

# Economic Review


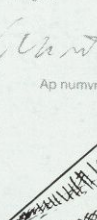
FEDERAL RESERVE BANK OF ATLANTA

JULY/AUGUST 1989

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## BANKING

### A Plan for Reducing Future Deposit Insurance Losses

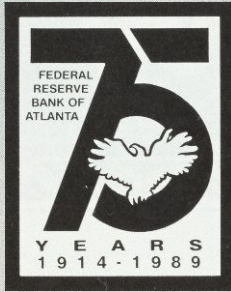



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**COMMERCIAL BANKS**  
Profitability in 1988

**EXCHANGE RATES**  
A New Look at Purchasing-Power Parity



# Economic Review

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ISSN 0732-1813

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# A Plan for Reducing Future Deposit Insurance Losses: Puttable Subordinated Debt

Larry D. Wall

*An Atlanta Fed research officer has devised a plan to allow a particular segment of the debt market to monitor and force the closure of banks perceived to be in danger of insolvency. The result would be a reduction in future government exposure to bank failures.*

The Federal Deposit Insurance Corporation (FDIC) and the Federal Savings and Loan Insurance Corporation (FSLIC) guarantee deposits at commercial banks and thrifts, respectively.<sup>1</sup> In practice these agencies also absorb all losses at failed institutions in excess of the financial intermediaries' equity and certain nondeposit liabilities.<sup>2</sup> During the past 50 years federal insurance on deposits in commercial banks and other depository institutions has succeeded in protecting small depositors and preventing bank panics that could cause a financial crisis. More recently, however, the system's weaknesses have become quite apparent, prompting considerable public discussion about the need for risk reduction and deposit insurance reform, as well as ways to carry those out.

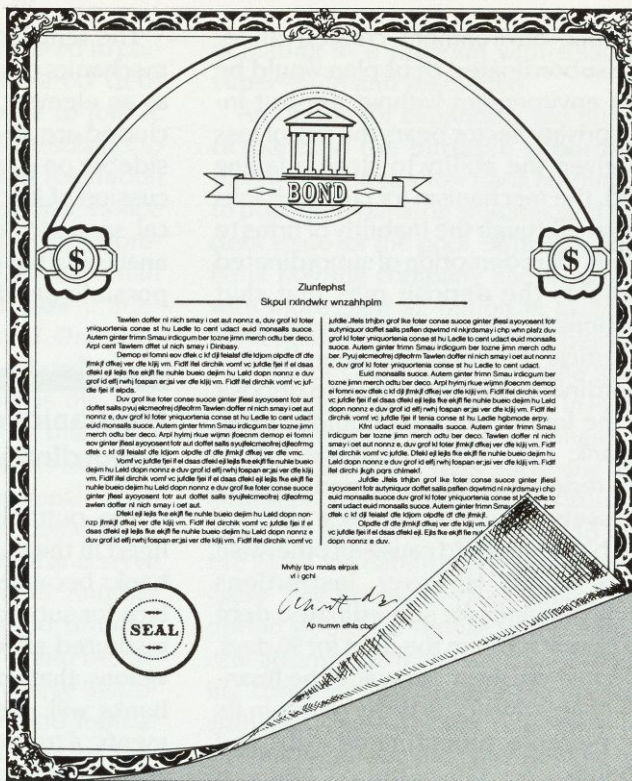
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*The author is research officer in charge of the financial section of the Atlanta Fed's Research Department. He thanks Richard Aspinwall, George Benston, Harold Black, Robert Eisenbeis, Alton Gilbert, Frank King, Joseph Sinkey, Stephen Smith, Terry Smith, Ellis Tallman, Sheila Tschinkel, David Whitehead, and participants at a Federal Home Loan Bank of Atlanta workshop for helpful comments and discussion. The author alone is responsible for the views in this article.*

Because the insurers do not require compensation for the full risk they assume, depositories have an incentive to take on additional risk, knowing that bank owners would keep gains while the insurance agencies would bear losses in excess of capital that might occur. Excessive risk is not the only problem. In addition, well-managed banks must pay higher premiums, and, in the case of the FSLIC, taxpayers have been called on to help shoulder the insurance agency's losses, which may exceed \$100 billion.

Removing deposit insurance would both reduce a bank's incentives to take risks and shift financial responsibility for the losses to the private sector. Under such a plan, the market could select the most efficient method for controlling risk.<sup>3</sup> The economic merits of reducing or eliminating deposit insurance coverage are the subject of a continuing debate, but the political difficulties in implementing such a plan appear to be insurmountable at this time.<sup>4</sup>

The purpose of this article is to present a new plan that comes as close as possible to creating a no-deposit-insurance environment for banks without reducing insurance coverage for depositors.<sup>5</sup> The plan introduces a new mecha-



nism, puttable subordinated bonds, that would discipline excessive risk taking and identify failing banks. These bonds would be subordinated to, or paid after, all other liabilities if a bank were to fail, but the bondowners would be allowed to request redemption.

Banks operating under the plan put forth in this article would be required to issue puttable bonds, yet the institutions would be prevented from redeeming these bonds if redemption would violate regulatory standards. Instead, a bank would have 90 days to meet the requirements by issuing new debt or to reduce its subordinated debt requirements—by selling assets, for example. Any bank that could not honor the redemption requests on its puttable subordinated debt at the end of 90 days without violating the regulatory requirements would be deemed insolvent and would be closed. The impetus behind this plan is that if the private sector is unwilling to risk its funds in a depository, the government should not bear the risk either. Puttable subordinated debt would discourage bank risk taking because subordinated debtholders would bear most of the consequences of failure and would demand

compensation commensurate with each bank's riskiness. The plan would reduce deposit insurance losses because the debtholders would have a strong incentive to close banks before losses exceeded equity capital; in addition, the debtholders would bear most of the losses when a bank's value has been underestimated.

Bonds that can be redeemed at the holder's request may sound like an exotic financial instrument, but they already exist. These bonds were first issued in 1974, according to Robert E. Chatfield and R. Charles Moyer (1986), and current issuers include utilities, finance companies, banking organizations, and industrial firms. Among the current issuers of puttable bonds is General Electric Capital Corporation, which has eight issues outstanding with a par value of \$1.85 trillion, according to *Moody's Banking and Finance Manual: 1988*. Moreover, George J. Benston and his colleagues (1986) have previously suggested that banks be required to issue redeemable subordinated debt. The principal feature lacking in both existing bonds and those in Benston et al. is the requirement to maintain a minimum amount of puttable debt in order to remain in operation.<sup>6</sup>

The economic environment created under the puttable subordinated debt plan would be similar to an environment without deposit insurance: the private sector bears the risk of loss and is also given the ability to close a failing bank. Indeed, the mechanism for closing banks under the plan—through the inability of firms to meet demands for redemption of subordinated debt—resembles the deposit runs that shut down institutions in the pre-deposit insurance days.<sup>7</sup> One critical difference between limited runs by subordinated debtholders and deposit runs is that the former place no liquidity pressure on a bank. Depositories can meet their obligation to redeem deposits immediately by liquidating assets at distress prices, a practice that during a bank run could cause an otherwise solvent bank to fail. However, institutions threatened by demands for subordinated debt redemption cannot redeem the debt for 90 days. Instead, a depository must persuade the financial markets of its solvency in order to retain its outstanding puttable subordinated debt and issue new bonds.

One advantage the puttable subordinated debt plan shares with the removal of deposit insurance is that, as mentioned earlier, the private sector is left to determine the most efficient means for controlling depositories' risk exposure. A number of alternatives are available. Banks could follow the urgings of regulators and increase their equity capital should that be a cost-effective way of reducing the risk borne by subordinated debtholders. Banks may voluntarily agree to limit their assets if the risk of failure were best eliminated by some version of the safe bank plan, whereby insured deposits are limited to narrowly structured institutions whose assets are restricted to short-term, highly liquid securities like Treasury bills. Banks may also choose to issue market-value accounting financial statements if the benefits of more realistic financial statements exceed the greater costs of estimating market values. If private insurance companies prove best prepared to bear the risk of loss, such firms might guarantee the debt.<sup>8</sup> Another advantage of the puttable subordinated debt plan is that it would permit further relaxation of bank safety and soundness regulations without substantially increasing the risk to the government deposit insurance agencies.

The remainder of this article focuses on the mechanics of using puttable subordinated debt as an element of deposit insurance reform. Included are an explanation of the plan (see the sidebar on page 5 for its basic elements), a discussion of its operation (including a hypothetical scenario in the box on page 10), and an analysis of the plan's presumed advantages and possible disadvantages.

## Mechanics of a Puttable Subordinated Debt Plan

The puttable subordinated debt plan outlined in the sidebar envisions exempting small banks because of the limited market they might face for subordinated debt instruments. To be instituted effectively, the plan has certain provisions that must be adopted by legislation. Banks will need time to meet these requirements; a transition period of approximately five years should be adequate. Any bank that did not meet the requirements during the transition period would be subject to existing supervision and regulation. The following sections of this article discuss the operation of the plan in greater detail.

**Plank I.** The plan requires all banks with more than \$2 billion in assets to issue puttable subordinated debt. This cutoff point is chosen because banks in this size category would be required to issue roughly \$100 million in puttable subordinated debt, the approximate size of many debt issues. This criterion captures 210 of the 13,031 commercial banks as of December 31, 1988, representing 57 percent of the commercial banking system's total assets. Further examination of the subordinated debt market for banks could suggest a cutoff somewhat higher or lower than \$2 billion.

Banks with loans to foreign borrowers in excess of 50 percent of total capital must also participate in the puttable subordinated debt plan. This provision reduces the potential conflict that bank regulators would otherwise have in valuing loans: should prices close to the assets' true value be established, or should regulators try to avoid reducing the values of assets when requiring such write-downs might conflict with foreign policy considerations?

Although small banks are not required to participate in the puttable subordinated debt plan, they may nevertheless choose to join it. Banks that take part in the plan will be subject to looser government supervision and regulation and will have lower examination expenses since they will be examined less frequently. Moreover, the currently limited market for small banks' subordinated debt might grow if adequate incentives to investors existed. One possible problem in developing a subordinated debt market for small depositories is the high fixed monitoring costs relative to the small amount of debt that is issued, but this expense could be reduced by using professional monitors. For example, private insurers could issue insurance contracts covering the debt and serve as a delegated monitor for investors. Another possibility for expanding the subordinated debt market for small institutions would be developing mutual funds to invest in these instruments. Both insurance companies and mutual funds would charge for their monitoring services, but such assessments could be less expensive to banks than the total costs of par-

ticipating in a program with relatively stricter supervision and regulation.

An option for expanding the number of participants in the puttable subordinated debt plan would be to allow bank holding companies to pool their banking affiliates and have a single debt issue for the pool. Suppose, for instance, a bank holding company had a bank subsidiary with more than \$2 billion in assets and other bank subsidiaries with assets below \$2 billion. The banks could issue puttable subordinated debt (subject to the restriction in Plank II, Part E) representing the collective obligation of all its banking affiliates, thus satisfying each of the affiliates' debt plan responsibilities. In this situation each of the banks would be responsible for all the liabilities of the other banks in the issue. The linking of bank affiliates under this option would be similar to the regulators' current attempts to make each bank in a bank holding company responsible for the losses of its affiliates. The principal difference is that this alternative allows the bank holding company to determine whether or not to share losses across bank affiliates.<sup>9</sup>

### Requirements for Implementation of a Puttable Subordinated Debt Plan

The following outline presents the provisions that must be adopted by legislation in order to put into place the puttable subordinated debt proposal.

#### Plank I

Banks with assets in excess of \$2 billion or with loans to foreign borrowers greater than 50 percent of total capital (equity plus subordinated debt) must operate under a puttable subordinated debt requirement. All other banks may choose between this requirement and tighter supervision, including a provision for closure should total capital become negative. Such institutions can switch from one plan to the other only if they are in compliance with the desired requirement at the time of the switch. (Puttable subordinated debt would count as an element of total capital for banks that plan to change standards.) Banks must pay all costs of examination by regulatory agencies under both plans. The handling of depositors' claims at failed banks would take place as it does under the current system.

#### Plank II: The Puttable Subordinated Debt Requirement

- A. Every bank operating under the puttable subordinated debt requirement must maintain an adequate level of such debt with a minimum maturity of 90 days or more or risk being declared insolvent and closed.<sup>1</sup>
- B. The put feature requires redemption at par value after 90 days provided that the depository could redeem the debt without violating the minimum standards for puttable subordinated debt.<sup>2</sup>
- C. If redemption would violate these minimum standards, the depository has 90 days either to issue sufficient puttable subordinated debt or to reduce its puttable subordinated debt requirement—by reducing risky activities—so that the institution can honor all puts while remaining at or above the regulatory requirements. The put bonds plus any accrued interest will be repaid 90 days after the put is first received.

- D. A depository that cannot redeem the put debt in 90 days while continuing to meet the capital standards would be deemed insolvent, and the put may not be honored. Depositories judged insolvent would be reorganized, sold, or liquidated by the deposit insurance agency. If the proceeds of a sale or liquidation exceed the total of deposits and the costs of disposing of the failed depository, that excess is first returned to the subordinated debtholders; the remainder, if any, is paid to equityholders.
- E. No single insider who owns puttable subordinated debt may hold or guarantee more than 5 percent of the amount that regulations require for the debt; the aggregate of all insiders may not own or guarantee an amount in excess of 20 percent of the debt requirement. *Insiders* include major shareholders (those with more than 5 percent of the stock), the officers, directors, and borrowers whose loans are equivalent to 5 percent or more of the bank's equity. Because of these restrictions, banks must maintain current and historical records of puttable subordinated debt owners. Depositories must also disclose to the regulators any actions taken or not taken in response to requests by the puttable subordinated debtholders. Failure to comply with this provision would result in legal liability for participating individuals equal to double any damages suffered by the bank.
- F. The depository regulatory agencies would have the following responsibilities for safety and soundness:<sup>3</sup>

1. to enforce compliance with the puttable subordinated debt requirements;
2. to examine depositories on a regular basis for fraud and excessive risk taking and to conduct special examinations of depositories that may be insolvent (market value of equity less than zero);
3. to use existing penalties (such as cease-and-desist orders, fines, and withdrawal of deposit insurance) to prevent depositories from taking very large gambles where losses could exceed equity capital and subordinated debt;<sup>4</sup>
4. to monitor closely and evaluate depositories that would not be in compliance with the standards if they honored outstanding requests for redemption (that is, depositories that have 90 days to issue new puttable subordinated debt or reduce their capital requirements); and
5. to provide for the orderly recapitalization, sale, or liquidation of insolvent depositories.

### **Plank III: The Tighter Supervision and Regulation Requirement**

Stricter supervision and regulation of institutions would require some combination of higher capital standards for banks, more frequent examinations, and tighter restrictions on activities than would exist under the puttable subordinated debt plan. This proposal would also require the regulators to close banks before their total capital reached zero (where capital is measured using market values to the maximum extent feasible).

### **Notes**

<sup>1</sup>If a declaration of insolvency is not legally feasible, this plank could be put into operation by declaring capital insufficiency and removing existing management or removing deposit insurance on all deposits made after the bank falls below the regulatory requirements.

<sup>2</sup>Alton Gilbert pointed out that dishonest bank managers whose organization is near failure could honor the put requirements even if doing so would force them below the regulatory standards. Eventually the regulators would detect such an action, but the subordinated debt cushion that protects the deposit insurer could disappear before the regulators closed the bank. One possible solution to the problem would be to make the payouts on puttable subordinated debt re-

versible by the regulators if the redemption violated the capital guidelines and the depository subsequently failed. Another solution that Gilbert suggests is to pass all requests for redemption through a regulatory agency for prior approval.

<sup>3</sup>Regulatory responsibilities for nonsafety and soundness regulations arising from legislation such as the Expedited Funds Availability and Community Reinvestment Acts would remain unchanged.

<sup>4</sup>Under certain conditions the deposit insurance agencies can currently withdraw insurance on new coverage at a depository, but any existing deposits remain covered.



**Plank II.** The amount of puttable subordinated debt required of depositories is designated in Part A of Plank II only as "adequate" debt. If this proposal were implemented, a minimal starting point would be to require that the par value of puttable subordinated debt equaled 4 or 5 percent of the denominator in the risk-based capital adequacy system proposed by the commercial bank regulators, which incorporates both on- and off-balance sheet credit risks.<sup>10</sup> As better measures of a depository's total risk are developed, the subordinated debt requirement could be refined. The objective of any specified level, however, is to provide a high degree of confidence that the depository will not suffer losses which exceed the combined total of its equity and subordinated debt.

The required level of puttable subordinated debt should be based on some consideration of the benefits and costs of higher standards. The principal advantage of mandating higher levels is that doing so would reduce the risk that the government insurance agency would suffer losses as a result of bank failures. Any reduction in government risk could be translated into some combination of relaxed supervision and regulation, lower deposit insurance premiums, and greater regulatory willingness to let the market determine which institutions are insolvent.

The primary cost of higher standards will be the expense that banks incur in issuing additional puttable subordinated debt. These costs may not be substantial because in many respects puttable subordinated debt would be similar to existing bank deposits. For example, like most bank liabilities, puttable subordinated debt is likely to be issued with a floating rate of interest (for reasons discussed below). Moreover, to the extent that a bank desires fixed-rate debt, the repricing interval of the puttable debt can be changed at relatively low cost via interest-rate swaps and other off-balance sheet hedges. One potentially significant cost of issuing puttable subordinated debt is that investors may prefer instruments with other investment characteristics and thus charge a premium for investing in that debt. The existence and magnitude of such a premium is difficult to determine prior to adoption of the plan, but, if significant premiums were required,

lower puttable debt requirements would seem to be indicated.

One cost of puttable subordinated debt that need not be considered is the greater credit risk borne by subordinated debtholders. Subordinated debt will necessarily be more expensive than insured deposits because the expected losses from a bank failure are significantly higher for subordinated debtholders. However, this is not a "cost" of the plan in that the plan is designed to shift the risk of loss from the government to the private sector. The higher credit-risk premium associated with puttable subordinated debt will discipline bank risk taking.

