

Demand Collapse or Credit Crunch to Firms?

Evidence from the World Bank's Financial Crisis Survey
in Eastern Europe

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Abstract

While there is a consensus that the 2008–2009 crisis was triggered by financial market disruptions in the United States, there is little agreement on whether the transmission of the crisis and the subsequent prolonged recession are due to credit factors or to a collapse of demand for goods and services. This paper assesses whether the primary effect of the global crisis on Eastern European firms took the form of an adverse demand shock or a credit crunch. Using a unique firm survey conducted by the World Bank in six Eastern European countries during the 2008–2009 financial crisis,

the paper shows that the drop in demand for firms' products and services was overwhelmingly reported as the most damaging adverse effect of the crisis. Other "usual suspects," such as rising debt or reduced access to credit, are reported as minor. The paper also finds that the changes in firms' sales and installed capacity are significantly and robustly correlated with the demand sensitivity of the sector in which the firms operate. However, they are not robustly correlated with various proxies for firms' credit needs.

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DEMAND COLLAPSE OR CREDIT CRUNCH TO FIRMS?

EVIDENCE FROM THE WORLD BANK'S FINANCIAL CRISIS SURVEY IN EASTERN EUROPE

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1 Introduction

The role of credit and demand factors in the 2008-2009 financial crisis is still not well understood. A negative credit shock to firms is generally thought of as a credit crunch— a reduction in the general availability of loans, or a sudden tightening of the conditions required to obtain a loan from the banks. Credit crunches squeeze firms' working capital and cripple their production. On the other hand, adverse demand shocks to firms come from general declines in demand for firms' products and services (i.e. a shift of the demand curve). While there is a consensus among researchers and policy makers that the 2008-2009 crisis was triggered by financial market disruptions in the United States, there is little agreement on whether the transmission of the crisis and the subsequent prolonged recession are due to credit factors or to a collapse of demand for the goods and services. Each type of factors has fundamentally different policy prescriptions. If credit factors are found to play the main role, the main prescription involves providing more and cheaper credit, directly injecting credit and liquidity to banks, or issuing loan guarantees. On the other hand, if demand factors are the main drivers, the focus should be on boosting investors' and consumers' confidence. Fiscal policies and the reduction of uncertainty regarding fiscal, monetary and regulatory policy are the conventional instruments in this case.

The existing literature almost exclusively focuses on the credit side to explain the transmission and propagation of the crisis. Recent theoretical contributions by Mendoza (2010), Devereux and Yetman (2010), Perri and Quadrini (2011) and Kalemli-Ozcan et al (2012) generally argue for a strong role of credit market frictions in the propagation and transmission of the crisis, following a long tradition starting from Kiyotaki and Moore (1997). An exception is Van Wincoop (2013), who develops a two-country model with leveraged financial institutions to show that the model cannot account for the impact of the crisis and the extent of the transmission.

Perhaps due to the strong influence of a well-established theoretical literature, the empirical literature also focuses on the credit side.² Tong and Wei (2011) use data on 3,823 listed firms in 24 emerging countries and find declines in stock prices to be, on average, more severe for firms intrinsically more dependent on external finance. Cowan and Raddatz (2013) use industry-level data for 45 countries to show that industries dependent on external finance decline significantly more during a sudden stop, especially in less financially developed countries. Paravisini et al (2011) use export data for Peruvian firms to show that credit shortages explain a 15 percent decline in Peruvian exports during the crisis. Similarly, Ahn (2013) also found bank liquidity shocks in Colombia had significant impacts on its imports. Not until

² For early evidence see Bernanke and Blinder (1992), Khwaja and Mian (2008). Recent studies on the current crisis using aggregate data include Amiti and Weinstein (2009), Helbling et al (2011), and Chudik and Fratzscher (2011).

recently, empirical studies that discuss demand sensitivity have started to emerge. Claessens, Tong and Wei (2012) investigate the impact of both the demand shocks and credit crunch for 7,722 listed firms. They show that the crisis negatively affected firms with greater demand and trade sensitivity. Isyuk (2013) focuses in U.S. non-financial firms and shows that around the collapse of Lehman Brothers, liquidity shocks had a greater impact, while in the first few months of recovery, improvements in demand mattered more.

This short paper is an effort to contribute the debate. We explicitly look for the impact of demand channels on firms. Using the Financial Crisis Firm survey conducted by the World Bank in six Eastern European countries, this paper shows that the drop in demand for firms' products and services is very severe, and is reported as the most damaging factor on firms in these countries. In addition, the firms' change in sales is significantly correlated with the sector's demand sensitivity, and not with various proxies used for firms' dependence on external finance.

Our paper has two main contributions. First, it provides evidence about the *relative* importance of demand and credit shocks on firms. It is probably not so surprising that in this severe crisis, both credit and demand factors are at play. Different studies have indeed pointed out that both credit and demand factors have negative impacts on firms during the crisis. Nevertheless, it is important to be able to provide some evidence about the relative importance of the factors because they have fundamentally different policy emphases. Traditionally, with balance sheet data it is difficult to directly compare the relative impacts of the two factors. The World Bank's Financial Crisis Survey is unique in that it asks firms to judge directly demand and credit channels, among others. While subjective, the data strongly indicate that declining demand is more important for the vast majority of firms.

Our second contribution is regarding the representativeness of the sample. The comprehensive coverage of the survey allows us to look at impacts on a more representative set of firms. In this sense our paper complements the existing literature. Tong and Wei (2011) and Claessens, Tong and Wei (2012) use data of publicly listed firms, which are generally large and well-established. Because of the data constraint, they do not include actions for small and medium firms, which constitute the majority fraction of the economy. The World Bank's Financial Crisis Survey collected data from a more random set of firms (see section 2 for data description), which allows us to examine the impacts on small and private firms –those that can potentially be more vulnerable to demand shocks or credit shocks. Our results show that firm size does not seem to matter for sales, but it does for firms' capacity and employment, in opposite ways. While small firms' capacity is significantly more correlated with demand and credit sensitivities than large firms', small firms' employment is significantly less so.

