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Pandemics of the poor and banking stability

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ABSTRACT

We first develop a theoretical model that shows that the likelihood of a collapse of the banking industry of a developing country increases, as the joint prevalence of large pandemics such as AIDS and malaria increases. We also show that the optimal bank reserves increase as the prevalence increases. In the empirical part of the paper, we consider a large dataset of developing countries, and we exhibit a causality effect from combined prevalence to deposit turnover, as well as causality effect from an increase of combined prevalence to an increase in bank reserves. Those empirical facts therefore support our theoretical findings.

1. Introduction

The determinants of bank reserves have long been studied (see Baltensperger and Milde (1976) for an early study, Lown and Wood (2003) among many others). As importantly, and concurrently, the link between bank reserves and banking fragility has also devoted a lot of attention (see for instance Siegel (1981) and Wagner (2007)). Essential determinants of reserves and stability are interest rates, inflation tax (Brock, 1989), monetary policies (Freixas et al., 2011) and political factors among others. In the particular case of poor countries, of interest here, Detragiache et al. (2008) argues that competition from foreign banks is another determinant of banking fragility. We argue that, in poor countries, large pandemics such as tuberculosis and HIV/AIDS are also key determinants of bank reserves and banking stability. This view is first motivated by the observation of large deposit withdrawals and relative banking fragility in developing countries facing large pandemics such as HIV/AIDS and tuberculosis (for instance for South Africa, see South African Savings Institute (2007)). The causality effect between large pandemics and banking fragility is then explained by the fact that most of the treatments costs in developing countries are out-of-pocket health expenditures (Leoni, 2011). When experiencing significant morbidity symptoms requiring treatments, those patients may withdraw long-term bank investments (demand deposits for instance) to pay for their own care or that of their relatives. When withdrawals occur on a large scale, because of high combined prevalence, bank reserves are drained and long-term banking investments foregone. This implies that, as the prevalence in any of those diseases increases, the likelihood of a general banking collapse increases; this may occur even without runs, since the resulting withdrawal rate may exceed reserves, causing in turn a default from the banks. As a result, banks increase reserves to alleviate the problems. We develop a theoretical support for those claims, and we back them with strong empirical evidence.

We also contribute to the debate on excess bank reserves, at least in poor countries or in developing countries facing large pandemics. Typical arguments, advanced so far to explain excess reserves, were opportunity cost of holding cash (Agnora and El Aynaoui, 2010), and low short-term interest rates combined with banking fragility (see Ogawa (2007) for the case of Japan). Our work thus presents an alternative explanation, in poor countries, based on the anticipation of an increase in prevalence of a particular pandemic.

In more detail, this paper has both a theoretical and an empirical part. We first develop a theoretical framework where standard deposit contracts and long-term investments are modeled as in Diamond and Dybvig (1983). We call bank reserves the ratio between liquid reserves and overall bank assets, which implies that our variable is always greater than mandatory reserves set by local regulators. However, our main departure from the latter reference is that the fraction of infected population is random, and it is unknown at the time the banks set the deposits rates and bank reserves. This new realistic assumption allows for new insights about the dependency between equilibrium bank reserves and a

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stochastic increase in expected prevalence, as follows. When an agent learns her infection, she needs to provide for her own care; if so, she may have to forfeit her long-term investments, should the cost of medications be too high as it is typically the case. There are two types of equilibria: either every agent anticipates a bank failure and thus does not deposit, or every agent deposits and a bank failure occurs with strictly positive probability. This probability of failure is an increasing function, in the sense of first-order stochastic dominance, of the probability of infection. We also get the same corollary as in Leoni (2011), where social welfare is greater in equilibria where agents deposit, despite the risk of banking failure. We also show that, as the likelihood of an infection increases in the sense of first order stochastic dominance, the optimal equilibrium banking reserves also increase.

We then test the model's predictions using annual data for 80 low income, lower middle income and upper middle income countries over the 1995–2009 period. Using system GMM, we estimate a series of structural VAR models measuring the impact of a shock in the incidence of tuberculosis and out of pocket medical expenditure on a set of banking stability variables. In line with the theoretical model, inspection of the model's impulse response functions suggests that a shock on the incidence of tuberculosis has a negative impact on banking deposits, financial system deposits, banking turnover and private credit; while out-of-pocket expenditures have a negative impact on turnover and private credit. Turning to the variance decomposition analysis, we find the effect of pandemics to be comparable to the impact of lagged constant per capita GDP, controlling for lagged financial variables. We thus argue that the typical combination of those pandemics is a significant risk factor for the banking industry in developing countries with high prevalence, because of early withdrawals caused by the resulting morbidity. The fact that reserves run short in such circumstances sends negative signals to outside investors about the soundness of the banking industry, with the consequence of lower capital flows toward developing countries. The increase in bank reserves, and therefore the reduction of their long-term and most productive investments, also leads to an economic slowdown because of both credit and capital shortfall.

