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TRANSMISSION CHANNELS OF THE GLOBAL ECONOMIC CRISIS: MICRO EVIDENCE FOR MACEDONIA

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Abstract

The 2008-2009 global recession, which originated in developed economies, has rapidly spilled over worldwide, hitting different economies with various intensity. The Macedonian economy was not an exception - the export sector suffered heavily, expectations deteriorated and household consumption declined subsequently. In this paper we aim to improve our understanding of the effects of the global crisis on the Macedonian economy by using disaggregated, firm-level data. As micro data generally contain richer information compared to aggregated data, this research provides useful information for policy-makers regarding the main weaknesses of the domestic economy, as well as regarding the actions needed to improve the resilience of the economy to future economic distress. The results suggest that firms that produce and sell domestically had relatively weaker performance. The trade channel appears important only for the main exporting group - the metal producers, whereas the financial channel did not play a significant role during the crisis.

Keywords: *global crisis, crisis transmission, firm-level data*

JEL Classification: F3, O40, F43, D00

Introduction

The 2008-2009 global recession, which originated in developed economies, has rapidly spilled over worldwide, hitting different economies with various intensity. The Macedonian economy has proven to be relatively resilient to the external shock, with real GDP contracting by 1% in 2009. On the other hand domestic exports have suffered heavily declining around 16% in real terms.

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In this paper we aim to improve our understanding of the effects of the global crisis on the Macedonian economy by using disaggregated, firm-level data. Our goal is to empirically test the relative importance of three different channels - the financial channel, the export channel and the domestic demand channel, in the context of the global crisis. We employ a consistent empirical framework, commonly found in similar studies. The dataset consists of balance sheet and income statement indicators for 194 firms over the 2000-2009period, with annual frequency.

We find a significant negative effect from the domestic demand channel on firm performance, while the export channel turns to be insignificant, somewhat contrary to the dramatic fall in domestic exports during the crisis. However, once we control for sector specifics, we find that exporters of metal products, which constitute almost 30% of total exports, had a significantly weaker performance relative to the other exporters during the 2009 crisis. Our results point to the lack of importance of the financial channel in transmitting the crisis in the Macedonian economy.

The paper is organized as follows. Section II surveys the literature. In Section III we provide some insight in the effects of the global crisis on the Macedonian economy as seen through macro data. Section IV discusses the dataset. Section V discusses the estimation strategy and results and Section VI concludes.

Literature overview

The global financial crisis of 2007, which emerged in developed economies, quickly turned into the most severe and synchronized global recession in the last 80 years. Both emerging and developing economies were hit severely, although with different intensity, reflecting the level of financial integration and the soundness of the macroeconomic fundamentals prior to the crisis. As the crisis unfolded over 2008 and 2009, exports in emerging and developing economies slumped, financial flows declined and economic activity contracted sharply.

Recent studies explore the transmission of the crisis across countries, trying to identify the key channels and linkages as well as country specifics that enabled a quick global spillover of financial and economic shocks from developed economies. One part of the literature approaches this issue from the macroeconomic perspective by using aggregate data to explain the crisis. By using cross-country regressions, Berkmen et al. (2009) find that the severity of the crisis in different economies depends significantly on the level of previously cumulated financial vulnerabilities. This particularly holds for emerging economies, while for developing economies the export channel proves to be important as well, with countries exporting advanced manufacturing goods being more affected than those exporting food. Cetoreli and Goldberg (2009) confirm the role of the financial channel by showing that global banks played a significant role in transmitting the crisis from developed to emerging and developing economies. Similar conclusions are reported by Claessens et al. (2010), who try to draw some lessons for macroeconomic policy and financial reforms by studying the roots and main contagion channels. Blanchard et al. (2010) extend their analysis by exploring the role of the

exchange rate regime, foreign reserves holdings and policy stance in emerging and developing economies. According to their findings, countries with fixed exchange rate regimes have suffered more severely from the crisis as compared to those with floating regimes. This is explained with stronger adverse effects that higher holdings of short term debt had on countries with fixed exchange rates as compared to their floating counterparts. The authors fail to find evidence that foreign reserves holdings were an important buffer to the crisis, while the results on the role of the policy stance and policy mix are inconclusive.

Another strand of the literature explores the channels through which global crisis materialized by using firm-level data. Advocates of the micro approach argue that disaggregated, firm-level data provide better insight into the crisis transmission as they contain richer information about individual economic entities with different specifics and consequently diverse exposure to shocks. Kamil and Sengupta (2010) exploit the heterogeneity of firm-level data on a sample of Latin American countries. They study how and to what extent individual firm-level characteristics prior to the crisis, in terms of financial positions and international linkages; can explain different corporate performance during the crisis. Their results underline the role of the financial channel in transmitting the crisis into Latin America, with more leveraged firms suffering more from the global shock. In addition, cash-rich firms have weathered the crisis better as compared to their counterparts with lower or no cash buffers prior to the crisis, while external financial linkages (measured through the share of foreign currency denominated debt in total debt) were not an important source of vulnerability during the crisis. Their results also confirm the role of the export channel, with exporting firms being more adversely affected from the global crisis. Kolasa et al. (2010) focus on the performance of Polish firms, particularly the role of individual firm characteristics such as ownership status (foreign vs. domestic), size and sector. Their results show that membership in large multinational groups has considerably contributed for domestic subsidiaries to better cope with the crisis as compared to their domestically-owned counterparts, which can mostly be explained with their easy access to external and intra-group financing.

