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Bankruptcy costs, liability dollarization, and vulnerability to sudden stops

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ABSTRACT

Countries with intermediate levels of institutional quality suffer larger output contractions following sudden stops of capital inflows than less developed nations. However, countries with strong institutions seldom experience significant falls in output after capital flow reversals. We reconcile these two observations using a calibrated DSGE model that extends the financial accelerator framework developed in Bernanke, Gertler and Gilchrist (1999). The model captures financial market institutional quality with creditors' ability to recover assets from bankrupt firms. Bankruptcy costs affect vulnerability to sudden stops directly but also indirectly by affecting the degree of liability dollarization. Simulations reveal an inverted U-shaped relationship between bankruptcy costs and the output loss following sudden stops.

1. Introduction

Advanced economies with strong institutions seldom suffer large drops in output following capital flow reversals. One reason emphasized in this paper is that better institutional quality reduces domestic liability dollarization (Burger and Warnock, 2006; De Nicoló et al., 2005), decreasing the output loss following a sudden stop of capital inflows (Cavallo, 2004; Guidotti et al., 2004). Emerging economies with intermediate institutional quality, however, exhibit heightened vulnerability to capital flow reversals compared to less developed nations (Ranciere et al., forthcoming; Schneider and Tornell, 2004). These two observations imply a non-linear effect of institutional quality on the fall in output following a sudden stop.

In this paper, we model the non-linear relationship by extending the financial accelerator framework developed by Bernanke, Gertler and Gilchrist (1999) (hereafter BGG). In particular, we show that in some cases an improvement in institutional quality can have the counterintuitive effect of increasing the cost of a sudden stop. We focus on financial market institutions and capture institutional quality with the cost of bankruptcy, a key parameter in the model.[1]

Bankruptcy costs enter the model through a financial contract between a bank and domestic entrepreneurs. According to this contract, as entrepreneurs borrow more for a given level of net worth, they are charged a higher interest rate. The financial imperfection that generates this external finance premium is the result of a cost that lenders must incur in order to observe and retrieve borrowers' realized returns when they default. Lenders pay this amount only when firms default; otherwise lenders receive a fixed payment. We can interpret this cost as a bankruptcy cost that reflects auditing, accounting, and legal expenditures associated with liquidation as well as losses associated with the interruption of business (Carlstrom and Fuerst, 1997). The lower the cost, the greater the proportion of a firm's value creditors can recover.

In contrast to BGG (1999) and later work extending the financial accelerator framework to an open economy setting (Choi and Cook,

[1] Bankruptcy costs reflect institutional quality for several reasons. Countries with strong legal systems that protect creditor rights and provide an orderly bankruptcy process should have lower bankruptcy costs. In addition, given that a firm has declared bankruptcy, prudential regulation and supervision of the financial system that requires disclosure and transparency of firms' financial positions should also reduce these costs. We therefore focus on one aspect of institutional quality, bankruptcy costs, although we use the terms interchangeably in the paper.

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2004; Gertler, Gilchrist and Natalucci 2007, hereafter GGN), we calibrate the model using different levels of bankruptcy costs. We then analyze the effect of an exogenous increase in foreign interest rates, which initiates a sudden stop. There are two direct effects of a decrease in bankruptcy costs. First, a lower bankruptcy cost reduces the level of financial frictions due to asymmetric information, weakening the transmission of external shocks to entrepreneurs' net worth and costs of capital. This financial accelerator effect causes a more muted output response to external shocks. Second, when financial frictions are lower, the external finance premium and therefore borrowing costs are less sensitive to leverage. The reason is that creditors are not as affected by bankruptcy since they can retrieve a greater portion of a bankrupt firm's assets. Therefore, when there is a sudden stop and borrowing costs increase, firms must respond by decreasing investment sharply to lower their risk premium. This effect, which we refer to as the leverage sensitivity effect, amplifies the response of output. These two competing effects play a crucial role in the non-linear relationship between bankruptcy costs and vulnerability to sudden stops.

We use the framework to model three types of economies. We first analyze a benchmark economy that is characterized by the ability of domestic firms to obtain finance in local currency. In this economy, the first effect dominates, and a reduction in bankruptcy costs reduces vulnerability to sudden stops. We then look at an economy in which domestic firms must borrow in foreign currency. In this case, we find the opposite result that lower bankruptcy costs actually increase the output loss following a sudden stop. Specifically, liability dollarization and the depreciation of the currency strengthen the second effect, leading to a larger drop in output.

Finally, we look at a more realistic intermediate case in which some firms borrow in local currency and others borrow in dollars. In contrast to GGN 2007 and Choi and Cook (2004) in which all borrowing is denominated in a single currency, we make liability dollarization endogenous. Specifically, we model a causal relationship between bankruptcy costs and local currency borrowing. As mentioned above, there is some evidence of a negative relationship between institutional quality and domestic liability dollarization.[2] To model this relationship, we assume a fixed wedge between bankruptcy costs for domestic and foreign lenders (Hermalin and Rose, 1999; Iacoviello and Minetti, 2006; Rajan and Zingales, 1998). As we explain below, this wedge implies that liability dollarization decreases as bankruptcy costs decrease.

