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Ex-ante implications of sovereign default

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ABSTRACT

I study how the possibility of default on external debts affects other capital allocation decisions in a small open economy. In the model, default has an option value derived from the randomization over ex-post default regimes, which depends on country-specific productivity shocks. This feature of default reduces incentives for ex-ante diversification, which would reduce exposure to the productivity shock. As a result, if the economys debt to capital ratio is allowed to cross a fixed threshold (identified in the model), the unique equilibrium exhibits an allocation of capital that is less productive in expectation and more volatile than in a benchmark model without default. The model therefore captures a number of salient features of emerging and less developed countries, where low levels of international risk-sharing have gone hand-in-hand with frequent and recurring default events.

1. Introduction

Sovereign defaults are a recurring feature of many less developed and emerging countries (henceforth LDECs). There have been more than 100 default events in LDECs over the past 40 years (1970–2010). Moreover, a number of countries have defaulted more than once in this period. For example, Argentina, Brazil, Myanmar and Sri Lanka each defaulted thrice between 1980 and 2002 alone (see Hatchondo et al. (2007) for the date and frequency of sovereign defaults in LDECs). The empirical regularity of default in many LDECs suggests that default is not always a reaction to unanticipated, adverse economic conditions, but may sometimes reflect a conscious policy choice (Reinhart and Rogoff, 2004).[1] If default is an instrument of policy it can have feedback effects on other capital allocation decisions.

In this paper, I propose a simple open economy model to study the implications of sovereign defaults on ex-ante and ex-post capital allocation decisions. I introduce the possibility of default into an otherwise standard model of international risk-sharing. A small open economy makes capital allocation decisions both before and after the realization of a productivity shock. Ex-ante to the shock, the country decides how much to borrow from international lenders subject to a borrowing constraint. The country can invest capital either domestically or in a perfectly negatively correlated foreign sector. I assume that the representative consumer is risk-averse and so, without default, the optimal capital allocation uses the foreign sector to fully diversify against productivity shocks. To study how default impacts incentives for international diversification, I introduce the possibility of default on debt after the realization of the productivity shock, where default triggers a simple punishment mechanism that forces the country to utilize a strictly dominated (traditional) sector.

The option to default changes substantively the optimal allocation of capital both ex-ante and ex-post. Specifically, there are now two regimes. If access to capital markets is limited by a tight borrowing constraint, default is never realized in equilibrium (because of the punishment mechanism) and the ex-ante capital allocation is the same as without default. However, if the country has sufficient access to capital markets, the country borrows more, does not diversify risks and defaults on debt when it realizes a low productivity shock. This second regime has two consequences: relative to the benchmark model without default (1) the expected productivity of capital decreases because capital is allocated to the less productive traditional sector when default occurs, and

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[1] For example, Reinhart and Rogoff (2004) argue that while default events can be detached from fundamentals by well-known coordination problems (currency crises, bank runs, sudden stops, etc.), the "serial default" observed in some emerging economies is much more systematic and that "sovereign defaults tend to recur like clockwork in some countries, while being entirely absent in others" (Reinhart and Rogoff, 2004).

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(2) the variance of productivity increases because the country does not use the foreign sector to diversify against productivity shocks. As a result, the expected returns decrease while the volatility increases. Surprisingly, both effects occur in equilibrium despite the fact that the country has to pay a premium to compensate international lenders for the default-risk.[2]

There is a simple underlying intuition for the trade-off between ex-ante diversification and the ex-post decision about default. Intuitively, default can be viewed as an alternative insurance mechanism for an agent that faces a bad productivity shock. In the event of an incomplete market, default provides an additional asset to the agent. As discussed in Dubey et al. (2005), agents may use default as an alternative way to insure themselves when a bad productivity shock is realized. Default may be more fitting to the needs of the agent depending on the realization of the shock. Like Dubey et al. (2005), in the current paper, an agent that borrows too much of debt finds it optimal to choose default when faced with a bad productivity shock.[3] The basic idea in the current paper is that there is a trade-off between diversification mechanism (through ex-ante capital allocation in a perfectly negatively correlated production process in the foreign sector) and ex-post default on external debt. International diversification provides a hedge against country-specific productivity shocks. On the other hand, the option value of default is related to a randomization over different *ex-post* regimes, where default is optimal when productivity is low and not optimal when productivity is high. Since diversification reduces exposure to productivity shocks, it curtails randomization and decreases the option value of default. As a result, the optimal allocation depends on a trade-off between the insurance value of diversification and the option value of default, which are in conflict with each other. It is most beneficial for the agent to default on the external debt in a bad state if the agent has not utilized ex-ante diversification. The larger the external debt to capital ratio, the more important the option value of default becomes. As a result, there is a threshold effect in terms of the borrowing constraint leading to two regimes (Regime I is with full diversification and no default while Regime II is with no diversification and default in low state only).

