



Incomplete interest rate pass-through under credit and labor market frictions[☆]

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ABSTRACT

By introducing search and matching frictions in both the labor and the credit markets into a cash in advance New Keynesian DSGE model, we provide a novel explanation of the incomplete pass-through from policy rates to loan rates. We show that this phenomenon is ineradicable if banks possess some power in the bargaining over the loan rate of interest, if the cost of posting job vacancies is positive and if firms and banks sustain costs when searching for lines of credit and when posting credit vacancies, respectively. We also show that the presence of credit market frictions moderates the reactions of employment and wages to a monetary shock. Finally, we confirm the finding that pass-through incompleteness has limited short-term impacts on the transmission of monetary policy shocks to output and inflation.

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1. Introduction

Several empirical contributions that appeared before the recent financial crises provided convincing evidence that shifts in policy rates were not completely passed through to retail (market) lending rates, even though significant differences existed in the degree of incompleteness which was experienced across countries.² According to this evidence, the phenomenon was particularly sharp in the Euro Area.³ During the financial crisis, even though the transmission of policy rate changes to retail rates has become less efficient in this Area (Čihák et al., 2009), the interest rate pass-through to the market lending rates has been particularly affected in the United States. According to the IMF (2008, p. 81): “the normal relations governing

the pass-through of policy rates into the markets for short-term bank financing and for short- and long-term near-bank financing has become less reliable over the past year, particularly in the United States”. The existence of an incomplete pass-through of policy rate changes to the loan rates in both the Euro Area and the United States is confirmed by a recent study by Karagiannis et al. (2010).

The aim of this paper is to provide a novel explanation of the incomplete loan rate pass-through which proves coherent with this recent evidence suggesting that the financial crisis has also made the limited pass-through a U.S. phenomenon. To this aim we consider a fully microfounded New Keynesian DSGE economy with sticky prices and search and matching frictions in both the labor and the credit market. In this economy the main explanations of this phenomenon which have been provided so far are ruled out by hypothesis, as they are better suited for an economy like the Euro Area, where customer relations between banks and firms dominate, and search and matching frictions are rather limited. Hence, we do not rely either on exogenous cost functions associated with changes in retail interest rates (Chowdhury et al., 2006; Kaufmann and Scharler, 2009; Scharler, 2008), or on monopolistically competitive retail market where regional banks set loan rates according to a Calvo-type rule (Kobayashi, 2008). Further, by assuming perfect competition in the credit sector, we exclude the possibility of banks' collusive behavior and concentration in the financial market (Sander and Kleimeier, 2004; Van Leuvensteijn et al., 2008). Finally, agency costs à la Stiglitz and Weiss (1981) and customer switching costs à la Klemperer (1987) are absent, banks face no fixed costs when changing their loan rates and borrowers do not strongly react to rate changes in the way suggested by the customer reaction hypothesis (Hannan and Berger, 1991).

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² The literature is wide. Recent contributions are, e.g., Angeloni and Ehrmann (2003), Sander and Kleimeier (2004), Hofmann (2006), Egert et al. (2007), Fourcans and Vranceanu (2007).

³ See, e.g., Mojon (2000), Angeloni et al. (2003), Gambacorta (2008), de Bondt et al. (2005), Kok Sørensen and Werner (2006), Gropp et al. (2007). A recent review of the literature on the loan rate pass-through in the euro area is in Kobayashi (2008, section 2).

Our intuition is that a loosening of monetary policy lowers the banks' refinancing costs, hence putting downward pressure on interest rates. Yet, the expansionary policy also increases aggregate demand and, in the presence of search frictions, imposes a longer waiting time before finding credit, thus raising firms' surpluses. Since banks try to capture part of these higher surpluses in their bargaining with firms over the lending interest rates, these are not reduced as much as refinancing costs.

In order to test this intuition, we construct an economy, before production begins, wholesale competitive firms producing a homogeneous good search for lines of credit posted by banks; the firms that have lines of credit granted may then post vacancies in the labor market, where unemployed workers are searching for jobs. The firms matching with workers obtain from banks the advances necessary to pay for the wage bill. Those that obtain the loans financing job vacancy posting but that are unable to match with workers cannot start production and cannot repay their debt with the banks. At the end of the period, wholesale production is sold to retail firms transforming the homogeneous good into differentiated goods bought by households. Loans are then repaid and households receive profit income from banks and firms, and the principal plus interest on deposits from banks. A fraction of the wholesale firms producing in a given period – determined on the basis of exogenous separation rates specifying the fractions of labor matches and of credit matches which are destroyed at the end of the production period – obtain loans also in the next period. The other firms have to go afresh into the whole process of search, starting from the credit market.

