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Central bank liquidity provision and collateral quality ☆

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ABSTRACT

Should central banks lend against low quality collateral? We characterize efficient central bank collateral policy in a model where a bank borrows from the interbank market or the central bank. Collateral has favorable incentive effects but is costly to transfer to lenders who value the collateral less because of imperfect collateral quality. We show that a fall in the quantity or the quality of the bank's collateral can increase interest rates in the economy even with a constant policy rate. A looser central bank collateral policy can reduce the spread, alleviate the credit crunch and increase output.

1. Introduction

The collateral policy of central banks – or the types of assets central banks should require when lending to commercial banks – has traditionally been absent from discussions on monetary policy. The Bagehot (1873) assumption has been that central banks should lend only against high quality collateral.[1] In line with this principle, the Federal Reserve bought and sold only Treasuries in its open market operations over the last decades prior to 2007. During the same period more than half of the collateral pledged by banks to the European Central Bank (ECB) were liquid government bonds.

This changed dramatically during the 2007–2011 financial crisis which led to a paradigm shift. Not only did central banks expand the range of assets accepted as collateral, but they also adapted collateral requirements to changing market conditions. For example, when the market for asset-backed securities dried up in the United States and banks were unable to use them as collateral, the Fed provided credit to banks against these illiquid assets (see Table 1 and Appendix A). In Europe, the ECB removed the rating thresholds for distressed government bonds which private lenders refused to accept as collateral. The policy of setting low collateral requirements in the face of falling quantities and qualities of bank collateral has been and still is controversial on both sides of the Atlantic (Buiter, 2008; De Grauwe, 2012; Sinn, 2014).[2]

The changes in the collateral policy of central banks raise two questions: (1) Should the central bank tailor its collateral policy to developments in financial markets and if so, how? (2) How does the collateral policy of the central bank interact with its interest rate policy?

The central contribution of this paper is to show how negative collateral shocks provide a novel justification for central bank collateral policy loosening when the traditional transmission mechanism of monetary policy is distorted.[3] A looser central bank collateral policy can reduce the spread between rates in the real economy and the policy rate and increase output.

☆ The views expressed do not necessarily reflect those of the Banque de France.

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[1] In Bagehot's words: "If it is known that the Bank of England is freely advancing on what in ordinary times is reckoned a good security – on what is then commonly pledged and easily convertible – the alarm of the solvent merchants and bankers will be stayed." – Bagehot (1873), p. 198.

[2] In April 2009, the U.S. Congress required the Federal Reserve to reveal the names of the banks that received financial assistance as well as the collateral used in these transactions.

[3] In Acharya et al. (2012), imperfect competition provides the rationale for central bank lending. Our model allows to fully characterize the lending contract of the central bank.

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Table 1
Changes in ECB and Fed collateral policy (2007–2013).

Date		ECB	Federal Reserve
Oct	2007		Term-Auction Facility: Provided up to $500 bn against residential mortgages (25%), asset-backed securities (ABS) (17%) or commercial loans (15%)
Mar	2008		Term Securities Lending Facility and Primary Dealer Credit Facility: primary dealers can exchange (mainly) mortgage backed securities against Treasuries
Oct	2008	Credit threshold is lowered to BBB- from A- (except for ABS). Bonds traded on certain non-regulated markets become eligible	Commercial Paper Funding Facility and Money Market Investor Funding Facility: provide liquidity against asset-backed commercial paper
Nov	2008	Foreign-currency denominated assets become eligible (until January 2011)	Term Asset-Backed Securities Loan Facility: provide loans against newly issued ABSs
May	2010	Suspension of minimum rating threshold of Greek government debt	
Mar	2011	Suspension of minimum rating threshold of Irish government debt	
Jul	2011	Suspension of minimum rating threshold of Portuguese government debt	
Feb	2012	Additional credit claims (e.g. consumer loans, credit card loans) become eligible	
Jul	2013	Broader ABS eligibility criteria	

Sources: ECB and Federal Reserve.

