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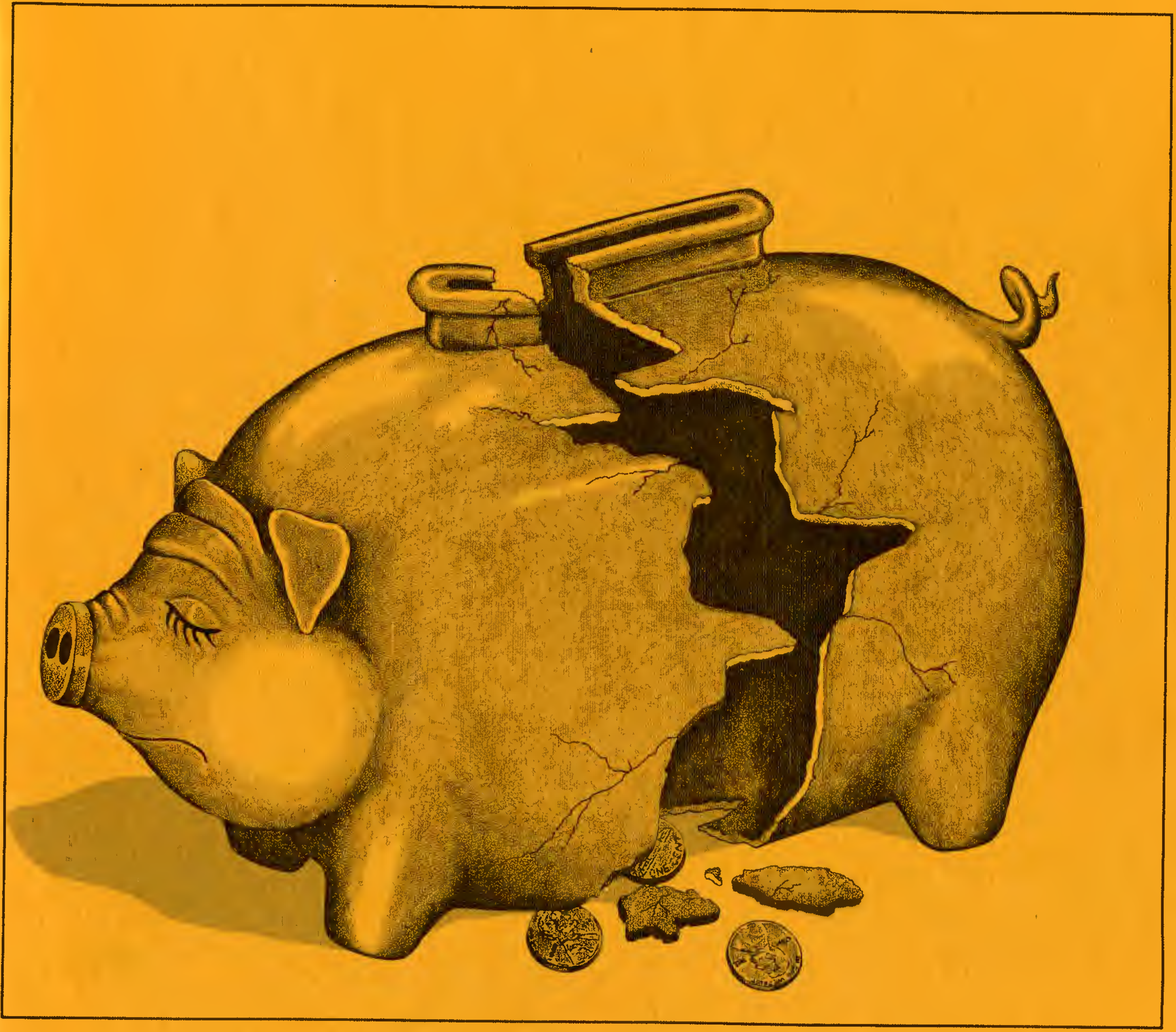

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After the new bankruptcy code became effective October 1, 1979, the number of personal bankruptcy filings (PBFs) in the United States sharply increased to record highs. Some analysts believe that the new code is primarily responsible for this increase. To evaluate this belief, K.J. Kowalewski examines the theoretical factors behind a consumer's decision to file for bankruptcy; in the aggregate these factors are broadly consistent with the behavior of PBFs in the past 20 years. Using these theoretical factors, he develops a regression model to explain PBFs and to evaluate the impact of the new code. He finds that the new code may have had a smaller impact on PBFs than previous studies have reported.

**The Case for Staggered-Reserve Accounting** ........... **30**

The Federal Reserve System rations the supply of money to the economy by rationing the supply of reserves to the banking system. Most U.S. banks are required to settle their reserve accounts simultaneously each Wednesday. If their total reserve needs differ from the amount made available by the System on settlement day, then the discrepancy must be made up at the discount window. This means that the System cannot directly control the supply of total reserves. William T. Gavin argues for an institutional reform to lengthen the reserve-accounting period from one week to four weeks and to stagger the reserve-accounting periods among four groups of banks. Such staggered-reserve accounting would allow the Federal Reserve to set operating targets for total reserves.

# Personal Bankruptcy: Theory and Evidence

by K.J. Kowalewski

In the statistical year ending June 30, 1981, total personal bankruptcy filings (PBFs) in the United States rose to a record high of 452,730, about 44 percent higher than the previous record of 314,862 set in statistical year 1980 and about 102 percent higher than in 1975.[1] This increase is a major concern of lawmakers and consumer lenders; it has swamped the already overloaded bankruptcy court system and increased loan losses of some consumer lenders by as much as 124 percent over 1979.[2]

Some analysts agree that slow real economic growth, high interest rates, and distortions to consumer budgets caused by unexpectedly rapid inflation during the late 1970s have forced many consumers into bankruptcy. Yet, a large number of analysts contend that other factors are at work, factors that have changed the behavior of PBFs since 1978, if not before. These factors include advertising by lawyers, a changing attitude toward the stigma of bankruptcy, an increased awareness of consumer rights, and, effective October 1, 1979, a new bankruptcy code—the Bankruptcy Reform Act of 1978. Many analysts claim that the new code is responsible for the vast majority of the increase in PBFs since late 1979.[3] In response, the Subcommittee on Courts of the U.S. Senate Judiciary Committee has begun hearings on possible changes in the code.[4]

The appropriate responses of lawmakers and consumer lenders depend on a careful analysis of the impact of the new code. If the new code has created an unintended and undesired increase in loan losses arising from personal bankruptcy, then legislative changes may be necessary. If the new code is blameless or thought to be an equitable law, then consumer lenders will need to tighten their lending policies to lessen their exposure to loan-default risk in this new environment. Tighter consumer-lending policies are a concern of policymakers, because the availability of credit affects the pace of personal consumption expenditures, the largest component

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[1] A statistical year begins on July 1 and ends on the following June 30.

The term *personal bankruptcy filings* refers to the number of bankruptcy petitions filed by employees and others not in business. They include filings under both Chapters 7 and 13 of the U.S. Code, Title 11. Joint husband and wife petitions are counted twice to make them comparable with past filing statistics. If joint petitions under the new bankruptcy code are not counted twice, the filing figures become 241,430 and 313,499 for 1980 and 1981, respectively. These numbers are reported by the Administrative Office of the U.S. Courts.

[2] There are no figures on total loan losses resulting from personal bankruptcy available from the Administrative Office of the U.S. Courts. However, many consumer lenders record their own losses from bankruptcy. For example, Continental Illinois reported a 74 percent increase in credit losses due to bankruptcy in 1980 from 1979; Sears reported a 109 percent increase in 1980 and a 16.5 percent increase in the first 11 months of 1981; Citibank reported a 56 percent increase in 1980 from 1979; in the first nine months of 1980, Household Finance Company reported its highest loan charge-off due to bankruptcy—40.3 percent of its total loan charge-off; Chase Manhattan Bank's VISA card plan lost $5 million in 1980, up 300 percent from 1979, and about $12 million in 1981.

[3] See, for example, Pfeilsticker (1978); Carter (1982); and Brimmer (1981).

[4] *Bankruptcy Reform Act of 1978*, Hearings before the Subcommittee on Courts of the Committee on the Judiciary, 97 Cong. 1 Sess. (Government Printing Office, 1981).

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of the gross national product. For example, one of the major reasons why forecasts of a recession occurring in 1979 were incorrect was because consumer spending was stronger than expected, financed by unexpectedly high levels of consumer credit. Moreover, some analysts suspect that the Consumer Credit Restraint Program contributed to the sharp 9.8 percent decline in real personal consumption expenditures during the second quarter of 1980, a postwar record (see Cox 1980).

This paper evaluates the impact of the new bankruptcy code by examining aggregate PBFs since 1961. Aggregate PBFs are used, because they are the only data readily available to study the personal bankruptcy issue. Although aggregate data cannot be used to evaluate the individual and societal costs and benefits of the new code, they can be used to estimate the aggregate impact of economic forces. The first section of this paper presents a theoretical framework for analyzing the PBF data. The second section reviews the historical behavior of aggregate PBFs and suggests an interpretation based on the implications of the theoretical model. The third section develops and estimates an empirical model of quarterly aggregate PBFs that is broadly consistent with the theoretical model and uses it to examine the impact of the new bankruptcy code. The important result is that the new code may account for about one-third of the increase in PBFs. The question of whether the new code may have changed the empirical model is also examined. The final section contains concluding remarks.

## I. The Elements of the PBF Issue

### *Framework*

It is useful to view the PBF issue as two separate questions. First, why do some consumers fall into financial distress, unable to pay their contractual obligations—installment and other regularly scheduled debt payments, insurance, rent, and utility payments, for example—with either current income or savings? Second, why do some financially distressed consumers file for bankruptcy, while others do not?

Failure to meet contractual obligations is, of course, a necessary condition for bankruptcy, and it occurs for a variety of reasons.[5] Income loss resulting from layoff or unemployment and burdensome expenses, such as alimony, child-support payments, hospital and doctor bills, and judgment debts from personal liability suits, can put considerable pressure on the budgets of consumers with insufficient savings. Past studies of individual personal bankrupts also have found that poor money management can precipitate a financial crisis.[6] Apparently, some consumers do not have the willpower or knowledge to live within their means. They save little or nothing and assume a contractual payment burden that they quickly find they cannot meet.[7] Most consumers who fall into financial trouble for this reason are presumably young, lower-income individuals with few savings or consumer goods necessary to raise a family, but the past cross-section studies are not clear on this point.[8]

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[5] Intuitively, this seems true. If a consumer makes all of his/her contractual payments on time, he/she will be in good standing with his/her creditors and need not worry about bankruptcy or legal actions by creditors. However, the bankruptcy laws usually have included other conditions for bankruptcy. Section 3a, Chapter III of the bankruptcy law in effect until October 1979 specifies six possible "acts of bankruptcy," the last of which permits an individual to file for bankrupcty by admitting "in writing his inability to pay his debts and his willingness to be adjudged a bankrupt." Section 623, Article IV, Chapter XIII of the same law requires that "a petition filed under this chapter shall state that the debtor [in this case a wage earner and not a business] is insolvent or unable to pay his debts as they mature . . . ." The new bankruptcy code does not explicitly define "acts of bankruptcy." To be eligible for relief under the new Chapter 13, Section 109e, Title 11 of the U.S. Code states that an individual must have a "regular income" and owe less than $100,000 in unsecured debts and $350,000 in secured debts. The new bankruptcy code apparently does not require consumers to claim that they are insolvent or having difficulty meeting their contractual payments, but this requirement probably did not prevent many, if any, consumers from filing under the old law.

[6] See, for example, Brunner (1964); Dolphin (1965); Herrmann (1965); Mathews (1969); Misbach (1964); Reed (1967); Sadd and Williams (1933); and Stanley and Girth (1971). These studies find poor money management to be the single most important precipitator of financial distress. Unfortunately, the term *poor money management* is never clearly defined by these studies. Depending on the judgments of the researchers and the people they interviewed, this term may be confused with *income loss* or *dishonesty* (the willful assumption of debts to take an unfair advantage of creditors and the bankruptcy laws) as the cause of financial distress for a particular consumer.

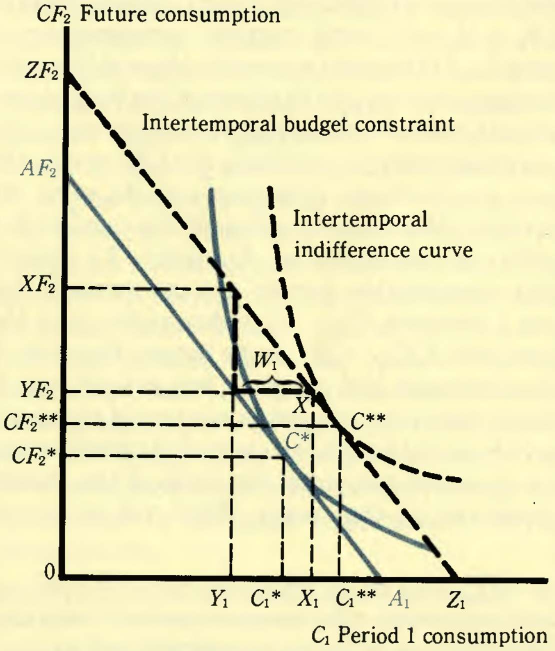
Financial distress does not necessarily lead to bankruptcy, because consumers may be able to refinance their debts directly through their current creditors or indirectly through proraters, consumer credit counseling services, finance companies and financial institutions, or wage-earner trusteeship programs such as the one administered by the Cleveland Municipal Court.[9] When a financially distressed consumer knows about these alternatives and can choose among them and bankruptcy, he/she examines the expected cost of each option in terms of foregone current and future consumption and chooses the option that yields the maximum present value of his/her expected future utility. However, when there are constraints on the ability of a consumer to borrow against his/her future income, the only utility-maximizing options available may be the bankruptcy options.

These issues are best understood by extending the intertemporal utility maximization model, which pertains to an individual consumer. For simplicity, assume a world with no uncertainty or inflation and consider a consumer who has a known life span of $T$ periods and is early in his/her life cycle, just starting a family, and unconcerned about bequests. This basic framework is illustrated in figure 1. The horizontal axis denotes the dollar value of consumption in period 1, $C_1$, and the vertical axis denotes the present value of consumption in periods 2 through $T$, $CF_2$, discounted to period 2; that is,

$$CF_2 = C_2 + C_3/(1 + r) + \ldots + C_T/(1 + r)^{T-2} ,$$

where $r$ is the one-period interest rate. The consumer's utility is a function of $C_1$ and $CF_2$, and his/her preferences for combinations of $C_1$ and $CF_2$ are summarized by a family of indifference curves. Two such curves are shown in figure 1. The consumer is indifferent to alternative combinations of $C_1$ and $CF_2$ along a particular indifference curve but prefers combinations that lie

**Fig. 1 Perfect Capital Markets**



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[7] It is ironic that many personal bankrupts fell into financial distress through poor money management. These consumers were able to obtain all the credit they needed to place themselves into financial distress, but they could not obtain sufficient credit to get themselves out. This presumably stems from the absence of perfect information in consumer loan markets.

[8] In fact, these studies made very few attempts to understand the relationships among the characteristics of personal bankrupts. For example, it was never made clear whether the younger personal bankrupts had different kinds and amounts of debts than older personal bankrupts. Nor were attempts made to understand the dynamics of financial distress. For example, did the consumers spend all of their savings to avoid financial distress, or were there no savings to fall back on when financial crises occurred?

[9] That a financially distressed consumer may get out of financial distress by refinancing the existing debt with new debt implies that the availability of consumer credit alone is not sufficient to explain PBFs or financial distress.

on indifference curves above or to the right. The slope of the indifference curve at any point measures the consumer's preference in trading $C_1$ for $CF_2$ at that point and depends on the rate at which the consumer discounts future utility. The larger the rate, called the *rate of time preference*, the more the consumer values $C_1$ relative to $CF_2$, and the steeper the indifference curve at every point.