This model economy shares similarities with some recent attempts that extended the labor market matching framework to financial markets (e.g., Ernst and Semmler, 2010; Nicoletti and Pierrard, 2006; Petrosky-Nadeau and Wasmer, 2010; Wasmer and Weil, 2004), but we depart from these contributions in several respects. First, our setting requires that banks advance the funds necessary to pay for both the cost of the job vacancies and for the wage bill, whereas in Nicoletti and Pierrard (2006), Wasmer and Weil (2004) and Petrosky-Nadeau and Wasmer (2010) the wage bill is not borrowed from the banks but is paid post factum by the firms. Second, firms demand a variable quantity of loans, rather than looking for a match with only one bank, as it is instead assumed in those three contributions. Third, we assume that firms produce a quantity of output which depends on total hours worked, while Nicoletti and Pierrard (2006) assume that firms produce a unit of output with one worker and one unit of capital provided by banks, even though capital plays a rather artificial role, as it is necessary to look for a worker but it does not enter the production function. Ernst and Semmler (2010) assume that the firm needs external finance to increase its capital stock, but the financial sector is represented by a bond market. Fourth, the wage and the interest rate on loans are determined according to a sequential Nash bargaining framework, a procedure which is present in Wasmer and Weil (2004), but it is absent in the more recent modeling attempts.

Our main results can be summarized as follows. Firstly, pass-through imperfection from policy rates to loan rates is an inner and ineradicable feature of any economy where matching frictions exist in labor and credit markets, as it depends on the endogenous reaction of several variables to the monetary policy shock. A first group of variables is related to the amount of loans borrowed by firms; a second group concerns the size of surplus generated by the existence of a productive credit relation, which affects the bargaining between the firm and the bank over the loan interest rate. The degree of incompleteness depends on the value of some key parameters such as the cost of posting labor vacancies (which influences also the cost that banks sustain in order to finance producing firms), the firm's bargaining powers in the labor and in the credit markets, and the costs that firms have to bear in order to look for lines of credit and that banks sustain in order to post their credit vacancies. Secondly, it is well known that an incomplete interest rate pass-through may mitigate the strength of the cost

channel of monetary policy (e.g., Christiano et al., 2005; Ravenna and Walsh, 2006), as banks shelter firms from monetary policy shocks. Recent contributions based on not-fully microfounded models have however suggested that pass-through incompleteness produces limited effects on the transmission of monetary policy shocks to output and inflation (Hülsewig et al., 2009; Kaufmann and Scharler, 2009). Our findings confirm this conclusion in a fully microfounded New Keynesian DSGE model economy with search and matching frictions in both the labor and the credit market.

The paper is structured as follows. In the next section we describe the model economy. In Section 2.3 we discuss our calibration strategy. In Section 2.5 we present the dynamic properties of the benchmark model and we compare them with those which obtain when search and matching frictions are present only in the labor market and the interest rate pass-through is complete. In Section 3 we discuss the effects on the model dynamics produced by changes in the main parameters influencing the degree of the loan interest rate pass-through. Section 4 concludes.

2. The model economy

Building on the original intuition by Wasmer and Weil (2004), we introduce search and matching frictions in both the labor and the credit markets into a cash in advance New Keynesian DSGE model with sticky prices. The economy is composed of four sets of agents: households, firms, banks and a monetary authority. Since firms do not possess their own cash, in order to produce they must obtain loans from banks that allow them to pay for the cost of job vacancy posting and for the wage bill. Before production begins, wholesale competitive firms, in order to finance their labor vacancy posting, hence search in the credit market for lines of credit vacancies (V_t^B) posted by banks. Each realized match between a firm and a bank provides the firm with one line of credit of real value k^f , which is also the cost that must be sustained in order to post one vacancy in the labor market, where unemployed workers are searching for jobs. As a bank can provide several lines of credit to a firm, in each period t , the total number of matched credit lines which finance job vacancies (H_t) is equal to the total number of job vacancies posted by firms (V_t^f). If the firm which has matched with a bank does not find a match in the labor market, it will be unable to produce and it will have to start, in the next period, the searching process afresh. A job vacancy which is not filled thus produces a default on the corresponding line of credit. We assume that the cost of default is borne by the banks, which also collect deposits (D_t) from households. Finally, the producing firm obtains from the bank L_t^N lines of credit which allow it to pay the nominal wage $W_t h_t$ to N_t workers, where h_t is the number of hours worked and W_t is the nominal hourly wage.

After wages are paid the wholesale production occurs. Monopolistic competitive retail firms then transform the wholesale homogeneous goods into differentiated retail goods which are sold to households. At the end of the period, banks receive from firms the principal plus interest on loans and households receive profit income from financial intermediaries and firms, and the principal plus interest on deposits. A fraction of the wholesale firms that produce in a given period obtain loans also in the next period. This fraction is determined by exogenous separation rates specifying the fraction of labor matches and of credit matches which are destroyed at the end of the production period. The monetary authority sets the rate of interest according to a rule to be specified below.

2.1. Matching

In the labor market, the search for workers is costly and the existence of search frictions prevents some workers from finding jobs and some posted job vacancies from being filled. Similarly, search frictions in the credit market prevent some firms from obtaining lines of credit and some banks from filling all their posted credit

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