Firms in the Great Global Recession:

The role of foreign ownership and financial dependence

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Outline

1. Motivation
2. Dataset
3. Aggregate data evidence
4. Econometric strategy
5. Firm-level data evidence
6. Conclusions

Outline

Motivation

1. Analyse whether access to internal financial markets helps foreign owned companies to be more resilient to financial distress in comparison to local firms in a small open economy
2. Apply the framework to the recent crisis and test on firm-level data from Poland.
3. Why Poland?
   - Relatively fast growth before the crisis
   - Not directly affected by the Subprime Crisis

What do we know?

Global trade and production collapse was deeper and faster than in any period after the 2^{nd} World War

- Within 8 months the value of global trade collapsed by 25% (Baldwin and Taglioni, 2009)
- Trade collapse has been unparallelled in terms of suddenness, severity and cross-country synchronisation (Eichengreen and O'Rourke, 2009).

Figure 5 Historical trade collapses and recoveries

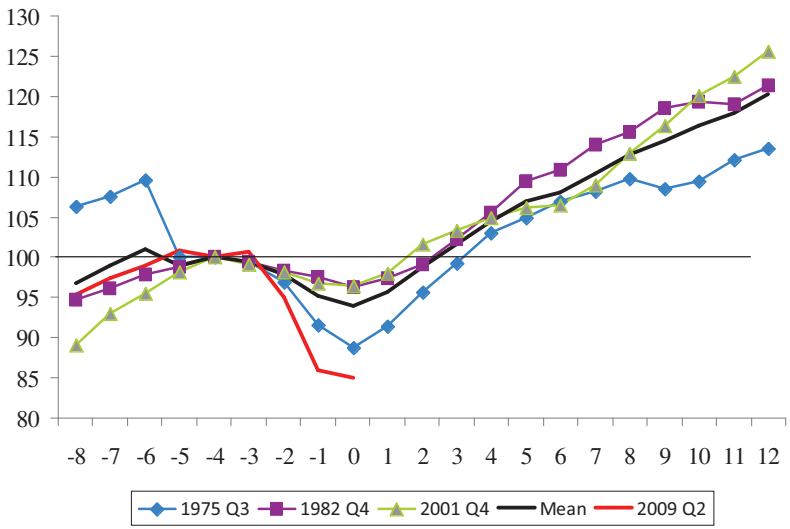
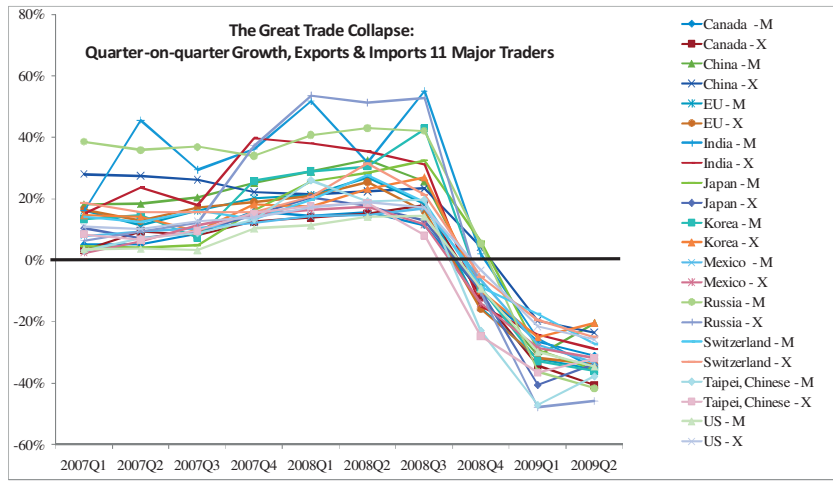


