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# Identifying the balance sheet and the lending channels of monetary transmission: A loan-level analysis

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## ABSTRACT

We make a novel attempt at comparing the strength of the lending and balance sheet channels of monetary transmission. To make this comparison, we use loan-level data to determine how borrower balance sheets and bank liquidity are related to bank lending decisions and how monetary policy can affect these relationships. The key innovation in this paper is the use of loan-level data. This enables us to measure the independent effects of the two channels and directly account for borrower balance sheets and lender liquidity instead of using proxies. Our results show that the balance sheet channel is the main mechanism through which monetary policy shocks are transmitted to the economy and that the lending channel does not play a significant role.

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## 1. Introduction

The consensus in the monetary economics literature is that monetary policy has a non-negligible short-run effect (for at least 2 years) on the real economy. A large number of empirical studies (Romer and Romer, 1989; Bernanke and Blinder, 1992; Christiano et al., 1994) reach this conclusion by using various strategies to identify monetary policy shocks in Structural Vector Auto-regressive (SVAR) models.

The standard cost of capital (or interest rate) channel falls short of explaining this short-run effectiveness of monetary policy. Research in the past 20 years has, hence, sought alternative explanations. The credit channel theory, or the effect of monetary policy on the level of financial frictions and thus the amount of bank lending, is currently the most prominent explanation and it is supported by empirical evidence (e.g. Bernanke and Gertler, 1995). Studies that investigate how this channel operates by analyzing bank behavior, however, overwhelmingly produce the conflicting result that the

response of total loan supply (an indicator of economic activity) to monetary policy shocks is small and has gradually declined over the past 30 years. The decline in this component of the credit channel (more commonly known as the lending channel of monetary transmission) is mostly explained by the easier access to liquidity that banks – especially larger banks – have gained together with deeper and more developed financial markets (e.g. Cetorelli and Goldberg, 2011; Kashyap and Stein, 2000).<sup>2,3</sup> So how exactly does monetary policy affect the economy?

Credit channel theory offers a well-documented, alternative explanation for the non-negligible effect of monetary policy. According to this theory, monetary policy can also affect the amount of lending by having an impact on borrower balance sheets (the value of collateral) and on lender sensitivity to these balance sheets. This channel of monetary transmission (more commonly known as the balance sheet channel), therefore, explains the effectiveness of monetary policy by focusing on the borrower side of

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E-mail addresses: [uaysun@bus.ucf.edu](mailto:uaysun@bus.ucf.edu) (U. Aysun), [hepp@fordham.edu](mailto:hepp@fordham.edu) (R. Hepp).URLs: <http://www.bus.ucf.edu/faculty/uaysun/> (U. Aysun), <http://faculty.fordham.edu/hepp/> (R. Hepp).<sup>1</sup> Tel.: +1 (718) 817-4066.<sup>2</sup> den Haan et al. (2007) similarly identify a significant bank portfolio adjustment mechanism and find that the insulation from monetary policy is caused by the counteracting effects of monetary policy on the different components of total loans (real estate versus commercial and industrial).<sup>3</sup> See Disyatat (2011) for an alternative interpretation of the results in the literature on the bank lending channel.

financial contracts. Most economists believe that the balance sheet channel is operative, and the mechanism has thus become a common component in macroeconomic models.<sup>4</sup> Empirical research that measures the strength of this channel, however, is very scarce and to the best of our knowledge, the strength of the lending and the balance sheet channels have not been compared before. This is not surprising. To fully measure the balance sheet channel, one needs loan-level data to identify borrowers and lenders, and link borrower balance sheets and lender liquidity with the terms of the loan contract; these data are not as readily available as bank-level data that are used to measure the lending channel of monetary transmission. *Bernanke and Gertler (1995)* summarize the difficulty in identifying the independent effects of these channels as follows:

It is extremely difficult to carry out an empirical test that would conclusively separate the bank lending channel from the balance sheet channel. For this reason, we are more confident in the existence of a credit channel in general than we are in our ability to distinguish sharply between the two mechanisms of the credit channel.

In this paper, we use a unique loan-level (commercial and industrial loans) dataset and identify the independent effects of borrower balance sheets and bank liquidity on the lending decisions of banks and investigate how monetary policy affects these decisions. To construct our dataset we first obtain loan-level data such as the spread between the interest rate on the loan and a risk free rate (hereafter, the lending spread), the amount and the maturity of the loan from the Thomson Reuters DealScan database. We then combine these data with borrower and lender specific variables that we obtain from the Capital IQ Compustat database. Our dataset covers 15,794 loan deals from 1995 to 2009. By using this large, loan-level dataset, our paper makes a first attempt at comparing the strength of the lending and balance sheet channels of monetary transmission. To clarify our contribution, we should point out that this is certainly not the first empirical investigation of the balance sheet channel. For example, studies such as *de Bondt (2004)* and *Ashcraft and Campello (2007)* find that this channel is operative by using proxies for the strength of balance sheets such as average corporate bonds spreads or state GDP gaps. Although these studies usually find that central banks exert a significant effect on the economy through borrower balance sheets, using aggregate variables as proxies for balance sheets does not allow them to fully assess the strength of this channel and to make a comparison with the lending channel. We are also not the first to use loan level data.<sup>5</sup> To the best of our knowledge, this paper is the first attempt, however, at measuring the strength of the different channels of monetary transmission using loan-level data.