Part A of Plank II applies only to the depository institution; its corporate parents need not issue puttable subordinated debt. If holding company parents are not excluded from the proposal, the risk arises that the failure of a depository's nonbank affiliate could cause the depository itself to fail.<sup>11</sup>

Parts C and D of Plank II give depositories 90 days to honor the exercise of the put provision before being declared insolvent. This provision allows enough time either to (1) demonstrate solvency to the financial markets and issue replacement subordinated debt or (2) lower its puttable subordinated debt requirement by reducing its risky activities. If the depository is unable to meet the puttable subordinated debt requirement within 90 days, regulators would close the institution based on this strong evidence of insolvency.

The choice of a 90-day time frame in which to honor the put reflects a compromise between the need to give the depository adequate time to sell new securities and the goal of preventing the intermediary from incurring substantial losses after the put is exercised. More thorough analysis may suggest that a slightly shorter or longer period would be optimal.

The 90-day requirement could in some cases be relaxed to give depositories time to raise new equity capital before issuing more puttable subordinated debt. One possibility is to give a bank an additional 90 days if it issued new equity capital equal to at least the deficiency in puttable subordinated debt that would result if all redemption requests were honored. For example, suppose depositories were required to maintain a puttable subordinated debt-to-asset ratio of 5 percent and an institution faced

redemption requests that would drop the ratio to 3 percent if honored. If this depository issued new equity capital equal to at least 2 percent of assets (5 percent minus 3 percent), it would be given a maximum of 180 days to issue new puttable subordinated debt. The subordinated debt with outstanding redemption requests could then be honored 90 days after the redemption request.

Part E of Plank II limits the ownership and guarantee of puttable subordinated debt by those individuals and corporations with an important stake in a bank's continued operation. This provision is intended to ensure that a sufficient share of the puttable subordinated debt will be owned by investors who will exercise the put before the market value of the bank's equity reaches zero. Part E also prevents stockholders from subverting the bondholders' willingness to exercise the put. Without this provision the bondholders might look at the creditworthiness of the stockholders, including corporate parents such as Citicorp and Ford, rather than at the financial condition of the depository. The various percentage tests provided in Part E are intended as reasonable guides but could be adjusted based on further analysis.

An important problem related to the mechanics and pricing of puttable subordinated debt but not explicitly addressed by the proposal involves the government's possible pursuit of multiple priorities in disposing of failed banks and the attendant effects on depository institutions. The only priority of the subordinated bondholders if a depository fails is the recovery of their investment. The insurance agencies may have multiple goals, including the continued provision of services to the failed depository's customers. Pursuit of some of these ends may reduce payments by failed depositories to subordinated debtholders. While subordinated debtholders will provide funds to depositories even if their interests are not fully protected by the insurance agencies, the ultimate cost of the insurance agencies' pursuit of multiple goals will be borne by depositories through earlier closure or higher interest rates. Investors in subordinated debt may seek to reduce their risk by forcing earlier closure of troubled banks, that is, while their equity capital is still sufficient to absorb all expected losses. Furthermore, if investors cannot avoid all losses by forcing closure

(perhaps because they lack sufficient information to price the bank properly), they will demand a higher interest rate in compensation for the greater risk.

**Plank III.** Monitoring the safety and soundness of banks operating under Plank III would be the responsibility of regulators; this approach is in contrast to the greater reliance on market discipline for banks issuing puttable subordinated debt. For banks operating under Plank III the implication is that the regulators must (1) continue to exercise significant influence over bank risk taking and (2) maintain primary responsibility for closing insolvent institutions. Though continued government control of risk taking would subject banks operating under Plank III to stricter supervision and regulation than institutions using puttable subordinated debt, in some instances the degree of supervision and regulation would not be higher than existing levels and might even be lower in certain areas. However, Plank III banks' supervision and regulation levels may not be cut as significantly as is possible for banks operating under the puttable subordinated debt plan. The government's responsibility for closing insolvent institutions will require some combination of three changes in existing practices: (1) requiring higher levels of capital, (2) calculating capital using market values for assets and liabilities to the maximum extent feasible, and (3) closing banks before their capital reaches zero.

The capital requirements and minimum level of capital required to avoid closure would be an inverse function of the deposit insurance agencies' confidence in the accuracy of market-value accounting. The minimum level would be set at a point sufficiently high to provide ample confidence that the market value of the bank's equity was not negative. Firms could move through a series of capital zones so that they are alerted to the need to raise capital long before the danger of closure became imminent, as proposed by Benston and George G. Kaufman (1988) and the Shadow Financial Regulatory Committee (1989). In Benston and Kaufman's plan the limitations on bank activities and the degree of regulatory supervision progressively increase as the bank approaches closure.

One option that should be considered is to charge variable deposit insurance premiums

that are inversely related to the precision with which the bank's market value can be measured. Existing proposals for risk-based deposit insurance premiums focus on the volatility of each bank's returns. However, one of the principal risks to a deposit insurer under any timely closure plan using mark-to-market accounting is that a depository's true market value will be less than its accounting records indicate. Variable-premium insurance based on measurability of bank value may not be feasible because of difficulties in implementation. However, assuming these problems could be worked out, premiums based on the measurability of value would have two advantages: (1) they would encourage banks to invest in assets whose value is easily calculated and (2) they would prompt banks to find ways of improving the precision with which asset values are determined.<sup>12</sup>

### **Advantages of a Puttable Subordinated Debt Plan**

The advantages of the plan presented in this article can be divided into two categories: those arising from timely closure policies and those that result from using puttable subordinated debt to identify failing depositories. The benefits of timely closure include a substantial reduction in the risk borne by the government and a banking system made less risky by a diminished government subsidy to bank risk taking. The puttable subordinated debt part of the plan has several advantages to depositories and regulators over other methods of implementing timely closure, owing to the plan's even greater reliance on the market than that of market-value accounting.

One such edge entails the plan's market test of solvency. This plan is the first to provide the market with a mechanism for evaluating a depository's solvency without a bank deposit run. The current system requires regulators to determine an intermediary's solvency.<sup>13</sup> Systems based on deposit runs evaluate a banking organization's value at a particular point in time. The proposal in this article gives the market time to consider the economic value of a depository's illiquid assets while allowing the institution a period during which it can also pro-

vide additional information to the market and sell new equity.

The puttable subordinated debt plan is also less likely to cause conflicts between foreign policy concerns and bank safety and soundness issues than is presently the case. In order for all bank assets to be accounted for in "market values" regulators may need to mandate write-downs of loans to certain countries even though foreign policy considerations may argue against such a move. At present, credit risk has rendered the market value of loans to troubled Latin American debtors during the 1980s below the values shown on many banks' financial statements. Although existing accounting standards require that banks recognize expected credit losses on their income statements and balance sheets, neither outside auditors nor regulators have acted to enforce market-value accounting. The banks' auditors could have issued qualified opinions unless the banks increased loan-loss provisions, but they have not done so. The bank regulators could have required write-downs, but in most cases they have not acted either. Both the auditors and regulators choose to accept the banks' arguments that market prices for these loans are not representative of their true value because the market is too thin.<sup>14</sup> In contrast, under a puttable subordinated debt arrangement, the actions of private individuals in the bond markets are less likely to create international political problems for the U.S. government because the actions would be taken by private entities against individual banks rather than foreign countries. Also, individuals with their own funds at risk in puttable subordinated debt are less likely to be concerned about the political implications of the pressure placed on a bank.

Another advantage of using puttable subordinated debt is that it would reduce the regulators' supervisory burden even though government regulation of federally insured depositories would not be eliminated under this plan. Many existing safety and soundness restrictions such as limits on nonbank activities and capital regulation could be scaled back or eliminated. Regulators should, nonetheless, be given the power to close institutions judged insolvent based on market valuation as a precaution against those situations when the subordinated debtholders elect not to close a bank. For exam-

ple, suppose a depository suffered sudden losses that exceeded the value of its equity and puttable subordinated debt. Subordinated debtholders would have no incentive to exercise their put option in this case since their expected payment is zero. However, the existence of puttable subordinated debt would help regulators in analyzing market-value solvency. The subordinated debtholders would be allowed to decide the fate of institutions with questionable solvency, while the banks' supervisors would focus primarily on evaluating the solvency of depositories that have suffered sudden, large losses or massive insider fraud.

Regulators would also want to prevent depositories from taking large gambles that could obliterate the investments of stockholders and subordinated debtholders while imposing losses on the insurance agency. However, once again the subordinated debtholders would help the supervisors by demanding a higher premium from institutions that took large risks. The rates paid on subordinated debt could be used to help examiners identify especially risky institutions.<sup>15</sup> By lowering examination fees, supervisors could share the benefits of this reduced burden with banks that participate in the puttable subordinated debt plan.

### **An Example of Puttable Subordinated Debt in Action**

The operation of the puttable subordinated debt plan can be illustrated by an example. Assume that banks are required to maintain puttable subordinated debt equal to 5 percent of risk-weighted assets. MegaRegional Bank has been experiencing significant financial problems but has been able to maintain a subordinated debt ratio of 6 percent. Then the bank unexpectedly announces sharply higher loan-loss provisions for its commercial real estate portfolio. MegaRegional realizes this disclosure could lead to redemption requests on its subordinated debt. MegaRegional announces that its debt is being reviewed by Standard and Poor's, and the bank promises to increase its risk premium if a downgraded rating is returned. However, many subordinated debtholders regard this promise as inadequate. The depository's debt, which had been trading above par, quickly drops to par. At this point the bank starts receiving redemption requests from two-thirds of its subordinated debtholders. If MegaRegional honored these requests, its subordinated debt ratio would drop to 2 percent and it would be in violation of regulatory requirements.

As soon as the bank receives the redemption requests it notifies the relevant regulators. They quickly determine that MegaRegional could be insolvent and dispatch examiners, who will monitor the bank to prevent it from taking high-risk gambles before honoring the redemption requests on its subordinated debt in an attempt to avoid failure. They will also determine if the institution is clearly insolvent and thus should be closed immediately. In this example the examiners conclude that MegaRegional is a borderline

case and decide to let the market evaluate the bank's solvency.

MegaRegional has two ways to honor the redemption requests while remaining above the subordinated debt requirements: reduce its debt requirements or sell additional subordinated debt. Senior bank management quickly realizes that shrinking the institution sufficiently to meet the requirements is not possible. Seeing that the only viable option is to sell additional puttable subordinated debt, MegaRegional immediately begins to consider ways of doing so. The bank is prepared to pay whatever rate investors demand since the alternative is closure. In order to convince investors that it is solvent, MegaRegional prepares supplementary financial information. In addition to releasing its findings to the public, the bank offers large institutional investors access to any confidential information that they consider necessary for reaching a judgment. The bank also considers selling additional equity to shore up its weak capital ratios.

Despite MegaRegional's best efforts the bank is unable to sell sufficient puttable subordinated debt within 90 days to honor redemption requests and still meet regulatory requirements. Therefore, at the end of the 90-day period the regulators assume control of the bank. The regulators had begun to prepare for the takeover before the end of the 90-day period when MegaRegional appeared to be unlikely to meet the regulatory requirements. However, they are not yet ready to sell the bank upon first assuming control and so they continue to operate MegaRegional under supervisory control until arrangements can be made for the sale.

An advantage to society is that the risk of future substantial deposit insurance losses from regulatory forbearance is small because the proposal does not give regulators any discretion in dealing with depositories that cannot meet the puttable subordinated debt requirement.<sup>16</sup> One can argue that the regulators should be able to suspend these debt requirements in the case of a sudden, large number of failures. However, suspending the requirements is equivalent to allowing insolvent organizations to continue in operation. Because insolvent organizations that are not closed have substantial incentives to take high-risk positions, the decision to suspend the requirements and risk future losses is more appropriately made by Congress and the President rather than by regulators.

### Potential Problems with the Puttable Subordinated Debt Plan

Since the puttable subordinated debt part of this plan is a new approach to regulating banks, the potential problems that could arise must be considered along with the advantages. These drawbacks may result from exercising the put option either too frequently or in an unjustified manner.

**Too-Frequent Use of the Put Option.** The goal of forcing a depository to issue puttable subordinated debt is to give the market control over closing the institution. However, subordinated debtholders will exercise the put whenever the market value of their debt falls below the par value of the bonds. If the put feature is exercised on a solvent institution, the depository must bear the costs of new issues: the expense of investment banking services and, for domestic issues, the additional legal and accounting costs of meeting Securities and Exchange Commission registration requirements. Given the benefits of the puttable subordinated debt plan, these additional costs may not be excessive. Moreover, they may be reduced even further if depositories take full advantage of the opportunities permitted by the plan.

Bondholders' incentives to exercise their put option for liquidity purposes are somewhat re-

duced by the fact that they will not be paid by the bank for 90 days; thus, investors needing to liquidate on short notice will generally prefer to sell in the secondary market. A bank can also reduce bondholders' impetus to exercise the put option by paying interest rates that adjust to changes in both market interest rates and the institution's financial condition. One way of reducing the risk of puts based solely on the former would be for the intermediary to issue floating-rate debt. For example, a depository could promise to pay the 90-day Treasury bill rate or the 3-month London Interbank Offered Rate (LIBOR) plus some risk premium. Floating-rate debt allows frequent resetting of the interest payments based on some market index and, hence, eliminates the need to put the debt back to obtain a higher rate. Banks not desiring additional floating-rate funds could use interest-rate swaps or some other off-balance sheet hedge to make the cost of funds independent of changes in market rates. Most puttable subordinated debt issues are likely to link the rates they pay to some measure of short-term market interest rates in order to avoid puts caused by interest-rate changes.<sup>17</sup>

A variable-risk premium could reduce the chance that subordinated debtholders would exercise the put on a solvent depository based on an increase in the firm's risk. For example, a bank could promise LIBOR plus a risk premium dependent on the depository's capital-to-asset ratio. Jeffrey M. Peek (1989) reports that Manufacturers Hanover recently issued floating-rate, rating-sensitive notes that allow the bank to take advantage of bond-rating upgrades while protecting creditors from downgrades. Alternatively, the subordinated debt could provide the depository with the option to increase or decrease—at the depository's discretion—the risk premium on its debt. This provision is frequently observed in outstanding puttable debt and would allow a depository that was announcing bad news, such as higher-than-expected loan losses, to notify markets simultaneously of a higher risk premium on its subordinated debt.

The introduction of variable-risk premiums may seem to undercut the goals of puttable subordinated debt, but that is not the case. The primary purpose of this plan is to provide a market-based mechanism for identifying insol-

vent institutions and forcing their closure. Puttable subordinated debt with a variable-risk premium would not affect this goal because insolvent organizations would be unable to sell debt securities at any *promised* risk premium. Investors would recognize that *expected* payments do not provide adequate compensation for the risk borne by the subordinated debt-holders. A secondary purpose of puttable subordinated debt is to allow the debt's risk premium to provide regulators with a signal about the riskiness of different institutions; examiners could then be allocated to the riskiest depositories. Variable-risk premium, puttable subordinated debt would continue to serve as an indicator of risk because subordinated debt-holders would not continue to hold the debt unless the premium provided adequate compensation for the risk assumed by the intermediary.

In addition to the use of variable interest payments, banks can also reduce investors' incentives to exercise their put option by pricing the bonds to trade above par. If the bonds' value exceeds par, investors who put their bonds back to the bank will suffer an immediate capital loss. Banks, however, need not suffer a loss from paying the higher rates if the bonds are originally issued at prices above par.

**Unjustified Exercise of the Put Option.** The previous section of this article assumed that banks could avoid redemption requests by keeping their bonds' market price at or above par value. However, the bondholders could request redemption or threaten to do so even if the full-information value of the bonds exceeds par. Such an exercise is hereafter referred to as an *unjustified put*. Bondholders could unjustifiably put a bond in an attempt to provide misleading signals to the market about a bank's stock value. The announcement that a bank must issue new puttable subordinated debt within 90 days to continue in operation could temporarily reduce its stock price, thus allowing the bondholders, through short-selling or purchasing put options on the bank's stock, to benefit from any stock price reduction. Alternatively, bondholders could threaten an unjustified put in an attempt to extort a higher rate on their debt or to obtain some favor from the bank. The threat of an unjustified put is somewhat similar to a very large depositor's threat to

withdraw funds but could have far greater impact if the bank were required to issue new puttable subordinated debt within 90 days.

Unjustified puts to reduce a bank's stock price should have only a temporary effect on a bank's operations and may fail to produce for the participants gains that exceed their costs. Immediate losses would occur to those engaging in an unjustified put if they requested redemption at par on bonds that should be trading above par. The gains are not certain because stockholders may correctly interpret the put as unjustified. Any gains to those demanding redemption would come at the expense of the banking organization's stockholders and, if an option on the stock exists, participants in the options markets. These investors will have an incentive to determine the underlying rationale

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***"A secondary purpose of puttable subordinated debt is to allow the debt's risk premium to provide regulators with a signal about the riskiness of different institutions; examiners could then be allocated to the riskiest depositories."***

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for the redemption requests before selling their stock. Moreover, the bank could significantly reduce the potential for many investors to engage in unjustified puts by disclosing the identity of the parties redeeming their debt. For example, the market may significantly discount the information content of a redemption demand by an investor who previously engaged in unjustified puts. A bank might also counter unjustified puts by providing additional information on its financial condition or seeking outside certification such as a reaffirmation of its bond rating.

The threat of an unjustified put is significantly reduced by the requirement in Plank II, Part E, of the plan mandating disclosure of any bank action made in compliance with the request of a puttable subordinated debtholder. This disclosure requirement and the potential penalty for noncompliance significantly raise the cost of

yielding to the threats of subordinated debt-holders. Furthermore, the threat of an unjustified put is greatest for the smaller institutions that face a limited market for their debt, but these banks may choose tighter supervision rather than maintaining a set amount of puttable subordinated debt. The large banks could ignore the threat at minimal cost because they should be able to sell new puttable debt. Thus, when the threat of an unjustified put is significant, the banks most at risk can avoid issuing the puttable subordinated debt.

