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International capital flows and credit market imperfections: A tale of two frictions ☆

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ABSTRACT

The financial crisis of 2007–08 has underscored the importance of adverse selection in financial markets. This friction has been mostly neglected by macroeconomic models of financial imperfections, which have focused almost exclusively on the effects of limited pledgeability. In this paper, we fill this gap by developing a standard growth model with adverse selection. Our main results are that, by fostering unproductive investment, adverse selection: (i) leads to an increase in the economy's equilibrium interest rate, and; (ii) it generates a negative wedge between the marginal return to investment and the equilibrium interest rate. Under international financial integration, we show how this translates into excessive capital inflows and endogenous cycles. We also extend our model to the more general case in which adverse selection and limited pledgeability coexist. We conclude that both frictions complement one another and show that limited pledgeability exacerbates the effects of adverse selection.

1. Introduction

In recent years, two important developments have spurred renewed interest in the macroeconomic effects of financial frictions: global imbalances and the financial crisis of 2007–08. In the case of global imbalances, financial frictions have been invoked to account for the large and persistent capital flows from Asia to the United States and other developed economies (e.g. Caballero et al., 2008). According to this explanation, the ultimate reason behind these capital flows is that—being subject to financial frictions—Asian financial markets have been unable to supply the assets required to channel their high savings towards productive investment. Hence, these savings have flowed to developed financial markets in which these assets could be supplied. In the case of the financial crisis of 2007–08, financial frictions have also been invoked to explain the run-up to the crisis and the unfolding of events during the crisis itself (e.g. Bernanke, 2009; Brunnermeier, 2009). In most of these explanations, however, financial frictions are cast in an entirely different light: instead of constraining the supply of assets, thereby limiting the amount of resources that can be channeled towards productive investment, they are portrayed as the source of an excessive supply of assets that has channeled too many resources towards unproductive investment.

How can these conflicting views of financial frictions be reconciled with one another? To answer this question, we must begin by acknowledging that each of these views has a different type of friction in mind. On the one hand, underprovision of assets and limited investment are typically attributed to limited pledgeability. This friction arises when the enforcement of contracts is imperfect, in the sense that there are limits to the resources that creditors can seize from debtors in the event of default. On the other hand, overprovision of assets is typically attributed to some form of asymmetric information regarding the quality of borrowers, which fuels investment by unproductive or inefficient individuals. This friction leads to adverse selection, in the sense that it provides incentives for relatively inefficient individuals to invest. Since markets in the real world are jointly characterized by some measure of limited pledgeability and some degree

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of adverse selection, both views are useful to understand reality. But how do they interact with one another? How does adverse selection affect the size and direction of capital flows in the presence of pledgeability constraints? How do these capital flows in turn affect the inefficiencies associated to adverse selection? Answering these questions is essential to understand recent events. Yet they cannot be addressed with existing macroeconomic models, which focus mostly on limited pledgeability while neglecting adverse selection. To address them, we need a stylized model that brings adverse selection to the foreground.

The goal of this paper is to provide such a model. In particular, we develop a standard growth model in which credit markets intermediate resources between savers and investors in capital accumulation. Individuals are endowed with some resources and an investment project for producing capital, and they must decide whether: (i) to undertake their project and become entrepreneurs, in which case they demand funds from credit markets, or; (ii) to forego their project and become savers, in which case they supply their resources to credit markets. Crucially, it is assumed that the quality of investment opportunities differs across individuals, so that it is in principle desirable for the most productive among them to become entrepreneurs and for the least productive among them to become savers. To give adverse selection a central role in credit markets, however, we also assume that an individual's productivity is private information and thus unobservable by lenders. What are the main consequences of this assumption for macroeconomic outcomes?

The first-order implication of adverse selection is that, by preventing lenders from distinguishing among different types of borrowers, it induces cross-subsidization between high and low productivity entrepreneurs. The reason for this is simple. Precisely because lenders cannot observe individual productivity, all borrowers must pay the same contractual interest rate in equilibrium. This implies that high productivity entrepreneurs, who repay often, effectively face a higher cost of funds than low productivity entrepreneurs, who repay only seldom. It is this feature that gives rise to adverse selection by providing some low productivity individuals, who would be savers in the absence of cross-subsidization, with incentives to become entrepreneurs. There are thus two clear macroeconomic implications of adverse selection: (i) by boosting equilibrium borrowing and investment, it leads to an increase in the economy's equilibrium interest rate, and; (ii) by fostering inefficient entrepreneurship, it generates a negative wedge between the marginal return to investment and the equilibrium interest rate.

