

The Impact of the 2008-2009 Global Crisis on Manufacturing Firms' Fixed Asset Purchases: The Case of Eastern Europe and Central Asia

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Abstract

We examine the impact of the 2008-2009 Crisis on two dimensions of manufacturing firms in Eastern Europe and Central Asia, i.e., receivables collection (whether the customers pay after the delivery rather than before or on the date of delivery) and financing of manufacturing firms' fixed asset purchases (what type of financing they used before and after the 2008-2009 Crisis). We use the Business Environment and Enterprise Performance Survey (BEEPS), i.e., BEEPS IV and BEEPS V data to represent the pre-Crisis and post-Crisis periods respectively. Our analysis indicates that the percentage of purchases paid by the customers of the manufacturing firms significantly decline from the pre-Crisis to the post-Crisis period. This finding suggests that manufacturing firms tighten their payment policies and are not as lenient with their customers post-Crisis. In addition, we find that the percentage of manufacturing firms' fixed asset purchases paid for by internal financing significantly increases, whereas the percentage of fixed asset purchases paid for by owner's contribution and supplier credit significantly decline post-Crisis. These findings suggest that as a result of the 2008-2009 Crisis, manufacturing firms in these countries seem to rely more on internal funding which may be due to tighter availability of external sources or drainage of shareholders funds (not enough cash) post-Crisis.

Keywords: fixed assets, receivables, global crisis, manufacturing firms, eastern Europe, central Asia.

JEL Classification: G01, G21, G31.

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Introduction

In this paper, we study the impact of the 2008-2009 Crisis on manufacturing firms' receivables collection (i.e., whether the customers pay after the delivery rather than before or on the date of delivery) and financing of manufacturing firms' fixed asset purchases (i.e., what type of financing these manufacturing firms use before and after the 2008-2009 Crisis).

We use the EBRD-World Bank's Business Environment and Enterprise Performance Survey, i.e., BEEPS IV and V. BEEPS IV covers the 2007 fiscal year, while BEEPS V covers the 2010-2014 fiscal years of survey data. Given that our focus is Eastern Europe and Central Asia, our sample includes 29 of the countries covered in the survey. We use the BEEPS IV data to represent the pre-Crisis period, and the BEEPS V data for the post-Crisis period. When analyzing how manufacturing firms in these countries collect their account receivables, we use the percentage of customers who pay after the delivery. In the case of how the

manufacturing firms finance their fixed asset purchases, we use the percentage of purchases paid by internal funds, percentage of purchases paid by owner's contribution or new shares, percentage of purchases paid by loans from private banks, percentage of purchases paid by loans from state-owned banks, percentage of purchases paid via supplier credit or advances from customers, and percentage of purchases paid via other methods.

In general, we find that both manufacturing firms' receivables collection and financing of fixed asset purchases undergo significant changes from the pre-Crisis to the post-Crisis period. In terms of the percentage of purchases paid by customers of the manufacturing firms in these countries, we find a significant decline in the percentage of customers paying after the delivery post-Crisis. This significant decrease suggests that as a result of the 2008-2009 Crisis, manufacturing firms are more stringent with their payment policies and less lenient with their customers. We find a significant increase in the percentage of manufacturing firms' fixed asset purchases paid for by internal financing post-Crisis. This suggests that as a result of the 2008-2009 Crisis, external financing may have become tighter post-Crisis which forces these firms to rely more on retained earnings to fund the acquisitions of fixed assets.

Additionally, we find that the percentages of fixed asset purchases paid for by owner's contribution and supplier credit both decline post-Crisis. The significant decrease in the percentage of owner's contribution or new shares suggests that shareholder funds may be drained (not enough cash) post-Crisis, whereas the significant decrease in the asset purchases financed by supplier credit or customer advances may be due to the overall tighter conditions (suppliers or customers were not willing to help) post-Crisis.