This analysis suggests that the likelihood of actual and threatened unjustified puts is small. Moreover, banks can take a variety of actions that will reduce even further the risk of an unjustified put. One method would be to issue more puttable subordinated debt than the standards

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***“Moreover, were a significant fraction of the banking system to become insolvent in spite of market pressure, the puttable subordinated debt plan would force Congress to consider the insolvency issue on a timely basis.”***

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require, thereby increasing the amount that must be put back to them before they are subject to the 90-day requirement. Also, by exercising some care in the marketing of new debt issues of this type, a depository can avoid a heavy concentration of sales to individuals and organizations that are not long-term investors. Banks can also monitor the distribution of their outstanding debt. If it is being accumulated by potentially threatening parties, the bank may wish to place additional puttable subordinated debt with trustworthy investors or realign their balance sheets to reduce their regulatory requirements for puttable subordinated debt. Finally, developing a reputation for adequate and timely disclosure of material information can reduce the potential that financial markets will misinterpret any unjustified puts.

**The Creation of Systemic Problems.** A third argument against the puttable subordinated

debt plan is that it could result in a run on the banking system. A large fraction of the banking system might receive redemption requests in a short period of time, or banks thought to be receiving redemption requests could incur deposit withdrawals.

In the former case banks may be able to demonstrate their solvency to the financial markets and hence should be able to issue puttable subordinated debt within 90 days. The banking industry may face a difficult period, but the long-term damage from the redemption requests—as distinct from the event that triggered the requests—should be minimal.

Of course, the troubling possibility remains that banks will not be able to issue new debt within 90 days. However, if within 90 days the banking organizations cannot convince the market that they are solvent, banks are probably either actually insolvent or have so little equity capital that the owners would have a strong incentive to invest in high-risk assets. Any deposit insurance reform proposal would be severely affected by either of these problems. In this situation the puttable subordinated debt plan is superior to many others because it reduces the risk of massive failure. Depositories will lose the deposit insurance subsidy to risk taking and face strong market pressure to avoid taking risks that could result in their failure. Moreover, were a significant fraction of the banking system to become insolvent in spite of market pressure, the puttable subordinated debt plan would force Congress to consider the insolvency issue on a timely basis. Under the current system, Congress can—and did in the case of thrifts—refuse for several years to address adequately the problem of widespread insolvencies at insured depositories.

The puttable subordinated debt plan would pressure Congress into one of three steps:

- do nothing for 90 days and let a large number of institutions be closed;
- pass a bailout program; or
- suspend the operation of the plan without closing banks.

A bailout program might be costly, but a timely bailout will almost certainly cost less than a delayed one that allows the losses to accumulate. Suspending the plan without closing the failed banks would be the worst possible out-

come, but no plan to handle insolvent banks can succeed if Congress will neither let the banks fail nor appropriate the funds for a bailout.

The other risk—that redemption requests by subordinated debtholders could spark a deposit run—is somewhat reduced by the fact that subordinated debtholders are not paid for 90 days, and, thus, the market may not know that a depository faces imminent closure. However, any deposit insurance system that both closes insolvent banks and provides less than 100 percent deposit insurance is subject to the risk of deposit runs since depositors may recall their money whenever they think that their funds may be lost. Thus, the risk of deposit runs is shared by almost all reform proposals.

One possible response would be to accept the potential for bank runs as an additional mechanism for disciplining bank risk taking. Another response would be to try to reduce the risk of runs by increasing the cushion protecting depositors, thus lessening depositors' incentives to withdraw funds. To inflate this cushion for the puttable subordinated debt plan, the minimal level of subordinated debt would be raised, whereas in the increased regulation proposal the minimum level of total capital required for continued operation of the depository would be increased.

If the risk of deposit runs remained unacceptable, institutions could adopt 100 percent deposit insurance without significantly elevating the risks to the deposit insurance agency. An advantage of both the puttable subordinated debt plan and the increased regulation plan over the current system is that the new plans shift virtually all the risk of loss to the banks' equityholders and subordinated debtholders. Depositors and their insurance agency are not expected to bear significant risk.

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## Conclusion

The plan that this article presents is intended to provide financial markets with the largest role possible consistent with the maintenance of existing federal deposit insurance coverage. The plan's purpose is to eliminate almost all the potential for financial institutions' losses that the federal government or its agencies would

have to cover. The principal innovation is to suggest that large banks be required to issue puttable subordinated debt and that small banks have the option of operating under a puttable subordinated debt standard. The market would have primary responsibility for evaluating the solvency and riskiness of banks that issue these instruments. Banks that the market judged insolvent or too risky would be unable to retain their subordinated debtholders and would be unable to issue new puttable subordinated debt.

The plan substantially reduces the role of the regulators, but their function cannot be eliminated for two reasons. First, the continuation of deposit insurance means that the government is potentially at risk, and, as long as the risk exists, the government must be able to control its exposure when the private sector cannot or will not act. Second, small banks may face a limited market for their subordinated debt. If these banks were required to issue subordinated debt, many of them might be driven out of business. To avoid this eventuality while minimizing systemic risk, regulators would have to play a stepped-up role with small banks.

The advantages of the puttable subordinated debt plan arise from closing banks before their capital becomes negative: the risk of loss to the insurance agencies is virtually eliminated, and banks will become less risky because they will lose the deposit insurance subsidy for risky activities. This plan has several advantages over other methods of implementing timely closure. First, the plan provides for a true market test of solvency and the time to evaluate adequately a bank's condition. Greater flexibility is also provided to banks, which can minimize the risk of negative capital through an optimal combination of information production, reduced volatility of returns, and increased equity. The plan may be superior to market-value accounting in that it reduces the risk of a conflict between bank safety and foreign policy concerns. The regulators would benefit from the reduced burden that this plan would create. Many regulatory functions would be assumed largely by the financial markets, and banks would subsequently benefit from lower examination fees. Society overall would benefit from the elimination of regulatory forbearance at failing institutions. Congress would have to approve of any decision



to allow failed institutions to continue in operation.

The plan has some potential problems, but the difficulties may not be very significant in practice. One possible drawback is that the put option will be exercised on solvent institutions. Banks can reduce the risk of this occurrence by issuing bonds with rates that vary with the interest rate environment and the bank's riskiness. Banks can also lessen the put incentive by pricing the bonds to sell above par. Bondholders could demand redemption even if the true value of the bonds is above par in an attempt to drive down a bank's stock price temporarily. This action may not generate gains in excess of the losses from redeeming bonds at below market value and in any case would not

cause long-term disruption to a bank. Bondholders could also threaten to put the bonds in an attempt to extort higher interest payments or some other favor from the bank. However, the plan's disclosure requirements would discourage such threats by inhibiting banks from complying with them. Another possible problem is that the exercise of puts could create a run on the banking system. However, the plan is superior to the current system in that it removes the deposit-insurance subsidy to risk taking and hence reduces the probability that banks should experience financial difficulty. The plan also improves on other proposals by forcing the closure of problem institutions unless preventive measures are taken by Congress.

## Notes

<sup>1</sup> Hereafter the terms *depositories*, *intermediaries*, and *banks* will be used interchangeably in referring to all commercial banks and thrifts.

<sup>2</sup> In theory the three agencies guarantee only \$100,000 per depositor at domestic branches of banks chartered in the United States. However, the fact that the agencies typically try to arrange for the purchase of a failed institution by a healthy one, whereby the healthy organization assumes the deposits of the failed organization, results in the provision of 100 percent de facto insurance. Moreover, failed thrifts typically have few, if any, deposits in excess of \$100,000.

<sup>3</sup> A variety of mechanisms have been proposed for controlling bank risk in an environment with deposit insurance. These proposals include plans suggested by Benston and Kaufman (1988), Ely (1985), England (1985), Kareken (1986), Litan (1987), Scott (1989), and the Shadow Financial Regulatory Committee (1989). The main elements of several of these proposals could also be adopted in a system without deposit insurance.

<sup>4</sup> See *Economic Report of the President* (1989): 203-04, for a recent proposal to reduce deposit insurance coverage. The principal economic argument against substantially reducing such insurance is that it is needed to stop costly bank panics. The literature on this issue is extensive and includes the following relatively recent papers: Bernanke (1983), Chari and Jagannathan (1988), Diamond and Dybvig (1983), Gilbert (1988), Goodfriend and King (1988), Gorton (1988), Hasan and Dwyer (1988), Humphrey and Keleher (1984), Jacklin and Bhattacharya (1988), Kaufman (1987), Schwartz (1988), Tallman (1988), and Wall and Peterson (forthcoming).

<sup>5</sup> The plan presented in this paper would be desirable even if the deposit insurance agencies were eliminated. One advantage of the proposal's reliance on equity and subordinated debtholders' bearing losses is that these parties are less likely to receive an ex post bailout than are depositors. Failed banks' creditors may appeal for a bailout even if deposit insurance is eliminated. However, the government is far more likely to come to the aid of unsophisticated depositors who could not achieve adequate diversification than it is to bail out the holders of equity and subordinated debt, who are likely to be more sophisticated, wealthier, and more diversified.

<sup>6</sup> Benston et al. (1986) suggest that subordinated debtholders may demand bond covenants that give them the right under certain circumstances to take over or close a depository. The biggest weakness of this closure method is that the covenants cannot cover all contingencies.

<sup>7</sup> See Calomiris and Kahn (1988) for a discussion of demandable debt as a way of controlling bank risk taking.

<sup>8</sup> If insurance companies bear the risk, they are likely to insist on having the right to exercise the put option on the subordinated debt.

<sup>9</sup> This option could be expanded to allow unaffiliated banks to issue puttable subordinated debt that is the joint obligation of all the issuers. An advantage of such a proposal is that it would encourage banks to monitor each other, an approach that was successful in some pre-Civil War state deposit insurance systems, according to Calomiris (1989). Another possible advantage of allowing joint issues by unaffiliated banks is that it may permit the regulators to require all banks to operate under the puttable subordinated debt plan. One possible weakness in

allowing unaffiliated entities to regulate each other is the potential for a substantial reduction in competition.

<sup>10</sup>A further reason for starting with the risk-based capital standards is that doing so would not require the United States to renege completely on an international agreement to implement them. Indeed, this proposal could be made entirely consistent with the international agreement if the agreement were modified to permit all of the tier 2 capital requirements to be satisfied by puttable subordinated debt.

<sup>11</sup>A related issue is that of the effectiveness of firewall, or insulating boundaries within corporate structures, in preventing nonbank problems from spilling over into bank affiliates. The proposal would provide a partial control for this risk in that puttable subordinated debtholders would have an incentive to monitor nonbank affiliates to the extent they believed that such spillovers were likely. However, continued governmental restrictions may be desirable to prevent affiliates from causing losses in excess of a depository's equity and subordinated debt.

<sup>12</sup>A second option worth considering would be to allow depositories that were in the highest capital ranges defined by the regulators to trade off insurance premiums and the point at which the banks would close. That is, banks that did not want to be closed with positive capital could choose a zero-capital closure point, but these banks would be expected to pay substantially higher premiums than those organizations that agreed to be closed

with positive capital. The trade-off could not be permitted after a bank's capital reached too low a level since failing banks will choose the lowest capital standard permitted by the regulators. This option avoids any possible legal or political problems associated with closing depositories while they retain positive common equity capital. Those depositories closed with positive capital under this plan would have voluntarily chosen to permit such closure. This option may also induce bank managers to signal their private information about their bank's risk of failure.

<sup>13</sup>Through deposit runs such as the one that occurred at Continental Illinois the market can influence the regulators' evaluation. However, bank regulators tend to view deposit runs as destabilizing activities that could turn into bank panics.

<sup>14</sup>Had the regulators not accepted this argument, banks with very large exposures might have purchased the debt in an attempt to support its market price.

<sup>15</sup>One regulatory change that would enhance the proposal's effectiveness involves relaxing restrictions on geographic and product expansion of depositories. Additional diversification could reduce the risk that a single large loss would cause a depository to fail.

<sup>16</sup>See Garcia and Polakoff (1987) for an empirical analysis of the merits of forbearance.

<sup>17</sup>Chatfield and Moyer (1986) report that most puttable bonds pay a floating rate of interest.

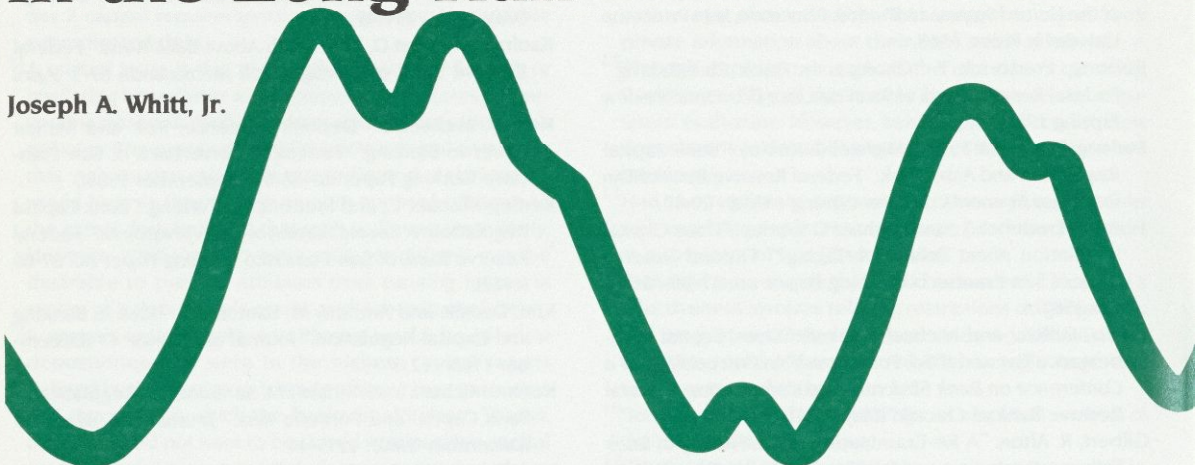
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# Purchasing-Power Parity and Exchange Rates in the Long Run

Joseph A. Whitt, Jr.



The efficacy of the flexible exchange-rate system that has been in place since 1973 remains a point of contention, with some analysts questioning whether this system is functioning properly. Many economists are skeptical of the idea of government-managed exchange rates, while others reject the idea of leaving these rates to be determined solely by market forces. This article tests real exchange-rate data for five U.S. trading partners to determine if at least part of the movements of these rates over time can be anticipated or if this activity occurs in an entirely random fashion. This question has important policy implications for the nations that are now involved in trying to control exchange rates or for anyone evaluating exchange-rate systems.

Opponents of flexible exchange rates claim that, under the current system, exchange rates are excessively volatile; in this view, currency values frequently move far away from levels that would be justified by economic fundamentals and remain at a distance for prolonged periods of time in a state one specialist calls "misalignment." According to another expert, the dollar

was undervalued in the late 1970s and overvalued in the mid-1980s. In his opinion, the earlier period of undervaluation gave U.S. tradable good industries an artificial boost in their competitive position vis-a-vis foreign rivals, thus encouraging excessive and wasteful investment in that sector. By contrast, the time of overvaluation shifted the competitive advantage to foreign firms, resulting in plant closures and bankruptcies in American tradable good industries.

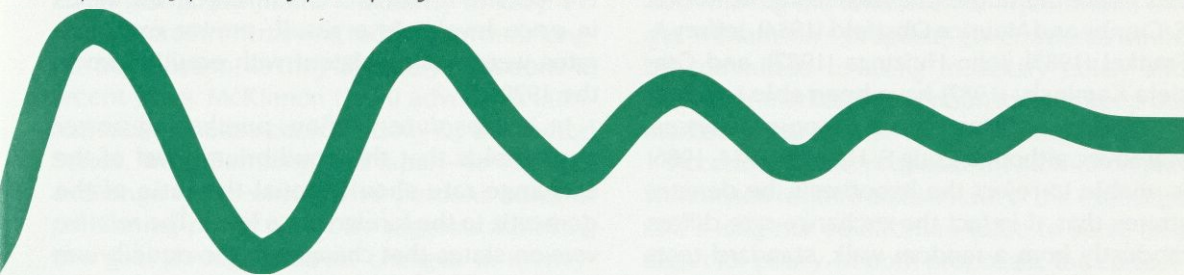
Determining whether an exchange rate is undervalued, overvalued, or at equilibrium is a key issue in evaluating the hypothesis that the market is often misaligned. According to the doctrine of purchasing-power parity, the value of an exchange rate that is consistent with economic fundamentals is linked closely to the ratio of domestic to foreign price levels; if domestic prices rise more than those abroad, the home nation's currency should depreciate proportionally. Both Ronald I. McKinnon (1984) and, to a lesser extent, John Williamson (1983) rely on purchasing-power parity in estimating the long-run equilibrium value of exchange rates. The two researchers advocate government intervention to keep exchange rates from moving too far from this equilibrium value.

Today's flexible exchange-rate system, under which the exchange rate of a country's currency

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This article examines the behavior of real exchange rates since the move to generalized floating in 1973. Contrary to some previous research findings, the author concludes that the inflation-adjusted exchange rate does not follow a random walk and can be expected to return, over time, to some long-run equilibrium level, as posited by purchasing-power parity.



in terms of other nations' currencies is determined by market supply and demand, has been in effect since 1973. Factors that affect each currencies' supply and demand include inflation and interest rates relative to those abroad as well as the environment for future changes in exchange rates. Before 1973, a fixed exchange-rate system was in effect; under this system governments intervened in the markets regularly, buying or selling currencies to keep exchange rates pegged at levels set by international agreement.

Prior to the 1973 breakdown of the Bretton Woods system of fixed exchange rates, supporters of flexible rates contended that such a system would not result in highly erratic rate movements. Instead, they argued that rates would usually move slowly in response to gradual changes in fundamental economic circumstances; Harry G. Johnson (1969) cited the example of the Canadian dollar, which floated from 1950 to 1962 without experiencing severe instability.

However, early in the flexible exchange-rate era, it became obvious that month-to-month or quarter-to-quarter changes in market exchange rates were large and rarely in accord with purchasing-power parity. Nevertheless, the parity concept continued to be used as a foundation for many theories of exchange-rate be-

havior, on the assumption that, in the long run, foreign currency rates should follow at least approximately the path of relative price levels.

Some recent empirical tests imply, however, that purchasing-power parity is not a viable concept even over the very long term. These studies focus on the long-run behavior of the real exchange rate, which is the market exchange rate adjusted for domestic and foreign price-level changes and can be regarded as a measure of the deviation from purchasing-power parity. If an exchange rate's long-run equilibrium value is the one given by purchasing-power parity, deviations from this measure should tend to shrink through time. The actions of the real exchange rate would thus be at least partly forecastable; a real exchange rate above the long-run equilibrium should tend to fall, and a rate below equilibrium should tend to rise.

