
<i>Treatment group</i>	-5.800*** [0.904]	-4.915*** [1.135]	-6.590*** [1.156]	-9.880*** [1.695]	-5.935*** [1.089]	-9.594*** [2.006]
<i>Treatment*process innovation</i>		-1.224 [1.575]				-2.072 [1.611]
<i>Treatment*product innovation</i>			1.757 [1.513]			1.799 [1.538]
<i>Treatment*importing</i>				5.341*** [1.902]		5.360*** [1.923]
<i>Treatment*external finance</i>					0.569 [1.681]	0.177 [1.689]
Industry dummies	yes	yes	yes	yes	yes	yes
Firm sized dummies	yes	yes	yes	yes	yes	yes
No. Observations	5,872	5,872	5,872	5,872	5,872	5,872
R <sup>2</sup>	0.045	0.044	0.044	0.044	0.044	0.045

Notes: (i) Table 8 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. In column 1 the results of the basic model which controls for firm size and industry effects are presented. The models in columns 2-5 include interaction terms between the variable *treatment group* and one of the independent variables. The model in column 6 includes interaction terms between the variable *treatment group* and all independent variables, (ii) \*\*\*/\*\*/\* represent significance levels at 1%,5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.



### 4.3 Robustness checks

In this section, I perform robustness checks on the results obtained in the previous section. In sections 4.3.1 and 4.3.2, I replace the independent variables *process innovation*, *product innovation* and *external finance* with other possible indicators of those firm characteristics. In sections 4.3.3 till 4.3.7, I test the model with additional control variables for ownership structure, firm size, organizational structure, profit margins and internationalization of the firm. The section ends with a model which controls for all of these additional checks presented in the preceding sections.

#### 4.3.1 R&D

The measures of innovation in the previous analyses may be less reliable and objective, as they are based on the perception of the respondents of the questionnaire. It may differ across countries, industries and respondents what they consider is an innovation. Instead, research and development (R&D) is widely understood and it may reflect more accurately the concept of innovation. R&D is defined in the EFIGE questionnaire as ‘creative activities aimed at increasing knowledge and using this knowledge in new applications, such as in the development of technologically new or improved products or processes.’ Ideally, I would like to include a lag variable for R&D as it takes some time for R&D to have impact on the actual exports performance. However, as the data from the EFIGE questionnaire are cross-sectional, this is not possible. Therefore, I am restricted to R&D data from one year.

In the models presented in Table 9, I show the results of the same regression analysis as the most elaborate model in the previous section (Table 8, column 6), but instead of innovation I use R&D as a proxy for innovation. The first model (column 2) uses the binary variable *R&D*, which equals 1 if a firm carried out any R&D activities in the period 2007-2009. Furthermore the interaction term between the variables *treatment group* and *R&D* is estimated. In the second model (column 3) I use the variable *external R&D* and the interaction term between the variables *treatment group* and *external R&D*.

*External R&D* equals 1 if a firm acquired any R&D activities from external sources. The third model (column 4) uses a continuous variable, *R&D level*. This variable indicates the percentage of total turnover that the firm on average invested in R&D activities in the period 2007-2009. In the third model I also include the interaction term between the variables *treatment group* and *R&D level*.

The results of the first model (column 2) show that the coefficient of R&D is positive and significant at a 5% significance level. This suggests that on average firms which carry out R&D activities face a growth in value of exports which is 2.8 percentage points higher than firms which do not undertake any R&D activities. The interaction term between treatment group and R&D is slightly positive, which suggests that firms from the treatment group that undertake R&D activities have a 0.2 percentage points higher exports growth than firms from the treatment group that do not carry out R&D. However, this effect is not statistically significant. Replacing innovation by R&D does not change the sign or the significance level of the coefficients of the other independent variables. The magnitude of the coefficient of *treatment group* increases to -10.4 percentage points. These results show that firms in the treatment group on average face a decline in value of exports of 10.4 percentage points compared to firms in the control group.

The results estimated by the second model (column 3) show that there is negative effect of external R&D on exports growth. However, this effect is not statistically significant. The interaction term between treatment group and external R&D is positive, which indicates that firms in the treatment group that obtain external R&D experience an increase in value of exports of 0.1 percentage points compared to firms that do not obtain external R&D. However, this effect is not statistically significant. The signs and significance levels of the other variables remain the same as in the extended model presented in column 1. An exception is coefficient of the variable *importing*, which is significant at a 10% significance level in the second model (column 2) compared to at a 5% significance level in the model presented in column 1.

The coefficient of the variable *treatment group* falls to -10.5 percentage points if external R&D is used as a proxy for innovation.

In the third model (column 4), I replace innovation with the continuous variable *R&D level*. The results show that the R&D level has a significant positive effect of 0.2 percentage points on exports growth, indicating that for each percent of annual turnover invested in R&D the value of exports increases with 0.2 percentage points. The interaction term between treatment group and R&D level is negative, which suggests that firms in the treatment group that have a higher share of their turnover dedicated to R&D activities face a larger decline in value of exports. However, the coefficient of the interaction term is not statistically significant.

Choosing R&D as a proxy for innovation does not change the evidence for the hypotheses. Only R&D and R&D level have a significant positive effect on exports performance. However, the interaction terms between treatment group and these alternative proxies for innovation are not statistically significant. Therefore, I conclude that also in the alternative model the results show no support for the hypothesis 2. The effect of being an importing firm on exports growth in the treatment group remains significant and positive. The magnitude only changes slightly to 5.3 percentage points from 5.4 percentage points in the basic model (column 1). If innovation is replaced with external R&D or R&D level (column 3-4), the coefficient of importing is only significant at a 10% level instead of at a 5% level in the other models. The maximum  $R^2$  value of 0.045 (column 4) indicates that the model does not gain explanatory power by substituting innovation with R&D.

Table 9 R&amp;D and firm-level exports

Dependent variable: Delta export	(1)	(2)	(3)	(4)
<i>Process innovation</i>	4.709*** [1.186]			
<i>Product innovation</i>	-1.108 [1.102]			
<i>R&amp;D</i>		2.817** [1.239]		
<i>External R&amp;D</i>			-0.940 [1.381]	
<i>R&amp;D level</i>				0.230*** [0.077]
<i>External finance</i>	0.947 [1.292]	0.943 [1.301]	0.974 [1.306]	1.075 [1.297]
<i>Importing</i>	-2.388** [1.107]	-2.368** [1.116]	-1.967* [1.103]	-2.042* [1.094]
<i>Treatment group</i>	-9.594*** [2.006]	-10.384*** [2.033]	-10.477*** [1.784]	-9.571*** [1.826]
<i>Treatment*process innovation</i>	-2.072 [1.611]			
<i>Treatment*product innovation</i>	1.799 [1.538]			
<i>Treatment*RD</i>		0.138 [1.665]		
<i>Treatment*externalRD</i>			0.140 [2.061]	
<i>Treatment*RDlevel</i>				-0.155 [0.098]
<i>Treatment*importing</i>	5.360*** [1.923]	5.476*** [1.921]	5.266*** [1.917]	5.307*** [1.909]
<i>Treatment*external finance</i>	0.177 [1.689]	0.160 [1.695]	0.385 [1.693]	0.170 [1.686]
Industry dummies	yes	yes	yes	yes
Firm size dummies	yes	yes	yes	yes
No. Observations	5,872	5,872	5,872	5,872
R <sup>2</sup>	0.045	0.044	0.043	0.045

Notes: (i) Table 9 estimates the effect of R&D activities on the change in value of exports in 2009 compared to 2008, expressed as a percentage. In column 1 the results of the basic model which controls for firm size and industry effects are presented. The model presented in column 2 uses the binary variable R&D, which equals one if a firm carried out R&D activities in 2007-2009, as a proxy for innovation. The model presented in column 3 uses externally acquired R&D as a proxy for innovation. The model presented in column 4 uses the continuous variable R&D level, which is the percentage of total turnover dedicated to R&D, as a proxy for innovation. (ii)\*\*\*/\*\*/\* represent significance levels at 1%,5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

### 4.3.2 External finance

In the models I presented thus far, the binary variable *external finance* is used as the indicator for external finance. This binary variable equals 1 if a firm relies on any form of external finance. As the financial crisis initially hit the banking sector and therewith the supply of short-term credit, I use short-term bank credit as an alternative proxy for external finance with respect to firm-level exports during the financial crisis. I hypothesize that for firms which rely on short-term debt for their production activities it is harder to obtain credit in times of a financial crisis. The results show that firms that rely on short-term bank debt or firms that failed to obtain credit in the past year do not face a statistically significant decline in value of exports compared to other firms.

The first alternative model replaces the variable *external finance* with the variable *short-term bank debt* (column 2). This binary variable equals 1 if a firm relies on short-term bank debt with a term up to 12 months. The second model uses another indicator for external finance, namely whether a firm applied for credit in the past year, but failed to receive it. I refer to this variable as *credit fail*. This could be a direct measure of the failure of the banking system and therewith the restriction of credit as a result of the financial crisis. In addition, I include interaction terms between the variables *treatment group* and the other proxies for external finance in these models. The results are presented in Table 10.

The variable *short-term bank debt* in column 2 has a negative coefficient, -1.6. This indicates that firms that at least partially rely on short-term bank debt on average face a decline in value of exports of 1.6 percentage points compared to firms that do not rely on short-term bank debt. The interaction term between treatment group and short-term bank debt is positive, which suggests that firms in the treatment group that rely on short-term bank debt on average face an exports growth of 1.4 percentage points compared to firms in the treatment group that do not rely on short-term bank debt. However, both the coefficients of *short-term bank debt* and the interaction term are not statistically significant. The second model (column 3) uses the failed application for

credit in the past year as a proxy for external finance. This variable has a large negative coefficient, which means that on average firms that failed to receive credit face a decline in value of exports of 8.5 percentage points compared to firms that did not face such a 'credit fail.' Again, the results show that such an effect is opposite in the treatment group, which is indicated by the positive coefficient of the interaction term between the variables *treatment group* and *credit fail*. However, both the coefficients of *credit fail* and the interaction term are not statistically significant. Firms in the treatment group that are reliant on short-term bank debt or that failed to obtain credit in the past year do not have a statistically different exports performance compared to firms in the treatment group that did not rely on short-term bank debt or that did not fail to obtain credit.

