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# The optimal allocation of alternative collateral assets between different loans

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ABSTRACT

This paper studies loan collateral and relationship banking. A firm has different loans (e.g. short-term and long-term loans) and alternative collateral assets. How does it allocate the collateral assets between the loans? It optimally secures a long-term loan with collateral that incurs high information costs initially and has a strong learning effect during the loan period (e.g. accounts receivables). A short-term loan is secured with collateral that requires low information investment and has a weak learning effect (e.g. government bonds). It is optimal to secure long-term loans with long-term collateral and short-term loans with short-term collateral. If the loan period is short, unsecured lending may be optimal.



## 1. Introduction

Loan collateral plays a fundamental role in lending. Both Avery, Bostic, and Samolyk (1998) and Berger, Espinosa-Vega, Frame, and Miller (2011) find that over 80% of small business loans in the USA are secured by collateral. Black, de Meza, and Jeffreys (1996) report that for 85% of small business loans in the UK, the ratio of collateral to loan size exceeds unity. The lack of capital and collateral mitigates entrepreneurial activity in mature markets (e.g. Black et al., 1996; Blanchflower & Oswald, 1998; Evans & Jovanovic, 1989) and particularly of all in emerging markets (Hanedar, Broccardo, & Blazzana, 2014;

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Menkhoff, Neuberger, & Suwanaporn, 2006). Understanding the role of collateral and its substitutes is also important because collateral has strong implications for monetary policy and macroeconomics. Changes in collateral values can intensify business cycles through procyclical changes fluctuate credit availability (e.g. Bernanke & Gertler, 1989, 1990). Gan (2007), for example, finds that a large drop in the value of real estate collateral assets in Japan in the early 1990s had a dramatic impact on the decrease of debt capacity and investment.

Numerous microeconomic theories of banking and financial contracting explain the widespread use of collateral due to its function to reduce credit rationing under asymmetric information (e.g. Stiglitz & Weiss, 1981). Bester (1985) advances a signaling theory. An ex ante good borrower signals his type by pledging collateral whereas a bad borrower posts no collateral. Alternatively, collateral may alleviate the problem of moral hazard, e.g. Chan and Thakor (1987), Boot, Thakor, and Udell (1991) and Boot and Thakor (1994). Collateral also influences the incentives of lenders, who utilize it either as a substitute for (Manove, Padilla, & Pagano, 2001) or a complement to (Rajan & Winton, 1995) screening and monitoring efforts. According to Manove et al. (2001) lenders who are protected by collateral may become "lazy" in the sense that they do not exert sufficient effort in project screening. Rajan and Winton (1995) show that collateral improves the lender's monitoring incentives. Manove and Padilla (1999) explore optimism. If an entrepreneur is overoptimistic about his probability of success, the option to post collateral increases his ability to obtain funding for an unworthy project.[1] Niinimäki (2009) shows that collateral may create a moral hazard problem in banking and Niinimäki (2011) studies nominal and real costs of collateral. None of these articles includes the assumption that the value of collateral assets is unknown ex ante, and endogenizes the generation of information on collateral value, an issue that is central to our paper. Neither article examines the optimal allocation of diverse collateral assets between different loans.

This paper takes a novel approach to modeling collateral and information. A lender who will ensure that a loan is safe has two options. He can either monitor the borrower's project or he can evaluate the collateral asset. If its value exceeds the repayment, the loan is safe. Both methods – project monitoring and evaluation of collateral – entail information costs and the lender selects the less expensive method. Consider the collateral method. A firm takes both the type of its project and the type of its collateral assets as given. It can decide the amounts of short-term or long-term loans. Thereafter, the firm allocates the collateral assets optimally between the loans. In this context each lender needs information on collateral. The value of the collateral asset must cover the loan repayment. Since information acquisition incurs costs, it is crucial to allocate the collateral assets between the loans so that collateralization costs (=information costs) are minimal.[2] Both the borrower's learning effect and the lender's learning effect reduce the information costs. The borrower's learning effect appears when the borrower uses the same asset as collateral in two periods. The lender's learning effect occurs when the lender and the collateral asset are the same in two periods. It is optimal to allocate collateral assets so that the learning effects reduce information costs as much as possible. Since the types of collateral assets vary in the sections of the paper, the study provides a few results on the optimal allocation. In Sections 4 and 5, for example, information costs vary between alternative collateral types. Accounts

[1] Coco (2000) surveys this "old" theoretical literature on loan collateral.

[2] The assumption that collateralization costs consist mostly of information costs is based on Mann (1997, p. 663) who summarizes his research as follows: "In conclusion, neither documentation costs nor filing costs are likely to play a significant role in most decisions whether to include collateral in a lending transaction. Information costs, on the other hand, are a significant closing cost." More precisely, Mann (1997, p. 660) specifies the collateralization costs: "These costs, of course, are primarily the costs of acquiring information about the value of the collateral and the borrower's title to it." In addition, Mann (1997, p. 660) interviews a chief financial officer and summarizes the interview as follows: "Based on his experience, he told me that the all-in transaction costs of producing a typical ten-million-dollar unsecured loan for his company would be in the range of seventy-five basis points. He then stated that a comparable secured transaction would cost about 150–200 basis points. He explained that the difference in costs arose from the large charges for appraisals and title company charges that his company would incur in the secured transaction." Senior lender officers who specialize in loans to relatively large borrowers attributed high secured debt costs to similar factors. Godlewski and Weill (2011) find that loan spread increases by more than 50 basis points, when the loan contract includes collateral. The results of Brick and Palia (2007) reveal that collateral has a statistically significant positive impact of 200–400 basis points on loan interest rates. The findings of Berger, Frame, and Ioannidou (2011b) suggest that the conflicting results regarding loan risk premium and collateral may occur because different samples may be dominated by collateral with different characteristics.