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THE EFFECTS OF CREDIT AVAILABILITY, NONBANK COMPETITION, AND TAX REFORM ON BANK CONSUMER LENDING

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Research Paper

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THE EFFECTS OF CREDIT AVAILABILITY, NONBANK COMPETITION, AND TAX REFORM ON BANK CONSUMER LENDING

Abstract

This study investigates the slowdown in U.S. bank consumer lending since the mid-1980s. Owing to important data considerations, the focus is on consumer loans rather than on C&I, real estate, or total bank loans. The study finds that nonrate credit conditions, tax reform, and nonbank competition variables, as well as more traditional variables, are significant determinants of consumer lending. Other results indicate that, after adjusting for securitization activity, the slowdown in consumer loan growth at banks since 1989 is largely explained by changes in nonrate credit conditions, the rise in unemployment, and the fall-off in consumer spending.

JEL Classification Codes: E51, G21, D12

I. Introduction

After posting strong growth in the mid-1980s, U.S. private debt and bank loans have grown at sharply slower rates. Recent weakness in bank loan growth has been attributed to either a tightening of bank credit standards and/or actions by firms and households to reduce their debt and deleverage their balance sheets (e.g., Bernanke and Lown (1991), Economic Report of the President (pp. 42-53, 1992), and Light and Greising (1991)).

However, it is unclear to what extent slower bank loan growth may instead reflect competition from nonbanks (e.g., commercial paper and finance companies), the effects of the Tax Reform Act of 1986, or efforts by banks to sell loans (e.g., securitizing consumer receivables or selling mortgages in the secondary mortgage market) in order to meet new bank capital requirements.

This study disentangles many of these effects using an empirical model of real consumer loan growth at banks. As illustrated in Figure 1, bank consumer loan growth recently has decelerated sharply in nominal terms after posting double-digit rates in the mid-1980s. Much, but not all of this slowdown reflects the step-up in securitizations which started in 1987. By issuing consumer loan-backed securities, banks can fund consumer loans without deposits and can remove originated loans from bank balance sheets. This effect on bank consumer loan growth is illustrated by the gap between the securitization-adjusted (the solid line) and unadjusted (the dashed line) growth rates in Figure 1. Based on loan data adjusted for securitizations, we find that adjusting real loan rates for tax changes is important, but that virtually all of the weakening in real consumer loan growth (securitization adjusted) since 1989 reflects the slowdown in consumer spending, the rise in unemployment, and a change in bank lending policies toward consumers.

The study focuses on bank consumer lending for several important

Figure 1: Growth of Domestic Bank Consumer Loans

empirical reasons. First, internal data from the Federal Reserve Board staff allow us to directly adjust bank consumer loans for securitizations, whereas it is more difficult to adjust bank commercial and industrial (C&I) or real estate loans for loan sales to nonbanks. Second, tax reform effects on consumer lending are more transparent and easier to model than those affecting business or real estate finance (e.g., changes in capital gains taxation, investment tax credits, and passive loss provisions). Third, data on auto loan rates at banks and finance companies provide a good measure of nonbank competition in consumer credit markets that is not plagued by term structure problems posed, for example, by substitution across C&I loans, commercial paper, and corporate bonds. Fourth, bank consumer lending has not been the focus of any recent regulatory "jawboning" which is difficult to measure and which many believe has recently depressed bank financing of commercial real estate and leveraged-buyouts. Fifth, consumer lending has not been subject to other complications such as those affecting C&I loan demand (the surge in mergers during the 1980s) or real estate lending (the collapse of the thrift industry and risk-based capital incentives for banks to sell home mortgages). Sixth and finally, Federal Reserve survey data can be used to construct a continuous non-rate credit availability series going back to the late 1960s for consumer loans, whereas such a survey series is not available for C&I or real estate loans. For these reasons, it is much more feasible to assess the impact of changes in the tax code, credit availability, and loan demand on bank consumer lending than on C&I, real estate, or total lending at banks.

This study is organized along the following lines. Section 2 sets up an empirical model that incorporates supply and demand factors in a simple reduced-form model. Section 3 describes the data used to measure these

factors, and section 4 presents results from a number of regressions and simulations. The final section concludes by interpreting the empirical findings and discussing their implications.

II. Empirical Specification

This section lays out a simple approach to modeling consumer loans at banks which can control for three types of factors: competition between banks and nonbanks, nonrate terms and availability of consumer credit, and the aggregate demand for consumer loans from all lenders.

The stock of real bank consumer loans (L^b) is assumed to be characterized by:

$$L^b = \alpha^b Q N L^t, \tag{1}$$

where α^b = bank share of consumer credit, Q = share of population that qualifies for a loan size large enough that households borrow given a vector of loan demand determinants (e.g., interest rates), N = population, and L^t = real notional consumer loan demand per capita. Superscripts b and t denote bank and all lender variables, respectively. Taking logs and then first differencing gives the growth rate expression:

$$dl^b = d\alpha^b + dq + dn + dl^t, \tag{2}$$

where lower case letters denote logs and d is the first difference operator.[1] Eq. (2) permits one to separately test different ways of measuring or proxying the impact on bank consumer loan growth of changes in competition from

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[1] Dickey-Fuller tests reject the presence of a unit root in dl^b with a time trend (17.3), without a time trend (17.3) and without a constant (17.8).

nonbanks ($d\alpha^b$), the population share that can qualify for credit (dq), and more traditional loan demand determinants (dl^t).[2]

III. Data and Variables

The Dependent Variable

The dependent variable used in the regressions presented below is the growth rate of real consumer loans at banks, adjusted for securitizations. The main data source is the Federal Reserve's monthly consumer bank loan series. These loans comprise consumer installment and noninstallment loans held on bank balance sheets, and this series is directly adjusted for securitizations which remove consumer loans from bank balance sheets much as selling mortgages in the secondary mortgage market does.

These securitizations have been spurred by the announcement of Basel risk-based capital standards in May 1987, and have accelerated as these standards have been phased in. By removing consumer loans from their balance sheets, banks are able to reduce the amount of expensive regulatory capital they are required to hold (see Duca and McLaughlin (1990)). Securitization activity was especially strong in 1990 when the first phase-in of the new capital standards was implemented at yearend, and in 1991, the year prior to full implementation. In that year, securitization activity depressed the growth rate of consumer loans held by banks by about 6 percentage points (see Figure 1). In recent years, the pace of securitization activity has been very uneven, and for this reason, the loan data used are directly adjusted for securitizations. This was was done by adding consumer loans removed from bank

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[2] Population growth was not included on grounds that changes in dlog(N) occur too gradually to be important over the sample and could likely pick up spurious effects.

balance sheets by securitizations to consumer loans on bank balance sheets using internal data collected by Federal Reserve Board staff.[3] This nominal series is first converted into a quarterly average series. Next, the quarterly average levels were deflated using the personal consumption expenditures (PCE) deflator, and then were transformed into growth rates.