One might argue that a decline in demand for firms' goods and services can still be a credit problem because the decline in firms' demand is due to consumers' reduced access to credit. We cannot rule out this possibility. Nevertheless, even if consumers face credit crunches and cut back on consumption, from the firms' perspective, it is a demand shock. Examining whether consumers actually face credit crunches is an interesting question by itself, but is beyond the scope of this paper. In fact, studies on firms in general will not be able to say much about consumers' credit situations. One has to rely on household data³. Another argument is that what we observe can be attributed to credit shocks to a few firms. For example, credit crunches to a few large firms, especially those that consume intermediate inputs, can squeeze demand and cause negative demand shocks for many smaller suppliers. While this is a legitimate concern, we do not think this is likely for the following reason: the data indicate that a vast majority of firms of all sizes and sectors robustly points to demand as the main cause of their worsening performance (see Table A2 in the Appendix), which runs counter to the argument that large firms are more prone to credit crunches and less to demand shocks.

2 Data

The data are from the World Bank's Financial Crisis Survey. The World Bank's Enterprise Survey Unit conducted three waves of firm surveys in six Eastern Europe countries: Romania, Bulgaria, Hungary, Lithuania, Latvia, and Turkey. These countries are among those that were hit hardest by the crisis. The three waves of survey were conducted in June-July 2009; April 2010 and August 2010. There are 1,686 firms in six countries: 514 firms in Turkey, 370 firms in Romania, 187 firms in Hungary, 226 in Latvia, 239 in Lithuania and 150 in Bulgaria. The Financial Crisis Survey is based on the baseline Business Environment and Enterprise Performance Survey (BEEPS) conducted in 2008, and released in 2009. The Financial Crisis Survey basically covers the same firms in the BEEPS, with some exceptions.⁴

The three waves of the Financial Crisis survey ask several questions about firms' employment, sales, and financial conditions, as well as expectations about future sales and labor decisions, but do not ask questions about firms' capital. The three waves can also be linked to a previous BEEPS survey that was

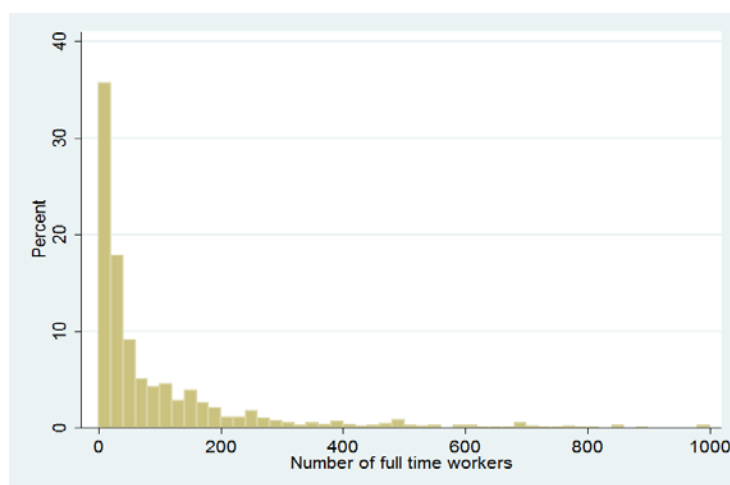
³ Studies on the U.S. have shown that house price declines and high debt before the crisis explain a large part the decline in households' consumption in the crisis (e.g. Mian, Rao and Sufi 2011). However it is difficult to tell to what extent the consumption decline is due to a negative wealth shock, or to higher precautionary motives, or to credit crunches.

⁴ Exceptions are firms that moved, discontinued business or filed for bankruptcy, or could not be contacted (e.g., telephone lines were out of order). In the first wave, the number of firms that discontinued business or filed for bankruptcy is relatively small (26 firms total for 6 countries). In addition, for Turkey, due to the constraints of financial resources, only manufacturing firms are covered in the first wave.

conducted in 2008 and released in 2009, that asked questions about fiscal year 2007 (henceforth referred to as the 2007 BEEPS survey). From this, we can have information about firms' basic characteristics such as firm size, firms' age, ownership as well as firms' operations in 2007. Since the focus of this paper is on the initial demand shocks of the crisis on firms, we only use the first wave of the crisis at June/July 2009, combined with the 2007 BEEPS.

Firms in the BEEPS survey are more representative than in previous studies, e.g., Tong and Wei, (2011) and Claessens, Tong, and Wei, (2012). Previous studies focused only on large listed firms and were criticized for not including small firms, where the impacts of either demand or credit shocks can be particularly severe (because of the relatively lack of access to finance for example). The World Bank's Financial Crisis Survey is more representative because it basically covers the same firms in the 2007 BEEPS, which is representative. The BEEPS is a joint product between The World Bank and the European Bank for Reconstruction and Development. It covers commercial, service or industrial business establishments. The sample was selected using stratified random sampling. Three levels of stratification were used in all countries: industry, establishment size, and region.⁵ A look at firm size reveals that most of the firms in the sample are small, and this is true for all countries. In 1,592 firms with data on the number of full-time workers in 2007, only 33 firms have more than 1,000 workers (the largest firm has 18,708 workers). Among firms with less than 1,000 workers, as Figure 1 indicates, more than 35 percent have less than 20 workers. When weighted accordingly to bring it to a truly representative sample, the percentage of small firms should be larger.

Figure 1: Firm size distribution



⁵ Sampling details can be found at “BEEPS 2008-2009: A report on methodology and Observations” [http://www.ebrd.com/downloads/research/economics/microdata/beeps_report_ebrd_april10.pdf]

We will largely focus on the first wave of the survey (June-July 2009), and analyze the associations between various demand and credit proxies before the crisis with firms performance during the crisis.

