210C - Part 1: Juan

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Instructions: Please read carefully: You must answer each question only in the space below each sub-question. I will penalize answers that are longer than the provided space. This exam accounts for 50 points.

1 Empirical Literature on Credit Supply

You are a researcher interested in estimating the effects of shifts in the willingness of banks to grant credit, often called shifts in credit supply, on firm outcomes.

After doing a literature review, you find that the earliest approach the literature used to answer this question is to run a regression in log changes of firm employment L and firm-level credit Q. Formally, the literature has estimated the following regression by OLS,

$$\Delta \log L_j = \beta_0 + \beta_1 \Delta \log Q_j + \epsilon_j, \tag{1}$$

where j index firms, and the OLS estimate of β_1, called $\hat{\beta}_1$, is interpreted as an estimate of the causal effect of shifts in credit supply on firm employment.

1. **20 points** Discuss one concern of interpreting $\hat{\beta}_1$ as an estimate of the causal effect of changes in credit supply on changes in employment.

To alleviate some of the concerns with equation 1, the literature adopted an approach labeled the *Khwaja and Mian* approach for Khwaja Mian (2008) in your reading list, often also called the *firm fixed effect* approach. This approach uses that firms (indexed by j) have multiple banking relations, where banks are indexed by b, and that banks are differentially exposed to funding shocks (denoted by D_b). Formally, the literature estimates the following regression

$$\Delta Q_{jb} = \alpha_j + \gamma_1 \Delta \log D_b + \epsilon_{jb}. \tag{2}$$

2. **20 points** Discuss the role of the firm fixed effect α_j in alleviating the concerns of estimating the causal effects of credit supply shocks.

Although very useful, equation 2 only links financial variables at a bank to firm credit, not firm real outcomes, like employment. Chodorow-Reich (2014) popularized an approach of running an equation similar to equation 1, but instrumenting $\Delta \log Q_j$ using as an instrument a variable Z_j that captured the health of the banks that serve firm j.

In the case of Chodorow-Reich (2014), the main instrument is the closeness of banks with Lehman Brothers in the syndicated loan market, although the paper considers other instruments.

3. **10 points** The research design in Chodorow-Reich (2014) must satisfy an exclusion restriction: the instrument only affects firm employment changes via its effect on firm credit changes. Discuss in words what the exclusion restriction entails **economically** in this setting. You can use an example of a violation of the exclusion restriction.

END OF THE EXAM.