Using short-term bank debt and credit fails as an alternative proxy for external finance does not change the sign or the significance levels of the other independent variables. The results show no support for an innovation moderation effect or for an external finance severity effect. When using other proxies for external finance, the results still support the overall crisis effect as hypothesized in hypothesis 1 and the import moderation effect as hypothesized in hypothesis 3. The  $R^2$  value of the models increases from 0.045 to 0.046 and 0.048, if external finance is replaced with short term bank debt and credit fail, respectively. This indicates that the model gains explanatory power by the substitution of external finance with these other proxies for financial dependency.

**Table 10 External finance and firm-level exports**

<b>Dependent variable</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
<b>Delta export</b>			
<i>Process innovation</i>	4.709*** [1.186]	4.702*** [1.186]	4.796*** [1.186]
<i>Product innovation</i>	-1.108 [1.102]	-0.953 [1.103]	-1.010 [1.104]
<i>External finance</i>	0.947 [1.292]		
<i>Short-term bank debt</i>		-1.657 [1.244]	
<i>Credit fail</i>			-8.474 [6.117]
<i>Importing</i>	-2.388** [1.107]	-2.225** [1.106]	-2.371** [1.103]
<i>Treatment group</i>	-9.594*** [2.006]	-9.667*** [2.029]	-8.888*** [1.951]
<i>Treatment*process innovation</i>	2.072 [1.611]	-1.972 [1.608]	-2.109 [1.607]
<i>Treatment*product innovation</i>	1.799 [1.538]	1.699 [1.537]	1.684 [1.533]
<i>Treatment*importing</i>	5.360*** [1.923]	5.291*** [1.920]	5.393*** [1.908]
<i>Treatment*external finance</i>	0.177 [1.689]		
<i>Treatment*short-term bank debt</i>		1.408 [1.655]	
<i>Treatment*credit fail</i>			3.914 [1.688]
Industry dummies	yes	yes	yes
Firm size dummies	yes	yes	yes
No. Observations	5,872	5,872	5,872
R <sup>2</sup>	0.045	0.046	0.048

Notes: (i) Table 10 estimates the effect of different proxies of external finance on the change in value of exports in 2009 compared to 2008, expressed as a percentage. In column 1 the results of the basic model which controls for firm size and industry effects are presented. The model presented in column 2 uses the binary variable short-term bank debt, which equals 1 if a firm relied on bank debt with a term up to 12 months, as an alternative proxy for external finance. The model presented in column 3 uses the binary credit fail, which equals 1 if a firm tried to obtain but failed to receive credit in the past year, as an alternative proxy for external finance. (ii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

### 4.3.3 Ownership structures

In the models presented thus far, I control for firm size and industry effects. However, other circumstances could influence the impact of the financial crisis on a firm's exports performance. One such factor could be the presence of shareholders. If a firm's board has to report to shareholders, it is likely that they have a higher incentive to presenting good results. Therefore, it could be that the presence of shareholders pushes the

management of the firm to perform better. In addition, the presence of shareholders might influence the strategic decision making process in such a way that the short-term results are preferred over the long-run results. This suggests a positive effect of shareholders on a firm's performance during the financial crisis. On the other hand, firms of which shares are traded on the stock market face a direct impact of their stock value on their working capital. To control for differences in ownership structures, I expand the models with additional variables. The results of these models are presented in Table 11.

The first model (column 2) includes the control variable *shareholders*, which equals 1 if a firm is a Limited Liability Company. In the second model I add a control variable for whether a firm is listed on a stock exchange. This dummy variable is called *publicly listed* and equals 1 if a firm is listed on a stock exchange. The third model (column 4) controls for whether the firm forms part of a group of companies. Being part of a group might influence the decision-making process in a firm, as these firms may not be judged on their individual results but mainly as a part of the group. The dummy variable *group* equals 1 if a firm belongs to a group, either a national or an international group. The model presented in column 5 includes all ownership structure control variables.

The inclusion of the control variables for ownership structures does not change the sign or the significance level of any of the variables in the models presented in columns 2-5. Likewise, the magnitude remains the same for most of the independent variables in all models. The magnitude of the coefficient *treatment group* increases to -9.7 percentage points, which indicates that firms in the treatment group experience decline in value of exports of 9.7 percentage points compared to firms in the control group. Performing robustness checks for ownership structures does not affect the conclusion upon the hypotheses. Still, the results show support for hypothesis 1 and hypothesis 3, which indicate the crisis effect and the import moderation effect, respectively. As the interaction terms between treatment group and the innovation variables and external finance are not statistically significant, the results show no support for an innovation moderation effect or an external finance severity effect as stated in hypothesis 2 and 4.



The value of the  $R^2$  of the models increases from 0.045 to 0.046 if control variables are added for differences in ownership structure. This indicates that the model slightly gains explanatory power when these variables are included.

**Table 11 Firm characteristics and firm-level exports (3),  
ownership structure robustness check**

<b>Dependent variable</b> <b>Delta export</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
<i>Process innovation</i>	4.709*** [1.186]	4.688*** [1.188]	4.679*** [1.187]	4.691*** [1.189]	4.675*** [1.187]
<i>Product innovation</i>	-1.108 [1.102]	-1.097 [1.105]	-1.074 [1.105]	-1.080 [1.106]	-1.091 [1.105]
<i>External finance</i>	0.947 [1.292]	0.885 [1.297]	0.963 [1.297]	0.903 [1.297]	0.920 [1.297]
<i>Importing</i>	-2.388** [1.107]	-2.407** [1.109]	-2.395** [1.109]	-2.398** [1.109]	-2.403** [1.109]
<i>Treatment group</i>	-9.594*** [2.006]	-9.690*** [2.016]	-9.704*** [2.016]	-9.731*** [2.398]	-9.656*** [2.018]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-2.026 [1.610]	-2.001 [1.609]	-2.009 [1.610]	-2.017 [1.610]
<i>Treatment*product innovation</i>	-1.799 [1.538]	1.754 [1.541]	1.715 [1.539]	1.712 [1.539]	1.759 [1.512]
<i>Treatment*importing</i>	5.360*** [1.923]	5.407*** [1.924]	5.363*** [1.924]	5.369*** [1.924]	5.402*** [1.924]
<i>Treatment*external finance</i>	0.177 [1.689]	0.267 [1.691]	0.197 [1.690]	0.214 [1.692]	0.246 [1.693]
Industry dummies	yes	yes	yes	yes	yes
Firm size dummies	yes	yes	yes	yes	yes
Shareholder dummy	-	yes	-	-	yes
Stockexchange dummy	-	-	yes	-	yes
Group dummy	-	-	-	yes	yes
No. Observations	5,872	5,872	5,872	5,872	5,872
$R^2$	0.045	0.046	0.046	0.046	0.046

Notes: (i) Table 11 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. In column 1 the results of the basic model which controls for firm size and industry effects are presented. In columns 2-5 additional control variables for ownership structure are added for robustness checks. The model presented in column 2 controls for ownership structure by the binary variable shareholder, which equals 1 if is a Limited Liability Company (LLC). The model presented in column 3 controls for ownership structure by a stock exchange dummy, which equals 1 if a firm is listed on a stock exchange. The model presented in column 4 controls for ownership structure by a group dummy, which equals 1 if a firm is part of a group. In column 5 the model including all controls for ownership structure is presented. (ii)\*\*\*/\*\*/\* represent significance levels at 1%,5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

#### 4.3.4 Turnover

So far, I used the number of employees as the indicator for firm size. However, some industries or specific firms are more capital intensive than others. Therefore, I include another control variable for firm size, annual turnover. Table 12 presents the results of an extended model with annual turnover as additional control for firm size. A number of 45 firms are dropped from the sample in this model, as they reported an annual turnover which could not be classified in one of the categories which were mutually exclusive and collectively exhaustive. The results of this extended model are presented in Table 12.

Although for some variables the magnitude of the coefficients change, the signs and significance levels of all independent variables remain the same. There is a significant crisis effect on exports growth of firms in the treatment group of -9.6 percentage points. In addition, according to the extended model (column 2) firms in the treatment group that import goods and services from abroad on average face a growth in value of exports of 5.1 percentage points compared to non-importing firms in the treatment group. These results support hypothesis 1 and 3. However, in the extended model with the additional firm size control variable, the coefficients for *treatment group\*process innovation*, *treatment group\*product innovation* and *treatment group\*external finance* are not statistically significant. Therefore, I conclude that the results show no evidence for an innovation moderation effect or for an external finance severity effect as hypothesized in hypothesis 2 and 4.

The value of the  $R^2$  of the model presented in column 2, including an additional control for turnover, is 0.050. If we compare this to the initial  $R^2$  value of 0.045, I conclude that the model gained explanatory power by adding turnover as an additional control variable for firm size.

**Table 12 Firm characteristics and firm-level exports (4),  
firm size robustness check**

<b>Dependent variable:</b> <b>Delta export</b>	<b>(1)</b>	<b>(2)</b>
<i>Process innovation</i>	4.709*** [1.186]	4.920*** [1.209]
<i>Product innovation</i>	-1.108 [1.102]	-1.137 [1.124]
<i>External finance</i>	0.947 [1.292]	1.007 [1.322]
<i>Importing</i>	-2.388** [1.107]	-2.340** [1.130]
<i>Treatment group</i>	-9.594*** [2.006]	-9.565*** [2.024]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-2.246 [1.623]
<i>Treatment*product innovation</i>	-1.799 [1.538]	1.720 [1.553]
<i>Treatment*importing</i>	5.360*** [1.923]	5.146*** [1.927]
<i>Treatment*external finance</i>	0.177 [1.689]	0.133 [1.708]
Industry dummies	Yes	yes
Firm size dummies	Yes	yes
Turnover dummies	-	yes
No. Observations	5,872	5,827
R <sup>2</sup>	0.045	0.050

Notes: (i) Table 12 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. In column 1 the results of the basic model which controls for firm size and industry effects are presented. The model presented in column 2 controls for firm size with an additional categorical variable, annual turnover. (ii) 45 firms were dropped in the extended model as they reported non-existing turnover values. (iii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iv) Standard errors between brackets are clustered at the firm level, (v) source: EFIGE 2010.

