

# Monetary Policy and Racial Unemployment Rates

**M A D E L I N E   Z A V O D N Y   A N D  
T A O   Z H A**

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**D**URING THE COURSE OF THE CURRENT EXPANSION, THE UNEMPLOYMENT RATE AMONG AFRICAN AMERICANS HAS FALLEN TO THE LOWEST LEVELS SINCE THE GOVERNMENT BEGAN REPORTING THE SERIES IN 1972. WHEN THE FEDERAL OPEN MARKET COMMITTEE (FOMC) BEGAN RAISING INTEREST RATES IN JUNE 1999 TO FORESTALL INFLATIONARY PRESSURES, CONCERN

mounted that monetary policy moves might slow the pace of economic growth, undoing the employment gains minorities and other disadvantaged groups made during the 1990s. Implicit in such concern is the idea that these groups will be disproportionately affected by an economic slowdown. Although it is widely believed that tighter monetary policy leads to slower economic growth and higher unemployment rates in the short to medium run, it has not been established that the effects of monetary policy differ across racial groups or that changes in monetary policy have a larger effect on the black unemployment rate than do changes in inflation or other macroeconomic fluctuations.

Previous research suggests that monetary policy changes may have different effects on blacks than on whites. One study found that increases in the money supply during the period from 1974 to 1987 led to larger declines in the unemployment rate of white males than of black males and concluded that monetary policy actions have results that tend to favor white men (Abell 1991). However, the study

also concluded that the effects of monetary policy on black women appear similar to the effects on white men, perhaps because of educational gains by black women. Another study found that the U.S. Federal Reserve's conduct of monetary policy during the 1970s—a period when the Fed focused on slowing the growth rate of the money supply in order to reduce inflation—significantly widened the gap between the unemployment rates of blacks and whites (Hull 1983).

This article assesses whether monetary policy shifts have different effects on the black unemployment rate than on the overall unemployment rate. The focus is on the unemployment rate among African Americans because this minority group tends to have relatively high unemployment rates. Most of the analysis that follows compares the black unemployment rate to the overall unemployment rate instead of to the white unemployment rate because the overall unemployment rate captures labor market conditions for the entire labor force. In addition, because whites make up about 85 percent

of the total labor force, movements in the white and overall unemployment rates tend to mirror each other. The monetary policy shifts examined are “exogenous” monetary policy moves, or changes in the federal funds rate not accounted for by movements in other macroeconomic series. This crucial distinction between any change in monetary policy and an exogenous change is explained further below.

This article also examines the effects of exogenous changes in inflation, output, and other macroeconomic factors on the overall and black unemployment rates. Using econometric techniques, structural relationships between the black and overall unemployment rates and changes in various macroeconomic factors, including monetary policy, are estimated during the period from 1972 to 1999. The analysis then focuses on the effect of monetary policy on unemployment rates during the 1980s and 1990s.

The next section briefly explores the trends in the black and overall unemployment rates. A discussion of how the Federal Reserve conducts monetary policy and why its actions may affect unemployment rates follows. The econometric model used to estimate the relationship between unemployment rates, monetary policy, economic growth, and other variables is then detailed, and the results are discussed.

Results from the econometric model used in this analysis suggest that exogenous changes in monetary policy have different effects on the unemployment rate among blacks than on the overall unemployment rate. The black unemployment rate tends to be more sensitive to cyclical fluctuations and slightly more responsive to exogenous monetary policy moves than the overall unemployment rate is. However, the examination of the effect of exogenous monetary policy shifts during the 1980s and 1990s indicates that exogenous monetary policy moves caused the black unemployment rate to increase by no more than the same percentage as the overall unemployment rate during the recessions in the early part of the two decades and caused black unemployment to fall relatively more than the overall unemployment during the late 1990s. In other words, the results do not indicate that the unpredictable component of monetary policy had significantly more adverse effects on blacks during the 1980s and 1990s than on the total population and may even have had positive net effects on blacks.

### Trends in Unemployment Rates

It is well known that the unemployment rate, or the ratio of unemployed, active job seekers to employed plus unemployed persons, is higher

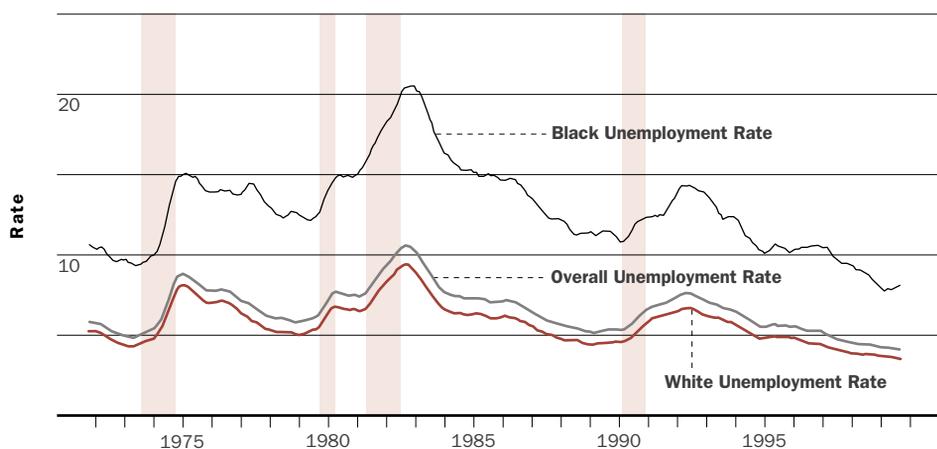
for blacks than for whites. Chart 1 shows the unemployment rates for blacks, whites, and the total labor force aged sixteen and older during the period from 1972 to 1999. The ratio of blacks actively seeking jobs to the black labor force is clearly well above the comparable ratios for whites and the overall labor force during the entire period. The declines in the black unemployment rate during the 1980s and 1990s expansions appear steeper than the drops in the other unemployment rates, suggesting that the racial unemployment gap may have narrowed during those periods.

Another stylized fact is that the unemployment rate of blacks is more cyclical than the unemployment rate of whites. During the 1981–82 recession, for example, the black unemployment rate rose by more than 5 percentage points, and the white unemployment rate rose by slightly less than 3 percentage points. As economist Alan Blinder (1987) put it, when the economy catches a cold, blacks get pneumonia. Chart 2 displays the difference between the black unemployment rate and the white and overall unemployment rates in percentage points. As the chart indicates, the difference between the black and white or overall unemployment rates tends to expand during recessions and narrow during expansions. This cyclical pattern is particularly clear during the recessions in the early 1980s, when the differences between the black and other unemployment rates rose sharply.

Potential reasons for these differences in unemployment rates across racial groups include differences in average educational attainment and experience as well as discrimination against minorities. Blacks tend to have fewer years of completed education, on average, than whites, and less-educated workers tend to have higher and more cyclical unemployment rates than more-educated workers do (Hoynes 2000; Stratton 1993; Thurow 1965). Similarly, the number of average total years of work experience and tenure at a given employer is lower among blacks than among whites, and unemployment rates are higher and vary more over the business cycle for less-experienced workers.

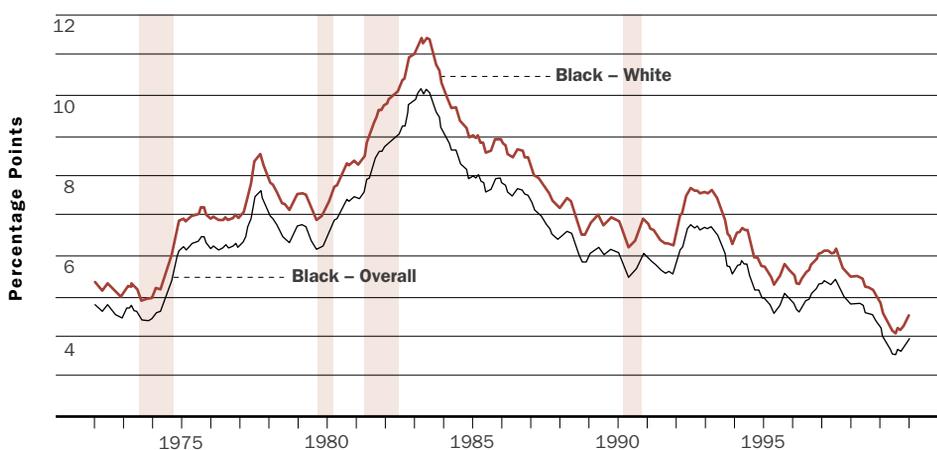
Blacks are both more likely to be laid off and to experience longer periods of joblessness after being laid off than whites (Kletzer 1991; Moore 1992). These differences tend to hold at all points in the business cycle but become exacerbated during recessions. An analysis of employment data from large corporations by the *Wall Street Journal* concluded that employment of blacks fell during the 1990–91 recession while whites, Asians, and Hispanics made employment gains at large companies during the same period (Sharpe 1993). The U.S. General Accounting

**CHART 1 Unemployment Rates by Race, 1972-99**



Note: Shown are six-month moving averages of unemployment rates for ages sixteen and older. Shaded areas indicate recessions.  
Source: Authors' calculations based on data from the U.S. Bureau of Labor Statistics

**CHART 2 Difference between Black and Overall or White Unemployment Rates, 1972-99**



Note: Shown are six-month moving averages of the difference in the unemployment rates for ages sixteen and older. Shaded areas indicate recessions.  
Source: Authors' calculations based on data from the U.S. Bureau of Labor Statistics

Office (1994) similarly found that blacks were significantly more likely than whites to lose their jobs during the last recession, and blacks also were unemployed longer, on average, than workers in other racial and ethnic groups. These two studies suggested that such differences are not entirely explained by observable characteristics, such as education, but may be partially attributable to discrimination. Analyses of racial differences in male unemployment rates have found similar results (Abowd and Killingsworth 1984; Stratton 1993).

The greater cyclical responsiveness of black unemployment rates prompts concern that monetary

policy actions aimed at quelling inflationary pressures may have more adverse short-run effects among blacks than among other racial and ethnic groups. This analysis therefore examines whether the black unemployment rate responds differently than the overall unemployment rate does when output, inflation, or other macroeconomic factors, including monetary policy, change. The discussion does not focus on reasons for the racial unemployment gap but rather investigates whether the gap fluctuates over the business cycle and the contribution of monetary policy to any such fluctuations.

## Conduct of Monetary Policy

The Federal Open Market Committee (FOMC) has several tools it can use to influence general economic conditions that may affect unemployment rates. These tools include the discount rate (the interest rate at which banks can borrow funds from the Federal Reserve), reserve requirements (which specify what proportion of deposits banks can loan out), and the federal funds target rate. Banks can loan out excess reserves (reserves in excess of reserve requirements) to other banks in the federal funds market. The federal funds target is the equilibrium interest rate in this market desired by the Federal Reserve, and the Federal Reserve Bank of New York conducts open market operations (the buying and selling of securities) to help ensure that this target is met.

Changes in any of these tools have myriad effects on the economy, but the effects are diffuse and can occur with a substantial lag. Changes in the discount rate, the federal funds target, or reserve requirements are believed to first affect short-term and long-term interest rates and then affect the amount of money in circulation, measured by M1 and M2. Effects on aggregate output, as measured by the value of gross domestic product (GDP), usually become observable within about six months of a policy change, and the impact on inflation is generally believed to begin appearing about one year after a policy move. Effects on unemployment rates occur at about the same time as effects on GDP but tend to be more muted than GDP responses. Many economists believe that any effects of monetary policy on output and unemployment are transitory, whereas effects on inflation may persist. Some industries will be affected fairly quickly by policy moves, such as the interest rate-sensitive construction and manufacturing industries, while the service and government sectors may remain relatively unaffected until the general level of economic activity changes.

The unemployment rates of blacks and whites may be affected differently by changes in monetary policy for several reasons. First, differences in the industry mix of employment may lead to a differential impact. Blacks are less likely to be employed in goods-producing industries than whites and are more likely to work in the government sector, potentially making blacks less exposed to interest rates changes.<sup>1</sup> However, the lower average level of tenure among blacks makes them more vulnerable to losing their jobs when the economy slows if employers follow a “last hired, first fired” policy.<sup>2</sup> As discussed above, the lower average educational

attainment of blacks may also make them more vulnerable to economic downturns if employers lay off less-skilled workers before more-skilled workers.<sup>3</sup>

A primary goal of the FOMC is price stability, which is generally believed to be necessary for maximum sustainable economic growth. The FOMC does not use monetary policy to attempt to influence race-specific unemployment rates. As FOMC Vice Chairman Roger Ferguson (2000) said, monetary policy is a blunt tool that cannot be calibrated to exempt a particular segment of the economy, such as the minority labor force.

## Methods

This analysis uses Bayesian vector autoregressions (VARs) to examine the relationships between race-specific unemployment rates, monetary policy, and other economic variables. VARs are an econometric technique useful for estimating how variables respond to changes in other variables. The results of a VAR can be used to predict how a given variable, such as the unemployment rate, will change over time in response to a change in another variable, such as the federal funds rate target. In a typical VAR model that includes several variables, the value of each variable is regressed on previous values of that variable and several other variables. The econometrician must decide which variables to include in each equation and how many lags of each variable to incorporate.

Identifying the relationship between variables in a VAR requires assuming that some variables do not help predict future values of other variables. For example, the unemployment rate of blacks might reasonably be believed to not affect the federal funds rate target set by the FOMC because the FOMC does not determine monetary policy based on race-specific unemployment rates. Granger causality tests are an econometric technique that can be used to test whether a particular variable helps forecast, or “Granger causes,” another variable. If a variable does not help predict another variable, the latter variable is said to be exogenous with respect to the first variable. In the model developed here, the federal funds rate and the other macroeconomic variables are exogenous with respect to the black unemployment rate.

The VAR model estimated here involves seven equations and is based on the dynamic multivariate framework developed by Leeper and Zha (1999). The model includes six variables that are frequently included in VAR systems used to model macroeconomic fluctuations: a commodity price index ( $P_{com}$ ), M2 ( $M$ ), the federal funds rate ( $R$ ), real (inflation-adjusted) GDP ( $y$ ), the consumer price index ( $P$ ),

and the overall unemployment rate ( $U$ ).<sup>4</sup> Because this analysis also focuses on racial differences in unemployment rates, the model also includes the black unemployment rate ( $U_b$ ). The model can be represented by the following equations, which are explained below:

$$P_{com} = \alpha_1 M + \alpha_2 R + \alpha_3 y + \alpha_4 P + \alpha_5 U + \alpha_6 \mathbf{X} + e_1, \quad (1)$$

$$M = \beta_1 R + \beta_2 y + \beta_3 P + \beta_4 \mathbf{X} + \varepsilon_2, \quad (2)$$

$$R = \gamma_1 M + \gamma_2 \mathbf{X} + \varepsilon_3, \quad (3)$$

$$y = \delta_1 P + \delta_2 U + \delta_3 \mathbf{X} + \varepsilon_4, \quad (4)$$

$$P = \phi_1 U + \phi_2 \mathbf{X} + \varepsilon_5, \quad (5)$$

$$U = \chi_1 \mathbf{X} + \varepsilon_6, \quad (6)$$

and

$$U_b = \varphi_1 y + \varphi_2 P + \varphi_3 U + \varphi_4 \mathbf{X} + \varphi_5 \mathbf{Z} + \varepsilon_7, \quad (7)$$

where the vector  $\mathbf{X}$  is a set of lagged variables of  $P_{com}$ ,  $M$ ,  $R$ ,  $y$ ,  $P$ , and  $U$ , and the vector  $\mathbf{Z}$  includes lags of  $U_b$ . The variable  $\varepsilon_i$  represents exogenous disturbances in equation ( $i$ ), where  $i = 1, \dots, 7$ ; these disturbances are random noise.

Estimating this system of equations yields the vectors of coefficients  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\phi$ ,  $\chi$ , and  $\varphi$ , which describe how the variables respond when another variable changes. Many of these coefficients have economic interpretations. For example,  $\beta_1$  in equation (2) represents the interest elasticity of money demand, and  $\gamma_1$  is the money elasticity of monetary policy as set via the federal funds rate.<sup>5</sup>

Each equation in the system is based on fundamental economic relationships, which Leeper and Zha (forthcoming) explore in greater detail. These fundamental relationships determine which variables

are included and which are excluded in each equation. Equation (1) posits that the commodity price index is a function of M2, the federal funds rate, real GDP, the consumer price index (CPI), the overall unemployment rate, and lagged values of all of the variables except the black unemployment rate. Equation (2) is a standard money demand equation in which the demand for money depends on output and the interest rate; the equation is estimated in nominal rather than real terms, as represented by the inclusion of the CPI on the right-hand side. Equation (3) describes monetary policy as conducted using the federal funds rate; the contemporaneous CPI and real GDP are excluded from this equation because the FOMC learns the values of these variables with a lag.

Equations (4) through (6) describe the production sector, which is composed of real output, prices, and the overall unemployment rate. Because firms need time to change production and investment, the production sector responds sluggishly to changes in financial factors, represented here by  $M$ ,  $P_{com}$ , and  $R$ . Contemporaneous values of money, commodities prices, and the federal funds rate are therefore excluded from equations (4) through (6). These three equations are also ordered recursively, with contemporaneous values of  $P$  and  $U$  affecting  $y$ , contemporaneous values of  $U$  affecting  $P$ , and only lagged values of variables affecting  $U$ .

Equation (7) models the black unemployment rate,  $U_b$ . The black unemployment rate is a function of its own previous values ( $\mathbf{Z}$ ) and also depends on current real output, prices, and the overall unemployment rate as well as lagged values of all other variables. One of the exclusion restrictions imposed on the system is that the black unemployment rate does not affect the other variables in the model; note that the variables  $U_b$  and  $\mathbf{Z}$  do not appear in equations (1) through (6). The black unemployment rate is mechanically related to the overall unemployment rate, but changes in the black unemployment

1. In 1999, about 32 percent of whites were employed in mining, construction, manufacturing, transportation, or public utilities, compared with 28 percent of blacks. Almost 7 percent of blacks were employed in government, compared with 4 percent of whites (U.S. Bureau of Labor Statistics 2000).
2. In February 1998, 57.4 percent of blacks had worked for their current employer for less than five years, compared with 56 percent of whites (U.S. Bureau of Labor Statistics 1998).
3. As of March 1998, about 16 percent of whites aged twenty-five and older had not completed high school, compared to 24 percent of blacks. About 25 percent of whites had a bachelor's degree, compared with about 15 percent of blacks (U.S. Bureau of the Census 1998a). An increase in average educational attainment of blacks over the past few decades has narrowed the racial gap; in 1962, more than 75 percent of blacks had not completed high school and only 4 percent had finished college, compared with 51 percent and 10 percent of whites, respectively (U.S. Bureau of the Census 1998b).
4. All variables except the federal funds rate and the unemployment rates are in logs.
5. The relationship between the interest rate and money in equation (3) is a quasi elasticity, instead of an elasticity, because the federal funds rate is in levels, not logs. The coefficient on the M2 variable captures the elasticity as a percentage point change instead of the traditional percentage change.

rate should not cause changes in the overall unemployment rate. These assumptions were strongly supported by Granger causality tests.

The Bayesian econometric method detailed by Sims and Zha (1998) was used to estimate the system of equations with monthly data from January 1972 to December 1999 (The box on page 15 gives the data sources). The Bayesian method imposes two types of priors (or initial assumptions). The first prior is designed to dampen the influence of distant lags; using this prior means that more recent data effectively “matter more” than older data. The second prior is used to induce similar long-run trends in the variables. Using these priors does not influence the nature of the results, as demonstrated by Robertson and Tallman (2000). Rather, the purpose of the prior is to improve the forecast performance of the model. These issues are discussed further by Sims and Zha (1998) and Robertson and Tallman (1999).

### Structural Relationships

The Bayesian VAR model explained above is used to address how exogenous changes in monetary policy and in the other variables in the model affect the black and overall unemployment rates. These exogenous changes are movements in each of the variables not explained by movements in the other variables in the model. For example, the FOMC may change the federal funds rate in response to a change in commodity prices; such a movement is not exogenous but is an endogenous response to a fluctuation in another variable. An exogenous movement in the federal funds rate occurs when the FOMC decides to tighten or loosen policy more or less than the change predicted by movement in the other variables, based on average comovements between variables during the period from 1972 to 1999. Exogenous movements in variables are “shocks” or unpredictable movements. The  $\epsilon$  terms in equations (1) through (7) represent these shocks, which are the focus of this analysis. This analysis considers the error term in equation (3), the federal funds rate equation, to be exogenous monetary policy shifts. These shifts cannot be predicted by movements in the variables in the model.

This analysis examines shocks that are one standard deviation of the average unpredictable monthly change from 1972 to 1999 for each series. These shocks illustrate the effect of the “typical” adverse shock experienced in each series during this period. The magnitudes of the shocks in this analysis are as follows: a 2.0 percent increase in the commodity prices index; a 43 basis point increase in the federal funds rate; a 0.13 percent increase in money demand as measured by M2; a 0.41 percent decrease in real GDP; a

0.20 percentage point increase in the CPI; and a 0.15 percentage point increase in the overall unemployment rate. The effects are symmetric, so the effect of a favorable shock in each series is the exact opposite of the unfavorable shocks discussed next.<sup>6</sup>

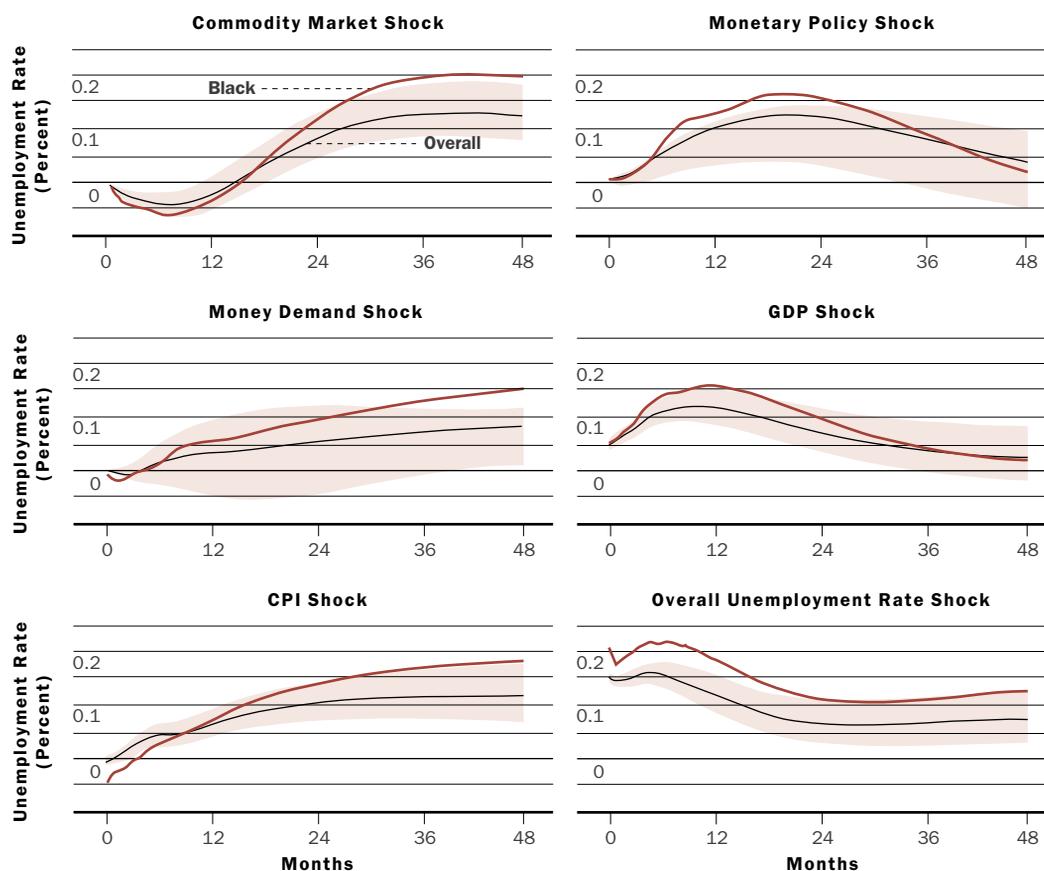
Chart 3 plots the dynamic responses of the overall unemployment rate and the black unemployment rate to various macroeconomic shocks over a forty-eight-month forecast horizon. The figures describe the underlying structural relationships in the data, as estimated by the model. Two-thirds probability bands (shaded) are attached to the overall unemployment rate. These error bands suggest whether movements in the overall and black unemployment rates are significantly different; if the black unemployment rate falls within the error bands on the overall unemployment rate, the probability that the movement in the black unemployment rate is not different from the movement in the overall unemployment rate is about 68 percent.<sup>7</sup> The vertical scale in the figures in Chart 3 is the percentage point change in the unemployment rates.

The black and overall unemployment rates generally have similar dynamic responses, but the movements in the black unemployment rate tend to be larger in absolute terms. For example, both the black and overall unemployment rates first fall and then rise when an exogenous upward movement in commodity prices occurs. The black unemployment rate appears to have a significantly larger response than the overall unemployment rate to shocks in commodity prices after about thirty months, and the difference between the changes in the two series plateaus at about 0.75 percentage points.

The responses of the overall and black unemployment rates to shocks in monetary policy and output differ slightly in the middle of the forecast horizon. In the first few months after a monetary policy or output shock, the black unemployment rate is virtually unaffected both relative to its initial level and relative to the overall unemployment rate. The black unemployment rate begins to rise significantly more than the overall rate about six months after an exogenous upward movement in the federal funds rate or an exogenous downward movement in GDP growth, and the differences in the changes remain significant for several months.

Although these differences are statistically significant, they are not large in magnitude. The peak difference between the changes in the black and overall unemployment rates in response to a monetary policy shock is less than 0.05 percentage points, and the difference is similar with regard to shocks to GDP growth. Given that the black unemployment rate is about twice the overall unemploy-

### CHART 3 Dynamic Responses of Unemployment Rates across Racial Groups to Different Structural Shocks



Note: The shaded areas are the two-thirds probability bands associated with the response of the overall unemployment rate.

Source: Authors' calculations

ment rate during much of the period from 1972 to 1999, the movement in the black unemployment rate is actually smaller relative to the underlying values of the series than the movement in the overall unemployment rate is.