The consumer's labor income in period 1 is $Y_1$, and $YF_2$ is the present value of labor income known to be earned in periods 2 through $T$, discounted to period 2. The consumer can borrow against future income to consume more than $Y_1$ in period 1 or save some of $Y_1$ to consume more than $YF_2$ in the future. In this simple model, with the borrowing and lending interest rates equal to $r$ and constant across time, the consumer can choose any combination of $C_1$ and $CF_2$ as long as it is within his/her budget, that is, within the area $(AF_2)A_1 0$. The intertemporal budget constraint, $(AF_2)A_1$, defines the maximum combinations of $C_1$ and $CF_2$ that the consumer can purchase. Along this constraint, the consumer can trade 1 dollar of $C_1$ for $(1 + r)$ dollars of $CF_2$. At $A_1$ the individual would consume $Y_1 + (YF_2)/(1 + r)$ dollars today and nothing in the future, while at $AF_2$ future consumption is $YF_2 + (1 + r)Y_1$ and current consumption is zero.[10] At the point where the slope of the indifference curve equals the slope of the budget constraint, point $C^*$ in figure 1, the rate at which the consumer prefers to trade $C_1$ for $CF_2$ equals the rate at which the consumer can do so in the market. The present value of the consumer's utility is maximized at this point. To achieve this consumption bundle, the consumer in figure 1 borrows $C^*_1 - Y_1$ today and repays the loan with $YF_2 - CF_2^*$ in the future. However, if the consumer had a high or low enough rate of time preference, the consumer would choose $A_1$ or $AF_2$, even though the slope of the indifference curve would not equal the slope of the budget constraint at that point. When the consumer chooses a point where the slopes are unequal, he/she is said to be at a *corner solution*.

Nonhuman wealth—for example, savings accounts and real estate—is easily incorporated into the model. When the consumer owns $W_1$ dollars of nonhuman wealth in period 1, the budget constraint shifts to $(ZF_2)Z_1$ in figure 1, where

$$X_1 = Y_1 + W_1, \; XF_2 = YF_2 + (1 + r)W_1,$$

$$Z_1 = A_1 + W_1, \text{ and}$$

$$ZF_2 = AF_2 + (1 + r)W_1.$$

The consumer achieves a higher present value of utility at $C^{**}$, consuming $C_1^{**}$ and borrowing $C_1^{**} - X_1$ today while consuming $CF_2^{**}$ and repaying the loan with $YF_2 - CF_2^{**}$ in the future.

Up to this point it has been assumed that capital markets are perfect. Consumers can borrow and lend at the same interest rate, consumption plans are constrained only by the present value of the consumer's human and nonhuman wealth, and loan horizons are essentially infinite. It is widely recognized, however, that capital markets are *not* perfect. Transactions and information costs drive a wedge between borrowing and lending interest rates, and imperfect information about the credit worthiness of potential borrowers prompts lenders to impose down-payment, collateral, and collateral maintenance requirements on loan contracts (see Stiglitz and Weiss 1981; Smith 1980). Moreover, transactions costs and imperfect information act to shorten loan horizons, and thin resale markets make it difficult to sell or borrow against many tangible assets. For consumers whose income streams mesh quite well with desired consumption plans or whose nonhuman wealth is sufficiently large and liquid, capital-market imperfections are not crucial. For other consumers, especially consumers contemplating bankruptcy, these imperfections, known as *liquidity constraints*, can restrict actual consumption plans to be less than they would be in perfect capital markets.

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[10] Henceforth, the set of affordable consumption bundles will be referred to only by its budget constraint designation. For example, the set $(AF_2)A_1 0$ is designated $(AF_2)A_1$.

**Fig. 2 Liquidity Constraints**

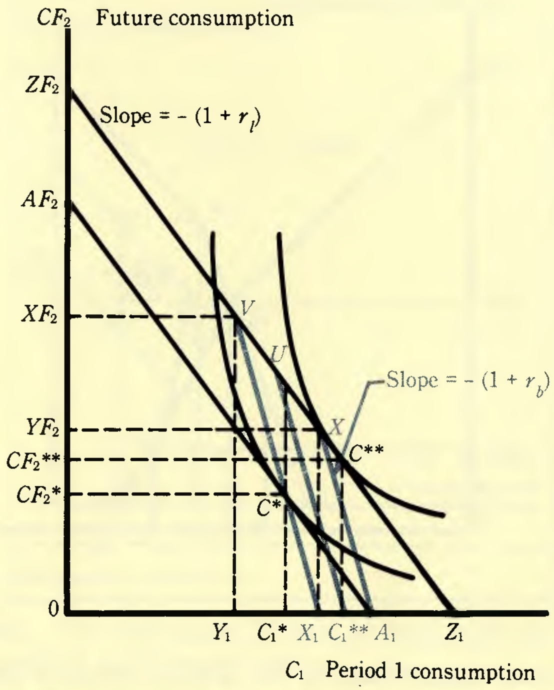


Figure 2 illustrates how liquidity constraints can affect the intertemporal budget constraint. When the borrowing rate, $r_b$, is greater than the lending rate, $r_l$, the budget constraint has a "kink" at the initial endowment point, $X$. A representative constraint is $(ZF_2)XA_1$. If, in addition, there is a collateral requirement for borrowing or a limit to the amount of nonhuman wealth that can be used for period 1 consumption, then the constraint resembles $(ZF_2)UC_1^{**}$. The constraint $(ZF_2)VX_1$ occurs when all of the nonhuman wealth is illiquid in period 1. If borrowing is not permitted, the constraint becomes $(ZF_2)VY_1$ or $(ZF_2)XX_1$, depending on whether nonhuman wealth today is completely illiquid or completely liquid, respectively. Shorter loan horizons, with $r_b = r_l$, imply constraints similar to $(ZF_2)C^{**}C_1^{**}$ in figure 2. In this case, the expression $C_1^{**} - X_1$ represents the maximum permissible amount of borrowing, where

$$Z_1 = Y_1 + W_1 + \frac{YF_2}{1 + r},$$

$$C_1^{**} = Y_1 + W_1 + \frac{YF'_2}{1 + r},$$

$$YF_2 = Y_2 + \frac{Y_3}{1 + r} + \frac{Y_4}{(1 + r)^2} + \ldots + \frac{Y_T}{(1 + r)^{T-2}},$$

and

$$YF'_2 = Y_2 + \frac{Y_3}{1 + r} + \ldots + \frac{Y_\tau}{(1 + r)^{\tau-2}}$$

for a $\tau < T$ period loan. It is clear that liquidity constraints can increase the likelihood of corner solutions and force a borrowing consumer to a present value of utility below the perfect capital-market level; liquidity constraints do not affect consumers who are saving along the $(ZF_2)V$ segment of the budget constraint.

To distinguish between financial distress and the decision to file for bankruptcy, and to complete the model, we must introduce the element of uncertainty. Ideally, the model would include uncertainty about future labor income, consumption needs, and interest rates. To keep the analysis simple, only uncertainty about future income will be considered. Financial distress then can arise when actual future income is less than its expected value. Again for simplicity, assume creditors compensate for this uncertainty by offering only one-period loans at a rate, $r_b$, higher than the lending rate, $r_l$, and assume the consumer owns only human wealth. The consumer's consumption decision in any period depends on current income and interest rates, expected future income, and actions taken in previous periods. In future periods, the consumer may not (be able to) consume in the pattern he/she planned or expected in past periods, but will change plans in ways consistent with revised expectations of future labor income and unfulfilled or exceeded expectations of past labor income.

Consider the consumer in figure 3. Current (period 1) labor income is $Y_1$, known with certainty, and $YF_2$* is the consumer's and the credi-

**Fig. 3 Initial Budget Constraint**

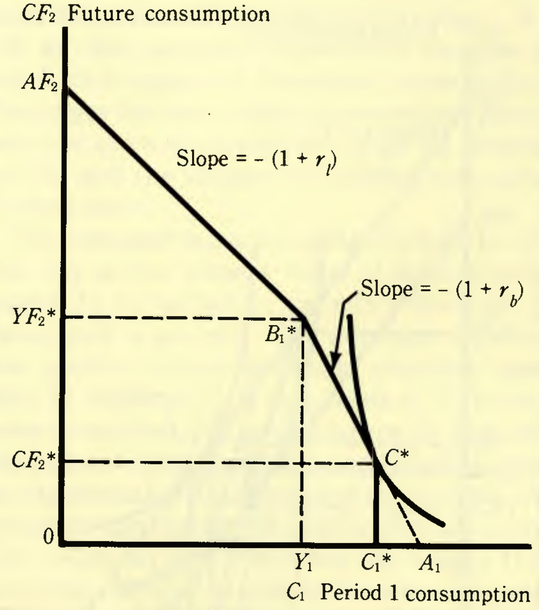
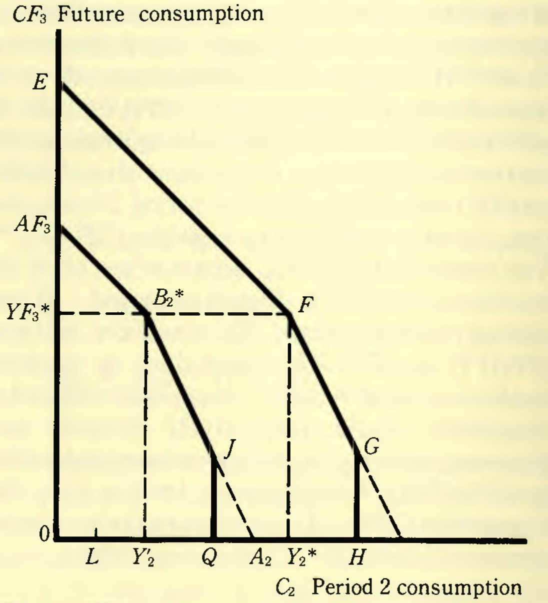


**Fig. 4 Budget Constraint with Full Payment**



tors' expectations of the present value of the consumer's labor income in periods 2 through $T$, discounted to period 2. The consumer has no borrowings or savings from previous periods. The maximum amount of expected future consumption, $AF_2$, equals $Y_1(1 + r_l) + YF_2^*$; the maximum possible amount of current consumption in the absence of limits on loan horizons, $A_1$, is $Y_1 + (YF_2^*)/(1 + r_b)$; the maximum amount of current consumption with only one-period loans, $C_1^*$, is $Y_1 + (Y_2^*)/(1 + r_b)$, where $Y_2^*$ is the expected labor income in period 2. The optimal consumption point in period 1 is $C^*$, entailing borrowing of $C_1^* - Y_1$ and a loan repayment of $YF_2^* - CF_2^*$ in the future (period 2, since the loan matures in one period).

If actual labor income in period 2, $Y_2$, is $Y_2^*$ as expected in period 1, then in period 2 the consumer faces the problem shown in figure 4. The initial endowment point would be $F$, and $EFGH$ would be the budget constraint in period 2 in the absence of the loan repayment. Because the contractual loan payment of $Y_2 - Y'_2$ must be repaid in period 2, the expected initial endowment point, or more properly the expected discretionary funds point, is $B_2^*$, and the consumer's expected budget constraint in period 2 is

$$(AF_3)B_2{}^*JQ\ ,$$

where

$$AF_3 = Y'_2(1 + r_l) + YF_3^*,$$

$$A_2 = Y'_2 + \frac{YF_3^*}{1 + r_b}\ ,$$

$$Q = Y'_2 + \frac{Y_3^*}{1 + r_b}\ ,$$

$Y_3^*$ is the expected labor income in period 3, and $YF_3^*$ is the expected present value of labor income in periods 3 through $T$, discounted to period 3.[11]

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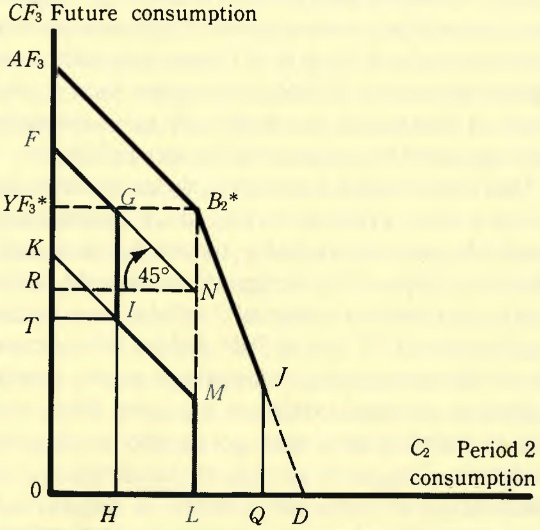
[11] Previous life-cycle models imposed borrowing constraints by restricting the choice of debt-income ratios. In this model, the borrowing constraint is more natural, depending on the amount of debt repayments that the consumer can afford. Only in the special case where debt repayments are a fixed proportion of outstanding debt are the two constraints equivalent. Subsistence or nondiscretionary consumption also may be incorporated into this model.

If actual labor income in period 2 turns out to be less than $Y_2^*$, then both $EFGH$ and $(AF_3)B_2^*JQ$ would shift to the left. Suppose actual labor income in period 2 is $L$, not $Y_2^*$ as first assumed. The consumer is now in financial distress, because $L$ is insufficient to cover the loan repayment. Even if all of $L$ is used to repay the loan, the consumer is in arrears for $Y_2^* - Y'_2 - L$, defined as $\alpha$. To keep matters simple, assume financially distressed consumers have only three options—Chapter 7 bankruptcy, Chapter 13 bankruptcy, or personally refinancing the loan with the creditors. This problem is illustrated in figure 5. Actual labor income in period 2 is $L$, the same as in figure 4, and $YF_3^*$ is the consumer's and the creditors' expectation of the present discounted value of the consumer's future labor income. The budget constraint in the absence of the loan repayment and other constraints, $(AF_3)B_2^*JQ$, is not attainable but is shown for reference. Creditors stand willing to refinance the debt at the current loan rate, $r_b$, without collateral or other requirements, provided that the whole debt be repaid by the third period. The creditors will not extend additional credit, however, thereby restricting $C_2$ to be no greater than $L$.[12] Under these conditions, $KIML$ is the intertemporal budget constraint with refinancing.

The derivation of this constraint is straightforward. If the consumer repays all of $L$ in period 2, then he/she must repay the remaining $\alpha$ dollars with interest in period 3. This amounts to $\alpha(1 + r_b)$ dollars. The maximum possible expected value of $CF_3$ is then $YF_3^* - \alpha(1 + r_b)$, shown as point $K$ in figure 5, as long as $Y_3^*$ is at least $\alpha(1 + r_b)$. If the consumer prefers a positive value for $C_2$, then $\alpha + C_2$ with interest must be repaid in period 3. The maximum value of $C_2$ is the lesser of $L$ or the value of $C_2$ that satisfies the equation $(C_2 + \alpha)(1 + r_b) = Y_3^*$. This is point $M$ in figure 5, assuming for simplicity that $L$ satisfies the equation. Note that there is no saving in period 2 with this constraint. Whatever is not consumed is used to repay part of the debt. The two points $K$ and $M$ determine the equation of the constraint:

**Fig. 5 Budget Constraint without Full Payment**



$$CF_3 = YF_3^* - (C_2 + \alpha)(1 + r_b),$$

$$Y_3^* \geq (C_2 + \alpha)(1 + r_b),\ 0 \leq C_2 \leq L.$$

The position of $KIML$ in the $C_2(CF_3)$ plane, or in other words the cost of debt refinancing in terms of foregone consumption in period 2 and the future, depends on the parameters $YF_3^*$, $\alpha$, and $r_b$, as well as other loan terms not explicitly incorporated here. Lower values of $YF_3^*$ and higher values of $\alpha$ and $r_b$ increase the cost of refinancing the debt. In period 2, $\alpha$ is predetermined by actions taken in period 1 and by $L$, but $YF_3^*$ and $r_b$ are determined by creditors. Based on the income shortfall in period 2, creditors may lower their expectations about the consumer's future labor income in period 3 and beyond and/or may demand a higher loan rate. A lower value of $YF_3^*$ produces a downward parallel shift in $KIML$, resulting in a decline in the maximum value of $CF_3$. A higher $r_b$ shifts $KIML$ down and twists it clockwise, also resulting in a decline in the maximum value of $CF_2$. In both cases, the maximum value of

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[12] This is another liquidity constraint that may be important to financially troubled consumers.

$C_2$ may also decline. Other loan terms, such as collateral requirements or other borrowing limits, lower the maximum value of $C_2$. Tighter loan terms of any form represent tighter liquidity constraints, and, clearly, if these constraints are tightened too far, *KIML* can vanish; that is, the costs of financing the debt will be essentially infinite, and the option will be unavailable.[13]

The bankruptcy constraint is complicated by the fact that there are two types of bankruptcy available to a financially troubled consumer. The first type of bankruptcy is *straight bankruptcy*, defined in Chapter 7 of the new bankruptcy code (11 U.S.C. § 701). Under this option, all of the consumer's nonexempt assets are liquidated; secured creditors are paid first, and any remaining proceeds go to the unsecured creditors. The second type of bankruptcy, *rehabilitation of consumer debtors*, is not technically considered as bankruptcy. Defined in Chapter 13 of the new bankruptcy code, this option allows the consumer to establish a court-protected debt repayment plan.[14] The consumer can retain all of his/her assets, and specified payments are made each month to repay the debt. The major requirement of a Chapter 13 bankruptcy is that the unsecured creditors receive at least as much as they would have received had the consumer alternatively filed for straight bankruptcy (see Kowalewski 1981).