#### 4.3.5 Organizational structure

In the next step of the robustness checks, I include control variables for firm-specific organizational structures which could affect the impact of the financial crisis on exports performance. The results are presented in Table 13.

The first indicator is the quality of the management of the firm. One could argue that firms with a better management team are less affected by the financial crisis than firms

with a worse management team. As a first proxy for managerial quality I use the dummy variable *external CEO*, hypothesizing that firms with a CEO recruited from outside the firm have proven to be looking for the best managers (column 2). An opposing view could be that firms that hire an external CEO are unable to solve their problems with internal resources. A second factor that could influence the exports performance in times of crisis is the locus of the strategic decisions. If strategic decisions are taken centrally, the central management can overview the whole firm and therefore it might be able to respond to the consequences of a financial crisis adequately. A contradicting view is that centrally taken strategic decisions usually take longer, so that the response to the financial crisis is less adequate in firms in which decisions are taken at the centralized level. The dummy variable *decision* (column 3) controls for these effects. The third model adds another control variable, *incentive* (model 4). This variable equals 1 if executives or managers are rewarded at least partially on the basis of their individual performance and the achievement of individual targets. Such incentives could influence a manager's drive to achieve the desired results. Another organizational aspect which could influence a firm's performance is the training of its employees. It may be that better trained employees form a better team and as a result the firm performs better. The dummy variable *formal training* equals 1 if more than 50% of the employees had some sort of formal training in the past year. I include this variable in the fourth model (column 5). The model presented in column 6 includes all variables which control for a firm's organizational structure and incentive schemes.

If I control for organizational structure, the conclusion upon the hypotheses does not change. I still find support for a crisis effect on exports growth, as shown by the significant negative coefficient of *treatment group*. The crisis effect decreases if I include control variables for incentive schemes (column 4 and column 6) from -9.6 to -8.7 and -8.9 percentage points, respectively. Firms in the treatment group that innovate face a higher exports growth compared to non-innovative firms in the treatment group, as the significant positive interaction term between *treatment group* and *importing* shows. In the models which control for central decision making (column 3), incentive

schemes (column 4) and training of employees (column 5) as well as in the most extended model (column 6), the magnitude of the import moderation effect decreases slightly from 5.4 to 5.3 percentage points.

**Table 13 Firm characteristics and firm-level exports (5),  
organizational structure robustness check**

Dependent variable: Delta export	(1)	(2)	(3)	(4)	(5)	(6)
<i>Process innovation</i>	4.709*** [1.186]	4.700*** [1.190]	4.795*** [1.189]	4.547*** [1.184]	4.729*** [1.188]	4.720*** [1.183]
<i>Product innovation</i>	-1.108 [1.102]	-1.074 [1.106]	-1.043 [1.104]	-1.401 [1.103]	-1.015 [1.107]	-1.305 [1.103]
<i>External finance</i>	0.947 [1.292]	0.894 [1.296]	0.895 [1.298]	1.051 [1.296]	0.847 [1.298]	0.979 [1.297]
<i>Importing</i>	-2.388** [1.107]	-2.398** [1.109]	-2.380** [1.108]	-2.409** [1.107]	-2.366** [1.109]	-2.353** [1.106]
<i>Treatment group</i>	-9.594*** [2.006]	-9.733*** [2.016]	-9.843*** [2.014]	-8.723*** [2.025]	-9.835*** [2.019]	-8.893*** [2.025]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-2.020 [1.162]	-2.072 [1.608]	-2.141 [1.607]	-2.033 [1.610]	-2.262 [1.607]
<i>Treatment*product innovation</i>	1.799 [1.538]	1.710 [1.539]	1.777 [1.539]	1.762 [1.536]	1.737 [1.539]	1.865 [1.536]
<i>Treatment*importing</i>	5.360*** [1.923]	5.365*** [1.924]	5.358*** [1.923]	5.315*** [1.923]	5.332*** [1.925]	5.253*** [1.922]
<i>Treatment*external finance</i>	0.177 [1.689]	0.229 [1.690]	0.223 [1.690]	0.145 [1.689]	0.271 [1.693]	0.227 [1.691]
Industry dummies	Yes	Yes	yes	yes	yes	yes
Firm size dummies	Yes	Yes	yes	yes	yes	yes
ExternalCEO dummy	-	Yes	-	-	-	yes
Decision dummy	-	-	yes	-	-	yes
Incentive dummy	-	-	-	yes	-	yes
Training dummy	-	-	-	-	yes	yes
No. Observations	5,872	5,872	5,872	5,872	5,872	5,872
R <sup>2</sup>	0.045	0.046	0.047	0.049	0.046	0.050

Notes: (i) Table 13 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. Column 1 shows the results of a basic model which controls for firm size and industry effects. The model presented in column 2 controls for organizational structure with an additional dummy variable, *external CEO*, which equals 1 if a firm recruited the CEO from outside the firm. The model presented in column 3 controls for the decision-making process by including the dummy variable *decision*, which equals 1 if a firm most managerial decisions are taken centrally. The model presented in column 4 controls for incentive schemes by adding the dummy variable *incentive*, which equals 1 if managers are rewarded at least partially based on their individual performance. The model presented in column 5 controls for formal training by adding the dummy variable *training*, which equals 1 if at least 50% of the employees enjoyed formal training in the past year. The model presented in column 6 includes all variables which control for organizational structure. (ii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

#### 4.3.6 Margins

Scholars find evidence that the trade collapse took place to a large extent at the intensive margin of trade, both at the sector- and at the firm-level (Haddad *et al.* 2010; Bricongne *et al.*, 2012; Behrens *et al.*, 2013). This could mean that the value of exports declines as a result of a quantity decrease, a price decrease or a combination of both. To measure these separate effects, I control for differences in margins in 2009 compared to 2008. The results are presented in Table 14. In the model presented in column 2, I include the dummy variable *margins decrease*, which equals 1 if the margins over the costs decreased in the period 2008-2009. With this variable I control for margins effects on firm-level value of exports.

Although the results of the coefficients are different from the results of the basic model, the conclusion upon the hypotheses does not change if I control for margins effects on exports growth. Firms in the treatment group on average experience a significant decline in exports performance of 9.5 percentage points compared to firms in the control group (column 2). If a control is added for margins effects, the significant positive effect of being an importing firm in the treatment group on firm-level exports increases from 5.4 to 6.5 percentage points. The coefficient of the interaction term between treatment group and external finance becomes negative in the extended model (column 2), -0.8 percentage points. These results show that firms in the treatment group that rely on external finance on average face a decline in exports growth of 0.8 percentage points compared to firms in the treatment group that do not rely on external finance. However, this effect is not statistically significant. Again, the results show that there is empirical support for the hypothesis 1 and 3, indicating a crisis effect and an import moderation effect. The results of the extended model which controls for margins effects do not show support for hypothesis 2 (the innovation moderation effect) and hypothesis 4 (the external finance severity effect).

The explanatory power of the model increases with the inclusion of a control variable for the effect of change in margins on exports performance, as the increase in value of the  $R^2$  from 0.045 to 0.052 indicates.

**Table 14 Firm characteristics and firm-level exports (6), margins robustness check**

<b>Dependent variable: Delta export</b>	<b>(1)</b>	<b>(2)</b>
<i>Process innovation</i>	4.709*** [1.186]	3.707*** [1.426]
<i>Product innovation</i>	-1.108 [1.102]	-0.644 [1.330]
<i>External finance</i>	0.947 [1.292]	1.126 [1.523]
<i>Importing</i>	-2.388** [1.107]	-1.184 [1.417]
<i>Treatment group</i>	-9.594*** [2.006]	-9.525*** [2.422]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-1.773 [1.920]
<i>Treatment*product innovation</i>	1.799 [1.538]	1.709 [1.829]
<i>Treatment*importing</i>	5.360*** [1.923]	6.499*** [2.289]
<i>Treatment*external finance</i>	0.177 [1.689]	-0.776 [1.997]
Industry dummies	yes	yes
Firm size dummies	yes	yes
Margin decrease dummy	-	yes
No. Observations	5,872	4,248
$R^2$	0.045	0.052

Notes: (i) Table 14 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. Column 1 presents the results of a basic model which controls for firm size and industry effects. The model presented in column 2 controls for price effects on firm-level value of exports by including a dummy variable *margin decrease*, which equals 1 if the margins on the production costs of the product decreased in the past year. (ii) 1,524 firms were dropped in the extended model as they did not answer this specific question in the survey. (iii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iv) Standard errors between brackets are clustered at the firm level, (v) source: EFIGE 2010.

#### 4.3.7 Internationalization

Some firms are naturally more internationally oriented than other firms, because they run part of their production activity abroad. The production of goods in other countries is referred to as internationalization. In addition to the international orientation of a

firm, internationalization may enable these firms to produce at lower costs compared to firms that do not produce abroad. This may give these firms a competitive advantage over firms that only produce in their home country. Especially, when in times of a financial crisis price and quality are more valued. Therefore, the effect of the financial crisis on firm-level exports performance might be different for firms that produce abroad than for firms that only produce in their home country. To control for internationalization, I construct an extended model which includes a dummy variable for foreign direct investment (FDI). This variable equals 1 if a firm currently runs at least part of its production activity in another country. The results are presented in Table 15. Column 1 presents the basic model which controls for firm size and industry effects, column 2 presents an extended model including a control variable for internationalization.

If I add a control variable for foreign direct investment, the empirical evidence for the hypotheses remains the same. The empirical results show support for a crisis effect, as is indicated by the significant negative coefficient of the variable *treatment group*. In addition, there is support for an import moderation effect as stated in hypothesis 3, indicated by the significant positive coefficient of the interaction term between *treatment group* and *importing*. I find no support for an innovation moderation effect or for an external finance severity effect (hypothesis 2 and 4), as the coefficients of the interaction terms between the variables *treatment group* and *innovation* on the one hand and *treatment group* and *external finance* on the other hand are not statistically significant.

