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Monetary base endogeneity and the new procedures of the asset-based Canadian and American monetary systems

***Abstract:** It is shown that asset-based financial systems, just like overdraft financial systems, rely on a fully endogenous supply of high-powered money, with central banks engaging essentially into “defensive” operations. This is demonstrated through an analysis of the Canadian monetary process, which is devoid of any reserve requirements, with the overnight rate closely gravitating around the target overnight rate. It is shown that the American process is no different, despite being less transparent. The main distinctness is that, in contrast to the Fed, the Bank of Canada knows with perfect certainty both its supply of and the demand for settlement balances.*

***Key words:** channel system, clearing balances, defensive operations, high-powered money, overnight rate, target interest rate.*

In a widely quoted article, Robert Pollin has argued in this journal that although the money supply could be considered endogenous, there were effective or “significant quantity constraints on the total reserves available to financial markets,” further claiming that “advocates of structural endogeneity assume that some degree of open market restrictiveness is the norm and that such restrictiveness does act as a significant restraint on the quantity of reserves supplied by the central bank” (1991, p. 373). Pollin claimed to have found three sets of empirical evidence supporting

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his claims, although these were questioned by Moore (1991) and Palley (1991). The matter was further pursued in Pollin, where additional empirical arguments were provided to support the claim that “central bank efforts to control the growth of non-borrowed reserves through open market restrictiveness exert significant quantity constraints on reserve availability” (1996, p. 495).

Some authors, such as Françoise Renversez (1996), have concluded from this that there exists two kinds of financial systems, one that is reserve constrained—the North-American and the British banking systems—and one that is not—Continental Europe. This distinction would cover another distinction, that between *asset-based* and *overdraft* financial systems, a distinction made by Keynes (1930, ch. 32) and Hicks (1974).

Asset-based financial systems—or the *auto-economy*, as Hicks would have it—are systems where producing firms and financial firms hold stocks of financial assets that allow them to face fluctuations in their income and capital needs, without the obligation to borrow. By contrast, “the overdraft economy is defined by a double level of indebtedness: that of the firms to the banks and of the banks to the central bank” (Renversez, 1996, p. 475). In such overdraft economies, commercial banks hardly hold any Treasury bills. The only means to acquire banknotes or compulsory reserves is to borrow them from the central bank, as has been shown in detail by Le Bourva (1992). The central bank thus has no choice but to provide the required high-powered money through the discount window, but at the interest cost of its choice, which makes the supply of high-powered money obviously endogenous and demand-led, without quantitative constraints. This has led some authors, following the arguments made by Pollin in the case of the asset-based North-American system, to argue that although the supply of high-powered money is fully endogenous in an overdraft economy, it is quantity-constrained in the case of an asset-based economy. Renversez, for instance, claims that the functioning of the monetary system in an overdraft economy is “different from that achieved under the control of the central bank in the financial market economy. . . . The intervention of the central bank is discretionary in the financial markets economy, but it is obligatory in the overdraft economy” (1996, p. 475).

In contrast to the view expressed by Renversez, some economists (Goodhart, 1987; Mosler, 1997–98; Thomas, 1981) have said that the supply of high-powered money is equally endogenous in the asset-based UK or U.S. systems and in the overdraft Continental Europe financial system, arguing that “the logic of a monetary production economy is

such that the consequences of an overdraft economy also apply to an economy with open market operations . . . whatever the actual financial institutions” (Lavoie, 1992, p. 179).¹ In other words, Anglo-Saxon monetary systems, dominated by asset-based financial systems, used to have more complex institutional features that hid the reversed causality and the essential mechanism of the endogenous supply of high-powered money.

The purpose of the present paper is to take advantage of the recent institutional changes that have arisen within the North-American financial systems in the 1990s, which help to cut through the complexities of asset-based financial systems. To those who are not blinded by mainstream money-multiplier textbook presentations of central banking, the new procedures put in place by the Federal Reserve System and the Bank of Canada illustrate quite clearly the endogenous nature of the supply of high-powered money. They show, as emphasized by horizontalist authors such as Basil Moore (1988), that short-term interest rates are the exogenous variable under the control of central banks. The central banks do not, nor can they, control relevant monetary aggregates. The supply of high-powered money, even in Anglo-Saxon countries with asset-based financial systems, is fully endogenous. In contrast to the view espoused by Pollin, high-powered money exerts no quantity constraint on the monetary system.

