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Asset-based Reserve Requirements: Reasserting Domestic Monetary Control in an Era of Financial Innovation and Instability

THOMAS I. PALLEY
Open Society Institute, Washington, USA

ABSTRACT *This paper argues for developing a new system of financial regulation based upon asset-based reserve requirements (ABRRs). Such a system represents a shift in regulatory focus away from the traditional concern with the liability side of financial intermediaries' balance sheets. ABRRs have both significant macroeconomic and microeconomic advantages. At the macroeconomic level, they can provide policy makers with additional policy instruments. This is particularly useful in light of recent concerns about the dangers of asset price inflation and the potential need to target asset prices. They can also help restore the traction of monetary policy at a time when banks are becoming a smaller part of the financial landscape. At the microeconomic level, they can be used to discourage excessive risk taking by financial intermediaries. Finally, they can also raise considerable seignorage. To be fully effective, a system of ABRRs should be applied to all financial intermediaries.*

1. A New Proposal: Asset-based Reserve Requirements

The last two decades have witnessed significant financial innovation within the US economy. One important innovation has been reduced reliance on traditional bank deposits, and here the driving forces have been the spread of money market mutual funds and the growth of the commercial paper market. This change in the significance of bank deposits is captured in Tables 1 and 2. Table 1 shows that bank deposits fell from 25% of household financial assets in 1979 to 10% in 1999. Table 2 shows that the bank and thrift share of financial sector assets fell from 52% in 1979 to 22% in 1999. A second innovation has been securitization, which has enabled banks to sell-off loans, thereby allowing banks continuously to re-liquefy their balance sheets and avoid getting loaned up over the course of the business cycle. A third innovation has been the growth of home equity lending, which has enabled homeowners to borrow against previously illiquid

Correspondence Address: Thomas I. Palley, Open Society Institute, 1120 Nineteenth Street NW, 8th Floor, Washington, DC 20036, USA. Email: tpalley@osi-dc.org

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Table 1. Composition of household financial assets

Type of holding	1979	1999
Deposits	25%	10%
Life Insurance Reserves	4%	2%
Pension fund Reserves	14%	30%
Mutual Fund Shares	1%	11%
Corporate Equities	13%	23%
Equity in Non-corporate Businesses	30%	13%
Bonds & Notes	8%	6%
Other*	5%	5%

Source: Financial Markets Center, Philomont, VA, based on Federal Reserve Flow of Funds Data, cited in Palley (2000).
*Includes Security credit. Bank personal trusts and miscellaneous.

housing wealth, and thereby finance consumption spending. And a fourth change has been the shift in the composition of wealth portfolios toward increased holding of equities.

These innovations have led to a number of problems. One problem posed by banking disintermediation is that the conduct of monetary policy may have become more difficult due to reduced bank demand for liabilities of the central bank (Friedman, 1999; Palley, 2001/02). A second problem concerns the interaction between increased equity holdings, increased access to home equity credit, and asset price inflation. Such inflation can have large effects on aggregate demand due to wealth effects; they can also contribute to the build up of financial fragility to the extent that agents borrow against increased asset values. Other than raising the general level of interest rates, central banks have little power to control asset price inflation. This poses a dilemma since cooling

Table 2. Composition of financial sector assets

Industry Segment	1979	1999
Banks & Thrifts	52%	22%
Insurance Companies	11%	8%
Pension Funds	17%	26%
Mutual Funds	3%	18%
Non-bank lenders	5%	3%
GSEs & Federally Related Mortgage Pools	6%	12%
Other*	6%	11%

Source: Financial Markets Center, Philomont, VA, based on Federal Reserve Flow of Funds Data, cited in Palley (2000).
*Includes security brokers & dealers, bank personal trusts, ABS issuers, REITs and funding corporations.

over-heated asset markets may require cooling the economy as a whole, making the cure as bad as the disease.

More generally, the financial system can now be said to be characterized by a series of 'automatic de-stabilizers' (Palley, 1999) that stand in sharp contrast to the earlier Keynesian notion of 'automatic stabilizers.' At each moment in time the financial system now has a greater elasticity of private production of credit money, and the elasticity of production of money is also more elastic over the course of the business cycle. The pro-cyclical tilt created by these changes is illustrated by the home equity market where rising home prices feed aggregate demand, and rising aggregate demand then feeds rising home prices. This process is accommodated via banks' ability to escape liquidity constraints by securitizing home equity loans, thereby ensuring a continuing supply of credit for the housing and home equity markets.