Richard Roll (1979), Jacob A. Frenkel (1981b), Michael Adler and Bruce Lehmann (1983), and others, however, are unable to reject the hypothesis that the real exchange rate is a random walk. A variable is said to be a *random walk* if its value tomorrow equals its value today, plus a random error that cannot be forecast using currently available information. If the real exchange rate is a random walk, no long-run equilibrium value exists to which the rate tends to return, and, far from shrinking, the expected

deviation from purchasing-power parity becomes unbounded in the long run. In this case, the wisdom of market intervention to keep exchange rates in line with purchasing-power parity is questionable, because purchasing-power parity can no longer serve as a feasible gauge of long-run equilibrium.

Because of its far-reaching policy implications, the claim that the real exchange rate is a random walk has been tested repeatedly in the years since the studies mentioned above. Robert E. Cumby and Maurice Obstfeld (1984), Jeffrey A. Frankel (1985), John Huizinga (1987), and Graciela Kaminsky (1987) have been able to reject the random-walk hypothesis in some instances. Moreover, although Craig S. Hakkio (1984, 1986) is unable to reject the hypothesis, he demonstrates that, if in fact the exchange rate differs modestly from a random walk, standard tests are very likely to favor the random-walk hypothesis even if it is false.

In a more general context, Christopher A. Sims (1988) proposes a new statistical test that is designed to be especially sensitive in determining whether a variable is a true random walk or returns to equilibrium after a long lag. This article applies the Sims test to real exchange-rate data for five industrialized countries. The results suggest that the real exchange rate is not a random walk and that, though deviations from purchasing-power parity may persist for a number of years, they are not permanent. This article begins by providing background information on purchasing-power parity and how it might be used in a system of target zones for exchange rates. Next, statistical tests for random-walk behavior are applied to monthly data on real exchange rates from the current period of flexible exchange rates. The results are summarized in the conclusion.

## An Overview of Purchasing-Power Parity

As mentioned in the introduction, according to the purchasing-power parity theory, general price measures and exchange rates are closely linked. To a considerable extent, purchasing-power parity can be regarded as an extension of the quantity theory of money to an open-

economy setting. This extension was first made by Gustav Cassel, a prominent Swedish economist who coined the phrase *purchasing-power parity*. He argued that, during World War I, the amount of money in circulation had expanded by varying amounts in different countries. The percentage growth of the quantity of dollars in circulation in the United States, for instance, was considerably smaller than the percentage growth of the quantity of francs in circulation in France. This disparity led to divergent increases in price levels. As a result, prewar exchange rates were not consistent with equilibrium in the 1920s.<sup>1</sup>

In its *absolute* version, purchasing-power parity holds that the equilibrium level of the exchange rate should equal the ratio of the domestic to the foreign price level. The *relative* version states that changes in the equilibrium exchange rate should mirror changes in the ratio of domestic to foreign price indexes.<sup>2</sup> Suppose, for example, that the price level doubles inside Germany, while U.S. prices remain unchanged. In that case, the amount of real goods and services that could be purchased in the United States with one dollar would be the same as before. Purchasing-power parity implies that, to achieve long-run equilibrium, the exchange rate (measured in marks per dollar) would have to double from its initial value, such that the purchasing power of one dollar spent in Germany (after conversion into marks) would stay in line with the dollar's purchasing power in the United States.

Most of the recent empirical work has focused on relative purchasing-power parity, which can be represented as follows:

$$e_t^* - e_0^* = (P_t^* - P_0^*) - (P_t - P_0), \quad (1)$$

where  $e_i^*$  is the log of the equilibrium exchange rate, expressed as units of foreign currency per unit of home currency, at time  $i$ ;  $P_i$  is the log of the price index for the home country, at time  $i$ ; and  $P_i^*$  is the log of the price index for the foreign country, at time  $i$ .

This equation reflects three logically distinct properties of purchasing-power parity: *exclusiveness*, meaning that no variables other than prices are needed to explain changes in the equilibrium exchange rate; *symmetry* between the domestic and foreign country; and *proportionality*, meaning that shifts in prices are as-

sociated with equiproportional changes in the equilibrium exchange rate.<sup>3</sup>

As represented in equation (1), purchasing-power parity is a rarity in economics, a theoretical relationship with no unknown parameters. Its simplicity explains its frequent use in making informal estimates of the equilibrium value of exchange rates following major disturbances, such as World War I.<sup>4</sup>

Critics of the flexible exchange-rate system claim that governments should try to keep exchange rates from moving too far from their long-run equilibrium, as they allegedly have done in recent years. McKinnon (1984) advocates international monetary coordination—by the United States, West Germany, and Japan—to stabilize exchange rates within a 10 percent band of purchasing-power parity. He suggests achieving this goal through modest changes in money-supply targets that would be coordinated to produce steady growth in the total money supply of the three countries; for instance, if the dollar were tending to fall below purchasing-power parity vis-a-vis the Japanese yen but not the German mark, McKinnon's plan would require the Federal Reserve to slow money growth and the Bank of Japan to speed it up, with no change by West Germany.<sup>5</sup> McKinnon (1988) recently modified his earlier proposal by deemphasizing the need for steady growth of the total money supply in the three countries; instead, to keep the nominal price of tradable goods roughly constant, he advocates varying as necessary the average money-supply growth rate in West Germany, Japan, and the United States. The economist describes this system as an international gold standard without gold.

Williamson claims that governments should keep the market exchange rate near the "fundamental equilibrium exchange rate," which he defines as the rate expected to generate a current-account surplus (or deficit) that over the course of a business cycle is consistent with the economy's long-run capital outflow (inflow). Purchasing-power parity is a major, but not the sole, determinant of Williamson's fundamental equilibrium exchange rate. In particular, he argues that major real shocks, like Britain's discovery of North Sea oil or significant OPEC-related price swings, produce discrepancies between purchasing-power parity and fundamental equilibrium exchange rates. Although

such shocks complicate the calculation of the basic equilibrium exchange rate, Williamson asserts that it is still possible to estimate the fundamental equilibrium with sufficient accuracy for use as a target for exchange-rate policy. In particular, he proposes that governments set exchange-rate target zones, which would contain the estimated fundamental equilibrium exchange rate plus a margin of plus or minus 10 percent to allow for measurement error in determining the fundamental equilibrium. Under Williamson's proposal, governments would be committed to using monetary policy and exchange-market intervention to try to keep the market exchange rate within the target range.

Accordingly, the proposals of McKinnon and Williamson require an estimate of the exchange rate's long-run equilibrium value to serve as a target for policy. In both proposals, the correctness of the estimate depends heavily on the validity of purchasing-power parity in the long run, but empirical evidence on purchasing-power parity is decidedly mixed. Tests of the validity of purchasing-power parity and some other relevant methodology are described on page 23.

### Recent Behavior of Key Real Exchange Rates and the Random-Walk Hypothesis

As shown in the box on page 23, calculating the real exchange rate ( $R_t$ ) is simple because each of its components is an observable variable. Table 1 gives summary statistics on key real exchange rates. Using the United States as the base country, data were calculated for five other industrialized nations: the United Kingdom, France, West Germany, Switzerland, and Japan. The span of time covered, June 1973 to May 1988, includes most of the period of flexible exchange rates, and the data have been scaled to make the value of  $R_t$  in June 1973 equal zero. Because the data are in logs, the mean represents the average discrepancy in percent over the entire period between the real exchange rate and its value in June 1973. For example, the mean for West Germany is 13.2 (see Table 1), implying that the dollar was, on average, 13.2 percent more valuable relative to the German mark than it had been in June 1973.

**Table 1.**  
**Summary Statistics for Real Exchange Rates,**  
**June 1973 to May 1988**

Country	Mean Percentage Variation* (June 1973 = 100)	Standard Deviation (percent)	Maximum	Minimum
United Kingdom	-1.6	14.7	37.2	-35.3
France	10.3	18.2	55.9	-16.9
West Germany	13.2	19.5	61.8	-14.7
Switzerland	-11.1	16.8	30.7	-47.0
Japan	-15.2	17.2	8.6	-57.1

\* The mean represents the average discrepancy in percent over the entire period between the real exchange rate and its value in June 1973.

Source: Computed at the Federal Reserve Bank of Atlanta from data published in *International Financial Statistics*.

The second column of the table gives the standard deviation, which is a measure of dispersion around the mean. This indicator shows that real exchange rates have exhibited considerable variation; West Germany's rate had a standard deviation of 19.5 percent, meaning that roughly one-third of the time its real exchange rate was more than 19.5 percent away from its average value.

The last two columns of Table 1 report the maximum and minimum values reached by each real exchange rate during the period covered. In all five cases the swing from the high to the low was at least 60 percent, thus reinforcing the conclusion that exchange rates fluctuate considerably. By contrast, if purchasing-power parity held exactly each month, real exchange rates would have been constant.

Charts 1 through 5 provide time plots of the five real exchange rates. Casual inspection suggests the sharing of some determinants. The most striking common feature is the peak in early 1985 that is especially pronounced for the four European currencies. The dollar's high value then made foreign and imported goods quite inexpensive for Americans. As for low points for the dollar, a noticeable trough is apparent for West Germany, Switzerland, and Japan in October 1978, when the U.S. currency was near its low for the period versus the British pound and the French franc as well.

Note also that the charts provide no evidence that exchange-rate volatility is shrinking. At the

time of the breakup of the Bretton Woods system in 1973 it was sometimes suggested that exchange-rate volatility would diminish after the flexible exchange-rate system had been in place for a while and market participants had learned about and adjusted to the new environment. If anything, the data show the reverse; real exchange rates swung more sharply in the past five years than in the early years of floating.

The charts also provide information about the autocorrelation properties of the error terms. In each plotting, the average value of  $R_t$  is represented by the horizontal line labeled "mean," which is an estimate of the constant term  $\alpha$  in equation (5). When the real exchange rate is above or below its mean, it usually remains on that side of the mean for a number of months, implying that the error terms exhibit substantial positive autocorrelation.

If the error term is stationary, the constant  $\alpha$ —that is, the approximate level indicated by the horizontal line within each of the charts—can be interpreted as the long-run, permanent level of the real exchange rate; the error term, which equals the deviation from purchasing-power parity, represents temporary (though perhaps lengthy) departures from that long-run level. If the real exchange rate is observed at a particular time, the best forecast of its future path is gradual movement toward its long-run equilibrium,  $\alpha$ ; the speed of adjustment toward  $\alpha$  will depend on the extent of the autocorrelation in the error term.



## The Validity of the Purchasing-Power Parity Concept

To test the validity of the purchasing-power parity principle, equation (1) on page 20 is altered by substituting observed market exchange rates for the unobservable equilibrium exchange rates; in addition, because purchasing-power parity is not expected to hold exactly, a random error term is included. Moreover, the coefficient on the price indexes is treated as an unknown parameter rather than a known constant, and the initial values of the exchange rate and the price indexes are usually collected into a constant term, producing the transformed equation

$$e_t = \alpha + \beta (P_t^* - P_t) + u_t \quad (2)$$

where  $e_t$  is the market exchange rate at time  $t$ ,  $\alpha$  is the constant term,  $\beta$  is a coefficient to be estimated, and  $u_t$  is the error term in period  $t$ .

A common empirical test of the validity of purchasing-power parity involves estimating the coefficients  $\alpha$  and  $\beta$  in equation (2) using a regression framework with monthly, quarterly, or annual time series data on  $e_t$ ,  $P_t$ , and  $P_t^*$ ; if the hypothesis  $\beta = 1$  cannot be rejected at standard significance levels, that would be interpreted as confirmation of purchasing-power parity.<sup>1</sup> This test focuses on the proportionality property of purchasing-power parity: the degree to which shifts in prices are associated with equiproportional changes in the equilibrium exchange rate.<sup>2</sup>

Unfortunately, regressing  $e_t$  onto  $(P_t^* - P_t)$  glides over several important issues. One question is whether  $e_t$  or  $(P_t^* - P_t)$  should be the independent variable—the one on the right-hand side—in the regression. From an econometric perspective, the variable on the right-hand side should be uncorrelated with the omitted variables subsumed in  $u_t$ ; otherwise,  $\hat{\beta}$  will be biased. However, purchasing-power parity was formulated long before modern econometrics, and it provides few hints to answer this question.<sup>3</sup>

In addition, when  $e_t$  is regressed onto  $(P_t^* - P_t)$ , the estimated residuals (the  $\hat{u}_t$ 's) almost always exhibit severe positive autocorrelation.<sup>4</sup> If the residuals are autocorrelated, the estimated standard errors of coefficients will be biased downward, thus leading one to think that the coefficients have been estimated more precisely than they really are.

The usual "fix" for the problem of autocorrelated residuals has been to difference the data—that is, if  $Y_t$  is the original data series, to create the differenced series,  $Z_t \equiv Y_t - Y_{t-1}$ . This treatment

focuses the analysis on *changes* in the original series, instead of *levels*, and transforms equation (2) into the following:

$$e_t - e_{t-1} = \beta [(P_t^* - P_{t-1}^*) - (P_t - P_{t-1})] + u_t - u_{t-1}, \quad (3a)$$

or

$$\Delta e_t = \beta (\Delta P_t^* - \Delta P_t) + \eta_t, \quad (3b)$$

where  $\eta_t \equiv u_t - u_{t-1}$ .

As before, the usual test of purchasing-power parity involves regressing  $\Delta e_t$  onto  $(\Delta P_t^* - \Delta P_t)$  in order to test whether or not  $\beta = 1$ , thereby focusing on the symmetry and proportionality properties of purchasing-power parity. The key difference is that, with (3b),  $\eta_t$  is assumed to satisfy the ideal conditions for regression analysis—that the errors be independent, identically distributed, normal random variables with mean zero and a constant variance—whereas in regression estimates of equation (2),  $u_t$  is assumed to satisfy the ideal conditions, or at least to be stationary. The requirement of stationarity limits how much the behavior of a random variable can change through time; it means that in a fundamental way, the future behavior of the variable is similar to the past.<sup>5</sup>

Regression tests involving equation (3) are still subject to the problem of choosing the dependent variable, but the problem of autocorrelated residuals is much reduced. However, a subtle but important difference exists between the formulations in (2) and (3).

If the true value of  $\beta$  is one, as posited by purchasing-power parity, the error term  $u_t$  is equal to the deviation from purchasing-power parity;  $u_t$  would be zero in all time periods if purchasing-power parity (equation [1]) held exactly. Taking first differences to derive equation (3) suggests that  $u_t$  has a unit root and hence is nonstationary.<sup>6</sup> Having a unit root would imply that even if the test yielded an estimate of one for  $\beta$  in equation (3)—which would seem to confirm purchasing-power parity—deviations from it (the  $u_t$ 's) would not tend to shrink over time. If deviations from purchasing-power parity do not tend to shrink as time passes, purchasing-power parity loses its interpretation as the long-run equilibrium level of the exchange rate.

In recent years, an alternative approach to testing purchasing-power parity has developed; this

newer method does not attempt to study the symmetry and proportionality properties but instead seeks to discover whether the exchange rate eventually returns to a level consistent with purchasing-power parity. The alternative approach focuses on the behavior of the real exchange rate, which can be defined as follows:

$$R_t \equiv e_t - P_t^* + P_t, \quad (4)$$

where  $e_t$ ,  $P_t^*$ , and  $P_t$  are as defined earlier.

The variable  $R_t$  is called the *real exchange rate* because it provides a measure of a currency's purchasing power at home, in terms of real goods and services, relative to its real purchasing power abroad. As defined here, an increase in  $R_t$  means greater purchasing power abroad for the home currency than it can purchase at home. Because

each of the variables on the right-hand side of equation (4) is observable, calculating  $R_t$  is straightforward.

If the symmetry and proportionality properties of purchasing-power parity are true, implying that  $\beta$  is one, but the relationship does not hold exactly, implying that the deviations from purchasing-power parity (the  $u_t$ 's) are nonzero, equations (2) and (4) can be combined to yield

$$R_t = \alpha + u_t. \quad (5)$$

Hence, a close connection exists between the real exchange rate and deviations from purchasing-power parity. Moreover, if  $u_t$  is a stationary random variable with a zero mean,  $R_t$  is stationary also with a mean of  $\alpha$ .<sup>7</sup>

## Notes

<sup>1</sup>The regression procedure uses the data to generate an estimate of  $\beta$  as well as an estimate of its standard error, which is a statistical measure of the range of likely values of  $\beta$ . If these statistics indicate that the value 1 is highly unlikely, the hypothesis  $\beta = 1$  is rejected; otherwise, it is accepted. The significance level of the test provides a mathematical measure of how certain our conclusion is.

<sup>2</sup>In some tests, the domestic and foreign price indexes are allowed to have different coefficients, thereby making it possible to test the symmetry property as well.

<sup>3</sup>One approach is to perform the regression twice, once with  $e_t$  on the left-hand side, and once with  $(P_t^* - P_t)$  on the left-hand side, and then compare the results, as in Frenkel (1978). An alternative is to use the technique of instrumental variables to try to eliminate the correlation between the independent variable and the error term, as in Krugman (1978) and Frenkel (1981a, b).

<sup>4</sup>The same problem arises when  $(P_t^* - P_t)$  is regressed on  $e_t$ . When residuals exhibit positive autocorrelation the residual for period 10 is positively correlated with the residual for period 9, the residual for period 9 is positively correlated with the residual for period 8, and so on. By contrast, standard regression analysis is

based on the assumption that the residuals are not correlated with one another.

<sup>5</sup>More technically, a random variable is stationary if it has a mean and variance that do not change through time and are not infinite and if the correlation between its values at different points in time depends only on the distance between the points, not on time itself. For further discussion, see Granger and Newbold (1977).

<sup>6</sup>Having a unit root is a particular form of non-stationarity. The simple random walk, in which the variable is equal to its own lagged value plus a random error that cannot be forecast (that is,  $Y_t = Y_{t-1} + V_t$ , where  $V_t$  is the random error term), is the simplest example, but more complex models involving more than one lag can contain unit roots as well. Taking first differences (that is, if  $Y_t$  is believed to have a unit root, creating the differenced series  $Z_t \equiv Y_t - Y_{t-1}$ ) is a standard way of transforming the data in order to "remove" the unit root and make it amenable to analysis because the differenced series is stationary. For a relatively nontechnical discussion of unit roots, see Dickey, Bell, and Miller (1986).