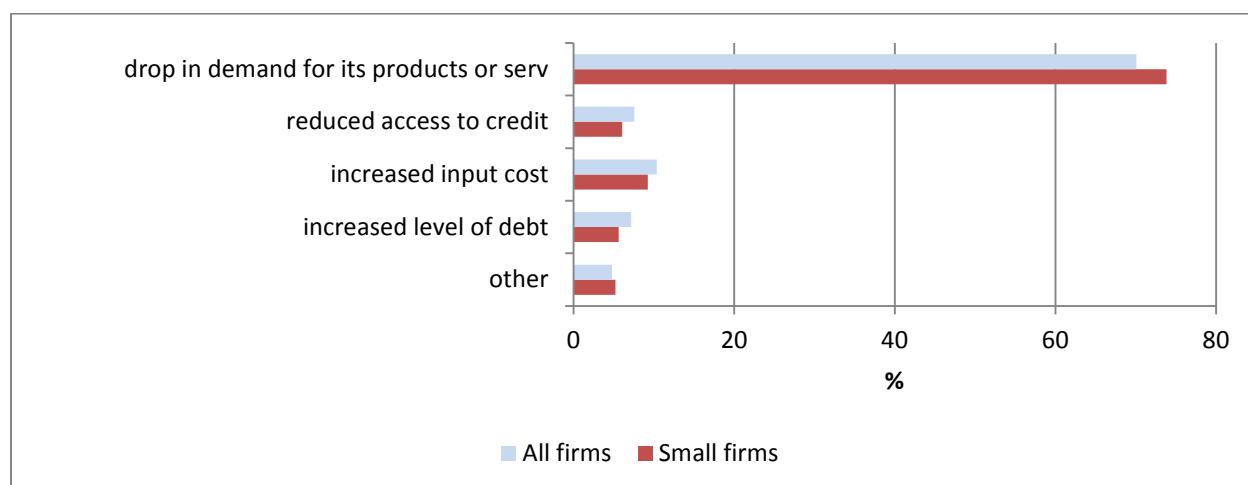
3 The relative importance of demand factors

This section provides descriptive evidence on the relative importance of demand shocks. The first piece is the most direct, but subjective about factors that most affect firms' operation in the crisis. One question in the first wave of the crisis survey in June-July 2009 asks: "*Choosing from the following list what has been the **main** effect the financial crisis on this establishment?*" Among 1,478 firms that responded, 69 percent pointed to the drop in demand for its product and service as the main effect. Increase in the level of debt, increase in input cost, and reduced access to credit account for about 7-10 percent of firms each. The percentages are similar between small firms and larger firms. Among small firms⁶, 73 percent reported the drop in demand as the main effect, whereas 6 percent of them reported the credit crunch as the main effect (see Figure 2).

The demand factor is also reported as the number-one cause for firms' recovery or further declines. In the following two waves of the crisis, firms were asked a follow-up question "*What is the main reason that your establishment's situation improved or worsened?*" Again, an overwhelming number of firms report changes in demand as the main reason for the improvement or worsening of their performance. In particular, at wave 2 of the survey in April 2010, 61 percent of firms that see some improvement state that an increase in demand for its product and services is the main cause, whereas 72 percent of firms that see further worsening claim that a drop in demand as the main cause. At wave 3 in August 2010, 76 percent of firms that see some improvement report that an increase in demand is the main cause, and 69 percent of firms that see further worsening attribute drops in demand as the main cause.

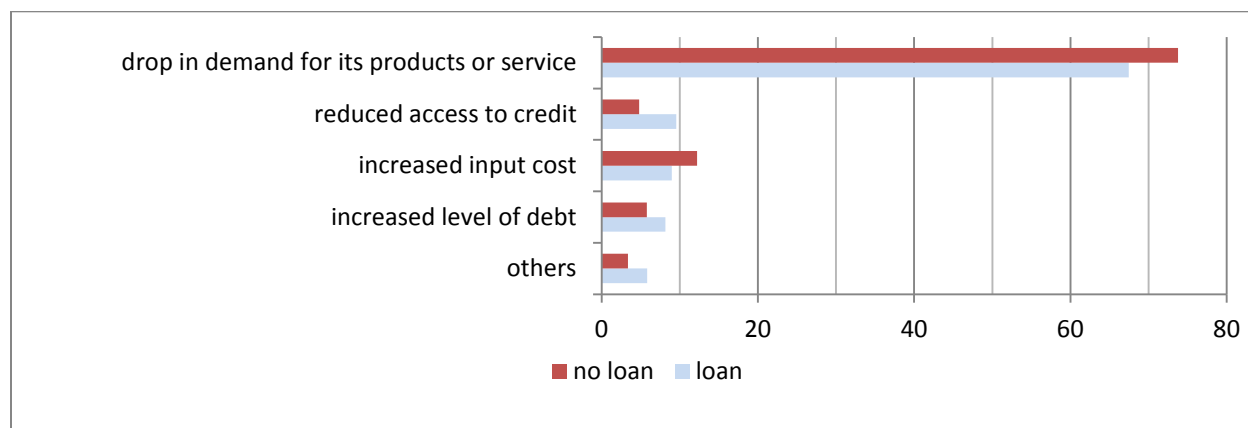
⁶ We define small firms as those that in 2007 have fewer than 20 full-time workers, which is consistent with the 2009 BEEPS.

Figure 2a: Main effects of the crisis, by firm size



Even for firms that have some ongoing credit relationship with lenders, demand is still the number-one factor. People tend to look into firms that are more dependent on external finance to find some impacts of potential credit crunches. Indeed in our sample, “reduced access to credit” is more often reported by firms that had loans before the crisis than those that did not. However, the difference is not large (10 v.s. 5 percent). Among 857 firms that had loans in 2007, 67 percent pointed to demand as the main factor in 2009, only slightly less than those that did not have loans.

Figure 2b: Main effects of the crisis, by credit status



The extent to which declines in demand are at play varies across countries and industries. Tables A1 and A2 in the Appendix show the summary of percentage of firms reporting drops in demand as the main cause in the first wave, across different countries and industries. Firms in Romania, Latvia and Bulgaria are more likely to report the drop in demand as the main cause, implying the demand shocks were more severe in those countries. In terms of industry, it appears that firms in more demand sensitive sectors

such as retail, electronics and equipment are most likely to report drops in demand as the main cause. Firms in less demand-sensitive sectors such as food are least likely to report a drop in demand. We examine the issue of demand sensitivity more carefully in the next section.