I start by describing the Canadian monetary system, explaining how the new system came about, and how it is now being implemented. This will then be compared to the situation occurring in the United States. The comparison will allow us to understand why Pollin and some Post Keynesian authors came to believe that the federal funds rate was not really under the control of the Federal Reserve, and why they thought the central bank could somehow constrain the amount of reserves. While the present contribution might rekindle the debate between structuralist and horizontalist money endogeneity, which Moore recently called a “quintessential storm in a teacup” (2001, p. 13). I believe it is useful to demonstrate that the views held by horizontalist authors were neither extreme nor radical, as they have been sometimes called, but that, instead, their conception of the full endogeneity of high-powered money has been clearly vindicated by the new procedures.

¹ An explicit critique of the reserve-constraining view is found in Rochon (1999, ch. 6).

The evolution of the Canadian payment system

Zero-reserve requirements at the Bank of Canada

Prior to 1991, Canada had a nearly textbook monetary system: commercial banks (chartered banks as they are called in Canada) faced reserve ratios on their deposits, advances to banks at the discount window were strongly discouraged, and open-market operations by the Bank of Canada were frequent. The discount rate (the Bank rate) was set as a mark-up over the Treasury bill rate, giving the illusion that financial markets, not the central bank, were responsible for the high interest rates that were then prevailing. The only peculiar characteristic was the use of transfers of government deposits, from the accounts of the central bank to those of commercial banks (or vice versa) to increase (or decrease) the amount of high-powered money. This government balances drawdown and re-deposit mechanism was the nearly exclusive instrument of the Bank of Canada in its day-to-day operations, the purpose of which was to neutralize the effect on bank reserves arising from movements in government expenditures and tax collection, as well as those arising from foreign exchange operations. By contrast, open-market operations were designed either to accommodate long-term increases in the demand for bank reserves and banknotes or to signal a change in the monetary stance (Bank of Canada, 1975).

Discussions on the possibility of implementing monetary policy with highly reduced reserve and even zero-reserve requirements started in September 1987 (Bank of Canada, 1987; 1991). A first step toward this process was implemented in 1991, when the frequency of advances or loans to commercial banks became unrestricted (with the appropriate collateral) and left to a new price mechanism designed by the staff at the Bank of Canada. While bank deposits at the Bank still did not pay interest, advances that lasted through the averaging period were costed at twice the discount rate. The purpose of such a move was to ensure that the opportunity cost of holding excess reserves was about equal to the opportunity cost of central bank advances (relative to returns on alternatives).

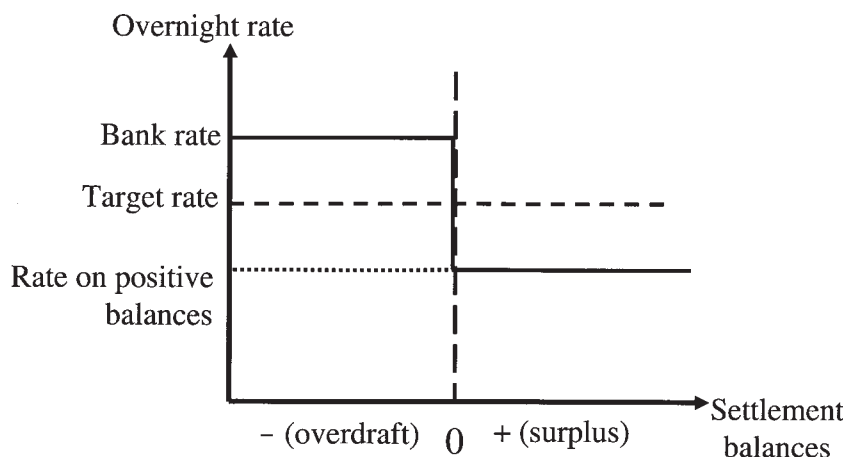
It was known, however, that this new system was only a transitory one. Compulsory reserve requirements were progressively diminished, until they were completely dismantled in mid-1994 (Clinton, 1997, p. 14). The focus of monetary policy moved away from the Treasury bill rate, toward the overnight rate. A 50 basis points operating band for the overnight rate was put in place in 1994, and in 1996, the Bank rate was set at the upper end of the operating band, to provide more clarity as to

the intentions of the Bank (Lundrigan and Toll, 1997–98, p. 36). A second round of discussions took place in 1995, when the present system, dealing with electronic large-value payments, was designed (Bank of Canada, 1995). It was implemented in 1999. The term *reserves* was struck out and replaced by the expression *settlement balances* (in the United States, they are called *clearing balances*). An official target overnight rate was put in place. This rate is in the middle of the operating band. Its upper limit is the Bank rate (the discount rate), at which commercial banks can borrow settlement balances (reserves); its lower limit is the rate on positive settlement balances—the rate paid on bank deposits at the central bank.² The spreads between these rates and the target rate are symmetric. This is the *channel* system, also called the *corridor* or *tunnel* system (Whitesell, 2003). All of this is illustrated in Figure 1, adapted from the Bank of Canada (1995) and Clinton (1997).

