



# (How) do credit market conditions affect firms' post-hedging outcomes? Evidence from bank lending standards and firms' currency exposure☆



Mikael C. Bergbrant<sup>a</sup>, Delroy M. Hunter<sup>b,\*</sup>

<sup>a</sup> Department of Economics and Finance, Tobin College of Business, St. John's University, Queens, NY 11439, USA

<sup>b</sup> Department of Finance, Muma College of Business, University of South Florida, Tampa, FL 33620, USA

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## ABSTRACT

Tighter bank lending standards could increase firms' post-hedging currency exposure by reducing firms' ability to fund hedging (funding channel) and/or by constraining counterparties' capacity to facilitate hedging (capacity channel). We find that tighter lending standards materially increase firms' exposure. In addition, we find no support for a funding-channel effect as firms' internal liquidity does not mitigate the impact of lending standards on exposure, indicating that the impact is through the capacity channel. Finally, we find a negative association between lending standards and aggregate transactions in currency derivatives, bolstering support for a capacity-channel effect. Our results have implications for firms' hedging policy and the bank lending channel of monetary policy transmission.

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## 1. Introduction

“We derive approximately 40 percent of our revenue from operations outside the United States. [...] Our ability to enter into new foreign exchange contracts to manage foreign exchange risk is currently limited [...]. [We] are still unable to hedge all of our currency exposures...” Xerox, 10-Q filing, 03/31/2003

Risk management is one of the most important objectives of many managers and, as a consequence, most firms engage in a range of hedging activities, to which they dedicate considerable resources (Froot et al., 1993; Bodnar et al., 2013). To adequately

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\* Corresponding author.

E-mail addresses: [bergbram@stjohns.edu](mailto:bergbram@stjohns.edu) (M.C. Bergbrant), [dhunter2@usf.edu](mailto:dhunter2@usf.edu) (D.M. Hunter).

manage risk and, therefore, obtain desired post-hedging outcomes firms require access to liquidity because limited liquidity constrains their ability to fund hedging and, as a result, increases their post-hedging risk exposure.<sup>1</sup> Cognizant of this potentially substantive impact of liquidity on firm risk, a large literature examines the impact of firms' internal liquidity on various aspects of firm risk and/or hedging (see, e.g., Smith and Stulz, 1985; Froot et al., 1993; Nance et al., 1993; Mian, 1996; Geczy et al., 1997; He and Ng, 1998; Allayannis and Ofek, 2001; Graham and Rogers, 2002; Francis et al., 2008; Rampini and Viswanathan, 2010; Rampini et al., 2014; Wei and Starks, 2013).<sup>2</sup>

However, a potential shortcoming of this literature is the assumption that internal liquidity is a binding constraint on firms' risk management, a condition that should hold only in the absence of access to external financial markets. We conjecture that (external) credit market conditions, represented by changes in bank lending standards, is the binding constraint on firm risk management and, hence, on firms' post-hedging risk exposure. In addition to affecting firms' post-hedging risk by limiting firms' ability to fund risk management (henceforth, we refer to this as the funding-channel effect), changes in bank lending standards can also impact the willingness and capacity of counterparties to engage in certain transactions that facilitate firms' risk management. We refer to this as the capacity-channel effect.

The funding channel of bank lending standards is straightforward. Tight lending standards restrict firms' access to bank credit (Lown and Morgan, 2006; Leary, 2009; Bassett et al., 2014; Becker and Ivashina, 2014) and, therefore, limit their ability to fund hedging.<sup>3</sup> Consistent with this, Rampini and Viswanathan (2010) and Rampini et al. (2014) show (theoretically and empirically) that, in the cross section, firms experiencing collateral constraints hedge less and may even forgo hedging in order to preserve scarce collateral to fund borrowing for investment, rather than to use to fund risk management. However, if firms optimally choose their internal liquidity, then those with greater need to hedge would maintain high levels of internal liquidity. This conjecture is consistent with the finding by McLean (2011) that firms often issue securities in order to accumulate cash for precautionary reasons when issuance cost is low. This suggests that the funding channel might have a limited impact on post-hedging outcomes and could explain why empirical work finds a positive association between liquidity and currency exposure (He and Ng, 1998).

