

# Firms in the Great Global Recession: The role of foreign ownership and intra-group finance\*

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## Abstract

This paper develops a framework to investigate the micro-economic channels through which an exogenous financial and consumer confidence crisis spreads to economic activity. The framework is applied to analyse the impact of the 2008-09 global crisis and tested on firm-level data from Poland, a small, open emerging economy heavily involved in global and regional production chains and whose growth was robust and based on solid fundamentals up to the inception of the global recession in October 2008. We analyze firms' response to the exceptional contraction in global demand and to the freezing up of financial markets. Our findings show that firms specialised in the production of all manner of postponable goods and services were the most hardly hit by the crisis. Their investment retrenched while sales and exports plunged. At the same time, a number of individual firm characteristics account for a heterogeneous firm response. In particular, foreign ownership appears to have provided a higher degree of resilience to the crisis. Irrespective of their specialisation of production, firms that could rely on intra-group financing have been more mildly affected by the crisis. All in all, our results suggest that while multinationals and their involvement in value chain production may have acted as factors of synchronisation of the crisis, they also proved to be an important source of resilience for their local affiliates in the face of the global exogenous shock.

*Keywords:* Global crisis; firm-level data; foreign ownership; financial constraints; internal capital market

*JEL Classification:* C23; F23; E44; G32

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\*This paper represents the views of the authors and should not be interpreted as reflecting those of the National Bank of Poland, the European Central Bank or the Graduate Institute.

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## Non-technical summary

While the 2007 subprime crisis originated in few developed countries, the ensuing global recession of 2008 quickly spread to most countries around the globe, revealing an extraordinary degree of interdependence and synchronisation in the world economy. Activity and trade fell abruptly and world-wide following the intensification of the financial turmoil in September 2008. Importantly, this sharp slowdown could be observed in nearly every country, even in those with relatively solid economic fundamentals and whose financial markets had remained relatively unaffected by the financial crisis.

This paper contributes to the strand of research which investigates how the financial troubles in few industrialized countries led to an economic and trade crisis that affected firms worldwide and, especially, in countries whose financial markets were not directly affected by the subprime crisis. It does so by exploring the channels and extent of contagion to Polish firms. The interest in this dataset stems from the features of the Polish economy: it is a small, open and emerging economy that was growing robustly and based on strong economic fundamentals until the second quarter of 2008. Moreover, its production is highly dependent on global and regional production chains. For these reasons, we believe that our findings may help explain also developments in other countries.

Our analysis first assesses how key balance sheet indicators, including sales, profits, indebtedness, investment, foreign trade, evolved during the time of the global crisis. Secondly, it examines if foreign ownership, and the associated involvement in global value chains, was a factor influencing firms' performance and, if so, through which channels. Finally, the identified channels are shown to be also important to explain differences across firms in the trade response to the crisis. To the best of our knowledge, this is the first article addressing systematically the implications of the recent crisis for firms' balance sheets and drawing from it insights about their resilience to global shocks.

Our key results are the following: ownership status (foreign vs. domestic), size and sector of activity are important to understand the firm-level impact of the global crisis. While firms producing all manner of postponable goods and services have been disproportionately hit by the crisis, foreign owned and larger firms were better able to cope with the contraction of foreign demand and increased credit constraints. In particular, we find that firms belonging to multinational groups performed better than their domestically owned counterparts: access to intra-group financing combined with the involvement in value chain production emerge as key factors supporting their sales

and trade activity. All in all, our results suggest that while multinationals may have acted as factors of synchronisation of the crisis, they also proved to be an important source of resilience for their local affiliates in the face of the global exogenous shock.

# 1 Introduction

While the 2007 subprime crisis originated in few developed countries, the ensuing global recession of 2008 quickly spread to most countries around the globe, revealing an extraordinary degree of interdependence and synchronisation in the world economy. Activity and trade fell abruptly and world-wide following the intensification of the financial turmoil in September 2008. World industrial production collapsed by 13% between its zenith recorded in April 2008 and its nadir of March 2009. The world trade contraction from peak-to-trough was even faster-paced and deeper: it lasted eight months and amounted to 25% (see Baldwin and Taglioni, 2009a). These patterns were observed in nearly every country, even in countries with relatively solid economic fundamentals and whose financial markets had remained relatively unaffected by the financial crisis. In short, the recent downturn has been unparalleled since at least the Great Depression in terms of its suddenness, severity and cross-country synchronisation (Eichengreen and O'Rourke, 2009).

Considerable research efforts are being devoted by economists worldwide to fully understand the causes and mechanics of the crisis. Over 1,200 new working papers have been posted on the SSRN website since 2008 containing the terms “2008 crisis” or “global crisis” in their title, abstract or keywords. This rich literature in the making is slowly reaching a consensus on the key features and stylised facts characterising the harsh response of economic activity and trade to the recent crisis. First, the deterioration in global demand appears to have been sharper and more profound than during any other recession recorded after the Second World War. Second, the downturn has been accompanied by a general climate of extremely high uncertainty and exceptionally low business confidence. Third, the pace of financial markets tightening and asset prices collapse was faster than ever in post-war times. Finally, the rapid growth of internationally fragmented vertical production chains observed in recent decades is unanimously considered to be the main culprit for the synchronisation of the crisis' impact across countries.

Our paper contributes to the strand of this research which investigates how the financial troubles in few industrialized countries led to an economic and trade crisis that affected firms worldwide and, especially, in countries whose financial markets were not directly affected by the “Subprime Crisis”. It does so by exploring the channels and extent of contagion to Polish firms. The interest in this dataset stems from the features of the Polish economy: it is a small, open and emerging economy that was growing

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The paper proceeds as follows: section 2 provides a discussion of the causes of the crisis, summarising the findings to date from the literature and, based on this literature, it provides a rationale for our research strategy; section 3 describes the dataset; section 4 presents descriptive statistics on the performance of firms and discusses them against their key characteristics; section 5 reports empirical results showing that foreign

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<sup>1</sup>Key features of value chain production, including lower uncertainty for the contractibility of payment for shipped goods and the dominance of long term contractual relationships, may justify the better resilience of this manufacturing model.

ownership greatly mitigated the impact of the crisis on firms balance sheets; section 6 investigates the sources of the different response of foreign vs. domestically owned firms; section 7 focuses on the trade performance of foreign owned companies; finally, section 8 offers concluding remarks. The econometric methodology is presented in the Appendix to this paper, which also reports all other technical details.

## 2 The “great global recession” and implications for firms

The "Subprime Crisis" broke out in August 2007 and for over one year it was broadly viewed as a financial crisis mainly restricted to those few industrialised countries whose financial markets were developed enough to absorb large quantities of the sophisticated financial derivatives, which were at the origin of the crisis. The metastasis into the “Great Global Recession” took place in September 2008. As Chochrane and Zingales note in the Wall Street Journal of 15 September 2009, the defining moment came when, following the bankruptcy of the Lehman Brothers investment bank, the US Treasury Secretary Paulson asked the US Congress for three-quarters of a trillion dollars based on a 3-page proposal and he had difficulties in answering direct questions about how the money would be spent to solve the problem. While congress rejected Paulson’s ill-explained plan, a massive feeling of insecurity formed and spread worldwide. The Lehman collapse and the country-regionplaceUS government’s clumsy response were only two of a number of extreme events that took place in the span of a few weeks time.<sup>2</sup> Their materialisation in rapid sequence plunged the world into “Knightian uncertainty”, or fear of the unknown (see Caballero, 2009a; Caballero, 2009b and Blanchard, 2009). Consumers, firms, and investors around the world applied a strategy "wait and see" by delaying purchases and investments of all what could be postponed until they could determine how bad things would get. The delaying of purchases and investments was amplified by the fact that inventories in many countries and industries were at record high levels. At the same time, firms did increasingly focus on redressing their balance sheets by massively switching their wealth to the safest assets and causing what Caballero has called a "sudden financial arrest". Deleveraging and a retrenchment of investment, often towards domestic assets, were another aspect of this collective action

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<sup>2</sup>See the timeline of the crisis by the New York Fed at [http://www.newyorkfed.org/research/global\\_economy/policyresponses.html](http://www.newyorkfed.org/research/global_economy/policyresponses.html)

(Kamil and Rai, 2009). In this framework, countries' ability to attract foreign capital is likely to have been less effective, in particular if their financial markets were not well developed and liquid.

In all likelihood, the freezing up of global credit markets may have harmed activity and trade, in line with the findings of the earlier literature. Thorough research on the 1997 Asian crisis by Amiti and Weinstein (2009) and an analysis of twenty-three past banking crises from the period spanning 1980 to 2007 by Iacovone and Zavacka (2009) provide compelling evidence that credit conditions can affect trade flows. Moreover, according to Kannan and Koehler-Geib (2009), crises with a pronounced surprise element tend to result in a widespread contagion through the financial channel. Yet, model-based simulations (Eaton et al., 2009) and empirical evidence at the firm-level (Bricongne et al., 2009) suggest that the contagion to countries world-wide came mainly through the contraction of demand and a drop in consumer confidence rather than through direct financial channels. This is indirectly confirmed also by Mora and Powers (2009) who find that declines in global trade finance have not had a major impact on trade flows. In the remainder of this section we discuss the mechanisms that may have been at play.