We show that both of these implications have important consequences for capital flows when we allow the economy to borrow from and/or lend to the international financial market. First, through its effect on the equilibrium interest rate, adverse selection induces the economy to attract more capital flows than it otherwise would: relative to the full-information economy, then, the presence of adverse selection boosts net capital inflows from the international financial market. In particular, since the marginal return to investment lies below the world interest rate, these capital inflows can lead to a fall in aggregate consumption. Second, since the extent to which it distorts individual incentives depends on the state of the economy, adverse selection exacerbates the volatility of capital flows, capital accumulation and output.

This last point warrants some discussion. In our economy, for a given interest rate, the incentives of less productive individuals to become entrepreneurs are strongest when the capital stock and income are low: it is precisely in this case that they are most heavily cross-subsidized by productive entrepreneurs, since a substantial fraction of investment needs to be financed through borrowing. Under these conditions, then, adverse selection exerts a strong boost on investment, capital accumulation and capital inflows. As the economy's capital stock and income increase, however, the extent of cross-subsidization decreases: individuals become wealthier, an increasing fraction of their investment must be financed with their own resources and entrepreneurship loses its appeal for less productive individuals. Economic growth therefore softens the overinvestment induced by adverse selection and its impact on investment, capital accumulation and capital inflows languishes. We show how, through this mechanism, adverse selection generates endogenous boom-bust cycles in which capital inflows fuel periods of positive capital accumulation and high growth that are followed by periods negative capital accumulation and economic contraction.

A first contribution of our paper is thus to develop a stylized dynamic model to characterize the macroeconomic effects of adverse selection. And these effects turn out to be the exact opposite of the ones stressed in the literature for the case of limited pledgeability. The latter is the standard friction in existing models, which assume that borrowers are capable of diverting part of the project's proceeds and this places a limit on the resources that creditors can appropriate in the event of a default. There are two clear macroeconomic implications that are recurrent in the literature: (i) by constraining equilibrium borrowing and investment, limited pledgeability leads to a decrease in the economy's equilibrium interest rate, and; (ii) by preventing efficient investment from being undertaken, limited pledgeability generates a positive wedge between the marginal return to investment and the equilibrium interest rate. Clearly, the contrast between these implications of limited pledgeability and our findings for the case of adverse selection extend to the open economy as well. Our results thus complement the existing literature and provide a more accurate picture of the relationship between financial frictions and the macroeconomy.

Real-world credit markets are not characterized solely by adverse selection or by limited pledgeability, however, but rather by a mixture of the two. In this sense, the benchmark models discussed above are particular cases of a more general framework in which both frictions coexist. A second contribution of our paper is to build such a framework by introducing limited pledgeability into our baseline model of adverse selection. Intuition might suggest that, if one friction tends to boost investment while the other one tends to constrain it, both of them should somehow offset one another. We find however that there is a sense in which limited pledgeability exacerbates adverse selection so that, if anything, the inclusion of the former makes the consequences of the latter more severe.

The reason for this “complementarity” between the two frictions is intuitive. Binding pledgeability constraints reduce investment and lower the equilibrium interest rate; but a low interest rate decreases the returns to savings and induces unproductive individuals to become entrepreneurs, exacerbating adverse selection. The ultimate result is the combination of a low interest rate and a large and relatively unproductive pool of potential borrowers, which in our setting requires rationing to attain market clearing. The interaction of both frictions is therefore more harmful than either one of them on its own, which either boosts or constrains total investment but does not affect the order in which projects are financed. The combination of both frictions instead does, so that - for each given level of investment — the average productivity of financed projects falls. The reason is that, due to credit rationing, those projects actually financed are randomly selected out of a larger pool of potential borrowers.

Our paper is related to the large body of research that studies the macroeconomic effects of financial frictions. This literature, which goes back to the contributions of Bernanke and Gertler (1989) and Kiyotaki and Moore (1997), stresses the role of borrowing constraints for macroeconomic outcomes. Of this literature, we are closest in interest and focus to the branch that has extended the analysis to open economies, studying the effects of contracting frictions on the direction and magnitude of capital flows. Most of these papers illustrate how contracting frictions, such as limits to investor protection, can restrict an economy's ability to borrow from the international financial market, thereby generating capital outflows even in capital-scarce or high-productivity economies. Gertler and Rogoff (1990),