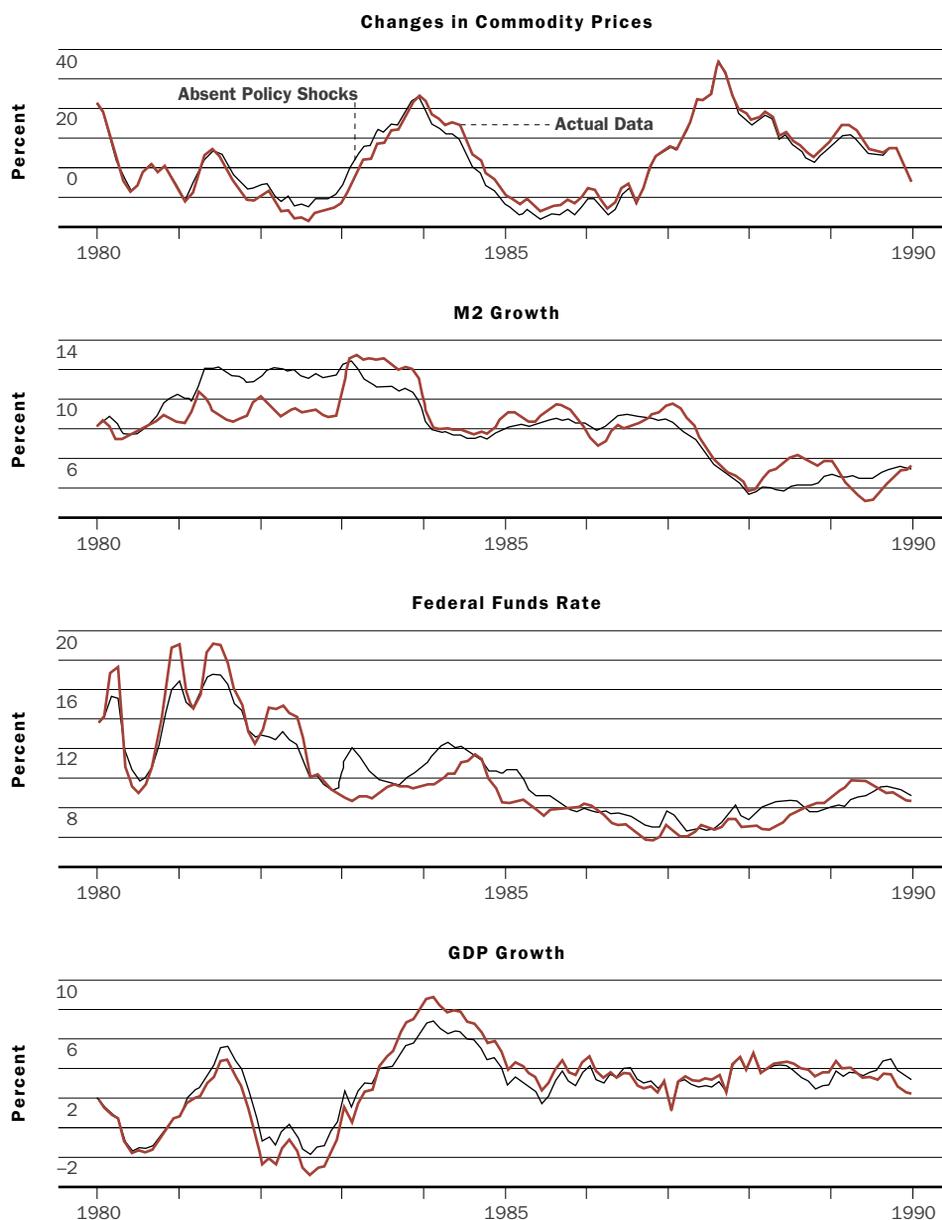
The responses of the overall and black unemployment rates to shocks in the overall unemployment rate are also statistically different at the beginning of the forecast horizon. The results shown in Chart 3 indicate that the black unemployment rate will increase by about 0.2 percentage points if there is a 0.15 percentage point exogenous increase in the overall unemployment rate, and the difference per-

sists for about two years. Combined with the slightly larger responsiveness of black unemployment rate to fluctuations in GDP output, this result supports the perception that the black unemployment rate is more cyclically sensitive than the overall unemployment rate. Shocks in the overall unemployment rate clearly lead to larger responses by both the black and overall unemployment rates than do the other variables, particularly in the near term.

The black unemployment rate also responds differently than the overall unemployment rate to shocks in money demand and inflation, but the differences do not become significant until about thirty months

6. The effects of favorable shocks would be a mirror image around 0 on the vertical axis in each plot in Chart 3.
7. This analysis implicitly views the response of the black unemployment rate given and compares it with the uncertain response of the overall unemployment rate. Alternatively, one could attach error bands to the movement in the black unemployment rate and compare the movement in the overall unemployment rate with those error bands, or one could take into account the uncertainty associated with both series. Because the forecast errors for the black unemployment rate are larger than those for the overall unemployment rate, the comparable error bands on the black unemployment rate are larger than those shown here for the overall unemployment rate.

## CHART 4 Macroeconomic Movements in the 1980s versus Movements Absent Exogenous Monetary Policy Shifts

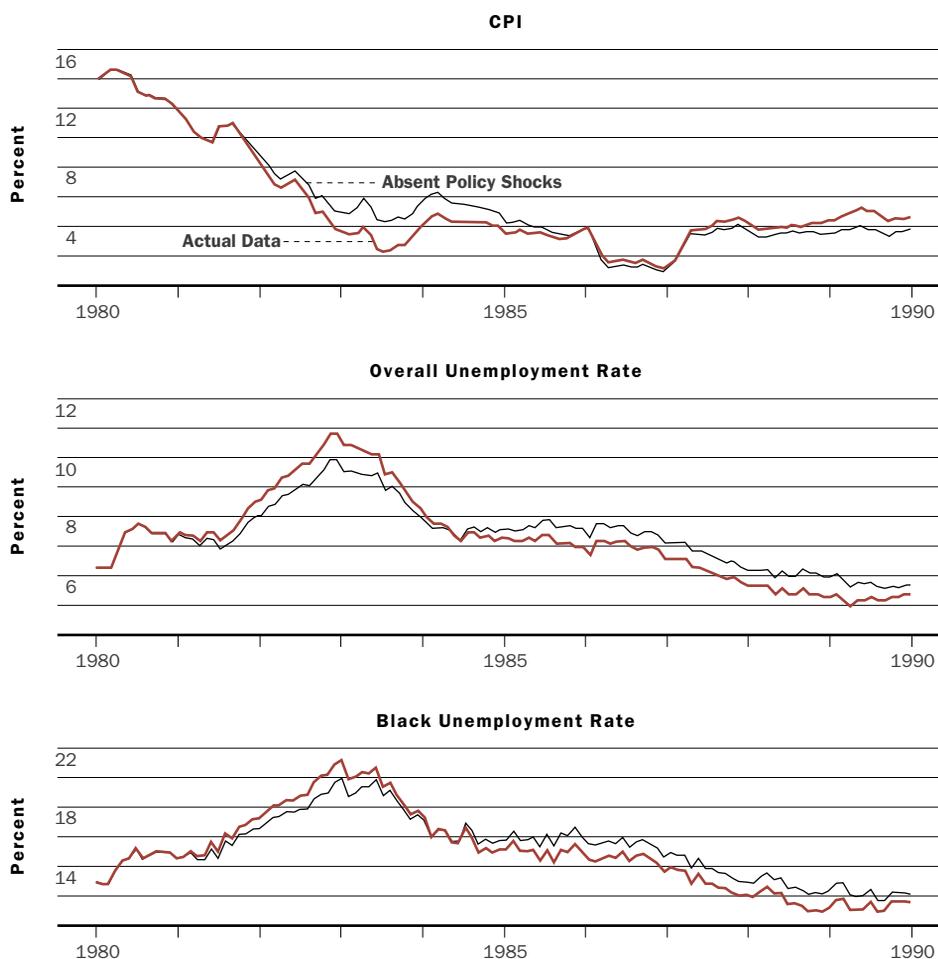


after the shocks have occurred. The differential effects of shocks in money demand and inflation appear to persist in the long run but are again fairly small in magnitude relative to the underlying values of the series; for example, the difference between the responses of the black and overall unemployment rates to a money demand shock after three years is only about 0.75 percentage points.

These structural relationships indicate some differences in the responses of black and overall unemployment rates to exogenous monetary policy and

other macroeconomic fluctuations. The timing and persistence of the differences vary across the shocks, but all of the differences are quite trivial when compared with the underlying values of the series. Using the structural relationships between the unemployment rates and shocks in monetary policy and other macroeconomic variables during the period from 1972 to 1999 generated by the model, the next sections examine the net effect of the implementation of monetary policy during the 1980s and 1990s on the overall and black unemployment rates.

## CHART 4 (Continued)



Source: Authors' calculations

### Monetary Policy during the 1980s

At the beginning of the 1980s, the FOMC was engaged in a battle against inflation that resulted in a double-digit federal funds rate. At the same time, output growth was sluggish as the economy struggled out of the 1979–80 recession before entering the 1981–82 recession. In the early 1980s, both the black and overall unemployment rates were high relative to the 1970s. However, it is not clear whether exogenous movements in monetary policy—movements that were not in response to movements in inflation, output growth, or other macroeconomic factors—caused these movements in the black and overall unemployment rates.

The structural relationships from the VAR model are used to examine what the black and overall

unemployment rates and the other variables in the model would have been during the 1980s absent exogenous movements in monetary policy. In Chart 4, the thinner lines give the forecast generated by the model for each variable if there had been no exogenous monetary policy changes, and the thicker lines are the realized values of the series, including any effects of monetary policy shocks.<sup>8</sup> The difference between the two lines represents the effects of exogenous policy shifts during the 1980s.

The figure for the federal funds rate in Chart 4 indicates that monetary policy was relatively tight during the period from 1980 to 1983 and then was loose for most of the remainder of the decade. When the actual federal funds rate was above the value predicted by the model, as in 1980–83, monetary

8. It should be noted that Charts 4–9 use the maximum likelihood estimates of the parameters; error bands for the “absent policy shocks” series in the charts are not shown. Small differences between the two lines in each figure in Chart 4 and Chart 7 (and small differences between the lines and 0 in Charts 5, 6, 8, and 9) should not be regarded as statistically significant differences.

policy was tight. Although the FOMC raised the funds rate target several times during the period from 1983 to 1985 in response to macroeconomic trends, the increases were smaller than those predicted by the model, indicating that policy was relatively loose, and policy remained slightly below the forecast for most of the period from 1985 to 1990.

The relatively tight monetary policy during the first part of the 1980s manifested itself in lower money growth, slower output growth, and lower inflation than would otherwise have been the case. As the panel for GDP growth in Chart 4 indicates, for example, the increases in the federal funds rate caused the 1982–83 recession to have been deeper than it otherwise would have been. Correspondingly, inflation in the early 1980s was lower than the forecast generated by the model.

The efforts of the FOMC to deal during the early 1980s with the high inflation of the late 1970s caused the overall and black unemployment rates to be higher than they otherwise would have been. The unemployment rates still would have been high absent exogenous monetary policy moves designed to reduce inflation, but the actions of the FOMC led to further increases in unemployment rates. Chart 5 shows the difference between the forecast and actual data for the two unemployment series; this chart displays the difference between the lines in Chart 4. In 1983, for example, the overall unemployment rate would have been almost 1 percentage point lower absent exogenous changes in monetary policy, and the black unemployment rate would have been slightly more than 1 percentage point lower. During the second half

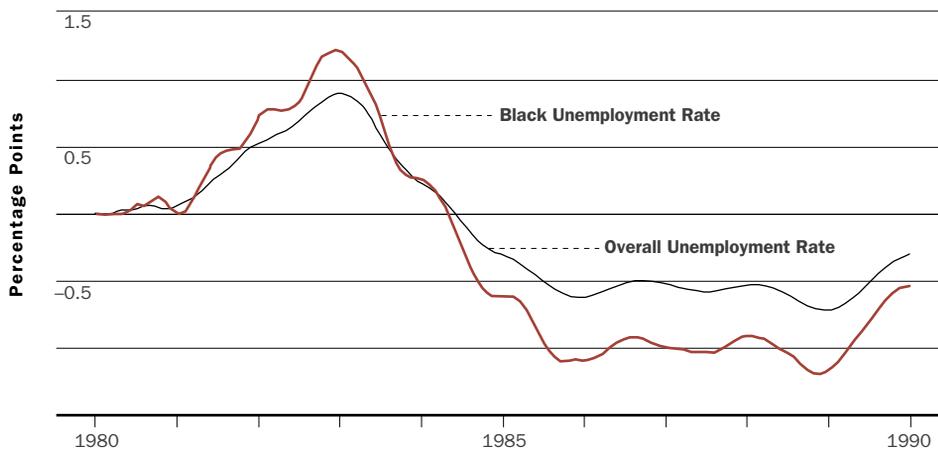
of the 1980s, however, exogenous monetary policy shocks caused the unemployment rates to be considerably lower than they otherwise would have been. In 1989, for example, monetary policy resulted in the overall unemployment rate's being almost 0.7 percentage points below its forecast value, and more than 1 percentage point lower for the black unemployment rate.

Comparing the lines in Chart 5 suggests that exogenous changes in monetary policy had slightly more adverse effects among blacks than among the total labor force during the early part of the 1980s and substantially more beneficial effects later in the decade. The increases in the black unemployment rate are slightly larger in magnitude than the increases in the overall unemployment rate, and the declines are also larger.

Another way to view these effects, however, is relative to the actual values of the series. Because the black unemployment rate is always substantially higher than the overall unemployment rate for reasons unrelated to monetary policy, a larger percentage point movement in the black unemployment rate than in the overall unemployment may not be larger as a fraction of the underlying values of the series. Chart 6 therefore shows the percentage difference between the actual unemployment rates and the forecast values absent monetary policy shocks relative to the actual values of the series.

Chart 6 suggests that the adverse effects of monetary policy shocks during the 1980s were slightly smaller for blacks than for the total labor force. The magnitude of the relative movement of the black unemployment rate is dampened compared with the

**CHART 5**  
**Changes in Unemployment Rates Attributable to Exogenous Monetary Policy Shifts in the 1980s**



Note: Data show the difference between actual and forecast paths.

Source: Authors' calculations

movement of the overall unemployment rate during the period from 1980 to 1985. In the second half of the decade, the beneficial effects of exogenous shifts in monetary policy were slightly smaller for blacks than for the total labor force. Comparing the two figures, the overall unemployment rate was over 12 percent lower than it otherwise would have been in 1989, compared with a 10 percent decline in the black unemployment rate. Monetary policy shocks therefore do not appear to have had more adverse effects among blacks than among the labor force as a whole during the 1980s and were perhaps slightly less advantageous for blacks during the expansion.

### Monetary Policy during the 1990s

The U.S. economy entered a recession in August 1990 that prompted the FOMC to lower the federal funds rate by more than 500 basis points between 1990 and 1993. The economy emerged from the recession in March 1991 and began a period of sluggish growth that slowly accelerated, leading to increases in the federal funds rate in 1994. As the expansion continued through the decade, both the overall and black unemployment rates fell dramatically, as noted earlier.

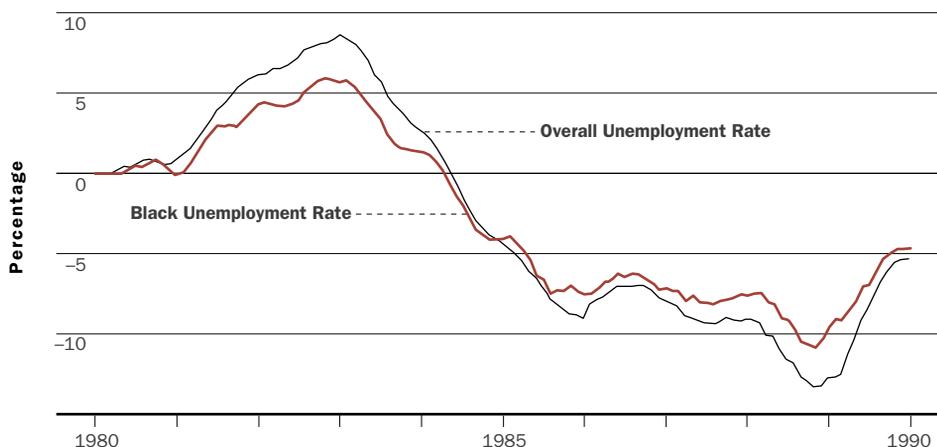
Monetary policy was relatively tight from 1990 to 1993 and then was loose for the remainder of the decade. As the monetary policy panel in Chart 7 indicates, the actual federal funds rate target was above the value predicted by the model early in the decade and then well below the forecast later in the 1990s. Tight monetary policy led to lower rates of money growth than otherwise would have occurred from 1990 to 1995, as the M2 figure in Chart 7 indicates.

The shocks in monetary policy affected GDP growth and inflation in the expected manner. Real output growth was below the forecast during the early 1990s, reflecting the impact of tight monetary policy. GDP growth tended to be slightly above the forecast after 1996, reflecting the relatively loose stance of monetary policy during this period. The effect of tight monetary policy on inflation early in the decade is apparent during 1992–98, when CPI inflation was considerably lower than forecast absent exogenous policy moves. In other words, exogenous monetary policy moves in the early 1990s led to inflation that was lower than it otherwise would have been during most of the 1990s, but the effect gradually peters out.

Exogenous movements in monetary policy also affected unemployment rates. The contractionary effect of the tight monetary policy during the beginning of the 1990s manifested itself in higher overall and black unemployment rates for much of the first half of the decade. However, the looser policy enabled by the early tightening led to a decline in the unemployment rate series in the late 1990s relative to the predicted values.

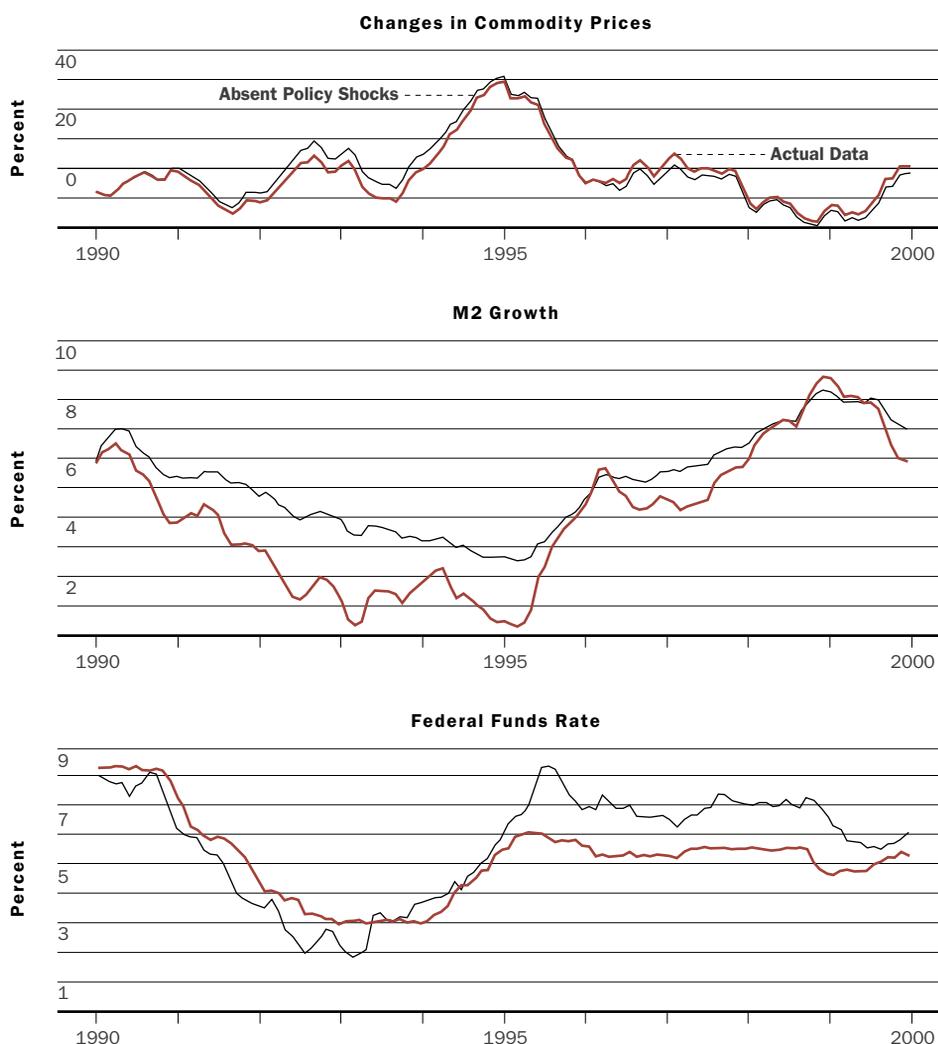
Chart 8 shows the difference between the actual and forecast paths for the two unemployment rates in levels. During the 1990s, the effect of exogenous monetary policy moves was larger on the black unemployment rate than on the overall unemployment rate, and the difference was particularly large during the expansion. As in the 1980s, the adverse effects of the tight monetary policy during the early part of the 1990s were slightly larger for the black unemployment rate than for the overall unemployment

**CHART 6**  
**Percentage Changes in Unemployment Rates**  
**Attributable to Exogenous Monetary Policy Shifts in the 1980s**



Source: Authors' calculations

**CHART 7**  
**Macroeconomic Movements in the 1990s versus**  
**Movements absent Exogenous Monetary Policy Shifts**



rate. During the later part of the 1990s, exogenous monetary policy had notably more beneficial effects on black unemployment than on total unemployment. This chart again suggests that black unemployment rates are more responsive to monetary policy. Again, however, larger fluctuations in the level do not necessarily translate into higher percentage changes.

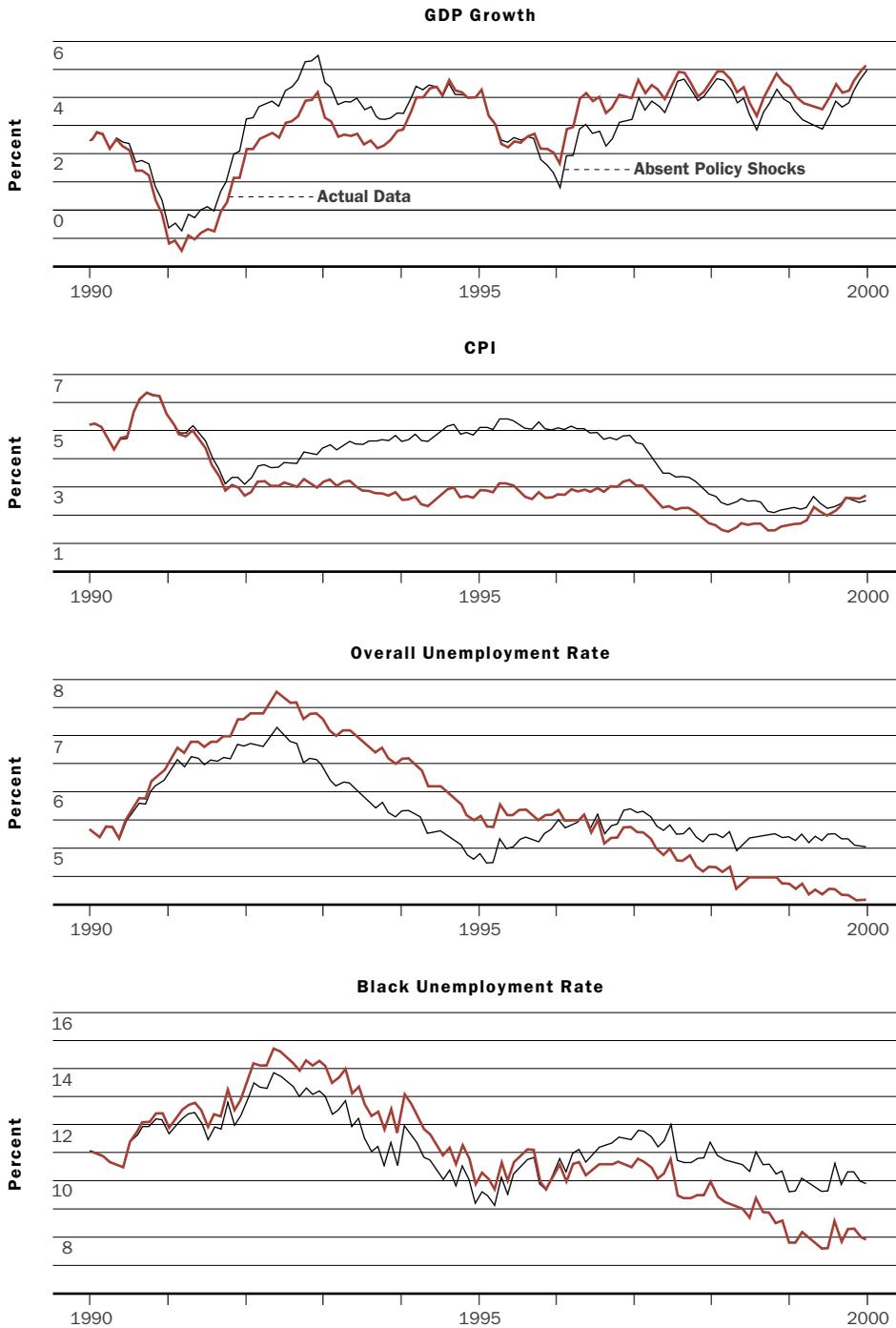
Chart 9 shows the difference between the actual and forecast paths relative to the actual value each month. The chart indicates that the tight monetary policy in the early 1990s had a smaller adverse effect on the black unemployment rate than on the overall unemployment rate relative to the values of the series. In addition, the effects of exogenous monetary policy were slightly more beneficial for blacks than for the population as a whole during the

later part of the 1990s. Monetary policy appears to have slightly mitigated the effects of the early 1990s recession on blacks. In addition, monetary policy appears to have boosted black employment during the second half of the 1990s.

**Conclusion**

**T**his analysis examines whether exogenous shifts in monetary policy have different effects on blacks than on the total labor force. The model used indicates that the black unemployment rate does respond slightly differently than the overall unemployment rate to exogenous changes in the federal funds rate and in other macroeconomic variables. Although the timing and persistence of the differences vary across variables, few of these differences are large in magnitude,

## CHART 7 (Continued)



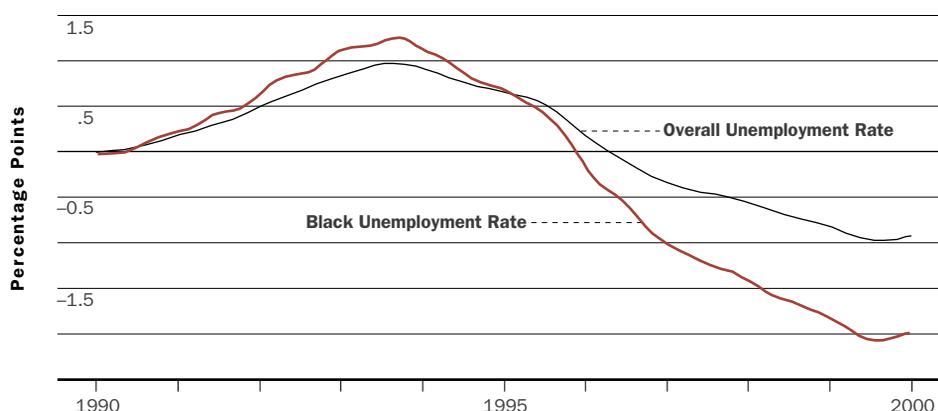
Source: Authors' calculations

particularly when viewed relative to the actual values of the two series.