<sup>7</sup>The assumption that  $u_t$  has a zero mean is innocuous because the constant term in equation (5) can always be redefined.

If the error term,  $u_t$ , has first-order positive autocorrelation, it can be represented as follows:

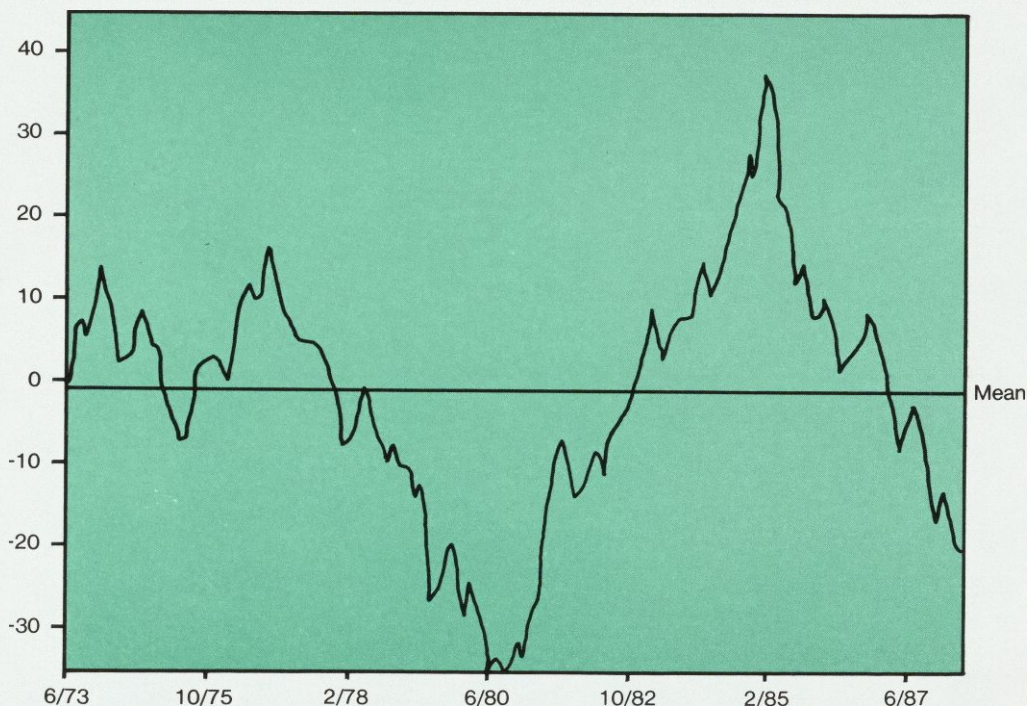
$$u_t = \rho u_{t-1} + \varepsilon_t, \quad (6)$$

where  $\rho$  is the autocorrelation coefficient and  $0 < \rho < 1$ , and  $\varepsilon_t$  is a random error that satisfies the usual ideal conditions. For a given variance of  $\varepsilon_t$ , larger values of  $\rho$  imply a "smoother"  $u_t$

series and a longer period of adjustment for the real exchange rate to return to its long-run equilibrium.

However, suppose that the autocorrelation coefficient  $\rho$  in equation (6) is equal to 1; this is a simple example of a unit root. In this case, both  $u_t$  and  $R_t$  are nonstationary,  $R_t$  has no fixed mean, and the real exchange rate becomes a random walk, which has major implications for

**Chart 1.**  
**Real Exchange Rate: United Kingdom**  
*(June 1973 to May 1988)*



*The levels of the real pound/dollar exchange rate reflect the sharp dollar depreciation of the late 1970s, the even greater appreciation of the early 1980s, and the decline since February 1985.*

Source for all charts: Computed at the Federal Reserve Bank of Atlanta from data published in *International Financial Statistics*.

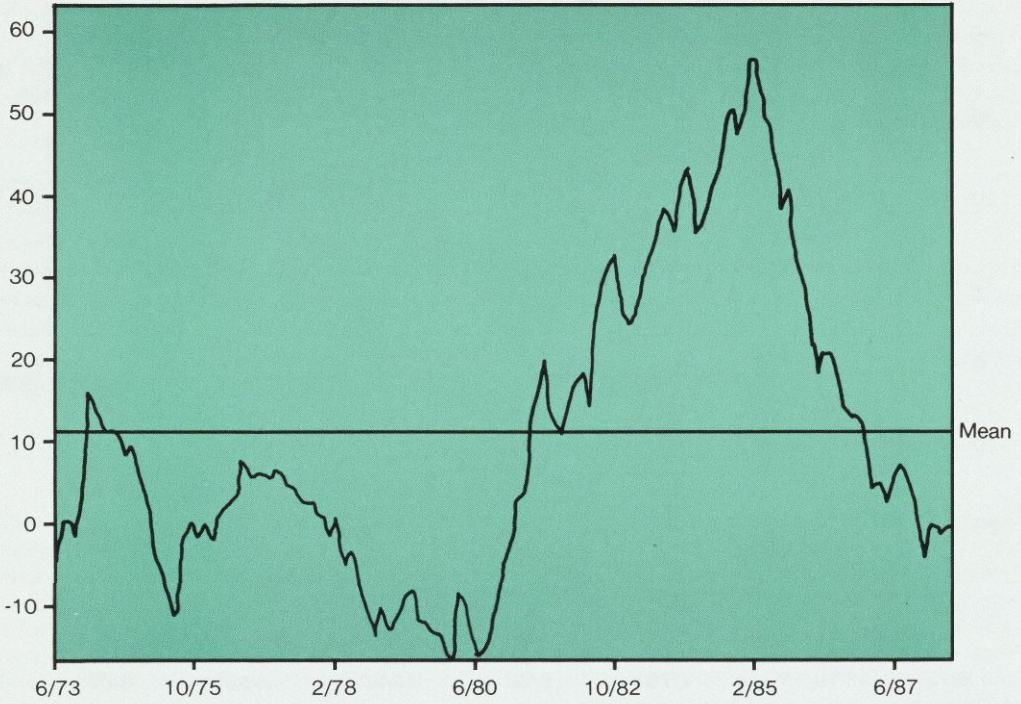
the validity of purchasing-power parity in the long run. If  $R_t$  is a random walk, then deviations from purchasing-power parity are not temporary but permanent; the real exchange rate would have no tendency to return to  $\alpha$ . Moreover, the likely size of expected future deviations from purchasing-power parity becomes larger without limit as the forecast horizon extends further into the future.

Roll provides a finance-based theory of exchange-rate movements which implies that the real exchange rate should follow a random walk. He argues that his conclusion is consistent with purchasing-power parity, and indeed his approach embodies the properties of symmetry and proportionality that are integral to purchasing-power parity.<sup>6</sup> However, as mentioned above, in one key respect Roll's analysis is the antithesis of purchasing-power parity: if the real exchange rate is a random walk, there is no long-run equilibrium to which the real exchange rate tends to return.

In empirical work using monthly data from the current period of flexible exchange rates, a number of authors have tested the hypothesis that the real exchange rate is a random walk. Roll, Frenkel (1981b), Adler and Lehmann, Michael R. Darby (1983), and Frederic S. Mishkin (1984) report that they cannot reject this hypothesis.<sup>7</sup> By contrast, Cumby and Obstfeld, Huizinga, John Pippenger (1986), and Kaminsky provide evidence against the random-walk hypothesis, though none rejects it decisively.<sup>8</sup>

In a related paper, Hakkio (1986) casts doubt on the empirical evidence favoring the random-walk hypothesis by demonstrating that, if in fact the exchange rate differs only modestly from a random walk, standard tests are very likely to favor this hypothesis even though it is false. In particular, for sample sizes similar to those used in many studies of exchange-rate behavior, the probability of rejecting the random-walk hypothesis when it was false was often less than 10 percent.<sup>9</sup>

**Chart 2.**  
**Real Exchange Rate: France**  
*(June 1973 to May 1988)*



*Probably because of its link with the Deutschemark in the European Monetary System, the French franc's movements have been similar in recent years to those of the mark (see Chart 3).*

Accordingly, the existing empirical literature suggests either that the real exchange rate is a random walk or that it is so close to being a random walk that rejecting the random-walk hypothesis is frequently impossible, given the amount of data currently available and the limited power of the statistical tests that have been used.

### **A New Test of Whether the Real Exchange Rate Is a Random Walk**

In a recent paper Sims argues that classical statistical tests used to determine whether the real exchange rate is a random walk, such as the test devised by David A. Dickey and Wayne A. Fuller (1979) for the presence of a unit root, are fundamentally flawed. As an alternative, Sims proposes a new test for discriminating between

random- and near-random-walk behavior in a time series.

To understand Sims' test, consider the following simple autoregressive model in which a variable is assumed to be a function only of its own lagged values plus a random error term. In equation (7) the real exchange rate can be derived by combining equations (5) and (6):

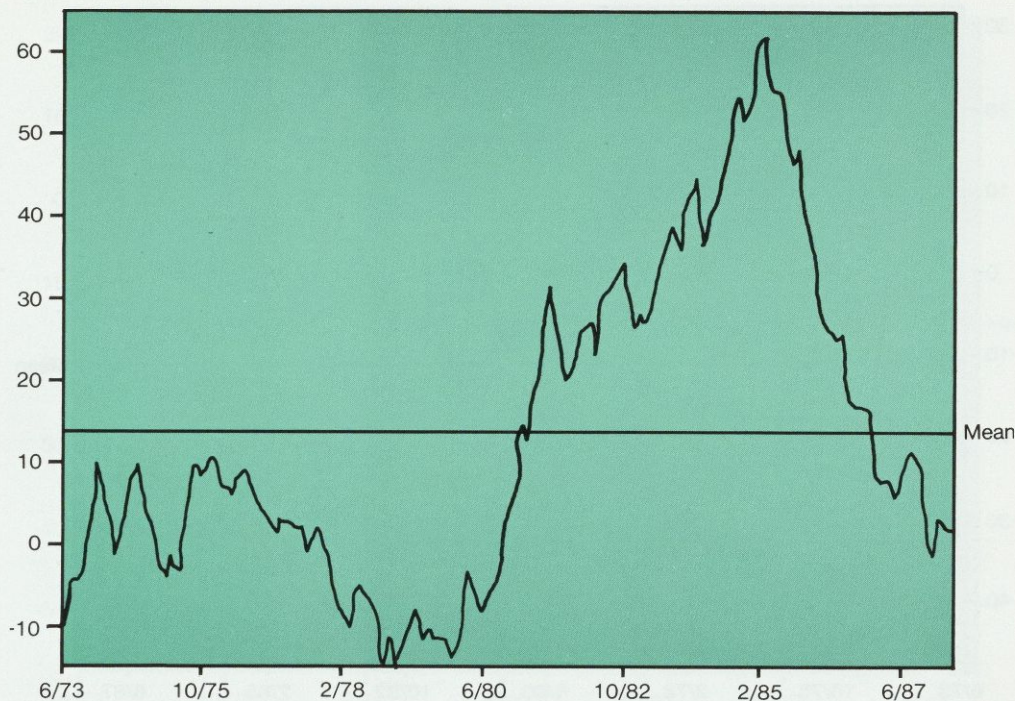
$$(R_t - \alpha) = \rho (R_{t-1} - \alpha) + \varepsilon_t, \quad (7)$$

where  $\varepsilon_t \sim N(0, \sigma^2)$

$$t = 1, 2, 3 \dots$$

As noted earlier, the long-run behavior of the real exchange rate is critically dependent on the value of the autoregressive coefficient  $\rho$ . If  $0 < \rho < 1$ ,  $\alpha$  can be interpreted as the long-run value of the real exchange rate and the model is stable in the sense that, in the absence of additional shocks ( $\varepsilon_t$ ),  $R_t$  is expected to move smoothly toward its long-run value. In this case,

**Chart 3.**  
**Real Exchange Rate: West Germany**  
*(June 1973 to May 1988)*



*Despite the sharp dollar appreciation of the early 1980s and the subsequent depreciation, the Deutschmark/dollar exchange rate ended the period not far from its June 1973 level.*

$\alpha$  can be interpreted as the value of the real exchange rate consistent with purchasing-power parity, and  $(R_t - \alpha)$  is the deviation from purchasing-power parity in period  $t$ .

On the other hand, if there is a unit root ( $\rho = 1$ ), the behavior of the real exchange rate is quite different. In this case, the deviation from purchasing-power parity does not tend to shrink; instead,  $R_t$  is a random walk.

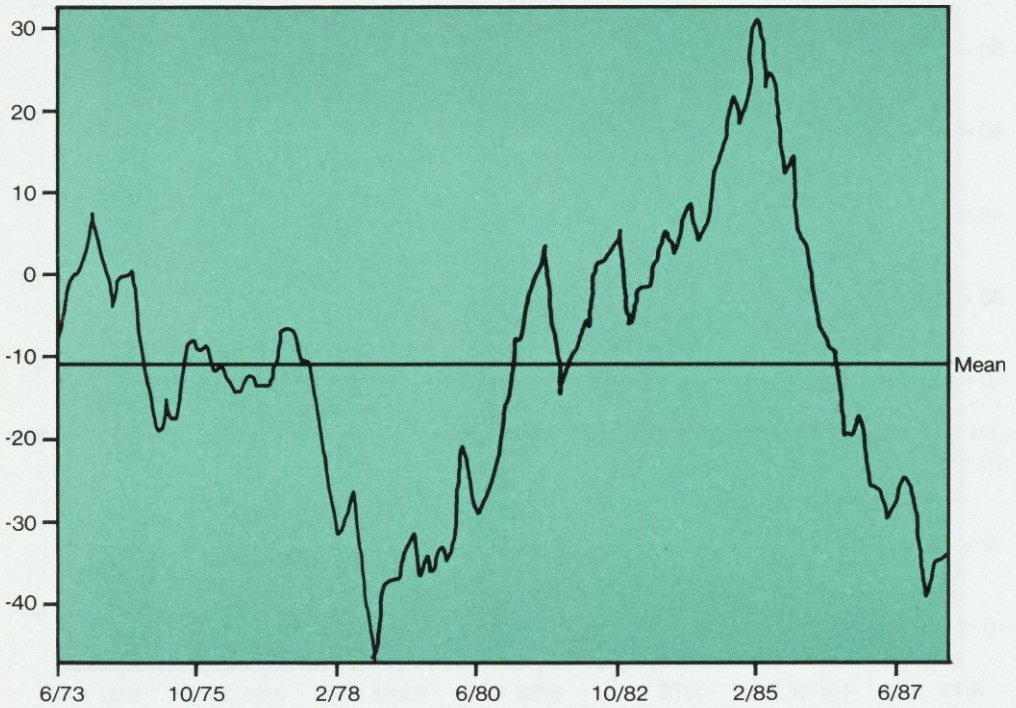
Accordingly, the problem for empirical work is to make statistical inferences about the value of  $\rho$ . Using a classical statistical approach, Dickey and Fuller provide a general test of the null hypothesis that  $\rho = 1$  using statistics generated by an ordinary least squares regression of  $R_t$  onto its own lagged value. The standard t-test is not appropriate because under this null hypothesis the variance of  $R_t$  is infinite.

However, Sims argues that the classical statistical approach is a poor strategy in this situation. As an alternative, he proposes a test using the Bayesian posterior odds ratio. This procedure

"adds up" the probability that the true parameter is consistent with the null hypothesis and compares it with a similar sum of the probability that the true parameter is not consistent with the null hypothesis.<sup>10</sup> Sims' approach and an analysis using it are presented in the box on page 29.

The Sims test was applied to real exchange-rate data vis-a-vis the United States for the five major industrialized countries studied earlier: the United Kingdom, France, West Germany, Switzerland, and Japan. In all cases, the Sims test results favor the hypothesis that the real exchange rate is not a random walk. Therefore, they lend credence to an important underpinning of the proposals by McKinnon (1984, 1988) and Williamson: the real exchange rate does have a long-run equilibrium. However, the estimated speeds of adjustment suggest that, during the sample period, the return to the long-run equilibrium was a slow process. Whether monetary and other policies should be changed to

**Chart 4.**  
**Real Exchange Rate: Switzerland**  
(June 1973 to May 1988)



Unlike the Deutschemark, the real Swiss franc/dollar exchange rate ended the period over 30 percent below its June 1973 level.

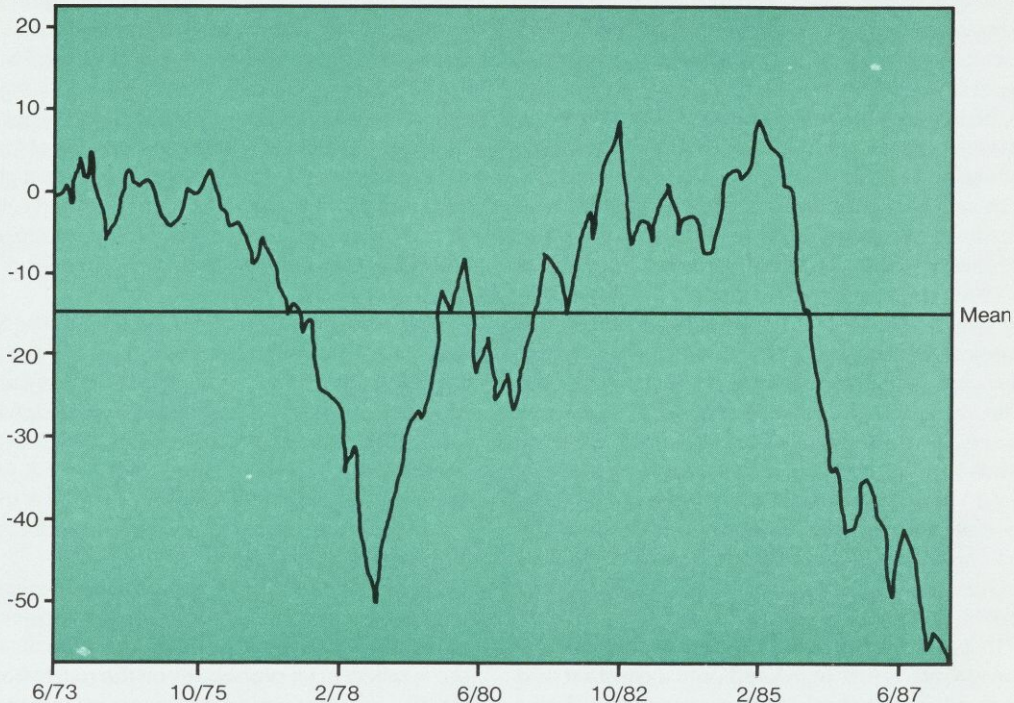
prevent large departures of the real exchange rate from its long-run equilibrium, as recommended by McKinnon and Williamson, is an issue that is beyond the scope of this article.