In Canada, as in Sweden, Australia, and New Zealand, the amount of high-powered money is now limited to the amount of banknotes held by the general public or in the vaults of commercial banks (Woodford, 2001). There are no compulsory reserves. In addition, one can say that there are virtually no reserves of any kind. Bank deposits at the Bank of Canada are normally zero.³ This in itself should help to demonstrate that the supply of high-powered money is fully endogenous. High-powered money in these countries is only made up of banknotes (issued by the central bank). Besides extraordinary situations as the one that occurred in Argentina in 2001–2, it is difficult to imagine that the supply of bank notes through automatic teller machines would be restricted by the central bank. Whenever commercial banks need banknotes to feed their machines, as a result of the demand for banknotes arising from their customers, they are being provided by the central bank. Indeed, as noted by a researcher at the Bank of Canada, “withdrawals of bank notes from

² A similar system, with identical rules, but a wider operating band, was also put in place for paper-based payments (checks) (see Howard, 1998). Although most transactions are made by checks, these constitute only a small fraction of the value of payments that go through the electronic large-value transfer system. As a result, monetary policy is only concerned with the latter.

³ Usually, the Bank of Canada leaves in settlement balances of about \$50 million, to reduce frictions in the system (Bank of Canada, 2001). But this amount pales compared to the amounts that are transacted through the large-value payments system, about \$125 billion per day (a 0.04 percent ratio) (see www.cdnpay.ca). In April 2004, Canadian banks held \$37 million in deposits at the Bank of Canada—that is, a 0.002 percent proportion of their assets worth \$1.811 billion. Banks also held \$4.2 billion in vault cash, or 0.23 percent of their assets (see www.osfi-bsif.gc.ca).

Figure 1 <<title for figure>>

the central bank are made as needed by the clearing institutions” (Clinton, 1991, p. 7).

The operation of the settlements system

In Canada, as in many other countries, banks and other direct clearers are required by law to settle their payment obligations on accounts at the Bank of Canada (Goodlet, 1997). If there were no transactions with the public sector, or with the foreign exchange fund, the level of net settlement balances would always be zero. Since any debit for a bank corresponds to a credit for some other bank, the net amount of settlement balances in this pure credit economy cannot be any different from zero. By contrast, the gross amount of settlement balances would vary according to the dispersion in incoming and outgoing payment flows between banks. A given amount of transactions can give rise to widely different amounts of gross settlement balances.

However, as has been emphasized recently by members of the neo-chartalist school, the situation is modified when government transactions are entered into the clearing system, or when the central bank intervenes on foreign exchange markets (Bell, 2000; Bell and Wray, 2002–3; Mosler, 1997–98; Wray, 1998). As is well known, when the central bank purchases foreign currency to keep the exchange rate fixed, this adds to the reserves or the settlement balances of commercial banks. Similarly, when governments pay for their expenditures, by making checks on their central bank account, which are later deposited at banks,

these transfers add to reserves. By contrast, when private agents pay their taxes by writing a check to the government, this transaction withdraws reserves or settlement balances from the financial system once the check is deposited in the government account at the central bank. Similarly, when banks acquire banknotes, this reduces their settlement balances.

The Bank of Canada normally acts in such a way that the level of settlement balances in the financial system by the end of the day is exactly equal to zero. “To maintain the level of settlement balances at zero, the Bank must neutralize the net impact of any public sector flows between the Bank of Canada’s balance sheet and that of the financial system” (Howard, 1998, p. 59). To achieve this, the Bank transfers government deposits in and out of its own accounts, toward or from government deposit accounts held at various commercial banks.

The Bank effects such neutralization late in the afternoon, after *all* settlement transactions with the government are completed. When the Bank makes its final cash management decisions, it knows with perfect certainty the amounts that need to be transferred between government accounts at the Bank and government accounts at commercial banks to achieve complete neutralization of the public sector flows. In addition, early in the morning, when most of the clearing transactions occur, the Bank offers (temporary) open-market operations (in the form of overnight repos or reverse repos, called sale and repurchase agreements and special purchase and resale agreements in Canada), at the target rate, to keep the market overnight rate on target.⁴ This often has the effect of promptly neutralizing government flows. For instance, on a day when tax receipts are high (a drain on the system liquidity), the Bank will be providing central bank credit from the outset.

