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Optimal (partial) group liability in microfinance lending☆

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ABSTRACT

This paper develops a model of group borrowing that incorporates partial group liability, where borrowers are penalized if their group members default but are not held responsible for the entirety of the failed loan. The model illustrates a trade-off of group liability lending: while higher levels of group liability increase within group risk-sharing, if liability is too high, borrowers strategically default. The model predicts the existence of an optimal partial liability that maximizes transfers between group members while avoiding strategic default. Consistent with this prediction, loan officers from a large microfinance institution in southern Mexico who rarely allow one group member to repay while the other defaults achieve substantially lower default rates than loan officers for whom the practice is commonplace or for those for whom it has never occurred. Structural estimation using repayment data suggests that while a partial liability below full liability may reduce default rates, the incidence of strategic default is rare.

1. Introduction

The advent of group liability — where multiple borrowers are jointly responsible for the repayment of their loans — has been identified as an important factor in the expansion of access to credit in the developing world (Armendariz and Morduch, 2010; Morduch, 1999). Group liability helps overcome information asymmetries between borrowers and lenders and incentivizes risk sharing within borrowing groups (Ghatak and Guinnane, 1999). At the same time, however, group liability may induce borrowers to strategically default when their group members default, increasing default rates (Besley and Coate, 1995). While empirical evidence of the effect of group liability on repayment is scant,[1] determining the optimal group liability remains a pressing concern for lenders. For example, to avoid strategic defaults, Grameen Bank transitioned from its traditional full liability group loans to individual liability loans in 2002 (Dowla and Barua, 2006; Yunus, 2002).

The goal of this paper is to see if a partial group liability — where borrowers are penalized if their group members default but are not held responsible for the entirety of the failed loan — can lead to lower default rates than either individual liability of full group liability.[2] To do so, I first develop a simple model of group borrowing that highlights the tradeoffs associated with group liability; while higher group liability provides an incentive for group members to share risk with each other, too high group liability can incentivize strategic default. The model implies that intra-group risk sharing is maximized and strategic default avoided when the group liability is equal to the present discounted value of repaying the loan and remaining eligible to borrow in the future. I then use administrative data from a large microfinance institution to show that loan officers who appear to be enforcing high (but not full) partial group liability achieve substantially lower default rates than those who either appear to be enforcing full group liability or those who appear to be enforcing lower group liability. Finally, I structurally estimate the model and find that default rates are minimized at a partial group liability below full liability.

The borrowing model is based on a repeated game framework where borrowers repay their current loan in order to remain eligible to borrow in the future. Borrowers receive stochastic and potentially correlated returns to borrowing, which they then may transfer to their group member. The lender can penalize borrowers if their group member fails to repay and can refuse to lend to defaulting borrowers in the future but cannot directly penalized defaulters. The model has two implications. First, if the penalty for having a group member default exceeds the present discounted value of repaying the loan and remaining eligible to borrow in the future ("the value of future borrowing"), then a borrower will find it optimal to strategically default. Second, the transfer

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[1] One notable exception is Gine and Karlan (2011), who experimentally remove the group liability provision in existing borrowing groups. They find no evidence of increased default rates but do not consider the possibility of partial group liability.

[2] Rai and Sjöström (2004) and Bhole and Ogden (2010) also show that relaxing full group liability can theoretically reduce default rates; I discuss how my model relates to theirs below.

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a borrower is willing to make is bounded above by the cost incurred by letting her group member default, which is the lesser of the group liability penalty and the value of future borrowing. As a result, the optimal group liability is the value of future borrowing; any less liability reduces within-group risk sharing, and any greater liability induces strategic default. I show that this optimal group liability minimizes default rates and maximizes the value of borrowing.

Because the repayment behavior of group members becomes more correlated the greater the amount of risk-sharing, the model implies that the probability of a borrower repaying conditional on her group member defaulting declines as the group liability approaches the optimal group liability. Once the group liability exceeds the optimal group liability, however, strategic default becomes optimal so the probability of one group member repaying when another defaults is zero. Using administrative data from a large microfinance institution (MFI) in southern Mexico, I test this prediction empirically. In qualitative interviews with the administrators of the MFI, it was emphasized that loan officers had substantial latitude in determining the group liability that he or she enforced. I use this variation across loan officers to show that loan officers for whom the probability of default conditional on a group member defaulting among the subset of two-person borrowing groups achieved lower default rates in all other borrowing groups than loan officers in their same MFI branch for whom this conditional probability was either higher or zero. By conditioning on the total default rate of a loan officer in two-person borrowing groups, I ensure that the estimated differences in out-of-sample default rates come from the particular combination of defaults within a borrowing group rather the total number of defaults, mitigating the concerns that the results are being driven by differences in the quality of loan officers.