While global credit markets froze up, demand worldwide contracted sharply. In particular, the production and exports of manufacturing collapsed as the uncertainty generated by the September 2008 events induced private demand for all manner of "postponeable" goods and services consumption to crash.<sup>3</sup> The cross-country contagion was greatly amplified by the very particular nature of the demand shock that hit the world economy in September 2009 (see Baldwin and Taglioni, 2009b).

Apart from direct trade and financial linkages, the worldwide propagation of the crisis may have also worked through indirect channels. First, the international crisis of confidence may also have easily spread to domestic money markets, as banks' willingness and capacity to lend was greatly reduced. Second, the decline in external demand may have further constrained the access to financial markets through the so-called financial accelerator (see Bernanke et al., 1999). Finally, in those countries where the crisis has been associated with exchange rate depreciation, the tightening of the credit terms is likely to have been more severe. Firms with liabilities denominated in foreign currency

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<sup>3</sup>We define here 'postponables' as consumption of goods and services which can be easily postponed in time. It includes investment and equipment goods, durable consumer goods and all their parts and components as well as services that are related to the production and handling of such goods or that are by definition postponable, such as tourism. In the appendix to this paper, we report our classification of postponable vs. non-postponable goods and services, based on the NACE rev. 2 classification.

may have experienced a severe deterioration of their balance sheets, with further limits to their access to external financing (Aghion et al., 2001 and Desai et al., 2004).

By consequence, the negative impact on firms relying on sources of financing external to the firm is likely to have been disproportionately high. Indeed, the reliance on external finance influences the performance of firms or sectors in times of financial crises. For example, Dell’Ariccia et al. (2008), on the basis of a panel spanning 41 countries from 1980 to 2000, find that more financially dependent industries experienced significantly slower growth in banking crisis periods. Braun and Larrain (2005), by investigating on data from 111 countries in the years 1963-1999, add to the above results showing that, in times of tight financial markets, industries dependent on external funds are more strongly affected, in particular in countries with poor financial contractibility and in sectors with low tangibility of assets. The above results indicate that banking sector problems may severely affect an individual firm’s performance, in particular if indebtedness is high and the firm access to external financing limited. To make matters worse, a restricted access to credit could also translate into contract enforcement problems, as suppliers of firms facing financial distress become uncertain about the solvency of their trading partners (Antras, 2003) or the stability of the home economy of their counterpart, if the latter is foreign.

In short, several mechanisms may act at the level of the firm, with the result to mitigate or heighten the impact of the shock on firms with specific characteristics. We already discussed that a firm’s external financing needs may contribute to determine its response to a demand shock. Similarly, a number of other features may be important. Remaining in the domain of financial related features, asset tangibility is likely to matter, in particular during financial crises (Braun and Larrain, 2005). Tangible assets serve as a collateral to loans that the firm may need to contract. Unlike intangible assets, such as software, or intellectual property, tangible assets can be readily monetized by the creditor if the debtor defaults. Also the level of liquidity readily available to the firm may determine the ability of a firm to survive a temporary shock. Given the relatively inexpensive access to liquidity which characterised recent years, it is possible that non-financial firms have accumulated cash holdings, sheltering their operations from any serious liquidity tightening. Supporting this hypothesis, Bates et al. (2006) note that US non-financial firms have become less financially constrained over time. According to them, the net debt ratio, defined as the ratio of debt minus cash to total assets, exhibits a sharp secular decrease and most of this decrease is explained by an increase in cash holdings.



Moving to non-financial characteristics, involvement in value chain production may also matter. Value chain production may act as a factor of propagation and synchronisation of a demand crisis. However, other aspects of vertically integrated production suggest that the overall impact may turn out to be more muted. More in detail, if production is organized in value chains across several producers, the whole production network might suffer. Firms within production chains are in continuous communication to align the flow of parts and components with final demand. A decline in the latter combined with higher uncertainty over future demand developments can prompt a fast adjustment along the entire supply chain, with sizeable repercussions for all countries involved. Moreover, the just in time nature of many production chains may further complicate matters due to the so-called “disorganisation hypothesis” (Kremer, 1993, and Blanchard and Kremer, 1997). It says that exogenous shocks which hit intermediate goods can give rise to much larger contractions in output, if the affected inputs are important components of wider production processes. Indeed, Blanchard and Kremer (1997) find that the collapse of the placeSoviet Union had an impact on individual sectors proportionate to the complexity of the underlying production process and range of intermediate inputs used. Finally, many producers of intermediate inputs customise their output to the downstream buyer. The more the production relationship has monopsonist characteristics the more likely is that shocks to the downstream buyer propagate to suppliers (see Burstein et al., 2008). Coming to the reasons that would support a greater resilience of value chain production, Antras (2003) claims that vertical integration partly eliminates problems with enforcing contracts, making trade within a multinational corporation, or in well integrated production networks, less subject to payment delays or defaults. Further evidence that foreign-owned companies might respond better than other firms to a financial crisis comes from Desai et al. (2004). The authors investigate the response of US multinational affiliates and local firms to currency crises in emerging economies. During these episodes, sharp exchange rate depreciations tend to be followed by a credit crunch, hitting particularly those firms that borrow in foreign currency. The key finding of the paper is that, unlike local firms, foreign-owned companies can rely on internal capital markets when faced with external financial constraints and so are better able to use investment opportunities related to a weaker domestic currency.

The insights from the existing literature and the key features emerging from the analysis of the great global recession suggest the following questions: First, have firms producing postponable goods and services suffered the most in terms of sales and ex-

ports? Second, did reliance on external sources of financing constrain firms performance? Third, how did foreign-owned companies respond compared to the rest of the sample? Finally, provided that we find a differential impact on foreign owned firms, was access to intra-group capital markets and involvement into value chain production a relevant explanatory factor? With respect to value chain production, the intuition is that in the face of exogenous shocks that are perceived as temporary, firms in a production network may be more resilient owing to a more certain contractibility of their output and to the dominance of long-lasting and difficult to sever relationships with suppliers and customers.

The above discussion shows that there are still many blind spots in the existing literature and that the channels are much too complex to allow stylised predictions based solely on the current stock of knowledge. The recent crisis gives us material to empirically test some of the hypotheses raised above. Representing almost a “textbook experiment”, it should help improving our understanding of the various factors at play.

### 3 The dataset

We construct our dataset out of the firm-level data provided by the Polish Central Statistical Office (CSO). It combines two sources: the quarterly profit-and-loss survey (F-01) and the annual balance sheet survey (F-02). The two surveys are compulsory for all non-financial enterprises employing at least 50 and 10 persons, respectively. The resulting merged dataset, from which we exclude state owned companies, covers almost 14,000 privately owned firms employing at least 50 people. Besides financial data, the dataset also includes information on the number of employees, the type of ownership (foreign vs. domestic, private vs. state-owned) and major type of economic activity. All 3-digit NACE rev.3 sectors from headings 5 to 96 are included with the exception of financial intermediation (NACE headings 64 to 66).

Data cover the period from 2006:3 to 2009:2. Given the focus on the recent global crisis and computational needs, most of our estimations are based on data grouped in three four-quarter periods, namely: 2006:3-2007:2, which we use as a base to calculate growth rates; 2007:3-2008:2, accounting for the pre-crisis period of economic growth; and 2008:3-2009:2, covering the time of the crisis. When this is not the case, an explicit mention is done.

Against the background of worldwide evidence that the impact of the crisis was

primarily concentrated on manufacturing, it is worth inspecting the basic features of firms in manufacturing and compare them with features of firms from the rest of the economy. As expected, firms in manufacturing tend to be very different from firms in the rest of the economy. More specifically, a majority of manufacturing firms are export-oriented and owned by foreign entities; their distribution is concentrated towards large and medium-sized firms and they tend to be moderately indebted. By contrast, non-manufacturing firms are usually more oriented towards the domestic market, owned by domestic entities, moderately to highly indebted and more evenly distributed across size classes (Table 1).