Independent Variables

The right hand side variables used in this study fall into five categories, the first three of which are factors affecting overall consumer loan demand: (1) real interest rate (user cost of capital) effects on total consumer loan demand,[4] (2) tax reform induced substitution away from consumer loans toward other forms of finance, (3) spending and labor market effects on overall consumer loan demand, (4) substitution between bank and nonbank consumer loans, and (5) nonrate credit conditions (availability).

Real User Cost of Capital Variables

The real user cost of bank consumer loans (r) can be measured by:

$$r = R(1-t\phi) - \pi^e, \qquad (3)$$

where R = some nominal interest rate, t = marginal income tax rate, ϕ = the percent of consumer loan interest payments that are deductible, and π^e = expected inflation. The four-quarter percent change in the PCE deflator was

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[3] Note that if bank "b" purchases consumer loan-backed securities issued by bank "a", then bank a's consumer loans decline while bank b's holdings of non-U.S. government securities (not consumer loans) rises under the system used by the Federal Reserve to classify the components of bank credit.

[4] Of course, real interest rates may also affect the share of the population that can qualify for loans.

used to proxy π^e.[5] The nominal loan rate used was the most common 48-month interest rate on loans for new autos at banks on grounds that (a) auto loans comprise much of consumer borrowing,[6] (b) credit card debt appears to be very interest insensitive[7] and nominal credit card rates are very sticky (Ausubel (1991)), and (c) much credit card debt is float (i.e., convenience card use). This auto loan rate is from a mid-month-of-quarter survey conducted by the Federal Reserve, and is adjusted for a sample break in 1983 when the auto loan maturity changed from 3-years to 4-years. The adjustment assumed that each additional year of loan maturity across the 3-5 year spectrum adds roughly one percentage point using anecdotal evidence on bank rate-setting practices. In regressions not reported in table form, the most common credit card rate and the one-year Treasury rate were used. These alternatives produced substantially worse equation fits, and did not affect the qualitative nature of other results.

The marginal tax rate used in implementing eq. (3) was the U.S. Treasury's annual series on the marginal income tax rate for a family of four earning the median level of income (Lerman (1991)). The share of deductible consumer loan interest was measured in the following way. Up through 1986:Q4, when the Tax Reform Act of 1986 was passed (October 22, 1986), ϕ was set equal to 1. In 1987:Q1 and all subsequent quarters, ϕ equaled the average four-year ahead expectation of the pre-announced, contemporaneous share of consumer loan

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[5] The PCE is also used to deflate consumer loans. The PCE deflator yielded better model fits and better-behaved residuals than using the CPI or the CPI excluding food and energy components.

[6] Auto loans comprise around 40% of consumer installment credit.

[7] Credit card debt grew at very high rates over the 1980s despite the fact that nominal credit card interest rates did not decline with inflation.

interest that could be deducted (σ); that is:

$$\phi_t = (1/16)\ [\sigma_t + \sigma_{t+1} + \sigma_{t+2} + \ldots + \sigma_{t+15}], \qquad (4)$$

for t = 1987:Q1 and later. This last step was done for two reasons. First, the announced phase-out of interest deductibility was drawn out and uneven.[8] Second, the four-year horizon in eq. (4) was chosen to match the maturity of the bank auto loan series that was used to construct real loan rate measures.

To see whether tax changes have empirically important effects on bank consumer lending via the real rate channel, different versions of dlog(r) were tried. These included (a) dlog(r1) which does not adjust nominal interest for any deductions (i.e., set ϕt=0 throughout the sample period), (b) dlog(r2) which adjusts for the marginal tax rate but not the phase-out of consumer loan interest deductibility (i.e., ϕ = 1 for all the sample period), and (c) dlog(r3) which adjusts for both the marginal tax rate and for the phase-out of loan interest deductibility (using eqs. (3) and (4)).

Variables Controlling for Other Tax Effects on Bank Consumer Loans

In principle, the tax-adjustment embodied in eq. (4) does not control for all tax-induced substitution between bank consumer loans and other forms of finance. With respect to competition from auto finance company loans, eq. (4) does control for the 1986 Tax Reform because all consumer loan interest was subject to the same treatment. However, the same is not true with respect to other forms of consumer finance. As a result, the Tax Reform Act of 1986 not only changed the after-tax real loan rate, but also changed the after-tax relative cost of using consumer loans versus other forms of finance. In

[8] The percent of consumer loan interest that could be deducted was 65% for the 1987 tax year, 40% for the 1988 tax year, 20% for the 1989 tax year, 10% for the 1990 tax year, and 0 thereafter.

particular, the loan interest rate deduction on most real estate-secured credit was left intact. This spurred many households to pay off consumer debt by using home equity lines of credit (HELCs),[9] and home equity debt has grown at phenomenal rates since 1986.

To test for this extra substitution effect, three variables were tried. The first, DEDUCT, measures the change in the relative tax-deductibility of consumer and HELC debt, and equals:

$$\text{DEDUCT} = d\phi. \tag{5}$$

DEDUCT implicitly assumes that this substitution effect occurred in a drawn out fashion in line with the announced phase-out of consumer loan interest deductibility. The second tax reform variable, REFDUM, is a dummy equal to 1 after 1986:Q4, and assumes that reform-induced substitution had a constant depressing effect on the growth of bank consumer loans. A third variable, REFDDUM, is a dummy equal to 1 in 1987:Q1 and 1987:Q2 only.[10] REFDDUM was tried to control for the possibility that reform-induced substitution largely occurred soon after the passage of the 1986 Tax Reform Act.

Consumer Spending, Unemployment, and Confidence Variables

Several other variables were included that are typically associated with loan demand. The growth rates of real personal consumption expenditure (dlog(C)) at t and t-1 were included on grounds that loans primarily reflect a

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[9] A Federal Reserve Board Survey found that for more than half of households with HELCs, HELCs were initially used to pay off consumer debt (see Canner, Luckett, and Durkin (1989), p. 337, for data and background).

[10] In other regressions, extending REFDDUM to equal 1 in 1986:Q4 reduced model fit, likely reflecting that the Tax Reform Act was passed in the middle of 1986:Q4 and that households started to substantially respond in 1987:Q1.

derived demand for purchases.[11] In other regressions (not shown) which replaced dlog(C) with the growth rates of real consumer durable purchases or that of real disposable income, the R^2s were slightly smaller, and the residuals were slightly less well-behaved. For this reason, only results using C are presented in the tables.