There is a very strong link between reporting demand shocks as the main cause and the actual sale performance. Firms that reported a drop in the demand as the main effects witness larger declines in sales. The decline in sales is 31 percent on average for firms that report “drop in demand of products and services” as the number one impact, whereas the decline is 20 percent for firms that do not do so. The difference is significant at the 1 percent level.

To sum up, we see a surprisingly overwhelming fraction of firms that claim the drop in demand as the most important factor for their worsening performance. Credit shocks, the usual suspect that was much more thoroughly examined in numerous studies, was reported by much fewer firms. This is robust for all firm sizes, for all sectors, for all three waves, and for all countries. While only subjective, the evidence is decidedly clear that demand declines are the number one concern for firms.

4. Demand versus credit factors: An econometric analysis

This section provides evidence on the impact of the change in demand on the performance and operation of firms in the crisis. The main indicators for firms’ performance and operation are firms’ sales, employment, and capacity at the first wave of the crisis. We find that the change in firm sales and the change in capacity are significantly and negatively correlated with firms’ demand sensitivity; and this is robust across specifications. We do not find a significant and robust relationship between firm sales and capacity with various proxies for credit dependence before the crisis. We also look at the change in full-time permanent employment, but do not find a relationship between it and either demand nor credit sensitivity.

The details of the dependent variables are below:

1. Current change in sales: the percentage change between a firm’s sales in June/July 2009 versus sales for the same month in 2008. We obtained this variable from the first wave of the Financial Crisis Survey.
2. The change in a firm’s capacity between June/July 2009 and the end of 2007 fiscal year. This is the difference between capacity asked at the first wave of the Financial Crisis survey and capacity asked in the 2007 BEEPS. Capacity indicates the current utilization rate (%) of all resources at the time of the interview.

3. Change in a firm's full-time permanent employment between June/July 2009 and the end of 2007 fiscal year. This is the difference in natural log (\ln) of full-time permanent employment between the first wave of the Financial Crisis Survey and that in the 2007 BEEPS. Ideally, we would like to examine full-time temporary employment because temporary workers are most likely to be the first to go when the firms get squeezed. This is not possible, however, because in the 2007 BEEPS, the vast majority of firms claim that they do not employ temporary workers (their reported number of full-time temporary workers is zero).

The details of the explanatory variables are below:

1. Sensitivity to demand shocks:

Establishing demand sensitivity is difficult. A traditional approach is to measure the correlation between a firm's sales and aggregate output, and take it as a proxy for demand sensitivity. In our view this is not satisfactory because we are not sure if demand shocks drive the correlation between sales and aggregate output. The simple correlation can capture many other shocks, such as productivity shocks and access to credit shocks. For example, an improvement in a one sector's technology (e.g. an introduction of new smart phones) would stimulate sales of that industry and at the same time increase total output.

We follow the approach of Tong and Wei (2008) to define the proxy for demand sensitivity. The proxy is at the sector level, based on U.S. data.⁷ It is the change in stock index by sector in a 10-day period following the September 11, 2001 attack, which is presumably a demand shock. The idea is that the terrorist attack caused temporary psychological setback, which can be considered as a negative demand shock to consumers, as firms' technology and banks' lending capacity remained intact.⁸ More demand sensitive sectors would then see stronger declines in the stock prices following the attack. For each sector, the proxy is calculated as the difference between the log of the sector's stock index on Sep 10, 2001 and that on Sep 21, 2001 (i.e., $\log[\text{price}_{\text{SEP10}}] - \log[\text{price}_{\text{SEP21}}]$). A higher value for the proxy indicates higher demand sensitivity. See table A3 in the Appendix for detailed sensitivity for the industries.

The use of stock index changes around the September 11, 2001 attack does carry some drawbacks.

Firstly, airline stocks were disproportionately hit. Second, stocks in defense industry may have seen some

⁷ The use of U.S. based industry data on demand and credit sensitivities and extrapolating to other countries is popular (see for example Rajan and Zingales (1998); Raddatz (2006); Claessens, Tong and Wei (2012)). This is to overcome the lack of data in many countries. As noted by Rajan and Zingales (1998), the estimator will be unbiased if the industry ranking of demand sensitivity or liquidity needs is preserved across countries.

⁸ Tong and Wei (2008) also conduct a number of checks to make sure that this index reflects the relative sensitivity of a firm's stock price to an unexpected shock in consumer demand, and is not contaminated by a firm's sensitivity to liquidity or other shocks.

boost because investors might have expected more military activities to respond to the attack. We try to minimize the drawbacks in our study by using *industry* transportation stock index as opposed to *passenger* transportation index to represent transportation sector's demand sensitivity. We are not too concerned about firms in the defense industry because one, they are very few in these countries, and two, if there are any, they would be categorized in "Other manufacturing" which we do not include in our regressions.

2. Credit Proxies: Measuring credit needs is more established in the literature. We create three proxies for credit needs. The first two are at sector level, based on U.S. data, while the third is at the firm level based on 2007 BEEPS.
 - a. The first credit proxy is dependence on external finance by sector (following Rajan and Zingales (1998)). A firm's dependence on external finance is defined as capital expenditures minus cash flow from operations divided by capital expenditures. This is to capture external finance needed for investment. A higher number implies that capital expenditure is high compared to the cash flows, which means the industry has to rely more on external finance. Note that the proxy is only available for manufacturing firms. Table A4 in the Appendix presents the details.
 - b. The second credit proxy is the cash conversion cycle (following Raddatz (2006)). This is to capture external finance needed for working capital. The cycle measures the time elapsed from the moment a firm pays for its inputs to the moment it receives payment for the goods it sells. The higher the cycle, the more firms depend on external finance for its operation. Raddatz (2006) provides the index for 4-digit ISIC sectors in the United States, also limited to manufacturing. Please see Table A5 in the Appendix for details.
 - c. The third proxy is generated from the dataset. It is the proportion of a firm's total purchase of fixed assets in fiscal year 2007 that was financed from retained earnings, owners' contribution or from issuing new equity. This proxy tries to capture how dependent the firm is on external finance with their asset purchases before the crisis, or how accessible external finance was to a firm before the crisis. The higher the value of the proxy, the less dependent the firm is to external finance. An upside of this proxy is that it is firm-specific. A downside is that it only covers firms that have data on investment and finance.
3. Other firm characteristics:
 - a. Firm size: Firm size is a dummy variable. Following the definition in BEEPS, small firms are defined as those that in 2007 have less than 20 workers (1: small, 0: otherwise).