The examination of the conduct of monetary policy during the 1980s and 1990s suggests that movements in monetary policy not explained by the movement of other variables in the model had larger effects on the black unemployment rate than on the

overall unemployment rate. When scaled by the actual unemployment rates, however, adverse effects on the black unemployment rate appear the same size as or smaller than those on the overall unemployment rate, and beneficial effects appear larger during the 1990s. The model used here thus suggests that the unpredictable component of monetary

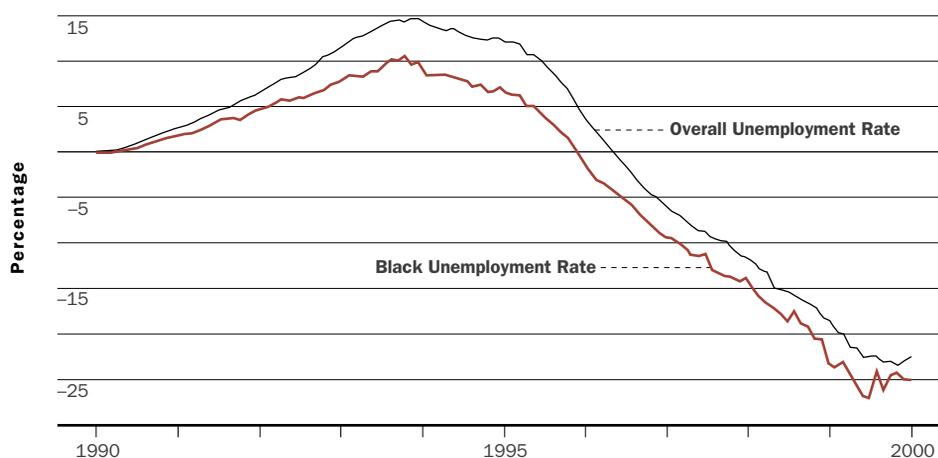
**CHART 8**  
**Changes in Unemployment Rates Attributable to Exogenous Monetary Policy Shifts in the 1990s (in Levels)**



Note: Data show the difference between actual and forecast paths.

Source: Authors' calculations

**CHART 9**  
**Percentage Changes in Unemployment Rates Attributable to Exogenous Monetary Policy Shifts in the 1990s (Relative to Actual Data)**



Note: Data show the difference between actual and forecast paths.

Source: Authors' calculations

policy in the recent past may have mitigated the effect of recessions on blacks while enlarging the effect of expansions. In addition, the pattern of responses to exogenous policy moves suggests that short-run movements in volatile unemployment rates series should not necessarily be regarded as the result of policy moves because the effects of monetary policy do not become evident for several months, during which time other events may occur.

This study does not examine why the black and overall unemployment rates respond differently to exogenous monetary policy shifts and other macroeconomic fluctuations. Any effects of monetary policy

shocks on unemployment rates are likely to be transitory, not permanent. It should also be kept in mind that exogenous monetary policy is not a primary cause of the persistent difference between black and overall unemployment rates, which is due to structural factors. The literature that compares unemployment patterns among blacks to the rest of the labor force suggests that differences in educational attainment, experience, and racial discrimination may play a role in the differences in the two series. Future research should examine further why black unemployment rates appear to show different cyclical responses than the overall unemployment rate.

## Data Description

The model uses monthly data from January 1972 to December 1999 for the following variables:

**CPI:** consumer price index for urban consumers (CPI-U), seasonally adjusted.

Source: Bureau of Labor Statistics, U.S. Department of Labor.

**Commodity prices:** spot commodity price index of raw industrials.

Source: Commodity Research Bureau.

**Federal funds rate:** effective rate, monthly average.

Source: Board of Governors of the Federal Reserve System.

**GDP:** real GDP, seasonally adjusted, billions of chained 1996 dollars. Monthly real GDP is interpolated from

quarterly data using the procedure described by Leeper, Sims, and Zha (1996).

Source: Bureau of Economic Analysis, U.S. Department of Commerce.

**M2:** M2 money stock, seasonally adjusted, billions of dollars.

Source: Board of Governors of the Federal Reserve System.

**Overall and black unemployment rates:** Civilian unemployment rates (ages sixteen and older), seasonally adjusted.

Source: Bureau of Labor Statistics, U.S. Department of Labor.

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## REFERENCES

- ABELL, J.D. 1991. "Distributional Effects of Monetary and Fiscal Policy: Impacts on Unemployment Rates Disaggregated by Race and Gender." *American Journal of Economics and Sociology* 50 (July): 269–85.
- ABOWD, JOHN M., AND MARK R. KILLINGSWORTH. 1984. "Do Minority/White Unemployment Differences Really Exist?" *Journal of Business and Economic Statistics* 2 (January): 64–72.
- BLINDER, ALAN S. 1987. *Hard Heads, Soft Hearts*. Reading, Mass.: Addison-Wesley.
- FERGUSON, ROGER W., JR. 2000. "Some Recent Findings Regarding the Economic Condition of Minority Americans." Speech presented at the Coalition of Black Investors, Washington, D.C., September 15.
- HOYNES, HILARY. 2000. "The Employment, Earnings, and Income of Less-Skilled Workers over the Business Cycle." In *Finding Jobs: Work and Welfare Reform*, edited by David E. Card and Rebecca M. Blank. New York: Russell Sage.
- HULL, EVERSON. 1983. "Money Growth and the Employment Aspirations of Black Americans." *Review of Black Political Economy* 12 (Spring): 63–74.
- KLETZER, LORI G. 1991. "Job Displacement, 1979–86: How Blacks Fared Relative to Whites." *Monthly Labor Review* 114 (July): 17–25.
- LEEPER, ERIC M., CHRISTOPHER A. SIMS, AND TAO ZHA. 1996. "What Does Monetary Policy Do?" *Brookings Papers on Economic Activity*, no. 2:1–63.
- LEEPER, ERIC M., AND TAO ZHA. 1999. "Modest Policy Interventions." Federal Reserve Bank of Atlanta Working Paper 99-22, December.
- . Forthcoming. "Assessing Simple Monetary Policy Rules: A View from a Complete Macro Model." Federal Reserve Bank of St. Louis *Review* for the 25<sup>th</sup> Annual Economic Conference in Monetary Policy in Theory and Practice.
- MOORE, THOMAS S. 1992. "Racial Differences in Post-displacement Joblessness." *Social Science Quarterly* 73 (September): 674–88.
- ROBERTSON, JOHN C., AND ELLIS W. TALLMAN. 1999. "Vector Autoregressions: Forecasting and Reality." Federal Reserve Bank of Atlanta *Economic Review* 84 (First Quarter): 4–18.
- . 2000. "Improving Federal Funds Rate Forecasts in VAR Models Used for Policy Analysis." Federal Reserve Bank of Atlanta. Photocopy.
- SHARPE, ROCHELLE. 1993. "Losing Ground: In the Last Recession, Only Blacks Suffered Net Employment Loss." *Wall Street Journal*, September 14.
- SIMS, CHRISTOPHER A., AND TAO ZHA. 1998. "Bayesian Methods in Dynamic Multivariate Models." *International Economic Review* 39 (November): 949–68.
- STRATTON, LESLIE S. 1993. "Racial Differences in Men's Unemployment." *Industrial and Labor Relations Review* 46 (April): 451–63.
- THUROW, LESTER D. 1965. "The Changing Structure of Unemployment: An Econometric Study." *Review of Economics and Statistics* 47 (May): 137–49.
- U.S. BUREAU OF THE CENSUS. 1998a. *Educational Attainment in the United States: March 1998 (Update)*. Washington, D.C.: U.S. Bureau of the Census. <<http://www.census.gov/prod/3/98pubs/p20-513.pdf>>.
- . 1998b. *Percent of People 25 Years Old and Over Who Have Completed High School or College, by Race, Hispanic Origin, and Sex: Selected Years 1940 to 1998*. Washington, D.C.: U.S. Bureau of the Census. <<http://www.census.gov/population/socdemo/education/tablea-02.txt>>.
- U.S. BUREAU OF LABOR STATISTICS. 1998. *Employee Tenure in 1998*. Washington, D.C.: U.S. Department of Labor. <<http://www.bls.gov/news.release/tenure.nws.htm>>.
- . 2000. *Employment and Earnings*. Washington, D.C.: U.S. Department of Labor.
- U.S. GENERAL ACCOUNTING OFFICE. 1994. *Equal Employment Opportunity: Displacement Rates, Unemployment Spells, and Reemployment Wages by Race*. Report HEHS-94-229FS. September.

# The Economics of Check Float

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**A**mericans commonly think of themselves as living in a technologically advanced nation. According to standard measures such as computers per capita or Internet usage, the United States ranks at or near the top of the list of developed countries. In some respects, Americans' penchant for technology carries over to the

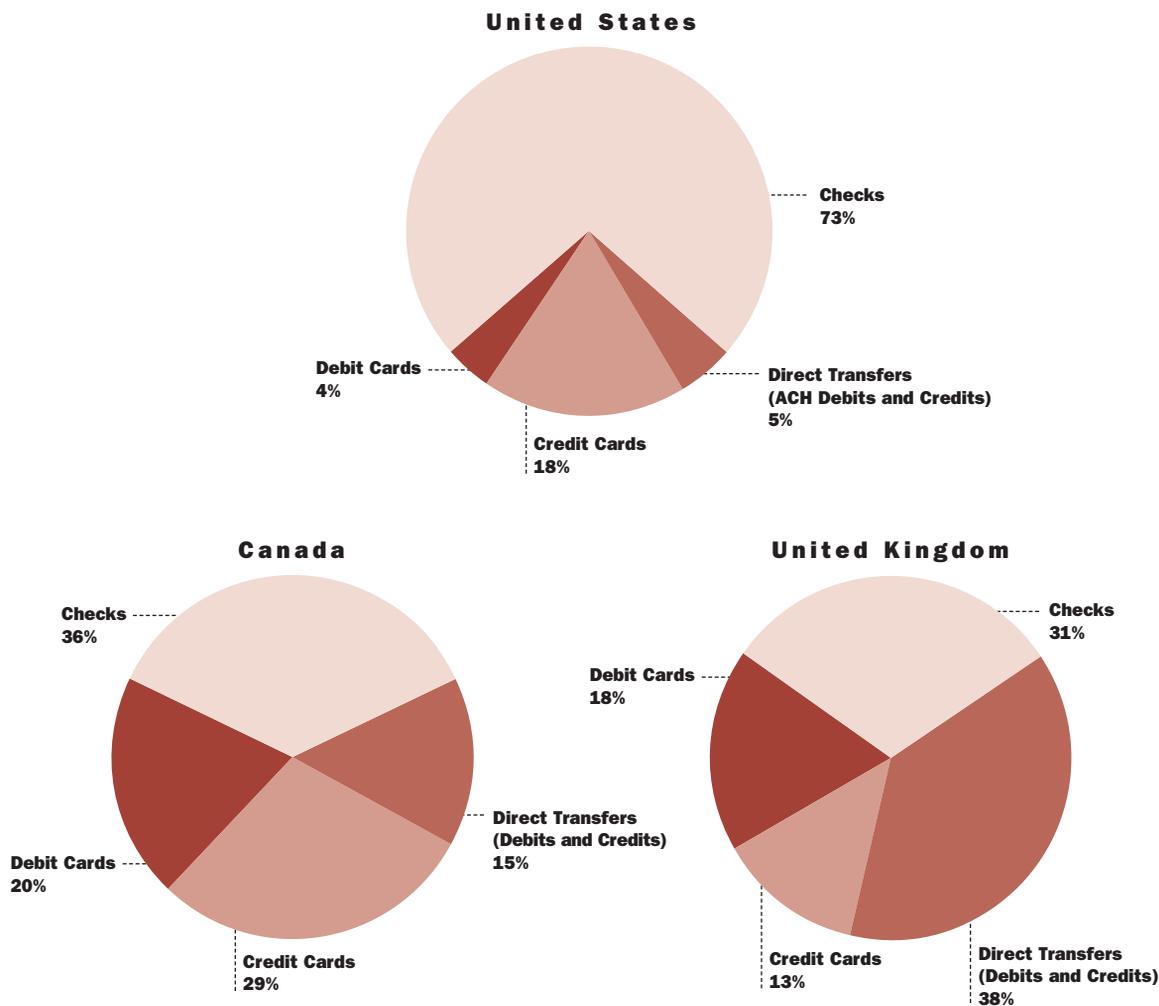
area of payments. For example, the United States ranks near the top among industrialized countries in use of debit and credit cards. What is surprising to many observers, however, is that cash and checks still dominate the overall market for retail payments.

The popularity of cash is perhaps to be expected. Despite advances in communications technology, cash remains an economical means of payment for small transactions and continues to be used widely throughout the world. Among developed countries, however, only the United States remains dependent on the use of checks. In 1997 (the last year for which statistics are available), American consumers and businesses wrote an estimated 66 billion checks. This figure amounts to roughly 250 checks per capita annually, or one check per business day per U.S. resident. The aggregate value of these checks is estimated at \$77.8 trillion, \$1,177 per check on average. And despite the rapidly expanding use of electronic payment media, the market share of checks remains quite high at 73 percent, measured as a percentage of noncash retail transaction volume.<sup>1</sup> Chart 1 shows that comparable market shares for Canada and the United Kingdom, two countries which formerly saw wide use of checks, amount to only 36 and 31 percent, respectively.<sup>2</sup>

Certainly the market for retail payments is an evolving one, and recent years have seen dramatic increases in the use of electronic modes of payment. However, the extent to which electronic forms of payment have substituted for checks is less than what is often supposed. Chart 2 plots U.S. per capita usage of checks, payment cards, and direct bank transfers over the period from 1988 to 1997. Comparable figures for Canada are also plotted. Both countries have seen strong growth in the use of noncheck forms of payment.<sup>3</sup> Growth in the use of direct transfers has been very similar in both countries while growth in the use of payment cards (particularly debit cards) has been somewhat faster in Canada than in the United States. In Canada this growth has involved extensive substitution away from check payments, so check usage per capita is actually falling. By contrast, per capita check usage in the United States has actually trended upward slightly over the same period.

The resource costs of maintaining a check-based retail payment system are considerable. Wells (1996, 5) estimates that the cost of a check payment averages about \$1.60 (in 1993 dollars) more than the cost of a payment made electronically via the Fed's

**CHART 1 Percent of Total Retail Cashless Payments**



Source: Bank for International Settlements, 1998

Automated Clearinghouse (ACH) system, when the costs to all parties are taken into account. While ACH transactions are admittedly imperfect substitutes for checks, it is instructive to contemplate the potential resource savings of moving away from the use of checks to an electronic instrument with the cost characteristics of the ACH. Multiplying the \$1.60 figure by 66 billion checks, an estimate of the savings from moving all check payments to such an electronic payment instrument would be about \$100 billion annually. Even if check usage in the United States were to fall only to the same levels as in the United Kingdom or Canada, the resulting annual savings would still be approximately \$60 billion.<sup>4</sup>

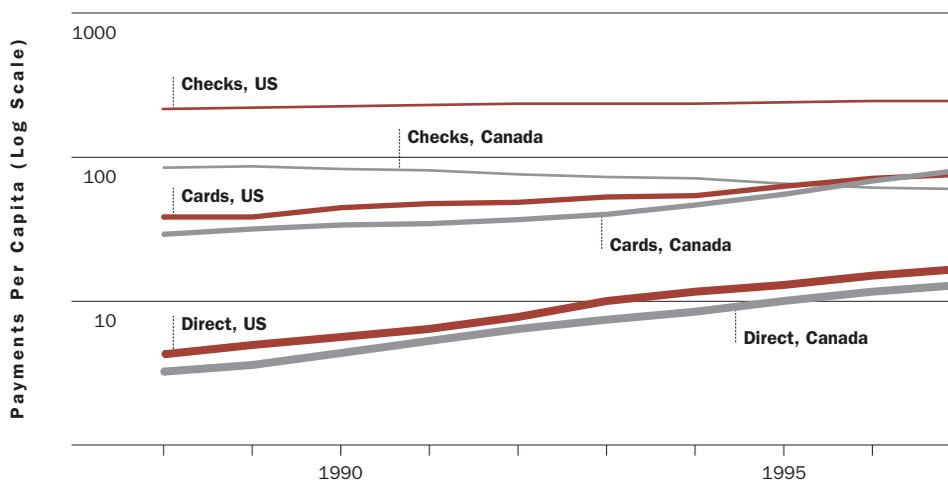
### The Check Float Hypothesis

**W**hy do Americans continue to use such an expensive means of payment? According to an influential study by Humphrey and

Berger (1990), one reason is the existence of check float. Check float can be defined as the income earned by the writer of the check between the time a check is received as payment and the time it is settled. Until the check clears and settles, the writer of the check can earn interest on the funds in the account on which the check is written. Given a large enough check amount or a long enough delay in clearing and settlement, the presence of float could lead payors to prefer checks over less costly means of payment that clear on a more timely basis. Using 1987 data, Humphrey and Berger estimate that the average amount of float earned per check more than compensates for the cost advantage of ACH.

On the basis of these results, Humphrey and Berger argue that the continued use of checks constitutes an inefficient outcome or market failure in the following sense. Other things being equal, an increase (or decrease) in settlement times means

## CHART 2 Retail Payment Usage in the United States and Canada, 1988–97



Note: Payment cards include credit and debit cards. Direct bank transfers include automated clearinghouse credit and debit transfers (United States), bill payments at ATMs (Canada), and direct debits (Canada).

Source: Bank for International Settlements (1993, 1998)

that interest income is simply transferred from a payor to a payee (or vice versa). Hence, the net or societal benefit of float is zero. On the other hand, because people expend real resources (for example, make use of checks as opposed to less costly means of payment) in order to appropriate the value of float for themselves, float can carry a societal cost. This argument was restated by Lacker (1997), who argues that the inefficiency associated with the continued use of checks results from a divergence between private and societal benefits. Under the current system for clearing and settling checks, Lacker argues, costly attempts to manipulate check clearing and settlement times may have a positive value to private parties (that is, float may accrue to payor or payee) but have essentially zero value to society as a whole.

Other reasons have been offered to explain the continued dominance of the use of checks. Mester (2000) reviews some of these other explanations. One possible reason lies in the large fixed cost necessary to implement an electronic payment instrument on a wide scale. Given the sunk costs of much of the check infrastructure, a high fixed cost for the electronic means of payment might delay its

adoption for a long time.<sup>5</sup> Another potential explanation is the presence of “network effects” in the use of different payment instruments. It may be, for example, that no other means of remote payment is as widely accepted as the check, and this convenience accounts for its continued use. A final set of reasons points to the characteristics of check payments that differentiate them from current electronic methods. These include such characteristics as flexibility of payment initiation, legal standing, user familiarity, and the automatic presence of a receipt (in the form of a canceled check). It may be that people simply prefer the bundle of characteristics offered by the check to other means of payment.

Given that there is relatively little hard data on check usage, it has been impossible to sort out the validity of the competing explanations for the continued widespread use of checks. The check float hypothesis, therefore, does not suggest that check use would fall to zero without check float but only that float continues to offer a key motive for the continued use of checks. Since the publication of Humphrey and Berger’s (1990) initial study, a number of research papers have explored the role of

1. Measured as a percentage of the value of noncash retail transactions, the market share of checks is even higher at 87 percent.
2. All figures in the paragraph above are from the Bank for International Settlements (1998, 1999).
3. See Weiner (1999) for an extensive survey of electronic payments in the United States.
4. These figures represent very approximate calculations and should be interpreted with caution. A more detailed estimate by Humphrey, Pulley, and Vesala (2000) puts the cost savings from elimination of checks at about \$91 billion.
5. Such costs are unlikely to be unique to the United States, however. The discussion below explains how the current system for check clearing within the United States lessens incentives to undertake investments in electronic payment systems.

checks in the U.S. payment system. While some of these studies disagree with Humphrey and Berger's conclusions, the issue of check float remains central to their analyses. Below, the discussion reviews a number of these studies and their treatments of the float issue, using an analytical framework developed by McAndrews and Roberds (1999). In addition, many papers have discussed proposals for accelerating the movement away from the current, primarily check-based retail payment system to a more electronics-based payment system. Some of these proposals are analyzed in the discussion below, with particular emphasis on their effects on check float.

While the framework of this discussion does not allow identification of any single "best" path to increased efficiency in the U.S. retail payment system, it does illustrate some of the trade-offs that proposals for reform must encounter.

### How Does Check Float Arise?

There are several key features of the U.S. check payment system that contribute to the cre-

ation of float. Essentially, these features define certain property rights of the people and institutions involved in the check payment process. A brief description of these will be helpful before proceeding further.

The first feature is that the check payment system is, like the U.S. banking system, highly decentralized. There are approximately 10,000 banks and savings institutions, as well as 10,000 credit unions (henceforth collectively called banks), in the United States. Thus, it is likely that if person A (let's call her Andrea, the "payor") pays person B (Bob, the "payee") by check, then Andrea will pay by a check drawn on a different bank from Bob's bank. If Andrea and Bob had accounts at the same bank, then the check could be settled as an "on-us" item. That is, the bank would simply debit Andrea's account and credit Bob's account in the amount of the check.

Since on-us checks remain the exception within the United States, the allocation of property rights within the check payment system is largely determined by the rules for interbank check settlement.<sup>6</sup> There are a number of ways in which banks can clear and settle checks among themselves. After Bob

deposits Andrea's check at his bank (bank B or the "depository bank," sometimes referred to in the literature as the collecting bank), bank B can return the check to Andrea's bank (bank A or the "paying bank") by mailing the check directly to bank A or by sending it through a third party (a private clearinghouse, a correspondent bank, or the Federal Reserve System). No matter how the check is cleared, however, in the vast majority of cases, Andrea's check has to physically return to bank A before the bank must make good on the check. This step is necessary because the body of law that provides much of the legal framework for check payments, the Uniform Commercial Code (UCC), allows a bank the right to inspect a check before paying it. This "right to physical inspection" is the second key feature of the check payment system. In practice, it means that checks must (usually) be transported to the banks on which they are drawn before they will be settled. This process, as illustrated in Chart 3, in turn means that check clearing can often be subject to travel delays.<sup>7</sup>

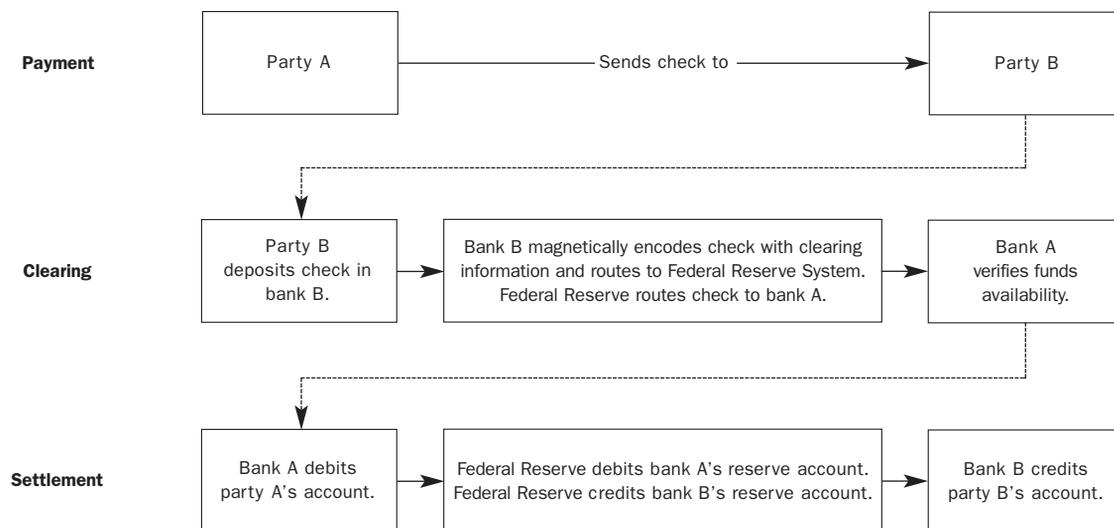
A third key feature of the check payment system is the allocation of the costs of check collection. Currently, a depository bank (bank B in the example) bears the bulk of the costs associated with clearing the check. In other words, a paying bank (bank A) is under no legal obligation to share a depository bank's costs of collecting checks drawn by the paying bank's depositors.

A final key feature of the check payment system is the legal requirement that checks presented for payment be paid at par, or full value. In the context of the example, bank A would have to pay bank B the full amount of Andrea's check to Bob. In practice, such payments are made by transfer of banks' account balances at the Federal Reserve. Note that the requirement to pay at par does not vary with the amount of time it takes to present a given check. As Emmons (1996) notes, this feature of the check payment system implicitly defines a zero interest rate for check funds in the process of collection. Thus, the greater the difference is between the market interest rate and this implicit rate, the greater the incentive to "capture" check float will be.

The example illustrates how the key features of the check payment system could interact so as to influence the choice of payment medium. If bank A and bank B are in the same city, then most likely Andrea's check will be settled within the same day. If, however, Andrea's bank is in a remote location, then several days can pass before bank B can return Andrea's check to bank A. Since bank A pays the same amount on Andrea's check no matter when it shows up, Andrea gains a day's interest and Bob loses a day's interest for every additional day the

**Among developed countries, only the United States remains dependent on the use of checks. In 1997, American consumers and businesses wrote an estimated 66 billion checks.**

### CHART 3 Check Clearing through the Federal Reserve System



Note: Checks are also cleared through the same institution (“on-us”) or through private third parties such as clearinghouses and correspondent banks.

check is delayed. (Check clearing may also be delayed if Bob has a busy day and does not deposit the check as soon as he receives it.)

Here, it may be useful to briefly contrast the clearing and settlement process for checks with that of more automated forms of payment, such as payment cards and ACH transactions. The crucial difference is that clearing and settlement for these types of payments is completely electronic (and therefore to a large extent automatic), making, in turn, the timing of these processes very predictable. For example, credit card transactions generally are cleared and settled within a day. In the case of ACH transactions, the timing of settlement is flexible, but it is also precisely controllable by the payor and payee. The predictability of the clearing and settlement process reduces the scope for people to undertake actions in order to manipulate float since such actions would immediately be observable to the other parties involved in the transaction. Hence, float is generally not an issue for these types of transactions.<sup>6</sup>

The payoff from the float on any single check is usually inconsequential. When aggregated over a

large number of checks, however, float can have significant effects. Suppose, for example, that Andrea owns a business (say, Andrea.com) that must pay many suppliers such as Bob. If Andrea has a choice between paying her suppliers electronically and paying them by check, she may prefer to pay them by check so as to have access to the float. This approach is less efficient than electronic payment from a societal point of view since extra costs are incurred by the suppliers (or by the suppliers’ banks) in collecting Andrea’s checks. Since these extra costs are borne by the suppliers and their banks, they are of no immediate concern to Andrea.

In the meantime, Andrea’s suppliers may have noticed that they are disadvantaged by this arrangement. If they do a significant amount of business with Andrea.com, they may end up negotiating more favorable payment terms. On the other hand, if they only occasionally do business with Andrea’s company, such negotiations may not be practicable. Instead, the suppliers may, with the help of their banks, make use of “accelerated presentment” techniques that speed the processing of

6. About 30 percent of checks written in the United States are on-us, according to Bank for International Settlements (1998) estimates. Rules for interbank check settlement are governed by articles 3 and 4 of the Uniform Commercial Code and by Federal Reserve Regulations J and CC.