In terms of standard terminology, one could say that these transfers of government deposits and open-market operations are part of the *defensive* operations of the Bank of Canada. As Eichner et al. put it, “this is the neutralizing component of a fully accommodating policy” (1985, p. 101). I argue that it cannot be otherwise. There is an overall demand for high-powered money, exactly equal to the demand for banknotes, to which the central bank responds by providing the precise amount being demanded. The extent and the importance of these *defensive* operations

⁴ Since the Bank is not targeting the Treasury bill rate anymore, there is no need for intervention on that market. Indeed, the Bank of Canada has not performed any *out-right* open-market operation since 1995 (Lundrigan and Toll, 1997–98, p. 36).

are nothing new. Prior to the implementation of the new procedures, the Bank already knew with a good degree of accuracy the amount of defensive operations that were required (Clinton, 1991, pp. 7–8).

The determination of the overnight interest rate

There are two substantial changes between the new procedures and the previous ones. First, banks are given the opportunity to get rid of their surplus settlement balances, or to wipe out their negative settlement balances (their day overdraft at the Bank of Canada), by being able to have a last go on the overnight market in the evening, when they know with certainty what their clearing balances are (this is the so-called pre-settlement period). This allows banks to have day overdrafts only, and to avoid the discount window. Second, the central bank now knows with perfect certainty not only the amount of settlement balances being supplied but also its demand. Previously, when compulsory reserves were still required and averaged through the month, the daily demand for settlement balances by the banks could vary, with the Bank being unable to predict the changes. This was because the daily demand for reserves was responsive to interest rates.

This reflected mainly two factors: “First, that uncertainty about the results of the clearings creates a precautionary demand to hold reserves in excess of minimum requirements; and second that reserve averaging allows the banks some flexibility to respond to expected changes in overnight rates” (ibid., p. 9). If overnight rates were expected to move up in the future, the demand for reserves would move up, in an attempt to accumulate excess reserves that could be depleted at a later stage of the averaging period, when their cost would be higher. This made the overnight rate fluctuate, as demand moved around the demand for settlement balances forecasted by the Bank of Canada, and hence the amount of nonborrowed reserves supplied by the Bank. Any adjustment had to be carried through either by changes in borrowed reserves or in changes in the overnight interest rate.

None of this, or very little of it, occurs with the new rules. The new procedures ensure a determinate demand for settlement balances. First, banks need not play any games about expected clearing positions or about future expected overnight rates, as there are no averaging provisions anymore, since no amount of reserves need to be held. Second, the Bank has put in place “incentives that motivate the banking system to target zero settlement balances at the central bank” (Clinton, 1997, p. 4). As already pointed out, there is symmetry in the opportunity cost of holding a reserve deposit at the Bank and in being in an overdraft posi-

tion vis-à-vis the central bank (recall that overdrafts are granted without restrictions, and hence carry no fronn costs). Overnight rates, repos rates, and Treasury bill rates are normally in the mid-range between the Bank rate on overdrafts and the rate paid on deposits at the central bank. This mid-range is the target overnight rate, publicly announced by the central bank. This encourages banks to rely on the overnight market to obtain or get rid of their excess settlement balances.

The overall demand for settlement balances is thus equal to zero, in normal circumstances, since no surplus-clearing bank will desire to keep its surplus balances as deposits at the central bank, while no deficit-clearing bank will rely on advances that can be granted on demand by the Bank of Canada, since settlement balances can be borrowed or lent at a rate that is somewhat halfway in between the rates that could be obtained from the Bank. In the worst of circumstances, the overnight rate cannot be any higher than the Bank rate, otherwise, deficit banks would prefer to get central bank advances. Similarly, the overnight rate cannot fall any lower than the rate on deposits at the central bank, otherwise, surplus banks would all put their surplus balances on the accounts of the Bank of Canada. Supply of and demand for settlement balances would readjust to each other.

Going back to Figure 1, Clinton (*ibid.*) argues that in normal times, both the supply and the demand for settlement balances are given by the vertical line arising from the zero level of settlement balances. “Since equality of demand and supply is represented by the intersection of two vertical lines (at zero quantity), on any given day the precise overnight rate at which the market settles is indeterminate within the 50-basis-point operating band. The actual rate will be influenced by a variety of technical factors, such as the size and distribution of clearing imbalances among the banks” (*ibid.*, p. 11). This analysis is confirmed by Whitesell (2003, p. 10).

The overnight rate of interest could thus be any rate within the operating band. In a truly competitive market, however, one would expect the overnight rate to be right in the middle of the operating band. If the target overnight rate is set as the midpoint of the operating band, there is thus some likelihood that it will be exactly realized. Under noncompetitive conditions, or if some banks are viewed as less creditworthy than others, the overnight rate might be different from the target set by the Bank of Canada. For instance, if deficit-clearing banks happen to be among the lesser creditworthy banks, there is a chance that the overnight rate would exceed the mid-range point. Also, if a single bank holds positive settlement balances, while all others are in a negative position,

the surplus-clearing bank may take advantage of its monopoly status, and the overnight rate could be higher than the target overnight rate.

