

Central Banking in an Open Economy*

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Issues in open-economy central banking are explored using two papers from this issue of the IJCB.

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1. Introduction

At first glance, the reader may think that there is little connection between the empirical study of Bordo, Humpage, and Schwartz of the effect of foreign exchange market interventions by the Federal Reserve during 1973–1995 and the Glocker and Towbin quantitative DSGE model of reserve requirements in a small open economy with financial frictions.¹

However, there are key links. Each study examines important aspects of central banking policy in open economies. Each also examines a basic intervention that is not monetary policy: a foreign exchange intervention that is sterilized in BHS and a broad-based requirement that financial institutions hold reserve (liquid) assets in GT.

These papers are part of the large and broad research stimulated by financial crisis and the zero lower bound on the nominal interest rate, thus necessarily concerning issues that border on macro and finance. The final and arguably most important link is that each paper has implications for the conduct of monetary policy.

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¹These author teams have multiple projects, as discussed further below. In this discussion, unless otherwise specified, my references will be to “The Federal Reserve as an Informed Foreign Exchange Trader: 1973–1995” by Michael D. Bordo, Owen F. Humpage, and Anna J. Schwartz (BHS) and to “Reserve Requirements for Price and Financial Stability: When Are They Effective?” by Christian Glocker and Pascal Towbin (GT). Both papers appear in this issue.

2. What's Different across the Papers?

A common element is that BHS and GT are each a contribution to the ongoing research programs conducted by the author teams. There is a huge difference in methodology: BHS is a detailed event study of trading strategies based on specific interventions, while GT is a DSGE evaluation of alternative structural specifications and policy rules. In terms of differences, there is also a maturity difference. BHS is one skirmish in a long battle by the authors on the consequences and desirability of central bank intervention in the foreign exchange market, on which they have compiled a voluminous amount of evidence (as discussed further below). GT is one component of an interesting new program of research by the authors into macroeconomic effects of reserve and capital requirements within DSGE models.

3. What Are the Key Findings of BHS?

Suppose that the Federal Reserve buys some foreign exchange but does not alter total volume of reserves (quantity view of monetary policy) or alter the target zone for the interbank rate (price view of monetary policy). That is, the intervention in the foreign exchange market, which has the potential to increase reserves or affect the interbank rate, is offset by a comparable intervention in the domestic market. It is thus a change in the nature of assets held by the central bank, but not the quantities.² BHS ask, does this affect the exchange rate? If so, why and for how long? More specifically, are the trades profitable?

The background to BHS's empirical investigation is a frictionless market view: there is no effect of sterilized intervention (in a quantity or price sense of sterilization).³ But there is a possible signaling effect on markets that BHS focus on: does an intervention signal a forthcoming increase or decrease in the exchange rate? The frictionless market view downplays possible portfolio balance and dealer inventory mechanisms sometimes stressed by central bank officials

²Thus, it is not monetary policy, in the sense that I will use this term in the paper. See Goodfriend and King (1988).

³The frictionless market view is perhaps best articulated in Wallace (1981).

and market participants. But the frictionless market view does not preclude different investors from having different information.

3.1 The Federal Reserve as a Hedge Fund (and Its Performance)

A novel element of the BHS study concerns the profitability of Federal Reserve trades as an indicator of the value of its information. Conceptually, it draws on an interesting literature on portfolio performance in a setting with differential information (initiated by Merton 1981 and employed previously by Humpage 1999, 2000).

This is a useful method. Implicitly, the vision of the Federal Reserve is that it is a huge hedge fund, with very deep pockets. BHS evaluate the performance of the Federal Reserve fund, learning about whether its trades are profitable as it shifts between various assets. This is a depiction of a central bank that is itself an interesting line of inquiry to pursue further in interpreting central bank behavior, both historical and modern.