7. According to Humphrey and Pulley (1998a, b), the right to physical inspection of a check before payment was originally designed to guard against fraud. Nowadays, such inspection is rarely carried out except in the case of large-value checks.

8. See the U.S. General Accounting Office (1997) for detailed descriptions of the clearing and settlement processes for most types of retail payments.

checks.<sup>9</sup> While accelerated presentment may improve the situation from the standpoint of the creditors, it further diminishes economic efficiency by incurring a societal cost for an activity (the capture of float) that has little societal benefit.<sup>10</sup>

### Does Check Float Really Matter?

**T**he foregoing discussion illustrates why check float could cause people to prefer checks over other, less costly means of payment. But does check float have this effect in the real world? It turns out that there are some plausible reasons to suspect that it may not.

Wells (1996) observes that since the appearance of the Humphrey and Berger study, reductions in check-processing times have vastly reduced the value of float for the average checkwriter. Wells calculates the value of float on an average check in 1993 to be about nine cents. For business checks, the amount of float is apt to be higher, averaging about twenty-one cents by Wells's estimate. Since this benefit is less than the difference in cost (to a payor) between a payment by check and a payment using the ACH, Wells argues that in most cases, float cannot explain why checks are the preferred means of payment.

Wells's estimates of float value are for hypothetical "average" checks, which are assumed to clear in one business day (as the vast majority of checks in fact do). But for some payments, particularly those with higher value or those with longer clearing times, the potential value of float might actually be large enough to overcome the cost differential between checks and electronic payment media. Wells argues that the terms of such payments are often negotiable between payor and payee, however. If payment by check is costlier than electronic alternatives, then both sides have an incentive to share the benefits of using the less costly payment medium. Hence checks probably would not be used in these situations, at least on the basis of float-cost considerations.

An earlier paper (McAndrews and Roberds 1999) argues that such negotiation may not be necessary to "even out" the effects of float. The study analyzes two model economies, one in which certain people's payments are subject to float and one in which there is no float. In the first economy, some people are nominally wealthier because they enjoy float—that is, they can collect an extra day's interest on their checks before they clear. However, this income effect is undone by a price effect, as the float beneficiaries bid up the prices of the goods they would like to purchase.<sup>11</sup> In general equilibrium (taking movements of all prices into account), float

ends up having no impact. Such a neat cancellation is unlikely in the real world, but one would still expect price effects to undercut the real value of any income effects associated with float transfers. This dynamic would again work to diminish the value of float and lessen the attractiveness of checks as a payment medium.

### A Coasian View

**W**hile the preceding arguments illustrate why float may be an unlikely explanation for the continued use of checks, they do not conclusively prove the case. Within the payment industry, the business of playing the float "game" (maximizing the float on one's own checks while minimizing the float on others' checks) is still seen as alive and well (see, for example, Humphrey and Pulley 1998b).<sup>12</sup>

In understanding how check float could still be contributing to check use, the Coase theorem offers a useful perspective. The Coase theorem states that efficient outcomes can always be obtained through bargaining among private parties, given an unambiguous initial assignment of property rights and sufficient flexibility to bargain away the initial assignment of rights.<sup>13</sup> Given the apparent inefficiency of check payment (at least in terms of costs), its persistence thus requires an explanation of why bargaining among private parties (payor, payee, and their banks) has not produced an efficient outcome (greater use of electronics). McAndrews and Roberds offer two such explanations, both of which focus on check float.

The first explanation involves transaction costs and "unpriced float." While bargaining over the terms of payment may make sense for larger or recurring transactions, such bargaining would be too costly in the case of smaller-value or one-shot transactions (and therefore in practice in many transactions involving consumers or small businesses). In the latter case, payees may be willing to simply accept the nominal value of a payment regardless of float considerations. This willingness creates an incentive for payors to try to capture the benefits of float by delaying the clearing of their checks. If only some people are successful at this game, inefficiency results because "winners" overconsume while "losers" underconsume the goods for which float is not priced (if everyone were successful, then prices would adjust in such a way as to eliminate the net benefit of float).<sup>14</sup> Since Wells's (1996) calculations imply that the aggregate amount of check float is relatively small, "unpriced float" cannot by itself carry large societal costs.

Unpriced float, or the threat of being on the losing end of the float game, can also lead to another

type of societal cost, however. This second cost involves the notion of “reliance investments.” Suppose a firm knows that it will receive many relatively small or nonrecurring payments from various customers and it is probably impractical to bargain over float for these payments, given that the firm cannot always identify such customers in advance. In such cases, the firm’s best option may be to undertake a reliance investment (an investment anticipating or “relying” on an initial assignment of property rights) in a technology that allows the firm to accelerate presentment of its customers’ checks.<sup>15</sup> Once the firm has invested in the technology (say, a lockbox service), the firm can quickly process checks at a low incremental cost, which lowers its incentives to employ electronic forms of payment. On the other hand, only by undertaking such investments can the firm fully exercise its property right to prompt payment at par. If the firm does not make the investment, it may end up subsidizing customers with access to float. Inefficiency results because all parties would be better off if they could first negotiate terms of payment and thereby avoid the expense of the reliance investment.

It seems likely that it is the decentralized nature of the U.S. banking system that ultimately allows these inefficiencies to persist. If the U.S. banking system were dominated by a few large institutions, it would be relatively easy for these banks to negotiate a set of rules that would automatically determine the allocation of float in interbank check clearing. Such “Coasian bargaining” becomes more difficult, however, when large numbers of institutions are involved.

To summarize, it is plausible that Humphrey and Berger’s (1990) hypothesis concerning check float can withstand both the weight of Wells’s (1996)

numerical evidence and the application of Coasian logic. Certainly payoffs from playing the float game have diminished since 1987. However, as long as some people believe that they are winners at the game, others will have an incentive to undertake investments so as to avoid being the losers. Once these investments have been made, incentives to switch to lower-cost forms of payment are weakened.

### Proposals for Change

**H**ow should the United States change the check payment system so as to encourage a more rapid transition from a paper-based to a more efficient and cost-effective electronics-based retail payment system? While there have been many proposed answers to this question, these proposals fall into two broad categories. In the language of Coasian analysis, the first category of proposals would leave the property rights of participants in the check payment system largely unchanged but would seek to make lower-cost reliance investments available to payees and their banks. The second category of proposals would substantially alter the current allocation of property rights with the idea that the resulting modification in incentives would increase the appeal of electronic payments.

The first set of proposals seeks to make greater use of electronic technology in the check collection process, particularly through electronic check presentment (ECP). The term *ECP* is used to describe a collection process whereby the settlement of a check is triggered using information from an electronic file instead of from the paper check itself. Promoting greater use of ECP is an important facet of Federal Reserve System policy in the retail payment area and has also been endorsed by several payment industry groups.<sup>16</sup>

9. One such technique is to make use of so-called lockbox operations. These operations are designed to reduce the processing time associated with mailed check payments.
10. Accelerated presentment provides some social benefit by reducing the scope for check fraud. Calculations by Lacker (1997, 15), however, suggest that the marginal benefit associated with fraud reduction is quite small in comparison with the marginal gain from the capture of float. Hence the discussion ignores this potential benefit.
11. In the model, all of the people who enjoy float are identical, so the “income effect” is the same for each.
12. Some support for this view can be obtained by a simple search of the Internet for the term “float management,” which yields more than 200 hits. A search for the more euphemistic but essentially synonymous “controlled disbursement” turns up over 600 hits. The fact that many float management services remain economically viable suggests that the issue of float is far from dead.
13. The theorem is attributed to Coase (1960), who, however, never wrote down a formal statement or proof. Various attempts to formalize the theorem are described in Medema and Zerbo (forthcoming).
14. In practice, most of the winners at this game are likely to be firms since households generally lack the necessary resources to be able to systematically manage float. Humphrey and Pulley (1998a) report that 90 percent of the benefits of float accrue to businesses.
15. For a general discussion of the concept of reliance investments, see Kaplow and Shavell (1999).
16. For Federal Reserve policy, see, for example, Committee on the Federal Reserve in the Payments Mechanism (1998), Greenspan (2000), and Ferguson (2000).

Stavins (1997) conducts a detailed analysis of the potential costs and benefits of a particular type of ECP in which each check is “truncated” at the bank where it is first deposited (each deposited check is immediately converted to electronic form and does not physically go any further). Truncation of a check avoids the costs of physically transporting the check to the paying bank. Stavins finds that a small cost savings (2.59 cents per check) could be obtained if the current check collection system were to be replaced with a system of ECP with truncation.<sup>17</sup>

While this result may be seen as encouraging for the use of ECP technology, there exist at least two factors that may serve to limit the potential social benefit of

ECP. The first is that, under the current allocation of rights in the check payment system, banks retain the right to insist on physical presentment, so any participation in an ECP program is purely voluntary. The banking industry as a whole might experience lower processing costs if ECP were universally adopted, but unilateral adoption of ECP by an individual

bank could deny that bank’s customers the benefits of float without any offsetting compensation. For this reason as well as others, the pace of voluntary adoption of ECP has been quite slow.<sup>18</sup>

Even if universal ECP proves achievable within a fairly short period of time (say, within the next ten years), its net social benefit would still be suspect precisely for the reasons described in the original Humphrey and Berger (1990) study. As Lacker (1997, 19–21) argues, seen from a pure cost perspective the “electronification” of the check through universal ECP would represent nothing more than a large-scale investment in an accelerated presentment technology. Expressed another way, the universal conversion of check clearing to ECP would, according to this view, amount to the costly construction of another electronic payment system that would compete with already existing systems (such as ACH and payment card technologies). However, if the perspective is that checks offer features that provide some benefit beyond what is available through purely electronic forms of payment—for example, flexibility and familiarity—investment in ECP could perhaps be justified to the extent that participants in the U.S. economy

place a high enough valuation on such features of check payment.

The second set of reform proposals would substantially reallocate property rights within the check payment system. One such reallocation, discussed by Humphrey and Pulley (1998a, b) and Lacker (1997), follows the design of the check clearing system in Canada. There, the dollar amount of inter-bank settlement of a check is generally backdated to the day the check is deposited, thereby eliminating any float advantage accruing to the paying bank or its customers. While such a system would almost certainly lower incentives to capture float, its implementation could be considerably more difficult in the United States than in Canada because of the more complex and decentralized nature of the U.S. banking and legal systems.

Lacker (1997, 18) discusses a related proposal. Under this proposal, par settlement would not be required until five days after a check is deposited. Checks presented before this date would be discounted at a prespecified rate of interest, lessening incentives to undertake accelerated presentment. As with the previous proposal, the underlying idea would be to lessen incentives to capture check float by bringing the implicit interest rate on check funds in the process of collection into alignment with market interest rates.<sup>19</sup>

Humphrey and Pulley (1998a, b) consider another type of property rights reallocation, which would have the effect of compelling greater use of ECP technology. Under this second type of reallocation, the UCC would be altered so that paying banks would either (a) cede the right to physically inspect checks before payment and agree to pay checks presented via ECP or (b) retain the right to inspection (most likely in the case of large-value checks) but agree to compensate collecting banks for the ensuing float costs. This approach would allow banks to retain the right to physical inspection in the cases in which it most mattered (where serious fraud is suspected) but would also give banks an incentive to minimize float costs when losses from fraud would be unlikely or immaterial.

Another method for reallocating property rights in check payments would be to introduce truncation technologies that automatically convert a check into another form of payment. Several industry groups are beginning to implement such technologies, which convert checks into electronic “debits” that are cleared either through the ACH or through ATM networks.<sup>20</sup> These technologies are seen as most applicable to point-of-sale (POS) transactions between merchants and consumers. In this type of transaction, a consumer writes a check and hands it to the merchant, who scans in the necessary infor-

**By continuing to rely on checks for the bulk of noncash retail payments, the United States may be paying as much as \$60 billion to \$100 billion more than it needs to for payment services.**

mation from the check. The check is then returned to the consumer. Precisely speaking, such technologies do not reallocate property rights within the realm of check payments because a POS-truncated check payment no longer represents a check in a legal sense. However, the result is much the same since these technologies in effect offer consumers an easy way to cede their bank's right to physical presentment of their check without sacrificing the convenience or familiarity of writing a check.

All of these changes in the allocation of property rights could be (to varying extents) subject to the same criticism as simple voluntary adoption of ECP, namely, that they could result in large investments in payment technologies that would largely replicate existing systems. In addition, reallocation of property rights would almost certainly be disadvantageous to some beneficiaries of float under the current system. That is, some parties paying by check and enjoying a float benefit would lose while payees would gain. Even if the resulting system were superior to the present one in terms of economic efficiency, the accompanying distribution of gains and losses could make a reallocation of property rights difficult to implement.

Nonetheless, a precedent does exist for the reallocation of property rights within the check payment system. Prior to the 1920s, it was not customary for banks to pay checks at full value unless they were presented directly (that is, in person and not through the mail) or presented through a clearinghouse or correspondent. Instead, paying banks would often deduct a presentment fee before payment. The traditional view of the pre-1920s check payment system is that it led to circuitous and inefficient routing of checks in an attempt to avoid such fees.<sup>21</sup>

Nonpar payment of "remotely presented" checks largely came to an end with the Federal Reserve's entry into the business of check clearing. The Fed enforced par clearing among the member banks in the Federal Reserve System and used a variety of methods to encourage nonmember banks to clear at par. As documented by Gilbert (2000), the changeover to par clearing allowed banks to clear checks more quickly and to reduce cash balances necessary for settlement. Lacker, Walker, and Weinberg (1999) argue that while the Fed's entry may not have increased the overall economic efficiency of the check collection system, it almost certainly shifted property rights within the system.<sup>22</sup> As paying banks lost the right to deduct presentment fees, costs were shifted away from collecting banks and toward paying banks. The ultimate effect of various proposed changes of property rights within the check collection system would constitute a further reallocation of costs in much the same direction.

### Conclusion

The U.S. retail payment system is in many ways a remarkable structure, handling more than 90 billion noncash transactions each year with a low rate of error and fraud. However, by continuing to rely on checks for the bulk of such payments, the United States may be paying as much as \$60 billion to \$100 billion more than it needs to for payment services.

One reason people continue to use checks is that the current allocation of property rights within the check payment system allows some payors to benefit from delays in check clearing times. Although the incentives to capture check float are less now than at other times, the opportunity costs associated

17. Implementation of another version of ECP has been under way for some time under the auspices of the Electronic Check Clearing House Organization (ECCHO). Begun in 1990, this version of ECP uses an approach called "Electronic with Paper to Follow." In other words, the paper check is still returned to the paying bank, and it is the delivery of the paper check, in most instances, that constitutes presentment and triggers settlement of the check. The delivery of the check information electronically allows paying banks to deduct funds from its customers' accounts prior to the arrival of the paper check, which "increases banks' investable funds," (ECCHO 2000, 4). In contrast to the proposal analyzed by Stavins (1997), this system reduces the risks of check fraud and of payment being released against accounts with insufficient funds but does not offer payees the inducement of earlier funds availability.

18. A recent Government Accounting Office report (U.S. General Accounting Office 1998) indicates that, in addition to loss of float, adoption of ECP has been hindered by the following factors: loss of canceled checks, diversion of banks' computer resources to Y2K problems, and banks' concerns about increased vulnerability to fraud.

19. If prices of goods bought with checks remained the same, this proposal could be seen as transferring income to check writers and therefore encouraging check use. In practice, one would expect that payees would discount checks and that nominal prices would adjust upwards, canceling this effect.

20. See, for example, Marjanovic (1998, 1999, 2000).

21. See Gilbert (2000) for a detailed analysis of the traditional view.

22. In particular, they note that no cost data has been produced showing that average (systemwide) check-processing costs fell after the introduction of par clearing. Hence it is possible that the main effect of the changeover to par clearing was simply to reallocate rents.

with “playing the float game” likely still form a significant component of the overall costs of the retail payment system.

Market forces have already led to considerable substitution of electronic forms of retail payment for checks over the last decade. However, the pace of substitution has been noticeably slower in the United States than in other countries, suggesting that some intervention may be necessary to encourage greater use of electronics. Proposals to this effect have focused on either voluntary adoption of check electrification technologies or on

reassignments of property rights within the check payment system. While both types of proposals hold some promise, they are also subject to the criticism that they could result in duplicative and potentially inefficient investment. In addition, some proposals could redistribute rents across payment system participants in a way that would make the proposals difficult to implement politically. Over the near future, policymakers will need to confront the issue of whether these drawbacks outweigh the potential benefits of a faster transition to a more efficient payment system.

## REFERENCES

- BANK FOR INTERNATIONAL SETTLEMENTS COMMITTEE ON PAYMENT AND SETTLEMENT SYSTEMS. 1993. *Payment Systems in the Group of Ten Countries*. Basel: Bank for International Settlements. <<http://www.bis.org/publ/index.htm>>.
- . 1998. *Statistics on Payment Systems in the Group of Ten Countries*. Basel: Bank for International Settlements. <<http://www.bis.org/publ/index.htm>>.
- . 1999. *Retail Payments in Selected Countries: A Comparative Study*. Basel: Bank for International Settlements. <<http://www.bis.org/publ/index.htm>>.
- COASE, RONALD. 1960. “The Problem of Social Cost.” *Journal of Law and Economics* 3 (October): 1–44.
- COMMITTEE ON THE FEDERAL RESERVE IN THE PAYMENTS MECHANISM. 1998. *The Federal Reserve in the Payments Mechanism*. Washington, D.C.: Board of Governors of the Federal Reserve System. <<http://www.federalreserve.gov/boarddocs/press/General/1998/19980105/19980105.pdf>>.
- ELECTRONIC CHECK CLEARING HOUSE ORGANIZATION (ECCHO). 2000. *ECP 101: The Basics*. <<http://www.eccho.org>>.
- EMMONS, WILLIAM R. 1996. “Price Stability and the Efficiency of the Retail Payments System.” *Federal Reserve Bank of St. Louis Review* 78 (September/October): 49–68.
- FERGUSON, ROGER W. JR. 2000. “Electronic Commerce, Banking, and Payments.” Speech presented at the 36<sup>th</sup> Annual Conference on Bank Structure and Competition, Chicago, May 4. <<http://www.federalreserve.gov/boarddocs/speeches/2000/200005042.htm>>.
- GILBERT, R. ANTON. 2000. “The Advent of the Federal Reserve and the Efficiency of the Payments System: The Collection of Checks, 1915–1930.” *Explorations in Economic History* 37 (April): 121–48.
- GREENSPAN, ALAN. 2000. “Retail Payment Systems.” Speech presented at the National Automated Clearinghouse Association Annual Meeting, Los Angeles, April 10. <<http://www.federalreserve.gov/boarddocs/speeches/2000/20000410.htm>>.
- HUMPHREY, DAVID B., AND ALAN N. BERGER. 1990. “Market Failure and Resource Use: Economic Incentives to Use Different Payment Instruments.” In *The U.S. Payment System: Efficiency, Risk, and the Role of the Federal Reserve—Proceedings of a Symposium on the U.S. Payment System Sponsored by the Federal Reserve Bank of Richmond*, edited by David B. Humphrey. Boston: Kluwer Academic Publishers.
- HUMPHREY, DAVID, AND LAWRENCE PULLEY. 1998a. “Retail Payment Instruments: Costs, Barriers, and Future Use.” In *Payment Systems in the Global Economy: Risks and Opportunities*. Chicago: Federal Reserve Bank of Chicago.
- . 1998b. “Unleashing Electronic Payments.” *Banking Strategies* 74 (November/December). <[http://www.bai.org/bankingstrategies/1998-nov-dec/Articles/Unleashing\\_Electronic\\_Payments/index.html](http://www.bai.org/bankingstrategies/1998-nov-dec/Articles/Unleashing_Electronic_Payments/index.html)>.
- HUMPHREY, DAVID, LAWRENCE PULLEY, AND JUKKA VESALA. 2000. “The Check’s in the Mail: Why the United States Lags in the Adoption of Cost-Saving Electronic Payments.” *Journal of Financial Services Research* 17 (1): 17–39.
- KAPLOW, LOUIS, AND STEVEN SHAVELL. 1999. “Economic Analysis of Law.” National Bureau of Economic Research Working Paper 6960, February. <<http://www.nber.org/papers/w6960>>.
- LACKER, JEFFREY M. 1997. “The Check Float Puzzle.” *Federal Reserve Bank of Richmond Economic Quarterly* 83 (Summer): 1–25.
- LACKER, JEFFREY M., JEFFREY D. WALKER, AND JOHN A. WEINBERG. 1999. “The Fed’s Entry into Check Clearing Reconsidered.” *Federal Reserve Bank of Richmond Economic Quarterly* 85 (Spring): 1–32.
- MARJANOVIC, STEVEN. 1998. “Big-Bank Project Takes Aim at Paper Checks.” *American Banker*, July 21.
- . 1999. “Three More Big Banks to Begin Check Conversion.” *American Banker*, August 11.
- . 2000. “Banks Tap ATM Systems to Banish 18B Checks.” *American Banker*, June 14.

- 
- MCANDREWS, JAMES, AND WILLIAM ROBERDS. 1999. "A General Equilibrium Analysis of Check Float." *Journal of Financial Intermediation* 8 (October): 353–77.
- MEDEMA, STEVEN G., AND RICHARD O. ZERBE JR., Forthcoming. "The Coase Theorem." In *The Encyclopedia of Law and Economics*.
- MESTER, LORETTA J. 2000. "The Changing Nature of the Payments System: Should New Players Mean New Rules?" Federal Reserve Bank of Philadelphia *Business Review* (March/April): 3–26.
- STAVINS, JOANNA. 1997. "A Comparison of the Social Costs and Benefits of Paper Check Presentment and ECP with Truncation." *New England Economic Review* (July/August): 27–44.
- U.S. GENERAL ACCOUNTING OFFICE. 1997. *Payments, Clearance, and Settlement: A Guide to the Systems, Risk, and Issues*. June. <<http://www.gao.gov>>.
- . 1998. *Retail Payments Issues: Experience with Electronic Check Presentment*. July. <<http://www.gao.gov>>.
- WEINER, STUART E. 1999. "Electronic Payments in the U.S. Economy: An Overview." Federal Reserve Bank of Kansas City *Economic Review* (Fourth Quarter): 1–12.
- WELLS, KIRSTEN E. 1996. "Are Checks Overused?" Federal Reserve Bank of Minneapolis *Quarterly Review* 20 (Fall): 2–12.

# Perspectives on a Potential North American Monetary Union

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IN AUGUST 2000, PRESIDENT-ELECT VINCENTE FOX OF MEXICO VISITED THE UNITED STATES AND CANADA. HE FORWARDED SEVERAL IDEAS REGARDING THE FURTHER INTEGRATION OF THE THREE ECONOMIES THAT CONSTITUTE THE NORTH AMERICAN FREE TRADE AGREEMENT, OR NAFTA. AMONG HIS PROPOSALS WAS AN EVENTUAL SINGLE CURRENCY FOR NAFTA MEMBERS.

The idea of a single currency for the United States, Canada, and Mexico is not new and has usually referred to one of two approaches. The first, and most discussed, is the unilateral adoption of the U.S. dollar by Canada and Mexico, otherwise known as dollarization. Dollarization has been advocated for not only Canada and Mexico but also many other countries in the Western Hemisphere (Hausmann 1999; Schuler 1999). Some Latin American countries are already dollarized: Ecuador unilaterally dollarized its economy in September 2000, and Panama has employed the U.S. dollar as its currency since 1904. Monetary union is the other interpretation of the single-currency idea; that is, rather than unilateral adoption of the U.S. dollar, a joint currency could be developed and managed by a number of countries.

This article examines the idea of monetary union in North America. Specific criteria for a single currency for North America are discussed, as are the pros and cons of a monetary union and dollarization in the North American context. On the basis of optimal currency area (OCA) criteria, the article concludes that

available evidence suggests that a single currency for NAFTA countries is possible. Canada appears much more suited for joining the United States in a single-currency arrangement than does Mexico. Mexico appears to be moving closer to fulfilling OCA criteria, however. The article also concludes that monetary union appears to hold several advantages over dollarization from the perspective of both the United States and its NAFTA partners. Although monetary union in North America is not likely to be a near-term development, it is an important idea that merits further study and consideration.

### The Single-Currency Debate

The idea of a single currency—be it via dollarization or monetary union—gained support following the Mexican crisis in 1995 and more recently the 1998 Asian crisis and its spillover to other emerging markets. However, many analysts noted that recent international financial crises were caused or exacerbated at least in part by the prevailing fixed or semifixed exchange rate regimes among

the affected countries and therefore forwarded the idea that flexible exchange rates were perhaps a better option (Espinosa and Russell 1996; Roubini, Corsetti, and Pesenti 1998; Sachs and Larrain 1999; Chang and Velasco 1998). Indeed, at a more fundamental level, Friedman (1988) found that a system of flexible exchange rates is a fundamental prerequisite for economic integration.

Nevertheless, flexible exchange rate regimes have come under increased criticism, especially as applied to emerging economies. Emerging markets that apply flexible exchange rate regimes are prone to instability and wide fluctuations in exchange rate values that inhibit long-term planning necessary for successful

economic development (Hausmann 1999). Recognizing, however, that fixed or semi-fixed regimes are susceptible to the kind of breakdown witnessed in Asia, more formal links with the world's main currencies—the U.S. dollar, euro, or yen—are often considered more preferable than a flexible exchange rate arrangement.

In the case of the Western Hemisphere,

linking to the dollar via dollarization or monetary union has recently gained more attention and, in one instance, has become a reality. In Ecuador, a financial crisis led to the collapse of the Ecuadorian sucre, and the U.S. dollar is now the official currency. Ecuadorian officials concluded that the best way to restore confidence in the economy was to introduce the dollar as the official currency.<sup>1</sup>

The recent crises in emerging markets are not the only reason dollarization or monetary union has gained attention. The advent of the European Monetary Union and the euro, the single currency for eleven of the fifteen European Union members, has also focused attention on the possibility of such an arrangement for other economically integrating countries, namely, NAFTA countries.

Simply taking the European Monetary Union model and applying it directly to NAFTA countries is not appropriate, however, because of the dissimilar economic and political histories involved and because the current level of economic and political integration is much deeper in Europe than in North America (McCallum 2000). Nonetheless, important lessons can be gleaned from the European experience.

The European Monetary Union is an effort to create greater economic efficiencies among integrated economies. Creating economic efficiency among NAFTA countries is also an appropriate goal. The use of a single currency eliminates some transaction costs, increases economic and financial efficiency, and leads to increased trade and investment within the single-currency area. The close economic links among the NAFTA countries can be seen in the growing trade relationships among the United States, Canada, and Mexico (Chart 1) and have helped give rise to the debate over a single currency for the NAFTA countries. In addition, recent studies show that the potential gains from trade among countries that choose to participate in a monetary union can be significant (Frankel and Rose 2000).