Claessenss et al. (2011) examine the impact of the 2007-2009 crisis on firm performance and the role of different transmission channels on a sample of 42 advanced emerging economies. Using accounting data for 7,722 non-financial firms, they investigate the role of three particular channels through which the crisis may have affected firms: the financial channel, the demand channel and the export channel. In order to capture both cross-firm and cross-country heterogeneity, the authors control for firm specifics and country features, such as country exposure to global capital inflows, its overall level of financial development and trade openness. Their findings indicate that export and demand channels are the most important in transmitting the crisis. With respect to country specifics, the results point to trade linkages as the prime propagator of shocks, while financial linkages are found to play a considerably weaker role.

Chakraborty (2012) analyzes the channels through which the global crisis affected export-oriented firms in India by using income statement and balance sheet indicators for around 5,000 manufacturing firms. Results show that the worse export performance

of Indian firms is mostly explained by the negative demand shock from India's major trading partners, with the impact being higher for US than the EU. They find no significant effects of the international financial constraints on Indian exports. On the other hand, domestic financial conditions, accompanied by loose monetary policy, act as a supporting factor to export-oriented firms.

Tong and Wei (2008) investigate the spillover of the subprime crisis to a sample of U.S. non-financial firms. More specifically, they are interested in two channels through which the financial crisis could have influenced the non-financial firms - the consumer demand channel and the financial constraint channel. Their results suggest that both channels are statistically significant, with the liquidity constraints channel being more significant.

The Macedonian economy during the global crisis

Before the outbreak of the global financial and economic crisis, Macedonia was in the expansionary phase of the business cycle, with rapid GDP growth fueled by credit growth and high capital inflows from abroad (Table 1 and Figure 1). Annual GDP grew by more than 5% between 2006 and 2008, reflecting strong domestic demand and increasing foreign direct investments. As economic growth was mainly demand-driven, it caused an increase in imports and subsequently a sharp widening of the current account deficit to around 13% of GDP in 2008. Therefore, large external imbalances represented the main vulnerability given the exchange rate peg to the euro and the high level of euroization. The banking sector was sound, with no major exposures to risky financial instruments on the international financial market, limited reliance on external financing and sufficient capital buffers against possible shocks. Fiscal policy was also prudent, as budget deficits and public debt were fairly low.

Table 1. Macedonian main economic indicators

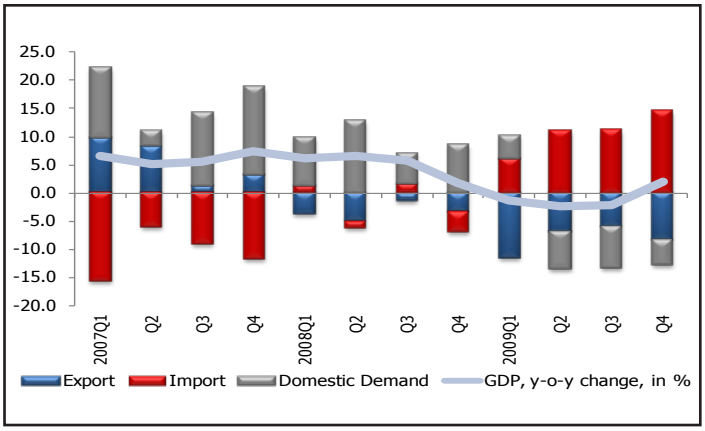
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
GDP (real growth rates)	4,5	-4,5	0,9	2,8	4,6	4,4	5,0	6,1	5,0	-0,9
Inflation (average, on cumulative basis,in %)	5,8	5,5	1,8	1,2	-0,4	0,5	3,2	2,3	8,3	-0,8
Unemployment rate (in %)	32,2	30,5	31,9	36,7	37,2	37,3	36,0	34,9	33,8	32,2
Government Budget balance (Central budget and Funds budget balance in % of GDP)	2,5	-6,3	-5,6	-1,0	0,0	0,2	-0,5	0,6	-0,9	-2,7
Money supply M4 (annual growth rates)	19,3	65,0	-11,4	18,6	16,5	15,0	25,0	29,3	11,2	6,0
Credit to the private sector (annual growth rates)	16,1	1,1	3,2	19,7	25,0	21,0	30,5	39,2	34,4	3,5
Current account balance (in % of GDP)	/	/	/	-4,0	-8,1	-2,5	-0,4	-7,1	-12,8	-6,8
Foreign direct investments in Republic of Macedonia (in % of GDP)	6,0	13,0	2,8	2,5	5,9	1,6	6,5	8,6	6,0	2,1
Gross external debt (in % of GDP)	/	/	/	/	51,3	49,8	50,3	51,1	47,4	58,2

Source: National Bank of the Republic of Macedonia, State Statistical Office and Ministry of Finance.