Figure 3 The great trade collapse, 2008 Q2 to 2009 Q2



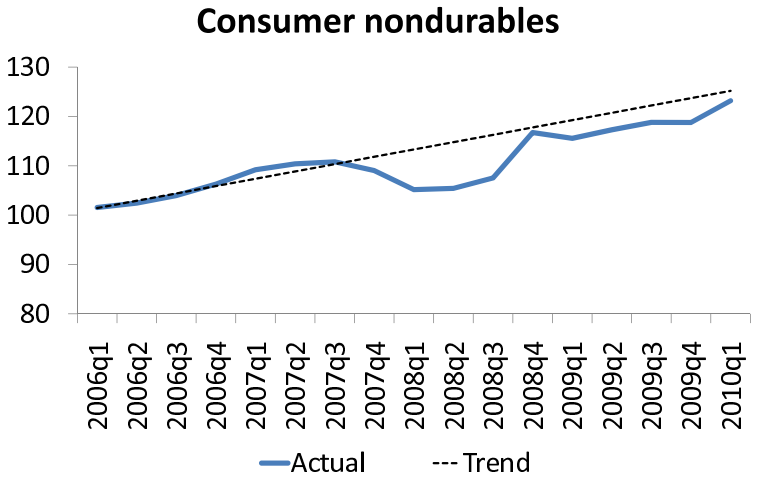
Source: Baldwin and Taglioni (2009); Eichengreen and O'Rourke (2009)

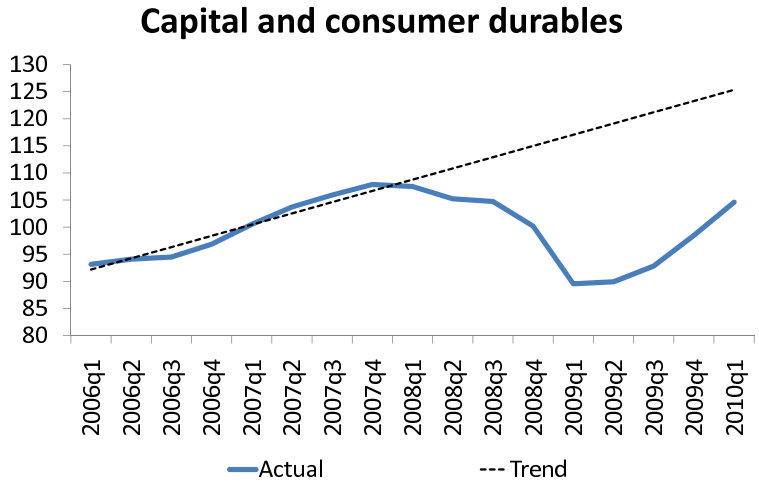
What do we know?

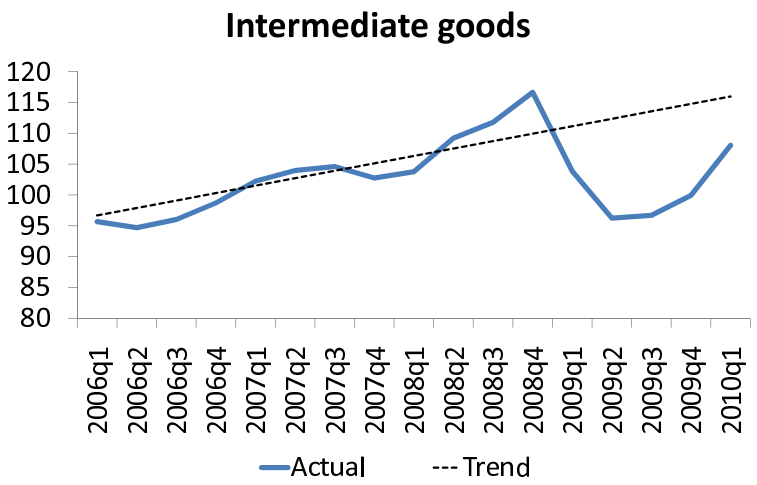
Demand collapse was especially sharp for all manner of postponable goods:

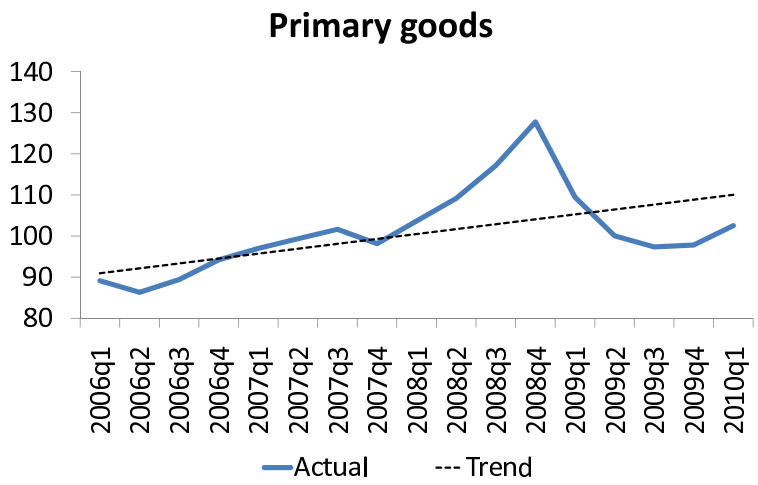
- Fear of the unknown (Blanchard, 2009) caused that consumers, firms, and investors around the world applied a strategy "wait and see" by delaying purchases and investments of all what could be postponed until they could determine how bad things would get (Baldwin and Taglioni, 2009)

Trade dynamics in different product groups









Source: IMF WEO, October 2010

What do we know?

Trade collapse was mainly due to contraction of global demand (Bricongne et al., 2009), but freezing up of financial markets could also be an important factor:

- 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

What do we know?

The reliance on external finance influences the performance of firms or sectors in times of financial crises:

- Dell'Ariccia et al. (2008), on the basis of a panel for 41 countries and period 1980-2000, show that more financially dependent sectors are more strongly affected in times of banking crises
- Braun and Larrain (2005), by investigating data from 111 countries in the years 1963-1999, show that in times of tight financial markets industries dependent on external funds are more strongly affected, especially in countries with poor financial contractibility and in sectors with low tangibility of assets (tangible assets can be used as a collateral).

What do we know?

Foreign owned companies might be more resilient to the negative impact of crises:

- Desai et al. (2004), using data for US multinationals, show that foreign-owned firms with access to internal capital markets are better equipped to profit from investment opportunities (due to FX depreciation) in countries hit by a crisis
- Vertical integration partly eliminates problems with enforcing contracts (Antras, 2003): trade within a multinational corporation is less subject to payment delays or defaults

Outline

Cross-section coverage

Our dataset consists of the firm-level data for Polish companies from:

- quarterly profit-and-loss survey (F-01), compulsory for enterprises employing at least 50 persons
- annual balance sheet survey (F-02), compulsory for enterprises employing at least 10 persons

The resulting merged dataset covers almost 14 thousand privately owned companies that were responsible for 47% and 13% of total employment in manufacturing and non-manufacturing sectors.

Time coverage

Since our focus is on the recent global crisis, most of our estimations are based on data grouped in three "academic years":

- **base** year to compute growth rates (2006:3 - 2007:2)
- **pre-crisis** period (2007:3 - 2008:2)
- **crisis** period (2008:3 - 2009:2)

Definitions

Exporters: firms with over 20% of sales from exports

Foreign owned: firms with foreign capital over 50% of total capital

Size: small - below 100 employees, medium - between 100 and 500, large - over 500

Indebtedness: low - liabilities below 30% of total assets, intermediate - between 30% and 60%, high - above 60%

Distribution of firms in manufacturing and non-manufacturing sectors

	Sales			Employment		
	non-man.	manuf.	total	non-man.	manuf.	total
Sales orientation						
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
Ownership						
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
Size						
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
Indebtedness						
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

Distribution of firms in postponable and non-postponable sectors

	Sales			Employment		
	non-pos.	postp.	total	non-pos.	postp.	total
Sales orientation						
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
Ownership						
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
Size						
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
Indebtedness						
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