The current paper proposes a new regulatory framework of asset-based reserve requirements (ABRRs) which can enhance and sharpen domestic monetary control in this new institutional environment. Under the proposed framework, financial intermediaries would be obliged to hold reserves against different types of assets, with the reserve requirement being adjustable at the discretion of the monetary authority. These reserves would consist of liabilities of the central bank, but their definition could also be widened to include government bonds.[1] Moreover, the new system would apply to all financial intermediaries—not just banks. This contrasts with the existing system of liability-based regulation, which is bank-centric and requires banks (1) to hold reserves against deposit liabilities and (2) to satisfy shareholder capital requirements that vary with the nature of the assets they hold.[2]

2. Overview of the Case for Asset Based Reserve Requirements

Before turning to the details of a system of ABRRs, it should be recognized that the welfare justification for such a system rests upon a meta-view that there are benefits to discretionary policy interventions—a view that is also implicit in existing monetary policy, which emphasizes control over short-term interest rates. The foundation for this position is that decentralized private markets generate sub-optimal outcomes, which can be improved upon by discretionary interventions.

ABRRs can be considered part of the general family of balance sheet regulations that link asset and liability compositions. They tie asset categories together by linking required reserve holdings to the composition of assets (i.e. they are an asset-to-asset link). In contrast, traditional liability-based reserve requirements (LBRRs) tie required reserve holdings to the composition of liabilities (i.e. they are a liability-to-asset link). A newer form of LBRR is

[1] Having government bonds qualify would increase the demand for bonds and lower the interest rate paid by government. Qualifying bonds could be restricted to short-term issues, or could be both short-term and long-term issues.

[2] These capital requirements were established under the 1988 Basle Capital Accords negotiation through the Bank for International Settlements.

risk-based equity requirements, which tie bank equity to the composition of assets. In this instance, causation runs from the composition of assets to the liability side of the balance sheet, making risk-based equity requirements an asset-to-liability link. Margin requirements are another non-bank form of LBRR, applying to stock market investors. They require that agents buying stock with broker-provided credit have liquid financial collateral equal to a specified percent of the loan (i.e. they are a liability-to-asset link).[3]

The system of ABRRs proposed in this paper has some institutional precedents. Regulation of the insurance industry by US states requires that insurance companies hold reserves against their assets for soundness purposes, with the riskiness of assets being determined by the National Association of Insurance Commissioners' Securities Valuation Office. Also, the existing system of bank risk-based equity requirements shows that it is possible to demarcate assets by riskiness. Both of these arrangements point to the feasibility of a system of ABRRs, and anticipate objections that such a system would not be feasible.

The proposed system of ABRRs has significant macroeconomic and microeconomic policy advantages. At the macroeconomic level, ABRRs can provide monetary authorities with multiple independent additional tools of monetary control that can supplement existing control over the short-term interest rate. In terms of Tinbergen's (1952) targets and instruments approach to macroeconomic stabilization policy, ABRRs can provide additional instruments that allow policy makers to focus on additional economic targets. This can be especially useful when fiscal policy is constrained by budgetary concerns. It can also be useful for controlling asset price inflation since ABRRs offer a new policy instrument that can be independently targeted on the stock market, thereby avoiding having to slow the entire economy.

At the microeconomic level there are also benefits. One long-recognized advantage is that ABRRs can be used to guide the allocation of credit toward areas deemed socially deserving (Thurow, 1972; Pollin, 1993). This credit allocation function links with recent discussions about stabilizing the international financial system. There is now an emerging awareness that the problem of financial instability arises from inappropriate asset allocations. Thus, the 1997 East Asian financial crisis is now widely attributed to excessive reliance on short-term lending, combined with overly risky portfolio investment by investors who chased yields with less than full regard to risk (Eichengreen, 1999, pp. 156–157). This, in turn, suggests shifting the focus of financial regulation away from its traditional concern with the liability side of financial intermediary balance sheets toward an increased concern with the asset side. ABRRs do this and can be used to discourage excessive investment and lending in areas deemed to be unduly risky. Thus, by imposing higher reserve requirements on short-term loans, ABRRs can raise the cost of short-term loans relative to longer-term loans, thereby discouraging short-term borrowing. Similarly, by making risky

[3] The old system of functional regulation was another form of balance sheet regulation. Rather than linking asset and liability compositions, it prevented financial intermediaries from holding certain types of asset and liability by restricting lines of business they could enter.

foreign country portfolio investments subject to reserve requirements, ABRRs can lower returns to such investments, thereby discouraging holdings.[4]