The sign and significance levels of the coefficients of all independent variables do not change if I include a control variable for internationalization (column 2). The magnitude of the coefficient of the variable *treatment group* increases from -9.6 to -9.7 percentage points. These results show that on average firms in the treatment group experience a decline in value of exports of 9.7 percentage points compared to firms in the control group. The magnitude of the coefficient of the interaction term between the variables *treatment group* and *process innovation* decreases from 2.0 to 1.9 percentage points.



The magnitude of the interaction term between the variables *treatment group* and *product innovation* also decreases from 1.8 to 1.7 percentage points. However, the interaction terms between the variable *treatment group* and the innovation variables are not statistically significant. Therefore, I conclude that these results show no support for an innovation moderation effect. The  $R^2$  of the extended model presented in column 2 is 0.046, whereas the  $R^2$  of the basic model presented in column 1 is 0.045. This indicates that the model slightly gains explanatory power if I include a control variable for internationalization.

**Table 15 Firm characteristics and firm-level exports (7), internationalization robustness check**

Dependent variable: Delta export	(1)	(2)
<i>Process innovation</i>	4.709*** [1.186]	4.643*** [1.192]
<i>Product innovation</i>	-1.108 [1.102]	-1.099 [1.105]
<i>External finance</i>	0.947 [1.292]	0.923 [1.296]
<i>Importing</i>	-2.388** [1.107]	-2.399** [1.109]
<i>Treatment group</i>	-9.594*** [2.006]	-9.695*** [2.016]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-1.998 [1.610]
<i>Treatment*product innovation</i>	1.799 [1.538]	1.739 [1.538]
<i>Treatment*importing</i>	5.360*** [1.923]	5.366*** [1.924]
<i>Treatment*external finance</i>	0.177 [1.689]	0.172 [1.690]
Industry dummies	yes	Yes
Firm size dummies	yes	Yes
FDI dummy	-	Yes
No. Observations	5,872	5,872
$R^2$	0.045	0.046

Notes: (i) Table 15 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. Column 1 presents the results of a basic model which controls for firm size and industry effects. The model presented in column 2 controls for the effect of internationalization on firm-level value of exports by including a dummy variable *FDI*, which equals 1 if the firm carries out at least part of their production activities abroad. (ii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

#### 4.3.8 Complete model

In the previous sections I showed the empirical results of models which performed robustness checks on the initial results by adding several control variables for firm characteristics. In Table 16, I present an overview of the results obtained by these models. In addition, I present the complete model which includes all control variables. This model controls for ownership structure, annual turnover, organizational structure and incentive schemes, margins effects and internationalization (column 7).

The results of the complete model show support for hypothesis 1 and 3, concerning the crisis effect and the import moderation effect. However, these results do not show support for hypothesis 2 and 4, concerning the innovation moderation effect and the external finance severity effect. If I control for all additional firm characteristics, the crisis effect – indicated by the variable *treatment group* – decreases from -9.6 percentage points in the basic model (column 1) to -8.7 percentage points in the complete model (column 7). The results show that on average firms in the treatment group experience a decline in value of exports of 8.7 percentage points compared to firms in the control group. The import moderation effect increases from 5.4 percentage points in the basic model (column 1) to 6.5 percentage points in the complete model (column 7). The results suggest that firms in the treatment group that import goods and services from abroad on average experience a growth in exports of 6.5 percentage points compared to firms in the treatment group that do not import goods and services from abroad.

If control variables are added for margins effects on exports performance (columns 5 and 7), the coefficient of the interaction term between the variables *treatment group* and *external finance* becomes negative. In these models the coefficient of *importing* is not statistically significant; indicating that *importing* does not have a significant effect on exports performance. These results also suggest that there is an external finance severity effect. However, none of these coefficients are statistically significant. Therefore, I find no support for an external finance severity effect. The magnitude of the coefficients of

the interaction terms between treatment group and process and product innovation increase in the complete model (column 7) compared to the most basic model (column 1). However, for none of the models these coefficients are statistically significant. Therefore, these results do not support hypothesis 2 concerning an import moderation effect. The complete model has more explanatory power than all other models, as the  $R^2$  value of 0.058 shows.

**Table 16 Firm characteristics and firm-level exports (8)  
all robustness checks**

Dependent variable Delta export	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Process innovation</i>	4.709*** [1.186]	4.675*** [1.187]	4.920*** [1.209]	4.720*** [1.183]	3.707*** [1.426]	4.643*** [1.192]	3.869*** [1.414]
<i>Product innovation</i>	-1.108 [1.102]	-1.091 [1.105]	-1.137 [1.124]	-1.305 [1.103]	-0.644 [1.330]	-1.099 [1.105]	-1.042 [1.323]
<i>External finance</i>	0.947 [1.292]	0.920 [1.297]	1.007 [1.322]	0.979 [1.297]	1.126 [1.523]	0.923 [1.296]	1.121 [1.520]
<i>Importing</i>	-2.388** [1.107]	-2.403** [1.109]	-2.340** [1.130]	-2.353** [1.106]	-1.184 [1.417]	-2.399** [1.109]	-1.067 [1.312]
<i>Treatment group</i>	-9.594*** [2.006]	-9.656*** [2.018]	-9.565*** [2.024]	-8.893*** [2.025]	-9.525*** [2.422]	-9.695*** [2.016]	-8.647*** [2.441]
<i>Treatment*process innovation</i>	-2.072 [1.611]	-2.017 [1.610]	-2.246 [1.623]	-2.262 [1.607]	-1.773 [1.920]	-1.998 [1.610]	-2.191 [1.912]
<i>Treatment*product innovation</i>	1.799 [1.538]	1.759 [1.512]	1.720 [1.553]	1.865 [1.536]	1.709 [1.829]	1.739 [1.538]	2.179 [1.920]
<i>Treatment*importing</i>	5.360*** [1.923]	5.402*** [1.924]	5.146*** [1.927]	5.253*** [1.922]	6.499*** [2.289]	5.366*** [1.924]	6.543*** [2.287]
<i>Treatment*external finance</i>	0.177 [1.689]	0.246 [1.693]	0.133 [1.708]	0.227 [1.691]	-0.776 [1.997]	0.172 [1.690]	-0.730 [1.996]
Industry dummies	yes	yes	yes	yes	yes	yes	yes
Firm size dummies	yes	yes	yes	yes	yes	yes	yes
Shareholder dummy	-	yes	-	-	-	-	yes
Group dummy	-	yes	-	-	-	-	yes
Stockexchange dummy	-	yes	-	-	-	-	yes
Turnover dummies	-	-	yes	-	-	-	yes
ExternalCEO dummy	-	-	-	yes	-	-	yes
Decision dummy	-	-	-	yes	-	-	yes
Incentive dummy	-	-	-	yes	-	-	yes
Training dummy	-	-	-	yes	-	-	yes
Margindecrease dummy	-	-	-	-	yes	-	yes
FDI dummy	-	-	-	-	-	yes	yes
No. Observations	5,872	5,872	5,827	5,872	4,248	5,872	4,248
$R^2$	0.045	0.046	0.050	0.050	0.046	0.046	0.058

Notes: (i) Table 15 estimates the effect of firm characteristics on the change in value of exports in 2009 compared to 2008, expressed as a percentage. Column 1 presents the results of a basic model which controls for firm size and industry effects. The model presented in column 2 controls for the effect of internationalization on firm-level value of exports by including a dummy variable *FDI*, which equals 1 if the firm carries out at least part of their production activities abroad. (ii) \*\*\*/\*\*/\* represent significance levels at 1%, 5% and 10%. (iii) Standard errors between brackets are clustered at the firm level, (iv) source: EFIGE 2010.

## 4.4 Discussion

In this section I discuss the results of the empirical analyses per hypothesis.

### Hypothesis 1

As expected, the results show that the financial crisis has a significant negative effect on firm-level exports. All models show that on average firms from Italy and Spain, countries that are thought to be hit by a more severe financial crisis, experience a decline in exports of 8.6-9.7 percentage points compared to firms from Germany and the United Kingdom. The abstract concept of a financial crisis is hard to grasp, as most scholars define it by its consequences. One could therefore discuss the objectiveness of the measure of the severity of the financial crisis in the treatment group compared to the control group. However, on average firms in all countries participating in the EFIGE program experience a decline in value of exports in 2009 as compared to 2008. Therefore, I think that the results from this study show that there is sufficient support for the hypothesis that the 2008-2009 financial crisis had a negative impact on the growth of firm-level exports.

### Hypothesis 2

The results show that the effect of process innovation on exports growth is significant and positive, oscillating between 3 and 5 percentage points. However, the results show that the effect of product innovation on exports growth is not statistically significant. If we look at the interaction terms between the variables *treatment group* and product and process innovation, we see that the coefficients are negative for process innovation and positive for product innovation. This suggests that firms in the treatment group that carry out process innovation on average face a larger decline (1.8-2.2 percentage points) in firm-level exports than firms that do not carry out process innovation. This effect is positive for firms in the treatment group that carry out product innovation. This suggests that firms in the treatment group that carry out product innovation on average face a 1.7-2.2 percentage points higher exports growth than firms in the treatment group that do not carry out product innovation. However, both coefficients are not statistically

significant. Therefore, I conclude that the results show no support for the hypothesis that innovation moderates the negative crisis effect on firm-level exports performance.

### **Hypothesis 3**

The results of all empirical analyses, except for the results of the complete model, show that importing goods and services from abroad has a significant negative effect on exports performance. However, this effect is opposed in the treatment group. All models show that firms in the treatment group that import goods and services from abroad on average face a growth in value of exports of 5.1-6.5 percentage points compared to firms in the treatment group that do not import goods and services from abroad. There is an opposed effect of importing on exports performance in the treatment group compared to the entire sample. One explanation for the opposed effect may be that firms from Italy and Spain that import goods and services from abroad, import from more developed western-European countries and therefore they are more competitive than their non-importing counterparts. All in all, I conclude that the results show sufficient support for the hypothesis that importing goods and services from abroad moderates the negative effect of the financial crisis on exports growth.