This rest of this paper is organized as follows: Section 2 reviews prior literature; Section 3 explains the data and methodology; Section 4 discusses the empirical findings; and Section 5 concludes the paper.

1. Literature Review

Prior literature indicates that a financial crisis tends to affect the ability to grow and invest in new projects, ability to recover, management competency, and overall performance of firms, particularly smaller and non-public companies (see e.g., Iannariello et al., 2007; Westergård-Nielsen and Neamtu, 2012; Notta and Vlachveib, 2014; Moore and Mirzaei, 2016; Peric and Vitezic, 2016; Golikova et al., 2017; Jebran and Chen, 2022). A crisis has also been shown to affect the dependence on both internal financing and availability of external funding and hence, the capital structure of firms (see e.g., Notta and Vlachveib, 2014; Alves and Francisco, 2015; He and Ausloos, 2017; Tsoy and Heshmati, 2017; Van Hoang et al., 2018; Demirguc-Kunt et al., 2019; Zubair et al., 2020). However, Balios et al. (2016) is one of those who find that the 2008 crisis does not seem to change the effect of capital structure determinants such as firm size, profitability, and growth rate.

Other studies such as Golikova et al. (2017) find that firms operating in regions with lower levels of corruption tend to recover better post-crisis, while Jebran and Chen (2022) show that companies with more competent management tend to reduce investments, financing, and cash holdings as a result of the crisis, while at the same time managing to increase their dividend payouts. Additionally, Notta and Vlachveib (2014) find that during the Greek crisis, firm size (positively related), liquidity (positively related), and leverage (negatively related) significantly affect profitability. Peric and Vitezic (2016) document a positive relationship between firm size and growth rates of manufacturing and hospitality firms during the economic recession between 2008-2013, especially among large- and medium-sized firms.

Iannariello et al. (2007) also show that the Asian crisis causes investment growth rates to significantly decline, especially among smaller firms, firms in non-tradable sectors, and firms with lower liquidity in Thailand. Tsoy and Heshmati (2017) provide additional evidence that the ease of obtaining external financing after the crisis is a crucial factor in the growth of smaller firms post-crisis, while Vermoesen et al. (2013) find that SMEs in Belgium with a large proportion of long-term debt maturing at the start of the 2008 crisis have difficulties to roll over their debt and as a result, experience a drop in investments.

Other studies find that the effect on financing during the crisis are supply-driven. For example, Westergård-Nielsen and Neamtu (2012) document that smaller firms in Denmark tend to have more difficulty obtaining financial support to fund new projects than larger firms during the last global recession. Demiroglu et al. (2012) find that during the crisis, banks seem to increase lending standards to private firms but not to public firms. Psillaki and Eleftheriou (2015) also find that smaller and lower grade firms (among French SMEs) have more difficulty obtaining credit during crunch periods as opposed to larger and higher rated firms. This

finding is supported by Holton et al. (2014) who, using a survey method, find that bad financial environments affect credit supply as lenders tighten the terms and conditions of credit allocation. More recently, Cao and Leung (2020) survey Canadian SMEs to find the determinants of credit-constrained firms. In the process, they find that in addition to size, the current debt-to-asset ratio and cash flow consistently indicate whether a firm will encounter such a problem.

Degryse et al. (2012) do not actually look at the effect of the crisis on capital structure but find that Dutch SMEs tend to rely on internal financing, and as a result, reduce their debt ratio even though they borrow more to support growth. However, Alves and Francisco (2015) investigate the impact of the subprime crisis and European debt crisis on capital structure, and find that during the crises, firms initially increase leverage but later on are forced to rely on short-term borrowing which exposes them to rollover risks. Demirguc-Kunt et al. (2019) also document similar findings when they examine firms' capital structure trends during and post-global financial crises among SMEs and large firms (listed and non-listed), particularly among non-listed companies of all sizes in less developed countries. Van Hoang et al. (2018) find that small firms in France which survive the 2008 crisis are those which mainly rely on internal financing. Similar finding is documented by Zubair et al. (2020) in a study involving SMEs in the Netherlands.