In reality, it turns out that the overnight market rate is systematically equal to the target rate set by the Bank of Canada. With the new procedures, tied to zero-reserve requirements, near-perfect certainty on the demand for settlement balances, and absolute control over the supply of settlement balances, the Bank is able to control the overnight rate to the tune of one basis point. Over the last 60 days preceding the writing of the final version of this paper, the overnight rate was nearly always exactly equal to its target, and otherwise, less than one basis point below it. When target rates are changed, overnight rates move instantaneously to their new position. For instance, on September 8, 2004, the target rate was moved up from 2.00 percent to 2.25 percent. On the same day, the actual overnight rate jumped to 2.245 percent.⁵

Another feature that is worth noting is that overnight rates change in response to target rates without central banks having to add or subtract any amount of settlement balances. This has been noted for other countries as well, under the name of “open-mouth operations” (Guthrie and Wright, 2000). In the Canadian case, the Bank of Canada keeps targeting zero settlement balances, even when a new rate is announced. The associated changes in the rates of the overnight credit and deposit facilities at the central bank are sufficient to enforce the new rate on the inter-bank money market. In general, there is no specific need to intervene on the repo market. As Woodford points out, in channel systems, such as the Canadian case, “the central bank can shift the rate at which the inter-bank market is likely to clear by shifting the interest rates associated with the two standing facilities without any immediate need for an adjustment of the supply of clearing balances” (2002, p. 89).⁶ The target

⁵ Even on September 11, 2001, and its aftermath, the Bank of Canada was able to keep the overnight rate right on target, as the rate hovered between 3.98 percent and 4.00 percent. It is true that to achieve this, the Bank did not target a zero settlement balance, but, rather, a large amount of surplus balances. When, on Monday, September 17, the target rate was dropped from 4.00 percent down to 3.50 percent, the overnight rate fell to 3.54 percent, and the next days it stood at 3.48 percent or 3.49 percent.

⁶ This point could be attributed to Keynes, since he wrote that “[i]f the change in the news affects the judgment of and the requirements of everyone in precisely the same way, the rate of interest (as indicated by the price of bonds and debts) will be adjusted forthwith to the new situation without any market transactions being necessary” (1936, p. 198). The news here is that the new target overnight rate is announced by the central bank, which all participants take as the new conventional anchor.

rate set by the central bank, with its operating band, provides an anchor to the financial system. The anchor is credible because the Bank of Canada has the capacity to enforce it. If the overnight rate were to wander away from the target, the Bank could get it back on track (Rogers and Rymes, 2000).

The above analysis clearly shows that reserves are fully endogenous. The Bank of Canada supplies high-powered money by fully responding to the demand for it—that is, by providing banknotes whenever banks require them. The fact that no reserves are required anymore, and that cost incentives have been put in place that encourage banks to hold neither positive nor negative settlement balances, makes the endogeneity of high-powered money very clear. In addition, it is quite evident that the control variable of central banks is the overnight rate of interest. The Bank of Canada sets the target overnight rate, and the actual overnight rate adjusts to it within the day, either right on the dot, or one or two basis points above or below it. As Wray correctly concludes, “the Canadian system makes central bank operations more transparent—reserves are not a lever to be used to control the money supply. The Bank of Canada intervenes to keep net settlement balances at zero, an operation that by its very nature must be defensive” (1998, p. 107)

This is precisely the argument that I wish to make. In the case of the overdraft economy, it is quite clear that reserves are being provided on demand by the central bank. It is not so apparent in an asset-based financial system. But in systems such as the Canadian one, which is an asset-based financial system, the veil of open-market operations is superseded by the transparency of the zero-reserve requirement. It becomes nearly as obvious that the day-to-day role of the central bank is to provide on demand the required level of high-powered money. It becomes evident that high-powered money is a fully endogenous variable, while the overnight rate is the exogenous interest rate, determined by the target rate set by the Bank of Canada.

Within such a system, it becomes patent that commercial banks cannot be reserve-constrained. This part of the structuralist story just does not hold up, and is clearly a remnant of neoclassical analysis. In addition, it contradicts the views espoused by Minsky (Wray, 1989, p. 154).

The case of the American monetary system

The defensive operations of the Fed

The argument that I wish to make here is that the American financial system obeys to the same logical requirements that rule overdraft econo-

mies or financial systems with zero-reserve requirements.⁷ Marvin Goodfriend is particularly clear about this: “In current practice, the Federal Open Market Committee (FOMC) announces a target for the federal funds rate and instructs the trading desk at the New York Fed to use open market operations to provide the quantity of reserves and currency that the economy demands at that federal funds rate” (2002, p. 2). This is confirmed by officers of the Trading Desk: “The conventional textbook view is that the Trading Desk buys and sells securities in response to policy easing and tightening. From the Desk’s perspective, however the supply–demand balance is primarily a function of the demand for required balances, which is almost completely insensitive to small changes in policy” (Krieger, 2002, p. 74).