Outline

Firms' performance during the crisis

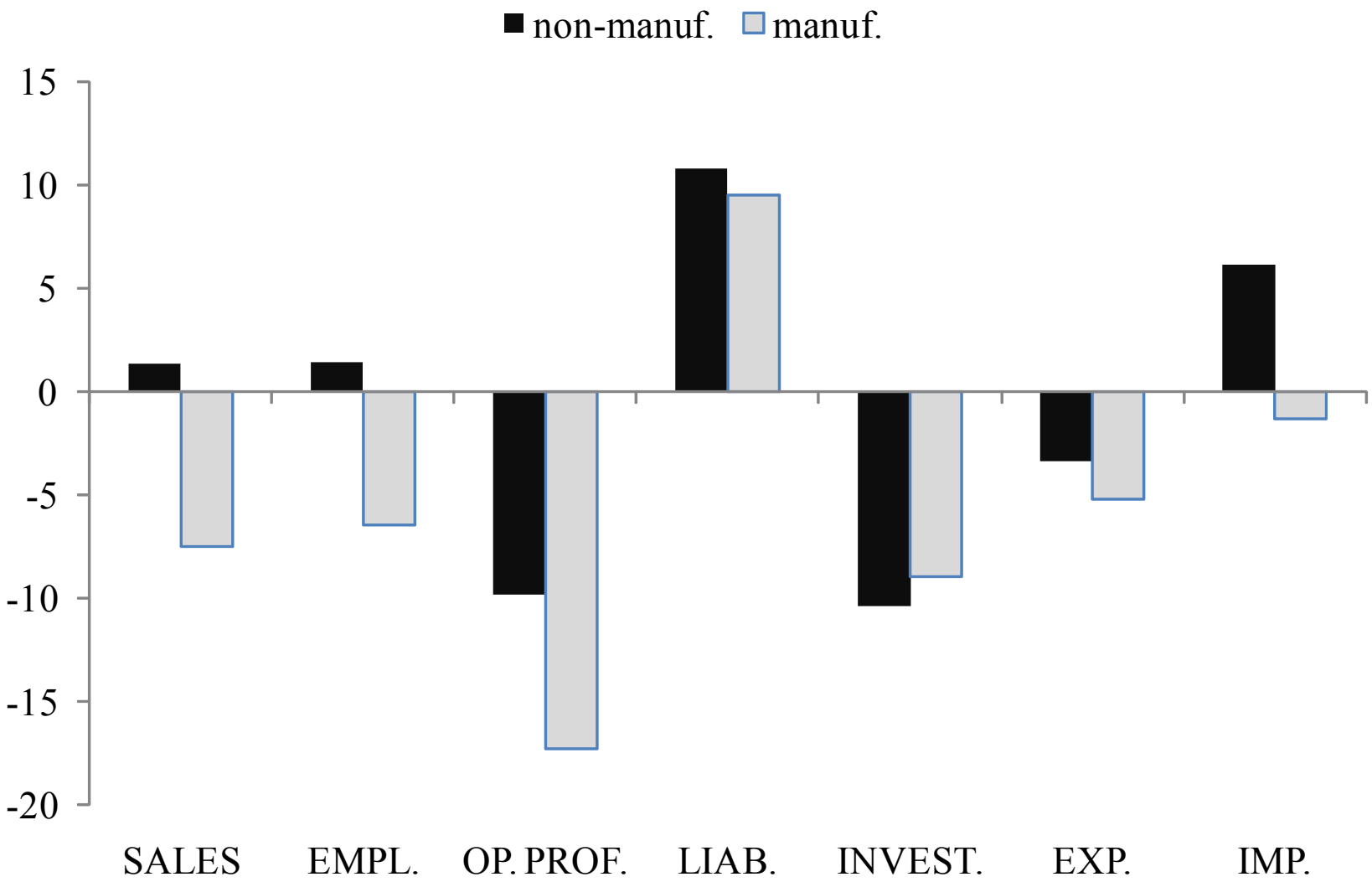
	Sales		Empl.		Exports		Imports	
	07/08	08/09	07/08	08/09	07/08	08/09	07/08	08/09
Sales orientation								
low exp. share	12.3	0.2	4.9	-0.4				
high exp. share	10.8	-8.1	4.6	-6.5				
Ownership								
domestic	12.5	-3.6	3.2	-3.2	14.1	-6.2	23.7	-1.9
foreign	10.9	-1.7	8.0	-1.0	7.9	-4.2	-2.1	3.0
Size								
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
Indebtedness								
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
Sector								
non-manuf.	12.3	1.3	5.8	1.4	9.7	-3.4	8.1	6.2
manuf.	11.1	-7.5	3.9	-6.5	10.0	-5.2	4.8	-1.3
of which:								
non-postp.	*15.0*	*-4.4*	*1.1*	*-6.1*	*21.7*	*0.9*	*30.0*	*-1.2*
postp.	*8.4*	*-9.9*	*5.3*	*-6.7*	*6.7*	*-7.1*	*-7.5*	*-1.5*
TOTAL	**11.8**	**-2.7**	**4.8**	**-2.4**	**10.0**	**-4.9**	**5.9**	**1.2**