Table 1: Distribution of firms in manufacturing and non-manufacturing sectors, weighted by sales and employment

	Sales			Employment		
	non-manuf.	manuf.	total	non-manuf.	manuf.	total
<b>Sales orientation</b>						
non-exporters	88.6	36.1	64.2	90.0	42.5	66.8
exporters	11.4	63.9	35.8	10.0	57.5	33.2
<b>Ownership structure</b>						
domestic	60.2	46.1	53.7	70.3	61.5	66.0
foreign	39.8	53.9	46.3	29.7	38.5	34.0
<b>Size</b>						
small	17.5	6.2	12.3	17.6	12.5	15.1
medium	45.5	34.4	40.3	39.9	47.2	43.4
large	37.0	59.4	47.4	42.5	40.3	41.4
<b>Indebtedness</b>						
low	17.2	24.5	20.6	25.1	26.5	25.8
intermediate	38.1	52.1	44.6	40.3	44.7	42.4
high	44.7	23.4	34.8	34.6	28.8	31.8

Notes: Exporters are defined as firms that realise more than 20% of their sales from exports; foreign owned firms are firms declaring that foreign capital represents the majority share of capital in their firm; small firms are identified with reference to the period 2006/2007 by having employment below 100, medium firms by employment between 100 and 500 and large firms by employment larger than 500; low indebted firms are those whose liabilities represent less than 30% of total firm's assets, firms with intermediate debt levels detain liabilities between 30% and 60% of their assets and heavily indebted firms report a liabilities-to-assets ratio above 60%.

Source: Central Statistical Office (GUS) and own calculations.

As we explained in section 2, another important dimension in this crisis appears to have been the postponability of goods and services. In further sections we will test if this dimension explains a differential impact on firms. With respect to basic features, we note that firms producing postponable goods and services are moderately less export oriented or foreign owned and more skewed towards large firms (Table 2).

Table 2: Distribution of firms in postponable and non-postponable sectors, weighted by sales and employment

	Sales			Employment		
	non-postp.	postponables	total	non-postp.	postponables	total
<b>Sales orientation</b>						
non-exporters	78.7	34.3	64.2	82.9	42.6	66.8
exporters	21.3	65.7	35.8	17.1	57.4	33.2
<b>Ownership structure</b>						
domestic	58.9	42.9	53.7	68.3	62.5	66.0
foreign	41.1	57.1	46.3	31.7	37.5	34.0
<b>Size</b>						
small	14.0	8.7	12.3	15.9	14.0	15.1
medium	42.4	36.0	40.3	42.1	45.4	43.4
large	43.6	55.2	47.4	42.0	40.6	41.4
<b>Indebtedness</b>						
low	17.6	24.2	19.8	25.4	26.7	25.9
intermediate	45.0	48.7	46.2	41.7	44.4	42.8
high	37.5	27.1	34.0	32.9	28.9	31.3

Notes: Classification of firms is the same as in Table 1.

Source: Central Statistical Office (GUS) and own calculations.

## 4 Firms' performance during the crisis

The performance of Polish firms appears to have deteriorated noticeably since the hastening of the global crisis in mid-2008. Net profits decreased by over 37 percent over the four quarters covering the period 2008:3-2009:2. Meanwhile, operating profits, investment, exports, sales, and employment also decreased (see Figure 1 and Tables 3 and 4).<sup>4</sup> Liabilities on the other hand increased, possibly owing to valuation effects related to domestic currency depreciation.

Taken together, the above mentioned developments mark a clear inversion of trend relative to the performance of Polish firms during the period of sustained and continued growth that the country has enjoyed up to mid-2008. Indeed, in the year up to June 2008, total firms' sales, investment, and exports all increased by over 10%, net profits by 7% and imports by 6% (see Tables 3 and 4).

<sup>4</sup>The decrease was 13.3% for operating profits, 9.7% for investment, 4.9% for exports, 2.7% for sales and 2.4% for employment.

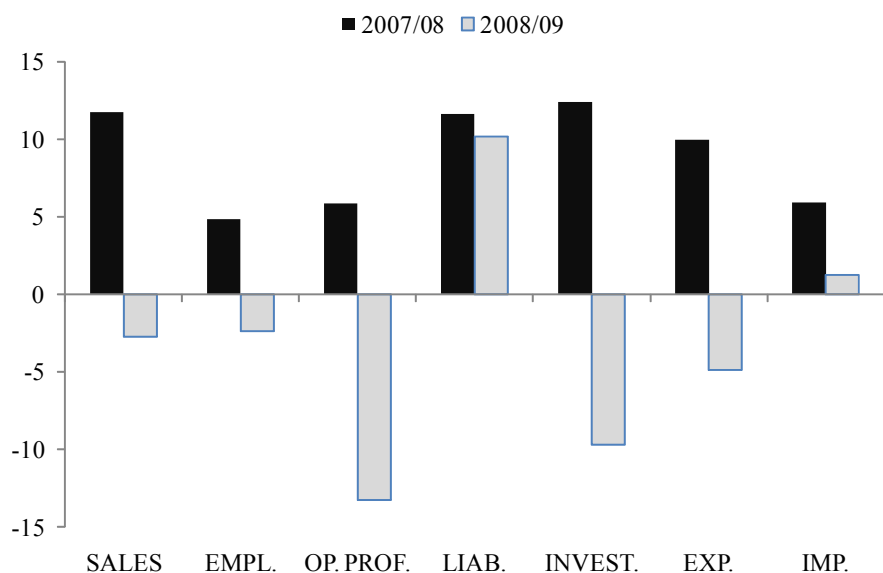
Table 3: Real activity of Polish firms during the crisis (annual growth rates)

	Sales		Empl.		Exports		Imports	
	07/08	08/09	07/08	08/09	07/08	08/09	07/08	08/09
<b>Sales orientation</b>								
low export share	12.3	0.2	4.9	-0.4				
high export share	10.8	-8.1	4.6	-6.5				
<b>Ownership structure</b>								
domestic	12.5	-3.6	3.2	-3.2	14.1	-6.2	23.7	-1.9
foreign	10.9	-1.7	8.0	-1.0	7.9	-4.2	-2.1	3.0
<b>Size</b>								
small	10.7	-0.7	5.1	-0.7	7.5	-3.4	10.2	-5.8
medium	10.9	-4.0	5.2	-3.1	10.0	-3.1	3.6	21.1
large	12.8	-2.2	4.3	-2.3	10.2	-5.8	8.2	-3.7
<b>Indebtedness</b>								
low	10.0	-3.6	3.7	-2.0	4.2	4.1	-24.2	32.5
intermediate	12.1	-3.7	4.4	-3.2	12.8	-7.8	11.7	-0.6
high	12.4	-1.0	6.3	-1.7	9.2	-6.0	13.0	-7.4
<b>Sector</b>								
non-manufacturing	12.3	1.3	5.8	1.4	9.7	-3.4	8.1	6.2
manufacturing	11.1	-7.5	3.9	-6.5	10.0	-5.2	4.8	-1.3
<i>of which:</i>								
<i>non-postponable</i>	15.0	-4.4	1.1	-6.1	21.7	0.9	30.0	-1.2
<i>postponable</i>	8.4	-9.9	5.3	-6.7	6.7	-7.1	-7.5	-1.5
<b>TOTAL</b>	<b>11.8</b>	<b>-2.7</b>	<b>4.8</b>	<b>-2.4</b>	<b>10.0</b>	<b>-4.9</b>	<b>5.9</b>	<b>1.2</b>

Notes: Classification of firms is the same as in Table 1.

Source: Central Statistical Office (GUS) and own calculations.

Figure 1: Performance of Polish firms during the crisis



Source: Central Statistical Office (GUS) and own calculations.

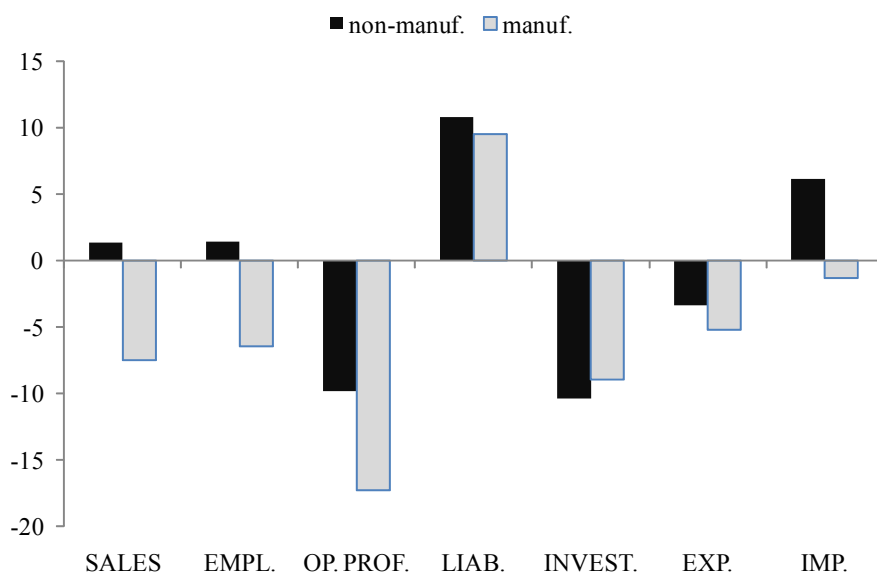
Table 4: Financial indicators of Polish firms during the crisis (annual growth rates)