Moreover, the same consumer can face different bankruptcy costs in different states and bankruptcy court districts; exemption provisions vary across states, and bankruptcy court judges have considerable discretion in approving bankruptcy plans (see Misbach 1964; Stanley and Girth 1971). Exemption provisions define exempt assets, that is, the amounts of various assets that the consumer can retain after a straight bankruptcy, and they affect the minimum repayment unsecured creditors are entitled to receive under Chapter 13. Consumers can choose between federal and state exemption levels unless state law permits the use of only state levels. Chapter 13 plans do not necessarily require complete repayment of the debts like the refinancing option described earlier. Bankruptcy court judges can specify that only a fraction of unsecured debts be repaid, and some Chapter 13 cases have been approved with zero payment to unsecured creditors. Hence, the types and the amounts of assets and debts that the consumer owns significantly affect the costs of the bankruptcy alternatives.[15]

The consumer in figure 5 has a very simple portfolio in period 2: $L$ is the only asset, and $Y_2^* - Y'_2$ is the only debt, which is unsecured because the consumer holds only human wealth. The consumer's exempt assets are assumed to be $H$. Under straight bankruptcy, $L - H$ is paid to the creditors, and the remaining debt is discharged or forgiven.[16] This constrains the consumer's resources to be $H$ in period 2 but leaves unchanged the expected resources of $YF_3^*$ in the future. Because the consumer is free to save any portion of $H$, the budget constraint under straight bankruptcy is *FGIH*. One possible budget constraint under a Chapter 13 bankruptcy is *TIH*, which assumes that the court requires full repayment of the debt with interest, in amounts $L - H$ in period 2 and $(\alpha + H)(1 + r_b)$ in period 3. The initial endowment point under this option is $I$. If the bankruptcy court decided in favor of less than full payment, the initial endowment point could lie anywhere between *KIML* and *FGNML*. The *GN* portion of this boundary arises from the requirement that the creditors must receive at least $L - H$, which equals $YF_3^* - R$, the amount they would receive if the consumer alternatively filed a straight bankruptcy. If the court requires repayment of the debt without interest, the constraint becomes *KIH.*

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[13] On the other hand, creditors may not demand complete repayment if they think they can receive more than they would if the consumer filed and completed bankruptcy. The debt financing constraint would then shift upward and possibly twist counterclockwise if creditors accepted a lower interest rate. Thus, creditor lending policies and liquidity constraints can depend on existing bankruptcy laws.

[14] 11 U.S.C. § 1301 (1978). Though not technically a *bankruptcy*, a filing under Chapter 13 will be considered a bankruptcy in this paper because a filing under either chapter is a measure of consumer financial distress and creditor losses.

[15] The new bankruptcy code also permits consumers to avoid nonpurchase money security interests on household goods to facilitate the consumers' "fresh start" after bankruptcy.

[16] For simplicity, filing, attorney, and court fees are assumed to be zero; in practice, these fees have priority over any payment to creditors.

The union of the three budget sets—*KIML, FGIH,* and *TIH*—determines the set of all possible consumption bundles available to the consumer; this grand budget set is *FGIML.* Of course, other grand budget sets are possible, depending on the exemption provisions, the disposition of the bankruptcy court judge, and the tightness of liquidity constraints. The consumer chooses the consumption bundle that maximizes the present value of his/her utility and, in doing so, decides among the three options: Chapter 7 bankruptcy, Chapter 13 bankruptcy, or debt refinancing through creditors. For example, if the consumer in figure 5 chooses the consumption bundle represented by point *G*, he/she can obtain that point only by filing a Chapter 7 bankruptcy. Similarly, if the consumer chooses a bundle along the segment *IM*, then the consumer refinances through the creditors.

Two additional comments deserve mention. The non-convexity of the grand budget set may leave the consumer indifferent to using more than one of the options. For example, the consumer may be indifferent between point *G* and point *M*. Generalizing the model to incorporate uncertainty about consumption needs or interest rates does not appreciably affect the formulation of the grand budget set, though it may affect the creditors' willingness to refinance.

## *Alternatives to Bankruptcy*

The grand budget set in the previous section is conceptually very simple, incorporating only one alternative to bankruptcy. It could be very complex, however, depending on the composition of the consumer's portfolio, the exemption levels, and the creditors' opinions of the consumer's credit worthiness. The grand budget set becomes even more complicated when the other bankruptcy alternatives are incorporated, and it is impossible to specify one general grand budget set applicable to all consumers. It would be useful, however, to have some general notion of the actual constraints facing financially distressed consumers to make the model more concrete. Unfortunately, this is difficult to do, as there are no empirical studies about the bankruptcy alternatives. However, some past studies of individual personal bankrupts criticize the alternatives and provide anecdotal evidence about their usefulness. Moreover, some of these studies attempt to learn why personal bankrupts choose bankruptcy over other alternatives. None of this evidence contradicts the view that these alternatives are imperfect responses to an imperfect consumer loan market. Not all alternatives have been or are available to all financially distressed consumers; when they are, their relative costs can be very high, principally through lack of protection against creditors' legal actions, and their eligibility requirements exclude certain financially distressed consumers.[17] That is, this evidence does not contradict the view that liquidity constraints have been an important element of the PBF problem.

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[17] These legal actions include garnishment of wages and property, repossession of goods, setoff of checking and savings accounts, and attachment of wages and goods. *Garnishment* is a legal action of a creditor to compel a third party—such as an employer or a bank—owing money to or holding money or property for a debtor to pay the money or turn over the property to the creditor instead of the debtor. Secured creditors take a security interest in the good purchased with the loan or in the property already owned by the debtor, usually specifying that if the consumer defaults on the loan, the full amount of the loan immediately becomes due. When the debtor misses a debt payment, the creditor has the right to *repossess* the security. If the security is worth less than the balance of the loan, the creditor may get a court judgment requiring the debtor to make up the deficiency, called a *deficiency judgment.* Consumers have been known to file bankruptcy to avoid what they believe are unfair deficiency judgments. In the case of a loan default, a setoff is used by a depository institution to take the defaulting consumer's checking, savings, and time accounts that it holds for the consumer to pay the loan in full and obtain a deficiency judgment for any remainder. *Attachment* is a process by which a debtor's wages and/or property are placed in the custody of the law and held as security pending the outcome of a creditor's suit. Until the case is decided, the debtor cannot dispose of or use the wages or property, or place them beyond the reach of the creditor.

Proraters, also known as financial or credit counselors, credit doctors, or debt poolers, are entrepreneurs who make their profit by mediating between creditors and financially distressed consumers. For a fee, a prorater establishes a debt-repayment plan for a consumer having difficulty meeting his/her contractual obligations. The prorater collects a fixed payment from the consumer each month and disburses this payment on a *pro rata* basis to the creditors. Sometimes budgeting advice also is offered to the financially distressed consumer.

There are problems with proraters' services. The repayment plan obtains only the *voluntary* participation of the creditors. Creditors can drop out of the plan at any time and try to collect from the consumer directly or indirectly through legal means, such as garnishment or attachment. Even if the plan collapses, the consumer must pay the prorater's fee. Stanley and Girth (1971) argue that some consumers may have been misled by proraters' advertising, believing mistakenly that creditors' cooperation was mandatory, not voluntary. These researchers claim that "the fees charged usually have been uncontrolled and the safeguards against misuse of the collected funds few. Thus the debtor's financial burden frequently has been increased rather than diminished by debt pooling. And creditors, too, have had no assurance that they will be treated fairly" (p. 71). In response to these and other shortcomings, 40 states as of 1971 had absolutely prohibited, drastically curtailed, circumscribed, or regulated proraters' practices. Other states "have judicially imposed restraints that render proration difficult, if not impossible" (Stanley and Girth, p. 71). Misbach (1964) notes that, until 1963, proraters in many states required a fee equal to 15 percent of the money handled. He also observed that, after the Utah legislature imposed tighter controls on proraters and set a maximum fee of 10 percent of the money handled, most of Utah's proraters discontinued business.[18]

Reed (1967) argues that proration services were not applicable to all consumers in Oregon. Proraters in Oregon apparently accepted only about one-third of their applicants; another one-third of the applicants were severely financially distressed and were rejected because they were likely to drop out of the service. The remaining one-third were not in serious financial trouble and also were rejected. Of the accepted applicants, 50 percent dropped out after the first year, and only 15 percent to 17 percent completed the basic repayment plan.

The wage-earner trusteeship is a debt-repayment program offered by only a few state and local governments. A local resident can voluntarily join the program by agreeing to pay a fixed percentage of his/her disposable earnings to court trustees for *pro rata* distribution to creditors. A consumer who makes regular payments is protected from wage garnishment. Another advantage is that the costs are quite low. A trusteeship program administered by the Cleveland Municipal Court requires a one-time $5.00 filing fee, a $0.50 fee for each listed creditor, and a debt repayment equal to 17.5 percent of disposable earnings each pay period.

Unfortunately, wage-earner trusteeships are not useful to all financially distressed consumers. Cleveland's program, for example, has the following drawbacks:

1. secured creditors are not compelled to participate,
2. creditors may garnishee the wages of co-signers on loan agreements,
3. creditors are free to take other legal actions against consumers,
4. personal checking and savings accounts can be attached by creditors,
5. budget counseling is not offered,
6. debts pertaining to rent, home mortgage, and current utilities do not apply, and home foreclosure may occur, and
7. if a trusteeship is dissolved for nonpayment, it cannot be reopened before six months has passed unless the nonpayment resulted from illness, lack of work, or a strike.

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[18] A recent article in *The Wall Street Journal* reported that average proraters' fees are currently 12 percent of the debt outstanding (see Vicker 1981).

In their study, Stanley and Girth (1971) found at least 4 percent of the personal bankrupts in their northern Ohio sample previously had been in wage-earner trusteeship proceedings.

The Consumer Credit Counseling Service (CCCS) is an increasingly popular alternative to bankruptcy. Begun in 1955, there are now over 200 offices nationwide in communities with populations of at least 100,000. In 1980 this not-for-profit service advised 130,000 consumers nationwide. Under the direction of the National Foundation for Consumer Credit and mostly funded by business, the CCCS educates financially distressed consumers in practical budgeting techniques and provides proration services to severely distressed consumers at little or no cost to the consumer. While legal protection against garnishment and attachment is not guaranteed because of the funding arrangement, creditors are more likely to participate voluntarily in a CCCS-sponsored repayment plan, increasing the chances that a consumer will successfully complete a plan. Though not widely available or recognized before the 1970s, today the CCCS may be the best alternative to bankruptcy available through a third party.[19]

A financially distressed consumer can always try to refinance his/her debts directly with creditors or indirectly through debt-consolidation loans provided by consumer finance companies and other consumer lenders. In dealing directly with creditors, the consumer can appeal to the common-law devices of *composition* and *extension* or both for informal out-of-court settlements. A *composition* is an agreement between the consumer and at least two of his/her creditors specifying that a partial payment is adequate to satisfy the debts owed these creditors. An *extension* permits the consumer to extend the maturity of a debt without fear of attempts to collect by the participating creditors, as long as the payments on the new loan are made diligently. Either arrangement conceivably can be arranged through a third-party creditor, such as a consumer finance company, though the old debts usually would be paid in full with the consolidation loan.

Composition and extension offer the advantages of being quick and requiring little effort. Their disadvantages are that they provide consumers no legal protection against actions by creditors who choose not to participate in the scheme and no advice on proper budgeting practices. Moreover, creditors probably view debt-consolidation loans as riskier than other loans and hence charge a higher interest rate and demand more stringent collateral requirements to compensate for the additional risk, raising the costs of these schemes relative to the costs of bankruptcy or other alternatives.[20]

Other researchers have commented on the inefficiency of these schemes for many consumers. Herrmann (1965) argues that composition is difficult to arrange directly with creditors and that it is designed primarily for use by businesses and not by consumers with few or no assets. Stanley and Girth (1971) report that these schemes "are most likely to be used when the debtor seems to be in temporary trouble and creditors expect to do satisfactory business with him in the future" (pp. 73-74). They also suggest that creditors' attorneys do not always recommend composition. They found that when asked what is best for creditors of individual consumers, 22 out of 42 attorneys responded Chapter 13, while only 15 replied composition agreement (p. 74).

More to the point, Haden (1967) argues that one purpose of Chapter 13 was to make extensions and compositions available to those consumers who could not get them in the marketplace. That is, the originators of Chapter 13 felt that the consumer loan market failed to provide deserving consumers with extension and composition options, and that a correctly formulated Chapter 13 option would leave both creditors and consumers better off. In justifying repeated use of Chapter 13 by an individual consumer, Haden writes:[21]

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[19] Both Reed (1967) and Mathews (1969) praised the CCCS, saying that, at the time, its only shortcoming was not being widely available.

[20] Consolidation loans can be particularly risky under the new bankruptcy code, because they change purchase money security interests into nonpurchase money security interests, and certain nonpurchase security interests pertaining to household goods necessary for a "fresh start" may be avoided.

> Anyone who questions the need for the service [Chapter 13] should first ask how many times in the last twenty years he has become overloaded with debts and borrowed enough to pay off everyone. In our present economy, where it seems unpatriotic to be out of debt, stones should not be thrown at Chapter 13 repeaters when typical upper-class procedure is to borrow a lump sum at the bank. Many wage-earners' [bankruptcy] petitions are made under the pressure of several thousand dollars of debt. The debtor cannot go to the bank and borrow this much money. He must use the only device open to him.

A common fault of all the alternatives is their inadequate protection against legal actions by creditors, actions that bring a financial crisis to a head. Like other problems with the alternatives, these legal actions raise the (expected) cost of the alternatives in terms of present and future consumption. Repossession of an automobile or other durable goods and garnishment or setoff of checking and savings accounts disrupt life-cycle spending and savings plans, forcing consumers to readjust their plans and bear the costs associated with the loss of these items and their future reacquisition. Even more serious is the possibility that an employee can be fired if his/her wages are garnisheed. Under the garnishment provisions in the Consumer Credit Protection Act, effective in 1970, an employee cannot be fired for garnishment against one indebtedness, but depending on state law can be fired for garnishments against a number of debts. Moreover, wage garnishments may leave the consumer with insufficient income to meet basic living expenses or other contractual obligations, perhaps resulting in additional legal actions by other creditors.

Past studies of individual personal bankrupts found that threatened or actual legal action by creditors was crucial in many consumers' bankruptcy decisions.[22] Brunner (1964) estimates that between 1956 and 1961 an average of about 36 percent of all consumers who filed for straight bankruptcy in Ohio were defendants in legal suits brought by creditors. Dolphin (1965) concludes that bankruptcy "apparently is used as a tool for avoiding garnishment" (p. 111). He found that 75 percent of the Flint (Michigan) area bankrupts indicated that they filed for bankruptcy because of actual or threatened garnishment; in most cases it was the threat of garnishment, since only 10 percent had been garnisheed within 4 months of their filing for bankruptcy. Mathews (1969) found that 70 percent of his sample "had been threatened with wage attachments by creditors in the period immediately preceding the filing of the bankruptcy petition" (p. 82). About 30 percent were named as defendants in suits brought by creditors in the year preceding the bankruptcy filing, and about 78 percent of these consumers had personal or real property repossessed during this time and owed deficiency balances on this debt.[23] Thirty-two percent of the attorneys, bill collectors, and credit bureau managers interviewed by Reed (1967) mentioned actual or threatened wage garnishment, and eight percent mentioned deficiency judgments as "causes" of personal bankruptcy. Sadd and Williams (1933) concluded that 15.4 percent of the consumers in their sample filed for bankruptcy "to avoid payment of judgment debts; 87.8 percent of these judgments were obtained against endorsers of notes for others" (p. 14). Stanley and Girth (1971) found that 43 percent of the consumers in their sample mentioned threats of legal action and 18 percent mentioned actual legal action in response to the question about why they went into bankruptcy court. "Other persons we interviewed—referees in bankruptcy, attorneys (both for debtors and creditors), and welfare authorities—also emphasized fear of garnishment or suit as a leading cause of bankruptcy" (p. 47).[24]

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[21] See Haden (1967), p. 596. In practice, Chapter 13 of the old bankruptcy act seems to have been a poor alternative to straight bankruptcy. Herrmann (1965) reports that critics of Chapter 13 believe that "the administrative expenses charged debtors are too high and that the length, austerity and inflexibility of the payment plans often drive debtors using the plan into straight bankruptcy. The plan is clearly of use only to those who meet the eligibility requirements and have sufficient income to repay all or most of their debts within three years" (p. 30). Also see Reed (1967), pp. 73-75; Mathews (1969), p. 91; Stanley and Girth (1971), chapters 4 and 5; Misbach (1964), p. 39; and Haden (1967).