In our model, a commercial bank refinances projects in the real economy by borrowing against collateral from the interbank market or the central bank. While collateral prevents the bank from shirking, it is costly to use as its value is lower for investors and the central bank than for the bank. We find that when the bank has plenty of high quality collateral, it borrows in the interbank market against low collateral requirements so that the collateral policy of the central bank has no impact on borrowing. However, when the amount or the quality of the available collateral falls below a threshold, the lack of collateral prevents borrowing. In this case, collateral policy can affect lending, and it is optimal for the central bank to relax its collateral requirements to avoid the credit crunch. Our model suggests that interest rate and collateral policy are complements: when the bank faces a collateral crunch, the return required by the bank from firms and households in the real economy increases without changes in the policy rate, set by the central bank. In these cases, a looser collateral policy can alleviate the negative impact of a lack of bank collateral and lower interest rates in the economy.

We develop our results in three steps. We first consider the situation where a commercial bank can only borrow from the interbank market to finance its project. We assume that the interbank market is fully competitive so that lenders in the interbank market earn zero profits in equilibrium. This corresponds to the Holmström and Tirole (2011) model of collateralized lending in the presence of moral hazard with the addition that the collateral is characterized by its quality. We define the quality of a collateral as the difference between the bank and the investors' value for the collateral.[4] This is an important consideration for thinking about collateral policy, where not only the quantity but also the quality of collateral matters.

This model helps us understand the interaction between the interest rate and collateral in addressing the moral hazard problem. From the perspective of investors, interest payments and collateral transfers are cash flows that pay in different states of the world (the interest rate is paid if the project succeeds while the collateral is seized if the project fails) but are otherwise substitutes: investors would be willing to trade off a higher interest rate for lower collateral transfer. However, interest payments and collateral transfers have different incentive properties for the commercial bank: a high interest rate reduces the profit from a successful investment, thereby making shirking more attractive. In contrast, a high collateral requirement makes shirking more costly as the commercial bank loses the collateral in case of default. The introduction of collateral quality - where the investors and the central bank have a different valuation for the collateral - adds a new trade-off. Because collateral has an extra cost (its transfer in case of default destroys value), in equilibrium the bank does not always pledge all the available collateral but minimizes its use. This allows us to define and explain the behavior of collateral requirements. When investment opportunities are attractive relative to the benefits of shirking, collateral requirements in the interbank market are low. When investment opportunities worsen, collateral requirements in the interbank market increase. The extra cost also explains the use of uncollateralized transactions in the interbank market prior to the 2007–2013 crisis, which other models cannot explain. Collateral quality also enables us to derive cross-sectional predictions regarding the equilibrium mix between interest rate and collateral requirements across collateral quality. We find that both interest rates and collateral requirements increase as the quality of collateral decreases, in line with empirical studies of collateralized lending (Gorton and Metrick, 2012).

In the second step, we consider the case where the central bank is the only potential lender to the commercial bank (there are no investors anymore). This case illustrates how the solution to the moral hazard problem between the commercial bank and the lender (the central bank) changes with the objective function of the lender. In our model the central bank is concerned about total output but discounts expected losses heavily. This implies that, unlike interbank market investors, it can tolerate some losses if this increases the efficiency of the investment by the commercial bank. We find that, in contrast with the collateral requirements of the interbank market, the optimal central bank collateral policy sets low collateral requirements in the face of low quantities and qualities of bank collateral and high collateral requirements otherwise. We also find that the central bank should refuse to lend to banks that have too little high quality available collateral and are "too encumbered to save".

Finally, we consider the interbank market, the central bank and the commercial bank together in the third and last step of our analysis. We assume that both the central bank and investors make an exclusive loan offer to the commercial bank, which selects the most attractive loan. While the coexistence of the two types of lenders does not change the contracts offered by these lenders, it changes the source of the commercial bank's funding. We show

[4] The difference in valuation is in the spirit of Geanakoplos (2010) and Simsek (2013) who model how differences in valuations affect lending. An alternative interpretation is the mechanism of Shleifer and Vishny (1992) through which liquidation values constrain the capacity to borrow.