



## Excess liquidity, bank pricing rules, and monetary policy

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### ABSTRACT

This paper studies the implications of excess bank liquidity for the effectiveness of monetary policy in a simple model with credit market imperfections. The demand for excess reserves is determined by precautionary factors and the opportunity cost of holding cash. It is argued that excess liquidity may impart greater stickiness to the deposit rate in response to a monetary contraction and induce an easing of collateral requirements on borrowers – which in turn may translate into a lower risk premium and lower lending rates. As a result, asymmetric bank pricing behavior under excess liquidity may hamper the ability of a contractionary monetary policy to lower inflation.

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### 1. Introduction

A recurrent concern of central bankers is the possibility that an abundance of liquidity may hamper the ability of monetary policy to influence the level of economic activity and inflation. In most financial systems, excess (bank) liquidity can be defined as the *involuntary* accumulation of liquid reserves by commercial banks.<sup>1</sup> Thus, although banks may choose to hold reserves above and beyond what is required by the legislation (to satisfy unexpected withdrawals of cash from their clients, for instance), excess liquidity prevails only if they *unwillingly* hold more cash than desired. In a crisis environment, characterized by increased volatility, the demand for reserves may increase sharply – either for precautionary reasons or because (risk-averse) banks find it too risky to lend.<sup>2</sup> This observation, as argued by Agénor et al. (2004), provides a useful starting point for identifying the source of a credit crunch: if banks are unwilling, rather than unable, to extend loans, a contraction in credit can be attributed to supply, rather than demand, factors. To perform this test requires therefore estimating a demand function for excess

liquid assets by commercial banks and examining its predictive capacity. Involuntary accumulation of liquidity can then be determined residually, and its statistical significance assessed by a variety of tests.

From an analytical standpoint, it is convenient to classify factors leading to excess liquidity into structural and cyclical determinants. The first structural factor that is commonly identified is a low degree of financial development. In countries with less developed financial sectors, banks (and their customers) will tend to have a greater demand for liquidity. In particular, unreliable money payment systems may induce banks to choose to hold a relatively large buffer of reserves to help them regulate their liquidity needs. The costs of processing information, evaluating projects, and monitoring borrowers may also be relatively high; in turn, this may complicate liquidity management and may lead to an accumulation of reserves beyond desired levels. This is one of the main explanations of the high and persistent levels of bank reserves (above and beyond those required by regulations) in the low-income countries of Central Africa, where opportunities for portfolio allocation are limited (see Saxegaard, 2006). A second factor is a high degree of risk aversion, which leads to high risk premia and a low demand for credit. The degree of risk aversion, in turn, may be directly related to chronic macroeconomic instability, and this may explain a positive, long-run correlation between high inflation and excess liquidity.

Inflation may also represent a cyclical cause of excess liquidity. To the extent that it is accompanied by higher volatility in relative prices (and thus an increase in the riskiness of investment projects

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<sup>1</sup> A more comprehensive measure of excess liquidity may be warranted for some countries, to account for banks' holdings of short-term government securities; see Mohanti et al. (2006).

<sup>2</sup> Ashcraft et al. (2009) for instance found that during the 2007–08 financial crisis in the United States, banks increased their holdings of excess reserves (curtailing lending in the process), as a precautionary measure against liquidity shocks.

characterized by a high degree of irreversibility), a surge in inflation may raise uncertainty about the value of collateral pledged by borrowers – leading banks, if confronted with adverse selection problems, to either charge a higher risk premium or increase the incidence of credit rationing. Because, in the former case, a higher lending rate would typically lead to a contraction in credit demand, both responses may translate into an involuntary accumulation of excess reserves.

Another important cyclical factor is large capital inflows intermediated by the banking system. In the past two decades, a number of developing countries, low- and middle-income alike, have indeed implemented measures to foster an asymmetric opening of the capital account (that is, a lifting of restrictions on capital movements for non-residents, while retaining a wide array of controls on foreign exchange operations by residents). In many cases these measures led to large capital inflows, often associated with privatization of large-scale state enterprises. In Guyana for instance, external financial liberalization was accompanied in the late 1990s by a dramatic increase in excess reserves (see *Khemraj, 2007*). In Morocco, a number of large privatization operations and increased amounts of foreign direct investment led in recent years to a significant increase in liquidity in the banking system, prompting the central bank to raise reserve requirements sharply to avoid the development of inflationary pressures (see *Agénor and El Aynaoui, 2007*). Between 2006 and 2008, China, India, and Korea all raised required reserve ratios on bank deposits several times in an attempt to mop up excess liquidity. In countries operating a pegged exchange rate regime, upward pressure on the nominal exchange rate created by large capital inflows often leads to sustained central bank intervention and a build-up of official holdings of foreign exchange; in the absence of sterilization, surplus reserves translate into an expansion of the monetary base and rapid accumulation of excess liquidity by commercial banks – with possibly destabilizing macroeconomic effects. Similar outcomes have been observed in managed float regimes, where the central bank intervenes to maintain the exchange rate within a (more or less stable) target range.