Further evidence with respect to the effect of a crisis on financing or leverage are provided by Tsoy and Heshmati (2017) and He and Ausloos (2017). The former examines the determinants of capital structure among Korean public firms across the Asian financial crisis and 2008 crisis and observe that debt ratios seem to decline post-Asian crisis but not post-2008 crisis. In addition, they find that the average debt ratio actually decreases over the entire sample period. On the other hand, He and Ausloos (2017) who examine the effect of the global financial crisis on Chinese SMEs financing find that more profitable and liquid firms tend to borrow less post-crisis, while larger firms and firms with high tangible assets borrow more.

Several studies comparing the use of trade credit versus bank loan during the crisis include Psillaki and Eleftheriou (2015) who find that SMEs use trade credit to complement bank credit during such periods. Similarly, in their study involving SMEs in East Asia, Love and Zaidi (2010) do not find that trade credit substitute bank loans during the Asian crisis. Instead, firms with limited access to bank loans are also given trade credit with even tighter terms including shorter repayment period. Demiroglu et al. (2012) find that during the crisis, private firms which have difficulty obtaining bank loans will rely more on trade credit. Carbó-Valverde et al. (2016) find that especially during the crisis, Spanish SMEs with limited access to credit to begin with tend to depend more on trade credit than bank loans, whereas unconstrained firms do the opposite. Kestens et al. (2012) document that the 2008 financial crisis affects the performances and decreases the availability of trade credit particularly for firms which are already highly dependent on short-term debts.

In a more recent study involving SMEs across 19 countries, Khan (2022) documents that these businesses not only suffer from COVID-19 restrictions, but also from obtaining bank loans. As a result, they turn to trade credit or stretch their payables and expenses to address their liquidity problems. According to Jucá and Fishlow (2020), during the 2008 global crisis, firms in Latin America substitute bank loans with non-bank credit, including issuing the public debt market and private non-bank debt. Those who continuously have to rely on bank loans find that they can only borrow for shorter terms.

In this respect, prior literature indicates that a financial crisis tends to prevalently affect firms with certain characteristics in terms of size, ownership, liquidity, cash flow, etc. Firms also seem to be affected by their ability to obtain external financing from banks and suppliers to weather the effect of a crisis on their business and are forced to rely on internal financing. Therefore, in this paper, we look at the effect of the 2008-2009 crisis on the timing of repayment of fixed asset purchases, as well as the utilization of internal versus external financing in funding the acquisition of fixed assets by retail and core industry firms across Central Asia and Eastern Europe.

2. Data and Methodology

We use the European Bank for Reconstruction and Development (EBRD) – World Bank's Business Environment and Enterprise Performance Survey (BEEPS)¹. Since this paper addresses the impact of the 2008-2009 Crisis on manufacturing firms across Eastern Europe and Central Asia, we specifically employ

¹ For further information, refer to <https://www.ebrd.com/what-we-do/economic-research-and-data/data.html>

both BEEPS IV (which covers the 2007 fiscal year) and V (which covers the 2010-2014 fiscal years) survey data. BEEPS IV and V cover 32 countries in Eastern Europe and Central Asia².

We use the BEEPS IV data to represent the pre-Crisis period, and the BEEPS V data for the post-Crisis period. As a measure of how manufacturing firms in these countries collect their account receivables, we look at the percentage of customers who pay after the delivery. As measures of how these manufacturing firms in these countries finance their fixed asset purchases, we look at multiple variables including the percentage of purchases paid by internal funds, percentage of purchases paid by owner's contribution or new shares, percentage of purchases paid by loans from private banks, percentage of purchases paid by loans from state-owned banks, percentage of purchases paid via supplier credit or advances from customers, and percentage of purchases paid via other methods. Due to the unavailability of data of some of the variables for the post-Crisis period, only the percentage of purchases paid by internal funds, owner's contribution or new shares, and supplier credit or advances from customers will be analyzed to assess the impact of the Crisis 2008-2009 on these variables, which will be performed using the Mann-Whitney test to compare the pre-Crisis and the post-Crisis data.