The headline finding is that 60 percent of all interventions between 1973 and 1995 are “successful” in the sense of profitability but that this is not statistically significant. This is consistent with the difficulty that investors have in evaluating fund performance more broadly: when there is a modest increase in observed return, it is hard to be sure whether this is luck or skill. Interestingly, there is somewhat stronger evidence when major interventions are undertaken. However, other elements of intervention such as secrecy and coordination don’t seem empirically important (a finding which is surprising and sure to be controversial).

3.2 BHS: Narrow Paper, Wide Program

While the BHS paper is narrow in its conception although novel in its approach, the authors make sweeping conclusions such as that their “analysis of the U.S. experience with sterilized foreign exchange intervention . . . cautions against a return to an active intervention policy.” Initially, a reader may think that this is unwarranted. But such an inference is unwarranted, because the authors are undertaking a major evaluation of Federal Reserve exchange

market interventions.⁴ So, while the current paper contributes to their general skepticism about the efficacy of foreign exchange market interventions, it is just one element of their “analysis of the U.S. experience with sterilized foreign exchange interventions.”

But if, as the authors suggest, there are empirically minor effects of sterilized intervention and little support for the view that the Federal Reserve has superior trading performance, then what were perceived purposes of interventions? Why did they take place at particular times with particular magnitudes? For the authors’ perspective on this, I turned to another part of their research program: a historical analysis of exchange interventions under Volcker and Greenspan (Bordo, Humpage, and Schwartz 2010). In this manuscript, the authors describe the Federal Reserve as conducting foreign exchange operations due to perceived pressure from other governments, U.S. politicians, and influential economists. But this story has two difficulties. First, it raises questions about the forecastability of the Federal Reserve interventions. Second, it simply pushes the question back one step. One needs to understand why governments would pressure the Federal Reserve to undertake interventions.

The potential cost of exchange market intervention seen by the authors is well articulated by quotes which they include from J. Alfred Broadus: “Intervention undermines credibility . . . by introducing some confusion as to . . . fundamental objectives” and “Some foreign exchange operations could over time undermine public support for the Fed’s financial independence, which is the ultimate foundation for our credibility.”⁵

4. What Are the Big Questions Related to GT?

GT are interested in the role that reserve requirements on bank deposits—broadly, liquidity requirements on short-term borrowing—play in desirable macroeconomic policy, as a separate tool from monetary policy.

⁴The authors have a book in progress, the outline of which is provided in Bordo, Humpage, and Schwartz (2011).

⁵Though the authors provide the date (July 2–3, 1996) for these quotes, the exact origins of the quotes are not clear to me. However, the argument is also spelled out—with some nearly identical wording—in Broadus and Goodfriend (1996).

4.1 *Background*

Reading this paper naturally led me to think about the 1980s literature on banking, which centered on five questions: What basic economic activities define a bank as opposed to other financial institutions? How are these considerations manifest in the liability side of a bank's balance sheet? How are they manifest in the asset side of a bank's balance sheet? What role do banks play in motivations for active monetary policy and in the monetary policy transmission process?

This old literature is important for two reasons. First, it sought to identify central functional characteristics of banks at the onset of the market and regulatory evolution which was central to the recent financial crisis. Second, it contains the early stages of the types of models imported by GT and others into modern DSGE models.

4.1.1 *Fundamental Functional Activities*

Fama (1980) argued that the central function differentiating the economic institutions which we call banks from other institutions is the provision of a service that allows individuals to quickly and soundly transfer wealth according to an "accounting system of exchange." In his view, in a competitive framework, these services would be competitively priced and could require individuals to hold some wealth with banking institutions. To the extent that banks also provided portfolio management services, they would face competition from many other institutions and be forced to competitively price these as well. In Fama's follow-up analysis (1985), reserve requirements were simply tax on holding of one particular form of wealth, with the incidence of the tax depending on the level of loan demand relative to the deposit base.⁶

Corrigan (1983) sought to consider why banks are special in the face of ongoing market evolution and financial deregulation. Like Fama, he saw a central role of banks as providing and managing individual access to an accounting system of exchange, which he

⁶While recognizing that lending could readily take place outside of the conventionally defined banking system, Black (1970) suggested potential synergies of loans and deposits, essentially due to reduction of monitoring costs for certain types of loans.

more conventionally defined as the payments system. Like Fama, he saw banks as potentially requiring investor wealth-holding to facilitate the exchange process, but he pointed to a special characteristic: assets trading at par value—such as conventionally defined deposits—would be particularly useful for this purpose. He also differed from Fama along some lines which we consider next.