- b. Firm age.
- c. Foreign ownership (=1 if 50% of the firm's stake is owned by foreigners).

4. Country fixed effects: to capture unobservable countries' characteristics.

The summary statistics are at Table A7 in the Appendix. The correlations between credit and demand proxies are at Table A8.

We first run OLS regressions with country fixed effects. The regressions are adjusted to take into account the weight of stratified random sample. We focus first on the change in sales. The results are reported in Table 1.

Table 1: Demand and credit sensitivity on firms' sales

	Change in sales							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demand Sensitivity	-115.708*** (31.68)				-144.950*** (33.37)	-139.320*** (39.53)	-156.735*** (42.13)	-189.888*** (44.71)
Dependence on External Finance		-1.094 (9.12)			37.767** (18.73)			-5.582 (24.72)
Cash Conversion Cycle			-10.493* (6.28)			2.941 (7.12)		-2.299 (10.65)
% of investment from own fund 2007				0.002 (0.04)			-0.025 (0.05)	0.050 (0.05)
Firm age								-0.037 (0.21)
Small firm								-7.674 (5.02)
Foreign owned								-9.298 (10.04)
Constant	-31.984*** (4.50)	-32.862*** (5.17)	-24.368*** (8.32)	-11.294*** (3.59)	-21.744*** (5.83)	-17.920** (7.27)	0.234 (5.88)	-10.830 (10.47)
Country fixed effects	√	√	√	√	√	√	√	√
Observations	1034	882	659	972	462	486	646	243
R-squared	0.11	0.04	0.04	0.08	0.13	0.11	0.17	0.27

Overall the relationship between firms' demand sensitivity and the change in sales is negative, strongly significant and robust. On average, within a country, if a sector saw a 1 percent decline in the stock index after Sep 11, 2001, firms in that sector saw a 1.15 percent decline of sales in the 2008-2009 crisis. Recall that the demand sensitivity is $\log(\text{index}_{\text{SEP10}}) - \log(\text{index}_{\text{SEP21}})$, hence the coefficient of -115.7 translates to a decline of 1.15 percent. If we control for other variables, the percentage decline is even higher, 1.89 percent. This result complements the findings of previous studies on demand channels (e.g., Tong and

Wei (2011) and Claessens, Tong and Wei (2012)). They also find a significant impact of the demand channel, but they only focus on large listed firms.

While the impact of the demand channel is clear, we do not see a clear impact of firms' credit characteristics on the change in firm sales between July 2008 and July 2009. None of the proxies we use for firms' dependence on external finance seem to matter much when introduced by itself. Among all proxies for credit sensitivity, only Cash Conversion Cycle is marginally significant, but it is not robust. When both demand sensitivity and the proxies for firm's credit characteristics are introduced, only demand sensitivity remains robust and significant. None of the three proxies for credit needs is robustly significant (only dependence on external finance becomes significant in one specification, but with the wrong sign). In addition, we interact the small-firm dummy with each demand and credit sensitivity proxy to find potential differential impacts on small firms. We do not find any differential impacts (results not shown here).

As a robustness check, we rerun the regression but replace the change in sales by a dummy variable representing reporting demand as the main factor. The dummy variable equals 1 if the firm reports demand as the main factor to cause damage to the firm, 0 otherwise. We would like to be sure that more demand sensitive firms are more likely to declare that demand channel matters most. Results in Table 2 indeed show this is the case. Reporting demand shocks is strongly correlated with demand sensitivity, and not correlated with other credit sensitivities. Loosely speaking, within a country, if a sector saw an additional 1 percent decline in the U.S. stock index between Sep 10, 2001 and Sep 21, 2001, firms in that sector are 1.15 percent more likely to report demand shocks as the main factor.

Table 2: On firms' reporting demand as the main factor

	Reporting Reduced demand as the main factor							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demand Sensitivity	1.157*** (0.39)				0.974** (0.44)	1.029** (0.48)	0.877* (0.45)	0.897* (0.51)
Dependence on External Finance		0.172 (0.13)			0.371 (0.31)			0.463 (0.38)
Cash Conversion Cycle			0.122 (0.10)			0.020 (0.12)		-0.283 (0.19)
% of investment from own fund 2007				0.001 (0.00)			0.001 (0.00)	0.000 (0.00)
Firm age								0.002 (0.00)
Small firm								0.061 (0.08)
Foreign owned								0.191*** (0.07)
Small* DemandSensitivity								
Constant	0.720*** (0.06)	0.696*** (0.08)	0.707*** (0.12)	0.709*** (0.07)	0.649*** (0.10)	0.695*** (0.13)	0.705*** (0.10)	0.874*** (0.19)
Country fixed effects	√	√	√	√	√	√	√	√
Observations	964	803	580	910	406	425	598	211
R-squared	0.02	0.02	0.03	0.02	0.06	0.05	0.02	0.14

Similarly we run the regression with the dependent variable “reporting reduced access to credit as the main factor”. Table 3 shows that none of the credit variables is alone significantly correlated with the dummy variable (dependence on External Finance is an exception when it becomes significant if we include demand sensitivity). This implies two possibilities: it could be that the credit proxies do not capture actual credit needs. We discount this possibility because the proxies are well-established and used extensively in the literature. Another possibility is that many credit dependent firms were also hit harder by demand shocks, and hence did not report reduced access to credit as the main factor. We lean towards this possibility, because indeed when controlled for demand sensitivity, dependence on external finance becomes significant.