### A Single Currency for NAFTA?

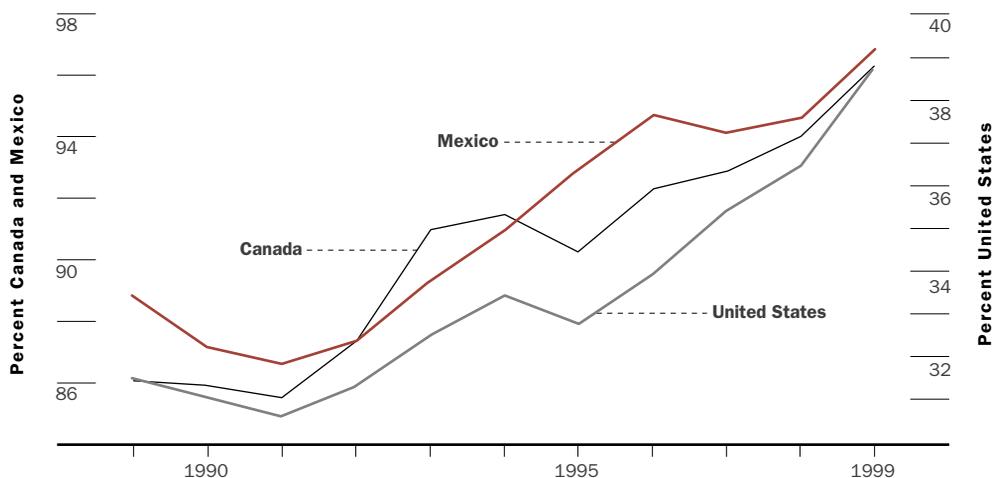
Now that the idea of a single currency for NAFTA is on the table, the next step is considering whether such an arrangement is appropriate. The best way to determine its suitability is to apply the literature on OCAs to Canada and Mexico. OCAs are groups of regions with economies closely linked by the trade of goods and services and by some degree of financial and labor mobility. OCA theory predicts that fixed exchange rates are the most appropriate for areas closely integrated through international trade and factor movements (Krugman and Obstfeld 1997). In the classic text on OCAs, Mundell (1961) first noted that factor mobility was a leading requisite for an OCA to exist. Since then, economists have added to the OCA literature and have developed a basic set of criteria for measuring OCAs (Tower and Willet 1976).

A number of these criteria, including size of the economy, openness as measured by total trade as a percent of gross domestic product (GDP), trade concentration by country, and similarity of shocks, are applied by Williamson (2000). He finds that, according to the criteria, Canada would be a good candidate for a fixed-dollar arrangement whereas Mexico may not yet be ready.

Canada's economy is the world's eighth largest, although it equals only about 7 percent of total U.S. GDP. Canada's economy is open in terms of trade as a percent of GDP (70 percent), and nearly 80 percent of Canada's trade is with the United States. Both countries respond similarly to economic shocks although as a major exporter of raw materials Canada confronts different challenges during periods of steep swings in global commodity prices. The flow of capital is open, and there are few barriers to labor mobility. Despite these favorable OCA measurements, Canada's deep financial markets and the prevailing satisfaction with

**Close economic links among the NAFTA countries can be seen in the growing trade relationships among the United States, Canada, and Mexico and have helped give rise to the debate over a single currency.**

**CHART 1 Interregional Trade as a Percent of Total Trade, 1989–99**



Note: Although the scales differ, it is clear that the trend toward increased interregional trade is positive for all three countries.

Source: International Monetary Fund Direction of Trade Statistics; U.S. Department of Commerce

its current floating exchange rate regime make support for a fixed-rate arrangement with the U.S. dollar unlikely in Canada (McCallum 2000; Murray 2000). On the other hand, some critics feel that Canada should have a stronger currency than it does and that the 30 percent depreciation of the Canadian dollar against the U.S. dollar over the last thirty years has contributed to a decline in Canada's living standards and the need to link with the U.S. dollar to arrest these declines (Courchene and Harris 1999).

For Mexico, the case is less compelling. Mexico's economy is a bit smaller than Canada's at just over 5 percent of U.S. GDP. It is also an open economy, with total trade amounting to 58 percent of GDP, and it also trades heavily with the United States (81 percent of total trade). Mexico responds differently to shocks than the United States, however; Mexico is a major oil-exporting nation and also remains vulnerable to changes in international interest rates. Importantly, though, the growing integration between the two countries may to some extent make responses to shocks more similar, especially if Mexico diversifies its economy and becomes less reliant on oil-export revenue. More research is needed in this area before definite conclusions can be reached.

The post-1995 banking crisis restructuring in Mexico is under way, and increased financial integration with Canada and the United States should deepen Mexico's financial system and make it less vulnerable to changes in international interest rates. Capital flows relatively freely between the United

States and Mexico even though most of the Mexican petroleum industry remains off-limits to foreign investors. Labor mobility is also a point of contention between the United States and Mexico, with many Mexicans migrating illegally to the United States every year in addition to legal migration. Although Mexico may not yet be an ideal candidate for a fixed exchange rate regime on the basis of OCA criteria, it appears that it may be headed in that direction.

### Dollarization versus Monetary Union

It is clear that the NAFTA countries are establishing a foundation suitable to an OCA. The question then becomes whether dollarization or monetary union would be a better fit.

Dollarization occurs when a country or countries adopt the U.S. dollar as their official currency. The United States does not have to be an active participant in the policy-making process because it relinquishes no management of monetary policy. The recent episode in Ecuador's unilateral dollarization exemplifies this situation.

Monetary union, however, requires substantial cooperation since two or more countries are involved in building a new currency regime together. Monetary union differs significantly from dollarization because all national monetary policies are abandoned in favor of a shared policy among participating countries. Fiscal policy coordination is also necessary. The European Monetary Union is an example of this type of arrangement.

1. Gustavo Oviedo, "Ecuador Government Defends Move to Adopt Dollar," Reuters Newswire, January 10, 2000.

Williamson (2000) lists criteria for choosing among fixed exchange rate regimes, including dollarization and monetary union. The criteria to consider when deciding on which fixed rate regime to adopt include seignorage, the interest premium, the lender of last resort, and the decision role in developing monetary policy. The next section discusses these criteria with regard to NAFTA countries.

**Seignorage.** Seignorage is the revenue governments gain by issuing currency and is an important benefit of issuing one's own currency. Net seignorage is the difference between the cost of putting money into circulation and the value of goods the money will buy. Hausmann (1999) estimates that seignorage accounts for roughly 0.5 percent of a country's GDP, and Schmitt-Grohé and Uribe (1999) note that most estimates of seignorage are understated in that they do not consider increases in the monetary base over time. Regardless of the exact amounts in question, governments have come to rely on seignorage revenue to some extent, and it should not be

dismissed as unimportant or insignificant (Chang 2000). A country that unilaterally dollarizes by adopting the U.S. dollar forgoes seignorage revenue. In a monetary union, countries would share seignorage based on a specified formula, either the size of GDP or a predetermined measure of the existing money stock. Therefore, from the Canadian and Mexican viewpoints, monetary union would have an advantage over dollarization because neither country would forfeit seignorage revenue as it would in a dollarization arrangement.

From the perspective of the United States, the issue is more complicated. Under dollarization, the U.S. government stands to gain from the increased issuance of currency abroad. However, legislation introduced in the U.S. Senate in 1999 advocates returning 85 percent of this net seignorage gain to countries that dollarize.<sup>2</sup> This effort to share seignorage revenue appears to indicate that U.S. policymakers do not plan to encourage dollarization as a means to enhance U.S. revenue. The net effect of how current foreign holders of U.S. currency would view a new North American currency must also be considered.

**The U.S. Interest Premium.** The interest premium is the amount of interest a country must pay above U.S. rates on the international market for issuing debt. The rate is generally higher because other countries' risks of default are considered higher. Default can occur for many reasons, but as the recent crisis in Asia shows, an exchange rate collapse can be a primary cause. Countries with high interest premiums often borrow in dollars because the interest rate is lower than in domestic markets. In the event of a significant exchange rate devaluation, however, the borrowing country can find itself short of funds with which to pay its short-term debts. That is, the weakened value of their currency means more domestic currency is needed to purchase the necessary dollars with which to repay the debt.

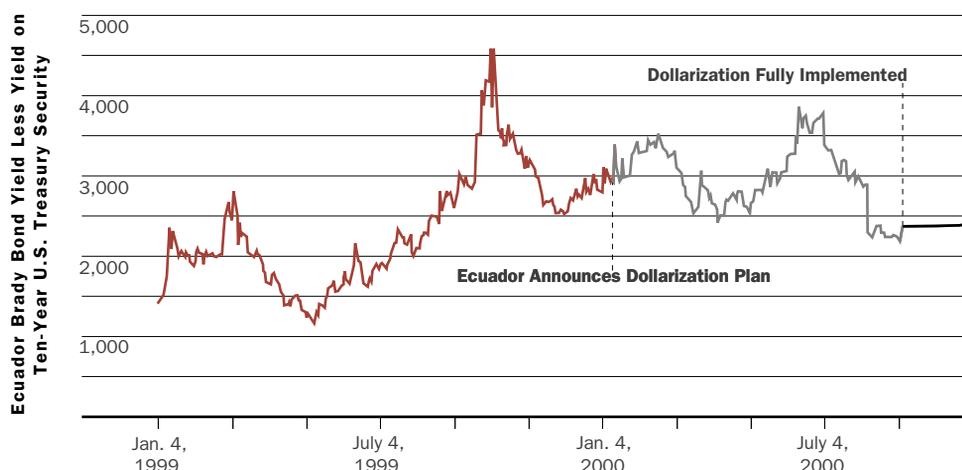
Under dollarization or monetary union, the interest premium would presumably be much lower since the risk of default is greatly reduced. There is no risk of devaluation since independent currencies no longer exist. In the case of dollarization, the only way a devaluation, or currency risk, could still come into play is if the country renounces the dollar and reissues its own currency. In the case of monetary union, currency risk can resurface if the union is dissolved and countries reissue individual national currencies. Given the staggering amount of chaos that would probably ensue, these options are not likely.

Importantly, the move to dollarization may not completely erase the interest premium. If a country dollarizes as the result of a crisis, as Ecuador did, investors are likely to demand an interest premium that continues well past the dollarization event because of that country's poor recent track record. Stated differently, dollarization all but eliminates currency risk, but it does not eliminate sovereign risk. Chart 2 shows that even after Ecuador announced its dollarization plan in January 2000, and even after it became fully dollarized in September 2000, a significant interest rate premium has remained. This situation may indicate the elimination of currency risk, but the remaining sovereign risk appears substantial. Chang and Velasco (forthcoming) also find that dollarization may not reduce interest rates in the dollarizing economy.

In a monetary union, sovereign risk could be reduced further since it becomes a collective factor spread out among the participating countries. In the case of a monetary union of NAFTA countries, those joining the United States would likely share its sovereign risk profile. This risk reduction would be even more pronounced if the countries involved formally developed joint fiscal policy guidelines as did the members of the European Monetary Union. Yet, even without a formal agreement, fiscal policy among

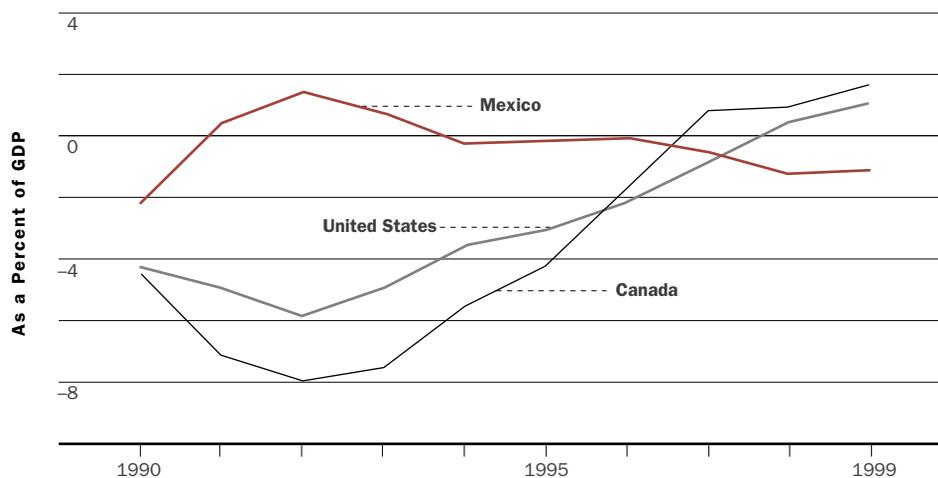
The idea of a single currency, be it via dollarization or monetary union, gained support following the Mexican crisis in 1995 and more recently the 1998 Asian crisis and its spillover to other emerging markets.

## CHART 2 Ecuador Interest Rate Spread



Source: Standard and Poors

## CHART 3 Central Government Budget Balance



Source: Organisation for Economic Co-operation and Development

NAFTA members seems to be converging as countries have been better able to control national government income and spending levels. Chart 3 shows that Canada, Mexico, and the United States have central government budgets that are nearly balanced.

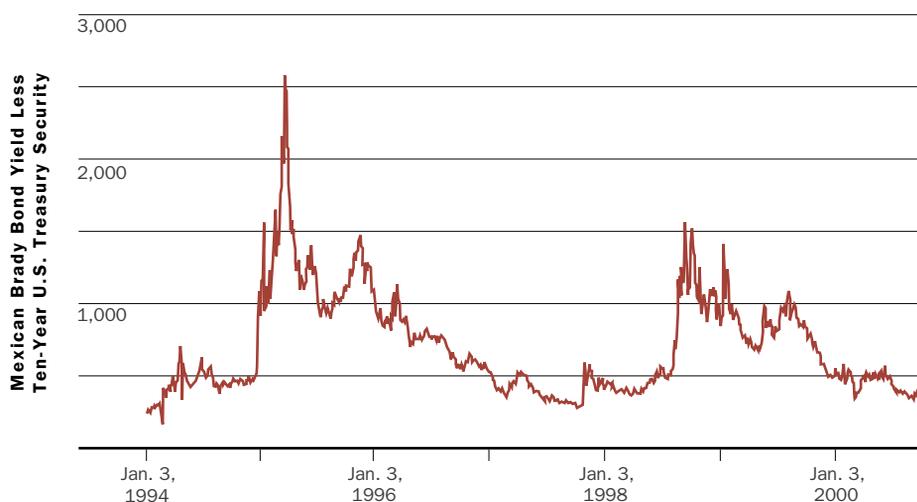
For developing countries like Mexico, the interest premium can be significant depending on domestic and international developments. At the beginning of 1994, Mexico's interest premium was 225 basis points, but it rose to more than 2,000 basis points by March 1995, three months after the peso was devalued. In September 2000 Mexico's interest rate premium averaged 350 basis points, but in January

1999 it had risen to over 1,000 basis points in the wake of the Brazilian devaluation (see Chart 4). This premium is a significant cost to Mexican borrowers and a major roadblock to sustained long-term planning and investment in the Mexican economy. Reducing both the level and volatility of the interest rate premium is a major policy goal of the Mexican government.

The Canadian case is broadly similar to Mexico's, although Canadian currency and sovereign risks are quite low in comparison, and its interest premium has been negligible recently. However, the noted long-term decline in the value of the Canadian

2. In 2000, Senator Connie Mack of Florida introduced legislation that would, if certain criteria were met, share seignorage revenue with countries that dollarize. See <<http://www.senate.gov/~jec/dollaract.htm>> for an overview and explanation of the bill.

## CHART 4 Mexican Interest Rate Spread



Source: Standard and Poors

dollar shows that there is a degree of currency risk at play, and sovereign risk persists as well; the possibility of Quebec's succession from Canada continues even after two referendums favoring continued federation.

Dollarization would likely do little to eliminate the political risk tied to the Quebec question, but it would all but end the threat of devaluation. It is unclear whether monetary union with the United States and Mexico would help eliminate the sovereign risk Canada faces. Therefore, from the Canadian perspective, the interest premium issue can be seen as neutral with regard to dollarization or monetary union.

**The Lender of Last Resort.** For a country contemplating dollarization, consideration must be given to the fact that it would forgo the lender-of-last-resort facility of its central bank since it could no longer issue currency, that role having been transferred to the U.S. Federal Reserve. In a monetary union, however, the lender-of-last-resort function would survive in all participating countries with the newly created, common central bank fulfilling this role.

The potential loss of this safety mechanism is an important consideration. In their traditional roles as lenders of last resort, central banks provide funds to financial institutions to keep them operating during financial crises. Such a resource is generally recognized as essential during liquidity crises—when an institution is solvent but lacks sufficient liquidity. However, providing funds during a solvency crisis—when the financial institution is insolvent, as occurred in Thailand in 1997—can actually do the overall economy a disservice by allowing insolvent institutions to keep operating and move further into

debt (Calvo 2000). A lender of last resort can only serve its purpose if it acts prudently, and Calvo shows that the lender-of-last-resort function in emerging economies has often made bad situations worse.

However, a well-functioning lender of last resort with clear guidelines on when and how funds will be dispersed to financial institutions facing liquidity problems is an important component of a mature financial system. Given the choice between no lender of last resort under dollarization and a solid lender of last resort under a North American monetary union, both Canada and Mexico would likely favor the latter.

As noted above, the United States is not inclined to serve as a lender of last resort for financial institutions in dollarized countries. This position is understandable given the fact that U.S. regulators would have no supervisory or regulatory authority in the dollarizing economy. Without this authority, U.S. regulators would not be in a position to accurately ascertain the health of foreign banks. However, the debate to date has concentrated on the question of the lender-of-last-resort role under dollarization, with little attention being paid to such an arrangement under a monetary union. Under a monetary union, the lender-of-last-resort function could be jointly administered and financial systems could be jointly supervised under a uniform set of guidelines. Such an arrangement would allow U.S. regulators to coordinate with Canadian and Mexican officials in ensuring the safety and soundness of North American banks. Having safe and sound financial institutions in North America is clearly in the best interest of the United States, Canada, and Mexico. Clearly, U.S. par-

ticipation in a lender-of-last-resort function in a North American monetary union would require deep financial and regulatory integration, something that is unlikely to be a near-term development. The lender-of-last-resort issue is clearly an area for future work, especially in view of the possibility of private sector participation in a lender-of-last-resort role.

**Developing Monetary Policy.** As part of a country's overall economic policy regime, monetary policy is tied to the issue of national sovereignty. A dollarizing country gives up its monetary policy along with its currency, and the national central bank ceases to function as the executor of monetary policy, that role being transferred to the U.S. Federal Reserve.

One of the main arguments against dollarization is that dollarizing countries give up too much when they forgo independent monetary policy. An independent monetary policy is seen as an essential policy tool in implementing changes necessary for successful national economic policy. Many countries that might otherwise contemplate dollarization consider the sacrifice of the ability to make these adjustments too costly.

This is the position of North American countries, where the Bank of Canada and Banco de México are considered to be well-run, responsible institutions highly in tune with the role and function of monetary policy in their respective country's economic policy regimes. It is difficult to see why Canada and Mexico would want to forsake their independent monetary policies through dollarization. To be sure, increased economic and financial integration in North America would theoretically weaken claims to a truly independent monetary policy for either country since the dominant size of the U.S. economy would drive the policy agendas of Canada and Mexico. Nevertheless, both the Canadian and Mexican central banks have excellent track records in recent years with regard to inflation (see Chart 5) during a time when North American economic integration deepened. It is not likely that either would be inclined to unilaterally give up their independent monetary policies.

The United States should also be wary of dollarization from the perspective of monetary policy. While the U.S. Federal Reserve would not be legally compelled to consider the economic and financial conditions of dollarizing countries when developing and implementing monetary policy, ignoring such information would likely be difficult in practice, especially for North American neighbors. Such a development could potentially cause tension within NAFTA, something that is clearly not desirable for any of its members. Therefore, dollarization in North America is not likely to be considered optimal from the U.S. monetary policy perspective.

From both the Canadian and Mexican viewpoints, monetary union seems preferable to dollarization in terms of monetary policy development. From the U.S. perspective, the monetary union issue is more complicated. Monetary union with Canada and Mexico would require sharing monetary policy development and implementation with foreign countries. The idea is anathema to many in the United States, and most studies of a single currency for NAFTA dismiss the possibility of the United States sharing monetary policymaking with Canada or Mexico as wholly unrealistic (McCallum 2000; Vernengo and Rochon 2000). One study that goes beyond this dismissal is by Courchene and Harris (1999). It argues that the United States should pursue monetary union because the euro presents a theoretical threat to the dollar's role as the international reserve currency. If more countries, especially those in Europe, choose the euro as their reserve currency, the United States could find it more difficult to finance its balance-of-payments deficit.

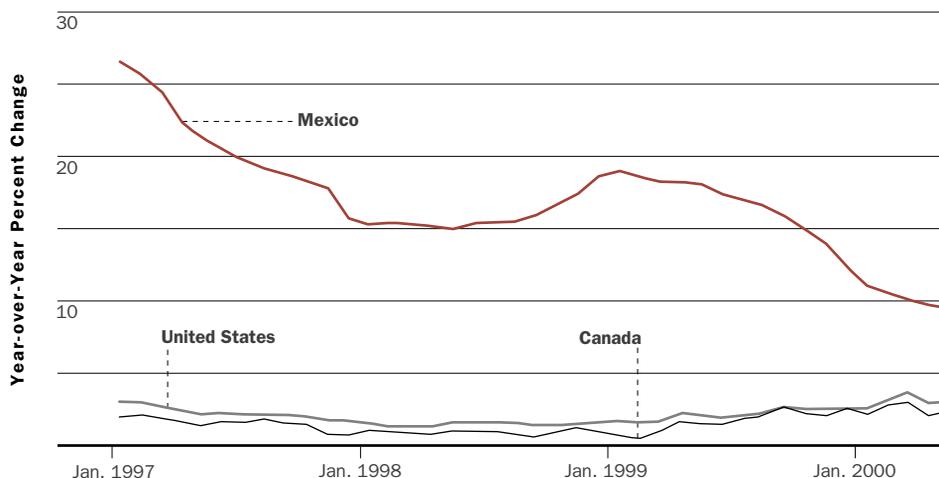
Grubel (1999) notes that a monetary union would deliver increased trade and investment opportunities to the United States. Accordingly, he notes that the NAFTA monetary union could eventually spread to include Central America and the Caribbean and perhaps even South America. In addition to increasing trade and investment opportunities, such a broadly encompassing monetary union would bring economic stability to what has historically been an unstable region. Stability would be in the interest of the United States since it would greatly diminish the need for possible future bailouts of countries experiencing severe economic crises by promoting economic growth.

Moreover, there are precedents for U.S. participation in supranational organizations. Participation in the World Trade Organization, the International Monetary Fund, the World Bank, and even NAFTA itself are seen as examples of the United States' having surrendered a degree of pure sovereignty when the economic benefits outweighed the supposed costs of diminished narrowly defined national sovereignty.

Grubel (1999) notes that there are escape clauses in these agreements that can be invoked if the

**The advent of the European Monetary Union and the euro has also focused attention on the possibility of such an arrangement for other economically integrating countries, namely, NAFTA countries.**

## CHART 5 Consumer Price Inflation



Source: International Monetary Fund

national interest is significantly threatened. However, such a passage is not likely to be written into a North American monetary union treaty because an escape clause would likely be interpreted as showing that the constituents were not fully committed to the union.

Similarly, Buitert (1999) notes that the development of a North American central bank would lack legitimacy if it were not accompanied with appropriate political institutions since some policymakers would be from foreign countries and would therefore lack any democratic accountability to U.S. citizens. Pastor (2000) also makes this point in his call for the development of political institutions as a means to deepen NAFTA.

The lack of multinational institutions is troubling to many observers. Vernengo and Rochon (2000) also note that if a North American central bank were to be created, some sort of supranational political authority would have to be developed as well. In their opinion, the costs of establishing such institutions outweigh the benefits of monetary union for the United States and therefore are not likely to be pursued.

Including Canadians and Mexicans in monetary decisions affecting the United States should not necessarily be seen as threatening from a U.S. perspective. Such a stance presumes that Canadian and Mexican monetary authorities would be predisposed to work against the goals of low inflation and high employment in North America, and there is no evidence to support this argument. Furthermore, policymakers at a North American central bank would be instructed to develop and implement policy for all of North America and not for individual countries, just as the members of the new European

Central Bank commit to consider the entire euro area and not their home countries in making policy decisions (Treaty on European Monetary Union 1992, Article 8 of the Statute on the European Monetary Institute).

A further cost-benefit analysis of the application of monetary policy in a North American monetary union is needed, but it seems clear that there are potential benefits to monetary union for the United States that should be closely examined on a systematic basis.

### Conclusion: Is NAFTA Ready for a Monetary Union?

The evidence presented in this article suggests that Canada and perhaps even Mexico are candidates for forming a single-currency area with the United States at some stage. A comparison of the two most likely avenues to a single currency, dollarization and monetary union, suggests that monetary union is preferable to dollarization. An important question remains to be answered: Are the NAFTA countries currently ready for a monetary union? The answer involves both economic and political variables as well as some practical implications. It seems unlikely that the United States, Canada, and Mexico will pursue this goal in the near future.

On the economic front, most policymakers and opinion leaders in Canada favor the country's current flexible exchange rate regime. The same can be said for Mexico, but the conviction that a free-floating Mexican currency is the best exchange rate regime for that country appears less certain. Furthermore, NAFTA is still in its infancy, having been in effect for only seven years. Economic integration is still developing, and financial integration has hardly begun.

While it is true that capital and trade flows have risen significantly since 1994, there are still three very distinct financial and banking systems in place. In addition, the lender-of-last-resort issue would need to be resolved before monetary union could proceed. Finally, deeper investigation into the potential economic benefits of a single currency for all NAFTA countries is needed before the idea of monetary union is seriously considered.

On the political front, the obstacles are even more daunting. Yielding their respective independent monetary policies to form an international central

bank does not appear to be favored by the United States, Canada, or Mexico at present. In the United States in particular, the idea of sharing monetary sovereignty is unlikely to gain support any time soon. Furthermore, some sort of institutional development would be required giving a North American central bank the democratic legitimacy it would need to operate credibly (Buitter 1999; Vernengo and Rochon 2000; Pastor 2000). Many technical issues such as what a North American currency would look like and how seignorage would be divided also would have to be worked out.<sup>3</sup>

3. Grubel (1999) and Courchene and Harris (1999) offer interesting ideas about what a North American currency could look like. Grubel calls the new North American currency the “Amero,” which would be an entirely new currency. Courchene and Harris suggest that the United States would continue to use the U.S. dollar as is and Canada and Mexico could issue new currencies that would bear national symbols but would carry a North American Central Bank mark rather than a Bank of Canada or Banco de México inscription.