### **Hypothesis 4**

I hypothesized that being reliant on external finance has a negative effect on exports performance during the financial crisis. The results of the empirical analysis however, do not show support for this hypothesis. Over the whole sample, external finance seems to have a positive impact on exports performance. In the treatment group, the effect on exports performance also is positive, apart from the models that include a control variable for fluctuations in margins. In those models, the results show that being reliant on external finance has a negative effect on exports performance for firms in the treatment group. However, none of the coefficients are statistically significant. Therefore, I conclude that the results show no support for the hypothesis that external finance has a negative effect on exports performance. I find no evidence for an external finance severity effect on the impact of the financial crisis on European firm-level exports.

## 5. Conclusion

The aim of this research was to empirically measure the effect of the financial crisis on firm-level exports in the European Union. In addition, I wanted to investigate what the impact of certain characteristics is on the effect of the financial crisis on exports performance. I used data from the *European Firms in a Global Economy* (EFIGE) program. This database consists of data from 14,480 manufacturing firms from seven European countries (Austria, France, Germany, Hungary, Italy, Spain and United Kingdom). I performed a cross-country experiment with a treatment group and a control group. The treatment group, consisting of all firms from Italy and Spain, is thought to have been hit by the most severe financial crisis. The control group is thought to have been hit by the least severe financial crisis and consists of all firms from the United Kingdom and Germany.

I find support for a crisis effect, which means that the financial crisis has a negative impact on firm-level exports growth. The results of the empirical analyses show that indeed firms from Italy and Spain experience a larger decline in value of exports compared to firms from United Kingdom and Germany.

This negative effect of the financial crisis on exports performance is moderated for firms that import goods and services from abroad. The results show support for an import moderation effect on the impact of the financial crisis for firms in Italy and Spain. I hypothesized that firms that carry out innovation are less affected by the crisis in terms of exports performance than their non-innovating counterparts. The results however, do not show support for such an innovation moderation effect. In addition, the results show no support for the hypothesis that firms that rely on external finance for their production activities are more severely affected by the financial crisis in terms of value of exports. The results of the empirical analyses do not show support for an external finance severity effect.

I performed several robustness checks on these results. First, I replaced process and product innovation with R&D as a proxy for the innovativeness of a firm. In addition, I substituted external finance with variables that measured short-term bank debt and the

failure of obtaining credit as a proxy for financial dependency. These modifications in the models did not change the conclusion that there is no support for an import moderation effect or for an external finance severity effect. If the initial proxies for innovation and external finance are substituted with alternative indicators, the results still show support for a crisis effect and for an import moderation effect. In addition, I controlled for ownership structure, annual turnover, organizational structure, margins effects and internationalization in additional robustness checks.

In all models with additional control variables, the results do not change significantly. All models show support for a crisis effect on firm-level exports and for an import moderation effect, but do not show support for an innovation moderation effect and an external finance severity effect.

### **5.1 Limitations & future research**

To my knowledge, this is the first research that measures the effect of the financial crisis on firm-level exports across multiple European countries. In addition, it is the first paper that estimates the effects of innovation, importing and external finance on this crisis effect on firm-level exports performance. There are some limitations to the data and to my research that should be taken into account.

First, all data are self-reported. The perception of certain indicators such as innovation might differ across countries, firms and roles within an organization. Therefore, the perception might differ across respondents of the survey. As the data are self-reported, financial data are not tested and therefore they may not be accurate. Respondents may have incentives to exaggerate certain numbers or firm capacities.

The second major limitation is that the data are cross-sectional. Cross-sectional data do not allow for a difference-in-difference approach. Therefore it is challenging to actually measure the impact of the financial crisis on firm-level exports over time. In the questionnaire only several questions deal with the difference in 2009 as compared to 2008. In an ideal situation the data would be available for multiple years so that the financial crisis can be measured more accurately as an exogenous shock. In this way

scholars can control for firm fixed effects more accurately than I tried to do in my robustness checks.

Future research could focus more on the combination of objective financial data and self-reported surveys. In this way the research can control for reporting bias and different perceptions of certain definitions in the questionnaire. In addition, future research could discern additional levels and angles of external finance, innovation and import. In this research I applied a basic approach with in most cases binary variables. Future research could be aimed at investigating the impact of certain degrees of external finance or the import from goods and services from particular countries. In addition, future research should, in my opinion, try to obtain firm-level panel data. With these panel data, scholars can perform a difference-in-difference analysis and measure the effect of the financial crisis on firm-level exports as an exogenous shock, while controlling for all firm fixed effects. Future research could expand the data to more European and non-European countries. In this way, researchers can gain more insight in the impact of the 2008-2009 financial crisis on global firm-level exports instead of European firm-level exports.



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## 7 Appendix

### Appendix 1: Questionnaire EFIGE database

23 December 2009



## Survey on European Firms in a Global Economy

BvD Number

Inc. Number / Tax payer code

Tel, fax, email

Post code / region/ Area

Ateco Code

PAY ATTENTION: Before start the interviews, ask:

EMPLOYEES → Please indicate the total number of employees of your firm in your home country? Include all the employers, temporary staff, but exclude free lancers and occasional workers.

- 10 - 19 employees"
- 20 - 49 employees"
- 50 - 249 employees"
- 250 employees and more"

ROLE → Could you please indicate which is your role?

- CEO
- General Director
- President
- CFO
- HR Manager
- Other \_\_\_\_\_

*Disclaimer: anonymity*

### EXPLANATION OF THE SURVEY OBJECTIVES

#### Section A - *STRUCTURE OF THE FIRM*

**A1.** Year of establishment:

--	--	--	--

#### **Core business/product**

A2a. Which is the **core business/product** of your firm?

\_\_\_\_\_

A2b. And which percentage of the **2008 turnover** does it represent?

--	--	--	--

%



**Annual Turnover**

A3. In which of the following ranges falls the annual **turnover in 2008** of your firm?

- less than 1 million euro
- 1-2 million euro
- 2-10 million euro
- 10-15 million euro
- 15-50 million euro
- 50-250 million euro
- more than 250 million euro

**A4. and A5. DELETED**

A6. Did you experience a reduction of your turnover **during 2009** in comparison with 2008?

- Yes, a reduction up to 10%
- Yes, a reduction between 10-30%
- Yes, a reduction of more than 30%
- No

A7. Which is the current legal form of your firm? (*to be adjusted accordingly to each Country*)

- Proprietorship/Ownership
- Partnership
- Limited Liability corporation
- Other \_\_\_\_\_

**Group**

A8. Does your firm belong to a group?

- Yes, National → skip to A12
- Yes, Foreign
- No → skip to A13

*If "Foreign" (code 2 at A8) please inquire A9 – A10 – A11 and then ask A12:*

A9. the name of the Group \_\_\_\_\_

A10. the nationality of the Group \_\_\_\_\_

A11. the location of headquarters \_\_\_\_\_

A12. And your firm is ... (*read out*)

- head of the group
- both controlled and controlling
- controlled by another firm of the group

**Acquisitions and Spin-offs**

A13. Has the firm acquired (totally or partially) or incorporated other firms **in the last three years (2007-2009)**? (*one answer*)

- Yes, national firms
- Yes, foreign firms
- Both
- No

A14. Has the firm been acquired or incorporated by other firms **over the same period (2007-2009)**? *(one answer)*

- Yes, national firms
- Yes, foreign firms
- Both
- No

A15. Has the firm any affiliates, i.e. firms of which you own a share of at least 10%? *(one answer)*

- Yes, national ones
- Yes, foreign ones
- Both
- No

*Ask A15a only if has foreign affiliates (i.e. codes 2 or 3 in A15)*

A15a. How many foreign affiliates does your firm have?

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**Control**

Think about the **3 main shareholders of your firm** in terms of capital share.

A16. What is the capital share of the **main one**?

A18. What type of shareholder is it?

1. Individual/Group of individuals
2. Industrial firm
3. Holding firm
4. Bank or insurance company
5. Other independent financial corporation not included in the group (private equity and venture capital)
6. Public entity
7. Other \_\_\_\_\_

A19. Is it a domestic or a foreign shareholder?

*Interviewer/EDP: Ask the same questions also for the **second** and the **third** shareholder by share of capital*

Shareholder <i>(anonymous)</i>	A.16 Share of capital	A.18 Type <i>(insert n.)</i>	A.19 Nationality
Shareholder 1	-----	-----	<input type="checkbox"/> Domestic <input type="checkbox"/> Foreign
Shareholder 2	-----	-----	<input type="checkbox"/> Domestic <input type="checkbox"/> Foreign
Shareholder 3	-----	-----	<input type="checkbox"/> Domestic <input type="checkbox"/> Foreign
Other	-----		
	<b>100%</b>		

A20 Is your firm directly or indirectly controlled by an individual or family-owned entity ?

- Yes
- No → skip to **A23**

*Ask A21 only if "yes" in A20*

A21. Is the chief executive officer (CEO)/ Company Head of your firm...? *(read out)*

- ...the individual who owns or controls the firm or a member of the family that owns /controls it
- ...a manager recruited from outside the firm
- ... a manager appointed within the firm
- other \_\_\_\_\_

**Organisation**

A23 With reference to strategic decisions which of the following statements better describe your firm situation? Decisions in your firm are ... *(read out)*?

- ... centralised: the CEO/owner takes most decisions in every area
- ... decentralised: managers can take autonomous decisions in some business areas

A23a. During 2009, has strategic decision making become... *(read out)*

- more centralised
- more decentralised
- nothing changed

A25. Are executives/managers rewarded (including financial and non-financial benefits) partly on the basis of their individual performance and achievement of individual targets?

- Yes, financial benefit
- Yes, non-financial benefit → skip to B3
- No → skip to B3

*Ask A28 only if "yes, financial benefit" code 1 in A25*

A28. On average, in a normal year, what percentage of the annual individual gross salary represents the bonus based on individual performance?

			%
--	--	--	---

**SECTION B - WORKFORCE**

**Employees in your firm in your home country**

**B3.** Please indicate the total number of employees of **your firm in your home country in 2008.**

Please refer to your firm and not to the Group (if the firm belongs to one) and include all the employers, temporary staff, but exclude free lancers and occasional workers.