Firms' performance during the crisis

	Op. profits		Net profits		Liab.		Invest.	
	07/08	08/09	07/08	08/09	07/08	08/09	07/08	08/09
Sales orientation								
low exp. share	17.1	-9.9	17.4	-24.6	12.4	10.7	11.6	-7.2
high exp. share	-9.1	-19.1	-6.4	-59.0	10.2	9.3	14.1	-14.6
Ownership								
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
Size								
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
Indebtedness								
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
Sector								
non-manuf.	14.2	-9.8	14.4	-21.3	10.9	10.8	14.4	-10.4
manuf.	-2.4	-17.3	0.3	-55.5	12.4	9.5	10.2	-8.9
of which:								
non-postp.	*7.0*	*-19.4*	*8.1*	*-56.3*	*15.4*	*11.1*	*11.0*	*5.0*
postp.	*-7.1*	*-16.1*	*-3.8*	*-55.1*	*11.0*	*8.3*	*9.8*	*-15.9*
TOTAL	5.8	-13.3	7.3	-37.4	11.6	10.2	12.4	-9.7

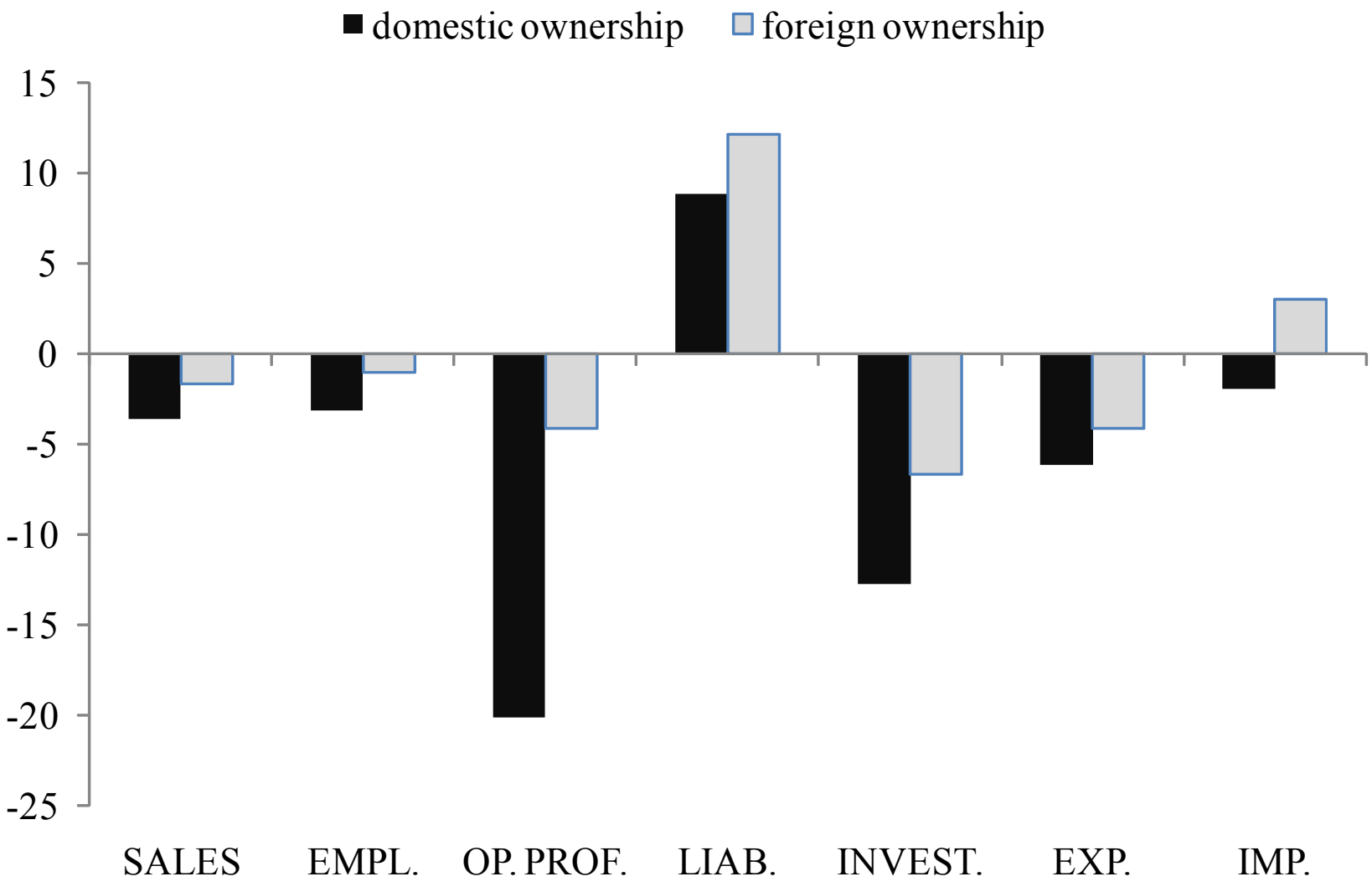
Manufacturing vs. non-manufacturing firms performance

(Annual growth rate in the crisis period 2008:3-2009:2)



Domestic vs. foreign owned firms performance

(Annual growth rate in the crisis period 2008:3-2009:2)



Outline

Mid-growth rates

Since we are interested in changes over time, our variables of interest are computed in terms of growth rates. In particular, we are using "mid-growth" rates proposed by Buono et al. (2008):

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

This makes possible computing growth rates also for quantities that were equal to zero in the initial period as $g_t \in [-2, 2]$, which helps a lot in regressions based on micro-data.

Robust regression

- Problem of extremely deviant observations, i.e. outliers, present in every firm-level database
- Apply the robust regression (see Huber, 1996) and in particular the iteratively reweighed least squares method proposed by Holland and Welsch (1977)
- The main idea of the robust regression: assign a weight to each observation, with higher weights given to better-behaved observations

Outline

Main questions we pose

- Did foreign firms perform better during the crisis if we control for other firm characteristics?
- Why are foreign owned firms different?
- What was the impact of foreign ownership on foreign trade?