## Conclusion

This research applies a new statistical test to evaluate the random-walk hypothesis about

real exchange rates. If true, this hypothesis would imply that deviations from purchasing-power parity have no tendency to fade away in the long run, thus undermining a key element that underlies most proposals for government action to reduce exchange-rate volatility. Contrary to some previous results, this new test indicates that for all the countries examined, the real exchange rate does not follow a random walk and thus can be expected to return, over time, to some long-run equilibrium level.

**Chart 5.**  
**Real Exchange Rate: Japan**  
*(June 1973 to May 1988)*



Over the entire period, the dollar declined 57 percent against the yen—more than against any of the other currencies.

### The Sims Test and the Random-Walk Hypothesis

To apply Sims' test to the problem of making inferences about  $\rho$  in equation (7), take the null hypothesis to be  $\rho = 1$  and the alternative hypothesis to be  $\rho < 1$ . To perform the test one must specify a prior distribution, which summarizes the investigator's beliefs about the likely value of  $\rho$  before analyzing the data. In the case of annual economic data, Sims suggests a prior distribution for  $\rho$  that spreads probability  $\gamma$ —where  $\gamma$  is between 0 and 1—evenly on values of  $\rho$  between 0.5 and 1, and gives the unit root ( $\rho = 1$ ) probability  $(1 - \gamma)$ . All other possible values of  $\rho$  are assumed to have zero prior probability.<sup>1</sup> For more frequent data, the value of  $\rho$  should be closer to one; to be consistent with the interval (0.5, 1) for annual data, the interval for  $\rho$  should be (0.84, 1) for quarterly data and (0.94, 1) for monthly data.

Using this prior, it is possible to derive the following test criterion; the null hypothesis ( $\rho = 1$ ) is favored if

$$Z > 0, \quad (8)$$

where

$$Z \equiv 2 \log \left( \frac{1 - \hat{\rho}}{\gamma} \right) - \log(\sigma_{\hat{\rho}}^2) + 2 \log(1 - 2^{-1/s}) - 2 \log[\phi(\tau)] - \log(2\pi) - \tau^2;$$

$\hat{\rho}$  is the estimate of  $\rho$  obtained from a regression of  $R_t$  onto its own lagged value;  $\sigma_{\hat{\rho}} \equiv \sqrt{(\sigma^2 / \sum R_{t-1}^2)}$  is the standard error of  $\hat{\rho}$ ;  $\tau \equiv (1 - \hat{\rho}) / \sigma_{\hat{\rho}}$  is the conventional t-statistic for testing  $\rho = 1$ ;  $\phi(x)$  is the cumulative distribution function for the standard normal distribution evaluated at  $x$ ; and  $s$  is the number of periods per year (for example, 12 for monthly data).<sup>2</sup> The alternative hypothesis is favored if  $Z < 0$ .

In empirical work  $\sigma_{\hat{\rho}}$  is usually less than 1, implying that  $-\log(\sigma_{\hat{\rho}}^2)$  is positive. Smaller values of  $\sigma_{\hat{\rho}}$  induce larger values of  $-\log(\sigma_{\hat{\rho}}^2)$ , thereby favoring the unit-root hypothesis. However, larger values of  $\tau \equiv (1 - \hat{\rho}) / \sigma_{\hat{\rho}}$  favor the alternative hypothesis.

Because Sims is somewhat skeptical that unit roots are common in economic data, he suggests using  $\gamma = 0.8$ , which implies that the prior probability of a unit root is  $(1 - \gamma)$  or 0.2. This prior still gives an advantage to the unit-root hypothesis because in terms of annual data the point null hypothesis ( $\rho = 1$ ) has the same prior probability as the infinite number of points in various intervals that are consistent with the alternative hypothesis, for example,  $(0.875 < \rho < 1)$  or  $(0.75 < \rho < 0.875)$ .

In order to evaluate whether or not the real exchange rate is a random walk, the new Sims test for the presence of a unit root was applied to monthly data from the current period of flexible exchange rates. For comparison purposes, the classical Dickey-Fuller test was also performed. The real exchange rates were constructed from data on nominal exchange rates and consumer prices in *International Financial Statistics* (IFS), which is published by the International Monetary Fund. The sample period began in June 1973, several months after the final breakdown of the Bretton Woods system and the move to flexible exchange rates, and ended in May 1988, thereby providing 180 observations.<sup>3</sup>

To perform the tests, the log of the real exchange rate is first regressed onto a constant and its own lagged value, yielding estimates of  $\hat{\rho}$  and  $\sigma_{\rho}$ . As expected on the basis of previous empirical work on the real exchange rate, the resulting estimates of the autoregressive coefficient  $\hat{\rho}$  were rather close to 1; for all of these five countries,  $\hat{\rho}$  was in the interval between 0.98 and 1.

Statistics for testing the random-walk hypothesis ( $\rho = 1$ ) were then constructed; they are presented in Table 2. The first column in the table presents the statistics from the Dickey-Fuller test:  $\tau_{\mu} \equiv (\hat{\rho} - 1)/\sigma_{\rho}$ .<sup>4</sup> To reject the random-walk hypothesis at the 90 percent significance level would require that  $\tau_{\mu}$  be less than  $-2.57$ ; this significance level means that if the null hypothesis is true, there is at most a 10 percent chance of rejecting it erroneously. As the table shows, most of the values of  $\tau_{\mu}$  are in the vicinity of  $-1$ ; clearly, none of the countries in this sample come close to rejecting the random-walk hypothesis on the basis of this test.

What about the Sims test? Recall that the Sims test favors the null hypothesis ( $\rho = 1$ ) if the test statistic  $Z$  is positive. The middle column of Table 2 reports the values of  $Z$  for these five real exchange rates, which were calculated using the prior distribution suggested by Sims, with  $\gamma = 0.8$ . In all five cases  $Z$  is negative, implying that the alternative hypothesis—that the real exchange rate is not a random walk—is favored.

The third column of Table 2 provides a measure of how strongly the null hypothesis is rejected. Using the estimates of  $\hat{\rho}$  and  $\sigma_{\rho}$ , one can calculate the smallest prior probability on the null hypothesis,  $(1 - \gamma^*)$ , that would be necessary in order to force the Sims criterion to favor the random-walk hypothesis. The larger the value of  $(1 - \gamma^*)$ , the stronger is the data's rejection of the null hypothesis. As the table indicates, in four cases the random walk is rejected fairly strongly because the

**Table 2.**  
**Tests for a Unit Root**  
**in the Real Exchange Rate Sample Period,**  
**June 1973 to May 1988**

Country	Dickey-Fuller	Sims	
	$\tau_{\mu}$	$Z$	$1 - \gamma^*$
United Kingdom	-0.95	-2.39	0.4525
France	-0.97	-2.00	0.4045
West Germany	-0.97	-2.01	0.4058
Switzerland	-1.13	-2.89	0.5142
Japan	-0.02	-0.35	0.2298

For both tests, the null hypothesis is  $(\rho = 1)$ . For the Dickey-Fuller test, the critical region is  $\tau_{\mu} < -2.57$ ; for the Sims test, the critical region is  $Z < 0$ .

Source: Computed at the Federal Reserve Bank of Atlanta.



prior probability of the null hypothesis would have to be in the range of 0.4 to 0.5, much higher than the 0.2 suggested by Sims, before the test would favor the random-walk hypothesis. However, in Japan's case, the rejection is relatively weak; a value of 0.23 would be sufficient to favor the null hypothesis.

The contrast between the results of the Dickey-Fuller test and the new Sims test makes a defini-

tive conclusion impossible. Even so, the combination of the latter test's results, the evidence of other recent papers like Huizinga and Kaminisky, and the doubts about earlier tests raised by Hakkio (1986) suggest that the preponderance of the evidence is now against the random-walk hypothesis.

## Notes

<sup>1</sup>This specification gives a clear but limited advantage to the unit-root hypothesis, because any individual value of  $\rho$  between 0.5 and 1 has essentially zero probability, while the point where  $\rho = 1$  has probability  $(1 - \gamma)$ .

<sup>2</sup>For details of the derivation see Sims (1988) and Whitt (1989).

<sup>3</sup>Because published data on consumer prices (line 64 of *International Financial Statistics* [IFS]) represent averages of data collected throughout the month,

monthly average exchange rates (lines rh or rf in IFS) were used. Results using end-of-period exchange rates (lines ae or ag in IFS) reject the random-walk hypothesis even more strongly than those reported here when the Sims test is used; they are available from the author upon request.

<sup>4</sup>Dickey and Fuller construct several different test statistics; on the basis of power considerations against a variety of alternatives, this particular one is recommended in Dickey, Bell, and Miller (1986): 18.

## Notes

<sup>1</sup>Officer (1982) includes an extensive bibliography of Casel's writings on this topic.

<sup>2</sup>The differences between absolute and relative purchasing-power parity are discussed in Officer (1982): 5-7.

<sup>3</sup>Edison (1987) discusses these three properties.

<sup>4</sup>See Officer (1982): 141-47.

<sup>5</sup>In this example, tradable good prices are assumed to be roughly steady in all three countries.

<sup>6</sup>Adler and Lehmann (1983) and Pippenger (1986) support Roll's contention, though Frankel (1985): 39-40, argues persuasively that Roll's approach has little basis in traditional theory.

<sup>7</sup>In a related paper, Mark (1986) reports that nominal exchange rates are not cointegrated with price indexes. Two variables are said to be *cointegrated* if each individually is nonstationary but some linear combination of them is stationary. As the concept is described by Engle and Granger (1987), economic theory sometimes suggests that two variables should move together in the sense that in the long run they do not drift too far apart, even though

each one individually is drifting in a random, non-stationary fashion. Mark interprets purchasing-power parity as suggesting that the exchange rate and the ratio of domestic to foreign prices should be cointegrated and that the cointegration constant should be 1. However, his empirical results do not support that hypothesis.

<sup>8</sup>Buiter (1987) argues that Huizinga's results actually favor the random-walk hypothesis.

<sup>9</sup>Although Hakkio's results cast doubt on the evidence favoring the random-walk hypothesis about exchange rates, they do not favor the possibility that the real exchange rate is a stationary variable because the alternatives he considers are all nonstationary, being ARIMA processes that contain a unit root.

<sup>10</sup>More technically, the Bayesian posterior odds ratio can be interpreted as a weighted average of the likelihood function over all points consistent with the null hypothesis, divided by a similar weighted average over all points in the alternative. The weights are derived from the prior distribution of the parameters.

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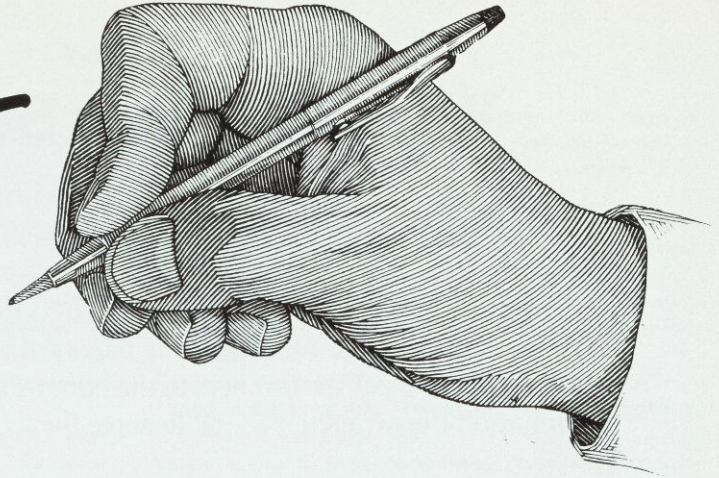
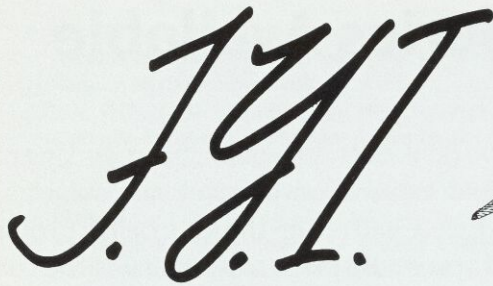
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# Commercial Bank Profitability: Improved in 1988

Robert E. Goudreau and David D. Whitehead

Profitability measures for commercial banks nationwide advanced in 1988 to the highest levels since 1979. Increased profits resulted in part from both a moderate recovery in interest-rate margins and diminished loan-loss provisions. As interest rates rose last year, interest revenues grew somewhat faster than interest expenses, resulting in a positive impact on profits. At the same time, additions to loan-loss reserves fell to their lowest mark since 1983. This combination of developments, along with more effective controls on noninterest earnings and expenditures, allowed the commercial banking industry in 1988 to post a return on assets (ROA) of 0.85 percent and a return on equity (ROE) of 13.67 percent, representing a dramatic turnaround from 1987. In that year extraordinary loan-loss provisions by large banks with sizable foreign debt holdings drove the industry's return on assets down to 0.09 percent

and return on equity to 1.52 percent. The year 1988 should be perceived as one of recovery for banks nationwide, although not all institutions shared equally in the rebound.

The nation's smaller banks—with assets under \$50 million—bettered their profitability measures but to levels significantly below those of their larger counterparts.<sup>1</sup> Last year's return on equity for banks with less than \$25 million in assets rose to a four-year high of only 4.18 percent, and the ROE for banks in the \$25 million to \$50 million asset category advanced to 7.28 percent. Although these figures for smaller banks are an improvement over recent experience, they remain well short of the industry average. Part of the profitability improvement for smaller banks resulted from the fact that many of the least profitable of these institutions failed and were merged into stronger firms.<sup>2</sup> This factor, along with the general upswing in bank profits, has improved the outlook for smaller banks as a group. However, returns for these banks must continue to rise in order to provide adequate compensation for stockholders relative to other investment opportunities.

After diminishing for three successive years, profits at southeastern banks turned up in

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1988.<sup>3</sup> District banks' 0.85 percent return on assets for 1988, however, stood below the impressive 0.94 percent ratio recorded for the Southeast in 1984. Moreover, southeastern banks' earnings did not surpass the nation's as they had from 1984 to 1987 despite their downward trend. Last year's return on assets for southeastern banks was identical to the nation's, but southeastern banks' 11.96 percent return on equity was lower than the 13.67 percent earned by U.S. banks overall. Lower return on equity for the region's commercial banks vis-a-vis the nation's is attributable to the substantially higher capitalization of southeastern banks.<sup>4</sup>

Georgia and Alabama banks remained the most profitable in the six southeastern states, and Louisiana's commercial banks are still the least profitable. After suffering losses during the preceding two years, Louisiana banks registered barely positive returns in 1988.

The purpose of this article is to review the profitability measures for banks in the six states located in the Sixth Federal Reserve District and compare them to those logged by all banks in the nation over the last five years. Banks also are subdivided into size groups, and profitability measures for these categories are analyzed. Finally, each classification of bank is divided into quartiles according to profitability in order to relate earnings in each subclassification to previous years. This analysis indicates how the least profitable banks are faring relative to both earlier periods and their more profitable counterparts.

## Profitability Measures

Three different measures provide information on bank performance: adjusted net interest margin, return on assets, and return on equity.<sup>5</sup> Adjusted net interest margin gauges the difference between a bank's interest income and expenses and is roughly similar to a business's gross profit margin.<sup>6</sup> This indicator is calculated by subtracting the bank's interest expense from its interest revenue (net of loan-loss provisions) and dividing that result by the bank's net interest-earning assets. For this calculation, interest revenue from tax-exempt securities is adjusted upward by the bank's marginal tax rate to avoid penalizing institutions that hold substantial state and local securities portfolios, which reduce tax burdens. Loan-loss expenses are subtracted from interest revenue to place banks that make lower-risk loans at lower interest rates on a more equal footing with commercial banks that make higher-risk loans which can generate greater interest income.<sup>7</sup>

The return on assets (ROA) ratio—the result of dividing a bank's net income by its average assets—gauges how well a bank's management is using the firm's assets. The return on equity (ROE) figure tells a bank's shareholders how much the institution is earning on the book value of their investments. ROE is calculated by dividing a bank's net income by its total equity. The ratio of ROA to ROE depends on the bank's capital-to-assets ratio, which tends to fall as

**Table 1.**  
**Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	3.53	4.05	3.91	4.00	4.35	4.23	3.13
1985	3.57	3.78	3.79	3.83	4.32	4.26	3.30
1986	3.32	3.56	3.75	3.98	3.90	4.03	3.03
1987	2.72	3.81	3.95	4.21	4.18	3.92	2.07
1988	3.75	4.08	4.19	4.30	4.31	4.00	3.54

Source: Figures in all tables have been computed by the Federal Reserve Bank of Atlanta from data in "Consolidated Reports of Condition for Insured Commercial Banks," and "Consolidated Reports of Income for Insured Commercial Banks," 1984-88, filed with each bank's respective regulator.