*Two more digits added (max. 999999)*

--	--	--	--	--	--	--

B4. Please indicate the distribution of the workforce of **your firm in your home country in 2008** by the following job categories. To answer you can give the percentages or the absolute figures.

	%				absolute figures			
<b>Entrepreneurs/executives (included middle management)</b> who are not related to the family who owns the company				%				

<b>Entrepreneurs/Executives (included middle management)</b> who are related to the family who owns the company				%				
<b>White collars</b>				%				
<b>Skilled blue collars</b>				%				
<b>Unskilled blue collars and apprentices</b>				%				
<b>Total (double check with B3)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>%</b>				

B5. In **2008** what percentage/number of employees have been involved in R&D activities\*?  
*\*R & D consists of creative activities aimed at increasing knowledge and using this knowledge in new applications, such as in the development of technologically new or improved products and processes.*

<input type="text"/>	<input type="text"/>	<input type="text"/>	%	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	absolute figure
----------------------	----------------------	----------------------	---	----------------------	----------------------	----------------------	----------------------	-----------------

B6. What is the percentage/number of university graduates in your workforce **in your home country?**

<input type="text"/>	<input type="text"/>	<input type="text"/>	%	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	absolute figure
----------------------	----------------------	----------------------	---	----------------------	----------------------	----------------------	----------------------	-----------------

B7. What is the percentage/number of foreign (both EU and Non-EU citizens) employees in your workforce **in your home country?**

<input type="text"/>	<input type="text"/>	<input type="text"/>	%	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	absolute figure
----------------------	----------------------	----------------------	---	----------------------	----------------------	----------------------	----------------------	-----------------

**Ask question B9 only if B7 > "0"**

B9. What is the percentage/number of foreign employee (both EU and Non-EU citizens) amongst your executives (included middle management)?

	%	of	tot.	absolute figures
	Executives		%	
Foreign Executives (included middle management)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

B18. In **2008** which percentage of employees have worked for the firm **with a fixed-term contract?**

<input type="text"/>	<input type="text"/>	<input type="text"/>	%
----------------------	----------------------	----------------------	---

B17. In **2008** which percentage of employees have worked for the firm **on a part-time basis?**

<input type="text"/>	<input type="text"/>	<input type="text"/>	%
----------------------	----------------------	----------------------	---

Please indicate the age and gender of your current CEO/ Company Head

B10. Age:

- Less than 25
- 25-34 y.o.
- 35-44 y.o.
- 45-54 y.o.
- 55-64 y.o.
- 65-74 y.o.
- 75 or over

B11. Gender of your current CEO/ Company Head

- Male

- Female

B12. Has any of your executives worked abroad for at least 1 year?

- Yes
- No

### Training of workers

B22. In **2008** what percentage of employees have participated to formal training programs?

			%
--	--	--	---

*Ask B23 only if percentage is higher than "0"*

B23. Were the training courses mainly ...? *(one answer)*

- ... in-house
- ... outside the firm

### Job flows in home country

B21. **During the last year** did you experienced a reduction or an increase of your workforce in comparison with 2008? *(read out – one answer)*

- yes, a reduction of \_\_\_\_\_ %
- yes, an increase of \_\_\_\_\_ %
- No, we did not experience any change

*Ask B21a and 21b only if "yes a reduction" (code 1 in B21)*

B21a. And this reduction was **mainly** on a temporary or on a permanent basis? *(one answer)*

- on temporary basis i.e. through special lay-off pay schemes (appropriate translation: Cassa Integrazione, chomage partiel, Kurtzarbeit, etc)
- on permanent basis

B21b. And this reduction which of the following job categories **mainly** involved? *(read out – one answer)*

- blue collars employees
- white collars employees
- executives

*Ask B21c and 21d only if "yes an increase" (code 2 in B21)*

B21c. And this increase was **mainly** on a temporary or on a permanent basis? *(one answer)*

- on temporary basis (i.e. temporary staff)
- on permanent basis

B21d. And this increase which of the following job categories **mainly** involved? *(read out – one answer)*

- blue collars employees
- white collars employees
- executives

### - Section C - INVESTMENT, TECHNOLOGICAL INNOVATION AND R&D

#### Technological equipment

C2. Has the firm access to a broadband connection *(high-speed transmission of digital content)*?

- Yes → skip to C4
- No

Ask C3 if "no" at C2

C3 is this because:

- it's too expensive
- the firm is not interested /doesn't need it
- other \_\_\_\_\_

C4. In addition to the standard software/ e-mailing system does the firm use IT systems/solutions for...? (*multiple answers allowed*)

- ... internal information management (e.g. SAP /CMS)
- ... E-commerce (online purchasing / online sales)
- ... management of the sales/purchase network (suppliers' orders, customer service)
- the firm does not have an access to an Internet connection

### Investment

C5. What percentage of the annual turnover do **the overall investments in plants, machines, equipment and ICT** represent on average **in the last three years (2007-2009)**? (*please indicate the %*)

% → If "0%" skip to C14

C10. How were these **investments in plants, machines, equipment and ICT** financed on average **in the last three years (2007-2009)**?

Self-financing (use of internal sources)					%
Intra-group financing					%
Venture capital					%
Bank credit (short/long)					%
Public funding					%
Leasing and factoring					%
Other					%
Total	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	%

C13. During 2009 has the firm benefitted from special tax allowances and/or financial incentives supporting its investments? (*add examples*)

- Yes
- No

C13a. During 2009 has your firm reduced its planned investments in machinery, equipment or ICT?

- Yes, a reduction of \_\_\_\_\_ %
- No

### Technological Innovation

C14. On average **in the last three years (2007-2009)**, did the firm carry out any ...  
(multiple answers allowed):

- product innovation (i.e. introduction of a good which is either new or significantly improved with respect to its fundamental characteristics; the innovation should be new to your firm, not necessarily to the market)
- process innovation (i.e. the adoption of a production technology which is either new or significantly improved; the innovation should be new to your firm; your firm has not necessarily to be the first to introduce this process)
- none of the above → skip to C17

C14a. Did this product/process innovation also prompted any organisational innovation?

- Yes
- No

Ask C15. and C16 only if code 1 at C14

C15. Indicate the average percentage of turnover from innovative products sales on average **in the last three years (2007-2009)**

			%
--	--	--	---

C16. Are the corresponding products innovative also with respect to the market ?

- yes
- no

C17. on average **in the last three years (2007-2009)** did your firm ... ? (multiple answers allowed)

- ... apply for a patent
- ... register an industrial design
- ... REGISTER a trademark (™)
- ... claim copyright (©)

C18. Has the firm sold the rights to use any patent, industrial design, trademark or copyright in the same period?

- Yes, sold in home country
- Yes, sold in foreign EU countries
- Yes, sold in foreign non-EU countries
- No

### R&D

R & D consists of creative activities aimed at increasing knowledge and using this knowledge in new applications, such as in the development of technologically new or improved products and processes.

C20. On average **in the last three years (2007-2009)**, has the firm undertaken any R&D activities? (multiple answers allowed)

- Yes, carried out **in-house**
- Yes, acquired from **another firm in the Group** (only if "yes" code 1 or 2 at A8)
- Yes, acquired from **external sources**
- No → skip to C28

C21. Which percentage of the total turnover has the firm invested in R&D on average **in the last three years (2007-2009)**?

			%
--	--	--	---

Ask question C22 only if more than one answer in C20. Make codes consistent with answers provided in C20.

C22. If we assume that the total R&D investments equals 100% which percentage on average **in the last three years (2007-2009)** has been... (ask only if applied):

... carried out in-house					%
... acquired from another firm in the group in the home country					%
... acquired from another firm in the group abroad					%
... acquired from <b>external</b> sources in the home country					%
... acquired from <b>external</b> sources abroad					%
Total	<b>1</b>	<b>0</b>	<b>0</b>		%

Ask C23 only if "the firm has purchased external R&D" code 3 at C20

C23. If we assume that the **R&D acquired from external sources** equals 100% which percentage has been supplied by... (read out)

... Universities and R&D centres					%
... other firms / consultants					%
Total	<b>1</b>	<b>0</b>	<b>0</b>		%

Ask C24 only if percentage > "0" in C5

C24. Were the R&D activities carried out in the period financed in the same way as the investments in plants, machines, equipment and ICT?

- Yes
- No

Ask C24a only if "No" in C24 or if percentage="0" in C5

C24a. How have R&D activities been financed on average **in the last three years (2007-2009)**? (%)

Self-financing (use of internal sources)					%
Intra-group financing					%
Venture capital					%
Bank credit (short/long)					%
Public funding					%
Leasing and factoring					%
Other					%
Total	<b>1</b>	<b>0</b>	<b>0</b>		%

C27. Did the firm benefit from tax allowances and financial incentives for these R&D activities?

- Yes
- No

C28 Which are in your opinion the main factors that hamper innovation? (*spontaneous – do not prompt*)

- excessive perceived economic risks
- lack of appropriate sources of finance
- organisational rigidities
- lack of qualified personnel
- lack of information on technology
- lack of information on markets
- regulation, standards
- lack of customer responsiveness to new products
- Other \_\_\_\_\_
- none



C29. During 2009, has your firm decided to postpone investments in product or process innovation?

- Yes
- No

**Section D – INTERNATIONALIZATION**

D1. Has the firm **sold abroad** some or all of its own products/services **in 2008**? (*Multiple answers allowed*)

- Yes directly from home country
- Yes directly from third countries where the firm produces (through affiliates or contracts and arms length agreements) → if this is the only code mentioned ask D5 and then skip to D23
- Yes through an intermediary based in home country → if this is the only code mentioned ask D5 and then skip to D23
- No → ask D5 and then skip to D23

**Export activities from home country**

Please for the following questions only focus on the **export activities** which your firm carries out from your home country. *Later on we will talk about the sales made through third countries.*

D4. Which percentage of your **2008** annual turnover did **the export activities** represent?

			%
--	--	--	---

D5. Before **2008**, has the firm exported any of its products?

- Regularly/always
- Sometimes
- Never

D6. Indicate to how many countries in total the firm exported its products **in 2008**?