	Op. profits		Net profits		Liab.		Invest.	
	07/08	08/09	07/08	08/09	07/08	08/09	07/08	08/09
<b>Sales orientation</b>								
low export share	17.1	-9.9	17.4	-24.6	12.4	10.7	11.6	-7.2
high export share	-9.1	-19.1	-6.4	-59.0	10.2	9.3	14.1	-14.6
<b>Ownership structure</b>								
domestic	14.1	-20.1	13.1	-42.7	13.8	8.8	16.6	-12.7
foreign	-3.5	-4.2	0.6	-30.3	10.0	12.1	8.5	-6.7
<b>Size</b>								
small	20.3	-13.6	24.7	-43.8	15.1	10.7	16.7	-5.5
medium	4.8	-6.8	2.9	-39.3	13.2	8.2	18.3	-13.8
large	3.3	-18.1	6.6	-34.2	9.9	11.7	7.9	-7.7
<b>Indebtedness</b>								
low	-3.2	-19.0	-2.9	-20.3	14.1	16.9	12.1	0.0
intermediate	7.7	-17.1	10.0	-38.5	11.9	12.3	20.7	-16.4
high	22.7	7.9	31.2	-76.2	11.0	6.1	1.4	-7.8
<b>Sector</b>								
non-manufacturing	14.2	-9.8	14.4	-21.3	10.9	10.8	14.4	-10.4
manufacturing	-2.4	-17.3	0.3	-55.5	12.4	9.5	10.2	-8.9
<i>of which:</i>								
<i>non-postponable</i>	7.0	-19.4	8.1	-56.3	15.4	11.1	11.0	5.0
<i>postponable</i>	-7.1	-16.1	-3.8	-55.1	11.0	8.3	9.8	-15.9
<b>TOTAL</b>	<b>5.8</b>	<b>-13.3</b>	<b>7.3</b>	<b>-37.4</b>	<b>11.6</b>	<b>10.2</b>	<b>12.4</b>	<b>-9.7</b>

Notes: Classification of firms is the same as in Table 1.

Source: Central Statistical Office (GUS) and own calculations.

Figure 2: Manufacturing vs. non-manufacturing firms' performance during the crisis



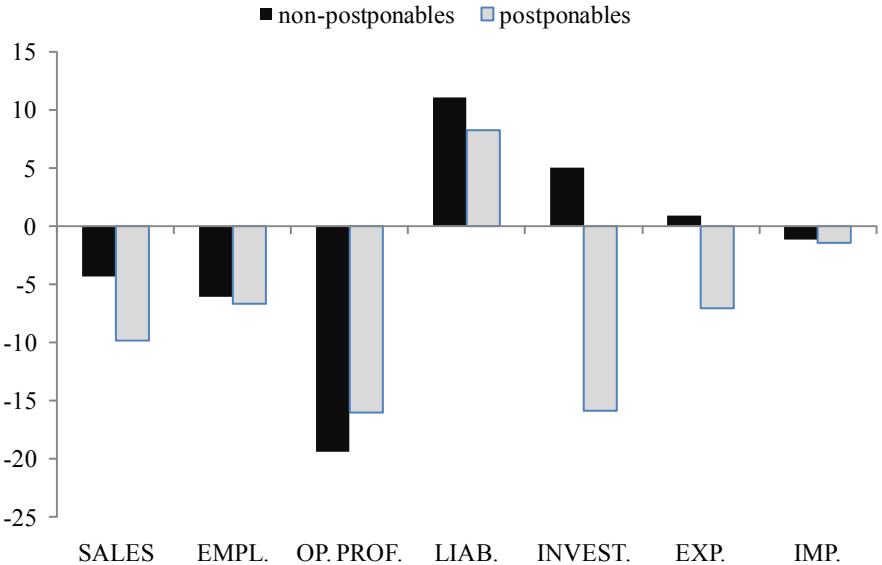
Notes: We define as crisis period 2008q3-2009q2.

Source: Central Statistical Office (GUS) and own calculations.

While the negative performance of Polish firms over the period from the third quarter of 2008 to the second quarter of 2009 reflects the global contraction, firms appear to have been heterogeneously affected. In particular, firms in the manufacturing sector registered high losses in terms of sales (7.5%) and employment (6.5%). By contrast, sales and employment in the rest of the economy grew moderately. Operating profits contracted for all firms but in manufacturing the contraction was more than 7 percentage points higher than in services and other goods (Figure 2).

Such developments are certainly not surprising as steel, automotive and electrical equipment industries, which constitute almost 40% of total sales in manufacturing, suffered exceptional losses during the crisis. The increasing dominance of manufacturing models relying on internationally fragmented supply chains, their importance in the Polish economy, and the fact that they may have contributed to a synchronised impact of the crisis on manufacturing may explain why the negative effects were strongest for manufacturing firms, and in particular for the above mentioned sectors, which are dominated by value chain production.

Figure 3: Performance of firms producing postponables vs. non-postponables manufacturing goods during the crisis

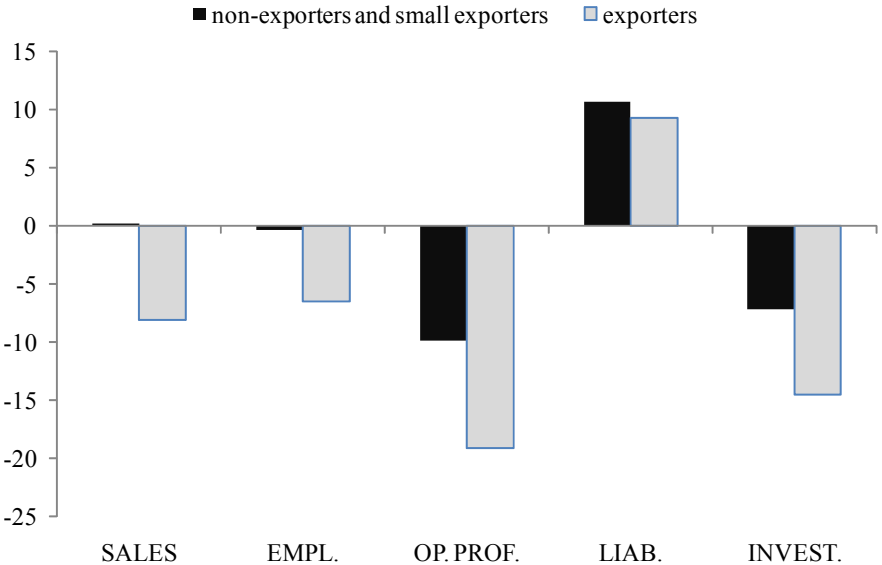


Notes: We define as crisis period 2008q3-2009q2.  
 Source: Central Statistical Office (GUS) and own calculations.

As discussed in Section 2, the extreme events that took place the few weeks following the Lehman bankruptcy plunged the world into “Knightian uncertainty”, inducing

consumers, firms, and investors around the world to delay purchases and investments of all what could be postponed until the situation would clear up a bit. Our descriptive statistics show, as expected, that firms producing postponable manufacturing goods were most severely hit. The contraction in sales, and even more so in exports, was substantially higher than in the rest of manufacturing. The difference in performance was even more evident for investment spending, which reflects expectations about future demand (Figure 3).

Figure 4: Exporters vs. non-exporters performance during the crisis



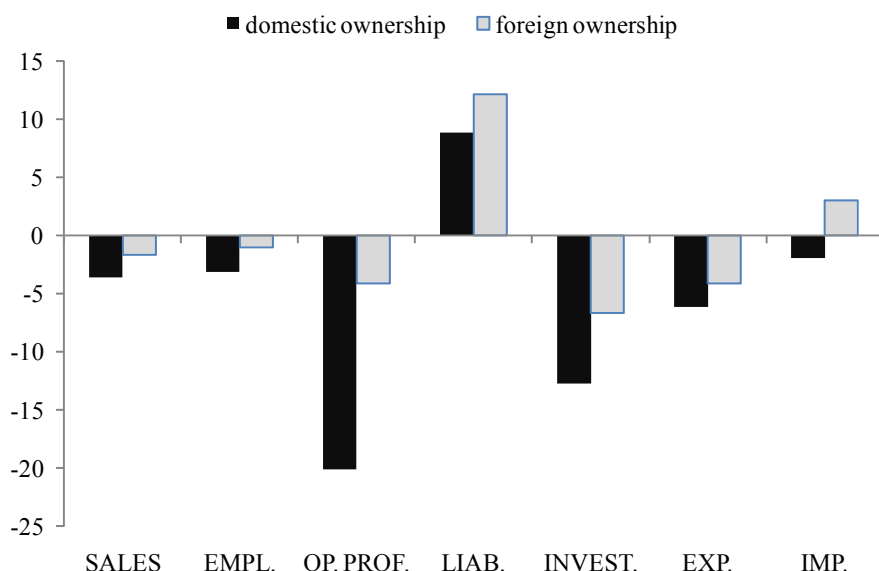
Notes: We define exporters as in Table 1 and the crisis as period 2008q3-2009q2.  
 Source: Central Statistical Office (GUS) and own calculations.

Another interesting stylised fact emerging from the data under analysis is that export-oriented firms appear more prominently hit than non-exporters or small exporters. Their contraction in sales, employment, operating profits and investments was substantially higher than for the rest of the dataset (Figure 4).