4.1.2 Bank Lending

In terms of lending, Corrigan saw banks as necessarily exposed to term-structure risk, as a result of the nature of funding through short-term deposits. Corrigan also saw banks as being the provider of backup sources of liquidity for other institutions, including brokers and dealers.

4.1.3 Options in Banking

For Corrigan, then, both borrowing sides of the bank balance sheet involved contingent claims: deposits with a par value withdrawal option characteristic on the liability side and loans with takedown option characteristics on the asset side (such as lines of credit, etc.).

4.1.4 Formal Models of Banking Borrowing and Lending

The 1980s also saw the rise of basic formal models of financial institutions, initiating an influential literature. On the liability side, the classic analysis of Diamond and Dybvig (1983) provided one rationale for the option characteristic of bank deposits, in terms of exogenous, idiosyncratic, uninsurable liquidity risk facing its customers. In their framework, the endogenously determined financial institution (deposit bank) chose to take on term-structure risk to enhance the attractiveness of its deposit product: it engaged in a form of asset transformation.

The Diamond-Dybvig analysis was key in two regards. First, it showed how the option characteristic on the liability side of a financial institution balance sheet could be generated endogenously, from more primitive assumptions on preferences, technology, and information structure. Second, more controversially, the deposit contract opened the door to multiple equilibria, one of which could be interpreted as a bank run.

On the side of practice (Corrigan) and theory (Diamond-Dybvig), there were thus rationalizations of discount window lending and deposit insurance, in terms of “financial stability” defined in somewhat different ways.

On the side of bank lending, the 1980s also saw the rise of a class of macroeconomic models which stressed the nature of financial contracts in settings with asymmetric information, such as those of Campbell and Kracaw (1980) and Bernanke and Gertler (1989). But there was little to suggest that these lending activities needed to be conducted either by the financial institutions that provided the payments system (accounting system of exchange) using deposits with option characteristics or other forms of short-term finance.⁷

4.1.5 Moving to DSGE Models

Consideration of these developments leads us to the important question—on which there is a huge amount of current research—of identifying the crucial features of banking and financial institutions to be embedded in DSGE models. In this process, two of the central topics are readily illustrated by quotes from Corrigan (1983).

- (i) The Nature of Funding Markets: “The ability of a bank to fulfill its role as a backup supplier of liquidity . . . depends on easy access not only to sources of traditional deposit liabilities, but also to markets for nondeposit sources of funding.”
- (ii) The Role of Reserve Requirements in Monetary Policy: “The fact that banks are subject to reserve requirements places the banking system in the unique position of being the ‘transmission belt’ through which the actions and policies of the central bank have their effect on financial market conditions, money and credit creation, and economic conditions generally.”

4.2 What Do Banks Do in the GT Model?

Given this background of the 1980s and the tremendous volume of literature that it spawned, macroeconomists are exploring tractable

⁷Subsequent studies, not reviewed here, grappled with these additional issues.

ways of introducing banking into macro models. There are tough choices to be made, and GT take a particular stand that seems useful to me. I start by listing the key elements and then evaluate aspects of these.

- (i) All household saving must be either deposits at domestic banks or bonds purchased from abroad.
- (ii) All banks lend a fraction of their deposit base in an inter-bank market—the reserve level is partially controlled by the individual bank and partly by the central bank, which also determines “interest on reserves.”
- (iii) Loans for real investment are undertaken by separate “lending units” which borrow from banks (pools of depositor funds) and lend to firms. GT consider alternative setups in which the loans are written in domestic currency and in foreign currency.