The paper is organized as follows. In Section 2, we carry out a more extensive literature review. In Section 3, we develop the model and carry out the theoretical analysis. In Section 4, we present the empirical part of the paper that supports our theoretical findings. Section 5 contains some concluding remarks, and the technical proofs, figures and tables are given in Appendix A.

2. Banking stability in developing countries

Banking instability has traditionally been presented as a deterrent for economic growth. For instance, Gupta (2005) showed that both panic and insolvency crises increase the opportunity cost of holding deposits and result in an increase in the cash to deposit ratio in a representative agent setting. This causes a liquidity squeeze for the bank, a decline in the money multiplier, an increase in interest rates, a lower demand for credit and ultimately a contraction in output and consumption. Such results were confirmed by several empirical studies highlighting that private credit and output decelerate during banking crises. Econometric results also highlighted a reverse causality mechanism: falling output magnifies banking crises via higher credit restrictions, lower demand for credit from distressed firms, and lower household savings (Kaminsky and Reinhart, 1999; Demirguc-Kunt et al., 2006; Serwa, 2010). From a policy perspective, the relevant question is the determination of the causes of banking crises, with a view to provide appropriate recommendations for the monitoring of the financial sector. To this date, the literature on the determinants of banking stability in developing countries contains three nested topics.

A first group of studies has discussed the impact of regulatory and supervisory practices (disclosure requirements, capital ratios, market versus government based regulation) on banking stability. The first studies in this field compiled datasets of international practices and analyzed their impact on bank performance (Barth et al., 2006). However, results were biased by a measurement error due to the gap between observed de jure regulations and de facto practices. In a recent paper focusing on de facto compliance with the Basel Core Principles (BCPs) and using a comprehensive dataset of 3000 commercial banks, Demirguc-Kunt and Detragiache (2011) showed that compliance with the Basel Core Principles had no significant impact on bank's Z-scores. Nonetheless, these results were obtained in a cross-section framework, which casts doubts on the robustness of the reported causal inference, as estimates do not control for the impact of financial crises and could be biased by endogeneity. The impact of regulatory frameworks on banking stability is therefore an ongoing discussion constrained by severe data availability issues.

A second group of studies has investigated the relationship banking market structure and instability. The discussion has developed around two conflicting views. On the one hand, proponents of the 'competition-fragility' hypothesis argue that larger banks can develop informational rents with their borrowers and better screen borrowers, which minimizes portfolio risk (Cetorelli and Peretto, 2000). On the other hand, advocates of the 'competition-stability' hypothesis argue that oligopolistic banks charge higher interest rates, leading to riskier portfolios due to usual moral hazard and adverse selection problems (Boyd and De Nicol, 2005). A set of empirical papers have investigated the impact of market concentration on the dynamics of informational asymmetries and banking efficiency, with ambiguous results. For instance, Uhde and Heimeshoff (2009) highlighted that national market concentration has had a negative impact on the Z-score of EU banks from 1997 to 2005. By contrast, Beck et al. (2006) showed that the likelihood of banking crises is lower in economies with more concentrated banking sectors, controlling for institutional and macroeconomic factors. More recently, Ariss (2010) argued that the efficiency losses of oligopolistic banks are compensated by higher diversification of revenues and higher profit rates, implying that market concentration enhances systemic stability via an additional channel. To this date, economic theory and empirical evidence are inconclusive about the impact banking market structure on financial stability. Future discussions will likely focus on the identification of the transmission channels and on the role of initial conditions on the direction of causality. Finally, a third group of studies analyzed how liquidity conditions affect banking stability. On a domestic level, research has shown that accommodating monetary policies can help preserve financial stability in crisis periods. Interventions should nonetheless be timed properly and compensated by higher rates in tranquil periods in order to avoid adverse selection and moral hazard in banking markets (Diamond and Rajan, 2008; Freixas et al., 2011). At an international level, global liquidity shocks affect commodities, stock and consumer prices mainly through variations in risk-appetite (Chudik and Fratzscher, 2011; Brana et al., 2011). In the case of developing countries, previous experience has shown that such external shocks can lead to appreciations of the real exchange rate, a deterioration of competitiveness, a reallocation of workers across the non tradable sectors, and a weakening of the banking sector, especially in lax institutional environments (Urrutia and Meza, 2011; Giannetti, 2007). This paper extends the above literature by focusing on the specific causes of systemic vulnerability in developing countries. Several reasons at national level have been given so far to explain the already observed large turnover of deposits in developing countries. Those explanations

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