In addition, the change in the civilian unemployment rate (dU) was included to control for any negative effects of actual or possible unemployment on loan demand.[12] Finally, the percentage change in the overall Michigan SRC consumer confidence index (CONFID) was included to control for any movements in consumer confidence not reflected in other variables.

Controlling for Substitution Between Bank and NonBank Consumer Loans

Since the early 1980s, the captive auto finance companies (e.g., GMAC) have, from time to time, offered auto-sales incentive programs. Up until the mid-to-late-1980s, these incentives generally offered consumers low auto loan interest rates through "captive" auto finance companies owned by automakers. More recently, automakers have offered consumers a choice of either low interest rate financing or cash rebates. Typically, when widespread sales incentives were instituted, consumers shifted from banks to auto finance companies for auto loans (see Duca (1991)). In addition, auto finance companies gained market share from banks between the late 1970s and mid-1980s

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[11] Using growth rates, Duca and Reifschneider (1992) find that real consumer durable outlays Granger causes real bank consumer installment loans (outstandings), but that real bank consumer installment loan extensions Granger causes real consumer durable spending. This result reflects that outstandings tend to lag after extensions because loan principal repayments are back-loaded owing to loan amortization.

[12] Any effect of dU or C on loan supply is likely to be reflected in the credit availability proxy used (see pp. 11-13), implying that any marginal information provided by dU or C in regressions likely reflects loan demand.

as deposit deregulation eroded a funding cost advantage enjoyed by banks. As shown by Duca (1991), several discrete deregulatory steps resulted in very quick and noticeable declines in the spread between auto finance and bank auto loan rates.

Including a number of variables to control for these deregulatory steps and for auto sales incentive programs would overly complicate a model of bank consumer lending and noticeably reduce degrees of freedom. Instead, the change in the spread between auto finance and bank auto loan rates (SPREAD) was included which avoids these problems, but which conveniently summarizes these effects (Figure 2).[13] This spread was defined as the difference between the average auto loan rate at finance companies and the most common auto loan rate at banks. An increased spread is expected to have a positive effect on bank loan market share ($d\alpha^b > 0$), and thereby boost bank consumer loan growth, ($dl^b > 0$), ceteris paribus. Both interest rates used in constructing the spread are for financing new cars, but have different maturities. The finance company rate is an average rate on all new loans made, whereas the bank rate is for a fixed maturity (36-months before 1983 and 48-months afterward). To control for this problem, the finance company rate was downwardly adjusted for the difference between the average monthly maturity on new car loans at finance companies less the monthly maturity on the most-common auto loan surveyed at banks.[14] The adjustments assumed that each additional year of loan maturity across the 3-5 year spectrum adds

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[13] SPREAD was defined as the change in this loan rate spread because the level of the spread was negative at times. Duca (1991) finds that deregulatory actions and auto sales incentives can empirically account for most of the variation in such a loan rate spread.

[14] In regressions where SPREAD was not adjusted for maturity differences, the R^2s were somewhat smaller, but the qualitative results were the same.