The worldwide deterioration of demand and economic activity, which has been particularly severe in rich OECD countries (Araujo and Oliveira Martins, 2009), may have indeed represented a primary reason for the subdued performance of Polish firms. Given the relatively high degree of openness of the Polish economy and its ongoing process of integration in the world economy and, in particular, with other EU countries, it is unsurprising that the trade channel emerges as important in transmitting the shock in demand and consumer confidence from industrialised countries to Polish firms.



Figure 5: Domestic vs. foreign owned firms performance during the crisis

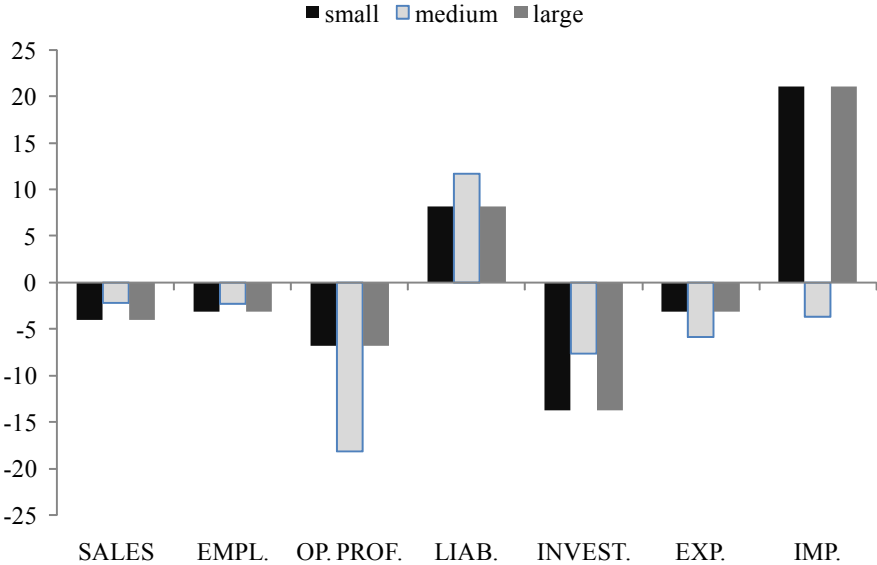


Notes: We define as foreign owned firms as in Table 1 and the crisis as period 2008q3-2009q2.  
 Source: Central Statistical Office (GUS) and own calculations.

Notwithstanding the fact that those Polish firms which are more exposed on international markets through the exports channel appear to have suffered more than the rest of the sample, foreign ownership may also matter. One could expect that more globalised firms do overcome more easily the contraction of foreign demand and increased credit constraints, for instance by relying on intra-group financing or securities issuing. Indirect support for this thesis and as far as it concerns exporters is provided by Muuls (2008), who focuses on exports. Our descriptive statistics show indeed that, compared to domestic firms, the sales and profitability of foreign owned firms contracted less, while exports and investment adjustments were also smaller (Figure 5).

One further question with important policy relevance is whether smaller firms are more adversely hit by the economic crisis than larger (and presumably more productive firms). In our sample, it appears that smaller firms have recorded the highest profit losses, but differentials in terms of sales, employment, investment and exports appear relatively contained (Figure 6). This is in line with evidence by Bricongne et al. (2009), according to which the impact of the crisis on French exporters was independent from the size and degree of export diversification of firms.

Figure 6: Firm size and performance during the crisis

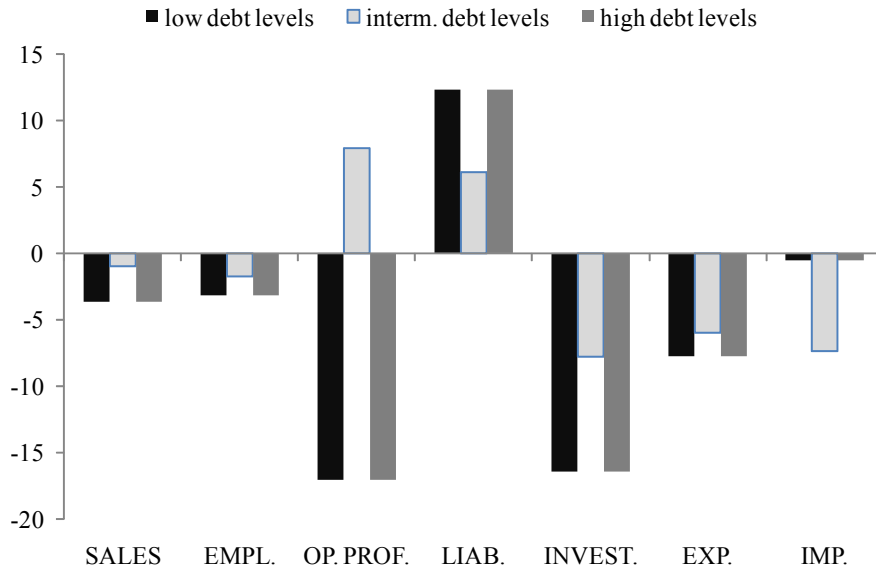


Notes: We define firms' size as in Table 1 and the crisis as period 2008q3-2009q2.  
 Source: Central Statistical Office (GUS) and own calculations.

Given the financial origin of the crisis, we further attempt to investigate if firms with higher degrees of indebtedness have been forced to downscale employment and production more than others. While we do not have direct evidence on production, we do observe variables correlated to it, including profits, sales, export, imports and investment (Figure 7).

The picture that emerges is not very clear-cut. The contraction in sales, investment and employment does not seem to be correlated to the level of indebtedness of the firm. Highly indebted firms do however record higher losses in net profits and higher contractions of both imports and exports. The intensification of the financial crisis may have led to liquidity shortages and to higher risk aversion and negative confidence effects, both on the side of financial institutions as well as of producers. As a result, the more limited availability of trade credit and financing, well documented by Auboin (2009), may have represented an important constraint for indebted firms. It may have greatly increased the costs of financing a firm's activities and obliged it to scale back its import and export activities.

Figure 7: Firm indebtedness and performance during the crisis



Notes: We define firms' indebtedness as in Table 1 and the crisis as period 2008q3-2009q2.  
 Source: Central Statistical Office (GUS) and own calculations.

In conclusion, the inspection of the data suggests that firm characteristics matter. Hence, in our next step, we perform econometric estimates aiming at explaining the growth rates of various determinants of firms' performance. Our conjecture is that, in the context of the global crisis, firms producing postponable goods and services were most hardly hit. Nevertheless, when controlling for the sector of activity, we expect to see that firms with higher financial resources fared better. Finally we do expect that financial constraints were less relevant for firms belonging to an international corporation, as these latter could rely on intra-group financing to overcome the contraction of foreign demand and increased credit constraints. With regards to import and export activity, we also expect these firms to post a greater degree of resilience than the rest of the economy.

## 5 Firm level evidence on the impact of the crisis on firms' balance sheets

As indicated before, a different response of foreign and domestic firms to the financial crisis might be related to their different distribution across sectors and other characteristics not necessarily directly related to the ownership status, such as size or exposition

to external markets. In this section we offer a more formal analysis based on firm-level data. In particular we ask the following questions. Which characteristics had a significant impact on firm activity during the crisis? Was foreign ownership hindering or helping firms performance? Through which channels?

We start our investigation by running a set of robust regressions for annual mid-point growth rates of sales, employment and investment, as well as for changes in profitability. The above-listed performance indicators are explained by various firms characteristics, including the foreign ownership status, export activity and size. Then we investigate the role of foreign ownership and of access to intra-group finance. Lastly, we do assess the role of foreign ownership in determining trade performance. In all the regressions we use industry-level fixed effects to control for differences among sectors in response to the crisis, among other accruing to the effect of postponability of produced goods.

Turning to the explanatory variables, our interest lies primarily on the foreign ownership dummy. We also include a set of controls. These are: the export status (using the 20% export share thresholds used in Table 1), log employment and a full set of 3-digit industry dummies. The export status controls for the exposure of a firm to foreign demand changes and exchange rate movements, whereas employment proxies for the firm size, included in the regressions for reasons discussed in more detail by Forbes (2002). In all the regressions described in this section, the values for independent variables related to firms characteristics refer to the base period of 2006:3-2007:2.

Since our focus is not the overall difference in performance across foreign and domestic firms but rather the difference in their response to the crisis, we also include interactions of all our regressors with the crisis dummy. To ensure comparability with some earlier related studies, we also perform the estimations for the subset of manufacturing firms.

The estimation results are reported in Table 5. Several observations are in order. Focusing first on the results for all sectors, we find that foreign firms performed significantly better in terms of sales growth than their domestic counterparts both before and during the recent crisis. Importantly, the difference is significantly larger in the second part of our sample. This suggests that foreign ownership, similarly to the firm size, helped to mitigate the contraction in sales related to the financial crisis.