A last microeconomic advantage of ABRRs concerns their financial crisis properties. In particular, ABRRs have valuable incentive properties that can help stabilize financial systems. In recent years, monetary authorities have emphasized the need to impose risk-adjusted capital requirements on banks in order to mitigate the moral hazard problem in lending. However, such requirements may be highly pro-cyclical and thereby exacerbate the business cycle. This is because banks are forced to look for additional capital in recessions when loan quality deteriorates and default risk increases, yet this is exactly when bank capital is hardest to raise. This can produce a credit crunch that amplifies the downturn. In contrast, ABRRs can help guard against moral hazard because reserve requirements are contingent on loan riskiness; at the same time ABRRs are less destabilizing since reserves are automatically freed up when borrowers default.

A final point concerns the scope of the regulatory system. The New Deal system of financial regulation was based on the principle of industry segmentation, which divided the financial sector into banking, insurance, and securities underwriting. A system of firewalls ensured that firms did not mix these three types of business, and each segment was subjected to different regulatory rules. Banks were singled out regarding the need for reserve requirements on certain types of liabilities. This system of regulation has now been significantly undone by repeal of the Glass–Steagall Act, which was prompted by the fact that financial innovation had steadily whittled away distinctions between financial intermediaries. Not only do nominally different types of intermediary now compete in the same markets, but even where products differ, they can be decomposed through the use of derivatives and shown to possess many shared attributes. For these reasons, the New Deal distinctions between financial intermediaries have become increasingly less relevant. This suggests that a new system of ABRRs should be applied to all financial intermediaries including banks, insurance companies, and mutual funds. Under such a comprehensive regulatory umbrella reserve requirements would be set by asset type, and not by who holds the asset.[5] This would ensure that the incidence of reserve requirements was determined by the asset configuration of different financial intermediaries, and would remove the incentive to shift business to avoid requirements, which was a problem afflicting the New Deal regulatory regime.

3. Microeconomic Foundations: ABRRs Within the Generic Financial Firm

Given that the proposed system of ABRRs is intended to apply to all financial intermediaries, the model that is developed below uses the construct of a generic financial firm. This firm is most easily identified with a bank that takes in deposits (bank liabilities) and makes loans (bank assets). However, it can also be

[4] This proposal has recently been advanced by D'Arista & Griffith-Jones (1998) and represents a specific application of ABRRs.

[5] Some asset categories might be zero-rated.

identified with a mutual fund which issues variable price deposits (mutual fund liabilities) and invests the proceeds in equities (mutual fund assets). The asset allocation consequences of ABRRs work through their impact on relative rates of return, and these are conceptually the same for both types of firm. The principal difference between banks and other financial intermediaries is that banks receive a pre-determined interest payment, whereas other financial intermediaries hold equity, which puts them in the position of residual claimants. This also means they bear correspondingly more risk.

The interest rate effects of different systems of reserve requirements can be shown through the following heuristic model of a perfectly competitive generic financial firm with constant-returns technology and non-stochastic withdrawals. The assumption of constant marginal costs is a simplifying assumption that facilitates incorporating the micro model into the subsequent macro model.[6]

Under the current system of liability-based reserve requirements (LBRRs) the representative firm's profit maximization program is given by:

$$\max_{L,H,D,T,F} V = i_L L + i_H H - [a_L + p_L]L - [a_H + p_H]H - [i_D + a_D]D - [i_T + a_T] T - [\mathrm{i_F} + a_F]F \tag{1}$$

subject to

$$L + H = [1 - k_D]D + [1 - k_T]T + F \tag{1a}$$

where L = investment loans,
H = consumer loans,
D = short term deposits,
T = long term deposits,
F = Money market borrowing ($F > 0$) or lending ($F < 0$)
i_j = interest rate ($j = L, H, D, T, F$),
a_j = constant marginal cost per dollar of administering loans and liabilities ($j = L, H, D, T, F$),
p_j = probability per dollar of default on loans ($j = L, H$),
k_j = reserve requirement ratio ($j = D, T$), $k_D <$ em t = ″i″k_T.