Table 1. Summary Statistics for the Manufacturing Firms

Variables	Pre-Crisis			Post-Crisis		
	N	Mean	Std	N	Mean	Std
Panel A. Purchased Fixed Assets						
Manuf. Firm's Cust. Paid After Delivery (%)	4,916	51.57	39.00	5,937	43.89	36.16
Panel B. Fixed Asset Financing Source						
% by Internal Funds	2,930	58.18	42.04	2,632	70.47	38.08
% by Owner's Contribution/New Shares	2,929	7.79	23.37	2,645	5.18	17.89
% by Loans From Private Banks	2,929	20.26	33.48			
% by Loans From State-Owned Banks	2,929	4.39	16.49			
% by Supplier Credit/Advances from Cust.	2,929	6.16	19.47	2,644	4.25	16.28
% by Other Methods	2,929	3.20	14.98			

Source: Compiled by authors.

Table 1 provides a summary of the statistics for the variables employed in this study for both the pre- and post-Crisis periods. Panel A indicates that the percentage of customers who paid after delivery decreases from 51.57 percent pre-Crisis to about 44 percent post-Crisis. In terms of how manufacturing firms in these two regions finance their purchases of fixed assets, Panel B indicates an increase in the percentage of internal funding used from 58.18 percent pre-Crisis to about 70 percent post-Crisis. Accordingly, the percentage of owner's contribution or new shares decline post-Crisis to 5.18 percent from 7.79 percent pre-Crisis. Similarly, a decline is also indicated in the percentage of purchases paid via supplier credit or advances from customers, i.e., from 6.16 percent pre-Crisis to 4.25 percent post-Crisis. Note that comparisons cannot be made for the other three variables. However, the percentage of loans from private banks is relatively high at about 33 percent pre-Crisis, while the percentage of loans from state-owned banks and other methods are both relatively low at 16.49 percent and 15 percent respectively pre-Crisis.

3. Empirical Results

This paper assesses the impact of the 2008-2009 Crisis on two dimensions of manufacturing firms in Eastern Europe and Central Asia, i.e., receivables collection (whether the customers pay after the delivery rather than before or on the date of delivery), and financing of manufacturing firms' fixed asset purchases (what type of financing they used before and after the 2008-2009 Crisis).

As shown in Table 2, the percentage of purchases paid by the customers of the manufacturing firms in these countries decline from the pre-Crisis to the post-Crisis period. The Mann-Whitney test performed indicates that the difference is statistically significant at the 95 percent confidence level. This significant decrease suggests that as a result of the 2008-2009 Crisis, manufacturing firms are more stringent with their payment policies and less lenient with their customers which results in a lower percentage of customers paying after the delivery.

² The 32 countries included in the survey are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, FYR Macedonia, Georgia, Greece, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Moldova, Mongolia, Montenegro, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan.

Table 2. The % of Sales Paid by the Manufacturing Firms' Customers After Delivery

Variables	Pre-Crisis		Post-Crisis		Mann-W.
	N	Mean	N	Mean	p-value
The percentage of sales paid after delivery	4,916	51.57	5,937	43.89	<0.0001

Source: Compiled by authors.

As shown in Table 3, the percentage of manufacturing firms' fixed asset purchases paid for by internal financing increases from 58 percent pre-Crisis to about 70 percent post-Crisis. The Mann-Whitney test performed indicates that the difference is statistically significant at the 95 percent confidence level. This significant increase in internal funding among these manufacturing firms suggests that as a result of the 2008-2009 Crisis, external financing may have become more scarce post-Crisis which forces these firms to rely more on retained earnings to fund the acquisitions of fixed assets.