Figure 2: Spread Between Finance Company and Bank Auto Loan Rates

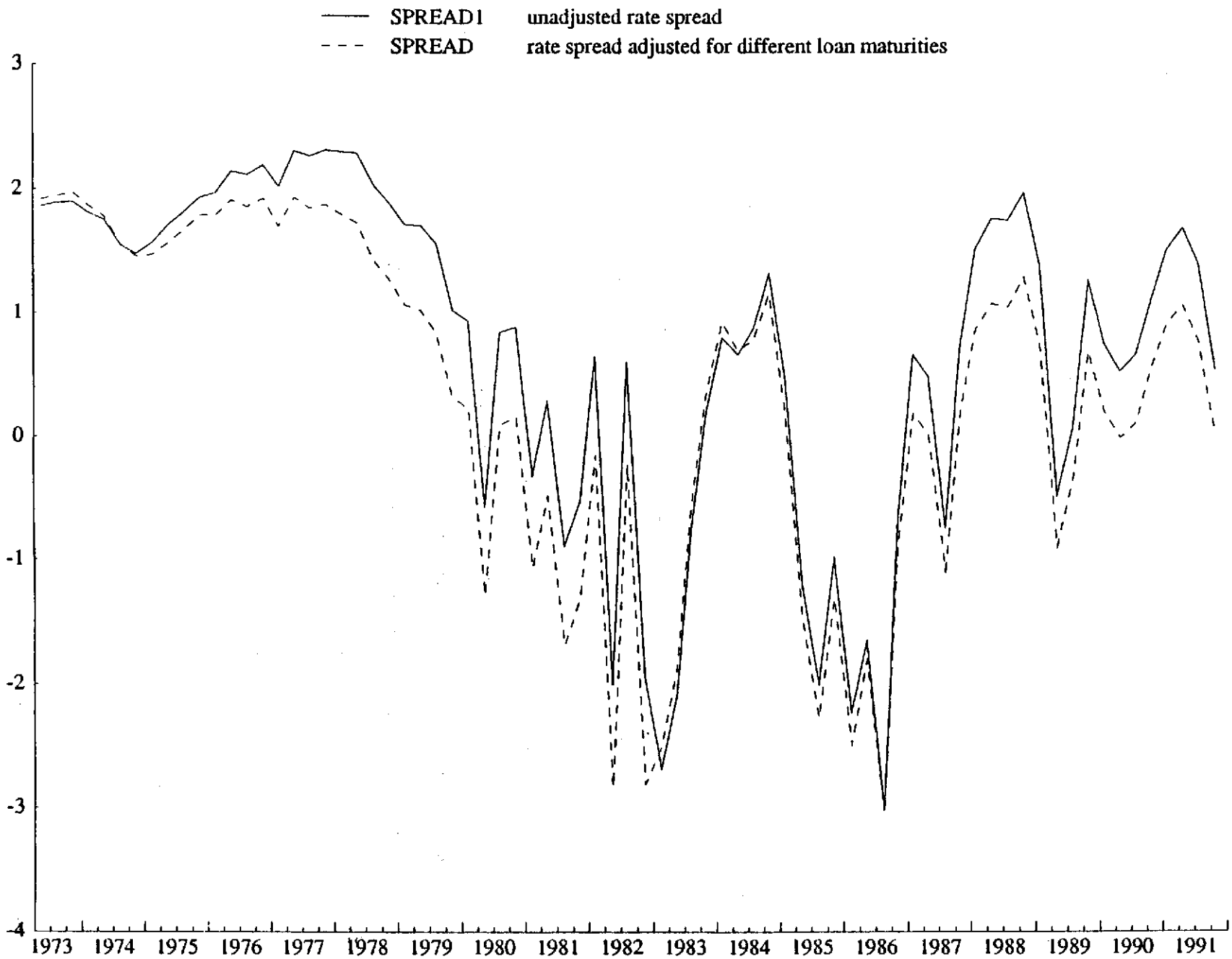
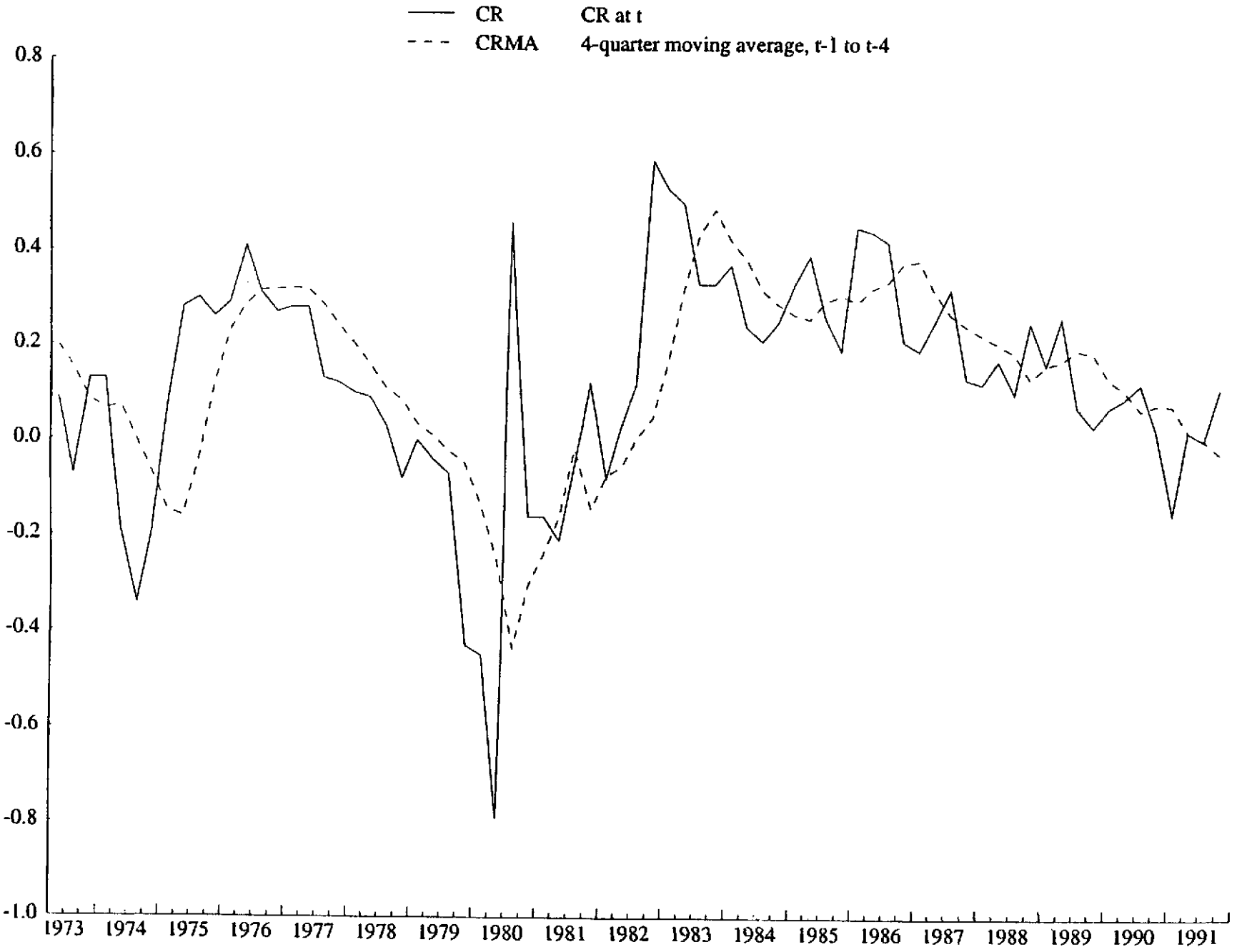


Figure 3: Bank Willingness to Make Consumer Installment Loans



roughly one percentage point using anecdotal evidence on bank rate-setting practices.

Non-Rate Credit Conditions/Availability Variables

Two variables were used to control for the effects of variation in non-rate credit conditions/availability. The first of these is a diffusion index measuring the relative change in bank willingness to make consumer installment loans. This index is based on large bank responses to the following question on the Federal Reserve's quarterly Survey of Bank Lending Terms:

> "How has your bank's willingness to make consumer installment loans changed relative to 3-months ago?"
>
> (a) much more, (b) somewhat more, (c) about unchanged, (d) somewhat less, or (e) much less.

A diffusion index (CR) of the average response was constructed by weighting responses of "much more" by 2, "somewhat more" by 1, "unchanged" by 0, "somewhat less" by -1, and "much less" by -2. As shown in Duca and Reifschneider (1992), CR is significant in explaining consumer durable purchases, and consistent with recent theories of credit rationing (e.g., Stiglitz and Weiss (1981)), movements in CR mainly reflect real market interest rates, the economic outlook, and the impact of Regulation Q ceilings.

The index, however, is much more tightly linked to the growth rate of real consumer installment loan extensions (i.e., loan originations) at banks than to the growth rate of real consumer loan outstandings (i.e., the stock of loans) at banks.[15] The reason is that because of loan amortization, loan principal payments are back-loaded over the life of a loan, and as a consequence, the growth of loan outstandings tends to cycle after the growth

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[15] Duca and Reifschneider (1992) find that CR Granger causes the growth rates of real consumer durable purchases, real bank consumer installment loan outstandings, and real bank consumer installment loan extensions.

rate of loan extensions by about one year. Unfortunately, the extensions series ended in 1982:Q4. To handle this lag problem, the four-quarter average of CR from t-4 to t-1 (CRMA) is included as an r.h.s. variable (see Figure 3).

CRMA controls for two types of effects on bank consumer loans. First, it reflects credit standards at banks and perhaps at nonbanks as well. For this reason, an increase in CRMA will likely accompany faster loan growth (higher dl^b in eq. (2)) by reflecting an increased share of the population that can qualify for a loan (dq is higher). Second, a rise in CRMA may also reflect that banks gained auto loan market share from auto finance companies, as Duca (1991) has found. One reason for this is that banks had tightened credit standards in periods when banks lost deposits owing to binding Regulation Q ceilings. By contrast, finance companies may not have simultaneously tightened their standards as much because they obtained financing from the commercial paper market rather than from regulated deposits.

Another reason a rise in CRMA boosts bank loan market share is related to the lender of last resort role played by captive auto finance companies. Captives lend to some consumers who are denied credit at banks because part of the profit earned on selling a car exceeds the negative expected return from lending to a poor credit risk.[16] When banks tighten their credit standards, they improve the average loan quality of people denied bank loans, and thereby reduce the incentives of finance companies to tighten their credit standards as much as banks. As a result, a fall in CRMA may also be correlated with falls in $d\alpha^b$ and dl^b as banks lose market share to finance companies.