Impact of the crisis on firms by their characteristics

More robust response of foreign firms to the financial crisis, evidenced by the aggregate statistics see chart, might be related to their characteristics (such as size) and not necessarily to the ownership status

We offer formal evidence of better performance of foreign companies based on firm-level data, which allow to control for other firm characteristics:

- Sector (3 digit industry-level fixed effects)
- Size (log of employment)
- Market of sales (exporting status dummy)

Impact of the crisis on firms by their characteristics

- We run a set of robust regressions for annual mid-point growth rates of sales, employment and investment, as well as for changes in profitability
- Our focus is to analyse the difference in the response to the crisis across foreign and domestic firms. We do this by including interactions of ownership status dummy with the crisis dummy

Impact of the crisis on firms by their characteristics

Sector	All sectors				Manufacturing			
Dep. variable	mpg_sales	mpg_emp	d_profrat	mpg_inv	mpg_sales	mpg_emp	d_profrat	mpg_inv
foreign	0.021***	0.028***	-0.001	-0.027	0.018**	0.033***	-0.005*	0.002
	[0.006]	[0.003]	[0.002]	[0.030]	[0.008]	[0.004]	[0.002]	[0.041]
foreign × crisis	0.014*	-0.007*	0.007***	0.084**	0.027**	-0.014**	0.015***	0.031
	[0.008]	[0.004]	[0.002]	[0.042]	[0.012]	[0.006]	[0.003]	[0.058]
exporter	-0.033***	-0.009***	-0.013***	-0.066**	-0.037***	-0.012***	-0.015***	-0.106***
	[0.006]	[0.003]	[0.002]	[0.030]	[0.007]	[0.003]	[0.002]	[0.036]
exporter × crisis	0.012	-0.016***	0.032***	0.003	0.023**	-0.010**	0.038***	0.079
	[0.008]	[0.004]	[0.002]	[0.042]	[0.010]	[0.005]	[0.003]	[0.051]
ln(emp)	-0.012***	0.002	0.001	-0.034**	-0.019***	-0.002	0.001	-0.036*
	[0.003]	[0.001]	[0.001]	[0.0144]	[0.004]	[0.002]	[0.001]	[0.021]
ln(emp) × crisis	0.024***	-0.004**	0.000	0.063***	0.029***	-0.006**	-0.000	0.037
	[0.004]	[0.002]	[0.001]	[0.020]	[0.006]	[0.003]	[0.002]	[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

Why are foreign-owned companies different?

1. Vertically integrated international supply chains might be more resilient to global financial shocks
   - Better contractibility (Antras, 2003)
   - Large sunk costs of setting up the chain (in the face of an adverse, temporary shock firms would adjust the entire chain along the intensive rather than extensive margin, see Altomonte and Ottaviano, 2009)
2. Foreign-owned firms have better access to internal markets and are thereby less financially constrained

- We test the former by estimating probit regression for exit dummy (foreign ownership status should decrease the probability of exit)
- We analyse the latter by running Braun (2003) type of regression, testing whether tangibility of assets is not important for foreign owned companies in raising new debt.

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Why are foreign-owned companies different?

Probit regression results

Sector Dep. variable	**All Sectors** Exit dummy	**Manufacturing** Exit dummy
foreign	-0.051*	-0.024
	[0.027]	[0.037]
foreign×crisis	-0.018	-0.029
	[0.048]	[0.066]
crisis	0.056***	0.093***
	[0.021]	[0.035]
ln(emp)	-0.782***	-0.749***
	[0.012]	[0.016]
exporter	0.223***	0.103***
	[0.021]	[0.029]
exporter×crisis	0.068*	0.088*
	[0.037]	[0.051]
Observations	74769	37529

Why are foreign-owned companies different?

Intra-group financing and foreign ownership status

Ownership: Liabilities	**domestic** total	intra-group	external	**foreign owned** total	intra-group	external
Share in total						
2006/07	100	13.5	86.5	100	38.2	61.8
2007/08	100	12.8	87.2	100	37.6	62.4
2008/09	100	12.6	87.4	100	40.4	59.6
Growth rate						
domestic	13.4	7.4	14.4	10.1	8.3	11.3
foreign	8.8	6.5	9.2	11.6	19.9	6.6

Why are foreign-owned companies different?

