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Competition in the economic crisis: Analysis of procurement auctions

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ABSTRACT

We study the effects of the recent economic crisis on firms' bidding behavior and markups in sealed bid auctions. Using data from Austrian construction procurements, we estimate bidders' construction costs within a private value auction model. We find that markups of all bids submitted decrease by 1.5 percentage points in the recent economic crisis, markups of winning bids decrease by 3.3 percentage points. We also find that without the government stimulus package this decrease would have been larger. These two pieces of evidence point to pro-cyclical markups.

1. Introduction

> How markups move, in response to what, and why, is however nearly terra incognita for macro … [W]e are a long way from having either a clear picture or convincing theories, and this is clearly an area where research is urgently needed. Blanchard (2008, p. 18).

The recent financial crisis provides a unique testing ground for analyzing causal economic relations. Although some economists warned of the bubbly nature of asset prices (e.g. house prices, see Shiller, 2005), the financial crisis and the ensuing economic crisis were unforeseen.[1] We use the current economic crisis to shed light on how markups move in response to an exogenous shock in demand. We investigate firms' competitive behavior in procurement auctions before and during the crisis; and build a bridge between micro-level behavior and the effects of macro-level shocks.

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[1] Financial markets in 2006 did not foresee the collapse of subprime mortgage markets in early 2007 nor the fire sale of Bear Stearns in March 2008 to JPMorgan Chase to avoid bankruptcy, nor the collapse of Lehman Brothers on September 12, 2008, nor the bailout of American International Group (AIG), etc.

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The recent economic crisis allows testing for (at least) two effects. First, it enables us to estimate the effects of the recent economic shock on fundamental structural characteristics of the economy. In particular, we test for the effects of the shock on the process and intensity of competition, i.e., pricing behavior and markups. Second, the effects of fiscal policy can be tested in an unprecedented manner. In normal times, the effects and determinants of fiscal policy are difficult to ascertain due to their endogenous nature. Activist fiscal policies in the crisis are clear cut and mostly targeted to specific industries like the construction sector. Thus, we can test for the effects of fiscal policy by constructing a proper counterfactual allowing us identification. We use data from before the economic crisis to predict what would have happened but for the state stimulus intervention.

Our theoretical reasoning and strategy of identification are as follows. In "normal" times (in the years before the recent economic crisis) firms operate at their equilibrium capacity utilization rate. Sometimes they are unconstrained, but sometimes they hit their capacity constraint. Using data from highway procurement auctions, Jofre-Bonet and Pesendorfer (2003), for example, estimate that firms are capacity constrained in 32% of the contracts during the "normal" economic time period 1996–1999, and find that bids are 18% higher if all bidders are constrained. This implies that economic rents are higher, if firms are capacity constrained. The negative demand shock resulting from the economic crisis relaxes capacity constraints: bidders have idle capacity. Given idle capacity, they participate more often in the remaining auctions and bid more aggressively since their costs are lower. In a dynamic model, if firms are capacity constrained, they may also price into their bids the lost option value of winning today versus winning later, i.e. the (additional) cost of winning today consists also of the loss of future discounted profits due to limited capacity.

Our results are based on an auction model fitted to detailed and comprehensive data from procurement auctions in the Austrian construction sector in the period 2006 to 2009. Using the start of the downturn as a quasi-experiment, the model enables us to show how firms react to the massive negative demand shock. The economic crisis has led, however, governments in many countries to implement stimulus packages and counteract these negative shocks. This has fueled interest in and discussion of the questions if, how and which government measures are effective. The Austrian government also implemented a stimulus package in response to the economic crisis. The main target was the construction sector. Applying the same logic as above, the government intervention should — ceteris paribus — increase markups.

The focus of stimulus measures on the construction industry is not idiosyncratic for Austria. Many countries implemented stimulus measures, of which the construction sector plays a large part. In Austria, the share of the stimulus packages covered by construction spending was about 22% in 2009. In Germany, about 17% of the stimulus in 2009 and 2010 were directed to construction. In the US, the share was about 13% in 2009. Thus, we believe that our results are relevant for fiscal policy in general and are not confined only to Austria.

For the empirical implementation, we follow and simplify Athey et al. (2011) and use a parametric version of Guerre et al. (2000) to recover the distribution of bidder costs from the observed bids. We assume that the demand shock exogenously changed bidders' participation.[2] The distribution of bidders' costs is estimated based on the assumption that in equilibrium the estimates of the distribution function summarize bidders' beliefs and can be used to infer bidders' costs based on the first-order conditions of optimal auctions. Estimation of the distribution of bids is based on auction characteristics, firm characteristics as well as the level of competition to which firms are assumed to respond optimally.

We utilize a detailed data set that includes a rich set of variables. Our data set covers nearly the population of all public procurement auctions in the construction sector in Austria during the years 2006 to 2009. It includes auction specific variables such as the engineers' cost estimates of one firm for each project and the identities and bids of participating bidders. By matching to a firm-level database and combining it with data on travel distances from the firm's address to the location of the project, several bidder-specific variables are added. We are thus able to control for bidder heterogeneity in the econometric model.

We show that the crisis indeed had the expected effects on competition: the negative demand shock led to more bidders in the remaining auctions and these bid more aggressively. We find a significant decrease of the average markup in the crisis period of about 1.5 percentage points relative to a pre-crisis mean markup of 12%. The winning bids are 3.3 percentage points lower relative to 22.9% pre-crisis. Extending our analysis to the dynamic model of Jofre-Bonet and Pesendorfer (2003) shows that the main crisis effect is robust to the incorporation of the option value effect of winning. Markups increase by about 2 percentage points overall in the dynamic model. The crisis drop is about 2 percentage points for all bids and about 4 percentage points for winning bids.

We attribute the decrease in markups mainly to two characteristics that are affected simultaneously by the negative demand shock: lower backlogs of firms and an increase in the number of bidders. Because of the unforeseeable nature of the recent financial crisis, firms did not reduce their capacities to the lowered demand level. Exit did not immediately follow. Roughly the same number of firms bid for a reduced number of projects and consequently more firms bid for each project. More competition and reduced marginal costs lead to lower markups and lower prices.

A counterfactual analysis provides an estimate of the effect of the stimulus on markups. In this counterfactual, we reduce the backlogs of bidders by the amount the government spent on stimulus in the construction sector. Our estimate indicates that the drop in markups would have been about a third higher — increasing from 1.5 to 2 percentage points — without government stimulus.

[2] As we are mainly interested in the effect of the recent economic crisis on firms' markups, we do not account for endogenous entry. We estimate a model with entry cost as one of our robustness checks, though.