While affiliates of foreign companies performed relatively well in terms of employment growth, this advantage somewhat declined during the crisis, which may suggest that their response to the turmoil was more flexible. According to our estimates, foreign firms also experienced a more moderate contraction of their profitability. This effect

was somewhat dwarfed by the impact of firms' exposure to foreign markets, which is not surprising given the depreciation of the local currency during the crisis. Finally, foreign owned firms cut their investment plans much less than domestic firms. The main findings are broadly similar for the subsample of firms in manufacturing.<sup>5</sup> In conclusion, our results clearly indicate that foreign ownership matters for the way a company deals with the financial turmoil.

Table 5: Firm performance during the crisis

Sector Dep. variable	All sectors				Manufacturing			
	mpg_sales	mpg_emp	d_profrat	mpg_inv	mpg_sales	mpg_emp	d_profrat	mpg_inv
foreign	0.021*** [0.006]	0.028*** [0.003]	-0.001 [0.002]	-0.027 [0.030]	0.018** [0.008]	0.033*** [0.004]	-0.005* [0.002]	0.002 [0.041]
foreign × crisis	0.014* [0.008]	-0.007* [0.004]	0.007*** [0.002]	0.084** [0.042]	0.027** [0.012]	-0.014** [0.006]	0.015*** [0.003]	0.031 [0.058]
exporter	-0.033*** [0.006]	-0.009*** [0.003]	-0.013*** [0.002]	-0.066** [0.030]	-0.037*** [0.007]	-0.012*** [0.003]	-0.015*** [0.002]	-0.106*** [0.036]
exporter × crisis	0.012 [0.008]	-0.016*** [0.004]	0.032*** [0.002]	0.003 [0.042]	0.023** [0.010]	-0.010** [0.005]	0.038*** [0.003]	0.079 [0.051]
ln(emp)	-0.012*** [0.003]	0.002 [0.001]	0.001 [0.001]	-0.034** [0.0144]	-0.019*** [0.004]	-0.002 [0.002]	0.001 [0.001]	-0.036* [0.021]
ln(emp) × crisis	0.024*** [0.004]	-0.004** [0.002]	0.000 [0.001]	0.063*** [0.020]	0.029*** [0.006]	-0.006** [0.003]	-0.000 [0.002]	0.037 [0.030]
Observations	27458	27457	27245	26245	12692	12692	12583	12116
R-squared	0.170	0.147	0.093	0.049	0.173	0.154	0.075	0.048

Notes: Standard errors in brackets; \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% level, respectively; mpg\_sales, mpg\_emp and mpg\_inv denote the mid-point growth rates of sales, employment and investment, d\_profrat stands for change in the ratio of operating profits to operating costs, ln(emp) is log employment, while foreign, exporter and crisis are dummy variables indicating foreign affiliates, exporters and the crisis period, respectively; the explanatory variables refer to the base period (2006:3-2007:2); all regressions are run with a full set of 3-digit industry dummies and their interactions with the crisis dummy.

## 6 Why are foreign-owned companies different?

The literature surveyed in section 2 identifies two main channels through which firms owned by large multinational corporations may have been better equipped to cope with the crisis. To start with, many multinational corporations are the expression of the

<sup>5</sup>In not-reported regressions of similar specification with sectoral-fixed effects substituted by the dummy variable for sectors producing postponable goods, we found that postponable sectors performed significantly worse during the crisis. The negative effect of postponability on the growth rate of sales, employment and investment amounted to around 8%, 4% and 15%, respectively.

increasing dominance of vertically specialised international supply chains. Affiliates of the same corporation in different countries produce output in sequentially integrated value chains. Hence, the better performance of foreign owned firms may be driven by a stronger resilience of value chain production models to global adverse shocks.

A better contractibility within supply chains (Antras, 2003) and possibly inter-company linkages that are more difficult to discontinue may constitute plausible reasons why foreign owned firms were less affected by the crisis. Moreover, setting up organised supply chains entails large sunk costs. In the face of an adverse shock that is perceived as temporary, firms would prefer to adjust the entire chain along the intensive margin, i.e. by reducing volumes of sales, rather than along the extensive margin, i.e. disrupting part of the supply chain (Altomonte and Ottaviano, 2009). This is exactly what Bricongne et al. (2009) find by analysing the behaviour of French exporters during the crisis. Relying on monthly data for individual French exporters observed until April 2009, they show that the drop in French exports is mainly due to the intensive margin of large exporters, with small and large firms evenly affected once sectoral and geographical specialisation are controlled for.

The foregoing considerations are consistent with evidence from our data. We find an exceptionally low rate of exits during the crisis, in particular among foreign owned firms (see Table 6). Overall, exit rates in 2008 increased compared to the pre-crisis years. However, the increase was relatively modest for foreign-owned firms. As expected, given the large contraction in foreign demand, exporters were more adversely affected. The differences between foreign and domestic owned firms are even more pronounced in manufacturing.

Table 6: Exit rates in pre-crisis and crisis period (percent)

	<b>All sectors</b>		<b>Manufacturing</b>	
	2006-07	2008	2006-07	2008
Foreign ownership status	5.36	6.34	4.52	5.56
Domestic ownership status	7.57	9.26	6.53	8.80
Exporter	8.70	11.02	6.54	8.70
Non-exporter	6.33	7.50	5.57	7.34
Total	7.12	8.64	6.05	8.00

Notes: Exits are identified as the percentage of firms not reporting to the Central Statistical Office in the first two quarters of the following year; this may imply that some exits are actually firms still in operation but that reduced their number of employees to a number below the threshold of 50 units. Source: Central Statistical Office (GUS) and own calculations.

To test for the significance of the differences reported in Table 6, we run a probit regression, where the dependent variable is the dummy identifying firms' exits from the sample over the years 2006-2008. Explanatory variables include a dummy for the crisis period. In this regression, unlike in most of the other estimations, this is identified with the year 2008. Additional variables of interest include dummies for foreign ownership and export status and their interaction with the crisis dummy. A measure for size, proxied by the number of employees, and sectoral dummies are the standard controls that we include in the regression.

Table 7: Statistical significance of exit rates in pre-crisis and crisis period (percent)

<b>Sector</b> Dep. variable	<b>All Sectors</b> Number of exits	<b>Manufacturing</b> Number of exits
ln(emp)	-0.782*** [0.012]	-0.749*** [0.016]
foreign	-0.0509* [0.027]	-0.0237 [0.037]
exporter	0.223*** [0.021]	0.103*** [0.029]
crisis	0.0562*** [0.021]	0.0929*** [0.035]
foreign×crisis	-0.0180 [0.048]	-0.0290 [0.066]
exporter×crisis	0.0684* [0.037]	0.0879* [0.051]
Observations	74769	37529

Notes: Crisis is a step-dummy taking value one in 2008; exits are identified as the percentage of firms not reporting to the Central Statistical Office in the first two quarters of the following year; this may imply that some exits are actually firms still in operation but that reduced their number of employees to a number below the threshold of 50 units.

Source: Central Statistical Office (GUS) and own calculations.

The results are reported in Table 7. They indicate that 2008 corresponded to a moderate but statistically significant increase in the probability to observe a firm exiting the market. This was particularly the case in manufacturing. While foreign owned and larger firms appear to be structurally less prone to exiting the market, this tendency enhanced in the crisis year 2008, confirming the intuition provided by the aggregate statistics in Tables 3 and 4: a negative coefficient, though not statistically significant,

for the interaction term between the crisis and foreign ownership dummies represents the supporting evidence. By contrast, exporters do seem to be subject to higher exit probabilities. This is surprising, as one would expect that, if sunk costs are a factor of hysteresis in exit decisions, exporters should post a behaviour qualitatively similar to foreign owned firms. On the other hand, the overproportional increase in the rate of exits among exporters during the crisis reflects the observed collapse of foreign demand.

In conclusion, the above results provide some indication that firms involved in global value chains may have been more resilient to the crisis. Yet, the data availability, limited to 2008, does not allow reaching firm and strong conclusions on this point. The difference between foreign owned firms and exporters, however, suggests that other factors, besides sunk costs, are important in determining the differential behaviour of foreign owned firms.

Indeed, a second important reason for the better performance of foreign owned firms may stem from their less restricted access to financing opportunities external to the firm. As pointed out by the literature surveyed in the introduction, the ability to use intra-firm financial markets may help firms to avoid the effects of a credit crunch by commercial banks, at least partly.

In order to check the relevance of intra-group financing, we run a regression on asset growth prior to the crisis (i.e. over the period 2003-2007), distinguishing between domestic and foreign owned companies. Our variables of interest include: the degree of market leverage, based on the ratio between market liabilities and total assets; the degree of intra-group leverage, which is measured as the ratio between intra-group liabilities and total assets; a measure of collateral, provided by the ratio between tangible assets and total assets; and proxies for firm performance, measured as labour productivity and sales profitability. In the regressions we control for inertia in asset accumulation, firm size, which we proxy using employment, and sector and time specific effects.