[22] Most of these studies fail to distinguish clearly between the reason for financial distress and the reason for choosing bankruptcy over the alternatives. For example, when Stanley and Girth (1971) asked debtors why they went into bankruptcy court, they received answers such as poor money management, poor health, and marital and other family problems, which are really precipitators of financial distress. They remarked that these reasons were the same as those given in response to a question about the reasons for financial distress, but they failed to see that these reasons alone were not sufficient for those bankruptcies. Sadd and Williams (1933), Mathews (1969), and Reed (1967) also seem to be unclear about the distinction.

[23] Repossessions and deficiency balances are described in footnote 17.

Without empirical studies about the experiences of financially distressed consumers in using these bankruptcy alternatives, it is difficult to estimate the relative costs of these programs. However, the evidence considered here does not contradict the view that for some financially distressed consumers, these alternatives involve very high costs relative to those of the bankruptcy options. The inability to borrow against future income appears to be an effective constraint for some consumers, possibly forcing them into a bankruptcy decision they would not make in the absence of this constraint.

It should be clear that the PBF issue is a very complicated one. A consumer's decision to file for bankruptcy depends on the interaction of his/her preferences for current versus future consumption, the types and amounts of tangible and financial assets and liabilities owned, the consumer's and the creditors' expectations of his/her future income, creditors' risk preferences, loan interest rates, the consumer's nondiscretionary outlays, the available bankruptcy alternatives, and the existing bankruptcy and consumer lending legislation.

## II. Historical Overview of Aggregate PBFs

Figure 6 shows the annual PBF rate—the total number of PBFs during a statistical year per 100,000 people aged 20 years and over—since the total PBF data were first collected in 1940. The unusual behavior of this series stands out clearly. The PBF rate rose steadily from 1946 through 1967, falling only once, in statistical year 1962. After 1967, the PBF rate displayed a pronounced procyclical pattern, rising during recessions and falling between them. In statistical years 1980 and 1981, the PBF rate grew at historically rapid growth rates to historically high levels; in 1981, about 0.3 percent of the population aged 20 years and over filed for personal bankruptcy.

Some researchers have argued that the new bankruptcy code is primarily responsible for the rapid growth of PBFs in 1980 and 1981 (see Brimmer 1981; Carter 1982; Pfeilsticker 1980). However, business bankruptcy filings (BBFs) grew as fast as PBFs since the new code was enacted. The ratio of PBFs to total bankruptcy filings, also shown in figure 6, suggests that the new bankruptcy code may not be responsible. This ratio was 0.87 in statistical year 1979, before the new code became effective, and remained at 0.87 in 1980 and 1981, after the new code was effective. Because the major changes in the new code deal with PBFs, the rapid increase in PBFs since late 1979 suggests that economic forces may have had a large impact on PBFs, as they apparently had on BBFs (see King 1981, p. 196). Moreover, the increase in the PBF rate began in statistical year 1979, before the new code became effective. The unusual behavior of PBFs across time can be explained largely by aggregate economic forces and their impact on

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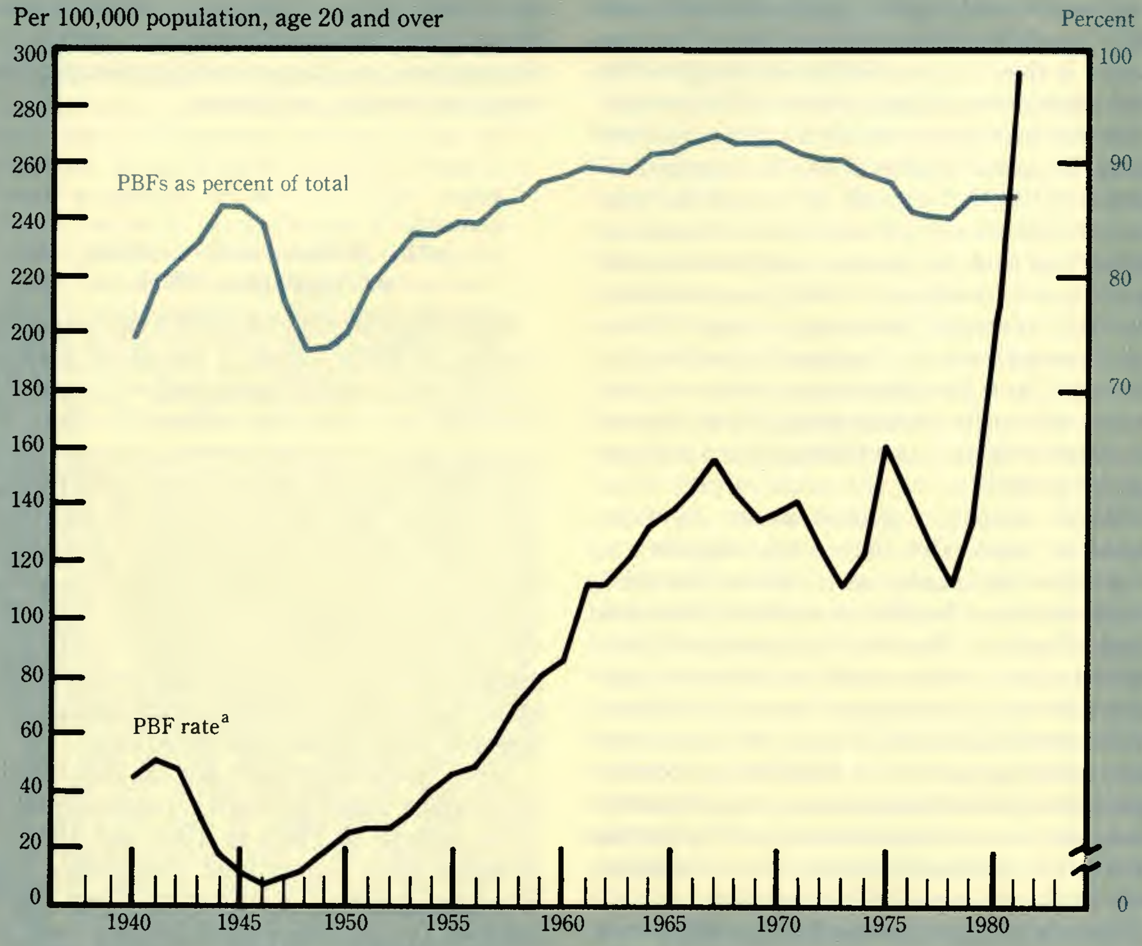
[24] They also show that the fraction of wages exempt from garnishment is negatively related to the number of personal bankruptcies per capita (see Appendix B, pp. 236–41).

This discussion should not be construed as a condemnation of consumer lenders. Imperfect information about a consumer's ability to repay debts is not necessarily the fault of creditors. Creditors may find it difficult to refinance the debts of some consumers and not those of others without appearing to violate the provisions of the Consumer Credit Protection Act of 1968. Under the old bankruptcy law, however, creditors were rewarded for swift action against consumers who defaulted on their debts.

**Fig. 6 Personal Bankruptcy Filings: 1940-81**



a. PBF rate based on a statistical year, beginning on July 1 and ending on June 30 of the following calendar year.

consumer financial positions, an important factor in a consumer's decision to file for bankruptcy.[25]

The PBF rate fell in the late 1960s, when consumer financial positions were remarkably strong. Real disposable income per capita grew at an annual rate of 3.3 percent from 1964 to 1969, after growing 1.7 percent between 1954 and 1959 and 2.3 percent between 1959 and 1964. The aggregate *debt-income ratio*—the ratio of total outstanding household liabilities to nominal disposable personal income—was essentially flat from 1965 to 1969 at about 0.72, after rising steadily from 0.47 at the end of 1954. Moreover, the real value of financial assets accounted for over 78 percent of the real value of household net

[25] Legal changes in the late 1960s and the 1970s dealing with actions creditors can take against consumers who default on debts and the legal rights of consumers involved in credit transactions may also have had some impact on the PBF rate. These laws include the Consumer Credit Protection Act, Fair Debt Collection Practices Act, Truth in Lending Act, Fair Credit Reporting Act, Fair Credit Billing Act, Equal Credit Opportunity Act, and the Uniform Consumer Credit Code. Other changes were made at various intervals by individual states to update their laws regarding wage garnishment and wage and property attachment and assignment.

worth from year-end 1963 to year-end 1968; nondiscretionary spending fell to about 60 percent of disposable personal income in the late 1960s, from about 62 percent in 1961.[26] Thus, by the late 1960s probably fewer consumers found themselves in severe liquidity-constrained positions.

Consumer financial positions remained strong until the 1973–75 recession. Although the debt-income ratio remained at about 0.72 and nondiscretionary spending accounted for 61 percent of disposable personal income throughout the recession, interest rates reached historic levels in 1974, real per capita disposable personal income grew at an annual rate of only1.7 percent from 1972 to 1975, and the real value of household portfolios grew slowly and shifted in composition, with the real value of financial assets accounting for about 70 percent of real household portfolios at year-end 1974. This shift in consumer financial positions contributed to a record 224,354 PBFs in statistical year 1975.

It is important to understand the role of consumer portfolios. Liquid assets—mostly financial assets—provide a readily available source of funds to cushion a shortfall in income. During recessions, incomes decline, liquid assets are drawn down, and tangible assets, such as houses, automobiles, and refrigerators, may be difficult to liquidate quickly at full market value. The simultaneous occurrence of these events may push some consumers into very tight liquidity-constrained positions, referred to as *corner solutions* in the previous section. In such positions small changes in income may have abnormally large effects. In the aggregate, if many consumers are in tight liquidity-constrained positions, small changes in income may lead to large changes in PBFs.

This nonlinear response helps explain the behavior of the PBF rate after 1975. Even though consumer portfolios were weak coming out of the 1973–75 recession, the PBF rate fell sharply as real per capita disposable income growth accelerated to an annual rate of 2.6 percent between 1975 and 1979. At the same time, household income continued to be bolstered by the employment of additional household members. After a slight reliquification in 1975 and 1976, consumer portfolios became highly levered as consumers purchased houses and real estate to guard against inflation.

Consumers were able to maintain better life styles and purchase many tangible assets in the late 1970s because consumer and mortgage credit were widely available. This trend probably dated back to the optimism prevalent in the late 1960s. Having experienced the remarkably prosperous 1960s, many creditors expected such prosperity to continue. Baily (1978) argues that in the late 1960s the business press was confident that activist policy measures could and would keep the growth of the real economy high and inflation rates low. This optimism also was reflected in the rapid growth in the number of bank-credit-card programs in the late 1960s and early 1970s, especially with the introduction of National BankAmericard, Inc., and Interbank Systems (see Fitzpatrick 1973). This type of unsecured lending probably would not have evolved as it did without the expectation and at least partial realization in the early 1970s that associated default risks were low. By the late 1970s, creditors' expectations probably changed but the credit programs remained; financial institutions needed the programs to attract consumer deposits from money market mutual funds, and consumers demanded and probably needed such credit to finance consumption.[27]

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[26] The real value of household net worth is defined as the end-of-year constant dollar sum of financial assets, consumer durables and housing stocks, and land minus constant-dollar household liabilities. The asset and liability figures come from the household sector of the Flow of Funds accounts. The financial asset and nonmortgage liability figures are deflated by the personal consumption expenditure (PCE) implicit price deflator, and the mortgage liabilities are deflated by the fixed weight deflator for gross fixed private residential investment. The land figure comes from the household sector of the Balance Sheets for the U.S. Economy, compiled by the Flow of Funds division of the Board of Governors of the Federal Reserve System; it is deflated by the fixed weight deflator. The durables and housing stocks are computed from the flows of constant-dollar consumer durables and nonfarm residential structures expenditures using a benchmark computed by the Bureau of Economic Analysis and constant straight-line depreciation. The nondiscretionary spending series comes from Luckett (1980) and begins in 1960. Gasoline-company credit-card liquidations were removed to avoid a discontinuity in the series in 1971.

When energy prices doubled and real per capita disposable personal income growth slowed in 1979, consumers held very weak financial positions; the real value of financial assets represented only 67 percent of the real value of household portfolios, nondiscretionary spending amounted to 65 percent of disposable personal income, and the debt-income ratio was up to 0.81. It is likely that PBFs increased in 1980–81 through the combination of weak financial positions and income growth and high interest rates. The remaining question is whether the new code affected PBFs as well. This analysis also suggests that the type of consumer who filed for bankruptcy in the late 1970s and early 1980s may be unlike the type who filed in earlier years. Now, more affluent consumers, who own relatively many more tangible assets than consumers in the past, may be filing because they cannot manage their highly levered portfolios. Perhaps many of these consumers would have filed for bankruptcy without a change in the bankruptcy law.

## III. Empirical Model of Aggregate PBFs

### *Specification and Estimation*

The empirical model is a multiple regression model and draws its specification from the spirit of the theoretical model outlined in the first section. Although that model pertains to an individual consumer (or consumer unit such as a household), it highlights the types of variables that may be useful for explaining aggregate PBFs. The dependent variable is the natural logarithm of PBFs per capita ($LBKPOP_t$), which is measured as the ratio of seasonally adjusted quarterly PBFs to quarterly population aged 20 years and over. The quarterly PBF data were seasonally adjusted using the standard default options of the X-11 seasonal adjustment procedure, and the quarterly population figures are interpolations of annual figures.

The explanatory variables are seasonally adjusted and include the following:[28]

$YLP_t$ = real, per capita, after-tax "permanent" labor income in the current quarter. Labor income includes wages and salaries and other labor income components of personal income

$YLT_t$ = real, per capita, after-tax "transitory" labor income in the current quarter

$RTB_t$ = the three-month Treasury bill rate in the current quarter

$NONDPAY_{t-1}$ = nondiscretionary payments relative to disposable personal income in the previous quarter. *Nondiscretionary payments* are total food, fuel oil and coal, and housing services expenditures; 20 percent of household operating services; 25 percent of other services; 50 percent of gasoline and oil expenditures (all of these being components of personal consumption expenditures in the National Income Accounts) plus repayments of consumer installment credit except gasoline-company credit-card debt plus repayments of mortgage debt

$RTAPC_{t-1}$ = real, per capita stock of consumer durables and residential structures in the previous quarter, measured at end of quarter

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[27] As mentioned in footnote 24, creditors may have experienced legal restrictions in rationing consumer credit.

[28] Further detail about the construction of these variables can be obtained from the author.

$RDBTPC_{t-1}$ = real, per capita outstanding household liabilities in the previous quarter measured end-of-quarter and taken from the Flow of Funds accounts

$RDEPPC_{t-1}$ = real, per capita household liquid assets in the previous quarter, measured end-of-quarter and taken from the Flow of Funds accounts. *Liquid assets* are defined as demand deposits and currency plus time and savings accounts plus money market mutual fund shares.

A constant term and a lagged dependent variable round out the list of independent variables.

Labor income is used, as it is the primary source of income for most consumers. In the first quarter of 1981, for example, labor income accounted for 69 percent of total personal income. More importantly, past cross-section studies found that the majority of personal bankrupts worked in blue-collar or lower-paying white-collar jobs, both of which pay wages and salaries. The before-tax figures were adjusted by average tax rates for both personal income taxes and personal contributions for social insurance. The permanent component was computed by first calculating an eight-quarter moving average of the real, after-tax per capita figure and then projecting this average ahead one quarter, using the previous eight-quarter growth rate of the average. The transitory component is then the difference between the actual income figure and the permanent component. Both income terms should be negatively related to the PBF rate, because higher incomes provide a greater cushion against financial distress. The impacts of these two income terms should be different, as they have different impacts on consumption and saving decisions. The permanent component can be thought of as the expected future income term, *YF*, in the theoretical model, the income measure used by consumers in determining current consumption and saving. When actual income is different from that expected, or in other words when transitory income is non-zero, consumption and savings plans may be dramatically altered, especially when transitory income is negative, and difficulty in meeting nondiscretionary payments is encountered. Thus, the coefficient of the transitory income component may be larger in absolute value than the coefficient on the permanent income component because transitory income is more important for financially distressed consumers.