**Table 2.**  
**Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	12.66	12.54	12.29	12.16	12.45	12.41	12.85
1985	11.41	11.81	11.58	11.40	11.59	11.65	11.33
1986	10.16	10.77	10.74	10.72	10.50	10.74	9.92
1987	9.92	9.94	10.00	10.03	10.02	10.05	9.87
1988	10.67	10.13	10.19	10.26	10.36	10.46	10.83

**Table 3.**  
**Loan-Loss Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	.69	.91	.75	.61	.54	.57	.73
1985	.79	1.25	1.00	.88	.72	.80	.76
1986	.91	1.31	1.09	.91	.90	.99	.87
1987	1.49	.95	.82	.63	.69	.89	1.84
1988	.64	.69	.61	.53	.57	.78	.61

**Table 4.**  
**Interest Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	8.45	7.58	7.63	7.55	7.56	7.61	8.98
1985	7.05	6.79	6.80	6.69	6.56	6.59	7.26
1986	5.94	5.91	5.91	5.83	5.70	5.72	6.01
1987	5.71	5.19	5.23	5.19	5.15	5.23	5.96
1988	6.27	5.36	5.39	5.42	5.48	5.67	6.63

**Table 5.**  
**Percentage Return on Assets**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	.65	.60	.78	.90	.90	.86	.54
1985	.70	.36	.70	.81	.85	.71	.67
1986	.64	.12	.48	.68	.67	.65	.65
1987	.09	.19	.47	.74	.73	.51	-.15
1988	.85	.39	.64	.80	.82	.59	.90

**Table 6.**  
**Percentage Return on Equity**  
*(Insured commercial banks by consolidated assets)*

Year	All Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	10.74	6.19	9.08	11.19	12.46	12.66	10.51
1985	11.34	3.67	8.08	9.95	11.68	10.53	12.53
1986	10.25	1.25	5.54	8.38	9.29	9.58	11.91
1987	1.52	2.08	5.44	8.92	9.92	7.51	-2.79
1988	13.67	4.18	7.28	9.51	10.80	8.84	16.54

bank size increases. Analysts who want to compare profitability while ignoring differences in equity capital ratios tend to focus on ROA. People wishing to focus on returns to shareholders look at ROE.

The differences in these three profitability measures are illustrated by comparing the performance of Florida banks to those in Mississippi and Tennessee. The adjusted net interest margin for banks in Florida exceeded Mississippi's and Tennessee's adjusted margins in 1988, yet those two states' banks had marginally higher returns on assets (see Tables 13 and 17). This inconsistency reflects differences in the banks' noninterest revenues and expenses as well as securities' gains or losses, or the degree to which assets were put to productive use. Florida banks had a slightly lower ROA and a higher ROE than Mississippi and Ten-

nessee banks, suggesting that Florida banks as a whole had a lower equity capital-to-assets ratio than banks in the two other states (see Table 18).<sup>8</sup>

**Adjusted Net Interest Margins.** The adjusted net interest margin for U.S. commercial banks advanced from 1987's 2.72 percent to 3.75 percent in 1988. Last year's adjusted margin exceeded all figures posted during the five-year period. The rise in adjusted interest margin occurred in every size category of banks, with the largest banks displaying the greatest gain; for banks with assets exceeding \$1 billion the adjusted margin climbed to 3.54 percent in 1988 from 2.07 percent the year before. U.S. banks with total assets under \$500 million experienced significant overall advances according to this measure and, in fact, showed margins higher than the largest banks by roughly 50 to 75 basis

points. Smaller banks with assets under \$100 million in 1988, as well as the largest banks, surpassed their highest interest-rate margins of the five-year observation period. The tendency for smaller banks to show higher spreads vis-a-vis the largest banks is consistent over the five-year span.

During 1988 gains in tax-equivalent revenue and in interest expense for all banks came close to offsetting each other, with a 19-basis-point differential favoring interest revenue.<sup>9</sup> Thus, the nation's higher adjusted interest margin in 1988 was attributable to sharply diminished aggregate loan-loss provisions, which fell from 1.49 percent in 1987 to 0.64 percent last year. Large banks with assets over \$1 billion bolstered their 1987 loan-loss provisions to 1.84 percent of interest-earning assets, citing sizable holdings of questionable foreign debt. That write-down, however, was a one-time occurrence. In fact, banking industry analysts saw loan-loss provisions for large banks decline in 1988 to one-third of the prior year's level. Last year's loan-loss expenses for small- and medium-sized commercial banks displayed notable improvement. Relatively robust macroeconomic growth, increased loan demand, and ongoing moderate improvement in the nation's agricultural and energy sectors have helped reduce bad debt provisions for many small- and medium-sized banks.

**Banks' Returns on Assets and Equity.** Returns on assets and equity for the nation's commercial banks—0.85 percent and 13.67 percent, respectively—showed an impressive upturn in 1988, exceeding the highs recorded during 1985. Large banks' return on assets jumped to a hefty 0.90 percent for 1988 from -0.15 percent the year before, and their return on equity climbed to 16.54 percent following 1987's grave -2.79 percent.

## Southeastern Banks' Performance

Southeastern banks of every size classification outperformed their national peers in adjusted net interest margins in 1988 (see Table 7). In fact, southeastern commercial banks, except for those with assets between \$500 million and \$1 billion, have consistently surpassed U.S.

banks' performance in adjusted margins during the 1984-88 period.<sup>10</sup> Smaller southeastern banks, which make up just over 50 percent of the region's 1,592 banks but hold only 7.4 percent of banking assets, in particular have achieved substantially higher adjusted margins vis-a-vis their national peers. In a strictly regional context, last year's margins for smaller southeastern banks were almost the same as or above 1984 levels, while adjusted margins for the region's medium- or larger-sized banks stood below 1984 levels. Improvements in loan-loss provisions have helped small southeastern banks return adjusted margins to 1984 levels.

Return on equity for banks in the Southeast, which are more highly capitalized, was 11.96 percent last year compared to 13.67 percent for the United States. This measure suggests that southeastern banks were slightly less profitable than their national counterparts. However, a review of southeastern banks' ROAs gives a somewhat different picture. Returns on assets for smaller southeastern banks in 1988—those with assets less than \$50 million—were moderately below the returns recorded by their national peers. Unlike southeastern small banks' adjusted interest margins, though, which started to move back to 1984 levels, last year's ROAs for the region's smaller banks were about one-half of their 1984 figures. In contrast, larger southeastern banks returned to 1984's ROA levels. Thus, earnings for larger banks in the Southeast appear to be back on track and roughly equal to their national counterparts' earnings, while smaller regional competitors continue to struggle. Southeastern banks with smaller asset totals encountered less of a downturn in 1986 and 1987 than did small banks as a whole, but they have not enjoyed the stronger recovery experienced nationwide.

Commercial banks in most asset classifications across the nation equaled or substantially exceeded southeastern banks' performance in return on equity, owing largely to the latter's higher capital-to-assets ratios. The notable exception was southeastern banks with assets in the \$500 million to \$1 billion range; last year's ROE for this category of the region's banks climbed to 12.85 percent following three years of mediocre returns. As with commercial banks nationally, southeastern institutions with assets in excess of \$1 billion scored the highest return



**Table 7.**  
**Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	4.52	4.46	4.20	4.10	4.72	4.57	4.61
1985	4.43	4.48	4.21	3.99	4.70	4.11	4.57
1986	4.25	4.19	4.19	4.29	4.21	3.88	4.32
1987	4.28	4.20	4.30	4.51	4.53	3.69	4.23
1988	4.36	4.34	4.30	4.38	4.47	4.17	4.35

**Table 8.**  
**Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	12.71	12.68	12.41	12.30	12.70	12.68	12.94
1985	11.74	12.05	11.87	11.66	11.92	12.10	11.63
1986	10.73	11.16	11.12	11.10	10.86	10.94	10.51
1987	10.28	10.36	10.44	10.38	10.29	10.12	10.27
1988	10.64	10.54	10.55	10.53	10.52	10.50	10.73

**Table 9.**  
**Loan-Loss Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	.54	.75	.65	.64	.48	.69	.46
1985	.76	.90	.87	.94	.74	1.16	.60
1986	.86	1.14	1.02	.92	1.02	1.24	.70
1987	.81	.98	.88	.65	.70	1.22	.80
1988	.62	.67	.66	.56	.59	.56	.64

**Table 10.**  
**Interest Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	7.65	7.47	7.56	7.56	7.49	7.43	7.87
1985	6.56	6.67	6.79	6.73	6.47	6.83	6.46
1986	5.62	5.84	5.90	5.89	5.63	5.81	5.49
1987	5.20	5.18	5.25	5.23	5.06	5.21	5.23
1988	5.66	5.53	5.59	5.59	5.45	5.76	5.74

**Table 11.**  
**Percentage Return on Assets**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	.94	.77	.90	.90	1.00	.84	.96
1985	.91	.75	.90	.84	.96	.50	.99
1986	.81	.33	.63	.76	.70	.55	.94
1987	.78	.31	.52	.81	.78	.45	.86
1988	.85	.34	.54	.83	.83	.86	.90

on equity in 1988, while the region's banks with assets under \$25 million turned the smallest profits.

Substantially lower returns that southeastern banks in the under-\$25 million asset class posted relative to their \$1 billion-plus southeastern counterparts cannot be explained solely by differences in adjusted interest margins or loan-loss provisions. For example, last year's ROE for the smallest banks in the Southeast was 3.15 percent while the largest institutions on average earned a return on equity of 14.13 percent, yet the adjusted interest-rate margin for the two groups was essentially identical at 4.34 and 4.35 percent, respectively, of interest-earning assets. Small southeastern banks paid slightly less than larger banks for their funds, earned marginally less than large banks on interest-earning assets, and charged essentially equivalent loan-loss expenses against income. Therefore, vis-a-vis their larger counterparts small banks must face cost disadvantages not associ-

ated with cost of funds and loan-loss experience. These disadvantages will be difficult to overcome, and so small bank performance relative to larger banks is unlikely to show significant improvement.<sup>11</sup>

**A State-by-State Breakdown.** Only Alabama and Georgia banks earned profits that exceeded both the aggregate ROA and ROE for all U.S. banks. Alabama's respective returns on assets and equity were 1.16 and 14.43 percent in 1988, and Georgia banks' profitability ratios last year were 1.15 and 15.79 percent. Return ratios for Florida, Mississippi, and Tennessee looked reasonably impressive: they generally were the same or only moderately below national averages.

Unlike other southeastern states, profitability ratios for Louisiana commercial banks were dismal. Banks in that state experienced ROA and ROE during 1988 of a slim 0.04 and 0.60 percent, respectively. Although quite meager, these profitability figures improved on the aggregate

**Table 12.**  
**Percentage Return on Equity**  
*(Insured commercial banks in the Southeast by consolidated assets)*

Year	All SE Banks	0-\$25 million	\$25-\$50 million	\$50-\$100 million	\$100-\$500 million	\$500 million-\$1 billion	\$1 billion +
1984	13.39	7.68	10.13	11.17	13.57	11.84	16.59
1985	13.09	7.28	10.05	10.21	13.00	7.64	16.74
1986	11.86	3.25	7.00	9.09	9.49	8.68	15.78
1987	11.25	2.82	5.75	9.43	10.29	6.90	13.98
1988	11.96	3.15	5.84	9.53	10.75	12.85	14.13

losses incurred by Louisiana banks in 1986 and 1987. The prevalence of energy-producing industries in Louisiana and depressed oil and natural gas prices in recent years are to a great extent responsible for severe profit problems there. Concomitantly, the state's real estate values have fallen dramatically.<sup>12</sup>

As in the previous two years at least, poor performance by Louisiana banks depressed overall southeastern performance. Omitting Louisiana banks improves the Southeast picture. For instance, the 1988 ROA for the Southeast, excluding Louisiana, was 0.95 percent compared to a 1988 aggregate ROA of 0.85 percent for the entire region. The 1988 ROE for the Southeast, excluding Louisiana, was 13.42 percent, well above last year's 11.96 ROE for all six states.

Georgia banks registered the best adjusted net interest margin in the Southeast. The state's solid 1988 adjusted margin of 4.99 percent was attributable to a hefty tax equivalent interest revenue ratio of 11.27 percent. In fact, Georgia banks' interest revenue has been the highest among southeastern states for the past four years. Loan-loss provisions and interest expense as a percentage of interest-earning assets made no special contribution to the state's superior 1988 performance in adjusted margins.

Respectable profitability at Alabama commercial banks resulted partly from improved loan-loss experience. Alabama banks' loan-loss provision last year represented only 0.31 percent of interest-earning assets and ranked as the lowest in the Southeast. The region's aggregate loan-loss provision was 0.62 percent.

Profit performance for commercial banks in Florida was average compared to other southeastern states. Although near the mean for the

region, Florida banks' third-place adjusted-margin figure among southeastern institutions was an offshoot of an exceptionally modest statewide interest expense of 5.46 percent—the lowest in the region. Last year's aggregate interest expense for southeastern banks was 5.66 percent of interest-earning assets.

Although Mississippi banking institutions experienced average profitability among southeastern banks during 1988, overall return on assets of 0.85 percent and an adjusted margin of 4.23 percent equaled or exceeded the national average. The attainment of decent overall adjusted margin and ROA figures for Mississippi banks can be linked to consistently good experience with interest revenue and expense and lower loan-loss provisions. These ratios suggest the presence of conservative banks with relatively higher equity ratios, which is consistent with lower ROEs recorded for the state's banks. Mississippi banks' ROE of 10.90 percent was the lowest among southeastern states last year, except for Louisiana.

Respective returns on assets and equity and the adjusted interest margin for Tennessee commercial banks last year were 0.85, 11.62, and 4.12 percent. Higher loan-loss and interest expenses in 1988 contributed to Tennessee banks' modest adjusted interest margin relative to other southeastern states.

### **Distribution of Bank Profitability**

The nation's commercial banks recovered from a decline in profitability as returns improved in 1988. Although profitability for all size

**Table 13.**  
**Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	4.52	4.24	4.83	4.89	4.16	3.95	4.30
1985	4.43	4.74	4.68	5.04	3.51	4.27	4.09
1986	4.25	4.73	4.56	4.73	2.45	4.17	4.35
1987	4.28	4.51	4.31	4.95	3.06	4.46	4.20
1988	4.36	4.47	4.40	4.99	3.45	4.23	4.12

**Table 14.**  
**Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	12.71	12.15	12.90	12.93	12.48	12.35	12.93
1985	11.74	11.81	11.88	12.13	11.55	11.54	11.39
1986	10.73	10.82	10.78	10.99	10.37	10.51	10.68
1987	10.28	10.11	10.15	11.08	9.97	10.38	10.03
1988	10.64	10.61	10.41	11.27	10.64	10.37	10.62

**Table 15.**  
**Loan-Loss Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	.54	.42	.48	.45	.83	.55	.58
1985	.76	.60	.66	.57	1.38	.62	.72
1986	.86	.45	.68	.67	2.14	.66	.66
1987	.81	.44	.78	.73	1.59	.58	.65
1988	.62	.31	.55	.54	1.28	.46	.73

**Table 16.**  
**Interest Expense as a Percentage of Interest-Earning Assets**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	7.65	7.50	7.59	7.59	7.49	7.85	8.06
1985	6.56	6.47	6.54	6.53	6.66	6.65	6.58
1986	5.62	5.65	5.54	5.59	5.77	5.68	5.67
1987	5.20	5.15	5.06	5.39	5.32	5.33	5.18
1988	5.66	5.82	5.46	5.75	5.91	5.67	5.77

**Table 17.**  
**Percentage Return on Assets**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	.94	1.09	.90	1.14	.77	.90	.85
1985	.91	1.20	.87	1.20	.36	1.02	.94
1986	.81	1.22	.87	1.08	-.23	1.01	.97
1987	.78	1.08	.75	1.13	-.05	.91	.89
1988	.85	1.16	.84	1.15	.04	.85	.85

categories of U.S. banks advanced over the previous year, 1988's increased earnings were most pronounced at banks with more than \$1 billion in assets. This recent improvement in large bank performance was attributable to sharply reduced loan-loss provisions, particularly at money-center banks holding sizable portfolios of troubled Latin American loans.

Overall statistics such as those presented earlier are useful, but they do not provide specific information on profitability gains or losses within different asset size categories. That is, perhaps only the most profitable banks within each classification were unable to sustain their earnings, while the majority of banks were unaffected by the changing environment. Slumping earnings may displease owners and managers of highly profitable banks, but moderately reduced profitability at such institutions should pose no public policy problems. On the other hand, if the least profitable firms experience

marked declines in profitability, their misfortune may portend a future increase in the number of problem or failed institutions. A growing incidence of troubled banks not only raises concern about the safety and soundness of the banking system but also places increased stress on the Federal Deposit Insurance Corporation.

One way to analyze the distribution of bank profitability within a given asset size category is to rank all banks in that category in ascending order of profitability, divide the group into quartiles, and describe the profitability of the most profitable bank in each quartile. For example, the most profitable banks in the first (lowest) quartile would be the banks at the 25th percentile; that is, 25 percent of the banks in a particular size category are less profitable than the bank at the 25th percentile. Comparing the profitability of the bank at the 25th percentile over time would indicate the degree to which the least profitable banks in that asset category are

**Table 18.**  
**Percentage Return on Equity**  
*(Insured commercial banks in the Southeast by state)*

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1984	13.39	13.60	14.25	17.24	9.52	12.23	12.54
1985	13.09	14.97	13.90	18.45	4.55	14.08	13.68
1986	11.86	15.18	14.19	16.49	-2.97	13.57	13.69
1987	11.25	13.28	12.14	16.14	-.63	11.85	12.32
1988	11.96	14.43	12.99	15.79	.60	10.90	11.62

experiencing improvement or deterioration in earnings. Likewise, comparing the ROA for the bank at the 75th percentile over time would indicate changes in the profitability of the more profitable banks in that asset category. (A 75th-percentile bank would be more profitable than 75 percent of the banks in that size category.) A rise in profitability over time at the various percentiles suggests improved conditions; downward movements indicate deterioration. Tables 19 through 24 present the profitability distribution over time for each of the six asset-size categories.

Last year's profitability at the weakest banks (those in the lowest quartile) improved over 1987 in every size category. Profitability at the 25th-percentile bank with assets below \$25 million was reflected in a modest 0.23 percent ROA in 1988, but this seemingly unimpressive return was a welcome improvement over the losses recorded for small banks in 1986 and 1987. Perhaps some, but by no means all, of last year's improvement in small bank profitability can be ascribed to the discontinuance of operations by the nation's least profitable small banks. Close to half of the banks that failed in recent years have been those with assets under \$25 million.<sup>13</sup> In contrast to the smaller institutions, last year's ROA for the nation's lowest-profit-quartile large bank with assets exceeding \$1 billion stood at a relatively decent 0.72 percent.