As a small and open economy heavily dependent on export demand and attracting foreign savings to boost domestic investment, the Macedonian economy is highly exposed to global shocks. The economy started to slow down gradually at the second half of 2008, following the Lehman Brothers collapse, the global financial instability

and eventually the global recession. The GDP growth rate was reduced from 6.2% in the first quarter of 2008 to only 1.7% in the last quarter, followed by negative growth rates throughout 2009. There was also a rapid fall in industrial production of around 11% in 2009.

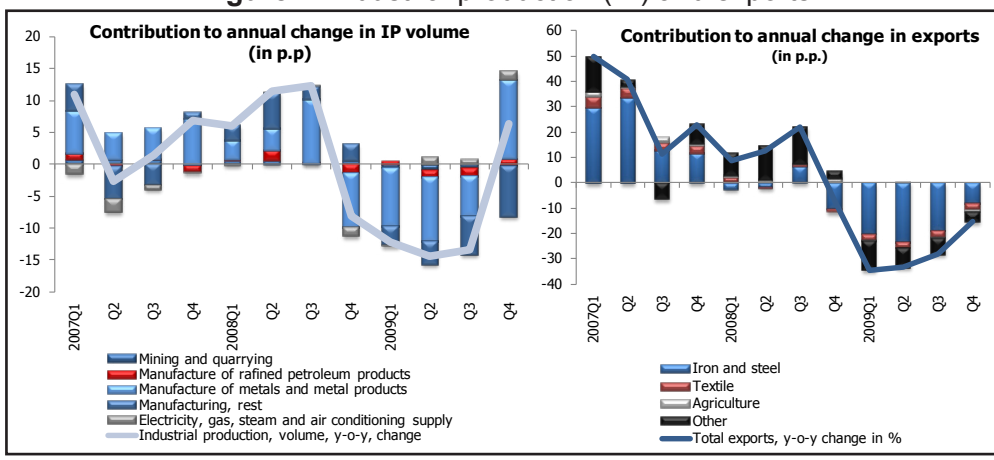
Figure 1. Contribution to annual change in real GDP (in p.p.)



Source: State Statistical Office.

The prolonged recession in the Euro-area caused lower foreign demand for Macedonian products, leading to a significant deterioration in Macedonian exports (Figure 2). Exports of goods and services declined for around 30% during 2009.The main exporting industries – metals and textile – were most severely hit by the crisis, confirming the role of the external demand channel. For instance, in 2009 only, metal exports fell by 56% in nominal terms. The effect of the external demand on metal exports was additionally exacerbated by the reversal in commodity prices, which fell dramatically after reaching the historical peak in mid-2008. Considerable deterioration was also observed in the textile industry, which is the most labor-intensive industry in the country. In addition, the falling of the external private financing inflows and the rising uncertainties imposed pressures on the exchange rate peg which led to a fall of the foreign reserves, by around 30% by mid-2009as compared to end-September 2008. However, the decisive monetary policy response, higher foreign borrowing by the government and the downward adjustment of imports lead to a quick reversal of this process.

Figure 2. Industrial production (IP) and exports



Source: State Statistical Office.

Domestic economy contracted by 0.9% in 2009, with domestic demand having the largest negative contribution to growth. The lower propensity to consume, in line with the higher uncertainty, significantly lower wage growth in 2009 and the restrictive credit policy of the banking sector are the key factors that explain the downward adjustment in domestic demand. Credit growth registered a significant slowdown in 2009, reflecting deteriorating economic conditions, heightened uncertainty and rising non-performing loans. Although well capitalized and mostly funded with domestic sources of financing, the higher risk aversion of domestic banks made them unwilling to lend to the private sector, which restrained household consumption, as well as the ability of firms to roll over their loans. Total credit increased by only 3.5% in 2009, which represents a rapid slowdown from credit growth rates of over 30% prior to the crisis. The considerable reduction in bank lending, together with the decreased financing from abroad, imposed constraints on firms' cash-flows and consequently on private investment. However, aggregate investment remained relatively resilient during the crisis as a result of government capital investments.

To summarize, macroeconomic data suggest that the contraction of the domestic economy could be explained with the collapse of exports, due to the drop in external demand, as well as by the decline in private consumption. In addition, worsened domestic and international financial conditions also appear to have a negative impact on domestic economic activity during the crisis. However, the macroeconomic data and descriptive analysis do not enable us to determine which of these channels had a more significant impact on firm performance. In order to investigate this issue, we proceed with an empirical analysis by using micro-data on individual firms.