The results are reported in Table 5. We first focus on our total sample of firms, using contemporaneous values of all variables of interest (column 1). Not surprisingly, weak performance and high leverage turn out to be a drag on firms' ability to expand their business. This suggests the existence of financial constraints, limiting the supply of credit to firms that can be screened as being in a good financial situation. Our results show that on average foreign affiliates manage to expand their assets at a faster pace than their domestic counterparts. Importantly, as the coefficients on interactions with the ownership status dummy show, financial constraints discussed above seem to be substantially less binding for foreign owned firms. Tangibility of assets enters the



regressions negatively, which can indicate that modern firms, relying less on traditional types of assets expand at a relatively faster pace.

Table 8: Foreign ownership and assets growth

Sector Specification	All sectors		Manufacturing	
	(1)	(2)	(1)	(2)
foreign	0.191*** [0.011]	0.121*** [0.012]	0.163*** [0.018]	0.133*** [0.019]
ln(labprod)	0.033*** [0.001]	0.024*** [0.001]	0.027*** [0.001]	0.026*** [0.002]
profrat	0.429*** [0.003]	0.129*** [0.003]	0.533*** [0.007]	0.184*** [0.008]
mkt_lev	-0.005*** [0.001]	-0.032*** [0.001]	0.011*** [0.001]	-0.029*** [0.002]
intgr_lev	-0.046*** [0.003]	-0.002** [0.001]	-0.053*** [0.004]	-0.061*** [0.008]
tang	-0.113*** [0.003]	-0.063*** [0.003]	-0.111*** [0.005]	-0.051*** [0.006]
ln(labprod) x foreign	-0.025*** [0.001]	-0.016*** [0.002]	-0.026*** [0.003]	-0.022*** [0.003]
profrat x foreign	-0.084*** [0.005]	-0.033*** [0.006]	-0.054*** [0.012]	0.013 [0.014]
mkt_lev x foreign	0.006*** [0.002]	0.028*** [0.002]	0.012* [0.006]	-0.002 [0.007]
intgr_lev x foreign	0.040*** [0.004]	-0.019*** [0.003]	0.067*** [0.008]	0.039*** [0.011]
tang x foreign	-0.055*** [0.007]	-0.017** [0.008]	-0.050*** [0.012]	0.006 [0.013]
Observations	129888	129837	39066	39080
R-squared	0.105	0.293	0.281	0.115

Notes: Standard errors in brackets; \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% level, respectively; the dependent variable is *mpg\_assets*, defined as the mid point growth rate of assets; *ln(labprod)* is log labour productivity (sales per employee), *ln(emp)* is log employment, *profrat* stands for the ratio of operating profits to operating costs, *mkt\_lev* and *intgr\_lev* are the shares of external and within-group liabilities in total assets, respectively, *tang* is defined as the ratio of tangible assets to total assets, while *foreign* is a dummy variable indicating foreign affiliates; specification (1) include current period regressors, while these are lagged by one period in specification (2); additional and not reported explanatory variables are lagged *mpg\_assets* and log employment, the latter with and without interaction with the foreign dummy; all regressions are run with a full set of time dummies and 3-digit industry dummies.

Using non-lagged regressors may entail endogeneity problems. Hence, we also repeat our estimation with all the above mentioned variables of interest lagged by one period, i.e. relative to the previous year. The results reported in column 2 indicate that the main conclusions remain qualitatively unchanged. We also redo all our estimations for

a subset of manufacturing firms. The results provide even stronger support for the conclusions formulated above.

In light of our results, we next devise a method to test if the performance premium of Polish foreign-owned companies derives from their ability to overcome credit market imperfections by relying on intra-group borrowing. If statistically significant, the advantage should be enhanced during the crisis, owing to the fact that the freezing up of global credit markets has been found to have increased the cost and difficulty to access external finance.

In order to investigate this issue more deeply we follow an approach, which builds on Braun (2003) and Rajan and Zingales (1998), introducing however considerable innovations.<sup>6</sup> Our aim is to check the sensitivity of firms' leverage with respect to assets tangibility depends on the ownership status. We interpret tangibility as able to proxy the easiness with which firms can shift control to the lender, and so substitute for financial contractibility.

More specifically, we regress the change in firm-level indebtedness (defined as total liabilities over total assets) over the share of tangible assets in total assets, the foreign status dummy and their interaction. We use a range of controls, which include log employment, the export status dummy, profitability and sectoral fixed effects. In some variants of our regressions we also try a few other, more financially motivated controls. As before, we augment the estimated equations with interactions of all our regressors with the crisis dummy and report our results for all sectors and for the subsample of manufacturing firms.

The main results are presented in Table 9. When we run our regressions on the total sample we find that foreign-owned firms managed to raise external funds better than their domestic counterparts. We do not find, however, that during the crisis foreign ownership had an effect on the sensitivity of leverage to the tangibility of assets. These results are robust to controlling the regressions for such indicators as initial leverage, capital intensity (indicating firms with relatively higher borrowing needs) or provision of liquid assets.

A different picture emerges when we restrict our attention to manufacturing. Similarly to the total sample results, we find that multinationals increased their indebtedness

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<sup>6</sup>The most natural way to explore the relevance of internal capital markets would be to look at the flows of funds within multinational groups. Unfortunately, such flow data are not available and the quality of the stock data does not seem to be satisfactory. Therefore, we follow an indirect approach which does not distinguish between the sources of external financing.

by more than domestic companies. For many firms, however, tangibility of assets turns out to be an important determinant of access to external financing during the crisis. Importantly, we find that this financial market imperfection is significantly less binding for borrowing possibilities of foreign-owned firms. As in the case of total sample, the regression results for manufacturing are robust to the inclusion of additional controls.

Table 9: Access to external financing during the crisis

Sector Dep. variable	All sectors				Manufacturing			
	dindebt							
foreign	-0.009 [0.007]	-0.014** [0.007]	-0.014** [0.007]	-0.014** [0.007]	-0.018 [0.011]	-0.020* [0.011]	-0.021* [0.011]	-0.021* [0.011]
foreign $\times$ crisis	0.026** [0.010]	0.029*** [0.010]	0.029*** [0.010]	0.029*** [0.010]	0.063*** [0.016]	0.066*** [0.016]	0.066*** [0.016]	0.065*** [0.016]
tang	0.018** [0.009]	0.004 [0.009]	0.003 [0.009]	0.002 [0.009]	0.007 [0.013]	0.003 [0.013]	0.001 [0.013]	0.001 [0.014]
tang $\times$ crisis	0.007 [0.013]	0.009 [0.013]	0.010 [0.013]	0.016 [0.013]	0.044** [0.019]	0.044** [0.019]	0.047** [0.019]	0.050*** [0.019]
tang $\times$ foreign	-0.017 [0.018]	0.000 [0.018]	0.000 [0.018]	0.000 [0.018]	0.006 [0.026]	0.017 [0.026]	0.017 [0.026]	0.017 [0.026]
tang $\times$ foreign $\times$ crisis	0.005 [0.026]	-0.001 [0.025]	-0.001 [0.025]	-0.001 [0.025]	-0.089** [0.037]	-0.095*** [0.036]	-0.095*** [0.036]	-0.094*** [0.036]
indebt		-0.084*** [0.005]	-0.084*** [0.005]	-0.085*** [0.005]		-0.087*** [0.006]	-0.086*** [0.006]	-0.086*** [0.0066]
indebt $\times$ crisis		-0.010 [0.007]	-0.011 [0.007]	-0.005 [0.007]		0.010 [0.009]	0.010 [0.009]	0.013 [0.009]
capint			0.000 [0.000]	0.000 [0.000]			0.001 [0.001]	0.001 [0.001]
capint $\times$ crisis			-0.000 [0.001]	-0.000 [0.001]			-0.001 [0.001]	-0.001 [0.001]
liquid				-0.008 [0.014]				-0.000 [0.023]
liquid $\times$ crisis				0.033* [0.019]				0.023 [0.033]
Observations	23067	23067	23067	23067	10809	10809	10809	10809
R-squared	0.08	0.11	0.11	0.11	0.07	0.09	0.09	0.09

Notes: Standard errors in brackets; \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% level, respectively; dindebt and indebt are defined as change and the level of the share of total liabilities to total assets, tang is the ratio of tangible assets to total assets, capint is the capital-to-output ratio, liquid is the share of cash in total assets, while foreign and crisis are dummy variables indicating foreign affiliates and the crisis period, respectively; the explanatory variables refer to the base period (2006:3-2007:2); all regressions are run with a full set of 3-digit industry dummies and their interactions with the crisis dummy; additional and not reported explanatory variables are: export status, log employment and the ratio of operating profits to operating costs, as well as their interactions with the crisis dummy.

In conclusion, our results are consistent with the hypothesis that foreign ownership helps to mitigate the effects of a credit crunch. Particularly in manufacturing there may be intra-group lending mechanisms supporting affiliates that face external credit constraints. Alternatively, the findings might simply indicate a creditworthiness premium

related to being a part of a multinational corporation. However, our data suggest that the former effect is more likely to be at work: while intra-group borrowing in foreign-owned firms stood at about 37.5% of total liabilities before the crisis, it accounted for about 58.0% of their growth during the crisis.