--	--	--

D13. If we assume that the total export activities equal to 100 which percentage goes to each of the following areas... (*read out*)

15 UE countries area				%
Other <u>UE</u> countries				%
Other European <u>countries not UE</u> (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)				%
China and India				%
Other Asian countries (excluded China and India)				%
USA and Canada				%
Central and South America				%
Other areas				%

	1	0	0	%
--	---	---	---	---

D7. Please indicate the top 3 destinations of your export activities

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

For each of the countries mentioned in D7 please indicate:

D9. number of product lines exported (ranges: 1; 2-5; 6-10; more than 10)

D10. if the activity in the country has started before 2004

D11. % of the total export;

D12. (Only if code 3 at D1.) whether you export in the listed country through an intermediary based in the home country

Country	D9. n. of product lines	D10. started before 2004	D11. % of the total export which goes to the country	(Only if cod. 3 at D1) D12. export in the listed country through an intermediary based in the home country
1 COUNTRY	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
2 COUNTRY	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
3 COUNTRY	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No

Ask questions D9a-D12a only if all countries mentioned in D7 belong to the UE areas AND has mentioned any area outside the UE area in D13 (codes 3-7 in D13)

D9a-D12a. Could you please indicate the same information for the MAIN country outside the UE area to which your firm exports?

Country	D9a. n. of product lines	D10a. started before 2004	D11a. % of the total export which goes to the country	(Only if cod. 3 at D1) D12a. export in the listed country through an intermediary based in the home country
1 COUNTRY	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No

D16. The main product line you sell to foreign markets ... *(read out)*

- ... is also the main product line in your domestic market
- ... is also sold in your domestic market but it is not the main product line
- ... is not sold in your domestic market

D20. Has your firm **benefitted/purchased** a trade/export insurance coverage? *(add examples/explanation)*

- Yes
- No

D20a. Has a significant share of your exports been financed by export credit?

- Yes
- No

D19. Has your firm benefited from any kind of tax allowances and financial incentives on export?

- Yes
- No

D17. During 2009, did you experience a reduction or an increase in terms of value of your export activities in comparison with 2008?

- Yes, a reduction of \_\_\_\_\_ %
- Yes, an increase of \_\_\_\_\_ %
- No, we did not experienced any change

*Ask D17a only if "yes a reduction" (code 1 at D17) and more than one area mentioned in D13*

D17a. In which of the previously mentioned areas your export activities experienced a reduction? *(show only those areas mentioned in D13)*

- 15 UE countries area
- Other UE countries
- Other European countries not UE (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)
- China and India
- Other Asian countries (excluded China and India)
- USA and Canada
- Central and South America
- Other areas

*Ask D17b only if "yes an increase" (code 2 at D17) and more than one area mentioned in D13*

D17b. In which of the previously mentioned areas your export activities experienced an increase? *(show only those areas mentioned in D13)*

- 15 UE countries area
- Other UE countries
- Other European countries not UE (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)
- China and India
- Other Asian countries (excluded China and India)
- USA and Canada
- Central and South America
- Other areas

## Purchase of services and intermediate goods for the domestic production

### Purchase of services

D23. In **2008** has the firm purchased any **services** for its domestic production (i.e. transport, communication, financial and R&D ... services)? (*multiple answers allowed*)

- yes, in home country → if mentioned this code only go to D23c then go to D27 and then go to D30a
- yes, from abroad
- no → ask D27 and then skip to D30a

D23c What percentage of the **2008** annual turnover did the **total purchased services (from anywhere)** represent?

--	--	--

 %

*Ask questions from D26 to D29 only if "yes, purchased services from abroad" (code 2 at D23)*

D26 What percentage of the **total purchased services (from anywhere)** did the **services purchased FROM ABROAD** represent?

--	--	--

 %

D27. Before **2008**, did the firm purchase any services from abroad?

- Regularly/always
- Sometimes
- Never

D28. Indicate from which of the following areas the firm has purchased services in **2008**?

- 15 UE countries area
- Other UE countries
- Other European countries not UE (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine ...)
- China and India
- Other Asian countries (excluded China and India)
- USA and Canada
- Central and South America
- Other areas

D29. Please indicate the main services purchased abroad amongst the following... (*read out – multiple answers allowed*)

- Transport Logistic and Insurance Services
- Communications and IT services
- Financial services
- R&D and Engineering services
- Other services (e.g. consultants)

### Purchase of intermediate goods

D30a. In **2008** has the firm purchased **raw material** or any **intermediate goods** for its domestic production? (*multiple answers allowed*)

- yes, in home country → if mentioned this code only go to D30d then go to D33 and then go to D37
- yes, from abroad
- no → ask D33 and then skip to D37

- D30d. What percentage of the **2008** annual turnover did the **total purchased intermediate goods (from anywhere)** represent?

			%
--	--	--	---

*Ask questions from D32 to D36 only if "yes, purchased intermediate goods from abroad" (code 2 at D30a)*

D32 What percentage of the **total purchased intermediate goods (from anywhere)** did the **intermediate goods purchased FROM ABROAD** represent?

			%
--	--	--	---

D33. **Before 2008**, has the firm purchased any intermediate goods from abroad?

- Regularly/always
- Sometimes
- Never

D34. Indicate from which of the following areas the firm has purchased intermediate goods in **2008**?

- 15 UE countries area
- Other UE countries
- Other European countries not UE (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine ...)
- China and India
- Other Asian countries (excluded China and India)
- USA and Canada
- Central and South America
- Other areas

D36. Please indicate the type of intermediate goods purchased ... *(read out – multiple answers allowed)*

- raw material
- standardized intermediates\*
- customized intermediates\*\*

*\* by standardized intermediates we mean components which are usually available in the market (e.g. standard steel screws)*

*\*\* by customized intermediates we mean components which are exclusively manufactured for your firm (e.g. steel screws shaped to fit the design of a piece of furniture)*

D36a. During 2009, did you experience a reduction in terms of value of inputs purchased from abroad in comparison with 2008?

- Yes, a reduction of \_\_\_\_\_ %
- No

### Internationalisation of production activities

D37. Does the firm currently run at least part of its production activity in another country?

- Yes, through direct investment (i.e. foreign affiliates/controlled firms)
- Yes, through contracts and arms length agreements\* with local firms
- No → skip to F1

*\*agreement" and "contract" refer to technical/manufacturing partnership agreements, such as job processing contracts and other subcontracts, and the sale of manufacturing licences to independent foreign firms*

### Production activities through direct investment

Ask questions D38 to D46 only if "yes, through direct investment" code 1 in D37

D38. Which percentage of **2008 turnover** did the **production activities through direct investment** (foreign affiliates/controlled firms) represent?

			%
--	--	--	---

D39. Assuming that the total turnover coming from production activities carried out abroad through direct investments equals 100 which percentage comes from each of the followings areas?

15 UE countries area				%
Other <u>UE</u> countries				%
Other European <u>countries not UE</u> (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)				%
China and India				%
Other Asian countries (excluded China and India)				%
USA and Canada				%
Central and South America				%
Other areas				%
	<b>1</b>	<b>0</b>	<b>0</b>	<b>%</b>

D48. Please indicate the main destinations of the production activity carried out abroad amongst the following (*multiple answers allowed*)

- sold in the foreign country / ~~close area where the production facility is located~~
- imported into your firms home country for use in production
- imported into your firm's home country to be directly sold in the domestic market
- imported into your firms' home own country to be re-exported to third countries
- sold directly in third countries where the firm does not produce
- sold directly in third countries where other production facilities are located

D46. Please indicate the main types of production activities carried out abroad amongst the following (*multiple answers allowed*)

- finished products
- semi-finished products/ components
- R&D, engineering and design services
- other business services

D46a. During 2009 has your firm experienced a reduction in the total turnover coming from production activities abroad? If yes, please specify in which countries.

- Yes in (*specify country*) \_\_\_\_\_
- No

D46b. During 2009 has your firm closed any production unit abroad? ? If yes, please specify in which countries.

- Yes in (*specify country*) \_\_\_\_\_  
 - No

**Production activities through contracts and arms length agreements with local firms**

*Ask questions from D49. to D55 only if "through contracts and arms length agreements with local firms" code 2 in D37*

D49. Which percentage of **2008 turnover** did the **production activities through contracts and agreements** represent?

			%
--	--	--	---

D50. Assuming that the total turnover coming from production activities carried out abroad through contracts and arms length agreements with local firms equals 100 which percentage come from each of the following areas

15 UE countries area				%
Other <u>UE</u> countries				%
Other European <u>countries not UE</u> (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)				%
China and India				%
Other Asian countries (excluded China and India)				%
USA and Canada				%
Central and South America				%
Other areas				%
	<b>1</b>	<b>0</b>	<b>0</b>	<b>%</b>

*Ask question D53 only for the areas > 0% mentioned in D50*

D53. Please indicate if the production activities through contracts and arms length agreements with local firms in the area has started before 2004

	<i>started before 2004</i>
15 UE countries area	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other <u>UE</u> countries	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other European <u>countries not UE</u> (Switzerland, Orway, Russia, Turkey, Byelorussia, Ukraine, ...)	<input type="checkbox"/> Yes <input type="checkbox"/> No
China and India	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other Asian countries (excluded China and India)	<input type="checkbox"/> Yes <input type="checkbox"/> No
USA and Canada	<input type="checkbox"/> Yes <input type="checkbox"/> No
Central and South America	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other areas	<input type="checkbox"/> Yes <input type="checkbox"/> No

D56. Please indicate the main destinations - amongst the following - of the production activity run abroad through contracts and arms length agreements with local firms (*multiple answers allowed*)

- sold in the foreign country / ~~close area where the production facility is located~~
- imported into your firms home country for use in production
- imported into your firm's home country to be directly sold in the domestic market
- imported into your firms' home own country to be re-exported to third countries
- sold directly in third countries where the firm does not produce
- - sold directly in third countries where other production facilities are located

D55. Please indicate the main types - amongst the following - of the production activity run abroad through contracts and arms length agreements with local firms (*multiple answers allowed*)

- finished products
- semi-finished products/ components
- R&D, engineering and design services
- other business services

Ask questions D57 only if "Yes" at D37 (code 1 or 2)

D57. Has the firm received assistance from public or private Institutions for its internationalisation activities? (*only one answer*)

- Yes, mainly from national institutions (either based in the home country or elsewhere)
- Yes, mainly from foreign institutions (either based in the destination country or elsewhere)
- No

D67. During 2009 has the firm experienced a reduction in the total turnover coming from production activities run through contracts and arms length agreements in comparison with 2008? (*multiple answers allowed*)

- Yes in (*specify country*) \_\_\_\_\_
- No

### **Section F - FINANCE**

Let's talk now about the firm's Financial Structure and its relationship with Financial Institution

#### **Firm's financial structure**

F0. Did your firm recur to external finance in the period 2008-2009? By external finance we mean funds not generated internally (not self financing)

- Yes
- No → ask question F3, F8 and F9 and then skip to F19

F1. What is the overall distribution of your **firm's debt structure** in percentage terms?