The dataset

Most of the studies that investigate the channels through which the crisis may have affected individual economies employ aggregate, macro data. Instead, we try to

evaluate the financial crisis transmission channels by using disaggregated, micro data. The database is constructed from the firm-level data provided by the Central Register of the Republic of Macedonia (CRM). In accordance with the legislation, all legal entities are required to submit financial statements to the Register of Annual Accounts held in the CRM. From this database, balance sheet and income statement data were used to create the indicators included in the analysis. Besides financial data, the dataset also includes information regarding the number of employees and companies' major area of activity. The dataset constructed in this manner consists of 194companies and covers the period from 2000 to 2009. The frequency of data is annual.

This was the only firm-level database readily available to the authors, so we don't have any information whether the firms were chosen randomly or not. The number of companies included in our dataset constitutes less than 1% of total number of companies operating in the country at the end of 2009[3]. However, these 194 firms represent important part of Macedonian corporate sector as their assets account for 46% (on average for 2006-2009 period) of total assets of the corporate sector[4].

All 2-digit NACE[5] sectors are included in the dataset. The share of individual sectors in the sample is broadly in line with their share in the total corporate gross income in the economy. For instance, manufacturing and trade companies have the largest shares in our sample (31% and 44%, respectively), while their share in the total economy turnover in 2008 was around 32% for manufacturing and 38%, for trade[6].At the end of 2007, the firms included in the dataset accounted for around 11% of total employment[7]. As shown in Table 2, around 45% of the firms in our sample are small firms mostly working in the trade sector. Large and medium size enterprises usually belong to the construction and manufacturing sectors.

Table 2. Characteristics of the dataset (2007 data)

	Construction	Manufacturing	Mining	Transport	Trade	Other sectors	Total
number of firms in the dataset	10	60	4	11	85	24	**194**
in %	5,2	30,9	2,1	5,7	43,8	12,4	
Size, in %							
small	30,0	13,3	0,0	36,4	77,7	25,0	**44,8**
medium and large enterprises	70,0	86,7	100,0	63,6	22,4	75,0	**55,2**
Indebtedness, in %							
low to medium	50	63,3	75,0	36,4	45,9	66,7	**54,1**
high	50	36,7	25,0	63,6	54,1	33,3	**45,9**

Notes: The firm is considered small if it has less than 100 employees; the firm is highly indebted if the ratio of liabilities to assets is higher than 60% (Kolasa et al., 2010).

Next, we review the indebtedness and profitability of the corporate sector in Macedonia

3 Data on total number of companies in Macedonia are taken from NBRM's Financial Stability Report for 2009.
4 Data on total assets of Macedonian corporate sector are taken from NBRM's Financial Stability Reports.
5 NACE is the acronym for National classification for economic activities in the country which is based on the EU Classification of economic activities NACE Rev.2.
6 Structural Business Statistics, 2010, State Statistical Office.
7 Total employment as measured by the Labor Force Survey, State Statistical Office.

in different economic sectors in two periods - the period before the crisis (2007) and the crisis period (2009). To that end, we have constructed several financial indicators that describe the debt burden of the firms and their profitability:

1. Debt ratio- calculated as total liabilities to total assets;
2. Debt-to-sales ratio- debt burden of the firm over its sales income;
3. Return on assets - net income of the firm over its assets;
4. Earnings before tax to total asset ratio - earning before taxes as a share of total assets.

The descriptive analysis of the corporate performance (Figure 3) suggests that:

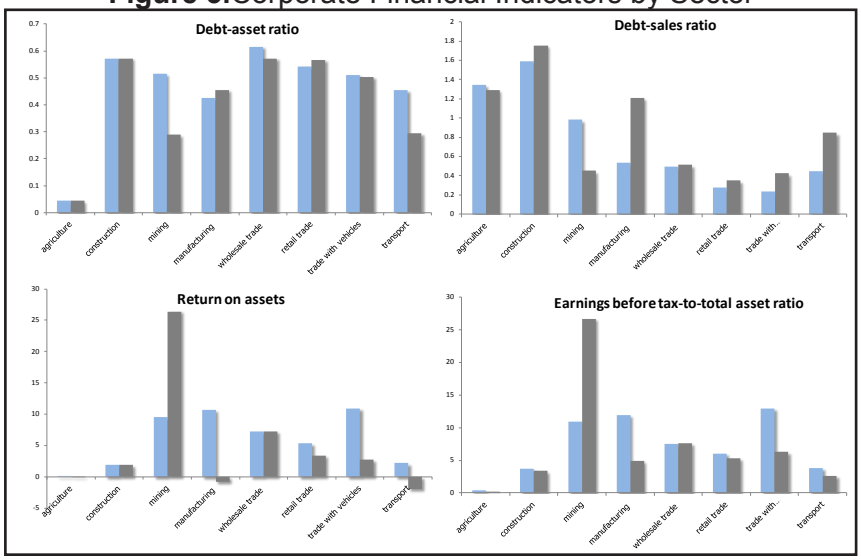
- The debt burden of the corporate sector did not increase significantly during the financial crisis as the debt ratio indicator is quite stable across the sectors[8]. The debt-to-sales indicator shows certain spikes in some sectors, but the detailed examination of the data suggests that this is largely due to the decline in firm sales during the crisis, rather than to higher liabilities.
- On the other hand, performance indicators suggest some weakening in firm performance as a result of the global crisis. In almost all economic sectors there was a decline in the return on assets in 2009, as well as reduced firm earnings[9], with the manufacturing sector being hit most severely.
- The analysis of the manufacturing sector shows that the producers of metals and non-metal minerals[10] suffered the most, with negative return on assets in 2009.