Equation (1) is the profit function, while equation (1a) is the balance sheet constraint. Substituting the constraint into (1) and differentiating with respect to the choice variables (D, T, H, F) yields four first-order conditions. Satisfaction of these conditions then implies the following structure of interest rates expressed in terms of the money market rate:

$$\mathrm{i_L} = \mathrm{i_F} + \mathrm{a_F} + \mathrm{a_L} + \mathrm{p_L} \tag{2a}$$

[6] The assumption of constant marginal costs means that the size of the individual firm is indeterminate. If pinning down the size of the firm is an important object, then rising marginal costs of intermediation are needed. This would cause the short run market loan supply schedule to be upward sloping, and the loan rate would rise with the extent of lending. However, such a modification would not change the core implication that the pattern of relative interest rates is impacted by the reserve requirement regime. An example of how the size of the individual financial firm can be determined is the following demand deposit cost function for the ith firm, $C_i = a_0 - a_1 D_i + a_2 D_i^2$. Total deposit taking costs are a quadratic function in the level of demand deposits. This implies an equilibrium level of demand deposits at the ith bank of $D_i = a_1/2a_2$. The number of firms, N, in equilibrium is given by $ND_i = D$ where D is the aggregate level of deposits.

$$i_H = i_F + a_F + a_H + p_H \tag{2b}$$

$$i_T = [1 - k_T][i_F + a_F] - a_T \tag{2c}$$

$$i_D = [1 - k_D][i_F + a_F] - a_D. \tag{2d}$$

The money market rate, which is set by the monetary authority, underpins the entire structure of interest rates.[7] The rates on investment and consumer loans are established as mark-ups over the money market rate. These mark-ups take account of the respective costs of administering loans, as well as the respective expected loan default losses.

The rates on short-term and long-term deposits are also established by reference to the money market rate. The effect of LBRRs is to reduce the interest rate paid on both short-term and long-term deposit—the larger the reserve requirement ratio, the lower the rate paid. The logic is as follows. Money market funds, short-term deposits, and long-term deposits are all alternative sources of funds, and firms will therefore seek to equate the marginal cost of funds across these different sources. Reserve requirements mean that part of each deposit has to be retained as reserves, so that financial firms have to acquire more than a dollar of deposits to make a dollar of loans. In effect, reserve requirements raise the effective marginal cost of deposits as a source for funding loans, and firms therefore lower the rate paid to depositors.

The effects of a system of LBRRs can be contrasted with those of a system of ABRRs. In this case, the representative firm's maximization program is given by

$$\max_{L,H,D,T,F} V = i_L L + i_H H - [a_L + p_L]L - [a_H + p_H]H - [i_D + a_D]D - [i_T + a_T] T - [i_F + a_F]F \tag{3}$$

subject to

$$[1 + k_L]L + [1 + k_H]H = D + T + F. \tag{3a}$$

The one change concerns the structure of the balance sheet constraint, in which required reserves are now held against assets. Comparing the two constraints reveals how reserve requirements are really a form of balance sheet regulation. Substituting the constraint into equation (3) and differentiating with respect to the choice variables (L, H, D, T) again yields four first-order conditions. Satisfaction of these conditions then implies the following structure of interest rates expressed in terms of the money market rate:

$$i_L = [i_F + a_F][1 + k_L] + a_L + p_L \tag{4a}$$

$$i_H = [i_F + a_F][1 + k_H] + a_H + p_H \tag{4b}$$

[7] If the monetary authority is targeting the monetary base, there will be a similar effect on the structure of rates. The one difference is that the 'general level' of rates would shift up and down as the federal funds rate varied with fluctuations in the demand base. However, it is now widely agreed that central banks in fact target short-term interest rates and allow monetary quantities to adjust endogenously (Friedman, 2000; Goodhart, 1989; Blinder, 1998).

$$i_D = i_F + a_F - a_D \tag{4c}$$

$$i_T = i_F + a_F - a_T. \tag{4d}$$

Once again, the money market rate underpins the entire structure of rates. However, reserve requirements now affect the structure of rates in dramatically different fashion. In a LBRR system, reserve requirements affect the relative rates paid on liabilities and have no effect on loan rates. In an ABRR system, they have no effect on the rates paid on liabilities, and instead affect the relative rates charged on loans. A higher required reserve ratio raises loan rates. The reason is that ABRRs oblige banks to borrow more than a dollar to make one dollar of loans, and they now charge borrowers for the extra that they must borrow.

Comparing equations (2a)–(2d) with (4a)–(4d) reveals the different microeconomic allocative effects of LBRR and ABRR. LBRRs penalize financial intermediary depositors by reducing the worth of deposits to financial firms, and so reduce the amount they are willing to pay for deposits. ABRRs require firms to acquire additional funds to make loans, and they pass on the costs of these additional funds to borrowers.