Recently, the willingness-to-lend index has turned down after a long

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[16] Auto loan delinquency rates tend to be higher at finance companies.

period of positive readings. Nevertheless, the index has neither registered the large negative readings as in previous periods in Figure 3 that have been described as credit crunches (1974-75 and 1979-82), nor in Federal Reserve surveys has it recently indicated as much tightening of credit conditions as the case for C&I and commercial real estate lending. Indeed, Figure 3 suggests that banks have ceased increasing the availability of consumer credit, rather than severely curtailing it as in the mid-1970s and early-1980s.[17] Results from Duca and Reifschneider (1992) imply that the absence of Reg-Q induced disintermediation and of a substantial tightening of monetary policy may account for this difference. Nevertheless, it should be recognized that recent lending attitudes/actions can induce a slowdown in consumer borrowing by reducing the pace at which the pool of qualified consumer borrowers expands.

The second credit availability variable controls for the imposition of the Carter credit controls in 1980:Q2 and their lingering effect in 1980:Q3. Although these controls exempted consumer credit, they induced banks to tighten their credit standards and appear to have boosted the auto loan market share of finance companies at the expense of banks (see Duca (1991)) owing to the following two information problems. First, many consumers mistakenly believed that it was illegal to borrow, and may not have found out they were wrong until they were in auto show rooms where autodealers could originate loans. Second, many consumers may not have bothered applying for bank loans fearing that they would be rejected under the then-existing abnormal

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[17] By contrast, in surveys conducted in 1990 and 1991, many banks indicated that they tightened their credit standards on C&I and commercial real estate loans. Overborrowing by many businesses and the degree of overbuilding in commercial real estate may help account for the greater curtailment of credit availability for these two types of loans.

circumstances. To handle these effects, the Carter credit control dummy variable from the consumer durables equation in the MPS model was included. This variable (CCON) equals 1 in 1980:Q2, 1/2 in 1980:Q3, and 0 otherwise, and is expected to have a negative sign.[18]

IV. Empirical Results

Regression Results

Owing to the availability of consumer loan rate data, the sample period in all regressions begins in 1973:Q2, and runs through 1991:Q4. Three sets of regressions were done (tables 1-3), each using one of the three real interest rate measures described above. In each set, there are four regressions, each of which uses one or none of three Tax Reform variables described earlier. Each regression includes current and one-quarter lags of the (1) change in the unemployment rate and (2) the growth rate of real personal consumption expenditures. Each regression also includes the following r.h.s. variables: relative changes in bank credit availability (CRMA), credit controls (CCON), and the auto finance company-bank auto loan rate spread (SPREAD).

In all cases, CRMA and CCON are significant, while SPREAD is generally significant or at least marginally significant. Other regression runs indicate that, in general, the inclusion of these three variables noticeably improves model fit and the behavior of equation residuals. The general significance of SPREAD highlights the importance of competition from nonbanks in this loan market, and reflects, given other results from Duca (1991), the

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[18] As shown later, CCON is statistically significant. This result likely reflects substitution effects much more than the effects of the controls on the pool of people who could qualify for any consumer loan (dq). The reason is that in other regressions not reported, CCON was significant in the presence of the contemporaneous value of CR.

effect of deposit rate deregulation on bank funding costs and the deepening of the consumer loan market. The significance of CRMA in the presence of significant real rate variables implies that the growth rate of bank consumer loans reflects both nonprice and price terms. Since CRMA is included along with consumption spending, it is likely that the coefficient on CRMA also reflects the impact of changes in nonrate credit conditions at banks on consumer spending and that the coefficients on the lags of consumption expenditures mainly reflect demand more than supply effects.[19]

With respect to other loan variables, the t-1 growth rate of real PCE (CON) and the t-2 change in the unemployment rate (dU) are significant with the expected signs. F-tests indicate that the two lags of CON are jointly significant, as are the lags on dU. However, the percent change in consumer confidence (CONFID) is insignificant in every regression run tried (not shown), likely reflecting that CONFID does not add any marginal information in the presence of other demand-related variables, such as dlog(C).

Given these findings, it is worthwhile to compare results from using different real rate and tax reform measures in regressions that include CON, dU, CCON, SPREAD, and CRMA, but not CONFID. When comparing regressions with the same tax reform variables, dlog(r3) yields the best fit and tends to have the highest t-statistic of the three real rate measures when comparing

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[19] The significance of CRMA is consistent with three-related studies. In one of these, Duca (1991) finds that the composition of auto lending shifted away from banks toward captive finance companies when banks became less willing to make consumer installment loans. The two other studies suggest that this cushioning effect is partial. Lam (1991) finds cross-section evidence that auto purchases are affected by liquidity constraints, while Duca and Reifschneider (1992) find that purchases of autos and other consumer durables are significantly related to bank willingness to make consumer loans.

regressions with the same tax reform variables.[20] Thus, in general, the real rate is most significant when it is adjusted not only for marginal income tax rates (such as dlog(r2)), but also for the phasing out of the consumer loan interest deduction under the Tax Reform Act of 1986.

Given this result, a comparison of regressions in table 3 can shed light on how to best control for tax reform effects aside from those reflected in dlog(r3). Model 9 adds $d\phi$ (DEDUCT) to test whether tax reform had a continuous, substitution effect aside from that in the real rate variable dlog(r3). DEDUCT, however, was insignificant. It is noteworthy that the tax reform dummy equal to 1 only in 1987:Q1 and 1987:Q2 (REFDDUM) was marginally significant (model 11), while a tax reform dummy equal to 1 from 1987:Q1-1991:Q4 (REFDUM in model 10) was insignificant. These results suggest that tax incentives to substitute real estate for consumer debt likely had an initial, discontinuous effect on bank consumer loan growth aside from those picked up in the real user cost measures. One explanation for this is that the real rate, auto loan rate spread, and labor/spending variables largely pick up the impact of current spending and borrowing on bank consumer loan growth. By contrast, these variables are unlikely to control for how the Tax Reform Act of 1986 also induced households to shift the composition of preexisting debt toward home equity debt. On the basis of fit and t-statistics, model 11 was chosen as our preferred specification,[21] and was

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[20] Note that in viewing the magnitude of the estimated coefficients, the growth rates of personal consumption expenditures and of real bank consumer loans are quarterly and are entered as decimals. Thus, estimates from model 11 imply that a 100 percent rise in r3 decreases the quarterly growth rate of real consumer bank loans ($dlog(L^b)$) by 4 percentage points, while a 100 percent quarterly decline in real consumption expenditures would initially reduce quarterly consumer loan growth by 16 percentage points.