Simulations of our partial dollarization economy reveal an inverted U-shaped relationship between institutional quality and vulnerability to sudden stops.[3] In particular, a lower bankruptcy cost increases the output loss following a sudden stop, but this effect only applies to countries with initially high bankruptcy costs. Finally, the model's simulated output loss is similar to actual declines in output.

The rest of the paper is organized as follows: Section 2 presents and calibrates the model. We then simulate sudden stop-induced output drops for different values of the bankruptcy cost parameter. Section 3 concludes.

[2] Burger and Warnock (2006) provide evidence that better institutional quality promotes local currency bond markets. Better institutions are also correlated with less dollarization in the domestic banking system (De Nicoló et al., 2005; Honig, 2009). In addition, there is evidence that better institutional quality, such as credit rights, spurs the development of the domestic banking system and/or bond market, regardless of currency denomination (c.f. Djankov et al., 2008). To the extent that local lending is in local currency, greater domestic borrowing and less foreign borrowing should reduce the share of foreign currency debt.

[3] The inverted U-shaped relationship is consistent with recent models (Aghion et al., 2004; Schneider and Tornell, 2004; Ranciere et al., forthcoming) showing that countries with intermediate levels of institutional quality that are characterized by limited contract enforcement and bailout guarantees are more likely to experience sudden stops. Our paper adds to this literature by describing the dynamic behavior of vulnerability to sudden stops as countries transition from low to high institutional quality economies. This paper also represents a first attempt to capture this non-linear effect using a DSGE model.

2. Model economy

In this section, we build a model to analyze the relationship between institutional quality and vulnerability to sudden stops. The financial accelerator framework of BGG (1999) in an open economy setting is well suited for this purpose. First, the model includes bankruptcy costs that can proxy for institutional quality. Second, bankruptcy costs determine the leverage of domestic firms, which in turn affects a country's vulnerability to sudden stops. Third, the general equilibrium framework together with reasonable calibration allows us to quantify the vulnerability to sudden stops.

2.1. Benchmark model (no liability dollarization)

There are six types of agents in the benchmark economy: households, entrepreneurs, a domestic bank, retailers, capital producers, and a central bank. Households work, consume, and invest in deposits denominated in domestic and foreign currency that have a riskless rate of return. Entrepreneurs are risk neutral and borrow from domestic banks to finance the production of wholesale goods. A domestic bank finances entrepreneurs using the deposits of consumers.[4] Retailers are monopolistically competitive and transform wholesale goods into final consumption goods. Retailers are included at this stage to simplify the financial contract and motivate price stickiness. Capital producers turn investment into capital goods. Finally, a central bank conducts monetary policy using a Taylor (1993) rule.

We begin by defining the financial contract since it is the component of the model used to study the effects of institutional quality. Aside from the financial contract, the rest of the economy follows a standard dynamic New–Keynesian small open economy model. The financial contract is embedded in this framework, the details of which are deferred to Appendix B.

2.1.1. The contract between the domestic bank and entrepreneurs

There is a continuum of entrepreneurs with insufficient net worth to internally finance their investments. Entrepreneurs borrow the difference between their desired investment and net worth from a domestic bank. Let Q_{t-1}, K_{it}, and N_{it} denote the price of capital, the capital stock, and the net worth of entrepreneur i, respectively. Desired investment is $Q_{t-1}K_{it}$. Funds borrowed from the bank, B_{it}, are therefore given by

$$B_{it} = Q_{t-1}K_{it} - N_{it}. \tag{1}$$

The external finance premium on these loans, x_{it}, is determined according to two equations that characterize the contract with the bank. The first equation is given by:

$$\left[1-F\left(\bar{A}_{it}\right)\right](R_t + x_{it})B_{it} + (1-\mu)\left[\int_0^{\bar{A}_{it}} A_{it}R_t^k Q_{t-1}K_{it}dF(A_{it})\right] = R_t B_{it} \tag{2}$$

Eq. (2) shows that banks set their expected rate of return equal to the risk free rate, R_t. The right hand side represents the opportunity costs of financing the entrepreneur. Expected returns consist of the principal and interest payments with probability $1-F(\bar{A}_{it})$ and whatever the firm has if it defaults net of bankruptcy costs. The bankruptcy cost coefficient, μ, represents the cost per dollar that lenders must pay when borrowers default in order to observe and retrieve borrowers' realized returns. This implies a recovery rate of $1-\mu$. A_{it} is a log normally, i.i.d. idiosyncratic shock to entrepreneurs' return on capital. $\bar{A}_{it}$ is the expected cutoff value

[4] Funding does not have to come exclusively from domestic sources. But we assume in this section that all financing is denominated in local currency.