Differential reserve requirements therefore provide a means of influencing the composition of financial firms' assets and liabilities. In a system of LBRRs, reserve requirements reduce the yield on liabilities and reduce the total demand for such liabilities. If reserve requirements differ across liabilities, then demand for the liability with the higher reserve requirement will fall relative to that with the lower reserve requirement. In a system of ABRRs, reserve requirements raise loan rates and reduce the overall demand for loans from firms. If reserve requirements differ by loan type, then the demand for loans with the higher reserve requirement will fall relative to that with the lower reserve requirement.

The above mechanism reveals how ABRRs can be used to influence the microeconomic allocation of credit. This is done by changing the relative price of different types of credit without changing the general level of interest rates. Such a credit allocation effect has some similarity with selective credit controls. However, selective credit controls are a quantity-based regulation, which leads to rationing problems associated with how to allocate the fixed quantity of credit. ABRRs allow the market to allocate credit at a price that is implicitly determined by the monetary authority.

If the menu of assets available to the financial intermediary is further disaggregated, the monetary authority can, in principle, make even finer decisions about pricing credit and asset returns. Consider, for example, over-heated real-estate markets, which may have amplified business cycle fluctuations (Case, 2000). Under LBRR, controlling this requires raising the general level of interest rates, with all its adverse consequences for the entire macroeconomy. In a system with ABRRs, the monetary authority can narrowly target the property sector by raising reserve requirements on mortgage loans. Indeed, such interventions could even be arranged so as to distinguish between commercial, residential and industrial property loans, or to distinguish loans by region. In this fashion, over-heated property markets could be cooled without slowing the whole economy.

Finally, the ability of ABRRs to influence credit allocation indicates its usefulness as a tool for regulating international financial flows. The recent currency crisis in South East Asia has been substantially attributed to excessive international short-term lending (Eichengreen, 1999, pp. 156–157). South East Asian economies were allowed to build up large foreign currency denominated debts, and a run on their currencies resulted when creditors realized they were going to have difficulty servicing these debts. Capital market failure associated with excessive extension of short-term credit was at the heart of the problem. A system of ABRRs could be used to prevent such outcomes since domestic monetary authorities could impose requirements on short-term loans in general, or just on loans to countries which they deem to be over-borrowed.

4. Targets and Instruments: the Macroeconomic Advantages of ABRR

The previous section analyzed the microeconomic effects of an alternative system of reserve requirements. This section analyses the implications of alternative systems of reserve requirements for macroeconomic stabilization. In particular, it shows how a system of ABRRs can provide a useful additional instrument for purposes of macroeconomic stabilization. This additional instrument can be particularly useful when governments are constrained in their use of fiscal policy, or when they have additional financial sector targets such as the exchange rate. The reason why ABRRs can be a useful instrument is that they can be used to control consumption spending while leaving investment spending unaffected.

The above claims can be illustrated in the following Keynesian general aequilibrium IS-LM model:

$$y = C(\bar{i}_H, \bar{i}_D \bar{i}_T, [\bar{1} - t]y) + \bar{1}(\bar{i}_L) + G + NX, \tag{5}$$

$$NX = NX(\bar{e}, \bar{y}), \tag{6}$$

$$e = \overset{+}{e}(i_F / \bar{i}_{F*}), \tag{7}$$

$$L + H = [1 - k_D]D + [1 - k_T]T, \tag{8}$$

$$k_L L + k_H H = B, \tag{9}$$

$$L = L(i_L, y), \tag{10}$$

$$H = H(i_H, i_D, i_T, [1\text{-}t]y), \tag{11}$$

$$D = D(i_H, i_D, i_T, [1\text{-}t]y), \tag{12}$$

$$T = T(i_H, i_D, i_T, [1\text{-}t]y), \tag{13}$$

where the signs above functional arguments represent assumed signs of partial derivatives. All quantities are real quantities. The definition of variables is as follows:

y = output,

C = consumption spending,

I = investment spending,

G = government spending,

NX = net exports,

e = exchange rate,

i_{F*} = foreign money market rate,

B = monetary base,

t = average tax rate.

Equation (5) is the goods market equilibrium condition. Equation (6) determines the level of net exports. Equation (7) determines the exchange rate, which is a function of relative cross-country money market interest rates. Equations (8)–(13) describe the financial sector. Equation (8) is the aggregate banking sector balance sheet constraint, and federal funds borrowings are therefore zero in aggregate. Equation (9) is the market equilibrium condition for the market for monetary base, and it is assumed for simplicity that non-bank currency holdings are zero. Equations (10) through (13) determine household demand for loans, corporate demand for loans, household demand for demand deposits, and household demand for time deposits.