Having shown that loan officers who appear to be maximizing within-group risk sharing without incentivizing strategic default achieve the lowest default rates, I structurally estimate the model in order to estimate the optimal group liability. By relying on the variation across loan officers in the liability enforced and the assumption that loan officers were randomly assigned to borrowers, the structural estimates recover both the unobserved group liability enforced by each loan officer as well as the parameters governing the distribution of returns to borrowing. The structural estimates suggest high but variable returns to borrowing that are negatively correlated between group members. The optimal group liability is estimated to be 98% the repayment cost of the loan; i.e. default rates are minimized when borrowers are required to repay almost the full amount of the loan when a group member defaults. This estimate is statistically significantly different from full liability (at the one-sided 10% level, but not at the one-sided 5% level) and individual liability (at the one-sided 5% level), suggesting that partial group liability may reduce the incidence of default. However, the estimated reduction in default is modest: moving all loan officers to the optimal group liability is estimated to reduce default rates from 3.61% to 3.51%. To put this in context, if all loan officers in the sample enforced the optimal group liability, the model predicts there would be about ten fewer defaults in the sample of 7844 loans. Furthermore, the estimated probability of strategic default is negligible, suggesting that full liability yields nearly as small default rates as the optimal liability.

This paper follows a long literature examining the tradeoffs of group liability in lending. Stiglitz (1990) shows that group liability can induce safer project choice through peer monitoring but at the cost of increasing the risk undertaken by the borrower. Ghatak (1999) shows that group liability induces assortative matching in group formation, lowering the effective borrowing costs of good borrowers and reducing default rates. In both papers, the authors show that the optimal group liability is strictly greater than individual liability. Besley and Coate (1995), in contrast, show that individual liability lending may perform better than group liability lending because of the possibility of strategic default. Rai and Sjöström (2004) analyze the role group liability plays in incentivizing within-group risk sharing using a mechanism-design framework and argue that an efficient lending scheme requires borrowers to be able to report their group members to the MFI for withholding output (i.e. "cross-report"). Bhole and Ogden (2010) show that a flexible joint liability contract where the amount a repaying borrower is penalized for her group member's default is optimally determined implies that borrower welfare will be strictly higher with group liability than partial liability. More recently, Baland et al. (2013) show that the relative benefits of group liability to individual liability depends importantly on the wealth of the borrower, while de Quidt et al. (2013) show that in the presence of social capital, implicit joint liability loans can be sustained even without joint liability explicitly enforced by the lender.[3]

The model presented in this paper most closely resembles those Besley and Coate (1995), Rai and Sjöström (2004), and Bhole and Ogden (2010). Like Besley and Coate (1995), the model presented below abstracts from project choice and group selection but allows for strategic default; however, the model here allows for endogenous within-group risk sharing, where, like Rai and Sjöström (2004), borrowers make transfers to avoid incurring penalties from the bank. Like Bhole and Ogden (2010), the incentive for borrowers to repay arises from the promise of remaining eligible for future loans; as a result, as in Bhole and Ogden (2010), the optimal group liability penalty depends importantly on how much borrowers value remaining eligible to borrow. Unlike Rai and Sjöström (2004) or Bhole and Ogden (2010), I characterize the equilibrium repayment decisions for an arbitrary joint probability distribution of returns to borrowing between two borrowers, which allows the model to be sufficiently flexible to be used quantitatively in conjunction with repayment data.

While the theory presented is novel in certain respects, the main contribution of this paper is to bridge the gap between theory and empirics, much in the spirit suggested by Ahlin and Townsend (2007). The empirical literature examining the effect of group liability on repayments is small but growing (Gine and Karlan, 2011; Giné et al., 2011; Madajewicz, 2003). Instead of relying on natural or field experiments as sources of identification, however, this paper is the first attempt (that I am aware) to use a structural approach to identify model parameters from the observed combinations of repayment and default within a borrowing group. Given the modest data requirements necessary to implement the estimation procedure, the paper provides a methodology that can be used to determine the optimal degree of group liability in other contexts.

More broadly, this paper contributes to the large literature examining the various factors that affect the efficiency of microfinance lending. A (non-exhaustive) list of these factors includes the role of dynamic incentives (e.g. Tedeschi, 2006), social interactions (e.g. Feigenberg et al., 2011), market structure (e.g. de Quidt et al., 2012), investment choice (e.g. Fischer, 2012), group size (e.g. Abbink et al., 2006), repayment frequency (e.g. Fischer and Ghatak, 2010) and lender monitoring (e.g. Conning, 1999).

The rest of the paper is organized as follows. The model is presented in the next section. Section 3 describes the empirical context and data. Section 4 provides empirical evidence that partial liability is associated with lower default rates than either full or individual liability. Section 5 structurally estimates the model to determine the optimal group liability. Finally, Section 6 concludes.

2. The model

In this section, I introduce a simple model of group liability borrowing. Borrowing is modeled as a repeated game in which every period borrowers have an incentive to default but continue to repay in order to remain eligible for future loans. Partial group liability is modeled as

[3] Other papers examining the role of group liability in microfinance lending include Banerjee et al. (1994), Armendariz de Aghion (1999), Ghatak (2001), Madajewicz (2004), Rai and Sjöström (2004), Chowdhury (2005), and Gangopadhyay et al. (2005).