## REFERENCES

- BUITTER, WILLEM. 1999. “The EMU and NAMU: What is the Case for North American Monetary Union?” Speech presented at the Douglas Purvis Memorial Lecture, Canadian Economic Association, May.
- CALVO, GUILLERMO. 2000. “The Case for Hard Pegs.” Speech presented at the North-South Institute Conference on Dollarization in the Western Hemisphere, October.
- CHANG, ROBERTO. 2000. “Dollarization: A Scorecard.” Federal Reserve Bank of Atlanta *Economic Review* 85 (Third Quarter): 1–11.
- CHANG, ROBERTO, AND ANDRES VELASCO. 1998. “The Asian Liquidity Crisis.” National Bureau of Economic Research Working Paper 6796, November.
- . Forthcoming. “Dollarization: Analytical Issues.” Federal Reserve Bank of Atlanta Working Paper.
- COURCHENE, THOMAS J., AND RICHARD G. HARRIS. 1999. “From Fixing to Monetary Union: Options for North American Currency Integration.” C.D. Howe Institute Commentary 127, June.
- ESPINOSA, MARCO, AND STEPHEN RUSSELL. 1996. “The Mexican Crisis: Alternative Views,” Federal Reserve Bank of Atlanta *Economic Review* 81 (January/February): 21–43.
- FRANKEL, JEFFERY, AND ANDREW ROSE. 2000. “Estimating the Effect of Currency Unions on Trade and Output.” National Bureau of Economic Research Working Paper 7857, August.
- FRIEDMAN, MILTON. 1988. “The Case for Flexible Exchange Rates.” In *The Merits of Flexible Exchange Rates*, edited by Leo Melamed. Fairfax, Va.: George Mason University Press.
- GRUBEL, HERBERT. 1999. “The Case for the Amero: The Economics and Politics of a North American Monetary Union.” The Simon Fraser Institute Critical Issues Bulletin, September.
- HAUSMANN, RICARDO. 1999. “Should There Be Five Currencies or One Hundred and Five?” *Foreign Policy* 116 (Fall): 65–79.
- KRUGMAN, PAUL, AND MAURICE OBSTFELD. 1997. *International Economics: Theory and Policy*. 4th ed. Reading, Mass.: Addison Wesley Longman, Inc.
- MCCALLUM, JOHN. 2000. “Engaging the Debate: Costs and Benefits of a North American Common Currency.” Royal Bank of Canada *Current Analysis*, April.
- MUNDELL, ROBERT. 1961. “A Theory of Optimum Currency Areas.” *American Economic Review* 51:657–65.
- MURRAY, JOHN. 2000. “Revisiting the Case for a Flexible Exchange Rate in Canada.” Speech presented at the North-South Institute Conference on Dollarization in the Western Hemisphere, October.
- PASTOR, ROBERT A. 2000. “Lessons from the Old World for the New: The European Union and a Deeper, Wider American Community.” Speech presented at the Federal Reserve Bank of Atlanta Latin America Research Group Seminar Series. September.
- ROUBINI, NOURIEL, GIANCARLO CORSETTI, AND PAOLO PESENTI. 1998. “What Caused the Asian Currency and Financial Crisis? Part I: A Macroeconomic Overview.” Nouriel Roubini Global Macroeconomic and Financial Policy Site at the Stern School of Business, New York University, September. <<http://www.stern.nyu.edu/globalmacro>>.

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SACHS, JEFFERY, AND FELIPE LARRAIN. 1999. "Why Dollarization Is More Straitjacket Than Salvation." *Foreign Policy* 116 (Fall): 80–92

SCHMITT-GROHÉ, STEPHANIE, AND MARTIN URIBE. 1999. "Dollarization and Seignorage: How Much Is at Stake?" University of Pennsylvania Research Paper, July. <<http://www.econ.upenn.edu/~uribe/seignorage.pdf>>.

SCHULER, KURT. 1999. "Encouraging Official Dollarization in Emerging Markets." Staff Report, Joint Economic Committee (Office of the Chairman), U.S. Congress, April.

TOWER, EDWARD, AND THOMAS D. WILLETT. 1976. "The Theory of Optimum Currency Areas and Exchange Rate Flexibility." Princeton University Department of Economics, International Finance Section, Special Paper in International Economics 11, May.

TREATY ON EUROPEAN UNION. 1992. Council of the European Communities and Commission of the European Communities. Luxembourg: Office for Official Publications of the European Community.

VERNENGO, MATIAS, AND LOUIS-PHILIPPE ROCHON. 2000. "Does NAFTA Need a Common Currency? A Skeptical View on NAMU." Paper presented at the University of Ottawa Conference "The Political Economy of Dollarization: Lessons from Europe for Canada," October.

WILLIAMSON, JOHN. 2000. "The Case for Flexibility (in Deciding Whether to Dollarize)." Speech made at the North-South Institute Conference on Dollarization in the Western Hemisphere, October.

# Is Commercial Banking a Distinct Line of Commerce?

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IN ANALYZING THE COMPETITIVE IMPACTS OF BANK CONSOLIDATIONS, BANKING AGENCIES AND THE U.S. DEPARTMENT OF JUSTICE HAVE TENDED TO RELY ON THREE BASIC NOTIONS: THE MARKET FOR BANK PRODUCTS IS PREDOMINANTLY LOCAL. IT IS DEFINED BY A GROUP OF PRODUCTS RATHER THAN BY INDIVIDUAL ONES. AND IT IS SERVED PRIMARILY BY COMMERCIAL BANKS. AT THEIR SIMPLEST,

these propositions assume that the market for all bank services is local and that the market is for services offered only by banks. This approach allows analysts to merge all products and services into a single “cluster of services” for analysis of competition.<sup>1</sup>

The concept of such a cluster of services, and the underlying ideas about the market for such services, is facing serious challenges, however. Since 1984 the U.S. Federal Reserve has taken a somewhat broader view by acknowledging savings and thrift institutions as local suppliers of banking services and including them in their competitive analysis; typically, though, these institutions are assigned a lesser weight than commercial banks in order to reflect their lower levels of expertise in providing some components of the cluster (Woosley 1995). In addition, some perceive that as bank services have evolved toward electronic distribution, as in the

case of mortgages, and remote distribution—through credit cards, for example—the set of services distributed locally is smaller (Ausubel 1991; Jackson 1992; Hymel 1994). Indeed, increases in types and locations of competitors have cast doubt on whether a cluster of services exists at all.<sup>2</sup> These changes have induced the U.S. Department of Justice to do separate analyses of small business lending in the consolidations that it analyzes (Board of Governors and U.S. Department of Justice 1995; U.S. Department of Justice and Federal Trade Commission 1997; Kramer 1999).<sup>3</sup>

Other evidence seems to support the conclusion that the demand for small business loans is largely confined to local financial institutions and that lenders serve only areas fairly close to their physical location (Cole, Wolken, and Woodburn 1996; Kwast, Starr-McClure, and Wolken 1997; Cole 1998;

Kwast 1999). As traditionally practiced, lending to small businesses involves diverse borrowers that have fewer of the standard measures of creditworthiness and require close monitoring of condition and collateral. The borrowers are not generally rated by national rating agencies and may lack audited financial statements, and the character and reputation of their owners/managers bears an important weight in the firms' performance and thus in the lender's analysis of the risks of their debts (Petersen and Rajah 1994; Frame 1995; Berger and Udell 1996).

Considerable anecdotal evidence also supports local origins for small business borrowers from

banks. In addition, surveys have found that small businesses, like households, obtain credit from local institutions far more frequently than from other sources (Ellihausen and Wolken 1990, 1992; Kennickell and Kwast 1997; Kwast, Starr-McClure, and Wolken 1997). Indeed, a recent analysis of the National Survey of Small Business Finances indi-

cated only a slight shift in business dependence on local bank sources (Kwast, Starr-McClure, and Wolken 1997).

Antitrust analysis by the Federal Reserve and the Department of Justice often implies that small business lending markets deserve special attention. The Federal Reserve basically holds to the cluster of products and services approach (Frame 1995).<sup>4</sup> The Antitrust Division of the Department of Justice often considers lending to small businesses as a separate local market in its analysis of bank consolidations (Board of Governors and U.S. Department of Justice 1995; Frame 1995; Cynrak 1998; Kramer 1999).

The reasoning, anecdotes, and survey evidence have not, however, convinced all observers that small business lending is either a local market, a market in which financial services are marketed in a tight cluster, or a market served primarily by depository institutions (Jackson and Eisenbeis 1997; Radecki 1998; Samolyk 1998; Grant Thornton LLC 2000).<sup>5</sup> The increasing use of credit scoring in underwriting small business loans suggests that larger institutions believe high-powered scoring models can substitute at least to some extent for the

banking relationships and on-site monitoring that have typically characterized local banking (Frame, Srinivasan, and Woosley forthcoming). Reliability of surveys, particularly market-specific surveys conducted for purposes of antitrust analysis, is another issue, with existing surveys having unavoidable problems associated with missing or inaccurate responses to potentially sensitive questions. And while there is no evidence of bias in data collection by the surveys, it is also true that there is no cost associated with errors and omissions.

The surveys also have other kinds of problems. They historically deal with static conditions, and they generally reflect stable banking relationships. The surveys provide no evidence on the impact of marginal price changes or interest rate changes by lenders chosen by small businesses. If these changes would move customers to lenders located in another area to a significant extent, then one would have to extend the geographic market area. In the extreme, if there were a national market in small business loans with the same price for the same type of loan at every supplier, one would expect small business borrowers to choose the most convenient (that is, local) bank from which to borrow. The survey data are therefore subject to at least two interpretations—either the market is local or, under current market conditions, local convenience outweighs any price or availability advantages offered by out-of-market lenders. Consequently, the surveys do not conclusively show that small business lending markets are local.

New data collected on bank small business lending by location now allow analysis of the number and size of lenders to small businesses in local markets. By identifying the borrower location of small business loans, the number of each reporting bank's loans and their sizes can be assigned a local area. This information allows comparing the number of lenders originating loans in a specific local area with the number of lenders physically located in that area. Since loan number and dollar volume are also now reported, market concentration can be calculated and compared. If the data show significant numbers of nonlocal small business loan originators, there would be reason to doubt the assertion that small business lending markets are local. Comparisons of market concentration would give evidence on the impact of nonlocal lenders on market concentration and potentially on competition.

In addition, the data make it possible to compare local loan-market concentration measures with measures of market concentration on the basis of deposits in local institutions to determine whether the deposit-based measures are useful approxima-

**Community Reinvestment Act small business loan data give a broader picture of the out-of-market participation in a local small business lending market and therefore an indication of the degree of competitive pressure applied by these institutions.**

tions of loan-market concentration. Although, like surveys, the new data reveal static conditions, the additional information available in the Community Reinvestment Act (CRA) small business loan data gives a broader picture of the out-of-market participation in a local small business lending market and therefore an indication of the degree of competitive pressure applied by these institutions. Although the Supreme Court said in *United States v. Philadelphia National Bank*, “In banking, as in most service industries, convenience of location is essential to effective competition,” the presence of out-of-market lenders indicates that the convenience of local offices can be overcome, at least to some extent, by distant lenders offering, for example, better rates, greater access to credit, or more flexible products and hours of service. It may be that as time pressures increase for individuals, banking convenience is becoming more a matter of banking at a convenient time than at a convenient location.

The issues of whether banking markets are local and whether deposits are an appropriate proxy for the cluster are crucial for antitrust analysis, particularly in small markets. Finding a source of reliable information is important given that anecdotes are generally insufficient and surveys provide only inconclusive evidence.

This article compares measures of local market concentration across deposit and small business loan products to answer two questions: Are small business lending markets local, and is deposit concentration an adequate proxy for small business loan concentration?

## New CRA Data

Given the apparent shift in banking patterns and practices, it is desirable to measure both the local orientation of lending markets and the degree to which deposits are a sufficient proxy for other parts of the cluster. The new CRA small business loan data permit assigning small business loans to the census tract of the borrower. The data were collected by bank and thrift regulatory agencies beginning in 1996 pursuant to the revision of federal regulations implementing the CRA. The data help bankers, bank examiners, and community groups monitor the extent to which commercial banks and thrift institutions serve small businesses in low- and moderate-income parts of their service areas.<sup>6</sup> Because the data are collected in the process of judging institutions’ compliance with the Community Reinvestment Act, they are referred to as CRA data.

Each bank and thrift meeting or exceeding a certain size criterion (jointly, “large lenders”) is required to report.<sup>7</sup> Because of these criteria, a number of smaller banks are excluded, particularly from rural areas. Nevertheless, data on number and concentration of reporters give evidence on the nonlocal competitors and the structure of local small business lending markets when large nonlocal bank and thrift competitors are included. A reasonable extension of the banking data is used to estimate the importance of a portion of the nonreporters.

The CRA data are a welcome alternative and supplement to Call Report and survey data for two reasons.<sup>8</sup> First, unlike Call Report lending data, CRA

1. *United States v. Philadelphia National Bank*, 374 U.S. 321 (1963); *United States v. Phillipsburg National Bank*, 399 U.S. 350 (1969); *United States v. Marine Bancorporation, Inc.*, 418 U.S. 602 (1974); *United States v. Connecticut National Bank*, 418 U.S. 656 (1974); *United States v. Central State Bank*, 621 F. Supp. 1276, 1292 (W.D. Mich., 1985), Aff’d. 817 F. 2d, 22 (6th Cir., 1987).
2. For example, in *United States v. Philadelphia National Bank*, Sup. Ct. page 1737, the court noted that “Some commercial banking products or services are so distinctive that they are entirely free of effective competition from products or services of other financial institutions; the checking account is in this category.” Today, bank checking accounts face competition from thrift checking accounts, credit union share draft accounts, and money market accounts. For a more complete discussion of this reasoning, see the section below on “The Cluster of Services and Local Deposits as a Proxy for Market Structure.”
3. Some, rather than questioning the existence of the cluster, question the use of deposits as a proxy (Dillon 1997).
4. See, for example, “First Security Corporation,” *Federal Reserve Bulletin* 86 (2000): 123–24 <<http://www.bog.frb.fed.us/boarddocs/press/bhc/1999/19991213/19991213.pdf>> (October 17, 2000); and “Chemical Banking Corporation,” *Federal Reserve Bulletin* 82 (1996): 239.
5. Although this latter issue deserves to be carefully analyzed, this paper does not attempt to do so because the new data analyzed here are reported only by commercial banks and thrifts lending to small businesses.
6. Data on the location of loans to farms were also collected under the same mandate. These data are not analyzed in this study. Farm loan data were excluded primarily because of the lack of location-specific data on significant sources of farm credit, such as the Farm Credit System and trade credit granted by suppliers.
7. The criteria require reports of all depository institutions with assets greater than \$250 million as well as all deposit-taking subsidiaries of bank holding companies with consolidated assets exceeding \$1 billion, regardless of subsidiary size. This study is based on 1998 data, reported by 1,714 institutions. (In 1997 there were 1,727 reporters, and in 1996 there were 1,844.)
8. “Call Report” is the common name for the Report of Condition and the Report of Income, which are financial statements required by federal banking regulators.

## Measuring Market Structure: The HHI

In this study, the Herfindahl-Hirschman Index measures banking market concentration. Both the Department of Justice and the Federal Reserve use this index as a first step in analyzing the likely competitive impact of mergers. Many articles that deal with market structure in any industry employ the HHI.

The HHI includes all the competitors that an analyst chooses in a particular market. To compute the index one squares each competitor's market share and sums these squared shares. If there is only one competitor, its share would be 100 percent and the market HHI would be 100 squared or 10,000. Two equally large competitors would each have market shares of 50 percent and the

market would have an HHI of 5,000. Greater numbers of competitors and more widely spread market shares result in smaller indexes. A market with ten firms with equal shares has an HHI of 1,000.

The HHI has two other useful characteristics. Because of the squaring of shares, the HHI gives heavier weight to firms with larger shares. In addition, 10,000 divided by the HHI equals the number of competitors of equal size that would result in the given HHI value. This latter characteristic gives another perspective on market concentration.

To learn more about the HHI and its use, see Rhoades (1993) and Holder (1993a).

lending data is location-specific. Second, while small businesses responding to surveys may be reluctant to respond to queries regarding their banking practices, lenders submitting small business loan data for CRA purposes are subject to regulatory pressure to file complete and accurate reports. Although the resulting data may be neither perfectly suited to competitive analysis nor perfectly accurate, it is a significant addition to the data available for analysis.

Cyrnak (1998) analyzed 1996 CRA small business loan data to determine the extent and impact of loan originations by out-of-market lenders on urban and rural small business loan markets of varying sizes. For all but the largest markets, Cyrnak found that the average number of out-of-market lenders exceeded the average number of in-market institutions, with the ratio of out-of-market competitors to in-market competitors inversely related to market population. At the same time, out-of-market institutions were responsible for fewer loans (both number and dollar volume) than in-market institutions. The average size of small business loans was smaller for out-of-market competitors than in-market lenders. In rural markets, out-of-market CRA reporters accounted for a higher proportion of loan dollar volume and a lower portion of small business loan originations by number of loans than in urban markets. Cyrnak concluded that the higher proportion of dollar lending by out-of-market banks was indicative of the greater importance of outside institutions in rural small business lending than in urban small business lending. For rural markets, Cyrnak found that out-of-market institutions accounted for

63 percent of institutions extending small business loans—17 percent of business loans by number and 14 percent by volume.

The potential significance of out-of-market lending in rural markets is clear. Limiting competitive analysis to local sources of credit is more often critical to antitrust analysis in small markets, in which consolidations are likely to remove a significant competitor. Markets outside of metropolitan areas (rural markets) typically have fewer commercial banks and thrift institutions than urban ones; by any local measure they are more concentrated (Cyrnak 1998; Woosley 1998). Mergers of banks in rural markets are, thus, more likely to breach guidelines that bank regulators and the Department of Justice use to identify mergers with potential for serious adverse effects on competition. For these reasons, this article focuses on measuring competition in rural counties.

This article extends Cyrnak's study by examining rural markets in greater detail. For the fifty states' rural counties, three separate market concentration measures are calculated and compared across four possible product markets, using 1998 data. (Concentration measures and product markets are discussed below in detail.) These metrics are reported by state and for the United States as a whole, allowing interested readers to compare a market's competition to the norms for the state.

In general, Cyrnak concluded that CRA data demonstrate that in some cases there is significant out-of-market competition. The potential implications of the research presented here are broader. If

market concentration measures differ significantly across the four product measures chosen, it may indicate either that the cluster theory no longer holds or that deposits are not the most appropriate proxy for the ability to provide banking products and services to a given locale.

Even if market concentration metrics are not significantly different, or if they differ only in degrees of extreme concentration, additional analysis will shed light on the use of these out-of-market competitors as a mitigating factor or anti-competitive factor. In one tabulation of mergers acted upon by the Federal Reserve Board, the most frequently cited mitigating factor was strong remaining competition, due either to thrift competition, numerous remaining competition, or nonbank and out-of-market competitors (Holder 1993b). If using deposit-based measures of concentration routinely understates the number and importance of remaining out-of-market competitors, then further consideration of potential mitigating factors is necessary. Furthermore, if Herfindahl-Hirschman Indexes (HHIs) and other concentration measures differ only insignificantly across product markets, the Department of Justice practice of considering local small business lending as a separate market may be overly strict or redundant.<sup>9</sup>

Finally, using 1998 data will permit users to make comparisons across time regarding the relative importance of out-of-market lenders in a changing competitive environment. It is possible that the increasing prevalence of interstate or nationwide branching and the continuing reduction in the number of commercial banks and thrifts has changed competitive patterns since 1996. Incidentally, one can assume that as reporting institutions have become more familiar with the reporting requirements, the CRA data have become more accurate.

## What Do the New Data Reveal?

Rural markets analyzed here are counties that are not in metropolitan areas and that have at least one CRA reporter or banking office.<sup>10</sup> In 1998 there were 2,356 of these markets in the United States. Within the rural counties, concentration is measured in three different ways—number of competitors, HHI, and the three-firm ratio—across four different combinations of products and competitors, or markets.<sup>11</sup>

The first product market is the local deposit base, including total deposits of each bank and thrift with offices in the county.<sup>12</sup> Banks and thrifts annually report deposits held in each office to the Federal Deposit Insurance Corporation (FDIC) as part of the Summary of Deposits report. Bank regulators and the Department of Justice typically use such deposit-based HHIs in the first step of analyzing competitive effects of mergers.

The second market is small business loans based on Call Report loan data for depository institutions with physical locations within the market. Since Call Report data do not identify local markets in which an institution made small business loans, loans for each given market are estimated. The estimation method assumes that each institution's loans and deposits are distributed identically—that is, if bank A has 15 percent of its deposits in county Z, then 15 percent of bank A's small business loans are attributed to county Z.<sup>13</sup> This estimation is the one that has traditionally been used to examine small business lending for antitrust purposes when such lending has been separated from the cluster of banking products and services.

The third market is small business loans based on CRA data for the market.<sup>14</sup> A HHI table is constructed using only the CRA reporters that originated at least one loan in the county. This approach

9. The HHI is the primary measure of concentration used by federal regulators to assess the effect of mergers and acquisitions. For an explanation of the HHI, see the box on page 42.

10. For the summary statistics presently in Tables 1, 2, and 3, all rural counties that had either a depository office or an out-of-market CRA lender are included. For Tables 4 through 7, only rural counties that had both a depository office and an out-of-market lender are included. There are 2,237 rural counties that meet these criteria.

11. The three-firm ratio is the sum of the market shares of the three largest competitors.

12. The article follows the Federal Reserve's policy of computing a market HHI counting all deposits held in branches of banks and thrifts affiliated with banks, and half the deposits of other thrift offices. The partial consideration of thrifts recognizes their limited offering of some bank products, such as business loans. All loans of banks or thrifts are given full weight for the purposes of calculating concentration metrics for the three small business loan product markets. However, since thrifts report small business lending differently than commercial banks, estimates based on Thrift Financial Reports may not accurately represent thrift small business loans in a locale.

13. In all three HHI tables based on small business loans, all banks and thrifts are given equal weight.

14. Cynak (1998) has reported 1996 HHI data excluding business credit card loans. Credit card loans are included here for three reasons. First, credit card debt is a prevalent means of small business finance. Second, a line of credit accessed by a credit card has few functional differences from other small business credit lines. Finally, for lenders that issue both credit card loans and other small business loans, the CRA data do not identify the type of loan made.

indicates market concentration among lenders large enough to meet CRA reporting size criteria, based on their CRA small business loan originations for the market.

The fourth market, referred to as combined measure, contains the most comprehensive set of competitors. It includes small business loans made by both in-market and out-of-market firms, with reporters' CRA data combined with in-market non-reporters' Call Report data to arrive at a more comprehensive set of market measures. Because of reporting criteria, the CRA data omit many smaller banks' business lending. In order to partially adjust for this omission, a set of market data is computed that adds nonreporting business lenders with at least one office in the county. This adjustment assumes that banks with offices in a county are likely to make small business loans in that county. Since these banks are too small to be captured by the CRA criteria, this assumption is at least somewhat defensible. The estimation methodology described above for the Call Report data is used to estimate the in-market loans of nonreporters. The inclusion of both small and large financial institutions is likely to give the most accurate portrayal of small business lending in each area, given the limited availability of small business loan data.

For CRA purposes lenders report loan originations while for Call Report purposes lenders report outstanding loans. Unless the CRA data are adjusted to approximate outstanding loans, a comparison of Call Report and CRA data will generally understate the impact of lending by CRA reporters. Typically, the small business loans reported for CRA purposes were approximately 60 percent of the outstanding small business loans noted on the Call Report. Accordingly, in calculating the combined small business loan product market, the loan originations reported for CRA purposes in a given market are assumed to be 60 percent of outstanding loans in that market.

The combined small business loan data for 1998 show much greater numbers of small business lenders when out-of-market CRA reporters are included.<sup>15</sup> Table 1 compares the number of competitors across the four product markets. The mean number of institutions more than doubles, from five to thirteen, when combined small business lenders are compared with deposit takers with local branches; on average, more than 60 percent of small business lenders do not have a physical presence in the market. For example, in the average rural county in Alabama, 4.98 depository institutions have offices, but 14.04 originated small business loans. Out-of-market banks are more important in smaller markets.

Since market concentration guidelines tend to be breached more often in smaller markets, the greater importance of out-of-market lenders implies that antitrust authorities should be more attentive to identifying outside lenders in these areas.

The HHI-based combined market structure measure did not differ as dramatically from Call Report or deposit measures as one might expect, given the substantial addition in the number of out-of-market lenders shown by the CRA and combined data. Table 2 shows that combined business loan concentration including both in- and out-of-market lenders is, on average, 5.71 percent (240 points) lower than the Call Report-based small business loan HHI with only in-market lenders counted and only 1.67 percent (65 points) higher than the deposit-based HHI. In other words, including out-of-market lenders reveals that the levels of lending concentration are lower than apparent from the Call Report lending data. Again using Alabama as an example, the average rural county has a deposit-based HHI of 3,572 points and an average small business loan HHI (based on Call Report data) of 4,080. The average rural Alabama HHI on the combined CRA and Call Report small business loan data is 3,479. Although the Call Report loan data generally indicate significantly higher concentration levels than deposit data, the combined small business loan data reveal average concentration levels that are closer to those of the deposit data. With all measures, rural markets typically exceed the HHI minimum set out in the Department of Justice guidelines for banks with mean HHIs of 3,901 (deposits), 4,206 (Call Report small business loans), and 3,966 (combined) (see Table 2).

Similarly, the three-firm ratios also differed less dramatically when comparing deposit market tables and combined small business loan market tables than might be expected in light of the greater total number of competitors. Table 3 compares the three-firm ratios across the various product and competitor combinations. As with the HHI, the variation in three-firm ratios generally indicates that omitting out-of-market small business lenders makes small difference in market concentration. The average three-firm ratio for the combined small business loan markets was 84.8 percent, compared with 85.4 percent and 87.7 percent for the deposit and Call Report small business loan markets, respectively.