In equation (5), the goods market equilibrium condition, the level of demand determines the level of output. The level of demand is, in turn, determined by consumption, investment, government spending and net exports. The level of consumption spending depends on the consumer loan interest rate, the demand and time deposit rates, the money market interest rate, and after-tax income. The influence of demand deposit and time deposit rates on consumption spending reflects the conventional transmission mechanism, where the yields on financial assets affect household saving. This effect is negative if the substitution effect dominates the income effect. The influence of the consumption loan rate reflects the credit channel. Investment spending depends on the investment loan rate, which reflects the cost of credit channel.

The determination of interest rates and monetary aggregates depends on the system of reserve requirements and the monetary authorities target variable. For current purposes the analysis is restricted to the case where the central bank is targeting the money market interest rate. In this case, the monetary base is endogenous and the system of equations given by (5)–(13) is block recursive, with equations (5)–(7) constituting one block and equations (8)–(13) constituting another.

If the financial system is governed by LBRRs, interest rates are determined according to equations (2a)–(2d). Substituting in equations (5)–(7), this yields the following system

$$y = C(i_F + a_F + a_H + p_H, [1\text{-}k_D][i_F + a_F]\text{-}a_D, [1\text{-}k_T][i_F + a_F]\text{-}a_T, [1\text{-}t]y) + I(i_F + a_F + a_L + p_L) + G + NX, \tag{5a}$$

$$NX = NX(e, y), \tag{6a}$$

$$e = e(i_F/i_{F*}). \tag{7a}$$

The endogenous variables are y, NX and e. The policy instruments are i_F, k_D, k_T, t and G.

From a policy standpoint, the target variables are usually the level of output, y, and the level of net exports, NX. If policy makers have control over both monetary and fiscal policy, then they have sufficient instruments (i_F, G and t) both to lower final demand and to change its composition such that the level of investment spending is maintained. This can be done by tight fiscal policy (higher t and lower G) and easy monetary policy (lower i_F). In terms of the IS-LM model, such a policy shifts the IS left and lowers the LM.

However, difficulties arise when fiscal policy is constrained. In this case, conventional wisdom is that policy makers have only one instrument, namely control over the money market interest rate. If policy makers wish to slow the economy to avoid inflationary pressures, then they have to raise the money market rate. This results in higher consumer loan rates, which reduces consumption demand by reducing consumer borrowing and increasing saving. However, it also raises investment loan rates and reduces investment spending, which slows the rate of growth of potential output. Thus, using higher interest rates to slow the economy and prevent inflation carries a heavy cost in terms of reduced investment and capital accumulation. Finally, higher rates cause a deterioration in the trade balance owing to their effect on the exchange rate, and this can have serious negative consequences for the manufacturing sector.

A system of ABRRs offers policy makers a way out of these dilemmas. In such a system, interest rates are determined by equations (4a)–(4d). Substituting in equations (5)–(7) yields the following system:

$$y = C([i_F + a_F][1 + k_H] + a_H + p_H,\ i_F + a_F\text{-}a_D,\ i_F + a_F\text{-}a_T,\ [1\text{-}t]y) + I([i_F + a_F][1 + k_L] + a_L + p_L) + G + NX, \tag{5b}$$

$$NX = X(e,\ y), \tag{6b}$$

$$e = e(i_F/i_{F*}). \tag{7b}$$

Inspection of this system shows that if policy makers want to twist the composition of aggregate demand by reducing consumption, they can do this by raising consumer loan reserve requirements. This immediately translates into higher consumer loan rates and reduced consumption spending, which reduces aggregate demand and output. Since money market rates are unchanged, the investment loan rate is unchanged and investment spending is not directly affected. Moreover, the exchange rate is also unchanged since the money market interest rate is unchanged. This means that the tightening vis-à-vis consumer spending is accomplished without an adverse exchange rate impact on net exports.

It is even possible that the monetary authority could lower the exchange rate and stimulate investment while simultaneously discouraging consumption. This can be done by lowering the money market interest rate while raising the reserve requirement on consumer loans even higher. If done appropriately, the consumer loan rate would rise and the investment loan rate fall. Moreover, the lower money market interest rate would depreciate the exchange rate, which would raise exports, lower imports, and improve the current account.

In sum, using ABRRs to twist the structure of consumer and investment loan rates provides a powerful policy tool for lowering consumption without lowering investment.[8] For this reason ABRRs can be a valuable instrument of stabilization policy.