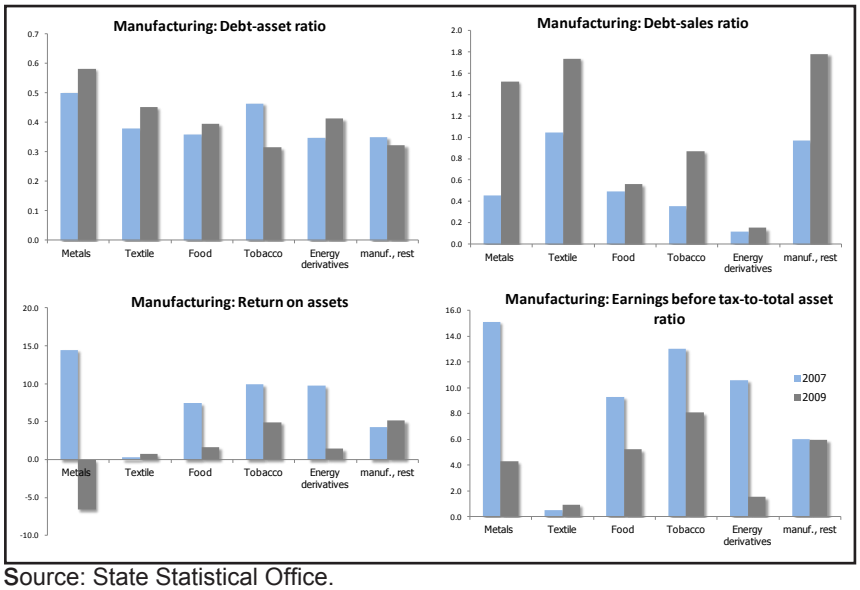
8 The significant decline of the debt ratio in mining is a result of the restructuring process of one of the main mining capacities in the country.

9 The better performance of the mining sector, similarly to the case of debt indicators, is a result of the restructuring process of one of the main mining capacities in the country.

10 In Figure 3, this sector is included in Manufacturing, rest.

Figure 3. Corporate Financial Indicators by Sector





Source: State Statistical Office.

Estimation method and results

The main goal of the research is to explain the effects of the 2009 crisis on the Macedonian economy by using firm-level data. More specifically, we aim to determine the relative importance of three different channels - the financial channel, the export channel and the domestic demand channel. To distinguish between these channels, we follow the approach used by Claessens et al. (2011). Namely, if the financial

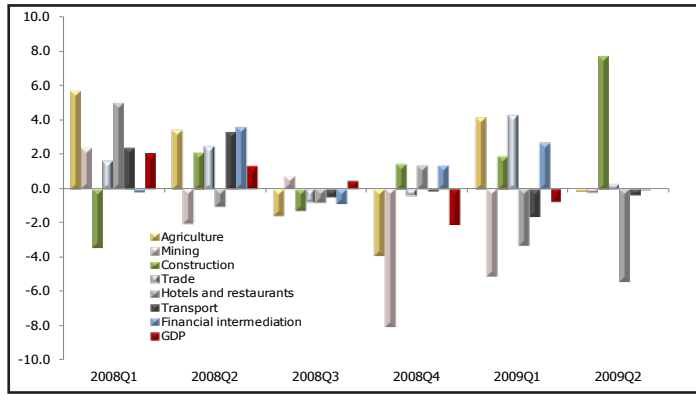
channel was important in the recent crisis, firms whose investment decisions during the pre-crisis period had been financed through credits would have worse performance relative to firms that had relied on their own resources. If the export channel was important, exporters would have a weaker performance in comparison to the other firms. Finally, if the global crisis led to a negative domestic demand shock, firms that produce and sell on the domestic market would be affected most.

The estimation method is based on Claessens et al. (2011) and Kamil and Sengupta (2010) i.e. firm-performance indicator was regressed on a set of variables which act as proxies for the channels mentioned above. The basic empirical specification is as follows:

$$\Delta\text{Performance}_{i,j}=c+\alpha*\text{Financial Dependence}_{i,j}+\beta*\text{Demand Sensitivity}_{i,j}+\gamma*\text{Trade}_{i,j}+\varepsilon_{i,j} \quad (1)$$