I like the separation of borrowing and lending units as a first-pass modeling device. It conforms to the Fama-Corrigan view that banks are special in governing access to the payments system (accounting system of exchange) and the assets held as part of that activity (including conventionally defined transactions deposits), with the corollary that the reserve requirement is mainly a tax on transactions activity. It also conforms to practical analysis by at least some modern bankers: markets like the uninsured CD market reflect the cost of funding, not the rates on transactions (retail) deposits.⁸

Separate lending units are desirable in two ways. First, they sharpen the nature of the financial contracting analysis at present, which is along the lines of Bernanke and Gertler (1989). Second, they allow for relatively straightforward extensions to lending models that feature “delegated monitoring” by external funders.

But the deposit unit component of the model cries out for additional detail on the allocation of saving, to alternative forms of short-term borrowing by additional institutions and direct finance to at least some groups of firms. Practical regulation also would have to

⁸The separation also rules out deposit and loan synergies, but that seems like the right starting point.

make these distinctions. For concreteness, I thus interpret the reserve requirement in GT as a general liquidity requirement on all entities using short-term funding in domestic currency.

Finally, the model does not feature “intrinsic mismatch” between bank deposits and assets, which is stressed in the literature reviewed above. But it is a feature which one may be skeptical about: since 1980, every individual bank has had a rich set of instruments to manage these risks.

4.3 Analytical Approach and Key Findings

The authors construct a DSGE model that is an extension of Bernanke, Gertler, and Gilchrist (1999) along two lines which are important for the directions that GT seek to explore. First, as discussed above, there is the introduction of reserve requirements, which I will interpret as a broad-based liquid asset requirement on financial institutions. Second, the framework is a small open economy. There are five key findings in my view.

First, the impact of changes in reserve requirements depends on the interbank market policy pursued by a central bank. If policy sets a rate, rather than a quantity, shifts in reserve requirements should only have banking policy, not monetary policy, effects. That is, an increase in the reserve tax induces substitutions away from the deposit banks, which in turn reduces funding for the lending banks and implications for investment.⁹

Second, reserve requirement changes are more powerful with financial frictions: there is a “multiplier” on variations in the level of private saving and its allocation to the intermediation sector. It would be nice to explore this aspect in greater detail.

Third, under a price stability objective, reserve requirements add little to macroeconomic performance under a conventional interest rate rule. This is a sensible result, likely invariant to whether the economy is closed or open.

⁹The relevant substitutions should be intertemporal (consumption) and asset composition (in this model, into or out of foreign assets): this may be the right model going forward, if broad-based liquidity requirements become the relevant policy in many countries. But it is not the right model looking backward, as substitution between bank deposits and other short-term vehicles not subject to the reserve tax have been important.

Fourth, when financial stability enters into the objective, then variation in reserve requirements becomes part of an optimal policy package. This is again intuitive. But there is a neat separation: reserve requirements are used for financial shocks, while monetary policy via an interest rate rule is employed for other shocks. While this is a sensible result, one would like to have a more complete understanding of the conditions under which it obtains. For this purpose, further exploration in the context of a standard closed-economy model seems warranted.

Fifth, in an open economy and with a financial stability objective, active reserve policy can be warranted in response to additional shocks, specifically if there are also financial frictions and foreign currency denomination of debt. It would be desirable to have a more complete breakdown of the sources of this mechanism.

5. Conclusion

The activity of introducing financial frictions, institutions, and frictions into DSGE models is perhaps the central component of research in this policy relevant area. As stressed by GT, DSGE models provide new conclusions about old policies that are assuming contemporary relevance. As macroeconomists and policy analysts explore these ideas, it will be important to discipline the activity by the conclusions of micro-based financial theory. It will also be important to evaluate the models against the type of evidence provided by BHS.

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