5. ABRR and the New Problem of Asset Price Inflation

Recently, concerns have arisen about the macroeconomic consequences of asset price inflations, especially in the US. Federal Reserve Chairman Alan Greenspan (1999) has noted how asset price inflations can produce a large wealth effect on consumption, and can also generate financially fragile balance sheets if individuals take on debt to purchase other flexible price assets. For the monetary authority, this poses a dilemma since using interest rates to control asset prices puts the general level of economic activity at risk.

ABRRs offer a way out of this dilemma by enabling the monetary authority to directly target asset prices. This can be seen from the following asset price augmented IS-LM model. Asset prices, q, enter as a positive argument in the consumption function. The goods market equilibrium, net export, and exchange rate equations become

$$y = C([i_F + a_F][1 + k_H] + a_H + p_H,\ i_F + a_F\text{-}a_D,\ i_F + a_F\text{-}a_T,\ [1\text{-}t]y, q) + I([i_F + a_F][1 + k_L] + a_L + p_L) + G + NX, \tag{5c}$$

$$NX = X(e,\ y), \tag{6c}$$

$$e = e(i_F/i_{F*}). \tag{7c}$$

The price of equities is determined by discounted profits per share. Assuming for simplicity a steady perpetual stream of profits, V, this implies

$$q = V/i_q, \tag{14}$$

where i_q = rate of return on equities. Finally, portfolio equilibrium requires that the risk-adjusted rates of return to holding equities equal the safe return on holding deposits. This implies

$$i_q/[1 + k_q] = i_D + z, \tag{15}$$

where k_q = ABRRs imposed on equity holdings,

z = equity premium.

Substituting equation (15) into (14) shows that an increase in the reserve requirement on equities drives down equity prices. This in turn reduces consumption spending and imports in equations (5c) and (6c), but the general level of interest rates remains unchanged. Consequently, asset prices can be specifically targeted without having negative spillover effects on investment spending and the exchange rate.

[8] If investment is a positive function of consumption spending, then raising rates to dampen consumption spending will also reduce investment spending. While this is true, it remains the case that ABRR can still be used to diminish the impact of monetary policy tightening on investment spending by twisting the structure of interest rates so as to raise consumption loan interest rates and lower investment loan interest rates.

6. Stability Advantages of ABRRs

Another advantage of ABRRs is their superior macroeconomic stability properties. Reserve requirements have traditionally been imposed against bank liabilities, with the size of these requirements depending on the perceived likelihood of net withdrawals. This design reflects an earlier belief that bank runs were caused by panic withdrawals of deposits, and reserve requirements could help mitigate this likelihood. However, to the extent that bank runs are triggered by deterioration on the asset side of bank balance sheets, the best way to protect against bank runs may be strengthening the asset side of balance sheets. This may be especially desirable given that deposit insurance reduces depositor discipline on banks, thereby contributing to a moral hazard problem that has banks engage in excessively risky lending.

The Basle agreement of 1988 introduced risk-based equity requirements to counter moral hazard. It attempts to discourage banks from adopting excessively risky asset compositions by obliging them to put up more capital as the riskiness of their lending increased. However, a problem with these requirements is that they can generate instability in the banking sector. In a recession, loan defaults wipe out equity, and this requires banks to raise more equity capital. Yet this is exactly when it is most difficult for banks to raise more equity. As a result, risk-based capital requirements may act as an 'automatic destabilizer' that amplifies business cycle downturns by contributing to credit crunches.

ABRRs do not have this problem, but they can still help combat moral hazard. ABRRs can be structured according to risk, thereby making risky loans relatively more costly and discouraging excessive risky lending. If a risky loan defaults, the reserves on that loan are freed up, giving banks the liquidity they need when most needed. Moreover, it is also easier to expand the banking system's capacity to lend in times of recession under a system of ABRRs than under a system of capital requirements. Under ABRRs the monetary authority can inject reserves through standard open market operations thereby giving banks the liquidity to back further lending, whereas a system of risk-based capital requirements requires that equity holders put up more capital. However, as noted above, recessions make equity holders reluctant to supply capital, thereby making counter-cyclical management of the banking system more difficult.[9]

7. Further Advantages of ABRRs

Two further advantages of ABRRs concern their implications for collection of seignorage and the conduct of monetary policy. Under existing arrangements, the government collects seignorage on cash held by the public and through reserve requirements levied on bank deposits. Over the last decade, as cash needs have

[9] Capital requirements have allocative properties that are similar to ABRRs. Since shareholder capital is the most expensive type of capital, they tend to discourage banks from accumulating assets that carry high capital requirements. There is now discussion of making capital requirements more subject to activist discretionary change, and using them to manage the financial business cycle. Their big drawback relative to ABRRs is their pro-cyclical character.

fallen owing to the introduction of new transactions technologies (such as credit cards), and as bank reserve holdings have declined due to lower reserve requirement ratios and reduced demand for bank deposits, seignorage collection has declined. Introducing ABRRs on the spectrum of financial assets held by financial intermediaries would reverse this, and increase the demand for reserves. In doing so, it would create a seignorage windfall that would benefit the public purse. Moreover, seignorage revenues would grow as holdings of financial assets grew.