The theoretical model points out the distinction between borrowing and lending rates of interest. Unfortunately, few data on consumer credit interest rates are available, and there are a variety of assets, and hence interest rates, relevant to consumer savings decisions. The incorporation of many interest rates would only introduce a multicollinearity problem. In addition, savings interest rates are probably irrelevant for financially distressed consumers. Thus, only one short-term interest rate is used as a proxy for short-term consumer credit interest rates, and it should be positively related to the PBF rate.

The theoretical model also stresses the importance of nondiscretionary payments. When such payments command a high percentage of disposable income, little income is available to meet unexpected expenses, and it may be difficult to obtain additional credit. Thus, $NONDPAY_{t-1}$ should be positively related to $LBKPOP_t$. There are obvious problems with defining and constructing nondiscretionary payments with aggregate data, but the series described by Luckett (1980) seems reasonable, with a minor modification.[29] There is a break in the consumer-installment-credit liquidation series in 1971, when gasoline-company credit-card figures were moved from noninstallment to installment debt. Since the figure for gasoline-company credit-card liquidation is small relative to the figure for total installment debt liquidation—for example, equal to 2 percent of total liquidations in 1981:IVQ—it was removed from total liquidations to eliminate the break. The personal consumption expenditure categories and their weights included with the debt repayment figures are crudely designed to measure basic living expenses that all consumers must pay.

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[29] There are two partially offsetting problems with this series. The installment-debt liquidation figures include not only contractual payments but also discretionary payments. With the rise in the use of credit cards as transactions media instead of debt media, the installment-debt liquidation figure is probably an over-estimate of contractual installment-debt repayments. The lengthening of loan maturities in the past five years to ten years works in the opposite direction, lowering liquidations relative to earlier liquidations.

The importance of the three portfolio terms has been discussed in the preceding sections as well. The composition of consumers' portfolios has direct bearing on the costs and benefits of filing for bankruptcy and on the ability of consumers to weather unexpected income losses or large consumption needs such as medical bills. When consumers hold many liquid assets relative to other portfolio items, $LBKPOP_t$ should be low; when consumers hold relatively many tangible assets or debts, $LBKPOP_t$ should be high. The durables and residential structures stocks were built from expenditure flows using straight-line depreciation and benchmark values for year-end 1950 computed by the Bureau of Economic Analysis. The financial assets used in $RDEPPC_t$ are quite liquid compared with other financial assets that consumers may own and probably comprise the majority of financial assets held by financially distressed consumers.

The differences in the timing of the explanatory variables, contemporaneous or lagged one quarter, result from the discrete decision-making framework of the theoretical model. Recall that consumption and savings decisions are made in the theoretical model by considering what is already owned and contracted to be paid at the beginning of the period and what income and interest rates will be during the current and future periods. Hence, in the empirical model, a bankruptcy decision in the current quarter depends on last quarter's portfolio composition and nondiscretionary payments, and the current quarter's income and interest rates.

The theoretical model by itself cannot define the complete specification of the empirical model, because the theoretical model pertains to an individual consumer, whereas the empirical model uses data aggregated across time and consumers to consider all consumers together. Such aggregation obscures the characteristics and behavior of any particular consumer and imparts a considerable degree of inertia or autocorrelation to such data. What this means is that past values of the explanatory variables will be useful in examining PBFs. In fact, last quarter's portfolio composition and nondiscretionary payments depend on all past consumption and savings decisions, income flows, and interest rates, so that a current bankruptcy decision conceivably depends on all other past values of the explanatory variables as well. However, all of these past values cannot be included in the model, and the use of only a few past values is an arbitrary decision, could omit important past values, and would introduce multicollinearity among the explanatory variables, thereby confounding the estimation of the coefficients. A parsimonious way to include the influence of all other past values is to use a lagged dependent variable as an explanatory variable.[30] This approach is employed here, even though it may make the impact of the new code difficult to evaluate. The coefficient on this lagged term should be less than one in absolute value.

Finally, the log-linear functional form was assumed so that the elasticity of an explanatory variable changes with the value of that variable. In this way, large imbalances in the indicators of consumer financial strength can have large effects on PBFs, as noted in the previous section.

The model was estimated by maximum likelihood with a correction for first-order serially correlated errors (see table 1). Because the empirical model will be used to evaluate the impact of the new bankruptcy code, it is important that the estimated coefficients are stable. Equations 1 through 5 in table 1 show the coefficients estimated over different sample periods. The first observation in the estimation period is always 1961:IQ, but the last observation varies across the columns as shown. Equation 5 con-

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[30] This assumes that the lag distributions of the explanatory variables are proportional to each other.

**Table 1 Regression Results under the Old Bankruptcy Law**
Dependent variable is LBKPOP; standard errors are in parentheses

| | Equation | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Number of observations | 60 | 64 | 68 | 72 | 75 |
| Sample period | 1961:IQ–1975:IVQ | 1961:IQ–1976:IVQ | 1961:IQ–1977:IVQ | 1961:IQ–1978:IVQ | 1961:IQ–1979:IIIQ |
| Explanatory variables | | | | | |
| $LBKPOP_{t-1}$ | 0.7810 | 0.7705 | 0.7715 | 0.7711 | 0.7598 |
| | (0.0444) | (0.0389) | (0.0370) | (0.0363) | (0.0356) |
| CONSTANT | -0.7675 | -0.7784 | -0.7335 | -0.8348 | -0.6154 |
| | (0.5881) | (0.5547) | (0.3851) | (0.2924) | (0.2481) |
| $YLP_t$ | -0.3274 | -0.3193 | -0.3152 | -0.3089 | -0.3180 |
| | (0.0673) | (0.0621) | (0.0560) | (0.0534) | (0.0530) |
| $YLT_t$ | -0.4128 | -0.4378 | -0.4416 | -0.4382 | -0.4409 |
| | (0.0751) | (0.0642) | (0.0560) | (0.0539) | (0.0538) |
| $RTB_t$ | 0.0075 | 0.0081 | 0.0080 | 0.0084 | 0.0066 |
| | (0.0044) | (0.0040) | (0.0037) | (0.0034) | (0.0031) |
| $RTAPC_{t-1}$ | 0.1201 | 0.1093 | 0.1078 | 0.1062 | 0.1101 |
| | (0.0378) | (0.0338) | (0.0312) | (0.0302) | (0.0300) |
| $RDBTPC_{t-1}$ | 0.3018 | 0.3090 | 0.3077 | 0.3067 | 0.3108 |
| | (0.0534) | (0.0489) | (0.0446) | (0.0435) | (0.0432) |
| $RDEPPC_{t-1}$ | -0.1998 | -0.1978 | -0.1980 | -0.1983 | -0.1995 |
| | (0.0506) | (0.0469) | (0.0435) | (0.0428) | (0.0427) |
| $NONDPAY_{t-1}$ | 1.6793 | 1.7305 | 1.6580 | 1.8121 | 1.4793 |
| | (0.8986) | (0.8450) | (0.5785) | (0.4288) | (0.3583) |
| Equation standard error | 0.0302 | 0.0293 | 0.0291 | 0.0289 | 0.0287 |
| Adjusted $R^2$ | 0.9615 | 0.9683 | 0.9680 | 0.9675 | 0.9659 |
| Durbin *h* | 0.1110 | 0.0400 | -0.0330 | -0.1620 | -0.0110 |
| Serial correlation coefficient | -0.2855 | -0.3635 | -0.3620 | -0.3533 | -0.3360 |
| Residual mean | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |

tains the coefficients estimated with all of the quarterly PBF data available under the old bankruptcy law, 1961:IQ through 1979:IIIQ.

Looking first at equation 5, the model appears to fit the data very well. All of the coefficients have the expected signs and are statistically significant at the 5 percent level using a two-tailed test. Only the coefficient on $RTB_t$ is surprising. Although positive, it has a small impact on PBFs. As expected, transitory income has a larger coefficient in absolute value than permanent income, and the composition of consumer portfolios significantly affects PBFs. In absolute value debt has a greater impact than liquid assets, which in turn have a greater impact than tangible assets. After accounting for scale differences, $\text{NONDPAY}_{t-1}$ has about the same impact as $\text{RTAPC}_{t-1}$, and the coefficient on $\text{LBKPOP}_{t-1}$ is statistically different from one at the 5 percent level.

The means and the elasticities, evaluated at the means, of the explanatory variables for the estimation period 1961:IQ through 1979:IIIQ are shown in table 2 and provide another measure of the relative importance of these variables. PBFs show the greatest elasticity with respect to $\text{YLP}_t$ and $\text{RDBTPC}_{t-1}$ and the least elasticity with respect to $\text{RTB}_t$ and $\text{YLT}_t$, the latter because its mean is very small.

**Table 2 Equation 5: Old Law Period**
1961:IQ–1979:IIIQ

| Explanatory variable | Mean | Elasticity at mean |
|---|---|---|
| $\text{LBKPOP}_{t-1}$ | 1.2104 | 0.9197 |
| CONSTANT | 1.0000 | -0.6154 |
| $\text{YLP}_t$ | 3.7050 | -1.1782 |
| $\text{YLT}_t$ | 0.0612 | -0.0270 |
| $\text{RTB}_t$ | 5.1673 | 0.0341 |
| $\text{RTAPC}_{t-1}$ | 7.4190 | 0.8168 |
| $\text{RDBTPC}_{t-1}$ | 4.0659 | 1.2637 |
| $\text{RDEPPC}_{t-1}$ | 4.5432 | -0.9064 |
| $\text{NONDPAY}_{t-1}$ | 0.6129 | 0.9065 |

**Table 3 *F*-Tests for Structural Stability**[a]

| | Equation | | | |
|---|---|---|---|---|
| Equation | 1 | 2 | 3 | 4 |
| 2 | 0.189<br>(4,51) | — | — | — |
| 3 | 0.454<br>(8,51) | 0.764<br>(4,55) | — | — |
| 4 | 0.560<br>(12,51) | 0.792<br>(8,55) | 1.700<br>(4,59) | — |
| 5 | 0.577<br>(15,51) | 0.763<br>(11,55) | 0.774<br>(7,59) | 0.703<br>(3,63) |

a. The numbers in parentheses are the numerator and denominator degrees of freedom.

Following are the corresponding 5 percent points for various *F*-distributions:

F(3,60) = 2.76
F(4,60) = 2.53
F(8,60) = 2.10
F(12,60) = 1.92
F(15,60) = 1.84

Comparing equation 5 with the preceding four equations in table 1 suggests that the coefficients are stable. The coefficients do not change by alarming amounts, an almost surprising result when using models with lagged dependent variables and aggregate time series data. Indeed, none of the ten pairwise *F*-tests in table 3 can reject the null hypothesis of structural stability with a 5 percent significance level.[31]

The out-of-sample forecasting results shown in table 4 for the first four equations also support this view.[32] The root mean squared errors (RMSEs) are all the same order of magnitude as the equation standard errors, although two RMSEs of dynamic forecasts are almost double in size. The correlations between actual and forecast values are very high, especially for the first two equations, whose forecast intervals

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31. This is loosely speaking, of course, since these tests cannot test the equality of the coefficients (see Rea 1978). Criticism about the power of *F*-tests whose numerator degrees of freedom are greater than the number of explanatory variables is misdirected. The difficulty in obtaining precise parameter estimates using small samples of aggregate time series data is well known. Moreover, there is little knowledge about the small properties of many of the estimation techniques used by macroeconometricians. Wilson (1978) provides a useful example of when these tests are uniformly most powerful. Multicollinearity does not appear to be a severe problem here. Standard errors of the coefficients and condition numbers are small, and auxiliary $R^2$s of the explanatory variables vary from about 0.6 to 0.9.

32. The terms *static* and *dynamic* refer to two types of forecasts computed for each equation. *Static forecasts* are computed with the actual values of the lagged dependent variable, $\text{LBKPOP}_{t-1}$. *Dynamic forecasts* are computed successively, using last quarter's forecast value as the value of the lagged dependent variable for the current quarter's forecast. The static forecasts are usually best for checking how well the model explains the dependent variable outside the estimation period, since the dynamic forecasts can be thrown "off-track" by a single large error. However, when the dynamic results do not differ greatly from the static results, there is additional evidence in favor of the adequacy of the model.

**Table 4 Forecasting Results of LBKPOP**

| | Equations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | |
| | 1976:IQ-1979:IIIQ | | 1977:IQ-1979:IIIQ | | 1978:IQ-1979:IIIQ | | 1979:IQ-1979:IIIQ | |
| | Static | Dynamic | Static | Dynamic | Static | Dynamic | Static | Dynamic |
| Actual mean | 1.176 | | 1.158 | | 1.182 | | 1.277 | |
| Forecast mean | 1.194 | 1.232 | 1.168 | 1.180 | 1.189 | 1.189 | 1.307 | 1.324 |
| Correlation between actual and forecast | 0.971 | 0.970 | 0.965 | 0.974 | 0.969 | 0.976 | 0.999 | 0.999 |
| RMSE | 0.029 | 0.059 | 0.028 | 0.033 | 0.030 | 0.028 | 0.030 | 0.050 |
| Theil U | 0.024 | 0.050 | 0.024 | 0.028 | 0.025 | 0.023 | 0.023 | 0.039 |
| Bias | 0.368 | 0.868 | 0.126 | 0.444 | 0.054 | 0.062 | 0.954 | 0.842 |
| Regression | 0.147 | 0.014 | 0.222 | 0.212 | 0.295 | 0.368 | 0.044 | 0.158 |
| Disturbance | 0.485 | 0.117 | 0.652 | 0.344 | 0.651 | 0.570 | 0.002 | 0.000 |

contain turning points. There appears to be some bias in both the static and dynamic forecasts, but it is generally small. More importantly, the regression component of the Theil U decomposition, an indicator of systematic error originating from the equation, is small for both forecasts of all equations. Thus, it appears that the specification fairly accurately captures the dynamic behavior of aggregate PBFs under the old bankruptcy law.[33]

## *Estimated Impact of the New Bankruptcy Code*

Seasonally adjusted PBFs increased from 57,496 in 1979:IIIQ to 112,469 in 1981:IVQ. About 44,000 PBFs, or 80 percent of this increase, occurred in the first three quarters of the new code period. The coincidence of this sharp increase and the date the new code took effect has led many analysts to believe that the new code is primarily responsible for the increase. Two techniques can be used to evaluate this belief. One is to determine how well the model estimated with data from the old bankruptcy law forecasts the new code PBFs. If the forecasts are very inaccurate, especially if they are biased, there is reason to believe that factors outside the model are important determinants of PBFs.

This technique must be used with care, however. First, incorrect seasonal factors bias quarterly forecasts, although annual forecasts based on quarterly forecasts should not contain this source of error. Second, forecasting error may bias estimates of the new code's impact. That is, comparisons of actual and forecast PBFs attribute all forecasting error to the impact of the new code.[34] Confidence intervals around the forecast values may be used to account for forecasting error when evaluating the impact of the new code. Third, static forecasts with this model may underestimate the impact of the new code. For example, say the new code caused a one-time increase in PBFs to a permanently higher rate. With static forecasts, the lagged dependent vari-

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[33] The lagged dependent variable is necessary for obtaining stable coefficients in this model.

[34] Carter (1982) and Brimmer (1981) ignore this point and thus may bias their conclusions in favor of the new bankruptcy code having a large impact.

