

Endogenous Market Incompleteness with Investment Risks

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In their review of the literature on financial structure and growth published in the first issue of the *Financial System Review*, Dolar and Meh (2002) argue that the legal system, the enforceability of financial contracts, a transparent accounting system, and transparent corporate governance all have a positive impact on macroeconomic performance. Consequently, policy-makers should pursue institutional reforms that deliver growth-enhancing financial services, such as those that lead to better sharing of the idiosyncratic (individual-specific) risks associated with investment activities.

Indeed, investment activities are subject to important, uninsurable idiosyncratic risks, and these risks are pervasive in the macroeconomies of both developing and developed countries. In the United States for instance, entrepreneurs and private investors face highly variable returns (Moskowitz and Vissing-Jørgensen 2002). Moreover, the incomes of entrepreneurs are two to four times more volatile than those of non-entrepreneurs. The survival rate of private firms is only 39 per cent over the first five years, and returns on investment vary widely among surviving firms.

These large idiosyncratic risks are likely to have important consequences for macroeconomic performance and welfare, since privately held companies account for about half of production, employment, and corporate equity, in addition to representing more than half the financial wealth of rich households.

Objective

Meh and Quadrini (2005) examine the macroeconomic and welfare implications of institutional reforms that produce financial

contracts which provide the best possible insurance against idiosyncratic investment risks. More specifically, the authors seek to determine the effect of such institutional reforms on aggregate capital accumulation and welfare.¹

Methodology

To address this objective, general-equilibrium models of three economies are considered²: (i) the complete markets economy, (ii) the optimal contract economy, and (iii) the debt contract economy. In the first two, agents can sign optimal state-contingent contracts; i.e., contracts where the payoffs are conditional on the state of the world—defined according to whether the entrepreneur's investment fails or succeeds (idiosyncratic investment risks). These risks are independently distributed across entrepreneurs. When the project fails, the entrepreneur receives an insurance payment, and when it is successful, the entrepreneur makes a payment to the financial intermediary. By pooling a large number of entrepreneurs, the financial intermediary is able to provide insurance against idiosyncratic investment risks. The provision of full or partial insurance by state-contingent contracts, however, depends on whether there is complete or incomplete information.

In the *complete markets economy*, information is complete, and all actions of the entrepreneurs are observable. Therefore, full insurance against idiosyncratic investment risks is possible. This is the benchmark economy with which the others are compared.

In the *optimal contract economy*, information is incomplete (asymmetric information), and the

* This report draws on a forthcoming journal article (Meh and Quadrini 2005).

1. For further details, see Meh and Quadrini (2005).
2. These general-equilibrium models are theoretical, not empirical, models.

entrepreneur's actions are not publicly observed. As a result, there is a moral-hazard problem in the sense that the entrepreneur has an incentive to invest in riskier projects when insurance is available. Because of this moral-hazard problem, the financial intermediary will structure the contract such that the entrepreneur has an incentive not to undertake projects that are too risky (i.e., the contract is incentive-compatible). Thus, the optimal state-contingent contract provides less than full insurance to the entrepreneur. Examples of such contracts are: options; credit derivatives, such as credit default swaps; and equity contracts.³ Another practical example of a state-contingent contract is one that would share the funding of pension deficits between workers and the firm when a firm encounters financial difficulty.

Unlike the first two economies, the *debt contract economy* does not feature any state-contingent contracts. As a result, agents can sign only non-contingent contracts, where the borrower makes a pre-arranged payment regardless of the success or failure of the investment (that is, regardless of the investment risk).

Results

By comparing these three theoretical model economies, we show that:

(i) In the two model economies with incomplete markets (the debt contract economy and the optimal contract economy) the steady-state equilibrium, risk-free interest rate is lower than that in the complete markets economy. However, the aggregate stock of capital is lower than in the complete markets economy; i.e., there is under-accumulation of capital.

(ii) Even with very large moral-hazard problems, the availability of optimal state-contingent contracts brings the aggregate stock of capital and the equilibrium riskless interest rate very close to the corresponding levels in the complete markets economy. As a result, the availability of optimal state-contingent contracts increases welfare significantly. More specifically, the average welfare gains from the debt contract economy to the optimal contract

economy are more than 2 per cent of aggregate consumption.

The intuition behind the under-accumulation of capital results from the fact that the accumulation of capital is risky, and agents require a risk premium when markets are incomplete. The availability of optimal state-contingent contracts allows better insurance against investment risks and, as a result, the risk premium decreases and the demand for capital increases. Consequently, the use of state-contingent contracts can lead to an aggregate stock of capital that is very close to that in complete markets and substantially higher than the stock of capital that would prevail when only non-contingent debt contracts are feasible. The provision of better risk sharing, coupled with the resulting increase in aggregate capital, leads to a significant increase in welfare.

Discussion

This result illustrates the importance of factors that make state-contingent contracts feasible. Among these factors, formal and informal institutions play a central role. State-contingent contracts may not be extensively used in practice because enforcement may be highly inefficient and costly. For instance, the resolution of contractual disputes might be extremely long and uncertain. Substantial cross-country evidence indicates that the degree of contract enforcement is correlated with the degree of financial development.⁴ In this study, the economy with state-contingent contracts can be interpreted as an economy in which financial markets are more developed, partly because of more efficient institutional enforcement. Thus, we argue that institutional reforms—for example, well-developed legal systems—that lead to greater contract enforceability can importantly improve welfare. Future research should establish which types of institutions facilitate or make possible the use of these contracts.

Policy Implication

Legal and regulatory policy should endeavour to create an environment where a wider variety of enforceable state-contingent contracts become available. This is one way that the Bank of

3. *The Economist* (2005) provides further examples of credit derivatives (contracts that, for a fee, allow lenders to transfer to another party the risk that a firm will default) to share the risk in business activity.

4. See Levine (1997) and Dolar and Meh (2002) for reviews of the empirical literature.

Canada can direct its efforts (through its advisory role) to promote the efficiency of the Canadian financial system (Dodge 2005).

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