Table 3: On firms' reporting access to credit as the main factor

	Reporting reduced access to Credit as the main factor							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demand Sensitivity	-0.236 (0.30)				-0.210 (0.32)	0.199 (0.35)	-0.313** (0.14)	-0.213 (0.16)
Dependence on External Finance		0.061 (0.07)			0.421** (0.21)			0.189 (0.15)
Cash Conversion Cycle			-0.067 (0.06)			-0.103 (0.07)		0.004 (0.06)
% of investment from own fund 2C				0.000 (0.00)			0.000 (0.00)	-0.000 (0.00)
Firm age								-0.000 (0.00)
Small firm								-0.028 (0.02)
Foreign owned								-0.043* (0.03)
Constant	0.049 (0.03)	0.021 (0.04)	0.151* (0.08)	0.018 (0.02)	0.031 (0.07)	0.177** (0.08)	0.027 (0.03)	0.083 (0.08)
Country fixed effects	√	√	√	√	√	√	√	√
Observations	964	803	580	910	406	425	598	211
R-squared	0.01	0.02	0.03	0.01	0.06	0.04	0.01	0.08

Subsequently we run OLS regressions with country fixed effects, focusing on the remaining dependent variables, which are the change in firms' capacity and employment. Capacity indicates the current utilization rate of all the resources at the time of the interview, as a percent of the maximum output possible using all resources available. Since we are not sure if the total resources remain unchanged between June 2009, and at the end of 2007, we take the results with caution. For example, in the case when a firm was hit by the crisis and sold some of its machinery, the total resources decline. This would inflate the utilization rate and distort our results.

Table 4 shows that the change in capacity is strongly influenced by demand sensitivity. The results are significant and very robust across specifications. Regarding the unconditional impact, for a 1 percent additional decline in a sector's stock index after Sep 11, 2011, firms in that sector saw a 1.89 percent decline in capacity between June/July 2009 and at the end of 2007. The impact remains robust with other control variables (although the magnitude is somewhat reduced). Also quite interestingly, among credit factors, Cash Conversion Cycle now is strongly significantly correlated with the change in capacity. This implies that financial need for working capital matters for the firms' operation. However, this is not robust: when we control for demand sensitivity, cash conversion cycle is no longer significant.

Table 4: Demand and credit sensitivity on capacity

	Changes in Capacity									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Demand Sensitivity	-188.567*** (33.60)				-200.054*** (34.85)	-201.714*** (40.48)	-154.513*** (44.25)	-142.214** (55.07)	-132.498*** (39.93)	
Dependence on External Finance		-6.969 (12.37)			22.459 (23.75)			14.001 (31.67)		
Cash Conversion Cycle			-19.487** (8.66)			3.691 (9.10)		-12.129 (13.86)		-13.604 (8.77)
% of investment from own fund 20				-0.080 (0.06)			-0.097 (0.07)	-0.074 (0.09)		
Firm age								-0.276 (0.30)		
Small firm								-4.280 (6.08)		
Foreign owned								-4.658 (9.01)		
Small* DemandSensitivity									-69.334* (38.25)	
Small* DependExtFin										
Small* CashConCycle										-11.080** (4.94)
Small* Ownfund07										
Constant	-12.562 (9.66)	-20.368*** (5.77)	-6.031 (9.94)	-7.496 (9.63)	-14.173* (7.67)	-13.915 (9.24)	-6.225 (8.51)	11.106 (16.59)	-13.053 (9.69)	-6.348 (10.23)
Country fixed effects	√	√	√	√	√	√	√	√	√	√
Observations	444	709	539	474	377	391	267	205	412	499
R-squared	0.18	0.04	0.07	0.08	0.18	0.18	0.19	0.23	0.20	0.09

With capacity we see differential impacts of demand sensitivity and credit needs on small and large firms. For a 1 percent decline in the stock price, small firms see capacity falls by an additional 0.69 percent compared to large firms. The impact of external finance needs (via the proxy Cash Conversion Cycle) is also steeper for small firms than for large firms. Other interactions between small firm dummy and other proxies are not significant; and therefore not shown here.

Lastly, we examine the impact of demand and credit sensitivity on the change in full-time permanent workers between June 2009 and at the end of 2007 fiscal year. Table 5 shows that none of credit or demand proxies is robustly associated with the change in full-time labor⁹.

⁹ We also examine the change in full-time temporary workers, and do not see an impact of demand sensitivity either. However the small sample of firms declaring temporary workers in both periods is very small (85 firms total), preventing us from reaching a meaningful conclusion.

Table 5: Demand and credit sensitivity on employment

	Change in full-time permanent employment								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Demand Sensitivity	-0.127 (0.63)				-1.259* (0.67)	-0.974 (0.71)	0.764 (0.89)	-1.097 (1.08)	-1.794** (0.78)
Dependence on External Finance		-0.145 (0.22)			0.642 (0.44)			2.075*** (0.54)	
Cash Conversion Cycle			-0.085 (0.12)			-0.012 (0.15)		-0.200 (0.20)	
% of investment from own fund 2007				0.000 (0.00)			0.001 (0.00)	-0.001 (0.00)	
Firm age								-0.000 (0.00)	
Small firm								0.230 (0.14)	
Foreign owned								0.136 (0.12)	
Small*DemandSensitivity									2.702*** (1.00)
Small*DependExtFin									
Small*CashConCycle									
Small*Ownfund07									
Constant	-0.389*** (0.12)	-0.454*** (0.11)	-0.376** (0.16)	-0.342*** (0.11)	-0.401*** (0.13)	-0.315* (0.16)	-0.313* (0.17)	-0.528** (0.24)	-0.391*** (0.12)
Country fixed effects	√	√	√	√	√	√	√	√	√
Observations	1091	907	677	1021	479	505	684	254	1039
R-squared	0.03	0.03	0.05	0.04	0.07	0.06	0.06	0.24	0.04

Nevertheless, we see severe across-firm declines in employment: our calculation shows that on average, a firm sheds 20.4 percent of its full-time employees between 2007 and 2009. This is quite interesting. We observe across the board declines in employment but they do not seem to clearly correlate with firms' demand or credit sensitivities. One potential explanation is that employment decisions, particularly those about permanent full-time employment are more forward-looking. Since investing and training permanent workers is costly, firms only let the workers go when they do not see good prospect for firms' products and services in the future. In other words, the employment decision today is driven by the expectation about the future demand for the firms' products and services. Indeed we see some evidence of that the expected change in sales one year from June 2009 is significantly correlated with the change in employment (see table A8). In other words, if a firm expected sales to improve, they significantly retain more full-time permanent workers.