Smaller relative differences in HHIs and three-firm ratios than in number of lenders when out-of-market lenders are included arise from the character of out-of-market loans. Many of the institutions with widespread lending outside their geographic footprint issue credit cards or signature loans with relatively small loan amounts. Including estimates of small

**TABLE 1 Average Number of Competitors in Rural Markets**

|                | Deposit | Call Reports | CRA   | Combined |
|----------------|---------|--------------|-------|----------|
| Alabama        | 4.98    | 4.98         | 11.02 | 14.04    |
| Alaska         | 2.70    | 2.50         | 6.44  | 6.69     |
| Arizona        | 5.89    | 5.67         | 13.78 | 14.89    |
| Arkansas       | 4.23    | 4.23         | 9.25  | 12.06    |
| California     | 5.42    | 5.35         | 15.00 | 16.54    |
| Colorado       | 3.71    | 3.67         | 9.02  | 11.02    |
| Delaware       | 11.00   | 9.00         | 25.00 | 28.00    |
| Florida        | 4.17    | 4.11         | 11.36 | 13.21    |
| Georgia        | 3.57    | 3.56         | 8.33  | 10.78    |
| Hawaii         | 7.67    | 7.67         | 18.00 | 18.33    |
| Idaho          | 4.20    | 4.10         | 9.41  | 10.22    |
| Illinois       | 7.90    | 7.87         | 11.19 | 16.55    |
| Indiana        | 5.54    | 5.46         | 14.84 | 16.93    |
| Iowa           | 6.88    | 6.88         | 8.75  | 13.74    |
| Kansas         | 5.52    | 5.51         | 6.43  | 10.98    |
| Kentucky       | 3.56    | 3.54         | 8.79  | 11.30    |
| Louisiana      | 4.45    | 4.43         | 9.08  | 12.13    |
| Maine          | 7.92    | 7.92         | 15.00 | 17.88    |
| Maryland       | 7.44    | 7.44         | 14.56 | 17.44    |
| Massachusetts  | 4.33    | 4.33         | 15.38 | 16.25    |
| Michigan       | 5.02    | 5.00         | 13.93 | 15.88    |
| Minnesota      | 7.47    | 7.40         | 9.77  | 15.97    |
| Mississippi    | 4.05    | 4.05         | 10.60 | 12.28    |
| Missouri       | 5.63    | 5.44         | 8.89  | 12.73    |
| Montana        | 3.50    | 3.50         | 6.49  | 8.64     |
| Nebraska       | 5.08    | 5.00         | 6.62  | 9.95     |
| Nevada         | 4.00    | 3.83         | 8.77  | 9.38     |
| New Hampshire  | 9.86    | 9.86         | 20.60 | 23.90    |
| New Mexico     | 4.19    | 4.19         | 9.11  | 11.74    |
| New York       | 7.17    | 7.17         | 18.21 | 20.75    |
| North Carolina | 5.72    | 5.70         | 14.05 | 15.20    |
| North Dakota   | 4.23    | 4.21         | 5.37  | 8.18     |
| Ohio           | 7.32    | 7.18         | 15.55 | 18.68    |
| Oklahoma       | 5.46    | 5.46         | 8.63  | 12.20    |
| Oregon         | 5.63    | 5.56         | 11.07 | 12.70    |
| Pennsylvania   | 6.97    | 6.94         | 16.65 | 19.62    |
| Rhode Island   | 5.00    | 5.00         | 10.00 | 10.50    |
| South Carolina | 5.64    | 5.52         | 13.87 | 15.25    |
| South Dakota   | 3.66    | 3.66         | 5.52  | 8.11     |
| Tennessee      | 4.49    | 4.46         | 10.71 | 13.04    |
| Texas          | 4.03    | 4.02         | 8.38  | 11.19    |
| Utah           | 3.57    | 3.48         | 8.92  | 9.83     |
| Vermont        | 6.45    | 6.36         | 16.14 | 17.86    |
| Virginia       | 4.66    | 4.65         | 10.16 | 11.79    |
| Washington     | 6.07    | 5.89         | 11.93 | 13.81    |
| West Virginia  | 3.82    | 3.77         | 9.33  | 10.71    |
| Wisconsin      | 8.22    | 8.20         | 13.33 | 17.69    |
| Wyoming        | 4.33    | 4.33         | 9.19  | 11.48    |
| United States  | 5.08    | 5.04         | 10.09 | 12.84    |

Note for Tables 1, 2, and 3: "Deposit" data are for local deposit bases, including total deposits of banks and thrifts. Call Report data are small business loans based on Call Report loan data for depository institutions with physical locations within the market. CRA data are for small business loan originations for the market. "Combined" data include small business loans made by both in-market and out-of-market firms, as reported in CRA data and Call Reports. For all charts: Connecticut, New Jersey, and Washington, D.C., are omitted because they have no completely rural counties.

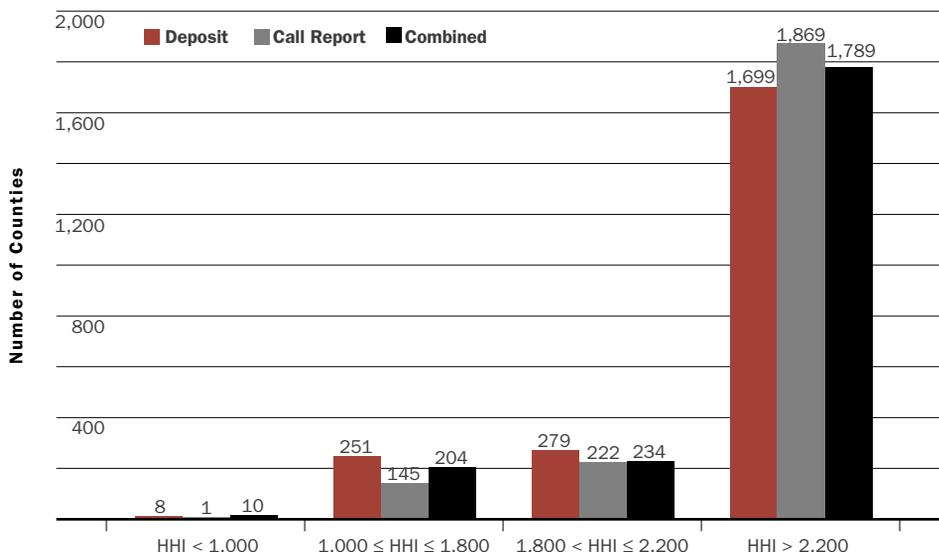
Source for all tables and charts: Deposit data are from the FDIC Summary of Deposits. Call Report data are from the Federal Financial Institutions Examination Council (FFIEC) Call Reports accessed via the Federal Reserve System's National Information Center. CRA data are from small business loan data as reported to the FFIEC for CRA purposes.

15. Cynrak (1998) shows similar changes for the 1996 data.

**TABLE 2 Average Rural Market HHI**

|                | Deposit | Call Report | CRA   | Combined |
|----------------|---------|-------------|-------|----------|
| Alabama        | 3,572   | 4,080       | 4,063 | 3,479    |
| Alaska         | 6,107   | 6,336       | 5,967 | 6,164    |
| Arizona        | 3,714   | 3,806       | 2,404 | 3,689    |
| Arkansas       | 4,060   | 4,292       | 4,959 | 4,172    |
| California     | 3,762   | 4,298       | 2,944 | 3,427    |
| Colorado       | 5,180   | 5,434       | 4,072 | 4,519    |
| Delaware       | 7,382   | 2,033       | 1,726 | 1,315    |
| Florida        | 4,410   | 4,642       | 3,817 | 4,794    |
| Georgia        | 4,779   | 5,274       | 5,382 | 4,584    |
| Hawaii         | 3,114   | 3,005       | 2,472 | 2,410    |
| Idaho          | 4,405   | 4,268       | 4,036 | 3,835    |
| Illinois       | 2,733   | 3,180       | 4,559 | 3,285    |
| Indiana        | 3,398   | 3,769       | 3,417 | 3,282    |
| Iowa           | 2,758   | 3,033       | 4,699 | 3,172    |
| Kansas         | 3,510   | 3,751       | 5,194 | 3,672    |
| Kentucky       | 4,700   | 4,914       | 4,687 | 4,643    |
| Louisiana      | 3,951   | 4,076       | 4,410 | 3,799    |
| Maine          | 2,355   | 2,692       | 3,333 | 2,883    |
| Maryland       | 2,831   | 3,651       | 4,103 | 3,016    |
| Massachusetts  | 3,633   | 4,563       | 2,411 | 3,164    |
| Michigan       | 3,905   | 4,073       | 3,413 | 3,633    |
| Minnesota      | 2,649   | 2,936       | 4,746 | 2,727    |
| Mississippi    | 4,080   | 4,160       | 4,494 | 4,134    |
| Missouri       | 3,209   | 3,571       | 4,795 | 3,355    |
| Montana        | 5,508   | 5,720       | 4,947 | 5,781    |
| Nebraska       | 4,225   | 4,427       | 5,548 | 4,131    |
| Nevada         | 4,396   | 5,201       | 3,381 | 4,506    |
| New Hampshire  | 3,012   | 2,338       | 2,216 | 2,372    |
| New Mexico     | 4,714   | 4,987       | 4,703 | 4,771    |
| New York       | 2,617   | 3,053       | 2,965 | 2,713    |
| North Carolina | 3,476   | 3,601       | 3,173 | 2,993    |
| North Dakota   | 4,060   | 4,536       | 6,164 | 4,518    |
| Ohio           | 2,719   | 3,241       | 3,218 | 3,089    |
| Oklahoma       | 3,486   | 3,681       | 4,251 | 3,773    |
| Oregon         | 3,637   | 4,454       | 3,978 | 4,603    |
| Pennsylvania   | 3,116   | 3,311       | 3,258 | 2,658    |
| Rhode Island   | 2,412   | 4,196       | 6,059 | 6,312    |
| South Carolina | 3,192   | 3,521       | 2,898 | 3,728    |
| South Dakota   | 5,085   | 5,191       | 6,156 | 4,838    |
| Tennessee      | 3,972   | 4,210       | 4,218 | 3,955    |
| Texas          | 4,612   | 4,962       | 4,673 | 4,535    |
| Utah           | 5,267   | 5,380       | 4,717 | 4,612    |
| Vermont        | 3,178   | 3,236       | 3,027 | 3,789    |
| Virginia       | 3,843   | 4,268       | 4,092 | 4,328    |
| Washington     | 3,276   | 4,244       | 2,898 | 3,858    |
| West Virginia  | 4,451   | 4,809       | 4,579 | 4,880    |
| Wisconsin      | 2,626   | 3,091       | 4,167 | 3,060    |
| Wyoming        | 3,647   | 3,913       | 5,022 | 4,232    |
| United States  | 3,901   | 4,206       | 4,447 | 3,966    |

**CHART 1 Distribution of Rural HHI Levels**



business loans made by nonreporters improves the competitive picture significantly when concentration is measured by number of competitors, but the changes are less dramatic when the HHI or the three-firm ratio measures concentration. Combined small business loan HHIs and three-firm ratios were similar or lower, on average, than the corresponding measures of concentration using different sets of products and competitors. Some markets that were highly concentrated when only in-market competitors were considered become only moderately concentrated when measured by the HHI based on combined small business loans. Overall, however, with concentration measured by combined small business loans instead of deposits, 2.22 percent more markets exceeded Department of Justice guidelines.<sup>16</sup> Conversely, 3.25 percent fewer markets exceeded Department of Justice guidelines if concentration is measured by combined small business loans instead of Call Report data.

To give some idea of whether individual market concentration differs significantly when out-of-market CRA lenders are included in concentration measures, all markets with HHIs over 2,200 based on in-market deposit takers and lenders were identified.<sup>17</sup> Percentage differences in their HHIs when out-of-market lenders were included were measured.

Tables 4 and 5 and Chart 1 show the results. Approximately 52 percent of the 1,699 markets in which the deposit HHI exceeded 2,200 had lower HHIs based on combined small business loans. In addition, in 8.7 percent of markets in which the deposit HHI is extremely high, the combined small business loan HHI is less than 2,200. On average, the combined HHI was fifty points lower than the deposit HHI in very concentrated markets.

Similarly, in the markets in which the in-market Call Report small business loan measures exceeded 2,200, 63.6 percent showed lower HHIs when out-of-market lenders were included, and 9.5 percent of combined small business loan HHIs were less than 2,200. On average, the combined HHI based on small business loans was 302 points lower than the HHI based on Call Report data for these highly concentrated markets.

These results indicate that a market that is highly concentrated when measured by deposits or Call Report data is not likely to become unconcentrated when measured by combined CRA and Call Report data. On the other hand, it is possible that the market will appear only moderately concentrated, or at least less highly concentrated, when combined small business loans are used to measure concentration instead of when deposits or Call Report data are used.

16. The HHI exceeded 1,800 in 1,978 markets when the product market is deposits, in 2,091 markets when the product market is Call Report small business loans, and in 2,023 markets when the product market is combined small business loans.

17. Based on Call Report small business loan HHIs, there were 1,869 counties where the HHI exceeded 2,200. There were 1,699 counties where the deposit-based HHI exceeded 2,200 and 1,789 where the combined HHI based on small business loans was greater than 2,200. The upper limit of 2,200 for HHI was chosen to reflect precedent for mergers receiving approval without divestiture.

**TABLE 3 Average Three-Firm Ratios**

|                | Deposit | Call Reports | CRA   | Combined |
|----------------|---------|--------------|-------|----------|
| Alabama        | 84.19   | 87.90        | 86.56 | 81.93    |
| Alaska         | 97.06   | 97.28        | 96.85 | 95.27    |
| Arizona        | 82.94   | 81.23        | 69.02 | 77.01    |
| Arkansas       | 89.92   | 91.05        | 89.85 | 89.45    |
| California     | 80.04   | 87.57        | 73.73 | 79.96    |
| Colorado       | 90.21   | 91.83        | 84.18 | 87.27    |
| Delaware       | 94.03   | 67.54        | 62.77 | 54.07    |
| Florida        | 90.10   | 90.86        | 81.81 | 88.58    |
| Georgia        | 92.21   | 93.84        | 91.66 | 90.53    |
| Hawaii         | 87.35   | 85.66        | 77.04 | 75.92    |
| Idaho          | 91.53   | 90.82        | 87.03 | 85.15    |
| Illinois       | 73.08   | 78.37        | 87.27 | 76.67    |
| Indiana        | 83.37   | 85.82        | 82.25 | 79.31    |
| Iowa           | 74.69   | 78.87        | 89.19 | 78.05    |
| Kansas         | 83.12   | 86.46        | 91.91 | 85.58    |
| Kentucky       | 93.28   | 94.65        | 89.10 | 91.25    |
| Louisiana      | 90.71   | 91.75        | 87.51 | 88.45    |
| Maine          | 73.25   | 76.59        | 81.61 | 75.44    |
| Maryland       | 75.32   | 84.45        | 85.36 | 83.84    |
| Massachusetts  | 86.54   | 87.78        | 70.82 | 77.40    |
| Michigan       | 86.53   | 87.73        | 81.49 | 82.28    |
| Minnesota      | 73.58   | 78.08        | 88.33 | 74.52    |
| Mississippi    | 91.44   | 91.83        | 89.27 | 88.70    |
| Missouri       | 81.98   | 85.00        | 90.07 | 83.56    |
| Montana        | 94.14   | 94.43        | 90.81 | 92.85    |
| Nebraska       | 84.75   | 86.94        | 93.40 | 85.39    |
| Nevada         | 87.72   | 91.83        | 80.50 | 84.50    |
| New Hampshire  | 70.99   | 70.03        | 67.44 | 70.08    |
| New Mexico     | 90.57   | 92.34        | 88.50 | 89.84    |
| New York       | 75.07   | 79.78        | 78.35 | 75.40    |
| North Carolina | 82.51   | 82.91        | 81.88 | 78.35    |
| North Dakota   | 91.73   | 93.24        | 92.86 | 92.36    |
| Ohio           | 74.67   | 79.81        | 79.36 | 75.63    |
| Oklahoma       | 81.62   | 85.54        | 89.89 | 84.41    |
| Oregon         | 83.30   | 87.98        | 81.82 | 87.81    |
| Pennsylvania   | 80.46   | 82.73        | 78.96 | 74.23    |
| Rhode Island   | 76.93   | 88.08        | 82.62 | 87.36    |
| South Carolina | 81.24   | 82.73        | 77.53 | 81.24    |
| South Dakota   | 92.43   | 93.57        | 96.27 | 92.52    |
| Tennessee      | 86.79   | 88.71        | 88.21 | 85.92    |
| Texas          | 89.26   | 90.71        | 86.26 | 88.28    |
| Utah           | 94.10   | 94.35        | 91.72 | 90.13    |
| Vermont        | 77.73   | 77.93        | 77.52 | 80.10    |
| Virginia       | 87.74   | 89.26        | 86.14 | 88.10    |
| Washington     | 81.07   | 87.09        | 76.96 | 80.01    |
| West Virginia  | 93.25   | 93.43        | 88.96 | 88.76    |
| Wisconsin      | 72.92   | 78.07        | 85.59 | 75.59    |
| Wyoming        | 89.23   | 90.90        | 91.38 | 89.58    |
| United States  | 85.42   | 87.72        | 87.11 | 84.79    |

**TABLE 4 Highly Concentrated Deposit Markets**

|                | Number of Counties with<br>Deposit HHI > 2,200 | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI < 2,200 | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI < Deposit HHI | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI > Deposit HHI |
|----------------|--|---|---|---|
| Alabama        | 35   | 5.71  | 54.29   | 45.71   |
| Alaska         | 17   | 5.88  | 58.82   | 41.18   |
| Arizona        | 5  | 20.00   | 60.00   | 40.00   |
| Arkansas       | 56   | 3.57  | 41.07   | 58.93   |
| California     | 13   | 30.77   | 61.54   | 38.46   |
| Colorado       | 41   | 4.88  | 63.41   | 36.59   |
| Delaware       | 1  | 100.00  | 100.00  | 0.00  |
| Florida        | 28   | 7.14  | 46.43   | 53.57   |
| Georgia        | 106  | 4.72  | 57.55   | 42.45   |
| Hawaii         | 3  | 0.00  | 100.00  | 0.00  |
| Idaho          | 37   | 16.22   | 64.86   | 37.84   |
| Illinois       | 33   | 6.06  | 33.33   | 66.67   |
| Indiana        | 41   | 19.51   | 60.98   | 39.02   |
| Iowa           | 41   | 7.32  | 39.02   | 60.98   |
| Kansas         | 69   | 7.25  | 49.28   | 50.72   |
| Kentucky       | 94   | 4.26  | 50.00   | 50.00   |
| Louisiana      | 36   | 8.33  | 52.78   | 47.22   |
| Maine          | 6  | 0.00  | 16.67   | 83.33   |
| Maryland       | 5  | 0.00  | 60.00   | 40.00   |
| Massachusetts  | 2  | 0.00  | 50.00   | 50.00   |
| Michigan       | 47   | 14.89   | 68.09   | 31.91   |
| Minnesota      | 34   | 11.76   | 58.82   | 41.18   |
| Mississippi    | 66   | 7.58  | 45.45   | 54.55   |
| Missouri       | 64   | 14.06   | 43.75   | 56.25   |
| Montana        | 46   | 0.00  | 43.48   | 56.52   |
| Nebraska       | 58   | 5.17  | 58.62   | 41.38   |
| Nevada         | 10   | 10.00   | 40.00   | 60.00   |
| New Hampshire  | 3  | 66.67   | 66.67   | 33.33   |
| New Mexico     | 23   | 0.00  | 43.48   | 56.52   |
| New York       | 13   | 15.38   | 53.85   | 46.15   |
| North Carolina | 48   | 25.00   | 60.42   | 39.58   |
| North Dakota   | 41   | 0.00  | 41.46   | 58.54   |
| Ohio           | 27   | 25.93   | 40.74   | 59.26   |
| Oklahoma       | 42   | 11.90   | 50.00   | 50.00   |
| Oregon         | 19   | 5.26  | 47.37   | 52.63   |
| Pennsylvania   | 20   | 30.00   | 70.00   | 30.00   |
| Rhode Island   | 1  | 0.00  | 0.00  | 100.00  |
| South Carolina | 18   | 11.11   | 44.44   | 55.56   |
| South Dakota   | 56   | 5.36  | 62.50   | 37.50   |
| Tennessee      | 55   | 9.09  | 54.55   | 45.45   |
| Texas          | 151  | 5.30  | 57.62   | 42.38   |
| Utah           | 22   | 4.55  | 72.73   | 27.27   |
| Vermont        | 5  | 20.00   | 60.00   | 40.00   |
| Virginia       | 56   | 5.36  | 44.64   | 55.36   |
| Washington     | 18   | 22.22   | 33.33   | 66.67   |
| West Virginia  | 41   | 7.32  | 56.10   | 43.90   |
| Wisconsin      | 25   | 8.00  | 32.00   | 68.00   |
| Wyoming        | 21   | 4.76  | 42.86   | 57.14   |
| United States  | 1,699  | 8.71  | 52.09   | 47.91   |

**TABLE 5 Highly Concentrated Call Report Markets**

|                | Number of Counties with<br>Call Report HHI > 2,200 | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI < 2,200 | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI < Call Report HHI | Percentage of Highly<br>Concentrated Counties<br>with Combined<br>HHI > Call Report HHI |
|----------------|--|---|---|---|
| Alabama        | 38   | 10.53   | 84.21   | 15.79   |
| Alaska         | 18   | 5.56  | 61.11   | 38.89   |
| Arizona        | 6  | 16.67   | 33.33   | 66.67   |
| Arkansas       | 57   | 1.75  | 54.39   | 45.61   |
| California     | 22   | 27.27   | 50.00   | 50.00   |
| Colorado       | 43   | 4.65  | 76.74   | 23.26   |
| Delaware       | 1  | 100.00  | 100.00  | 0.00  |
| Florida        | 29   | 3.45  | 44.83   | 55.17   |
| Georgia        | 109  | 5.50  | 77.06   | 22.94   |
| Hawaii         | 3  | 0.00  | 100.00  | 0.00  |
| Idaho          | 35   | 11.43   | 57.14   | 42.86   |
| Illinois       | 47   | 14.89   | 55.32   | 44.68   |
| Indiana        | 46   | 21.74   | 65.22   | 34.78   |
| Iowa           | 56   | 14.29   | 58.93   | 41.07   |
| Kansas         | 73   | 5.48  | 73.97   | 26.03   |
| Kentucky       | 95   | 6.32  | 69.47   | 30.53   |
| Louisiana      | 39   | 7.69  | 66.67   | 33.33   |
| Maine          | 10   | 10.00   | 30.00   | 70.00   |
| Maryland       | 8  | 0.00  | 62.50   | 37.50   |
| Massachusetts  | 2  | 0.00  | 100.00  | 0.00  |
| Michigan       | 50   | 14.00   | 62.00   | 38.00   |
| Minnesota      | 40   | 12.50   | 85.00   | 15.00   |
| Mississippi    | 66   | 6.06  | 50.00   | 50.00   |
| Missouri       | 77   | 10.39   | 54.55   | 45.45   |
| Montana        | 49   | 0.00  | 57.14   | 42.86   |
| Nebraska       | 62   | 3.23  | 72.58   | 27.42   |
| Nevada         | 11   | 9.09  | 45.45   | 54.55   |
| New Hampshire  | 4  | 50.00   | 50.00   | 50.00   |
| New Mexico     | 25   | 4.00  | 48.00   | 52.00   |
| New York       | 16   | 25.00   | 75.00   | 25.00   |
| North Carolina | 50   | 24.00   | 64.00   | 36.00   |
| North Dakota   | 43   | 0.00  | 60.47   | 39.53   |
| Ohio           | 34   | 29.41   | 61.76   | 38.24   |
| Oklahoma       | 47   | 10.64   | 65.96   | 34.04   |
| Oregon         | 25   | 4.00  | 40.00   | 60.00   |
| Pennsylvania   | 23   | 30.43   | 69.57   | 30.43   |
| Rhode Island   | 1  | 0.00  | 100.00  | 0.00  |
| South Carolina | 22   | 18.18   | 50.00   | 50.00   |
| South Dakota   | 59   | 5.08  | 64.41   | 35.59   |
| Tennessee      | 60   | 8.33  | 61.67   | 38.33   |
| Texas          | 165  | 6.67  | 76.97   | 23.03   |
| Utah           | 23   | 4.35  | 65.22   | 34.78   |
| Vermont        | 7  | 14.29   | 42.86   | 57.14   |
| Virginia       | 60   | 6.67  | 50.00   | 50.00   |
| Washington     | 24   | 25.00   | 58.33   | 41.67   |
| West Virginia  | 40   | 7.50  | 62.50   | 37.50   |
| Wisconsin      | 31   | 16.13   | 58.06   | 41.94   |
| Wyoming        | 19   | 0.00  | 26.32   | 73.68   |
| United States  | 1,869  | 9.47  | 63.62   | 36.38   |

**TABLE 6**  
**Percentage Distribution of Southeastern Rural Markets by Degree of Concentration, 1998**

| Basis for Calculating HHI | Unconcentrated (HHI < 1,000) | Moderately Concentrated (1,000 ≤ HHI ≤ 1,800) | Highly Concentrated (1,800 < HHI ≤ 2,200) | Extremely Highly Concentrated (HHI > 2,200) |
|---------------------------|------------------------------|---|---|---|
| Alabama                   |                              |   |   |   |
| Deposits                  | 0.00                         | 15.22   | 8.70                                      | 76.09                                       |
| Call Report               | 0.00                         | 10.87   | 6.52                                      | 82.61                                       |
| Combined                  | 2.17                         | 10.87   | 8.70                                      | 78.26                                       |
| Florida                   |                              |   |   |   |
| Deposits                  | 0.00                         | 6.06  | 9.09                                      | 84.85                                       |
| Call Report               | 0.00                         | 6.06  | 6.06                                      | 87.88                                       |
| Combined                  | 0.00                         | 9.09  | 0.00                                      | 90.91                                       |
| Georgia                   |                              |   |   |   |
| Deposits                  | 0.00                         | 3.48  | 4.35                                      | 92.17                                       |
| Call Report               | 0.00                         | 1.74  | 3.48                                      | 94.78                                       |
| Combined                  | 0.00                         | 2.61  | 7.83                                      | 89.57                                       |
| Louisiana                 |                              |   |   |   |
| Deposits                  | 0.00                         | 2.50  | 7.50                                      | 90.00                                       |
| Call SBL                  | 0.00                         | 2.50  | 0.00                                      | 97.50                                       |
| Combined                  | 0.00                         | 2.50  | 7.50                                      | 90.00                                       |
| Mississippi               |                              |   |   |   |
| Deposits                  | 0.00                         | 0.00  | 8.33                                      | 91.67                                       |
| Call Report               | 0.00                         | 1.39  | 6.94                                      | 91.67                                       |
| Combined                  | 0.00                         | 1.39  | 11.11                                     | 87.50                                       |
| Tennessee                 |                              |   |   |   |
| Deposits                  | 0.00                         | 5.88  | 13.24                                     | 80.88                                       |
| Call Report               | 0.00                         | 4.41  | 7.35                                      | 88.24                                       |
| Combined                  | 1.47                         | 2.94  | 10.29                                     | 85.29                                       |
| Southeast                 |                              |   |   |   |
| Deposits                  | 0.00                         | 4.81  | 8.02                                      | 87.17                                       |
| Call Report               | 0.00                         | 3.74  | 5.08                                      | 91.18                                       |
| Combined                  | 0.53                         | 4.01  | 8.29                                      | 87.17                                       |
| Nation                    |                              |   |   |   |
| Deposits                  | 0.36                         | 11.22   | 12.47                                     | 75.95                                       |
| Call Report               | 0.04                         | 6.48  | 9.92                                      | 83.55                                       |
| Combined                  | 0.45                         | 9.12  | 10.46                                     | 79.97                                       |

### Sixth District Results

In the six states that are completely or partially included in the Sixth Federal Reserve District, there are 374 rural counties that have at least one banking office and one out-of-market lender.<sup>18</sup> The vast majority of these markets is considered highly concentrated by any of the product market measures used in this analysis, with less than 5 percent considered unconcentrated or moderately concentrated. In fact, no rural markets are unconcentrated when measured by deposit HHI or Call Reports based on

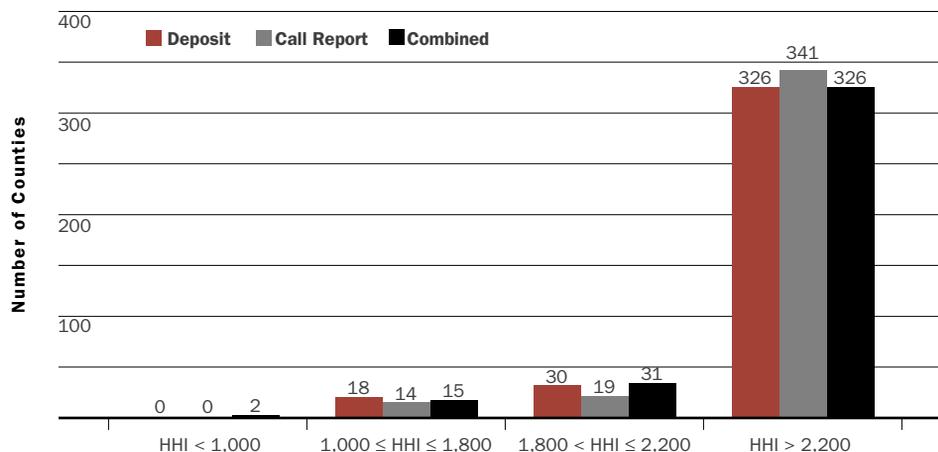
HHI, and only 0.53 percent of markets is unconcentrated when measured by combined small business loan HHI (see Table 6 and Chart 2).