With regard to monetary policy, the declining significance of banks threatens to make the future conduct of monetary policy more difficult.[10] Monetary policy works through central banks exchanging government bonds for reserves, and thereby altering the supply of reserves. A key requirement is that there be a demand for reserves, so that the change in supply causes a market imbalance that, in turn, causes interest rates to adjust. However, the demand for reserves has been shrinking as banks have shrunk relative to the overall financial sector, and as reserve requirements on deposits have been lowered. This means that central banks have an increasingly tenuous hold on the economy because their policies work via the banking system, and banks are increasingly small relative to the financial system. This trend will likely persist, making the conduct of future monetary policy more difficult. Imposing a system of ABRRs on all financial intermediaries would re-establish the central banks' hold over the entire financial sector, and monetary policy would work rapidly and forcefully, since any change in the supply of reserves would be felt by all financial intermediaries across the board.

8. Conclusions

This paper has argued for a new comprehensive system of financial sector regulation centered on asset-based reserve requirements. Such a system can be used to combat financial instability by giving policy makers the instruments needed to discourage excessive risk taking. It also facilitates the task of macroeconomic management by providing policy makers with additional instruments, allowing them to hit additional targets, including stock market prices. It can also be used to affect the allocation of credit, including discouraging excessive short-term foreign lending. ABRRs also possess highly desirable stability properties in that liquidity is automatically released in times of financial distress. Lastly, ABRRs can raise significant seignorage, and can enhance the traction of monetary policy in a world in which banks are becoming a smaller part of the financial landscape.

With regard to operationalizing such a system, ABRRs should be uniformly applied across all financial intermediaries. In the past, reserve requirements have just been imposed on banks, and this has placed banks at a competitive disadvantage versus other financial intermediaries and provided incentives to shift financial intermediation outside the banking sector, thereby diminishing the effectiveness of monetary control. Both of these problems would persist if

[10] This issue has been recently raised by Friedman (1999).

ABRRs were placed just on banks. For these reasons, they should be placed on all financial intermediaries on the basis of the assets they hold.

Within the US, the financial regulatory framework of the New Deal era has been largely bypassed by financial innovation and legal repeal. A significant regulatory gap has diminished the stability of policy makers to control financial markets. ABRRs can help fill this gap and restore stable financial markets and effective monetary control.

If ABRRs are placed only on firms operating in the domestic market, this creates an incentive to shift business offshore—much as banks' desires to escape reserve requirements on deposits contributed to the growth of the euro-dollar market in the 1960s. The best way to avoid such jurisdictional shopping is to have all major countries adopt ABRRs, as has been the case for bank capital requirements under the Basle accords. However, for a number of reasons, a system of ABRRs may still feasible for the US alone. First, shifting business to avoid ABRRs imposes costs on financial intermediaries, and these costs act to limit the incentive to shift. Second, decisions about business location depend on a range of factors including business environment, the network of other support services and ancillary markets, availability of qualified personnel, and the soundness of the regulatory system governing the conduct of business. All of these factors work to the advantage of the US, so that application of ABRRs need not be decisive regarding business location. Third, it may also be possible to make ABRRs stick on foreign financial intermediaries by having the validity of domestic collateralized loan agreements and loan guarantees depend on compliance with ABRR regulations. The same holds for domestic assets, as proper legal title registration at time of purchase could require compliance with ABRR regulations. Such measures would then give foreign financial intermediaries an incentive to comply, and they illustrate how domestic financial market regulation is still feasible despite the international mobility of financial capital.

Finally, as with any system of regulation, an ABRR system will need to be periodically updated in response to financial innovation. All effective regulation implicitly prevents profit-maximizing firms from doing what they would like to do, and thereby sets up an incentive to innovate and evade regulation. Over time, firms are inevitably successful in this process, so that good regulation always sows the seeds of its own destruction. In a system of ABRRs, financial firms stand to introduce new asset categories and new methods of transacting that are outside existing regulation; this means the system will need to be periodically updated. This is not a criticism of ABRRs *per se*, but rather a systemic feature of all regulation.

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