We also find that small firms' full-time permanent employment is less sensitive to demand than large firms'. As we can see in Table 5, for a 1percent decline in a sector stock price, the decline in small firms' employment in that sector, on average, is 2.7 percent smaller than that in large firms. In other words, large firms' employment is more negatively correlated to demand sensitivity. One possible reason is that for small firms, firing workers is more costly. This is because the cost of finding and training good workers for small firms are probably higher, or perhaps the relationship between firms' owners and workers are closer and more personal than in large firms, thus making the firing more difficult. We also interact the small firm dummy with the credit proxies but do not find differential impacts of credit needs on small firms.

5 Conclusion

Drawing from The World Bank's Financial Crisis Enterprise Survey, this paper presents evidence for the dramatic declines of demand for firms in six Eastern European countries and their impact on firms' operation. An overwhelming majority of firms report the change in demand as the main effect and as the main cause for the improvement or further worsening of their businesses during the crisis. We find that changes in sales and capacity are significantly and negatively correlated with firms' demand sensitivity, and not with various proxies for firms' dependence on external finance before the crisis.

The results seem to suggest demand factors play a more important role in the firms' performance during the crisis. Note that the results do not suggest that demand factors triggered the crisis—it might very well be the case that credit shocks did. Our conjecture is that as the crisis drags on, demand factors became more prominent. This has important policy implications. Since it is currently a demand problem, the focus should be on boosting investors' and consumers' confidence. Fiscal policies are the conventional instruments in this case.

Appendix

Table A1: Effect of changes in demand, by country

Countries	% of firms reporting drop in demand as the main cause	Number of firms reporting drop in demand as the main cause
Turkey	62.19	273
Romania	75.25	225
Hungary	67.58	123
Latvia	76.92	160
Lithuania	70.72	157
Bulgaria	76.56	98

Table A2: Effect of changes in demand, by sector

Sector	% of firms reporting drop in demand as the main cause	Number of firms reporting drop in demand as the main cause
Food	60.42	78
Textiles	64.29	69
Garments	73.85	62
Chemicals	68.33	31
Plastics and Rubber	73.33	23
Non-metalic mineral products	60.00	46
Basica Metals	75.00	16
Fabricated Metal Products	87.80	49
Machinery and Equipment	78.95	35
Electronics	78.95	13
Other Manufacturing	69.01	120
Retail	79.14	243
Wholesale	70.45	73
IT	57.89	9
Hotel and Restaurants	68.97	20
Services of motor vehicles	73.91	38
Construction	67.19	79
Transportation	64.18	44

Table A3: Demand index 2 as the change in log of stock index between Sep 10, 2001 and Sep 21, 2001.¹⁰

Sector defined by the Financial Crisis Survey	Demand sensitivity index	Corresponding sectors for the stock indices
Food	0.02553	Dow Jones Food and Beverage Index (DJUSFB)
Textiles	--	<i>Not available</i>
Garments	0.07915	Dow Jones Clothing and Accessory Index (DJUSCF)
Chemical	0.07172	Dow Jones Chemical Index (DJUSCH)
Plastics & rubber	--	<i>Not available</i>
Nonmetallic mineral product	0.06629	Nonmetallic minerals, except fuels (SIC code 14)*
Basic metals	0.1951071	Misc. Primary Metal Products (SIC code 339)*
Fabricated metal products	0.2045298	Misc. Fabricated Metal Products (SIC code 349)*
Machinery and equipment	0.08179	Dow Jones Industrial Machinery Index (DJUSFE)
Electronics	0.07589	Dow Jones Consumer Electronics Index (DJUSCE)
Other manufacturing	--	<i>Not available</i>
Retail	0.05308	Dow Jones Retail Index (DJUSRT)
Wholesale	--	<i>Not available</i>
IT	0.00467	Dow Jones Telecommunication Index (DJUSTL)
Hotel and restaurants	0.09893	<i>Average between Dow Jones Lodging Index (DJUSLG) and Dow Jones Restaurants and Bars Index (DJUSRU)</i>
Services of motor vehicles	0.12625	Auto Repair, Services and Parking (SIC code 75)*
Construction	0.08122	Dow Jones Construction and Material Index (DJUSCN)
Transportation	0.05941	Dow Jones Industrial Transportation Index (DJUSIT)

¹⁰ Most of the sectoral data are publicly available. Stock index data for some small subsector (marked with *) are supplemented from the calculation of Isyuk (2013). We would like to thank Varvara Isyuk for kindly providing the data.

Table A4: External dependence index from Rajan and Zingales (1998)

Sector	External Dependence	Corresponding sectors in Rajan and Zingales (1998)
Food	0.14	Food products
Textile	0.4	Textile
Garments	0.03	Apparel
Chemical	0.22	Other Chemical
Plastics & rubber	--	<i>Not available</i>
Nonmetallic mineral product	0.06	Nonmetal products
Basic metals	0.09	Iron and steel
Fabricated metal products	0.24	Metal products
Machinery and equipment	0.45	Machinery
Electronics	--	<i>Not available</i>
Other manufacturing	0.47	Other industries
Retail	—	
Wholesale	—	
IT	—	
Hotel and restaurants	—	
Services of motor vehicles	—	
Construction	—	
Transportation	—	

Table A5: Cash Conversion Cycle Index from Raddatz (2006)

