



Optimal lending contracts with long run borrowing constraints



Shuyun May Li*

Department of Economics, The University of Melbourne, Victoria 3010, Australia

ARTICLE INFO

Article history:

Received 2 March 2012
Accepted 2 January 2013
Available online 23 January 2013

JEL classifications:

G3
L2
D21

Keywords:

Optimal lending contract
Borrowing constraints
Asymmetric information
Limited commitment
Impatient entrepreneur

ABSTRACT

This paper discusses two variations to the optimal lending contract under asymmetric information studied in Clementi and Hopenhayn (2006). One variation assumes that the entrepreneur is less patient than the bank, and the other assumes the bank has limited commitment. The qualitative properties of the two modified contracts are very similar. In particular, both variations lead to borrowing constraints that are always binding such that the firm is financially constrained throughout its life cycle and subject to a positive probability of being liquidated eventually.

© 2013 Elsevier B.V. All rights reserved.

1. Introduction

A considerable body of empirical evidence suggests that many firms are constrained in their borrowing and borrowing constraints can be important determinants of firm dynamics.¹ Recent attempts to analyze, theoretically, the impact of borrowing constraints on firm dynamics, such as Quadrini (2004), Albuquerque and Hopenhayn (2004) and Clementi and Hopenhayn (2006), have used the optimal contract design framework—where borrowing constraints arise as a feature of an optimal long-term lending contract subject to market failures such as asymmetric information or limited contract enforceability. This approach has been very successful in generating short-to-medium-run implications of borrowing constraints. For example, the optimal lending contract under asymmetric information studied in Clementi and Hopenhayn (2006) (hereafter, CH) implies that smaller firms are more financially constrained, grow faster, but have higher probability of being liquidated. These features are consistent with the qualitative properties of firm growth and survival documented in the empirical literature.²

An important feature of the aforementioned contracting models is that borrowing constraints are transient phenomena in all these models: the firm ceases to be borrowing constrained in finite periods and hence there is no firm growth or exit driven by borrowing constraints in the long run. For instance, in CH, the evolution of equity values of the firm (the state variable of the recursive contract) has two absorbing states: either the firm is liquidated, or it grows in finite periods to the point where it reaches its unconstrained efficient size and will never be liquidated. This seems counterfactual: borrowing constraints as well as the possibility of exit are likely to remain in the long term, as a firm grows larger and older.³

* Tel.: +61 3 83445316; fax: +61 3 83446899.

E-mail address: shuyunl@unimelb.edu.au

¹ For a survey of this literature, see Hubbard (1998) and Stein (2003).

² For empirical studies on firm dynamics, see Evans (1987), Hall (1987), Dunne et al. (1988), and Davis et al. (1996).

³ Early empirical evidence on borrowing constraints cites the positive correlation between investment and some measure of current liquidity such as cash flow, see, e.g., Fazzari et al. (1988). This interpretation has been debated, as the positive correlation might be spurious due to the endogeneity of cash

This paper considers two variations of the CH contract—each relaxing one assumption in CH, and both variations lead to borrowing constraints that are always binding during the firm's life cycle. One variation assumes that the entrepreneur has a lower discount factor than the bank, or in other words, the entrepreneur is more impatient than the bank. The assumption of having a lender that is more patient than a borrower has been adopted in many studies, for examples, see Carlstrom and Fuerst (1997), Monge-Naranjo (2009) and DeMarzo and Fishman (2007). It is consistent with an important implication of general equilibrium models with incomplete financial market (e.g., see Huggett, 1993; Aiyagari, 1994)—the equilibrium interest rate (which reflects the discounting by the lender) is lower than the time preference rate of the agent. The other variation relaxes the assumption that the bank has full commitment. Although full commitment on the part of the bank (the principal) is a standard assumption in the optimal contracting literature, frequent bank failures, as observed in the recent financial crisis, suggest that it is not realistic to assume banks are able to keep promises under all circumstances.⁴ So in the second variation we assume, in a similar form as the limited commitment assumption on the agent's side that has been extensively studied in the literature, that the bank has limited commitment: the bank can renege on the contract if the expected discounted flows of payments to himself implied by the contract fall below a critical value which represents the value of some outside option for the bank.