The results of the model provide some basic insights into trade-offs facing LDECs as they become more integrated into international capital markets. Capital market integration provides opportunities for diversification, which can reduce exposure to country-specific productivity shocks (resulting into "income risk-sharing"). However, a large literature has shown that risk-sharing has not increased in LDECs as would have been anticipated by standard models of international market integration (see for e.g., Kose et al., 2009; Flood et al., 2009; Yeyati and Williams, 2011). One reason may be that capital market integration has gone hand-in-hand with a large increase in sovereign debt, and a concomitant increase in default incentives. The model in this paper provides a simple theoretical mechanism consistent with this idea, and therefore complements the growing empirical literature on risk-sharing and default in LDECs.

The model and analysis in this paper therefore represent an application of the theory on limited enforcement and default risk (e.g., Kehoe and Levine, 1993; Dubey et al., 2005), and collateralized debt and bankruptcy (e.g., Chatterjee et al., 2007; Geanakoplos and Zame, 2013), to an open economy setting, where I show how default affects incentives for risk-sharing. I discuss the related literature in detail in the next section, Section 2. In the subsequent section, I present the two-period model of a small open economy with a single representative agent, and study efficient allocations as the solution to a planner's problem. The basic set-up of the model is simple in order to highlight the key interaction between diversification decisions ex-ante to a shock, and the value of ex-post default options. The analysis of the model proceeds in two steps. I first introduce the model without default in Section 3 and analyze capital allocation decisions in this benchmark case. I then introduce default with a risk premium to the benchmark set up in Section 4 and present the main result, which shows how default with risk premium affects ex-ante capital allocation decisions. Section 5 concludes. Proofs of results are given in a separate Appendix.

2. Related literature

The current paper is related to a wide literature on limited enforcement of contracts and default-risk. The theory of limited enforcement without default is discussed in Kehoe and Levine (1993); Kocherlakota (1996) and Alvarez and Jermann (2000), while for limited enforcement with default see Zame (1993) and Dubey et al. (2005). The first set of studies assumes a complete set of contingent assets to search for allocations that are efficient subject to limitations on enforceability of contracts. However, in these models, unlike in the present paper, default never actually happens in equilibrium and the market structure they consider may therefore miss salient features of those LDECs which have regularly witnessed default in the recent past.

The second set of studies assumes incomplete markets where default can occur in equilibrium with a positive probability. In particular, Arellano (2008); Aguiar and Gopinath (2006) and Bai and Zhang (2012), present models of emerging economies in which there are equilibrium default events. However, their analysis is restricted to international financial market transactions of non-contingent bonds only. The point of distinction of the current paper from this previous literature is the emphasis in this paper on the role of the interaction of ex-post default risk with ex-ante allocation of capital in contingent assets for diversification purposes.

The paper also builds on a literature on bankruptcy and default, which assumes incomplete markets with a requirement of collateral for borrowing, for example, Zame (1993); Tarun (2003) and Geanakoplos and Zame (2013). In this literature, default can also occur in equilibrium with a positive probability. In particular, Geanakoplos and Zame (2013) extend an otherwise standard intertemporal general equilibrium model by incorporating collateral requirements, possibility of default and durable assets. They show that collateral requirement affect allocations, prices, market structure and the efficiency of the market outcomes. In particular, they show that collateral requirements that lead to default ex-post can be efficient ex-ante in comparison to collateral requirements that do not lead to default.

The collateral requirement to secure the borrowing in this literature provides a pecuniary penalty of default in the form of forfeiture of collateral in the event of default. Another version of forfeiture that incorporates some exemption where fraction of income of the defaulter is not garnished is modeled in Araujo et al. (2002). The basic idea behind forfeiture in general is that a potential defaulter is exposed to seizure of collateral or some other claims. The framework in the current paper does not explicitly model the collateral requirements but the opportunity to invest in the foreign sector provides similar exposure to claims of the borrower which can be seized in the event of default.

In addition, the risk premium modeled in the current paper is motivated by Chatterjee et al. (2007) where credit suppliers can link the price of the loans made out to the households based on the type of household as well as the credit levels. This means that

[2] Borrowers pay a premium as a compensation to international lender for assuming the default risk. This premium is paid by the borrowers indirectly in the form of a lower price for domestically issued bonds.

[3] As it will be clear from the main result, the equilibrium with default in our setting is therefore related to Dubey et al. (2005)'s Example 2 which illustrates that despite having receipts on hand to fulfill the promise of repayment to lenders, the borrower defaults if they realize a bad state of the economy and therefore such a default can be classified as a strategic default.