For the Southeast overall, the combined small business loans reveal an average of 12.42 competitors, nearly three times the number of deposit and Call Report competitors (4.20 and 4.18, respectively). Similarly, the southeastern combined small business loan three-firm ratio is 2.1 percent lower than the deposit three-firm ratio and 3.9 percent lower than the Call Report three-firm ratio.<sup>19</sup> The average

18. The terms *Sixth District*, *Sixth District states*, and *Southeast* are used interchangeably in this article. The Sixth District includes Alabama, Florida, Georgia, and parts of Louisiana, Mississippi, and Tennessee. The entire states of Louisiana, Mississippi, and Tennessee were included in this study.

19. The regional combined small business loan three-firm ratio is 87.7 percent while the deposit and Call Report small business loan three-firm ratios are 89.6 percent and 91.2 percent, respectively.

**CHART 2 Distribution of Rural HHIs in the Southeast**



combined HHI of 4,123 is 8.2 percent lower than the HHI based on Call Reports (4,460) for the region but only 0.5 percent lower than the deposit HHI (4,143).

Some southeastern states benefit more than others from out-of-market lending competition. Georgia, for example, has the highest average rural deposit-based HHI in the region, at least partly as a relic of its previously restrictive branching laws. The combined HHI is 195 points (4.3 percent) lower than the deposit HHI and 690 points (15.1 percent) lower than the Call Report HHI. In Alabama, which has the lowest average rural deposit HHI in the southeast, the combined HHI is only 106 points (2.7 percent) lower than the deposit HHI but is 601 points (17.3 percent) lower than the Call Report HHI. Florida's average deposit HHI and Call Report HHI are both lower than the combined HHI, by 8.0 percent and 3.2 percent, respectively. In Florida, some of the largest banking organizations with widespread branching networks do not focus on small business lending in the state. As a result, the CRA data indicate fewer small business loans than estimated by Call Report data. The resulting average combined loan HHI is higher than the average deposit and Call Report-based HHI(s). Even so, the mean combined three-firm ratio is 1.7 percent lower than the deposit three-firm ratio and 2.6 percent lower than the Call Report three-firm ratio.

Although most markets remain highly concentrated regardless of the measurement used, the variations in results illustrate the benefits of using the combined small business loan HHI in addition to the deposit measurements of concentration. The use of multiple measures reveals additional information about the specific markets in question that may be helpful in analyzing the county's competitive profile

and any potential mitigating factors in apparently anticompetitive mergers.

### The Cluster of Services and Local Deposits as a Proxy for Market Structure

In *United States v. Philadelphia National Bank*, the Supreme Court noted that “some commercial banking products or services are so distinctive that they are entirely free of effective competition from products or services of other financial institutions; the checking account is in this category.”<sup>20</sup> With the rise of thrift checking accounts, credit union draft accounts, and money market accounts offered by investment companies, this distinction no longer holds. The Supreme Court also noted, “Others enjoy such cost advantages as to be insulated within a broad range from substitutes furnished by other institutions. For example, commercial banks compete with small-loan companies in the personal-loan market; but the small-loan companies’ rates are invariably much higher than the banks’, in part, it seems, because the companies’ working capital consists in substantial part of bank loans.” These conditions also no longer hold. Specialty lenders are not dependent on commercial banks for working capital, relying instead on access to capital markets and securitization to provide needed funds. The Court also held that “there are banking facilities which, although in terms of cost and price they are freely competitive with the facilities provided by other financial institutions, nevertheless enjoy a settled consumer preference, insulating them, to a marked degree, from competition; this seems to be the case with savings deposits.” In today’s marketplace, savings deposits are subject to competition from thrifts, credit unions, annuities, mutual funds, and other

**TABLE 7 Paired T-tests of Differences in Means<sup>a</sup>**

| Variable 1                        | Variable 2                        | Mean Variable 1 | Mean Variable 2 | T     | Degrees of Freedom | Prob. >  T |
|-----------------------------------|-----------------------------------|-----------------|-----------------|-------|--------------------|------------|
| Deposit HHI                       | Call SBL HHI                      | 3,880           | 4,081           | -4.78 | 4,472              | <0.0001    |
| Deposit Number of Competitors     | Call Report Number of Competitors | 5.18            | 5.14            | 0.47  | 4,472              | 0.6378     |
| Deposit Three-Firm Ratio          | Call Report Three-Firm Ratio      | 85.07           | 87.43           | -5.44 | 4,472              | <0.0001    |
| Deposit HHI                       | Combined HHI                      | 3,770           | 3,846           | 1.21  | 4,472              | 0.2244     |
| Deposit Number of Competitors     | Combined Number of Competitors    | 5.18            | 13.15           | 54.49 | 4,472              | <0.0001    |
| Deposit Three-Firm Ratio          | Combined Three-Firm Ratio         | 85.07           | 84.47           | -1.39 | 4,472              | 0.1653     |
| Call Report HHI                   | Combined HHI                      | 4,081           | 3,846           | -3.78 | 4,472              | 0.0002     |
| Call Report Number of Competitors | Combined Number of Competitors    | 5.14            | 13.15           | 54.87 | 4,472              | <0.0001    |

<sup>a</sup>These results assume unequal variances. Assuming equal variances yielded similar results.

securities and insurance products. With the rise of alternative delivery systems, competing products from nonbank institutions, and greater price competition among financial institutions, it may no longer be accurate to assume this settled consumer preference.

As noted previously, deposits held by banks located within the local market area typically are used to measure market concentration (Woosley 1995). These deposit-based HHIs are said to approximate market structure of the cluster of banking services.<sup>21</sup> The availability of CRA data gives an opportunity to partially test this assertion and indeed provides evi-

dence about whether the concept of a cluster of services is appropriate in today's financial environment.<sup>22</sup> A series of paired T-tests indicated that some of the differences in the means of the various HHIs were not statistically equal to zero (Table 7).<sup>23</sup> Similar results were found for the differences in the means of the three-firm ratios and number of competitors. It appears that the deposit concentration measures are not a consistently reliable proxy for concentration in small business loans, whether measured by the traditional Call Report data or by the combined Call Report and CRA data. The debatable

20. Similarly, *United States v. Connecticut National Bank* stated, "Commercial banks in the State offer credit-card plans, loans for securities purchases, trust services, investment services, computer and account services, and letters of credit. Savings banks do not." Today, all of these products are offered by at least one type of nonbank financial institution.

21. Although deposits are routinely used as a proxy for the cluster by the federal banking agencies, case law does not require such usage. Indeed, in *United States v. Philadelphia National Bank*, deposits, loans, and assets were used to measure concentration. Similarly, in *United States v. Phillipsburg National Bank* and *United States v. Marine Bancorporation, Inc.*, demand deposits, loans, assets, and number of banking offices were used. Until recently, only deposits could be easily identified by locale, encouraging regulators to use this readily available data for antitrust purposes. The advent of CRA small business loan and small farm loan data and Home Mortgage Disclosure Act of 1975 data has increased the amount of available data regarding banking products and services sold by location.

22. Antitrust review in the federal banking agencies still utilizes the cluster of products and services concept in the face of much change in the nation's financial system. Sometimes this adherence is supported as adherence to a concept stated by the Supreme Court. The court, however, has changed its concepts when contrary evidence was presented. See, for example, *Brown v. Board of Education of Topeka, Kansas*, 349 U.S. 294 (1955). Furthermore, the banking agencies have also ceased to adhere to some of the dictates of previous Supreme Court decisions. For example, *United States v. Philadelphia National Bank* included only commercial banks with their head offices in the local market as competition. Federal banking regulators include all banks with offices in the local market. *United States v. Connecticut National Bank* specifically excluded savings banks, but the banking regulators give local thrifts at least half weight in antitrust analysis, and the Federal Reserve cited thrift competition as a mitigating factor in more than 53 percent of cases reviewed by Holder (1993b). *United States v. Philadelphia National Bank* rejected "countervailing power," or the market share of the dominant firm, as a potential mitigating factor. Holder found that the Federal Reserve cited this factor as mitigating potential anticompetitive effects in some markets affected by merger activity.

23. A T-test is a statistical measurement of the probability that the difference observed in the means is due to chance. Paired T-tests are used when, as in this instance, the observed measurements are drawn from related, rather than independent, samples. Pearson correlation coefficients indicated modest correlations between concentration measures based on the various products.

reliability of deposits as a proxy for the cluster is consistent with the changing role of deposits in modern banking. Banks today rely less on deposits and more on wholesale, noncore funding, such as federal funds, Federal Home Loan Bank advances, notes, and commercial paper. Given the greater access to national and global capital and funding markets, even for regional banks, deposits are becoming less relevant as a measure of the capacity to provide banking products and services. Smaller banks may have fewer wholesale funding options, but they are also relying less on deposits and more on Federal Home Loan Bank advances and similar funding sources.

**As credit scoring, disintermediation, and electronic distribution of banking services increase, out-of-market providers are likely to increase in importance. At the same time, local institutions are likely to remain significant.**

### Conclusions and Policy Considerations

Use of the data first reported for 1996 CRA analysis sheds new light on sources of and the importance of competition in rural markets for small business loans. Analysis shows that the number of lenders in these markets is seriously underestimated when only lenders located in

the market are counted as competitors. Including out-of-market lenders more than doubles the number of total reporting loan originators on average, and the importance of out-of-market lenders increases with markets of smaller size.

Out-of-market lenders typically make fewer and smaller loans than in-market lenders, however. Thus, out-of-market lenders have much less influence on traditional measures of market concentration than they do on the number of competitors in a market. Even so, in markets in which the deposit-based HHI exceeds the level typically approved in merger transactions, using the combined HHI reduces the HHI enough for it to fall below that level in 12.7 percent of markets. Similarly, when the deposit HHI exceeds 1,800, the combined HHI falls within the parameters of the Department of Justice guidelines 7.8 percent of the time.<sup>24</sup> Including both CRA reporters and non-reporters with local offices reduces both mean concentration in highly concentrated markets and the number of markets in which concentration exceeds Department of Justice guidelines.

Using the four concentration measures above to analyze variation of HHIs indicates that markets vary

widely. No single measure approximates any other precisely. Hannan (1991) concludes that variations in deposit and loan concentration in banking markets will introduce considerable noise into tests of the relationship between deposit concentration and market performance. Consequently, a single concentration measure is a poor approximation of market concentration as a structure measure in the structure-conduct-performance approach to antitrust analysis. Although using multiple measures of concentration might increase the uncertainty connected with receiving regulatory approval of mergers, it appears that, for at least some markets, deposits are not an adequate proxy for small business lending.

Furthermore, the use of multiple measures is not inconsistent with the reasoning or evidence used in precedent. For example, in *United States v. Philadelphia National Bank*, Justice Brennan wrote, "There is no evidence of the amount of business done in the area by banks with offices outside the area; it may be such figures are unobtainable." One could infer from this statement that such evidence should be presented, if available. In addition, *United States v. Philadelphia National Bank*, *United States v. Phillipsburg National Bank*, and *United States v. Marine Bancorporation, Inc.*, all used multiple market share indicators. Finally, the consideration of business loans has received at least some support from the high court. In dissenting from the majority opinion in *United States v. Marine Bancorporation, Inc.*, Justices White, Brennan, and Marshall opined, "A main component of that cluster, and one which determines profits, is the ability to provide loans, and it seems to me that a prospect of competition for loans, whether based on deposits garnered in Spokane or elsewhere, has a substantial possibility of effecting deconcentration in at least one segment of the banking business."

The considerable variation in concentration measures across product markets also casts doubt on two of the practices carried on in government antitrust circles since *United States v. Philadelphia National Bank*. Specifically, for small businesses it is unclear whether commercial loans are provided as part of a cluster of banking products and services (since out-of-market lenders are not likely to be providing all other parts of the cluster to these businesses) by local institutions and whether deposit concentration is an appropriate proxy for small business loan concentration. Although the Court has held that out-of-market banks are not important, at least to small businesses (*United States v. Philadelphia National Bank*) and that, as a result of relationship banking, "the cluster has economic significance well beyond the various products and services involved" (*United*

*States v. Phillipsburg National Bank*), the financial services sector, its technology, and its customers' preferences may have changed enough that these findings are no longer valid. As credit scoring, disintermediation, and electronic distribution of banking services increase, out-of-market providers are likely to increase in importance. At the same time, local institutions are likely to remain significant, particularly for businesses that have need of coin and currency services. Further research into the effect of out-of-market lenders is needed to determine whether such lenders influence prevailing local loan rates, lend to a broad customer base within a given market, are more likely to garner local customers for nonloan products and services, or are more likely to establish a branch office than outside banks with no local loans.

Despite the need for additional research, using multiple measures of market concentration is likely to give a truer picture of market concentration, especially in marginal cases. Furthermore, if addi-

tional research indicates that the changes in structure due to out-of-market competitors result in changes in pricing or behavior, the Federal Reserve should consider subjecting the acquisition of an in-market institution by an out-of-market lender active in the local market to competitive review similar to that given to a merger of two in-market firms.<sup>25</sup>

Finally, the CRA data suggest that the traditional use of mitigating factors may understate remaining competition. Because of changes in the business of banking since *United States v. Philadelphia National Bank*, the Board of Governors of the Federal Reserve System has exhibited flexibility in its approach to antitrust matters by considering the particular factors of a case market-by-market. In some cases, the Board has considered mitigating factors such as remaining competition. The results of this study support the approach of giving close scrutiny beyond local-deposit-based concentration measures to markets that would be affected by a merger application.

24. In 9.7 percent of the rural markets examined, the combined small business loan HHI is less than 1,800 when the Call Report small business loan HHI exceeds 1,800.

25. Cynak and Hannan (1999) compared deposit and combined small business loan HHIs in 98 metropolitan statistical areas and found a relatively low correlation (a Pearson correlation coefficient of 0.56) between them. Their results indicated that deposit-based HHIs performed as well, or better than, loan-based HHIs in determining business loan pricing. However, it is uncertain whether their results using urban data are applicable to rural markets. First, there is generally much greater overlap between the competitors with offices in a market and the competitors with loan originations in that market for urban markets than for rural markets. Second, rural markets tend to be less competitive than urban markets (when competitiveness is measured by market structure), so the price response to out-of-market competitors may be different. In addition, Cynak and Hannan did not control for individual borrower characteristics.

## Structure-Conduct-Performance: The Reigning Antitrust Paradigm and Alternatives

Antitrust analysis by both the federal bank regulators and the Department of Justice has its base in what is called the structure-conduct-performance approach. This approach, introduced and well explicated by Caves (1964), begins with theoretically based and empirically verified assertions that the number and market share of competitors in a product market influence the prices offered and other competitive behavior of the firms offering the product. Each will charge a profit-maximizing price, but that price will vary with the market's structure. At one extreme, a single provider will maximize its profit by selling at a price that extracts monopoly rents. At the other, in a market with many competitors, price will tend to equal the marginal cost of producing the product. In structures other than those at the ends of the monopoly-competitive continuum, pricing will become closer to monopoly pricing as the number of competitors becomes fewer and the market becomes more concentrated. Hannan (1991) formally models this paradigm specifically for markets with banking firms that offer multiple types of loans and deposits. His results follow those of many other descriptive applications; however, his findings are more detailed and offer guidelines for identifying variables to be controlled for in empirical work when the model is applied to banking markets.

Thus, in the structure-conduct-performance model, market structure influences the pricing conduct of sellers of a product as well as many other kinds of competitive conduct. When structure is concentrated, it is more likely that prices will be higher than marginal costs of producing a product and that predatory conduct of other sorts will occur.

This pricing and other anticompetitive conduct affects the way the market performs in bringing about prices and quantities of products sold in the market. As concentration increases toward monopoly, as prices increase, and as quantities of the product decline, other sellers and new products are deterred so that the users of the product are less well served by the producers. The market moves farther away from an optimum solution provided in a market with many sellers of similar size—that is, its performance declines. Out of this comes the concentration of antitrust

authorities on market structure and seller conduct as keys to market performance.

There are other approaches to market performance that provide alternative forms of analysis and, at times, opposite conclusions. These tend to emphasize the dynamics of market development. While the structure-conduct-performance approach essentially takes structure as a given, these approaches go deeper to assess how the basic physical dimensions of production and their changes influence structure-conduct-performance and, again, structure.

The two most often presented take different paths. The contestable markets approach, developed by Baumol (1982), deals with the influence of possible competitors not currently operating in a local or product market but able to do so in the future at higher costs than current competitors. The approach thus focuses on the opportunities of out-of-market or fringe sellers who might sell in a market if, for example, prices were somewhat higher. The approach concludes that it is realistically possible for out-of-market fringe sellers to influence market conduct and performance because the threat of their entry limits the conduct of in-market sellers. Current structure may still be important, but more than static structural analysis is required to generate valid conclusions about likely market performance. If the contestable markets hypothesis holds for local banking markets, the out-of-market lenders could play the role of fringe sellers as depicted by this theory.

Another alternative, called the variable efficiency approach, is associated with Demsetz (1973). It turns the structure-conduct-performance approach on its head. In this approach, production and marketing efficiency play a major role in determining market structure. The more efficient firms gain the higher market shares and earn the higher profits. They do not, however, charge the higher prices. Their ability to produce more efficiently allows them to charge lower prices and gain market share. In the extreme, if economies of scale will allow a single seller to supply the full market at a cost lower than any number of other sellers, the market will both tend to be a monopoly market and have the lowest possible production costs for its output. In this

model, methods of production and marketing determine optimal market structure; moves away from this structure may reduce production efficiency and raise prices. If this theory best explains competition in local banking markets, the out-of-market competitors are the efficient producers of small business loans. Their lower cost structures in originating, underwriting, or monitoring

loans, which may be due to better use of banking technologies such as credit scoring or electronic delivery, would allow them to enter the market and gain market share by charging lower prices. Additional research into the pricing practices of out-of-market lenders and the effect on local prices is necessary to determine whether this theory of competition holds.

## A P P E N D I X B

### Department of Justice Merger Guidelines

In order to identify mergers that deserve special analysis, the Antitrust Division of the Department of Justice has issued “guidelines” for consolidations (Board of Regents and U.S. Department of Justice 1995; U.S. Department of Justice and Federal Trade Commission 1997). These guidelines are stated in terms of the HHI explained in the box on page 42. The guidelines call for using a market’s HHI and the change in the

HHI caused by a proposed merger to decide whether the consolidation might have anticompetitive impacts. For most industries, addition of more than 50 points resulting in an HHI of 1000 or greater sends a warning. For banking, the guidelines recognize that local banks are not the only providers of bank services by using different benchmarks—an addition of 200 or more points resulting in a market HHI of 1800 or more signals danger.

## REFERENCES

- AUSUBEL, LAWRENCE M. 1991. “The Failure of Competition in the Credit Card Market.” *American Economic Review* 81 (March): 50–81.
- BAUMOL, WILLIAM J. 1982. “Contestable Markets: An Up-rising in the Theory of Industry Structure.” *American Economic Review* 72 (March): 1–15.
- BERGER, ALLEN N., AND GREGORY F. UDELL. 1996. “Universal Banking and the Future of Small Business Lending.” In *Universal Banking: Financial System Design Reconsidered*, edited by A. Saunders and I. Walters, 558–67. Chicago: Irwin.
- BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM AND THE U.S. DEPARTMENT OF JUSTICE. 1995. “Bank Merger Competitive Review: Introduction and Overview.”
- CAVES, RICHARD E. 1964. *American Industry: Structure, Conduct, Performance*. Englewood Cliffs, N.J.: Prentice-Hall, Inc.
- COLE, REBEL. 1998. “The Importance of Relationships to the Availability of Credit.” *Journal of Banking and Finance* 22 (August): 959–77.
- COLE, REBEL, JOHN WOLKEN, AND R. LOUISE WOODBURN. 1996. “Bank and Nonbank Competition for Small Business Credit: Evidence from the 1987 and 1993 Surveys of Small Business Finances.” *Federal Reserve Bulletin* 82 (November): 983–95.
- CYRNAK, ANTHONY W. 1998. “Bank Merger Policy and the New CRA Data.” *Federal Reserve Bulletin* 84 (September): 703–15. <<http://www.bog.frb.fed.us/pubs/bulletin/1998/998lead.pdf>> (October 17, 2000).

- CYRNAK, ANTHONY W., and TIMOTHY H. HANNAN. 1999. "Is the Cluster Still Valid in Defining Banking Markets? Evidence from a New Data Source." *Antitrust Bulletin* 44 (Summer): 313–36.
- DEMSETZ, HAROLD. 1973. "Industry Structure, Market Rivalry, and Public Policy." *Journal of Law and Economics* 16 (April): 1–9.
- DILLON, ED. 1997. "Are Deposits the Best Antitrust Measure?" *Bank Mergers and Acquisitions* 12, no. 16:1–4.
- ELLIHAUSEN, GREGORY E., and JOHN D. WOLKEN. 1990. "Banking Markets and the Use of Financial Services by Small and Medium-Sized Businesses." *Federal Reserve Bulletin* 76 (October): 801–17.
- . 1992. "Banking Markets and the Use of Financial Services by Households." *Federal Reserve Bulletin* 78 (March): 169–81.
- FRAME, W. SCOTT. 1995. "Examining Small Business Lending in Bank Antitrust Analysis." Federal Reserve Bank of Atlanta *Economic Review* 80 (March/April): 31–40.
- FRAME, W. SCOTT, ARUNA SRINIVASAN, and LYNN W. WOOSLEY. Forthcoming. "The Effect of Credit Scoring on Small Business Lending." *Journal of Money, Credit, and Banking*.
- GRANT THORNTON LLC. 2000. *The Changing Community of Banking*. <[http://www.grantthornton.com/resources/finance/banksurvey2000/survey00\\_4print.html](http://www.grantthornton.com/resources/finance/banksurvey2000/survey00_4print.html)> (November 30, 2000).
- HANNAN, TIMOTHY H. 1991. "The Functional Relationship between Prices and Market Concentration: The Case of the Banking Industry." Board of Governors of the Federal Reserve System Finance and Economics Discussion Series Paper No. 169.
- HOLDER, CHRISTOPHER L. 1993a. "Competitive Considerations in Bank Mergers and Acquisitions: Economic Theory, Legal Foundations, and the Fed." Federal Reserve Bank of Atlanta *Economic Review* 78 (January/February): 23–36.
- . 1993b. "The Use of Mitigating Factors in Bank Mergers and Acquisitions: A Decade of Antitrust at the Fed." Federal Reserve Bank of Atlanta *Economic Review* 78 (March/April): 32–44.
- HYMEL, MICHAEL. 1994. "The Retail Bank CD Market." *Growth and Change* 25 (Fall): 427–44.
- JACKSON, WILLIAM E., III. 1992. "Is the Market Well Defined in Bank Merger and Acquisition Analysis?" *Review of Economics and Statistics* 74, no. 4:655–61.
- JACKSON, WILLIAM E., III, and ROBERT A. EISENBEIS. 1997. "Geographic Integration of Bank Deposit Markets and Restrictions on Interstate Banking: A Cointegration Approach." *Journal of Economics and Business* 49 (July/August): 335–46.
- KENNICKELL, ARTHUR B., and MYRON L. KWAST. 1997. "Who Uses Electronic Banking?" Board of Governors of the Federal Reserve System Finance and Economics Discussion Series Paper No. 1997-35. <<http://www.bog.frb.fed.us/pubs/feds/1997/199735/199735pap.pdf>> (October 17, 2000).
- KRAMER, ROBERT. 1999. "Mega-Mergers in the Banking Industry." Speech made at the American Bar Association Meeting, Antitrust Section, April.
- KWAST, MYRON L. 1999. "Bank Mergers: What Should Policymakers Do?" *Journal of Banking and Finance* 23 (February): 629–36.
- KWAST, MYRON L., MARTHA STARR-MCCLURE, and JOHN D. WOLKEN. 1997. "Market Definition and the Analysis of Antitrust in Banking." Board of Governors of the Federal Reserve System Finance and Economics Discussion Series Paper No. 1997-52. <<http://www.bog.frb.fed.us/pubs/feds/1997/199752/199752pap.pdf>> (October 17, 2000).
- PETERSEN, MITCHELL A., and RAGHURAM G. RAJAH. 1994. "The Benefits of Lending Relationships: Evidence from Small Business Data." *Journal of Finance* 49, no. 1:3–37.
- RADECKI, LAWRENCE J. 1998. "The Expanding Reach of Geographic Banking Markets." Federal Reserve Bank of New York *Economic Policy Review* 4 (June): 15–34. <[http://www.ny.frb.org/rmaghome/econ\\_pol/698rad.htm](http://www.ny.frb.org/rmaghome/econ_pol/698rad.htm)> (October 17, 2000).
- RHOADES, STEPHEN A. 1993. "The Herfindahl-Hirschman Index." *Federal Reserve Bulletin* 79 (March): 188–89.
- SAMOLYK, KATHERINE. 1998. "Small Business Credit Markets: Why Do We Know So Little about Them?" *FDIC Banking Review* 10, no. 2:14–32. <<http://www.fdic.gov/bank/analytical/banking/1998mar/small.pdf>> (October 18, 2000).
- U.S. DEPARTMENT OF JUSTICE AND FEDERAL TRADE COMMISSION. 1997. "Horizontal Merger Guidelines." <[http://www.usdoj.gov/atr/public/guidelines/horiz\\_book/hmg1.html](http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html)> (October 11, 2000).
- WOOSLEY, LYNN W. 1995. "Agencies Explain Screening of Bank Acquisitions." Federal Reserve Bank of Atlanta *Financial Update* 8 (January–March): 1–3.
- . 1998. "Bank Consolidation Affects Lending in Southeastern Rural Markets." Federal Reserve Bank of Atlanta *Financial Update* 11 (July–September): 4–5. <[http://www.frbatlanta.org/publica/finan\\_update/v11n3/fu\\_v11n3\\_4.html](http://www.frbatlanta.org/publica/finan_update/v11n3/fu_v11n3_4.html)> (October 11, 2000).