Access to external financing during the crisis

Sector Dep. variable	All sectors dindebt	Manufacturing dindebt
foreign	-0.009	-0.018
	[0.007]	[0.011]
foreign × crisis	0.026**	0.063***
	[0.010]	[0.016]
tang	0.018**	0.007
	[0.009]	[0.013]
tang × crisis	0.007	**0.044****
	[0.013]	[0.019]
tang × foreign	-0.017	0.006
	[0.018]	[0.026]
tang × foreign × crisis	0.005	**-0.089****
	[0.026]	[0.037]
Observations	23067	10809
R-squared	0.08	0.07

Global companies and foreign trade

Channels of global crisis impact on exports of Polish firms:

1. Worldwide collapse of trade decreased external demand for Polish products
2. Increase of risk premium and subsequent depreciation of local currency (by about 30% in real effective terms) created new investment opportunities but also increased debt denominated in foreign currency. As evidenced by Desai et al. (2004), new investment opportunities might be exploited only by firms with access to (internal) financial markets
3. Increased uncertainty might harm trade of local firms due to contractibility problems

To test the hypothesis that access to intra-group financing had a positive impact on trade activity we run a set of regressions for the annual mid-point growth rates of exports and imports

Global companies and foreign trade

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

Outline

Conclusions

On the basis of Polish firm-level data we found that:

1. Ownership status (foreign vs. domestic), size and sector of activity are important to understand the impact of the global crisis on Polish firms.
2. Producers of postponable/manufactured goods have been disproportionately hit by the crisis
3. Foreign owned and firms were better able to cope with the downturn due to access to intra-group financing
4. Foreign owned firms were more resilient to export collapse, which might suggest that vertically integrated model of production might be better suited to respond to global exogenous shocks

References:

Altomonte, C., Ottaviano, G. I., 2009. Resilient to the crisis? global supply chains and trade flows. In: Baldwin, R. (Ed.), The Great Trade Collapse: Causes, Consequences and Prospects. Centre for Economic Policy Research and VoxEu.org, Ch. 11, pp. 95–100.

Antras, P., 2003. Firms, contracts, and trade structure. The Quarterly Journal of Economics 118 (4), 1375–1418.

Baldwin, R., Taglioni, D., 2009. The great trade collapse and trade imbalances. In: Baldwin, R. (Ed.), The Great Trade Collapse: Causes, Consequences and Prospects. Centre for Economic Policy Research and VoxEu.org, Ch. 6, pp. 47–58.

Blanchard, O., 2009. (Nearly) nothing to fear but fear itself, the Economist, 29 January.

Braun, M., 2003. Financial contractibility and asset hardness, mimeo.

Braun, M., Larrain, B., 2005. Finance and the business cycle: International, inter-industry evidence. Journal of Finance 60 (3), 1097–1128.

Bricongne, J.-C., Fontagné, L., Gaulier, G., Taglioni, D., Vicard, V., 2009. Firms and the global crisis: French exports in the turmoil, mimeo.

Buono, I., Fadinger, H., Berger, S., 2008. The micro dynamics of exporting: Evidence from french firms. MPRA Paper 12940, University Library of Munich, Germany.

Dell'Ariccia, G., Detragiache, E., Rajan, R., 2008. The real effect of banking crises. Journal of Financial Intermediation 17 (1), 89–112.

Desai, M. A., Foley, C. F., Forbes, K. J., 2004. Financial constraints and growth: Multinational and local firm responses to currency crises. NBER Working Papers 10545, National Bureau of Economic Research, Inc.

Eichengreen, B., O'Rourke, K., 2009. A tale of two depressions, mimeo.

Holland, P. W., Welsch, R. E., 1977. Robustness regression using iteratively reweighted least-squares. Communications in Statistics: Theory and Methods A6, 813–827.

Huber, P. J., 1996. Robust Statistical Procedures. Society for Industrial and Applied Mathematics, Philadelphia.

Iacovone, L., Zavacka, V., 2009. Banking crises and exports: Lessons from the past. Policy Research Working Paper Series 5016, The World Bank.