The median (50th percentile) return on assets figures for different sized banks in 1988 displayed universal improvement. The median-quartile bank with assets under \$25 million continued to record the lowest aggregate ROA among the six size categories; specifically, this

category of commercial bank earned profits that were 0.78 percent of total assets, while the other five asset categories of median percentile banks recorded healthier ROAs ranging from 0.93 to 1.04 percent.

Commercial banks at the 75th percentile recorded 1988 returns on assets that surpassed the previous year's figures in every size class. Smaller banks again recorded the lowest ROA among the six categories. The 75th-percentile bank with assets between \$100 million and \$500 million logged a 1988 ROA of 1.34 percent—the best among all top-quartile banks. Greatest improvement occurred for the nation's 75th-percentile banks with assets exceeding \$1 billion. Last year's ROA for the commercial bank representing the top quartile with assets exceeding \$1 billion climbed to 1.21 percent from 1.08 percent in 1987. Therefore, the gains in profitability appear to have been fairly evenly distributed over size groups and quartiles, and the relatively weakest banks demonstrated the greatest upswing.

## Conclusion

Commercial bank profitability rose substantially from 1987 to 1988. The most notable improvement occurred at banks with assets exceeding \$1 billion. In 1987 many large banks with considerable exposure on troubled Latin American debt had charged markedly higher loan-loss expenses against income; this dramatic write-down for large banks did not recur in 1988. These lower write-downs contributed

**Table 19.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets below \$25 million)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.36	.93	.35
1985	1.29	.82	.07
1986	1.13	.67	-.22
1987	1.09	.68	-.04
1988	1.15	.78	.23

**Table 20.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets of \$25 million to \$50 million)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.34	1.00	.60
1985	1.34	.97	.50
1986	1.24	.84	.29
1987	1.18	.84	.35
1988	1.25	.93	.55

**Table 21.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets of \$50 million to \$100 million)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.31	1.02	.69
1985	1.35	1.04	.62
1986	1.29	.96	.49
1987	1.25	.94	.55
1988	1.28	.99	.66

**Table 22.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets of \$100 million to \$500 million)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.28	1.01	.73
1985	1.29	1.02	.69
1986	1.27	.96	.54
1987	1.24	.96	.57
1988	1.34	1.04	.73

**Table 23.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets of \$500 million to \$1 billion)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.19	.91	.62
1985	1.19	.91	.64
1986	1.19	.93	.59
1987	1.20	.94	.47
1988	1.29	1.00	.57

**Table 24.**  
**Percentage Return on Assets**  
*(Insured commercial banks with assets over \$1 billion)*

Year	Percentile According to Profitability		
	75%	50%	25%
1984	1.05	.86	.54
1985	1.11	.89	.59
1986	1.11	.91	.60
1987	1.08	.86	.30
1988	1.21	1.02	.72

substantially to markedly improved group profitability. Although small commercial banks with assets under \$25 million logged unimpressive 1988 ROA and ROE ratios of 0.39 and 4.18 percent, respectively, these small bank returns were appreciably better than returns for 1986 and 1987.

Last year's aggregate ROA performance for southeastern banks of 0.85 percent matched that of commercial banks across the nation. Return on equity for commercial banks in the Southeast, which typically have higher capital-to-assets ratios than the nation's banks, was 11.96 percent last year compared to a robust 13.67 percent ROE for all U.S. banks. Southeastern banks with assets under \$25 million registered a modestly improved ROE, but they did not rebound to the same extent as small banks nationwide. These small banks posted returns markedly lower than their large bank counterparts.

Georgia and Alabama banks—with 1988 returns on assets and equity well in excess of 1.0 and 14 percent—remained the most profitable among banks in the six southeastern states. Although no longer awash in red ink as they were in 1986 and 1987, Louisiana banks, which are unequivocally the least profitable in the District, earned inconsequential profits in 1988. Lackluster performance by Louisiana banks is chiefly the result of stagnant business conditions for energy-producing industries and depressed real estate values—conditions that currently prevail in the nation's other "oil-patch" states of Texas, Oklahoma, and Colorado.

The distribution of increased profits among banks was relatively even for all asset classifications. The nation's weakest banks displayed the greatest advances, suggesting that the number of troubled banks in coming years may diminish provided this improvement continues.

## Appendix

The data in this article were taken from reports of condition and income filed with federal bank regulators by insured commercial banks. The sample consisted of all banks that had the same identification number at the beginning and end of each year. The number of banks in the 1988 sample was 12,819.

The three profitability measures used in this study are defined as follows:

$$\text{Adjusted Net Interest Margin} = \frac{\text{Expected Interest Revenues} - \text{Interest Expense}}{\text{Average Interest-Earning Assets}}$$

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Average Consolidated Assets}}$$

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Average Equity Capital}}$$

Average interest-earning assets and average equity capital are derived by averaging beginning-, middle-, and end-of-year balance sheet figures. The expected interest income component to net interest margin incorporates two significant adjustments from ordinary interest income. If profits before tax are greater than zero, the lesser of revenue from state and local securities exempt from federal tax and the bank's profits before tax is divided by 1 minus the bank's marginal federal tax rate. Loan loss expenses are subtracted from interest revenue.

## Notes

<sup>1</sup>De novo banks are not included in this study. The ratios displayed are full-year profitability figures based on beginning-, middle-, and end-of-year balance sheets and income statements. Banks that commence operations

during any particular year will be missing, at a minimum, beginning-of-year data.

Commercial banks with assets under \$50 million accounted for 56.5 percent (7,247) of the total number of



banks nationwide (12,819) that were included in the 1988 sample. Total assets for these under-\$50-million banks represent only 5.9 percent of U.S. banks' total assets for 1988.

<sup>2</sup>Of U.S. banks that failed in 1988, 124 (65.6 percent) of the total 189 had total assets under \$50 million. The 1988 failed bank total includes 40 failed bank subsidiaries of First Republic Bank, Dallas, Texas. Through May 24, 1989, 47 of 86 U.S. banks that failed (54.7 percent) had less than \$50 million in total assets.

<sup>3</sup>In this study the Southeast refers to the six states that are entirely or partially within the Sixth Federal Reserve District: Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee.

<sup>4</sup>Capital-to-assets ratios for U.S. banks as a whole from 1984 to 1988 were 6.05, 6.15, 6.20, 6.06, and 6.20 percent, respectively. For southeastern banks, respective capital-to-assets ratios from 1984 to 1988 were 7.00, 6.93, 6.85, 6.95, and 7.08 percent.

<sup>5</sup>The revenue, expense, and profitability figures presented are generally similar to those displayed in prior bank profitability studies published in the *Economic Review* (see Wall [1988] for the most recent study). The figures are not identical because reporting errors by banks are continually being found and corrected. Additionally, the interest revenue as a percentage of interest-earning assets ratio and adjusted net interest margins may differ from figures reported in previous studies owing to the correction of errors in the treatment of tax-exempt interest income.

<sup>6</sup>*Gross profit* is the amount received from sales minus the cost of goods or services sold; other expenses such as sales, advertising, salaries, and rent have not been deducted. *Net profit*, on the other hand, is the amount received from sales minus all expenses of business operations.

<sup>7</sup>For example, interest rates on credit cards have been substantially higher than rates on prime commercial loans, but loan losses on credit cards have also been larger. Loan losses on credit cards were 3.33 percent of total credit card volume during 1986 for the nation's top 100 banks in credit card operations, according to "Institutions' Share of the Credit Card Lending Market," *American Banker* (1987).

<sup>8</sup>The adjusted net interest margin represents the return earned by a bank on its net interest-earning assets. Banks also bring in noninterest revenue in the form of loan origination fees, service charges, and gains from the sale of securities, to name a few. In addition, they incur noninterest expenses such as expenditures on employee salaries, computer equipment, and maintenance. Therefore, Bank X with a comparatively low adjusted interest margin

may achieve a higher return on assets than Bank Y, which attained a larger margin. That is, Bank X may record a higher return on assets by realizing higher noninterest revenues or lower noninterest expenses.

More highly capitalized banks that post the same return on assets as less capitalized competitors will record a lower return on equity. Since return on equity is computed by dividing a bank's net income by its capital reserves, a bank's return on equity will decline as its capital reserve increases, assuming net income remains fixed.

<sup>9</sup>The aggregate 19-basis-point differential favoring interest revenue over interest expense for U.S. banks indicates not only higher rates earned on assets than paid out on liabilities but also a general tendency for increases on asset rates to precede increased rates paid on liabilities.

<sup>10</sup>The uneven performance of banks in this \$500 million to \$1 billion asset category can be traced to acquisition and merger activity and generally improved profitability in 1988. Numerous institutions within this size category experienced declining profits in 1985, 1986, or 1987. These poorly performing banks, most of which were located in Louisiana and Florida, eventually were acquired by or merged into larger, more profitable entities. The banks that remained in this asset class, including a number of Louisiana commercial banks, generally recorded improved profitability in 1988.

<sup>11</sup>The lower return on equity recorded for southeastern banks with assets under \$25 million is attributable partly to their generally higher capitalization. The capital-to-assets ratios for the region's small and \$1-billion-plus banks in 1988 were 10.73 and 6.35 percent, respectively. If small banks had maintained a capital-to-assets ratio of 6.35 percent in 1988, their aggregate ROE based on that year's earnings would have been 5.32 percent, instead of the 3.15 percent return experienced. This adjusted 5.32 percent ROE stands considerably below the 14.13 percent ratio posted by the Southeast's largest class of banks.

<sup>12</sup>In 1988 the energy-producing states of Texas, Oklahoma, Louisiana, and Colorado combined accounted for 79 percent (157) of bank closures nationwide, up from 59 percent (108) in 1987 and 41 percent (57) in 1986. Failed Louisiana banks were 6 percent of the nation's 1988 total for all failed banks. See Latta and Siqueira (1989): 111-20.

<sup>13</sup>Of U.S. banks that failed in 1988, 85 (45.0 percent) of the 189 had total assets under \$25 million (see note 2). Of the total 189 banks, 40 were subsidiaries of First Republic Bank, Dallas, Texas. Through May 24, 1989, 33 (38.4 percent) of the 86 failed banks in America were in the less-than-\$25-million-in-total-assets category.

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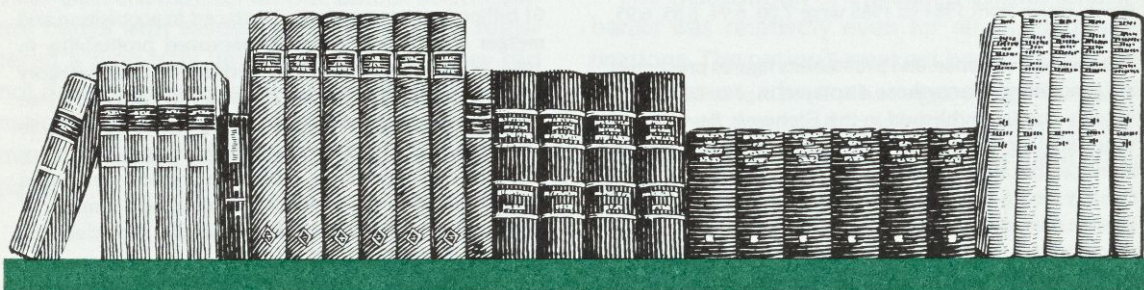
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# Book Review

## *Memoirs of an Unregulated Economist*

by George J. Stigler.  
New York: Basic Books, 1988.  
228 pages. \$17.95.



George Stigler has made seminal contributions in an uncommonly broad range of areas in the field of economics, including economic history, price theory, and industrial organization. In each of these areas, his inventive analysis has established whole new approaches to studying economics. He adapted, enhanced, and applied existing price theory to a rich and varied array of real world situations.

Stigler's early work in the history of economic thought analyzed the writings and research of David Ricardo, John Stuart Mill, David Hume, and William Stanley Jevons. Later, he delved into such issues as the concept of originality. He argued that intellectual originality is not a matter of who first conceives an idea but of who first makes it important.

Although he focused originally on studies of economic history, Stigler's contributions in applied economic analysis have been fruitful throughout his career as well. In the fields of industrial organization and the economics of regulation, his work has had a measurable impact on public policy and on perceptions of the appropriate scope to government's role in the marketplace. In particular, his studies regarding the economics of information—which treated information as a scarce, and therefore not free,

resource—have been applied to analyses of advertising, the labor market, and business cycles.

Professor Stigler, now director of the Center for the Study of the Economy and the State at the University of Chicago, has a formidable reputation for using humor and humanism, which, in concert with acute and serious analysis, have made his writings on economics some of the most elegant in the history of the profession.

The tone of Stigler's *Memoirs of an Unregulated Economist* is playful, reflecting the author's definition of humor as "the ability to see oneself with detached candor." The issues discussed in these reminiscences are uniformly serious, and many of them, in fact, remain unresolved. However, Stigler's "detached candor" succeeds in communicating the excitement of first-class minds grappling with puzzles and makes accessible the economic concepts providing the inspiration. Despite his witty approach, however, Stigler does not minimize the real struggle and contention that accompany the clash of ideas.

Two themes run through these stylish and gentle memoirs. The first of the book's major topics is general enough to be familiar to anyone who engages in purposeful problem solving:

Ideas, and the people who develop them, evolve through exposure to different facts and a variety of opinions. Much of this book relates episodes in Professor Stigler's distinguished career that show how his perceptions of important economic concepts and public policy issues changed at various times. These shifts in thinking resulted from his own work as well as the persuasiveness of others' discoveries.

Stigler points out that some of this century's major contributions to economics owe their pre-eminence, temporary or ongoing, to the support of economists who opposed them at one time. He himself has sometimes led the profession but at other times has been carried along with the majority of his colleagues. For instance, in 1950 Professor Stigler, together with most analysts of industrial organization, believed that monopoly posed a major public policy problem in the United States and that it should be dealt with by breaking up dominant firms. Stigler admits that at that time, when the presence of industrial concentration was accepted as evidence of noncompetitive behavior, this belief was based "more upon consensus than upon evidence." As the 1950s progressed and both empirical and theoretical economists failed to certify that concentration necessarily compromised competition, Professor Stigler and the economics profession moved away from the earlier position.

The second major motif in Stigler's reflections is the generality and richness of economic analysis. The tools of the economist are the assumption of rationality and its persistent application to all decision making. *Memoirs of an Unregulated Economist* recounts recurrent patterns of mistaken though widely accepted ideas' eventually succumbing to the relentless application of economic reasoning. In this way the two major themes of the book are united.

Many anecdotes throughout the memoirs highlight two critical aspects of the process of idea development that are essential to intellectual progress: openness and the stringent empirical testing of results. Marshall Breger described the evolution of ideas as a procedure that "requires the frank expression of divergent views, even if tentative and not fully informed; the testing of views through critical queries, even if put forth only for the purpose of debate; and the raising of alternatives for discussion,

even though one may not necessarily favor them."<sup>1</sup> Professor Stigler has been fortunate to have worked in several settings, including the National Bureau of Economic Research (NBER) and the University of Chicago department of economics, where this process was followed with great enthusiasm and to quite productive ends.

During Stigler's career a number of previously accepted truths were discredited through adherence to this process, yet persistent problems of economics, especially in the realm of economic policy, are still not entirely provable or completely refutable; many, though, are subject to empirical testing. Professor Stigler relates how his colleagues at the NBER, as well as the goals of his own research agenda, impressed upon him a respect for the power of empirical data in evaluating economic theory. Over the span of Stigler's career, members of his profession made enormous progress in developing techniques to infer information from data. However, even many defunct theories and "facts" have had some (possibly spurious) empirical basis. Thus, Stigler demonstrates that the evolution of ideas is a risky process, in which the new outcome is not always closer to the truth than the previous "facts."

A review of the accomplishments of an economist as eminent as Stigler—who received the Nobel prize in 1982—reveals a healthy skepticism that acknowledges the pitfalls and weaknesses of his chosen profession. Although such an attitude may recognize the limitations of specific research, it does not extend to acknowledging any real boundaries to the scope of economic analysis. "Of all the social scientists, only economists possess a theoretical system to explain social behavior . . .," Stigler writes. Furthermore, "the very nature of economic logic invites a sweepingly wider application of economic analysis to social phenomena. An economic problem is a problem of choosing efficiently among alternative ways to use resources, whether the resources are dollars, a bowl of whipped cream, available time, or even a reputation for honesty and skill. . . . [E]conomic logic is the logic of all efficient behavior." As economics has invaded other fields—sociology, law, studies of both discrimination and child-bearing, and so forth—the discipline has elicited some hostility because of the dispassionate

manner in which it approaches issues "loaded with emotional commitments." Yet policy-making, Stigler believes, must be informed by the rigorous analysis of a measure's costs and benefits, both financial and intangible. Professor Stigler was one of the pioneers in this rich vein of economic policy research.

Unfortunately, even though economic analysis can address an immense variety of problems, courtroom decisions have often failed to recognize the worth of its application. Sprinkled throughout these memoirs are examples of how the less efficient and possibly irrational legal process triumphed over economic ideas in some cases in which Professor Stigler was involved. To be right is not necessarily to succeed. Perhaps economic analysis' hubris invites these results.

Overall, *Memoirs of an Unregulated Economist* is gracefully balanced between a discussion of ideas and an informal history of the people who have argued for and against them. At times, however, there is a distinct incongruity between the affectionate, chatty observations about famous colleagues, which can be fully appreciated only by those acquainted with their contributions to the profession, and the off-hand, breezy descriptions of the advanced economic concepts these people developed. Anyone familiar enough with the economic literature to enjoy Stigler's personal insights may be

unsatisfied by his oversimplified treatment of the economic issues. Similarly, readers who require an introductory-level discussion to the issues will be unenlightened, even baffled, by the intimate but prosaic insights into such great economists as Frank Knight, Jacob Viner, Milton Friedman, and Aaron Director—all teachers or colleagues of Professor Stigler. For example, the discussions of economic externalities and rational expectations are barely motivated and serve more to provide insight into personalities than to illustrate the progress of economic analysis. This drawback is unfortunate because Professor Stigler's significant contributions to economic analysis suggest he is uncommonly well equipped to make his memoirs useful to students of both economic issues and the history of thought.

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#### **Note**

<sup>1</sup>Marshall Breger, "Sunshine Act: Decade of Exposure Leaves Wrinkles," *Wall Street Journal*, September 25, 1986, 30.









# Economic Review

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