Surprisingly enough, and despite the importance of the issue for central banks, there have been few attempts to explore analytically the implications of excess liquidity for the effectiveness of monetary policy.<sup>3</sup> This paper attempts to bridge this gap by proposing a simple macroeconomic model where banks' pricing behavior and portfolio decisions are explicitly accounted for. Given the static nature of our framework, we do not specifically identify the source (structural or cyclical) of excess liquidity; instead, we focus on the case where the (voluntary) motive for holding excess reserves is uncertainty about cash withdrawals by the public, and define excess liquidity as a situation where actual excess reserves exceed the desired value. Although our framework is fairly general, the countries that we have in mind are middle-income countries, where the financial system is sufficiently developed to allow monetary policy to operate through the manipulation of a short-term interest rate whose "pass-through" effect on market rates is fairly rapid, as in more developed countries; in many low-income countries, by contrast, monetary policy is often based on indirect instruments. At the same time, however, we assume that the financial system is dominated by banks and that capital markets are either underdeveloped or illiquid – in line with the evidence for middle-income countries. Thus, firms in these countries (unlike their counterparts in more developed countries) have no real alternative but to either

use retained earnings or borrow from commercial banks if they must cover production costs prior to the sale of output.<sup>4</sup>

The rest of the paper is organized as follows: Section 2 presents the basic model, which dwells on the framework for short-run monetary policy analysis developed in *Agénor and Montiel (2006, 2008a)*. Because open-economy considerations are somewhat tangential to the issue at hand, we deliberately simplify the approach followed in those papers by focusing on a closed economy. Credit market imperfections are introduced by assuming that commercial banks set both deposit and lending rates, in the latter case as a premium over the cost of borrowing from the central bank. The premium itself depends on firms' net worth, in the tradition of *Bernanke and Gertler (1989)*. In addition, we also derive explicitly a demand function for excess reserves, which we relate to precautionary factors and opportunity cost variables. After characterizing the model's solution in Section 3, it is used in Section 4 to examine the financial and real effects of a change in the official cost of borrowing and the required reserve ratio. The analysis is then extended in Section 5 to introduce an asymmetric effect of excess liquidity on bank pricing rules and determine how these asymmetries affect the effectiveness of monetary policy. This section represents the essential contribution of this paper; it has been argued in some previous contributions that excess liquidity may generate asymmetric pricing behavior, but (as far as we know) this has not been formally analyzed before. Our key insight is that excess liquidity may impart greater stickiness to the deposit rate in response to a monetary contraction and induce an easing of collateral requirements on borrowers – which in turn may translate into a lower risk premium and lower lending rates. Asymmetric price response under excess liquidity may therefore hamper the ability of a contractionary monetary policy to fight inflationary pressures. The last section offers some concluding remarks and suggests some directions for future research.

## 2. The basic framework

Consider a closed economy producing a single, homogeneous good. There are five markets in the economy (for currency, bank deposits, credit, bonds, and goods), and five categories of agents: firms, households, a commercial bank (or bank, for short), the government, and the central bank.

### 2.1. Supply side and prices

To finance their working capital needs, which consist solely of labor costs, firms must borrow from the bank.<sup>5</sup> Total production costs faced by the representative firm are thus equal to the wage bill plus the interest payments made on bank loans.<sup>6</sup> For simplicity, we will assume that loans contracted for the purpose of financing working capital are made at a fixed mark-up (normalized to unity) over the cost of borrowing from the central bank. Firms repay loans, with interest, at the end of the period, after goods have been produced

<sup>4</sup> A third characteristic that differentiates middle-income and more developed countries is the degree of capital mobility, which remains largely imperfect for the first group (see *Agénor and Montiel, 2008b*). However, in the present case this does not carry any specific implication, given that we consider only a closed economy.

<sup>5</sup> There is no substitute for bank loans, so that firms cannot issue equities or bonds (claims on their capital stock) to finance their working capital needs. In addition, given our assumption of a closed economy, firms have no direct access to world capital markets. We also abstract from retained earnings.

<sup>6</sup> The direct effect of lending rates on firms' marginal production costs is a common feature of developing economies, and there is evidence that it may be important also in industrial countries. See for instance *Ravenna and Walsh (2006)* for the United States, and *Gaiotti and Secchi (2006)* for Italy. The link between credit, working capital needs, and output was emphasized early on in the New Structuralist literature by *Taylor (1983)* and *van Wijnbergen (1982)* and is the foundation of the so-called Cavallo–Patman effect.

<sup>3</sup> *Ganley (2004)* discusses informally the implications of excess liquidity for monetary policy, whereas *Saxegaard (2006)*, dwelling on the analytical framework developed in *Agénor et al. (2004)*, studies empirically the determinants of excess reserves. However, both studies remain fundamentally partial equilibrium in nature.

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