Sector	Cash Conversion Cycle	Corresponding sectors in Raddatz (2006)
Food	0.55	Food products n.e.c.
Textile	1.01	Textiles spinning and weaving
Garments	1.23	Wearing apparel exc. footwear
Chemical	0.96	Basic industrial chemicals
Plastics & rubber	0.91	Average between Rubber products n.e.c. (0.98) and Plastic Products (0.84)
Nonmetallic mineral product	0.84	Non-metallic mineral prod. n.e.c.
Basic metals	0.90	Iron and steel basic ind.
Fabricated metal products	1.06	Fabricated metal prods.
Machinery and equipment	1.32	Machinery and eqp. n.e.c.
Electronics	1.435	Elect. app. and supp. n.e.c. (1.46) Radio, TV. and comm. eqp. (1.41)
Other manufacturing	--	
Retail	--	
Wholesale	--	
IT	--	
Hotel and restaurants	--	
Services of motor vehicles	--	
Construction	--	
Transportation	--	

Table A6: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Change in sales	1576	-24.14784	29.41487	-100	100
Change in capacity	784	-12.97704	33.05345	-100	95
Change in log employment	1645	-.2019166	.7199735	-5.626	3.73
% of asset purchased financed by own sources	1040	62.61058	40.62848	0	100
Small firm (1: small; 0: large)	1686	.3303677	.4704851	0	1
Foreign ownership (1 of majority owned by foreigners)	1686	.091	.288	0	1
Firm age	1663	16.48	11.91	2	144
Demand Sensitivity	1117	.0658	.038	.0046	.2045
Dependence on External Finance	930	.281	.164	.03	.47
Cash Conversion Cycle	691	.914	.256	.55	1.435
% of investment from own fund 2007	1040	62.61	40.62	.0	100

Table A7: Correlations between credit and demand proxies

	Demand Sensitivity	Dependence on External Finance	Cash Conversion Cycle	% of investment from own fund
Demand Sensitivity	1.0000			
Dependence on External Finance	0.2011	1.0000		
Cash Conversion Cycle	0.5869	0.1097	1.0000	
% of investment from own fund	0.0553	-0.0661	0.1075	1.0000

Table A8: Change in full-time employment and expected change in sales

VARIABLES	Change in fulltime permanent employment
Expected change in future sale	0.002*** (0.001)
Constant	-0.301*** (0.064)
Country fixed effects	Y
Observations	1282
R-squared	0.029

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

References

- Ahn, JaeBin (2013) “Estimating the Direct Impact of Bank Liquidity Shocks on the Real Economy: Evidence from Letter-of-Credit Import Transactions in Colombia”, *mimeo*, The International Monetary Fund
- Amiti, Mary, and David Weinstein. 2009. “Exports and Financial Shocks.” NBER Working Paper 15556. Cambridge, Mass.
- Bernanke, Ben, and Alan Blinder. 1992. “The Federal Funds Rate and the Channels of Monetary Transmission.” *The American Economic Review* 82(4),
- Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2005. “Financial and Legal Constraints to Growth: Does Firm Size Matter?” *Journal of Finance* 60(1): 137-177.
- Chudik, Alexander, and Fratzscher, Marcel. 2011. “Identifying the global transmission of the 2007-2009 financial crisis in a GVAR model.” *European Economic Review* 55(3): 325-339, April.
- Claessens, Stijn, Hui Tong, and Shang-Jin Wei. 2012. “From the financial crisis to the real economy: Using firm-level data to identify transmission channels.” *Journal of International Economics* 88(2): 375-387.
- Cowan, Kevin, and Claudio Raddatz. 2013. “Sudden stops and financial frictions: Evidence from industry-level data.” Forthcoming, *Journal of International Money and Finance*.
- Devereux, Michael, and James Yetman. 2010. “Leverage Constraints and the International Transmission of Shocks.” *Journal of Money, Credit and Banking* 42(s1): 71-105.
- Helbling, Thomas, Raju Huidrom, M. Ayhan Kose, and Christopher Otrok. 2011. “Do credit shocks matter? A global perspective.” *European Economic Review* 55(3): 340-353, April.
- Isyuk, Varvara. 2013. “Financial versus Demand shocks in stock price returns of US non-financial firms in the crisis of 2007.” Forthcoming, *International Economics / Économie Internationale*
- Kalemli-Ozcan, Sebnem, Elias Papaioannou, and Fabrizio Perri. 2012. “Global Bank and Crisis Transmission.” Forthcoming *Journal of International Economics*.
- Khwaja, Asim Ijaz, and Atif Mian. 2008. “Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market.” *American Economic Review* 98(4): 1413-42, September.
- Kiyotaki, Nobuhiro, and John Moore. 1997. “Credit Cycles.” *Journal of Political Economy* 105(2): 211-48, April.

- Mian, Atif, Kamalesh Rao and Amir Sufi, 2011, "Household Balance Sheets, Consumption and the Economic Slump", mimeo, University of Chicago
- Mendoza, Enrique. 2010. "Sudden Stops, Financial Crises and Leverage." *American Economic Review*: 1941-1966.
- Paravisini Daniel, Veronica Rappoport, Philipp Schnabl and Daniel Wolfenzon. 2011. "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data." working paper.
- Perri, Fabrizio and Vincenzo Quadrini. 2011. "International Recessions." NBER Working Paper 17201, Cambridge, Mass.
- Raddatz, Claudio. 2006. "Liquidity needs and vulnerability to financial underdevelopment." *Journal of Financial Economics* 80: 677-722.
- Rajan, Raghuram G., and Luigi Zingales. 1998. "Financial Dependence and Growth." *American Economic Review* 88(3): 559-86, June.
- Tong, Hui, and Shang-Jin Wei. 2011.. "The Composition Matters: Capital Inflows and Liquidity Crunch During a Global Economic Crisis." *Review of Financial Studies* 24(6): 2023-2052.
- Tong, Hui, and Shang-Jin Wei. 2008. "Real effects of the subprime mortgage crisis: is it a demand or a finance shock?" NBER Working Paper No.14205, and IMF Working Paper 08/186.
- Van Wincoop, Eric. 2013. "International Contagion Through Leveraged Financial Institutions." Forthcoming, *American Economic Journal- Macroeconomics*.