## 7 Global companies and trade performance

In the last step we analyse whether the ownership status also mattered for firms performance in terms of exports and imports. Our hypothesis is that access to intra-group financing, combined with involvement in value chain production, enhanced the resilience of foreign owned firms.

Three key channels may account for how the global crisis affected trade by Polish firms. The first, and possibly the most important channel, may have been the worldwide collapse of demand for postponable goods and services. This shock should have affected domestic and foreign owned companies in a similar way, where the scale of the impact is likely to be mainly a function of the sector in which a given firm operates. The second possible channel is represented by higher risk, which may have led to tighter financial markets and the massive depreciation of the local currency, by over 30% in real effective terms within less than six months. The depreciation may have enhanced the international price competitiveness of Polish firms, but at the same may have resulted in a higher leverage for companies with debt denominated in foreign currency. Higher leverage, in combination with tight financial markets, could have constrained domestic companies in their access to financial markets, both to finance new investment opportunities and in terms of trade credit availability.<sup>7</sup> On the contrary, foreign owned companies with access to intra-firm capital markets might have exploited new investment opportunities and rolled over their debt (see Desai et al., 2004, for evidence from U.S. multinational affiliates operating in emerging markets). The third channel through which the crises may have influenced foreign trade activity is the increased uncertainty related to the contractibility of payment for shipped goods. This uncertainty might be especially detrimental for liquidity constrained firms, decreasing their willingness to export. It could also influence Polish importers, which become less credible for their foreign suppliers.

To test the hypothesis that access to intra-group financing had a positive impact

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<sup>7</sup>ICC Banking Commission (2009) report presents extended discussion of trade financing problems during the recent crisis.

on trade activity we run a set of regressions for the annual mid-point growth rates of exports and imports values inspired by our results from previous sections of the paper. These regressions have two general specifications. In the first one we explain exports and imports dynamics by foreign ownership, the level of indebtedness and their interactions with the crisis dummy. However, this specification does not fully address the above discussion, which indicates that foreign ownership should have a positive effect on foreign trade performance mainly in firms with constrained access to external financial markets. We tackle this issue in the second specification, in which we add the interaction of firm indebtedness, which we interpret as a measure of credit constraints, with the foreign ownership dummy. Consistently with the rest of the paper, we augment the estimated equations with control variables; we account for a sector specific impact of the worldwide trade collapse and the local currency depreciation by using a full set of 3-digit industry dummies and their interaction with the crisis dummy; we add log employment to control for firm size; finally the estimation is carried out over the whole population of firms, as well as for the subsample of firms operating in the manufacturing sector.

The estimation results for specification (1), which are reported in Table 10, show that during the crisis foreign-owned companies performed significantly better than local firms, especially in their importing activity. Moreover, firms' indebtedness appears to represent a significant drag on exports and imports in times of relatively tight financial markets, whereas it is statistically not significant in times of prosperity. These results confirm ICC Banking Commission (2009) report according to which trade financing problems have concurred to determine the recent trade collapse. We are however unable to determine the relative importance of these supply-side problems relative to other factors, such as the fall in demand. The estimation results for specification (2) confirms that, even for exports, if the whole sample of firms is considered, being an affiliate of a foreign company relaxes the crisis-related indebtedness-trade link. The impact is robust at the 10% significance level. Unfortunately, this result is not confirmed in the subsample of firms from the manufacturing sector. Nevertheless, all in all the above results constitute evidence of the positive role that multinational companies had in attenuating the impact of the recent crisis on foreign trade.

Table 10: Foreign trade performance

Sector Dep. variable Specification	All sectors				Manufacturing			
	mpg_exp		mpg_imp		mpg_exp		mpg_imp	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
foreign	0.003 [0.022]	-0.032 [0.031]	-0.067** [0.032]	-0.078* [0.045]	0.009 [0.019]	-0.015 [0.026]	-0.070** [0.035]	-0.088* [0.048]
foreign $\times$ crisis	0.069** [0.032]	0.022 [0.044]	0.164*** [0.045]	0.090 [0.062]	0.053* [0.027]	0.033 [0.037]	0.133*** [0.049]	0.089 [0.068]
indebt	0.011 [0.017]	-0.033 [0.025]	0.040 [0.025]	0.027 [0.0385]	0.016 [0.013]	-0.017 [0.021]	0.041* [0.025]	0.014 [0.043]
indebt $\times$ crisis	-0.053** [0.024]	-0.110*** [0.036]	-0.110*** [0.033]	-0.190*** [0.050]	-0.035* [0.019]	-0.077** [0.031]	-0.079** [0.035]	-0.140** [0.064]
indebt $\times$ foreign		0.058* [0.033]		0.019 [0.050]		0.041 [0.027]		0.032 [0.053]
indebt $\times$ foreign $\times$ crisis		0.080* [0.047]		0.120* [0.0665]		0.040 [0.039]		0.076 [0.077]
ln(emp)	0.005 [0.012]	0.006 [0.012]	-0.003 [0.018]	-0.003 [0.018]	-0.008 [0.011]	-0.007 [0.011]	-0.024 [0.020]	-0.024 [0.020]
ln(emp) $\times$ crisis	0.040** [0.018]	0.041** [0.018]	0.006 [0.025]	0.007 [0.025]	0.027* [0.015]	0.029* [0.015]	0.009 [0.028]	0.010 [0.028]
Observations	13952	13952	13530	13530	9427	9427	8596	8596
R-squared	0.160	0.160	0.089	0.090	0.079	0.082	0.061	0.061

Notes: Standard errors in brackets; \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% level, respectively; mpg\_exp and mpg\_imp denote the mid-point growth rates of exports and imports, indebt is the share of total liabilities in total assets, ln(emp) is log employment, while foreign and crisis are dummy variables indicating foreign affiliates and the crisis period, respectively; all regressions are run with a full set of 3-digit industry dummies and their interactions with the crisis dummy.

## 8 Conclusions

This paper investigates the impact of the global crisis on Polish firms. Our key results are the following: the ownership (foreign vs. domestic), size and sector of activity are important to understand the impact of the global crisis on Polish firms. While producers of all manner of postponables have been disproportionately hit by the crisis, foreign owned and larger firms were better able to cope with the downturn. Foreign owned firms in particular were more easily able to overcome the contraction of foreign demand and increased credit constraints. We found evidence supporting the hypothesis that reliance on intra-group financing or securities issuing may have been a key factor in explaining the greater resilience of these firms. Our paper also addresses an issue highly debated, namely the role of value chain production during the crisis. Our data do not provide strong conclusions regarding this point, but the evidence gathered would suggest that this model of production might be better suited to respond to global exogenous

shocks. Finally, we test directly foreign trade response of foreign owned firms. Also in this case foreign owned firms posted better results than the rest of the sample, in particular during the crisis.

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## Appendix

### A.1 Econometric strategy

As we are interested in changes over time, our variables of interest are computed in terms of growth rates. In particular we use the so called “mid-point growth rates” method proposed by Buono et al. (2008) and applied to monthly data by Bricongne et al. (2009).

We apply this method to annual data, which in our database are represented by four-quarter periods 2006:3-2007:2, 2007:3-2008:2 and 2008:3-2009:2. Namely, the mid-point growth rate for variable  $y_t$  is computed according to the formula:

$$g_t = \frac{y_t - y_{t-1}}{\frac{1}{2}(y_t + y_{t-1})}.$$

The main advantage of the mid-point growth rate over traditional methods is that it makes possible computing growth rates also for quantities that were equal to zero in the initial period. This measure is therefore more suitable to calculate dynamics for individual firms. In the next section, the mid-point growth rate is computed for the following variables: sales, employment, investment, exports and imports. In case of other variables, their dynamics is measured in standard manner.

As regards the estimation method, we had to address the problem of extremely deviant observations, i.e. outliers, which are present in every firm-level database. Since in the presence of outliers, and consequently heterogeneity, OLS estimates become inefficient, we applied the robust regression (see Huber, 1996, for extended exposition of the method). The main idea of the robust regression is to assign a weight to each observation, with higher weights given to better-behaved observations, whereas the extremely deviant cases are assigned weights close to zero. In our study we use the iteratively reweighed least squares method proposed by Holland and Welsch (1977).

A final methodological remark concerns our unit of measurement for the econometric estimations. Since we work with growth rates, which tend to be relatively volatile, the overall fit of the estimations should be expected to be lower than if we were working with levels of the same variables.

## A.2 Classification of postponable goods and services

We define as postponables goods produced in the following sectors (NACE rev. 2 classification):

Two-digit sectors: 16, from 22 to 32, 41, 43, 50, 51, 55, 68, 77 and 79

Three-digit sectors: 191, 205, 206, 491 and 492

Four-digit sectors: 1724, 2011, 2012, 2013, 2016 and 2017