The performance variable is measured by the profit ratio of individual firms. Alternatively, one can use sales as an indicator for firm performance (Kamil and Sengupta, 2010). Given the primary goal of our research, our dependent variable is defined in differences instead of levels, the differences being calculated as a change between firm performance after the crisis and firm performance before the crisis. In order to define the dependent variable, we need the exact timing of the beginning and the end of the crisis. According to the GDP data, the effects of the global crisis were transmitted to Macedonia in the fourth quarter in 2008,when GDP fell by 2.1% seasonally adjusted compared to the previous quarter. When analyzed by economic sectors, one can notice that the crisis started earlier in most sectors. For instance, in mining and tourism negative q-o-q rates were registered already in the second quarter, whereas in agriculture, transport, trade, construction and in the financial sector q-o-q rates were negative in the third quarter of 2008.However, the dataset is of an annual frequency, which prevents us from precisely defining the beginning and the end of the crisis. Therefore, the change in performance is calculated as the difference between the profit ratio in 2009 (post-crisis performance) and the profit ratio in 2007 (pre-crisis year).We are using 2007 as a pre-crisis period, because all economic sectors were still functioning “normally”. On the other hand, using 2008 as a pre-crisis period would probably understate the true negative effect of the crisis due to the fact that, even in the first half of the year, one can notice negative movements across various sectors. The dependent variable is winsorized at 1% level to reduce the impact of outliers.

Figure 4. Value added by economic sectors (q-o-q, in %)



Source: State Statistical Office.

The existing literature employs various measures of the financial dependence variable. Rajan and Zingales (1998) use the index of intrinsic dependence on external finance for investment. More specifically, they are interested in "the amount of desired investment that cannot be financed through internal cash flow generated by the same business" [Rajan and Zingales 1998]. Consequently, they calculate the index of financial dependence by dividing the difference between a firm's capital expenditures and cash flow by capital expenditures. Raddatz (2006) considers firm financial dependence on external finance for working capital. He constructs a proxy for the importance of the working capital by calculating the ratio of inventories to sales. The higher the value of this measure, the smaller the fraction of inventory investment that can be financed by ongoing revenues and therefore the higher the need for external financing. In addition, he uses two more measures as a robustness check - the cash conversion cycle and the ratio of labor costs to sales. Claessens et al. (2011) uses the index of intrinsic dependence on external finance for investment and the cash conversion cycle, calculated both on sector and on firm level.

Bearing this variation in mind, we use several variables in order to capture the financial channels: the credit to assets ratio, the inventories to sales ratio and a firm indebtedness variable. The two ratios (credits/assets and inventories/sales) are calculated for 2006. The choice of 2006 as a reference year is due to the following reasons. In order to capture the true effects of the financial channel during the recent crisis, ex ante data should be used for the financial variable, i.e. it has to be pre-determined. As noted in the literature, during the crisis period, it is difficult to distinguish between different transmission channels. For instance, a firm may reduce its exports during the crisis, thus leading to a conclusion that the export channel was important. However, the reduction of the firm's exports could also be a result of the lack of working capital (the financial channel) rather than the export channel. In other words, ex ante data should be used in order to explain ex post firm performance. Further, the firm indebtedness variable is a dummy variable that equals one if the credit/assets ratio in 2006 exceeds 30%, and a value of zero otherwise. In fact, this variable serves as a robustness check. Namely, the ratios can be subject to the endogeneity problem - it is possible that firms with lower profitability are more indebted. In order to control for this problem, we created the firm indebtedness dummy variable and compared the results obtained with different financial indicators.

As the domestic demand channel is concerned, Tong and Wei (2008) construct a sector-level index by using the stock price reaction of US firms to the September 11th attack. Their idea is to capture pure firm sensitivity to an unexpected consumer confidence shock, i.e. firm's reaction should not be affected by other shocks (e.g. the liquidity shock). Claessens et al. (2011) develop a firm-level demand indicator by regressing firm sales on GDP between 2000 and 2006. The estimated coefficients are then used as a measure of firms' demand elasticity. However, a potential problem with this approach is the possibility of endogeneity bias due to omitted variables, which renders OLS coefficients to be biased. This is due to the fact that firm-level regressions do not include any firm-specific variables, such as managers' talent or skills, which are in fact strongly correlated with firm performance.

We construct our indicator for the domestic demand to reflect demand sensitivity as in Claessens et al. (2011). The idea is that if the global financial crisis triggered a negative domestic demand shock then firms that have higher sensitivity to domestic demand changes will suffer more. To construct this variable we estimated firm-level, OLS regressions of changes in firms' sale on the changes in domestic demand for 124 firms for which we have data for the 2000-2009 period (equation 2)[11].

$$\Delta \log(\text{Firm sales}_t) = c + \beta 1 * \Delta \log(\text{Domestic demand}_t) \quad (2)$$

Next, we use the estimated $\beta_1$coefficients to create the demand sensitivity variable which will be included in the main regression (equation 1) to reflect the domestic demand channel. Given that we had data to estimate demand sensitivity coefficients only for 124 out of 194 firms we were not able to construct firm level indicator. Instead, we've created a sector level demand sensitivity indicator meaning that firms in the same sector have same sensitivity to domestic demand as in Tong and Wei (2008). The estimated β_1 coefficients were used to calibrate the values for those firms for which we didn't have enough data to estimate equation 2. In case when we had more than one $\beta_1$coefficient for one sector we average them to create only one value for the corresponding sector. A potential problem with our measure of the domestic demand channel is that created in this way the demand sensitivity variable is not completely predetermined. Namely, when we estimated equation 2 we've used the whole sample, instead only the pre-crisis period. Hence, rather than representing only domestic demand effects, the estimates may contain effects from other transmission channels as well. The only way to address this potential problem is to re-estimate equation 2 for the same firms with an enlarged database – an option which was not feasible for us. Instead, we perform several robustness checks i.e. we estimated several versions of the model and we checked the stability of the results regarding the demand sensitivity variable.