In other words, while in the past, open-market operations were part of the means by which the Fed would signal a change in its policy stance, now the new policy stance is directly signaled by announcing the new federal funds rate target. Open-market operations are now (nearly exclusively) purely technical means by which the Desk adjusts, as best as it can, the supply of high-powered money to its daily forecasted demand. Indeed, announcements of changes in the federal funds rate target by the FOMC have an immediate effect upon the funds rate, before the Desk is given any chance to engage into open-market operations (Woodford, 2001, p. 15).

The daily conduct of open-market operations is quite telling in that regard (Edwards, 1997, p. 864). A large amount of activity and research is devoted to forecasting the demand for required reserves and clearing balances. Other estimates are made to compute the forecasted demand for free reserves (by some banks) and the forecast of borrowed reserves (by other banks). The latter, in particular, move along seasonal lines, with such borrowing peaking in the spring, at planting time, and tapering off in the fall, when harvesting allows loans to be paid back. This yields the forecasted demand for nonborrowed reserves. This forecast is then confronted to the forecasted supply of nonborrowed reserves, based, in particular, on the amount of vault cash left in the banks. The amount of reserve balances that must be added or drained through open-market operations each day is the difference between the forecasted demand for nonborrowed reserves and the projected supply of nonborrowed reserves.

⁷ Compulsory reserves in the United States account for less than 2 percent of the monetary base.

Some Post Keynesians pointed out long ago that open-market operations had little or nothing to do with monetary policy. For instance, Eichner et al. start their article by making the following statement: "It is usually assumed that a change in the Fed's holdings of government securities will lead to a change, with the same sign attached, in the reserves of the commercial banking system. It was the failure to observe this relationship empirically which led us, in constructing the monetary-financial block of our model, to try to find some other way of representing the effect of the Fed's open market operations on the banking system" (1985, p. 100). That other way is that "the Fed's purchases or sales of government securities are intended primarily to offset the flows into or out of the domestic monetary-financial system" (Eichner, 1987, p. 849).

Throughout most of its history, the Federal Reserve System has acted on the premise that its main role in the financial system is to conduct *defensive* operations, since the monetary base is an endogenous variable beyond its direct control (Lombra and Torto, 1974). At times, the Fed has attempted to restrict the amount of nonborrowed reserves, forcing banks to go to the discount window; but this policy, besides pushing up interest rates, has had little effect on total reserves. For instance, between December 1979 and February 1980, the Fed sold for over \$3 billion worth of securities on the open market, thus reducing nonborrowed reserves by this amount; but borrowed reserves increased by that very amount during that period (Thomas, 1981, p. 960).

In addition, it is well known that even when the Fed had monetary targets, these targets were implemented through the estimation of a money demand function; this estimate led the Fed to target unannounced federal funds rates, and the game was to guess the Fed's target overnight rate. In 1987, the Fed reverted to official federal funds rate targeting, and that rate became publicly announced in 1994. In the United States, as in Canada, there has been a move toward greater transparency, removing the scaffolding that hid the true monetary operations of the central bank. As Mosler points out, "the Federal Open Market Committee's target has been the focus of activity under previous Fed policies as well, and the difference is that prior to 1994 the target rate was known only within the Fed, whereas currently it is disclosed to the general public" (2002, p. 419).

It is now much more obvious that the Fed is mainly pursuing *interest maintenance operations* (Mosler, 1997–98, p. 170; Wray, 1998, p. 87). Again, neo-chartalist Post Keynesians have made this quite clear over the last years. For instance, Wray claims that "Fed actions with regards to quantities of reserves are necessarily defensive. The only discretion

the Fed has is in interest rate determination” (1998, p. 115). Similarly, Mosler writes that “as a practical matter, the Fed can only react to required legal reserve imbalances that threaten to alter the targeted federal funds rate. The Fed does not have the option to act proactively to add or drain reserves to directly alter the monetary base” (1997–98, p. 173).

This has been recently confirmed by an institutional analysis of the daily actions and tactics of the Fed, more specifically, those of the Trading Desk at the New York Fed. Fullwiler argues that “the Desk’s actions are generally defensive in nature,” attempting to provide the adequate supply of balances based on the intraday, average maintenance period and seasonal needs of the banks (2003, p. 857). Fullwiler, like the authors cited above, concludes that “the primary objective of the Desk’s open market operations has never been to ‘increase/decrease reserves to provide for expansion/contraction of the money supply’ but rather to maintain the integrity of the payments system through provision of sufficient quantities of Fed balances such that the targeted funds rate is achieved” (ibid., p. 869).