Table 5 Static Forecasts of Equation 5 in the New Bankruptcy Code Period

| Quarter | Forecast value | 0.050 Confidence interval | Forecast error | Actual value |
|---|---|---|---|---|
| | | **Part A. LBKPOP** | | |
| 1979:IVQ | 1.448 | 1.383 - 1.514 | 0.053 | 1.501 |
| 1980:IQ | 1.607 | 1.537 - 1.678 | 0.151 | 1.758 |
| 1980:IIQ | 1.816 | 1.746 - 1.886 | 0.082 | 1.898 |
| 1980:IIIQ | 1.904 | 1.829 - 1.979 | 0.068 | 1.972 |
| 1980:IVQ | 1.952 | 1.861 - 2.043 | 0.036 | 1.988 |
| 1981:IQ | 1.977 | 1.884 - 2.070 | 0.063 | 2.040 |
| 1981:IIQ | 1.999 | 1.898 - 2.100 | -0.016 | 1.983 |
| 1981:IIIQ | 1.965 | 1.867 - 2.064 | 0.019 | 1.985 |
| 1981:IVQ | 1.919 | 1.831 - 2.008 | 0.054 | 1.973 |
| | | **Part B. PBFs** | | |
| 1979:IVQ | 64,168 | 59,741 - 68,596 | 3,512 | 67,680 |
| 1980:IQ | 75,587 | 69,411 - 81,763 | 12,309 | 87,896 |
| 1980:IIQ | 93,555 | 86,433 - 100,680 | 7,972 | 101,530 |
| 1980:IIIQ | 102,630 | 94,397 - 110,870 | 7,217 | 109,850 |
| 1980:IVQ | 108,100 | 97,892 - 118,310 | 3,930 | 112,030 |
| 1981:IQ | 111,380 | 100,360 - 122,400 | 7,223 | 118,600 |
| 1981:IIQ | 114,340 | 102,950 - 125,740 | -1,818 | 112,530 |
| 1981:IIIQ | 111,060 | 99,913 - 122,220 | 2,143 | 113,210 |
| 1981:IVQ | 106,540 | 96,592 - 116,490 | 5,928 | 112,470 |

**Statistics for Part A:**

| | | | |
|---|---|---|---|
| Forecast mean | 1.8432 | Theil U | 0.037 |
| Actual mean | 1.8998 | Bias | 0.632 |
| Correlation | 0.9742 | Regression | 0.111 |
| RMSE | 0.0712 | Disturbance | 0.257 |

Note: Discrepancies are due to rounding.

able feeds this increase, with declining weights, into subsequent forecasts in a purely mechanical way. After the first forecast quarter, static forecasts will underestimate that increase in PBFs resulting from the new code. Dynamic forecasts, however, do not suffer from this problem, because they use previously forecast values, which do not include any new code shift, for the values of the lagged dependent variable. Of course, if the new code had no impact on PBFs, then the two types of forecasts should be similar. Finally, the occurrence of other events not captured by the model but important for PBFs during the new code period will obscure estimates of the fraction of forecasting error stemming from the new code. For example, if liquidity constraints tightened in the new code period in ways not captured by the model and increased PBFs, this technique could not distinguish the forecasting errors arising from the liquidity constraints from those arising from the new code.

Tables 5 and 6 display the forecasting results of equation 5 in the new code period. The numbers in part A pertain to LBKPOP, and those in part B are translations of the confidence intervals and forecast values into corresponding

**Table 6 Dynamic Forecasts of Equation 5 in the New Bankruptcy Code Period**

| Quarter | Forecast value | 0.050 Confidence interval | Forecast error | Actual value |
|---|---|---|---|---|
| | | **Part A. LBKPOP** | | |
| 1979:IVQ | 1.448 | 1.383 - 1.514 | 0.0533 | 1.501 |
| 1980:IQ | 1.567 | 1.498 - 1.636 | 0.191 | 1.758 |
| 1980:IIQ | 1.671 | 1.605 - 1.737 | 0.227 | 1.898 |
| 1980:IIIQ | 1.732 | 1.664 - 1.800 | 0.241 | 1.972 |
| 1980:IVQ | 1.769 | 1.688 - 1.850 | 0.218 | 1.988 |
| 1981:IQ | 1.811 | 1.728 - 1.895 | 0.229 | 2.040 |
| 1981:IIQ | 1.825 | 1.735 - 1.916 | 0.158 | 1.983 |
| 1981:IIIQ | 1.845 | 1.754 - 1.937 | 0.139 | 1.985 |
| 1981:IVQ | 1.814 | 1.732 - 1.896 | 0.160 | 1.973 |
| | | **Part B. PBFs** | | |
| 1979:IVQ | 64,168 | 59,741 - 68,596 | 3,512 | 67,680 |
| 1980:IQ | 72,588 | 66,509 - 78,667 | 15,308 | 87,896 |
| 1980:IIQ | 80,897 | 74,178 - 87,615 | 20,630 | 101,530 |
| 1980:IIIQ | 86,365 | 78,895 - 93,835 | 23,486 | 109,850 |
| 1980:IVQ | 90,044 | 81,005 - 99,082 | 21,986 | 112,030 |
| 1981:IQ | 94,346 | 84,453 - 104,240 | 24,258 | 118,600 |
| 1981:IIQ | 96,098 | 85,914 - 106,280 | 16,429 | 112,530 |
| 1981:IIIQ | 98,515 | 88,179 - 108,850 | 14,694 | 113,210 |
| 1981:IVQ | 95,861 | 86,630 - 105,090 | 16,608 | 112,470 |

**Statistics for Part A:**

| | | | |
|---|---|---|---|
| Forecast mean | 1.7202 | Theil U | 0.099 |
| Actual mean | 1.8998 | Bias | 0.911 |
| Correlation | 0.9486 | Regression | 0.017 |
| RMSE | 0.1882 | Disturbance | 0.073 |

Note: Discrepancies are due to rounding.

measures for PBFs.[35] These results suggest that there is an unexplained increase in PBFs during the new code period. The static forecasts miss the sharp increase in 1979:IVQ through 1980:IIQ; the 1980:IQ and 1980:IIQ static forecasts have the largest errors, and the confidence intervals exclude their actual values. The dynamic forecasts also miss the initial increase, and these errors throw the subsequent dynamic forecasts "off-track," inflating the Theil U and RMSE statistics. The bias in the dynamic forecasts is quite clear, since every forecast error is positive and every confidence interval after 1979:IVQ excludes its actual value. The bias and the RMSE are much less for the static forecasts, but this improvement seems to arise primarily from the lagged dependent variable, which feeds this unexplained increase into subsequent forecasts and hence lowers their forecast error.

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[35] The confidence intervals for LBKPOP are only approximate, because they ignore the complications arising from the lagged dependent variable. The confidence intervals for PBFs are first-order Taylor series expansions of the LBKPOP intervals. The correct intervals in both cases would be wider.

**Table 7 Dynamic Forecasts of Equation 5 Beginning in 1980:IIIQ**

| Quarter | Forecast value | 0.050 Confidence interval | Forecast error | Actual value |
|---|---|---|---|---|
| | | **Part A. LBKPOP** | | |
| 1980:IIIQ | 1.904 | 1.829 - 1.979 | 0.068 | 1.972 |
| 1980:IVQ | 1.900 | 1.812 - 1.988 | 0.087 | 1.988 |
| 1981:IQ | 1.911 | 1.822 - 2.000 | 0.129 | 2.040 |
| 1981:IIQ | 1.901 | 1.806 - 1.996 | 0.082 | 1.983 |
| 1981:IIIQ | 1.903 | 1.808 - 1.998 | 0.082 | 1.985 |
| 1981:IVQ | 1.857 | 1.773 - 1.942 | 0.116 | 1.973 |
| | | **Part B. PBFs** | | |
| 1980:IIIQ | 102,630 | 94,397 - 110,870 | 7,217 | 109,850 |
| 1980:IVQ | 102,660 | 92,807 - 112,510 | 9,370 | 112,030 |
| 1981:IQ | 104,230 | 93,687 - 114,770 | 14,375 | 118,600 |
| 1981:IIQ | 103,650 | 92,964 - 114,340 | 8,873 | 112,530 |
| 1981:IIIQ | 104,350 | 93,630 - 115,060 | 8,862 | 113,210 |
| 1981:IVQ | 100,140 | 90,623 - 109,660 | 12,327 | 112,470 |

**Statistics for Part A:**

| | | | |
|---|---|---|---|
| Forecast mean | 1.8961 | Theil U | 0.049 |
| Actual mean | 1.9901 | Bias | 0.951 |
| Correlation | 0.4718 | Regression | 0.005 |
| RMSE | 0.0964 | Disturbance | 0.044 |

Note: Discrepancies are due to rounding.

Like the actual PBF increase, much of the unexplained increase occurs by 1980:IIIQ. When the dynamic forecasts begin in that quarter, as shown in table 7, they are much better than the dynamic nine-quarter forecasts. The RMSE falls by almost one-half; the bias is much less in absolute terms but a bit higher relative to the RMSE; only two of six confidence intervals exclude their actual values.

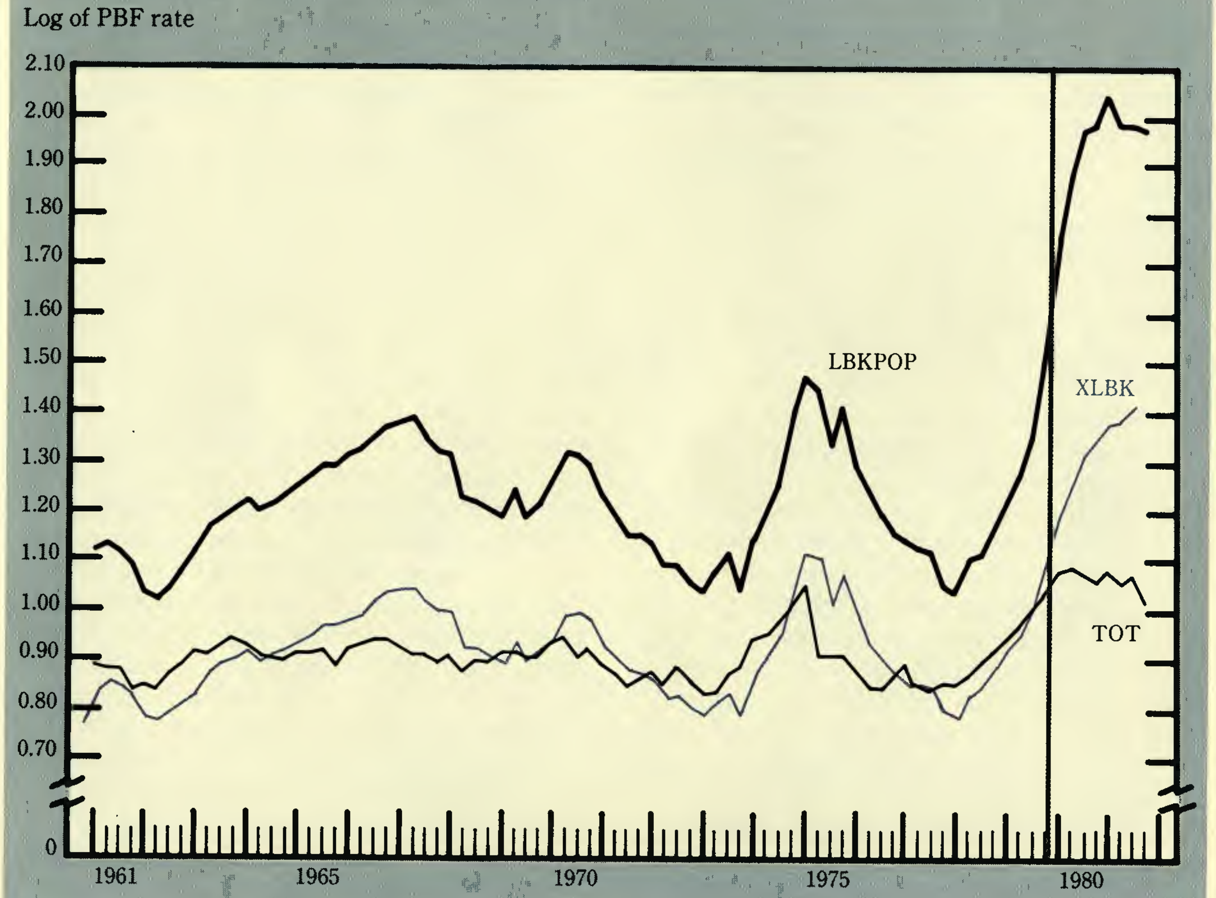
The explained increase in PBFs does not arise from any one variable, but from the combined influence of all the variables. Table 8 shows the means and elasticities of the explanatory variables in the new code period. Comparing these figures with those of table 2, the most obvious differences are found in the figures for RTB$_t$ and

**Table 8 Equation 5: New Code Period 1979:IVQ–1981:IVQ**

| Explanatory variable | Mean | Elasticity at mean |
|---|---|---|
| LBKPOP$_{t-1}$ | 1.7202[a] | 1.3070[a] |
| CONSTANT | 1.0000 | -0.6154 |
| YLP$_t$ | 4.2136 | -1.3399 |
| YLT$_t$ | -0.0930 | 0.0410 |
| RTB$_t$ | 12.6313 | 0.0835 |
| RTAPC$_{t-1}$ | 9.3853 | 1.0333 |
| RDBTPC$_{t-1}$ | 4.6512 | 1.4456 |
| RDEPPC$_{t-1}$ | 5.7745 | -1.1520 |
| NONDPAY$_{t-1}$ | 0.6463 | 0.9559 |

a. These figures are derived from the dynamic forecast.

**Fig. 7 Impact of Explanatory Variables**



YLT$_t$; the mean of RTB$_t$ in the new code period is over twice its mean in the old law period, and transitory income is negative on average in the new code period. However, none of the means of the remaining variables has changed sufficiently to suggest that one or several variables have an inordinate effect on the forecasts. The mean of the dynamic forecast values of LBKPOP$_{t-1}$ also increased in the new code period, but it arises simply from the collective current and past impacts of the income, interest rate, portfolio, and nondiscretionary spending terms.

This is clear in figure 7, which plots the impact of the lagged dependent variable, XLBK, and the total impact of all of the other variables but the constant term, TOT, on the predicted LBKPOP values. These impacts are simply the products of the actual values of the explanatory variables and their coefficients from equation 5. There are quarters when TOT has a larger impact than XLBK, and others when XLBK has the larger impact. In the new code period it appears that XLBK, which is computed with the dynamic forecasts of LBKPOP, has a much larger impact relative to TOT, perhaps leading some readers to criticize the importance of the TOT variables in the new code period. Such criticism is unfounded, however. First, TOT assumes its largest values in the new code period; that is, the financial pressures measured by the TOT variables are the greatest that they have been in at least 20 years. Thus, it is not surprising that LBKPOP increased in the new code period. Second, XLBK captures the past effects of the TOT variables, as argued earlier. Figure 7 clearly shows that changes in TOT precede changes in XLBK. The increasing financial pressures beginning in 1978 raise LBKPOP and the subsequent XLBK values as well, and the sustained large TOT values in the new code period push up LBKPOP and XLBK further.[36] Thus, the explained increase in PBFs is solely a function of current and past values of income, interest rate, portfolio, and nondiscretionary payments terms.

Although an unexplained increase seems to have occurred, the dynamic forecasts shown in table 6 suggest this increase is not very large. Using the confidence interval for 1981:IVQ, the unexplained increase in PBFs may range from 13 percent, or 7,380 filings, to 47 percent, or 25,840 filings, of the actual increase of 54,973 PBFs over the nine quarters of the new code. The predicted values imply the midpoint of 30 percent, or 16,609 filings. Other researchers measure the unexplained increase differently. Carter (1981) looks at the increase in PBFs between statistical years 1979 and 1981 and concludes that 72 percent of the increase is unexplained, whereas the results in table 6 show 34 percent. Brimmer (1981) examines the first five quarters of the new code period and argues that between 28 percent and 32 percent of all the PBFs over these five quarters are unexplained, whereas the results in table 6 indicate 18 percent.

A second technique that can be used to study the impact of the new code is to test hypotheses about how it may have changed the empirical model. One test is whether the coefficients estimated with the old bankruptcy law data remain unchanged when estimated with data from the new code.[37] The results of estimating the empirical model with the full sample 1961:IQ through 1981:IVQ are shown in equation 6 of table 9. In comparing these coefficients with those of equation 5, shown for convenience in table 9, all of the coefficients in equation 6 are larger in absolute value. That is, the high levels of PBFs after 1979:IVQ forced all of the explanatory variables to "work harder" to explain PBFs. The first-order serial correlation coefficient fell by about one-half as the sharp increase in PBFs immediately after the new code took effect broke up the autocorrelation in the errors. The *F*-test rejects the structural stability hypothesis at the 1 percent significance level; the *F*-statistic with 9 and 75 degrees of freedom is 4.29, greater than the 1 percent point for an *F* distribution with 9 and 80 degrees of freedom equal to 2.64. That is, there is a high probability that some factor or factors in the new code period have changed the coefficients as estimated in equation 5.