[21] The R^2 of model 11 (.893) is quite high for modeling a growth rate.

used in out-of-sample simulations.

Simulation Results

As shown in Figure 4, model 11 fits the data well within sample. To further test the model, a simulation was conducted in which coefficients from an in-sample estimation (1973:Q2-88:Q2) of the preferred model were used to forecast the period 1988:Q3-91:Q4. To avoid tax reform problems, the forecast period begins after 1987, and to avoid any temporary effects of the October 1987 stock market crash, the forecast begins in 1988:Q3.[22]

Aside from testing for robustness, the simulation is used to decompose the sharp slowdown in real bank consumer loan growth since 1988:Q2. It also gives some perspective on how much of this deceleration stems from (1) a tightening of credit conditions, (2) a slowing in consumer durable purchases, and (3) tax reform effects as embodied in the real user cost of capital (dlog(r3)). Unfortunately, it is difficult to disentangle how much the recent slowing in bank consumer loan growth reflects any attempts of households to deleverage or simply reduce any perceived excess debt burden accumulated during the 1980s. The reason is that some of these effects may be reflected in reduced growth of personal consumption expenditures.

As shown in Figure 5, the simulation does a good job of tracking the decline in real bank consumer loan growth since 1988:Q2. Indeed, the mean square error (quarterly basis) of the simulation period (.00464) is smaller than that of the insample period (.01417).

Figure 6 depicts several counter-factual experiments based on simulations which do not make use of the simulation error in t-1. The solid

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[22] Consumer loan growth at banks was unusually weak in 1988:Q1 and then was unusually strong in 1988:Q2. This pattern of residuals from model 12 strongly suggests a temporary uncertainty effect from the crash.

Figure 4: Actual and Estimated Growth of Real Bank Consumer Loans

Figure 5: Estimated and Simulated Real Bank Consumer Loan Growth

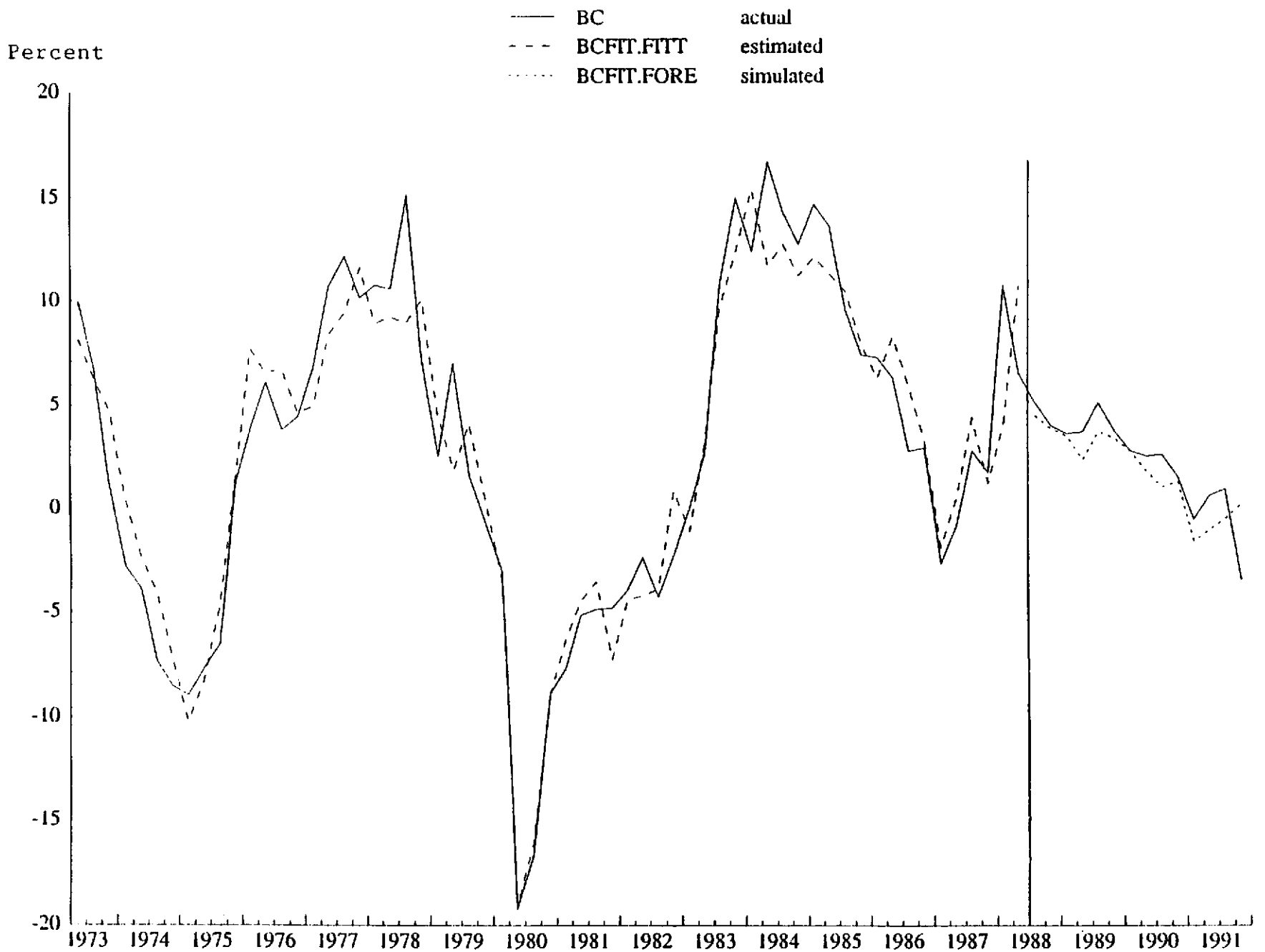
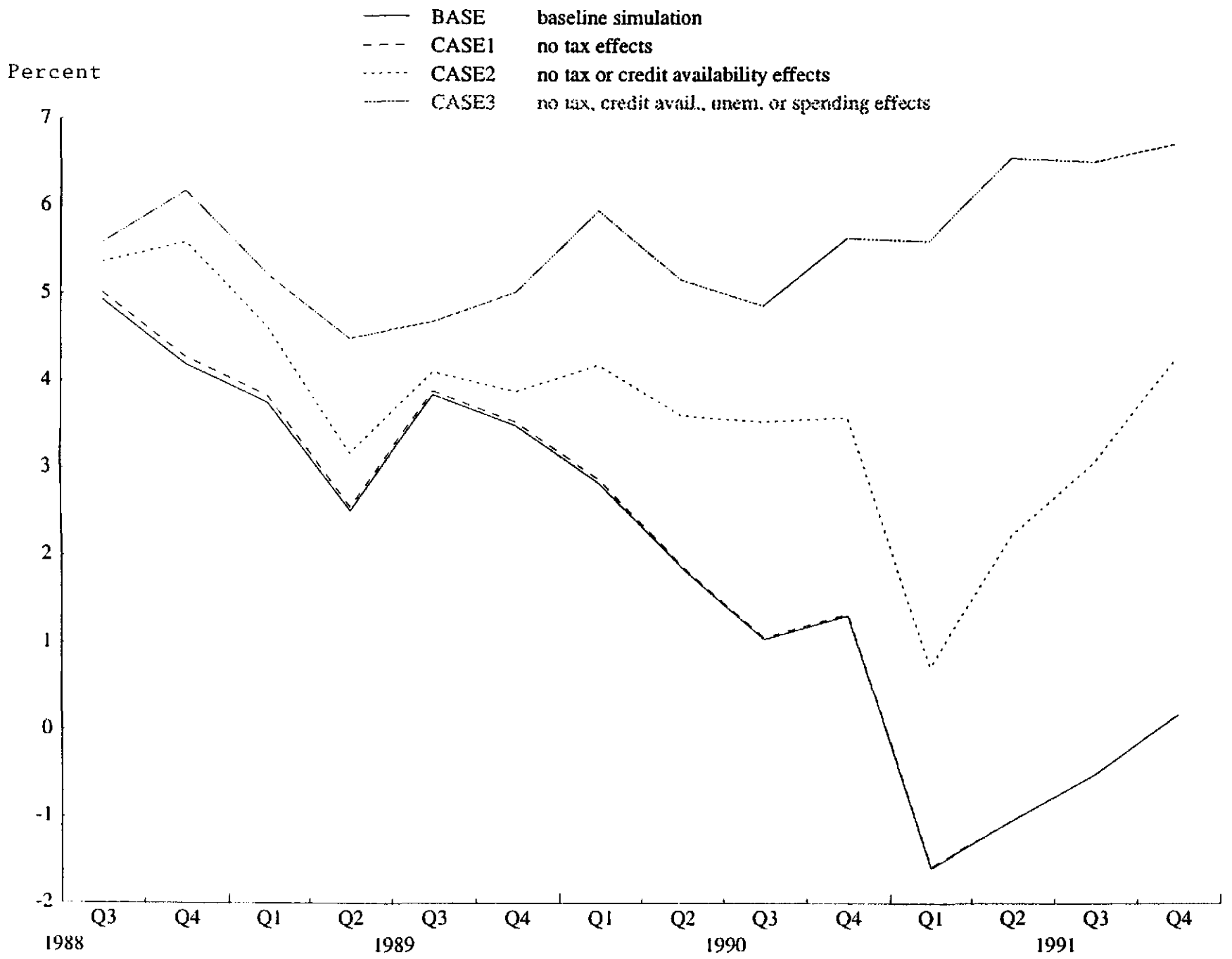