While the percentage of internal funding increases post-Crisis, the same table shows that the percentage of fixed asset purchases paid for by owner's contribution and by supplier credit decline from the pre-Crisis to the post-Crisis periods. The Mann-Whitney tests performed on both variables indicate that both declines are statistically significant at the 95 percent confidence level. The significant decrease in the percentage of owner's contribution or new shares suggests that the shareholders may be drained (not enough cash) post-Crisis, whereas the significant decrease in the asset purchases financed by supplier credit or customer advances may be due to the overall tighter conditions (suppliers or customers were not willing to help) post-Crisis.

Table 3. The Financing of Manufacturing Firms' Fixed Asset Purchases

Variables	Pre-Crisis		Post-Crisis		Mann-W.
	N	Mean	N	Mean	p-value
% Fin. by Internal Funds	2,930	58.18	2,632	70.47	<0.0001
% Fin. by Owner's Contribution/New Shares	2,929	7.79	2,645	5.18	0.0032
% Fin. by Supplier Credit/Advances from Cust.	2,929	6.16	2,644	4.25	<0.0001

Source: Compiled by authors.

Conclusion

In this paper, we study the impact of the 2008-2009 Crisis on two dimensions of manufacturing firms in Eastern Europe and Central Asia: whether the customers pay after the delivery rather than before or on delivery date (receivables collection), and the type of financing used before and after the 2008-2009 Crisis (financing method of manufacturing firms' fixed asset purchases).

We obtain our data from the Business Environment and Enterprise Performance Survey or BEEPS, i.e., BEEPS IV and BEEPS V. Our sample includes manufacturing firms from 29 countries in Eastern Europe and Central Asia. We use the BEEPS IV data to represent the pre-Crisis period, and the BEEPS V data for the post-Crisis period. We look at the percentage of the customers who pay after the delivery to assess the credit environment around the crisis. To measure how these manufacturing firms finance their fixed asset purchases, we look at the percentage of purchases paid by internal funds, percentage of purchases paid by owner's contribution or new shares, percentage of purchases paid by loans from private banks, percentage of purchases paid by loans from state-owned banks, percentage of purchases paid via supplier credit or advances from customers, and percentage of purchases paid via other methods. As such, we compare the percentages of these variables between the two different periods to assess how they are impacted by the 2008-2009 Crisis.

Our analysis shows that the percentage of purchases paid by the customers of the manufacturing firms in these countries significantly decline from the pre-Crisis to the post-Crisis period. This finding suggests that following the 2008-2009 Crisis, manufacturing firms are more stringent with their payment policies and less lenient with their customers which is reflected in a lower percentage of customers paying after deliveries.

In addition, we find that the percentage of manufacturing firms' fixed asset purchases paid for by internal financing significantly increases from the pre-Crisis period to the post-Crisis period, whereas the percentage of fixed asset purchases paid for by owner's contribution and by supplier credit significantly decline between the pre-Crisis period and the post-Crisis period. These findings suggest that the 2008-2009 Crisis may have resulted in manufacturing firms in these countries to rely more on internal or retained earnings to fund

acquisitions of fixed assets due to tighter external funding or credits, or shareholders may be drained (not enough cash) post-Crisis and are reluctant to inject more money into the companies.

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Authors contribution

Conceptualization: Kaya, H.D.; **Data curation:** Kaya, H.D.; **Formal analysis:** Kaya, H.D.; **Investigation:** Kaya, H.D.; **Project administration:** Kaya, H.D., Engkuchik, E.N.; **Supervision:** Kaya, H.D., Engkuchik, E.N.; **Validation:** Kaya, H.D.; **Visualization:** Kaya, H.D., Engkuchik, E.N.; **Writing – original draft:** Engkuchik, E.N.; **Writing – review and editing:** Engkuchik, E.N.

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