Based on these results, it would be useful to learn how the model changed in the new code period. Does the relationship between some or all of the variables and PBFs change, or are there additional variables that are now important for explaining PBFs? With only nine quarters of data available on the new code experience, few hypotheses can be tested. A simple test is whether the change is merely an intercept shift. Two such tests are shown in equations 7 and 8 of table 9. In equation 7, NEWCODE1 is a simple dummy variable whose value is 1 throughout the new code period and zero otherwise. In equation 8, NEWCODE2 has a zero value through 1979:IIIQ, increases sharply in the first few quarters of the new code period, and increases

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[36] Another way to see this is to view equation 5 as $LBKPOP_t \approx TOT'_t + 0.76\ LBKPOP_{t-1}$, where $TOT'_t = TOT_t + CONSTANT$, or $LBKPOP_t \approx TOT'_t + 0.76\ TOT'_{t-1} + 0.58\ TOT'_{t-2} + 0.44\ TOT'_{t-3} + 0.33\ TOT'_{t-4} + 0.25\ TOT'_{t-5} + \ldots$, obtained by repeated substitution for $LBKPOP_{t-1}$. In the long run, when $TOT'_t$ is constant in every quarter, $LBKPOP_t \approx 4.2\ TOT'_t$. Thus, when TOT′ increases to a higher, sustained level, as it did in the new code period, LBKPOP should increase by a much larger amount to a higher, sustained level, as it also appeared to do in the new code period.

[37] Rea (1978) is relevant again here. To avoid ambiguous results, all relevant factors, except the new code, must be included in the null hypothesis. Other factors not captured by the model but important for PBFs in the new code period will affect the outcome of the test and thus obscure the estimated effect of the new code.

**Table 9 Regression Results under the New Bankruptcy Code**

Dependent variable is LBKPOP; standard errors are in parentheses

| | Equation | | | |
|---|---|---|---|---|
| | 5 | 6 | 7 | 8 |
| Number of observations | 75 | 84 | 84 | 84 |
| Sample period | 1961:IQ–<br>1979:IIIQ | 1961:IQ–<br>1981:IVQ | 1961:IQ–<br>1981:IVQ | 1961:IQ–<br>1981:IVQ |
| Explanatory variables | | | | |
| LBKPOP$_{t-1}$ | 0.7598 | 0.7650 | 0.6946 | 0.6719 |
| | (0.0356) | (0.0243) | (0.0256) | (0.0379) |
| CONSTANT | -0.6154 | -1.1601 | -0.6920 | -0.9125 |
| | (0.2481) | (0.2815) | (0.2545) | (0.2774) |
| YLP$_t$ | -0.3180 | -0.3357 | -0.3512 | -0.3562 |
| | (0.0530) | (0.0672) | (0.0556) | (0.0638) |
| YLT$_t$ | -0.4409 | -0.4935 | -0.4725 | -0.4936 |
| | (0.0538) | (0.0665) | (0.0556) | (0.0627) |
| RTB$_t$ | 0.0066 | 0.0072 | 0.0021 | 0.0022 |
| | (0.0031) | (0.0025) | (0.0024) | (0.0029) |
| RTAPC$_{t-1}$ | 0.1101 | 0.1253 | 0.1479 | 0.1576 |
| | (0.0300) | (0.0342) | (0.0285) | (0.0339) |
| RDBTPC$_{t-1}$ | 0.3108 | 0.3520 | 0.3759 | 0.4002 |
| | (0.0432) | (0.0442) | (0.0368) | (0.0445) |
| RDEPPC$_{t-1}$ | -0.1995 | -0.2368 | -0.2640 | -0.2888 |
| | (0.0427) | (0.0444) | (0.0371) | (0.0452) |
| NONDPAY$_{t-1}$ | 1.4793 | 2.2879 | 1.5644 | 1.9059 |
| | (0.3583) | (0.4086) | (0.3723) | (0.4048) |
| NEWCODE1 | | | 0.1076 | |
| | | | (0.0235) | |
| NEWCODE2 | | | | 0.1227 |
| | | | | (0.0397) |
| Equation standard error | 0.0287 | 0.0332 | 0.0297 | 0.0314 |
| Adjusted $R^2$ | 0.9659 | 0.9857 | 0.9907 | 0.9874 |
| Durbin *h* | -0.0110 | 0.0970 | 0.0800 | 0.1300 |
| Serial correlation coefficient | -0.3360 | -0.1468 | -0.2640 | -0.1566 |
| Residual mean | 0.0002 | 0.0001 | 0.0001 | 0.0001 |

slowly later in the period.[38] Both intercept shifts have the correct sign and are statistically significant at the 5 percent level, but the coefficients of CONSTANT, LBKPOP$_{t-1}$, RTB$_t$, and NONDPAY$_{t-1}$ change considerably. The reason for these changes is the reason why tests of the new code's impact on the empirical model await more data. Most of the explanatory variables achieve their largest values late in the sample period, when the new code was in effect. The variables $LBKPOP_{t-1}$, $RTB_t$, and $NONDPAY_{t-1}$ in particular achieve values much larger than their previous values, and these large values are quite highly correlated with the values of NEWCODE1 and NEWCODE2. Because the correlation is positive, the coefficients on these three variables are negatively correlated with those of the intercept shifts. Thus, the coefficients on these three variables fall from their values in equation 6.

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[38] The values of NEWCODE2 are computed with the formula 1.0-EXP(-0.461 *J*), where *J* has value 1 in 1979:IVQ, 2 in 1980:IQ, and so on. The weight -0.461 was chosen so that NEWCODE2 would be 0.99, or close to 1 after 10 quarters. The first five values are 0.369, 0.602, 0.749, 0.842, and 0.900; NEWCODE2 has zero value before 1979:IVQ.

Another way of making the point is to say that the particular combination of values for the explanatory variables in the new code period is unique to the period 1961:IQ to 1981:IVQ. These values have very high leverage in determining the coefficient estimates. If the PBF values are thought to be unrelated to factors outside the model, then these values add precision to the coefficient estimates, and equation 6 is the appropriate equation for the whole sample. Otherwise, the coefficients in equation 6 are biased, and the impact of the new code and/or other factors needs to be explicitly incorporated.

## IV. Conclusion

The shape of consumer financial positions is the key to understanding the behavior of aggregate PBFs. Income provides the cash flow to finance nondiscretionary spending, and the size and composition of consumer portfolios help determine nondiscretionary spending, the cushion against unforeseen income loss and spending, and the vulnerability to liquidity constraints. The level of interest rates is also important, because it determines the cost of carrying and refinancing debt. In the aggregate, these factors are very powerful in explaining PBFs. Indeed, these factors may explain about 70 percent of the increase in PBFs in the new code period. The remaining 30 percent may result from the impact of the new code. Apart from the forecasting error, the Consumer Credit Restraint Program, effective from March 14, 1980, to July 3, 1980, also may have influenced PBFs. The reduction in the supply of consumer credit during these months, or, in other words, the tightening of liquidity constraints, may have forced some financially distressed consumers to file for bankruptcy.[39] However, the impact of this program on PBFs probably was small.

PBFs should have been expected to increase under the new code, if only because the new federal exemption levels are more consistent with past inflation rates. Under the old bankruptcy law, only state exemption levels were available, and these were infrequently and imperfectly adjusted for inflation. Hence, real exemption levels fell over time, possibly supressing the number of PBFs until the new code took effect. Much of the unexplained increase in PBFs may be just a natural reaction to an inflation-adjusted new law. Assuming lawmakers expected PBFs to increase for this reason, the relevant question to answer is how much of the increase in PBFs is an undesired result of the new code?

Much of the recent increase in PBFs occurred in the first three quarters of the new code period, paralleling the sluggish growth in real GNP. Since then, PBFs have grown more slowly and actually have fallen; preliminary figures for 1982:IQ show PBFs falling further. The argument that the new code has a large impact on PBFs would be supported by future PBFs remaining at very high rates. Arguments for changing the new code would be severely undercut if PBFs declined to rates found in the old bankruptcy law period. The future course of PBFs will help decide this issue.

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[39] Cox (1980) argues that the Consumer Credit Restraint Program reduced both the supply of and the demand for consumer credit during these months.

## References

Baily, Martin Neil. "Stabilization Policy and Private Economic Behavior," *Brookings Papers on Economic Activity*, 1:1978, pp. 11–50.

*Bankruptcy Laws of the United States*. House of Representatives, Washington: GPO, 1960.

*Bankruptcy Reform Act of 1978*. Title 11, U.S. Code, Bankruptcy. 95 Cong. 2 Sess. 1978.

Brimmer, Andrew F. "Statement," in *Bankruptcy Reform Act of 1978*. Hearing. U.S. Senate. Committee on the Judiciary. Subcommittee on Courts. 97 Cong. 1 Sess. Washington: GPO, April 3, 1981.

Brunner, George Allen. "Personal Bankruptcies in Ohio." Ph.D. dissertation, Ohio State University, 1964.

Carter, Charlie. "The Surge in Bankruptcies: Is the New Law Responsible?," *Economic Review*, Federal Reserve Bank of Atlanta, vol. 67, no. 1 (January 1982), pp. 20-30.

Cox, Donald. "The March 14 Credit Controls, Consumer Credit and Spending—Progess Report." Research Paper 8010. Federal Reserve Bank of New York, November 1980.

Dolphin, Robert, Jr. "An Analysis of Economic and Personal Factors Leading to Consumer Bankruptcy." Occasional Paper 15. Michigan State University, Graduate School of Business Administration, Bureau of Business and Economic Research, 1965.

Fitzpatrick, Dennis B. "An Analysis of Limited Aspects of the Past, Present and Future Operations of Commercial Bank Card Systems." D.B.A. dissertation, University of Colorado, 1973.

Haden, Harry H. "Chapter XIII Wage Earner Plans—Forgotten Man Bankruptcy," *Kentucky Law Journal*, vol. 55, no. 3 (1967), pp. 564-617.

Herrmann, Robert O. "Causal Factors in Consumer Bankruptcy: A Case Study." Occasional Paper 6. University of California, Davis, Institute of Governmental Affairs, December 1965.

King, Lawrence P. "Statement," in *Bankruptcy Reform Act of 1978*. Hearing. U.S. Senate. Committee on the Judiciary. Subcommittee on Courts. 97 Cong. 1 Sess. Washington: GPO, April 3, 1981.

Kowalewski, K.J. "Consumer Lending and the Bankruptcy Reform Act of 1978," *Economic Commentary*, Federal Reserve Bank of Cleveland, January 12, 1981.

Luckett, Charles. "Recent Financial Behavior of Households," *Federal Reserve Bulletin*, vol. 66, no. 6 (June 1980), pp. 437-43.

Mathews, H. Lee. "Causes of Personal Bankruptcies," Bureau of Business Research Monograph 133. Ohio State University, College of Administrative Science, 1969.

Misbach, Grant L. "Personal Bankruptcy in the United States and Utah." M.B.A. thesis, University of Utah, 1964.

Pfeilsticker, Paul J. "Soaring Personal Bankruptcies: The Reality of the New Act," *Journal of Retail Banking*, vol. 2, no. 3 (September 1980), pp. 7-15.

Rea, John D. "Indeterminacy of the Chow Test when the Number of Observations Is Insufficient," *Econometrica*, vol. 46 (January 1978), p. 229.

Reed, Edward W. *Personal Bankruptcies in Oregon*. Eugene, Ore.: University of Oregon Press, 1967.

Sadd, Victor, and Robert T. Williams. "Causes of Bankruptcies among Consumers." Domestic Commerce Series 82. U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce. Washington: GPO, 1933.

Smith, Clifford W., Jr. "On the Theory of Financial Contracting: The Personal Loan Market," *Journal of Monetary Economics*, vol. 6, no. 3 (July 1980), pp. 333-57.

Stanley, David T., and Marjorie Girth. *Bankruptcy: Problem, Process, Reform*. Washington: Brookings Institution, 1971.

Stiglitz, Joseph E., and Andrew Weiss. "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, vol. 71 (June 1981), pp. 393-410.

U.S. Congress. Senate. Subcommittee on Courts, Committee on the Judiciary. *Bankruptcy Reform Act of 1978*. Hearings. 97 Cong. 1 Sess. Washington: GPO, 1981.

Vicker, Ray. "Demand for Credit Counseling Rises as Personal Bankruptcy Rates Grow," *Wall Street Journal*, November 19, 1981.

Wilson, A.L. "When Is the Chow Test UMP?," *American Statistician*, vol. 32, no. 2 (May 1978), pp. 66-68.

# The Case for Staggered-Reserve Accounting

by William T. Gavin

The fundamental role of the Federal Reserve System is to ration the supply of money to the economy. The Federal Reserve does this by rationing the supply of reserves to the banking system. Control of reserves implies control of the money supply in our banking system, because banks are required to hold reserves against the deposits that are included in the money supply. Since the 1920s the larger banks have been required to settle their reserve accounts simultaneously on a weekly basis. This simultaneous settling occurs each Wednesday and can lead to hectic trading in the market for reserves on the settling day.[1]

Eighteen years ago Cox and Leach (1964) proposed an institutional reform that would lengthen the reserve-accounting period from one week to one month and stagger the reserve-accounting periods among four groups of banks. The general argument for their proposal was that it would reduce volatility and uncertainty in short-run financial markets. However, there was relatively little short-run volatility in financial markets under the operating procedures and monetary control mechanisms of the 1960s and 1970s.[2] A major institutional change to prevent short-run volatility, such as the staggered-reserve-accounting proposal, was not warranted under the old operating procedures. With the change in operating procedures adopted on October 6, 1979, interest rates have become significantly more volatile.[3] Increased volatility and uncertainty under the new operating procedures have led the Morgan Guaranty Company (1981) to reissue the call for staggered-reserve accounting. Under the Morgan Guaranty proposal, each bank would have a four-week period for averaging reserve holdings to meet its reserve requirements.[4] All banks would be divided into four groups, each with approximately one-quarter of all deposits. The reserve-maintenance periods would be staggered so that one group would settle its reserve accounts each Wednesday.

The argument for this proposal is based on two premises: (1) that short-run fluctuations in the demand for money and reserves should be accommodated by monetary policy and (2) that monetary control mechanisms should be structured so that total reserves could be the operating target of monetary policy. Extensive research based on the theoretical framework of Poole (1970) supports the first premise. Brunner (1973) uses his macroeconomic model with markets for money, credit, and goods to extend Poole's analysis. He concludes, as did Poole, that the central bank should accommodate changes in the demand for money. However, he argues that the

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[1] See Johnson (1981), p. 14. Between 1978 and 1980, the average trading range for the federal funds rate, the interest rate on reserves that banks lend to one another, was three to ten times larger on Wednesdays than on other days.

[2] Cox and Leach (1964) show that there is volatility or "churning" in the market for government securities, but they do not show that it causes volatility in interest rates. Coats (1976) provides some evidence on volatility in the federal funds rate before and after the 1968 changes in Regulation D. Johnson (1981) provides evidence on interest-rate volatility before and after the introduction of the new operating procedure in October 1979.

[3] For a detailed description of the new operating procedure, see Stevens (1981).

[4] The term *bank* is used in a generic sense to include all depository institutions subject to reserve requirements.

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volatility in financial markets stemming from variation in money demand is a very short-run transitory phenomenon. He goes on to argue that other sources of instability in financial markets are longer lasting and should not be accommodated. The problem for the central bank is that it has proven difficult, if not impossible, to identify the sources of volatility in financial markets while they are occurring.

To finesse this problem, some observers have suggested that the central bank abandon monetary targets in favor of interest-rate or credit targets. Presumably, this would allow for flexible monetary growth in the short run but not in the long run. The Morgan Guaranty proposal offers another solution. This proposal would create flexibility in the short run so that a given total reserve path would support a wide range of interest-rate and deposit paths. This flexibility would dampen the interest-rate effects of short-run variation in money demand.

The Morgan Guaranty proposal would provide two channels for handling short-run fluctuations in financial markets. The first channel is internal to each bank. Each bank could average reserves over four weeks. Under the current week-long reserve-accounting periods, each bank has its own "seasonal" pattern for holding reserves within the week. This allows each bank to accommodate offsetting day-to-day fluctuations in reserves. Week-to-week variations are smoothed by banks' trading in the federal funds market or borrowing from the Federal Reserve at the discount window. Under the Morgan Guaranty plan, each bank would accommodate offsetting week-to-week fluctuations by choosing its own "seasonal" pattern for holding reserves within the month.

The second channel is external to the individual banks, but internal to the private banking system. Staggering reserve-settlement days among four groups of banks would allow settling banks to trade reserves with nonsettling banks. This trading would tend to accommodate offsetting week-to-week and month-to-month fluctuations in reserves.

The staggered-reserve-accounting proposal is also based on the premise that the Federal Reserve should retain close control over total reserves. Any proposal that gives the Federal Reserve close control over total reserves must include a mechanism to prevent the "crunches" that can occur when all banks have to settle simultaneously.