- short-term bank debt ( <a href="#">up to 12 months</a> )					%
- medium to long term bank debt ( <a href="#">12 months and over</a> )					%
- short-term securities					%
- medium and long-term securities					%
- other financial instruments					%



Total	<b>1</b>	<b>0</b>	<b>0</b>	%
-------	----------	----------	----------	---

F3. In the industry your firm works, how dependant are companies on external finance? To give your answer please use a score from 1 (not dependent all) to 5 (Extremely dependent)

- 1 not dependent at all
- 2
- 3
- 4
- 5 extremely dependent

F4. Has the firm increased the total amount of external finance (i.e. access to financial funds not generated internally) during **the last year**?

- Yes
- No → skip to F7

*Ask F5. and F6. only if "yes" (code 1 at F4)*

F5. What is the main purpose of the use of external finance? (*spontaneous do not read out*)

- Increase production scale through investments
- Participation or share in other firms related with the main business activity
- Participation or share in other firms not directly related with the main business activity
- Working capital/liquidity needs
- Optimizing financial structure (i.e. debt /equity ratio)
- Other

F6. What kind of financial instruments have been used to satisfy your firm's financing needs? (*spontaneous, do not read out*)

- Equity
- Venture capital and private equity
- Short-term bank credit
- Medium or long term bank credit
- Securities
- Public funds
- Tax incentives
- Leasing or factoring
- Other financing methods

F7 . **During the last year** did your firm use any kind of derivatives products (e.g. forward operations, futures, swaps) for external finance needs or treasury management or foreign exchange risk protection?

- Yes
- No
- **Relationship with financial institutions**

F8. What type of bank/credit institution does the firm use for...? (*examples of bank type*)

	F8A. ...Domestic activities	F8B ...Foreign activities (only if codes 1,2 at D1 OR code 2 in D23 OR code 2 in D30a OR codes 1 or 2 in D37)
Domestic local banks	<input type="checkbox"/>	<input type="checkbox"/>
Domestic national banks	<input type="checkbox"/>	<input type="checkbox"/>

Foreign banks	<input type="checkbox"/>	<input type="checkbox"/>
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F9. Number of banks used in total

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F10. What % of your firm's total bank debit is held at your **main bank**?

			%
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F11. For how many years has this bank been the firm's **main bank**? \_\_\_\_\_ years

F12. Which factors are key in the choice of a **main bank**? (*spontaneous do not read out*)

- the bank offers competitive services and funding
- the bank offers efficient internet services
- the bank's lending criteria is clear and transparent
- the bank is conveniently located
- the bank has an extensive international network
- the bank offers also a consultancy on strategic financial decisions
- the bank has a long-lasting relationship with the firm
- the bank has flexible procedures/not constrained by red tape
- it was the Group's main bank
- other

F13. **During the last year**, was the firm willing to increase its borrowing at the same interest rate of its current credit line?

- Yes
- No → skip to F16

F14. **During the last year**, did the firm apply for more credit?

- Yes applied for it and was successful
- Yes, applied for it but was not successful
- No, did not apply for it

*Ask F15 only if "not successful" at F14 (code 2)*

F15. To increase its borrowing, would the firm have been prepared to pay a higher rate of interest?

- Yes
- No

F16. Which type of information does the bank normally use/ask to *assess* your firm's credit worthiness? (*read out*)

- Collateral
- Balance sheet information
- Interviews with management on firm's policy and prospects
- Business plan and firms' targets
- Historical records of payments and debt service
- Brand recognition
- Other

*Ask F17 if 'Collateral' in F16 ask F17*

F17. What kind of collateral did you provide in order to obtain credit?

- Personal guarantees from the person who manages or owns the firm
- Guarantees on assets belonging to the firm

- Guarantees on assets of the Group the firm belongs to
- Third party collateral (i.e. by a consortium, ...)
- other collaterals

F18. With reference to **the last year** has your firm experienced an increase of the cost of debt charged?

- Yes
- No

F19. Is the firm listed on a stock exchange?

- Yes → skip to F23
- No

F22. Does the firm intend to go public in the next three years?

- Definitely yes
- Probably yes
- No

### Financial incentives

F23. **During the last year** did the firm benefit from financial incentives provided by the public sector?

- Yes
- No → skip to F25

F24. Please indicate the distribution of the financial incentives received in percentage terms between ...

... European				%
... National				%
Total	<b>1</b>	<b>0</b>	<b>0</b>	%

F25. In the same period, did the firm benefit from tax incentives?

- Yes
- No → skip to E1

F26. Please indicate the distribution of the total tax incentives received in percentage terms between ...

... European				%
... National				%
Total	<b>1</b>	<b>0</b>	<b>0</b>	%

### Section E - MARKET & PRICING

#### Market

E1. Can you please indicate which percentage (on average) of your firm's turnover was made up by sales of produced-to-order goods:

			%
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*Ask E2 if produced-to-order goods > 0% at E1.*

E2. In which of the following categories your main clients, for whom the firm produce-to-order, belong to?

- intra-group
- other firms, in the same region. *NOTE FOR TRANSLATOR: personalise for each country (e.g. county for UK, länder for Germany)*
- other firms, in the rest of the country

- other firms, abroad
- public administration
- private customers

E3. Where are your main competitors located?

- In your home country
- In other UE countries
- In other European countries not members of the UE (Switzerland, Orway, Russia, Turkey, Ukraine)
- China and India
- Other Asian countries (excluding China and India)
- USA and Canada
- Centre and South America
- Other areas
- We haven't any competitor → skip to E6

E5. Compared to your competitors, do you think that your firm's scale of production is adequate?

- Yes
- No

E6. Indicate the main factors preventing the growth of your firm (*spontaneous do not read out*)

- financial constraints
- labour market regulations
- legislative or bureaucratic restrictions
- lack of management and/or organisational resources
- lack of demand
- other
- none

E7. With respect to your business, indicate the main competitive factors which will determine the success of your firm in the next years (*spontaneous do not read out*)

- lowering production costs
- improving product quality
- broadening the range of products
- increasing brand recognition
- expanding the distribution network
- expanding the after-sales support network
- other

E8. Has the firm gone through any form of quality certification (e.g. ISO9000) during **last year**? (*one answer*)

- yes for products
- yes for process
- yes, both for products and process
- No, the firm already had a quality certification
- No, the firm has not gone through any quality certification

*Ask E9 if "yes" at E8. (code 1,2 or 3) OR code 4 in E8*

E9. Was the quality certification mandatory (because of international or national regulations)?

- Yes
- No

Ea. Always referring to the **last year** the product range offered by your firm has:

- Been widened
- Remained the same
- Been reduced

Eb. Now please think of the product category your main product belongs to. If we rank the maximum quality available in the market for this product equals 100, how would you rate the quality of your own product?

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### Pricing

E10. How do you mainly set your prices in your domestic market? (*one answer*)

- prices are set as a margin over total costs
- prices are set as a margin over variable costs
- prices are fixed by the market
- prices are regulated
- other

*Ask E10a if the firm belongs to a Group and is not the head of the group (yes in A8 and code 2 or 3 in A12)*

E10a. Does the Head of the Group influence the pricing policy of your firm?

- Yes
- No

*Ask E11 and E12 if codes 1 or 2 in E10*

E11. During the last year, the size of your margin has:

- Increased
- Decreased
- Remained constant

E12. Among the following which is the most important factor in determining the size of the margin over your costs? (*only one answer*)

- Responsiveness of demand for the product to variation in prices
- Average margin in the industry
- Macroeconomic factors (GDP, exchange rates, inflation, etc)

E15. Within your domestic market, the price (net of trade cost)...:

- is the same for all customers
- depends on the volume or distribution channel
- is set case by case
- other

*Ask E13 only if the firm sells or produces abroad (codes 1, 2 or 3 in D1 OR code 2 in D23 OR code 2 in D30a OR code 1 or 2 in D37.)*

E13. For a given good, the prices net of trade costs (declared as free-on-board price in the custom survey) are the same over all destination countries?

- Yes → skip to E16
- No

*Ask E14 only if 'no' at E13*

E14. What determines these differences? (*spontaneous do not read out*)

- competition
- demand-related factors (local tastes/ marketing / advertising costs)
- sold quantity

- trade costs
- quality differentiation
- differences in the tax-system
- tariffs
- other

*Ask E16 only if the firm sells OR produces abroad (codes 1, 2 or 3 in D1 OR code 2 in D23 OR code 2 in D30a OR code 1 or 2 in D37.)*

E16 In which currency do you set your prices in foreign countries?

- domestic (for UK and Hungary only)
- euro
- other

*Ask E17a and E17 only if the firm sells abroad (codes 1, 2 or 3 in D1.)*

E17a How do you deal with the exchange rate risk? Which of the following statements is similar to what your firm do?

- I use a foreign exchange risk protection
- I do not normally hedge against exchange rate risk
- The question is not applicable, as I only sell to countries with the same currency of my domestic market → close interview

E17. If the currency of your destination country is different than your domestic currency, how do you react to an appreciation of your domestic currency with respect to the currency of the destination country?

- I exit the market
- I lower my prices (in domestic currency) to remain competitive
- I increase the product quality
- I do not change anything
- Other