The two modified optimal lending contracts are carefully characterized. In comparison to the CH contract, both variations lead to borrowing constraints that are always binding such that the firm is financially constrained throughout its life cycle and subject to a positive probability of being liquidated eventually. The key result underlying such difference is that either variation leads to an upper bound on the optimal value entitlement to the firm such that the equity value of the firm cannot grow to the unconstrained level. The term 'equity' represents the firm's claim to future cash flows that the contract will deliver, and it grows as the firm makes repayments to the bank, or in other words, as the firm puts deposits in the bank. In the impatient entrepreneur case, as the firm discounts future cash flows more heavily, it is not optimal for the firm to accumulate deposits at the bank, by sacrificing current consumption (dividends), to a level that would allow the firm to be borrowing unconstrained. In the case of the bank having limited commitment, the firm, fearing that the bank may renege on the contract, also does not want to deposit too much at the bank.

Considering the similarities in the properties of the two contracts, we conduct a numerical comparison to see whether the two variations are structurally identical. The numerical results show that there are some structural differences in the computed value functions and policy functions, but the differences are modest compared with the similarities. In particular, the two contracts imply roughly the same evolution dynamics of equity values for the firm. The numerical exercise hints that a quantitative exercise is unlikely to reject one model and not the other.⁵

This paper contributes to the literature on dynamic contracting in several aspects. First, it formally discusses the implications of different discount rates for the lender and borrower in the context of a dynamic lending contract with private information. In the dynamic contracting literature, different discounting by the principal and the agent with the agent being more impatient is first considered by Williamson (1998) and Aiyagari and Williamson (1999, 2000) in the context of dynamic risk sharing with privately observed endowments. This assumption, as formally established in Aiyagari and Williamson (1999), leads to a non-degenerate limiting distribution of expected utilities for the agent. In the dynamic lending literature, DeMarzo and Fishman (2007) and Monge-Naranjo (2009) consider the same assumption as ours in their contracting problems, where the former study an optimal long-term financial contract in the presence of agency problems and the latter studies a continuous time version of the contracting problem with limited commitment on the firm's side studied in Albuquerque and Hopenhayn (2004). In both studies this assumption also serves to avoid uninteresting degeneracies. Here, the properties of the optimal lending contract with impatient entrepreneur implies that an aggregation of firms financed by this type of contract would yield a non-degenerate stationary distribution of firm sizes (equity values), with borrowing constraints binding for all firms and continually driving firm growth and exit.⁶ On the contrary, if firms are financed by the CH contract, a degenerate firm size distribution would result with all firms operating at the unconstrained efficient size. So our result is consistent with previous studies regarding the role of impatient agent. It again demonstrates the robustness of this assumption as a device to avoid degeneracies in dynamic contracting problems.

Second, this paper is one of the very few studies that address the implications of limited commitment on the part of the principal for optimal contract design. In the dynamic contract literature, most studies assume that the agent may or may not fully commit, but the principal has full commitment in the sense that it can fully honors its contracts under all

(footnote continued)

flow (Kaplan and Zingales, 1997). More recent literature tests borrowing constraints by looking at how capital expenditure responds to changes in internal liquidity that are more of an exogenous nature, such as those resulting from a policy or controlled experiment, see Rauh (2006) and Banerjee and Duflo (2004) for examples. In both literature, borrowing constraints are found to exist for publicly traded firms that typically have large amount of assets and have been in operation for a long time. Bankruptcy of large corporations is also constantly observed.

⁴ The Federal Deposit Insurance Corporation announced in February 2009 that the number of "problem banks" increased to 252 at the end of the fourth quarter of 2008, and there were 25 bank failures in 2008, which was the largest annual number since 1993 in the U.S.

⁵ Li (2010) embeds each of the three lending contracts, the CH contract with exogenous firm exit and the two modified contracts here, into an industry equilibrium model to explore their quantitative implications for job reallocation. The results show that the firm size distributions implied by the two modified contracts match the data better than that implied by the CH contract with exogenous exit, and the two modified contracts give similar results regarding firm exit rates and gross job flow rates, whilst notable differences are found in their implications for firm size distribution.

⁶ See Li (2010) for such an aggregation exercise.

Download English Version:

<https://daneshyari.com/en/article/5098718>

Download Persian Version:

<https://daneshyari.com/article/5098718>

[Daneshyari.com](https://daneshyari.com)