Our results show that balance sheet strength, captured by the borrower leverage ratio, is a significant and important determinant of lending spreads. We find, for example, that lending spreads increase by 0.85 basis points on average when the leverage ratio increases by 1% point. In contrast, we find that lender liquidity is not significantly related to lending spreads. Our more central result is that the balance sheet channel of monetary transmission is significant and large in magnitude. A comparison with the lending channel reveals that the balance sheet channel is also the main way in

which monetary policy affects bank lending. For example, we find that a 1% orthogonal shock to non-borrowed reserves growth (captured by the *Strongin (1995)* index) increases the sensitivity to balance sheets by approximately 0.34%. The corresponding effect of monetary policy on the sensitivity to lender liquidity is only 0.007% and is insignificant. These results confirm the usual finding in the literature that the lending channel of monetary transmission is insignificant; but, more importantly, they show that monetary policy changes the course of the economy mainly through its effect on borrower balance sheets.

To obtain these results we follow a two-step approach. First, we use quarterly cross section data to measure the sensitivity of lending spreads to the indicators of borrower leverage and lender liquidity. We measure these sensitivities for each quarter in our dataset. Second, we stack the sensitivity coefficients obtained in the first stage to form a time series. We do this separately for the lender liquidity and borrower leverage coefficients. We then measure the effect of monetary policy on these sensitivities in a second stage regression. We also follow this two-step estimation strategy by including different indicators of monetary policy stance and by accounting for first stage measurement errors. Finally, we check the robustness of our benchmark results to using a single stage estimation methodology. The results are similar.

The main advantage of using a loan-level dataset is that it allows us to control for lender and borrower specific variables when identifying the independent effects of the balance sheet channel and the lending channel, respectively. As explained later in the paper, however, our baseline methodology restricts our dataset by excluding banks for which financial information could not be obtained from the Capital IQ Compustat database (e.g. foreign banks). To overcome this shortcoming, we follow an alternative methodology to measure the balance sheet channel. Specifically, we use data from banks that lend more than once in each quarter and compare the lending spreads and borrower leverage on these loans. This is similar, in spirit, to the methodology in *Ashcraft and Campello (2007)*. This identification strategy allows us to fully control for lender liquidity, obtain a more pure measure of the balance sheet channel and use more observations, but it does not allow us to make a comparison with the lending channel. We do, however, find that the balance sheet channel is similarly significant and large in magnitude.

The rest of the paper is organized as follows: Section 2 presents the theoretical framework that illustrates the balance sheet and lending channels of monetary transmission. Section 3 discusses our two-step empirical methodology. Section 4 describes the dataset and Section 5 presents our baseline results. Section 6 checks the robustness of our results and compares the strength of the two channels. Section 7 concludes.

## 2. Theoretical framework

The transmission of monetary policy shocks to the real economy through the lending and balance sheet channels of monetary transmission is explained by asymmetric information costs in credit markets (e.g. *Bernanke and Gertler, 1995*). More specifically, asymmetric information between a borrower and a lender generates a wedge between the risk free rate and borrowing costs (the lending spread) when state verification is costly and monetary policy affects the economy by having an impact on this wedge. According to the balance sheet and lending channels, monetary policy shocks are amplified by their countercyclical effects on borrower leverage and lender liquidity constraints and thus on lending spreads.

Models that include these asymmetric information costs derive a positive relationship between borrower leverage and lending rates (e.g. *Bernanke et al., 1999; Carlstrom and Fuerst, 1997;*

<sup>4</sup> See *Bernanke (2007)* and *Bernanke and Gertler (1995)* for a detailed explanation of the lending and balance sheet channels of monetary policy transmission.

<sup>5</sup> The only study that uses a comprehensive dataset on loan deals that we could find was *Jiménez et al. (2009)*. The authors use data from the Banco de España and the supervisory agency Central de Información de Riesgos to include credit line-specific, borrower-specific, and lender-specific variables in their dataset. We could not find comprehensive data for US loan deals. However, we should note that there are a number of survey based studies that analyze the determinants of corporate credit lines in the US (*Ham and Melnik, 1987; Melnik and Plaut, 1986; Berger and Udell, 1995; Morgan, 1998*).

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