Most of the papers that investigate the effects of the global financial crisis are focused on the financial channel. To the best of our knowledge, only two papers examine the effects of the export channel - Claessens et al. (2011) and Kamil and Sengupta (2010). In order to approximate the export channel, Claessens et al. (2011) construct sector-level and firm-level trade sensitivity indexes. Alternatively, Kamil and Sengupta (2010) create an exporter dummy variable which is equal to one if exports are positive and non-missing. We followed these two approaches and constructed two variables. The first one is a dummy variable which is equal to one if the firm is an exporter, and zero otherwise. The second export variable is calculated in a similar manner as the domestic demand sensitivity indicator. Sect oralexport elasticities are calculated by using export data for individual sectors according to the Standard International Trade Classification (SITC). More specifically, we regress changes in nominal exports[12]on changes in foreign demand[13] (equation 3).

11 For the rest 70 firms we have data only for several years and we were not able to obtain meaningful results.

12 Nominal export, in million of USA dollars.

13 Foreign demand is calculated as a sum of the weighted GDP indexes of Macedonia's main trading partners, based on each country's share in Macedonian total export.

$$\Delta \log(export_t) = c + \beta_2 * \Delta \log(foreign\ demand_t) \quad (3)$$

In this case, we are using quarterly data for the 1998-2006 period i.e. only for the pre-crisis period. After obtaining estimates for we create the export sensitivity variable by attaching these coefficients to the 2-digit NACE sectors, the classification that is used in our micro dataset. The export sensitivity variable is used in equation 1 as an indicator for the export channel.

In addition, we use a set of control dummy variables such as a dummy variable for the size of the firm and dummy variables for different economic sectors. Table 3 reports the results of our analysis.

The primary goal of the research is to identify the relative importance of different transmission channels during the 2009 crisis. Therefore, in the first regression (column 1) we include only the key explanatory variables - the domestic demand, the export dummy and the dummy for financial dependence. All three transmission channels have the expected, negative effect on firm's performance during the crisis. However, only the domestic demand channel appears to be significant at the conventional significance levels. This variable remains significant in different model specifications (column 2 - 6). The significance of the domestic demand channel does not come as a surprise. Namely, as mentioned previously, the global crisis was translated in large, negative domestic demand shock, with domestic demand contracting by 11% on cumulative basis in the first quarter of 2010 as compared to the fourth quarter of 2008[14]. The largest part of this decline (around 85%) can be explained by drop in personal consumption and gross investment. The decline in the personal consumption and in the demand for investment goods will logically lead to a higher profitability loss of those firms that have higher sensitivity to changes in domestic demand. An interesting direction for future research would be to distinguish between different domestic demand channels - personal consumption channel, investment channel and public consumption and to see which of these components was the most important during the crisis. This can be done by creating three new variables based on separate demand sensitivities.

14 The comparison captures the difference between the lowest and the highest level of domestic demand, respectively, during the period of the global crisis.

Table 3. The Impact of Crisis on Firm Performance

VARIABLES	(1) pa_w1	(2) pa_w1	(3) pa_w1	(4) pa_w1	(5) pa_w1	(6) pa_w1	(7) pa_w1
D_construction				-6.509			
				(5.020)			
D_transport				-2.996			
				(4.870)			
D_trade				-3.527			
				(3.428)			
D_agriculture				-2.234			
				(8.064)			
D_mining				0.726			
				(7.147)			
D_metal				**-13.251*** **			
				(4.158)			
D_food and textile				-3.598			
				(4.147)			
D_manu_rest				-2.348			
				(3.984)			
D_size	-1.154	-1.632	0.178	0.580	-0.420	-0.090	1.615
	(2.118)	(2.070)	(2.133)	(2.366)	(2.138)	(2.150)	(2.905)
Demand sensitivity	**-2.369*** **	**-2.319*** **			**-2.015*** **	**-2.030*** **	-1.954
	(0.750)	(0.757)			(0.767)	(0.767)	(1.204)
D_export	-1.813		-1.351		-0.534	-0.541	-1.982
	(2.082)		(2.127)		(2.173)	(2.173)	(2.815)
Financial dependence	-3.165	-3.253			-3.040		
	(2.338)	(2.362)			(2.322)		
Trade sensitivity		-0.250					
		(0.509)					
Metal*D_export					**-6.467***	**-6.560***	**-6.462***
					(3.378)	(3.377)	(3.582)
Credit/Assets						-0.063	
						(0.049)	
Inventory/Sales							-0.029
							(0.102)
Constant	1.889	1.462	-3.041**	0.098	1.030	1.219	-0.220
	(2.034)	(1.980)	(1.493)	(3.372)	(2.069)	(2.105)	(2.941)
Observations	194	191	194	194	194	194	115
R-squared	0.063	0.061	0.002	0.065	0.081	0.081	0.092
Breusch_Pagan_Godfrey [p-value]	0.751	0.571	0.734	0.110	0.817	0.644	0.8623