The weak exogeneity of the federal funds rate

Still, in the United States there have been important fluctuations in the overnight rate, relative to the federal funds rate target. Taylor (2001, p. 36) reports that the standard deviation of the spread between the federal funds rate and its target was 18 basis points over the 1998–2000 period. The maximum deviation was –150 basis points, on December 31, 1999—the result of a mistaken evaluation of the fears generated by a possible Y2K mishap. Similar deviations between the target rate and the actual overnight rate can be observed with the new European Central Bank. Nonetheless, over the last years, the *average* federal funds rate is virtually equal to its average target rate.

In view of these results, it is easier to understand why some American Post Keynesians are reluctant to recognize that reserves are fully endogenous and that interest rates are set exogenously by central banks. In the United States, as in Europe, the central bank does not appear to have full control over the shortest of the rates—the overnight rate. Interest rates under the control of the central bank do not appear to be truly exogenous. Their levels seem to depend on the interaction between the demand for and the supply of reserves. It should be noted that this feature of the American system was underlined by the major proponent of exogenous interest rates. In his book, Moore wrote that “the federal funds rate is predetermined within a small range, ordinarily within fifty or sixty basis points. . . . It is not *directly* set by the Fed. . . . It is . . . disingenu-

ous and misleading to declare that the funds rate is now ‘market-determined.’ Market forces are really attempting to forecast the behavior of the Fed itself” (1988, p. 124).

Pollin (1996, pp. 501–502) is quite aware of Moore’s analysis, but, on the basis of his Granger–Sims causality tests, he argues that there is a two-way causality between interest rates controlled or nearly controlled by the central bank (such as the discount rate and the federal funds rate) and other market rates.⁸ Pollin (*ibid.*, p. 511) rejects the horizontalist view that the Fed independently administers short interest rates and that it is unable to constrain reserves.

More recent evidence enlightens this debate. When examining recent episodes of changes to the official target rate, Taylor (2001) points out that changes in the federal funds rate often precede the change in the target rate, and that this is confirmed by causality tests based on daily data. Atesoglu (2003–4), on the basis of monthly data, shows that there is a two-way causality between federal funds rates and the prime rate between 1987 and 1994, whereas causality is unidirectional between 1994 and 2002, running from the federal funds rate to the prime rate. In addition, there is a nearly complete pass-through in the latter period.

My interpretation of all this evidence is the following. The Fed is pursuing essentially defensive operations, just like the Bank of Canada. The difference is that the Fed does not have perfect information about the drains on reserves that must be compensated for, nor does it have perfect information about the daily or even hourly demand for free reserves or for discount window borrowing; as a result, the Fed cannot perfectly equate supply to demand at the target funds rate (or at the actual rate). As Sellon and Weiner put it, “the size of a daily surplus or shortage in the settlement system depends, in large part, on the central bank’s ability to estimate settlement bank demand for settlement balances” (1997, p. 18). In the United States, over the reserve-averaging period, the Fed supplies high-powered money on demand, as in overdraft economies or in zero-reserve financial systems, but it is unable to do so perfectly on a day-to-day basis. In other words, the apparent *nondefensive* operations arise inadvertently. They are an artifact.

⁸ With respect to long-term bond yields, Moore (1988, p. 286) also found empirical support for a one-way causality going from long rates to short rates. But it should be pointed out that more recent findings, based on more reliable statistical techniques (the Johansen cointegration and vector error correction modeling technique), imply a one-way causality that runs from the federal funds rate to long-term bond rates (Atesoglu, 2005).

In the American case, excess reserves held by small depository institutions seem difficult to predict, since these small banks do not have the resources to monitor closely enough their reserve position, so that their actual reserves wander randomly. In addition, the newly required clearing balances, which depend on the size and the timing of daily transactions (rather than on the stock of deposits), are quite volatile and, hence, their targeted demand is highly difficult to forecast correctly. To this volatility, one must add fluctuations in the Treasury balance, which are the focus of the neo-chartalist analysis, and fluctuations in the Federal Reserve float, which often depend on weather conditions (Edwards, 1997, p. 861). Despite the introduction of interstate branching, the American banking and payments system is still highly decentralized, which helps to explain why both the supply and the demand for balances are so hard to predict.

It is usually argued that the presence of averaging provisions in compulsory reserve requirements allows to smooth movements in the federal funds rate, which arise as a result of mistaken forecasts, mainly on the part of the Desk. The preservation of the current American system is thus justified on those grounds (Sellon and Weiner, 1997). A system of averaged reserves flattens out the demand curve for settlement balances, which, otherwise, as in the illustration of the Canadian case, would be perfectly vertical. This is most certainly the case for given expectations about overnight rates, but averaging provisions also contribute to enhance uncertainty about expected overnight rates, as expectations about federal funds rate movements may become self-fulfilling (Krieger, 2002, p. 74).