Figure 6: Counter-Factual Simulations of Consumer Loan Growth



line depicts such a simulation in which actual r.h.s. data are used (baseline). The long-dashed line depicts a simulation (case 1) in which the values of t and ϕ used in constructing the real rate term dlog(r3) are frozen at their 1988:Q2 levels. The mixed dashed line combines freezing t, ϕ, and CRMA at their 1988:Q2 levels (case 2). The dotted line, case 3, combines freezing t, ϕ, and CRMA along with (1) setting $U_t = U_{88q2}$ after 1988:Q2 to compute dU_t, dU_{t-1}, and dU_{t-2}, and (2) setting $dlog(C_t)$ and $dlog(C_{t-1})$ after 1988:Q2 equal to the average value of $dlog(C_t)$ over 1988:Q1-Q2.[23]

The gap between the baseline and case 1 simulations is relatively small, indicating that the additional impact of the 1986 Tax Reform Act after 1988:Q2 was small. As suggested by the large gap between cases 1 and 2, about half of the deceleration in bank consumer loan growth since mid-1988 reflected a change in the path of nonrate credit conditions as proxied by CRMA. The other half of the predicted deceleration from the baseline simulation owes to a sharp downturn in consumer spending and the recent rise in unemployment as reflected in the large gap between cases 2 and 3.

V. Conclusion

This study finds that consumer lending by banks reflects not only demand factors and supply influences related to interest and tax rates, but also nonrate conditions of credit and competition from other financial intermediaries. In this way, our time series results are consistent with recent cross-section evidence that borrowing constraints have substantial

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[23] The 1988:H1 average of $dlog(C_t)$ was used rather than the 1988:Q2 value to smooth out the October 1987 stock market crash induced decline in consumption spending during 1988:Q1 that was reversed in 1988:Q2. For this reason, a 1988:H1 average is more indicative of the path of real growth in PCE than the 1988:Q2 value of $dlog(C_t)$.

effects on households (e.g., Jappelli (1990) and Cox and Jappelli (forthcoming)), and with theoretical arguments that bank credit is allocated with nonrate terms (e.g., Jaffee and Russell (1976), Stiglitz and Weiss (1981), and Williamson (1986)), as well as interest rates.

This study's findings indicate that in order to make inferences about consumer spending from bank consumer loans, one needs to consider five factors in addition to interest rates. First, consumer loan-backed securities (bank originated) should be added to consumer loans on bank balance sheets to obtain a reasonable measure of bank lending. Second, bank consumer lending is affected by sales incentives offered by captive auto finance companies. Third, owing to changes in the tax code, bank consumer loans have been losing ground to other forms of finance, particularly home equity loans. Fourth, changes in credit availability not reflected in interest rates need to be considered. Fifth, real bank consumer loan growth tends to lag growth in real consumption outlays, consistent with the U.S. Commerce Department's classification of consumer installment loans as a lagging economic indicator. For these reasons, this study implies that consumer loans at banks should be viewed from a comprehensive perspective.

With regard to recent developments, our results imply that the impact of tax reform on bank consumer loan growth mainly occurred in 1987, and that most of the slowing in the growth of real bank consumer loans since the mid-1980s is explained by (1) large securitizations of consumer loans (implied by Figure 1), (2) the sharp slowing of real consumption growth and the recent rise in unemployment, and (3) the sharp slowdown in the extent to which banks have eased credit standards since 1987. The first finding reflects the incentives for banks to sell consumer loans under the recently implemented risk-based

capital standards. The second result is consistent with the notion that households have recently been reducing their indebtedness, while the third finding provides evidence that changes in consumer credit availability have substantially restrained consumer loan growth at U.S. banks since the mid-1980s. Nevertheless, survey evidence indicates that credit availability to consumers has not been curtailed to the same extent as in previous periods of tight credit conditions or to the same degree as for C&I or commercial real estate loans. On balance, the findings suggest that it is more accurate to describe U.S. consumer loan markets as having gone through a "credit squeeze" rather than a "credit crunch." Finally, simulations indicate that about half of the further slowdown in consumer borrowing from U.S. banks since 1989 (securitization-adjusted) has stemmed from changes in nonrate credit availability, and the other half, from cyclical factors and perhaps deleveraging that are reflected in the recent rise in unemployment and the sharp slowing in personal consumption spending.