There are several reasons why changes in lending standards can have a capacity-channel effect (see, e.g., Grossman and Vila, 1992; Naik and Uppal, 1994; Krishnamurthy, 2003; Baba et al., 2008; Barkbu and Ong, 2010; Wei and Starks, 2013). For instance, counterparties have to satisfy capital requirements and pledge collateral in the provision of their services and tight lending standards reduce the availability of collateral (see, e.g., Kirk et al., 2014).<sup>4</sup> In addition, when lending standards tighten counterparties attempt to limit their credit risk exposure and, therefore, are less willing to transact with firms below a certain credit risk level even if they previously transacted with said firms. Further, during periods of tight lending standards counterparties are less willing to transact in long-term forwards, options, currency swaps, and foreign currency lending, which subject them to substantial credit risk exposure (see, e.g., "Exposed!" Wall Street Journal, 3/1/2011). The reduction in the supply of these instruments limits firms' ability to engage in both financial and operational hedges, even when firms are internally liquid, leading to less-than-desired post-hedging outcomes.

Surprisingly, empirical work has not heretofore examined the potential link between changes in bank lending standards and firms' post-hedging outcomes and the channels that give rise to this link. The purpose of this paper is to fill this gap by focusing on exchange rate exposure as our measure of post-hedging outcome. There are several reasons for focusing on exchange rate exposure. First, among all risks, exchange rate exposure is one of the most likely to be hedged by firms (Bodnar et al., 1998; Bodnar et al., 2013). Since the returns-based estimates of exposure that we use in this paper are well established as a measure of post-hedging outcome (Bartram et al., 2010), exchange rate exposure is particularly well suited for examining the impact of lending standards on post-hedging outcomes. Second, exchange rate risk is one of the most important influences on performance for a large and growing number of firms (Mello and Ruckes, 2005) as it has been shown to reduce investment, profitability, and capacity utilization (Lewent and Kearney, 1990; Hung, 1992; Kazaz et al., 2005) and to increase the cost of equity and bank loan spreads (Francis et al., 2008; Bergbrant et al., 2018). Therefore, it is important to understand how impediments to the management of currency risk work. Third, despite the longstanding theoretical and empirical interest in time-varying currency exposure (Allayannis and Ihrig, 2001; Williamson, 2001; Bodnar et al., 2002), evidence that exposure varies with macroeconomic conditions is sparse (see exception in Francis et al., 2008). However, such a relation could have important implications for macroeconomic

<sup>1</sup> Limited liquidity can also cause a significant increase in the level of firms' pre-hedging risk exposure. For instance, given that sales is a function of trade credit offered (Nadiri, 1969), limited liquidity could reduce firms' ability to offer trade credit, making sales more sensitive to unfavorable currency shocks. Similarly, since investment declines with exchange rate exposure (Lewent and Kearney, 1990; Campa and Goldberg, 1995), tighter liquidity could make investment and, hence, firm value more sensitive to unfavorable currency shocks. Due to data limitation our focus is on post-hedging exposure.

<sup>2</sup> While internal liquidity is not the primary focus in all the above papers, there is consensus in the literature that internal liquidity is important to firms' risk. However, there is no consensus as to how internal liquidity relates to pre-hedging risk, hedging intensity, or post-hedging risk. In fact, the literature makes contradicting theoretical predictions and the empirical results are mixed, with no consistent support for any particular theory.

<sup>3</sup> Firms' financial market/derivatives hedging requires a substantial amount of liquidity. For instance, two thirds of OTC derivative transactions are collateralized, amounting to \$5 trillion in collateral in 2014. Cash accounts for 77% of this amount, with the remainder being fixed income securities and equities (International Swaps and Derivatives Association Margin Survey 2015). Surveys find that about two thirds of firms using OTC derivatives would hedge less or none at all if they were required to post all collateral in cash or if collateral requirements were increased (Bodnar et al., 2013).

<sup>4</sup> Several banks have separately capitalized subsidiaries that provide OTC derivatives/financial hedging services. Their capacity to provide said services depends on, inter alia, the value of the collateral they post, their regulatory capital, and their ability to fund margin calls, say, when at periodic marking to market their swap deals are out of the money (Krishnamurthy, 2003; Barkbu and Ong, 2010). All the above are potentially affected by tighter lending standards.

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