Lack of control over total reserves in the past may or may not be the reason why monetary targets were missed so often in the 1970s. In any event, there would be an advantage to targeting total reserves, because the operating procedures would be simplified. Under the current arrangement, the stance of monetary policy depends on uncertain estimates of interest rates, borrowed reserves, and excess reserves. The financial press is again monitoring and reporting "free reserves" as an indicator of policy stance. The actual stance of policy depends on nonborrowed reserves, the discount rate, and the slope of the borrowing function. The Federal Open Market Committee sets the targets for money growth and the initial borrowing assumption from which the target for nonborrowed reserves is derived. The Board of Governors decides on the discount rate. There is no evidence that these separate decisionmaking processes impede the formulation and implementation of policy, but the arrangement does little to enhance the public's understanding of policy.

The advantages of the Morgan Guaranty proposal are that it would lengthen the reserve-accounting period from one week to four weeks, and it would allow the adoption of total reserves as the operating target for monetary policy. Going to a four-week reserve-accounting period would mute the impact on reserve markets of unpredictable week-to-week variation in the money stock. Adopting total reserves as an operating target would simplify the operating procedure.

## I. Length of the Settlement Period

There are theoretical grounds for making the length of the reserve-settlement period coincident with the average payment cycle. Consider one household that is paid biweekly, with income deposited in a transactions account on the first day of the payment period. Suppose the demand-deposit balance falls in a random way throughout the period until it reaches zero on the last day. For this example, also assume that there is no currency. If the economy were made up of households identical to this one, where all firms had sophisticated cash-management programs but households did not, then a one-week aggregate measuring of the money stock generally would overstate the average money stock in the first week and understate it in the second. If the central bank were to set weekly targets for the money supply, seasonal adjustment would be necessary to supply a target amount of total reserves in a biweekly cycle that duplicated the average payment cycle.

If the weekly seasonal factors were predictable, there would be no problem. But, if the seasonal factors changed in an unpredictable way, then institutions would be induced to intermediate the repeated discrepancies between the demand for reserves, derived from the deposit cycle, and the supply of reserves, implied by the "targeting" procedures. If this intermediation is not costless, then whether the central bank should adopt weekly reserve maintenance when the average payment cycle is longer than a week depends on how accurately the weekly seasonal-adjustment factors can be predicted.

As this simple example suggests, it is important for short-frequency seasonal-adjustment factors to be predictable when the reserve-accounting period is shorter than the average payment cycle and total reserve targeting is practiced. If the seasonal factors are in error, the Federal Reserve would force markets to adjust to an incorrect supply of reserves. One way to avoid the possibility of "targeting" errors is to lengthen the reserve-accounting period to the minimum predictable average payment cycle.

How long is the minimum predictable average payment cycle? Cox and Leach (1964) and the Morgan Guaranty proposal suggest four weeks. The pattern of the seasonal factors for 1981 indicates that payment cycles are interwoven at all measured frequencies—weekly, monthly, quarterly, and annually. Recent evidence suggests that the cycle in the weekly interval is much more difficult to predict than the cycles in monthly or longer intervals.[5] Pierce (1981) discusses the problems posed by the weekly money-supply data. The problems are reflected in the relative absence of weekly money-market models. Carlson (1982) discusses the importance of using models to predict movements in the money supply. He concludes that there is a good chance that existing models of monthly seasonal factors may be improved in the near future. However, our confidence in weekly models is still quite limited. In a letter to Senators Jake Garn and William Proxmire, Federal Reserve Chairman Paul Volcker (1981) wrote:

> There is nearly unanimous agreement by all observers that weekly money statistics are extremely erratic and therefore poor indicators of underlying trends. While monthly data can often deviate considerably from such trends, the weekly observations are particularly "noisy." Week-to-week changes are quite large and recent estimates indicate that the "noise" element—attributable to the random nature of money flows and difficulties in seasonal adjustment—accounts for plus or minus $3.3 billion in weekly change two-thirds of the time. Such a large erratic element appears intrinsic to money behavior, rather than implying poor underlying statistics.

This uncertainty in the weekly data generates uncertainty in the reserve-target paths, because they are based on weekly seasonal factors for the money supply.

The dollar size of unexpected variation in the money supply is about the same for monthly as for weekly data. If one assumes that the adjustment costs to the banking system are proportional to the unexpected variation in the money supply over the settlement period and to the number of settlement days, then the Morgan Guaranty plan would reduce these adjustment costs by 75 percent.

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[5] See also *Seasonal Adjustment of the Monetary Aggregates*, Report of the Committee of Experts on Seasonal Adjustment Techniques (Board of Governors of the Federal Reserve System, 1981).

Another consideration is relevant to choosing the appropriate length of the accounting period. The period chosen should be consistent with the timeframe appropriate for close monetary control. A wide range of research within the Federal Reserve System clearly suggests that money control within very short periods of time, such as one week, is pointless for both operational and theoretical reasons.[6] There are many issues involved in selecting an appropriate temporal framework for monetary control. Nevertheless, there is neither support nor sentiment for close control of the money supply within a period shorter than one month.[7] While there still would be a chance of "targeting" errors if reserves were controlled on a monthly basis, the errors probably would be much smaller than with a weekly control period; empirical evidence gives us more confidence in the stability of monthly seasonal factors than weekly factors.

Two obstacles stand in the way of moving to a monthly reserve-accounting period. One is the desire to update information weekly. Yet, there is no reason why weekly reporting could not be maintained with monthly reserve accounting. The other is a concern that the banking system as a whole would accumulate larger aggregate errors if the reserve-accounting period were lengthened. This may be true, because markets process and disseminate information when they clear. In a sense, the reserve market clears only on settlement day. Between settlement days the federal funds rate is determined by expectations about future interest rates, especially expectations about the federal funds rate on the next settlement day. The individual bank learns about aggregate behavior on settlement day. Larger errors associated with a longer time between settlement days would require larger interest-rate variations to correct the errors and/or less precise control over total reserves.

Staggering reserve-maintenance periods as suggested in the Morgan Guaranty proposal would mitigate these problems, because one-fourth of all banks would settle each week. All banks would learn of accumulating aggregate errors on settlement days. Nonsettling banks would have time to adjust their reserve positions before their own settlement days.

## II. Simplifying the Operating Procedures

Under the current operating procedures, the discount window is an important and necessary link in the transmission of monetary policy from nonborrowed-reserve operating targets to the money-supply targets. The discount window is necessary because required reserves today are held against deposits of two weeks earlier. The short-run path of the money supply is determined by the public's demand for currency and deposits. The money supply is controlled indirectly by controlling nonborrowed reserves. Reserves to support deviations of the money supply from target must be borrowed at the discount window. Because the Federal Reserve district banks use administrative pressure to prevent banks from borrowing too frequently, short-term interest rates tend to rise when borrowing rises and to fall when borrowing falls. One implication of this procedure is that nonborrowed reserves normally should be maintained below required reserves. Otherwise, borrowing and the federal funds rate could fall to zero when the money supply goes below the target path, as it did briefly in 1980 and for a longer period in 1981.

One source of slippage in this procedure is the uncertain relationship between the amount of borrowing today and the change in the money supply in the future. If the money supply goes above the target path, borrowing and interest rates will rise, but there is considerable short-run variation in the reaction of the public to the higher interest rates. The money supply usually comes down in the weeks following the higher interest rates, but the response is delayed and variable. These deviations of the money supply from target are viewed as a problem by some market participants today. Since the mid-1970s many deviations were above target and were not readily corrected; when they occurred at the end of a targeting period, they were incorporated into the level of the money supply from which succeeding targets were calculated.[8]

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[6] For example, see Axilrod and Lindsey (1981), p. 248, and the papers by Lindsey et al. and by Pierce in *New Monetary Control Procedures*—Volume II. Karl Brunner (1973) argues that the appropriate timeframe for targeting the money supply exceeds one month (pp. 530–31).

[7] There are exceptions, of course. First, some are willing to make radical institutional changes such as suggested by Laurent (1981). Second, others, such as Balbach (1981), see the need for close week-to-week control as a method of getting longer-run control.

To prevent this upward drift in the money supply, many observers have called for a change in operating targets from nonborrowed reserves to total reserves. If total reserves were controlled at a target level, then the money supply could not drift off target over time. The Federal Reserve has proposed a change in reserve-accounting rules that would permit more control of total reserves.[9] Jones (1981) suggests that targeting total reserves under this proposal might increase the volatility of interest rates and uncertainty in short-term financial markets. This increased volatility in short-term markets might not be too high a price to pay for closer control of total reserves. However, proponents of staggered-reserve accounting argue that it is an unnecessary price to pay. With staggered-reserve accounting the Federal Reserve could use total reserves as its operating target without requiring perfectly contemporaneous reserve-maintenance periods.

To analyze the effect that staggering reserve periods would have on the impact of monetary policy, it is important to identify which impacts are desired and which are not. It is likely that the short-term securities market would not be as responsive to monetary policy as it is in a nonstaggered regime; yet, the reaction to policy in the short-term securities market today may not be optimal, given the high cost to banks of adjusting assets other than short-term securities on short notice. The impact of monetary policy on bank lending would not necessarily be delayed under a staggered-reserve regime.

To understand why this is so, imagine that each bank seeks a fairly stable ratio of short-term securities to loans and that it is more costly for a bank to change its lending plans within a few days than for it to change its holdings of securities. Today, with small carryover privileges and limited access to the discount window, a shortage of reserves in the aggregate encourages banks to sell short-term securities to the nonbank public. This causes yields on securities to rise, inducing nonbanks to shift from money to securities and inducing banks to increase their use of the discount window. In following periods, banks reduce loans and buy back some of the securities. Staggered settlement days would allow banks to adjust a wider range of assets, reducing the need for some of the trading in short-term securities. Persistent excess demand for reserves over a few weeks would cause interest rates to rise, but yields on securities would not have to rise relative to yields on loans. Achieving immediate control of total reserves could be associated with reduced turnover in securities markets and associated interest-rate movements. As this simple example suggests, the impact of monetary policy on loan markets and the money stock could be achieved with less "churning" by banks in security markets if reserve-maintenance periods were staggered among banks.

Staggering reserve-maintenance periods would perform much the same role that the discount window serves today in moderating short-run volatility of interest rates in securities markets. But, staggered settlement days would allow the Federal Reserve to end most adjustment lending at the discount window and gain more precise control of total reserves. Only if a bank had special problems that prevented access to the inter-bank market would the Federal Reserve still have to be the source of reserve-adjustment credit. Seasonal and extended credit facilities would not have to change in any way. With staggered reserves, however, the reserve-targeting process would no longer be complicated by an erratic short-run linkage between changes in

[8] Poole (1976) predicted the inflationary consequences of incorporating this "base drift" in setting annual targets.

[9] For a description of this proposal, see *Federal Reserve Bulletin*, November 1981, pp. 856–57.

borrowed reserves, money market interest rates, and money growth. Removing the discount window from the control mechanism would still allow the Federal Reserve to set attainable targets for total reserves. Attaining perfect control over total reserves under staggered-reserve accounting would not give perfect control over money-supply growth. But, deviations of the money supply from target automatically would cause interest rates to adjust in a way that would encourage banks to supply and the public to demand the targeted amount of money.

## III. Dynamic Stability and Staggered-Reserve Accounting

Laufenberg (1975) first noted that the institutional structure of the staggered-reserve-accounting regime implied the possibility of dynamic instabilities. Lindsey (1981) suggests that such instabilities are a property of staggered accounting *per se.* Trepeta and Lindsey (1979) present a model in which a disturbance to deposits with no change in total reserves sets in motion an undamped cycle in which deposits oscillate above and below the equilibrium level implied by the total reserve target. This seems improbable, however; a cycle in deposits would tend to induce a cycle in the federal-funds rate and imply a profit opportunity that banks could easily exploit. Moreover, Bagshaw and Gavin (1982) show that, even if banks ignored this profit opportunity, the dynamic instability described in the Laufenberg and the Trepeta-Lindsey papers is peculiar to a model with just two banking groups. When the model is extended to include more than two groups, the dynamic instability disappears, although damped cycles are still present.

## IV. Conclusion

The Morgan Guaranty proposal would lengthen the reserve-accounting period to four weeks and stagger settlement days among four groups of banks. Lengthening the reserve-settlement period would make it more consistent with a timeframe that is considered appropriate for measuring and controlling the money supply.

The adoption of a reserve-targeting operating procedure in October 1979 created a new environment for the financial community. Weekly variations in the money stock and the demand for reserves impose costs in financial markets that did not exist under the old operating procedure. Staggering settlement days provides a new way of handling these short-run variations in money demand. Lengthening the reserve-maintenance period to four weeks alleviates some of the costs associated with these variations by reducing the frequency of reserve adjustment for each bank.

Adoption of staggered-reserve accounting would allow the Federal Reserve to set operating targets for total reserves. The operating procedure would be simplified. This institutional structure has the advantage of allowing market participants to determine the short-run path for the money supply and interest rates. At the same time, the Federal Reserve could maintain total reserves on a path consistent with its long-run monetary objectives.

## References

Axilrod, Stephen H., and David E. Lindsey. "Federal Reserve System Implementation of Monetary Policy: Analytical Foundations of the New Approach," *American Economic Review*, vol. 71, no. 2 (May 1981), pp. 246–52.

Bagshaw, Michael L., and William T. Gavin. "Stability in a Model of Staggered-Reserve Accounting." Working Paper 8202. Federal Reserve Bank of Cleveland, June 1982.

Balbach, Anatol B. "How Controllable Is Money Growth?," *Review*, Federal Reserve Bank of St. Louis, vol. 63, no. 4 (April 1981), pp. 3–12.

Brunner, Karl. "A Diagrammatic Exposition of the Money Supply Process," *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, December 1973, pp. 481–533.

Carlson, John B. "The Problem of Seasonally Adjusting Money," *Economic Commentary*, Federal Reserve Bank of Cleveland, May 31, 1982.

Coats, Warren L., Jr. "Lagged Reserve Accounting and the Money Supply Mechanism," *Journal of Money, Credit and Banking*, vol. VIII, no. 1 (May 1976), pp. 167-80.

Cox, Albert H., Jr., and Ralph F. Leach. "Defensive Open Market Operations and the Reserve Settlement Periods of Member Banks," *Journal of Finance*, vol. XIX, no. 1 (March 1964), pp. 76-93.

Johnson, Dana. "Interest Rate Variability under the New Operating Procedures and the Initial Response in Financial Markets," *New Monetary Control Procedures*. Federal Reserve Staff Study—Volume I. Washington, D.C.: Board of Governors, 1981.

Jones, David S. "Contemporaneous vs. Lagged Reserve Accounting: Implications for Monetary Control," *Economic Review*, Federal Reserve Bank of Kansas City, November 1981, pp. 3-19.

Laufenberg, Daniel E. "Staggered Reserve Periods," Board of Governors Staff memo to Mr. Axilrod, December 9, 1975; revised July 6, 1978.

Laurent, Robert D. "Reserve Requirements, Deposit Insurance, and Monetary Control," *Journal of Money, Credit and Banking*, vol. XIII, no. 3 (August 1981), pp. 314-24.

Lindsey, David E. "Nonborrowed Reserve Targeting and Monetary Control," in *Improving Money Stock Control: Problems, Solutions, and Consequences*, Federal Reserve Bank of St. Louis and Center for Study of American Business, Washington University, forthcoming.

Morgan Guaranty Survey. "Interest Rate Volatility: A Way to Ease the Problem," Morgan Guaranty Company, July 1981, pp. 7-10.

Pierce, David A. "Trend and Noise in the Monetary Aggregates," in *New Monetary Control Procedures*. Federal Reserve Staff Study—Volume II. Washington, D.C.: Board of Governors of the Federal Reserve System, 1981.

Poole, William. "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," *Quarterly Journal of Economics*, vol. 84, no. 2 (May 1970), pp. 197-216.

————. "Interpreting the Fed's Monetary Targets," in *Brookings Papers on Economic Activity*, 1:1979, pp. 247-59.

*Seasonal Adjustment of the Monetary Aggregates*, Report of the Committee of Experts on Seasonal Adjustment Techniques. Washington, D.C.: Board of Governors of the Federal Reserve System, October 1981.

Stevens, E.J. "The New Procedure," *Economic Review*, Federal Reserve Bank of Cleveland, Summer 1981, pp. 1-17.

Trepeta, Warren, and David E. Lindsey. "The Reuss Proposal to Stagger Reserve Accounting Periods," Washington, D.C.: Board of Governors of the Federal Reserve System, Division of Research and Statistics, April 25, 1979; processed.

Volcker, Paul A. Letter to Senators Jake Garn and William A. Proxmire, March 24, 1981.

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