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The export dummy variable, used as a proxy for the export channel, is not statistically significant at the conventional levels (column 1). The results remain the same even if we replace the export dummy with the alternative export sensitivity variable that is based on sector-level trade elasticity (column 2). This comes as a surprise given the high drop in exports during the crisis relative to the drop in the domestic demand. However, there are two possible explanations that could justify the insignificant estimate for the export channel. First, as noted in Claessens et al. (2011), in small and very open economies the export channel and the demand channel are highly correlated. If this is the case, the significance of the export channel could be underestimated. Nevertheless, the export coefficient remains insignificant even if we drop the domestic demand variable (column 3). Second, while it is true that there was a significant decline in aggregate exports during the financial crisis, the decline was not symmetrically distributed across different sectorsi.e. the fall in the aggregate exports is almost entirely explained by the reduced metal exports which declined by 56% compared to 2007, while exports from all other sectors fell by only 1%.In order to account for different impact of the crisis across economic sectors, we include dummy variables for each sector (column 4). Results show that being a metal producer resulted in a significant decline of the profitability during 2009 as compared to the other sectors i.e. if a firm is a metal

producer then its performance during the crisis was worse than the firms from other sectors for 13.3%. Next, we test whether there is a significant difference between firms in the metal industry that are also exporters and the other exporters (column 5). The results confirm that metal exporters had significantly weaker performance during the crisis, as they were disproportionally hit during the crisis compared to the other exporters. In addition, these results point to the relatively high level of concentration of exports as one of the main weaknesses of the Macedonian economy, since around 50% of Macedonian exports between 2003 and 2011 have been concentrated in only two sectors: iron and steel, and textiles. The 2009 crisis showed that shocks affecting the dominant sectors have huge detrimental effects on aggregate exports. Therefore, it is important to promote and enforce further structural policies aimed towards higher degree of export diversification.

The dummy for financial dependence has the expected negative sign but it is insignificant at the conventional levels, suggesting that there was no significant difference in the performance of the firms in 2009 due to their indebtedness level. Alternatively we tried the other measures for financial dependence, such as the credit to assets ratio and the inventories to sales ratio (columns 6 and 7), but none of them turn out to be significant leading to a conclusion that during 2009 firms that were in more fragile financial condition before the crisis did not experience higher drop in profitability compared to the rest of the firms. This result does not come as a surprise. Namely, the global financial crisis affected the Macedonian economy directly through the real sector.This is in line with the significant coefficients on the domestic demand and the export channels (for the metal sector). On the other hand, there was no direct effect from the global financial crisis to the Macedonian financial sector. Macedonian banking sector remained sound and stable. Banks' lending was reduced but this came as a result of the increased risk aversion of the banks in line with the weak economic outcomes. Firms' profitability in 2009 was already reduced as a result of a weaker demand – domestic and foreign. In other words, the financial position of the firms before the crisis was not the reason for the reduced profitability i.e. firms did not need any additional external financing because their production had already been reduced as a response to the demand contraction. Finally, the dummy variable for firm size does not appear significant in any specification, indicating that the difference in firms' performance during the crisis cannot be attributed to their size.

Conclusion

In this paper we investigate the impact of the global financial crisis on the Macedonian economy by evaluating the relative importance of three transmission channels: the domestic demand channel, the export channel and the financial channel. Unlike most studies that use aggregated data, we use a unique, disaggregated; firm-level dataset based on balance sheet and the income statement data.

We analyze changes in the performance of Macedonian firms during the crisis by looking at the ex-ante firm characteristics. In order to do so, we create several different proxies to capture the effects of the three transmission channels. Our results show a significant negative effect of the domestic demand channel, suggesting that firms that have higher sensitivity to changes in domestic demand had relatively weaker performance than the rest of the firms. This finding is in line with the macroeconomic data, according to which domestic demand fell significantly during the crisis. On

the other hand, we did not find significant impact of the export channel, although exports declined dramatically during the crisis. However, this negative shock was quite asymmetric across export sectors. Once we control for this characteristic, we find evidence that metal exporters, which constitute almost 30% of total exports, had weaker performance during the 2009 crisis relative to other exporters. This result suggests that new structural policies aimed towards export diversification should be promoted and enforced further. The financial channel is insignificant in all specifications, indicating that there was no significant difference in firms' performance on the basis of their indebtedness level before the crisis.

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