Indeed, Whitesell (2003) shows that in a world with average reserve requirements and uncertain bank clearing balances, a channel system is conducive to a demand for reserves curve that has a long flat segment at the expected future overnight rate. This implies that even fairly large changes in the daily supply of reserves will have no effect on the actual overnight rate, and hence that expectations about overnight rates will be self-fulfilling.⁹ In other words, average provisioning flattens the relevant segment of the demand curve for reserves, but it also tends to induce vertical shifts in the middle horizontal portion of the demand curve, due

⁹ Krieger gives the following American example: "If funds were very firm on a quarter-end date, there would be a tendency for the same pattern to appear in funds trading on subsequent quarter-end dates. . . . If the Desk reacts too strongly to intraday pressure, it may create volatility toward the end of the day and possibly on subsequent days as well" (2002, p. 74).

to changing expected overnight rates, which may differ from the target rate.

Averaging provisions encourage banks to speculate about daily or even hourly evolutions of the federal funds rate, by modifying their demand for reserves. The markets try to anticipate changes in the target rate, and they try to anticipate the evolution of the federal funds rate around the target rate. This is why the prime rate, ever since the target rate has been publicly announced, does not seem to “cause” the federal funds rate any longer. When setting the prime rate, banks do not need to second-guess the weekly or monthly evolutions of the federal funds rate anymore; the target acts as the anchor. As pointed out by Mosler, “this is in sharp contrast to the notion often supported by the media that market rates, rather than anticipating Fed action, contain information as to where the Fed should target the federal funds rate” (2002, p. 420), the media view being precisely that of Pollin (1996).

Conclusion

In the conclusion of his 1996 paper, Pollin alleges that the horizontalist position is steering “in the wrong direction” and that it is wrong to start from the “absolutist and unsustainable assertions that central banks have no power to constrain reserve levels but complete control over interest rates” (ibid., p. 511).¹⁰ The present paper has shown that it is the “reserve-constraining view” that is contrary to institutional and technical facts. If we understand complete control over interest rates as meaning control over the overnight interest rate within a tight operating band, one or two basis points for countries such as Canada and Australia, and a dozen or so basis points for the American and the European systems, then it is clear that short-term interest rates are exogenous in that sense. Indeed, this is the point of view adopted by central bankers and some New Keynesians, through the “new consensus view” (Fontana and Palacio-Vera, 2002; Lavoie and Seccareccia, 2004).

As to the supply of high-powered money, after a long intermission driven by the monetarist fad, central bankers are coming back to the

¹⁰ Although Palley (1996) has also been associated with structuralist endogeneity, I interpret his view to be different from that of Pollin and closer to that of Moore. According to Palley, under some institutional setups, central banks would modify overnight rates by changing the *proportions* of borrowed and unborrowed reserves, while being unable to modify *total* reserves within the period. It is in this sense that Palley would claim that “structuralists maintain that quantity-based procedures are also theoretically possible” (ibid., p. 593).

view that movements in money aggregates or in the monetary base contain no useful information for monetary policy; they are a sideshow—“a meaningless abstraction” as Albert Wojnilower once put it (1980, p. 324). The new procedures put in place in Canada are particularly enlightening. Central banks do not attempt to control the monetary base. The latter is entirely demand-determined. The monetary operations of central banks are entirely defensive. Their purpose is precisely to ensure that the supply of high-powered money is exactly equal to its demand, at the target interest rate of their choice. The central bank may also intervene in specific markets, besides the repo market, to make sure that interest rates in these markets are in line with the target overnight rate. Monetary operations are always interest rate maintenance operations.

Thus, perhaps it would be best to distinguish between “defensive” and “accommodating” behavior, as done by Eichner (1987, p. 847) and, more recently, by Rochon (1999, p. 164). In my opinion, central banks pursue “defensive” or “neutralizing” operations at all times, as emphasized by the neo-chartalist authors. High-powered money is thus always fully endogenous. This is a key feature of horizontalism. On the other hand, central banks can be accommodating or not. When they are, they will peg the interest rate, whatever the economic conditions. When they are not accommodating—that is, when they are pursuing “dynamic” operations as Victoria Chick (1977, p. 89) calls them—central banks will increase (or decrease) interest rates. As shown above, to do so, they now need to simply announce a new higher target overnight rate. The actual overnight rate will gravitate toward this new anchor within the day of the announcement. No open-market operation and no change whatsoever in the supply of high-powered money are required. One should thus conclude, as I wrote some time ago, by saying that “money is in some sense endogenous whether central banks are dynamic or not” (Lavoie, 1984, p. 778).

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