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Table 1: Selected Regression Results Using dlog(rl)

	Model 1	Model 2	Model 3	Model 4
constant	-.002 (-0.67)	.0009 (0.21)	-.002 (-0.58)	-.003 (-0.75)
$dlog(C)_t$	.203 (1.46)	.214 (1.55)	.187 (1.37)	.284* (2.06)
$dlog(C)_{t-1}$	.336* (2.60)	.319* (2.45)	.277* (2.11)	.380** (2.89)
dU_t	.0004 (0.13)	.0002 (0.05)	-.0003 (-0.10)	.0008 (0.25)
dU_{t-1}	-.003 (-1.09)	-.003 (-1.16)	-0.003 (-1.11)	-.004 (-1.27)
dU_{t-2}	-.009** (-3.14)	-.008** (-3.04)	-.009** (-3.15)	-.009** (-3.04)
$dlog(rl)_t$	-.043* (-2.13)	-.040* (-2.01)	-.044* (-2.20)	-.040 (1.92)
$SPREAD_{t-1}$	.002* (2.07)	.002* (2.04)	.002* (2.42)	.002 (1.70)
$DEDUCT_t$	.007* (2.22)			
$REFDUM_t$		-.010 (-1.85)		
$REFDDUM_t$			-.015** (-2.81)	
$CRMA_t$	.044** (3.35)	.040** (2.85)	.045** (3.58)	.040** (2.99)
$CCON_t$	-.023** (-3.18)	-.023** (-3.22)	-.023** (-3.23)	-.022** (-2.92)
D.W.	2.08	2.09	2.12	2.08
R^2	.886	.883	.891	.879
Q(18)	10.77	12.20	14.00	17.85
rho	.720** (5.86)	.778** (7.07)	.707** (5.64)	.722** (5.94)

(t-statistics are in parentheses)

Table 2: Selected Regression Results Using dlog(r2)

	Model 5	Model 6	Model 7	Model 8
constant	-.002 (-0.68)	-.002 (-0.04)	-.002 (-0.60)	-.003 (-0.80)
$dlog(C)_t$	.216 (1.57)	.210 (1.54)	.183 (1.36)	.255 (1.88)
$dlog(C)_{t-1}$	.348** (2.68)	.337* (2.61)	.290* (2.22)	.385** (3.02)
dU_t	.0003 (0.08)	.0007 (0.02)	-.0004 (-0.14)	.0006 (0.17)
dU_{t-1}	-.003 (-1.08)	-.003 (-1.17)	-.003 (-1.07)	-.004 (-1.29)
dU_{t-2}	-.009** (-3.20)	-.009** (-3.16)	-.009** (-3.24)	-.009** (-3.17)
$dlog(r2)_t$	-.041* (-2.21)	-.044* (-2.49)	-.043* (-2.48)	-.048** (-2.68)
$SPREAD_{t-1}$	.002* (2.03)	.002* (2.13)	.002* (2.44)	.002 (1.95)
$DEDUCT_t$	.004 (1.38)			
$REFDUM_t$		-.007 (-1.37)		
$REFDDUM_t$			-.012* (-2.38)	
$CRMA_t$	.043** (3.30)	.041** (3.06)	.045** (3.58)	.041** (3.14)
$CCON_t$	-.023** (-3.16)	-.023** (-3.17)	-.023** (-3.30)	-.021** (-2.92)
D.W.	2.06	2.07	2.09	2.06
R^2	.887	.887	.893	.885
Q(18)	10.81	10.57	12.22	13.58
rho	.721** (5.88)	.754** (6.53)	.712** (-5.73)	.724** (5.97)

(t-statistics are in parentheses)

Table 3: Selected Regression Results Using dlog(r3)

	Model 9	Model 10	Model 11	Model 12
constant	-.002 (-0.68)	-.008 (-0.21)	-.002 (-0.54)	-.002 (-0.73)
$dlog(C)_t$	.216 (1.57)	.199 (1.45)	.175 (1.29)	.223 (1.64)
$dlog(C)_{t-1}$	.348** (2.68)	.330* (2.57)	.281* (2.16)	.361** (2.89)
dU_t	.0003 (0.08)	.00004 (0.01)	-.004 (-0.13)	.0004 (0.11)
dU_{t-1}	-.003 (-1.08)	-.003 (-1.10)	-.003 (-0.98)	-.003 (-1.18)
dU_{t-2}	-.009** (-3.21)	-.009** (-3.20)	-.009** (-3.25)	-.009** (-3.22)
$dlog(r3)_t$	-.041* (-2.22)	-.042** (-2.69)	-.038* (-2.47)	-.046** (-3.04)
$SPREAD_{t-1}$	.002* (2.03)	.002* (2.15)	.002* (2.38)	.002* (2.07)
$DEDUCT_t$	.002 (0.41)			
$REFDUM_t$		-.004 (-0.90)		
$REFDDUM_t$			-.010 (-1.93)	
$CRMA_t$	.043** (3.30)	.042** (3.24)	.045** (3.59)	.042** (3.30)
$CCON_t$	-.023** (-3.16)	-.023** (-3.33)	-.024** (-3.52)	-.022** (-3.20)
D.W.	2.06	2.07	2.07	2.06
R^2	.887	.888	.893	.889
Q(18)	10.74	9.82	11.21	10.80
rho	.721** (5.87)	.735** (6.15)	.714** (5.76)	.722** (5.94)

(t-statistics are in parentheses)

List of Variable Definitions

L^b = real stock of U.S. bank consumer loans, adjusted for securitizations.

α^b = bank share of total consumer loans.

Q = share of population that can qualify for a loan large enough that they choose to borrow.

N = population.

L^t = average per capita demand for real consumer loans from all lenders.

C = real personal consumption expenditures.

dU = change in the civilian unemployment rate.

r1 = real bank auto loan rate, not adjusted for tax rates or interest deductibility.

r2 = real bank auto loan rate, adjusted for tax rates but not for interest deductibility.

r3 = real bank auto loan rate, adjusted for tax rates and interest deductibility.

π^e = expectations of inflation.

R = nominal bank auto loan rate (source: Federal Reserve surveys)

t = U.S. Treasury's estimate of the average, marginal federal tax rate for a family of four earning the median level family income.

σ = contemporaneous percent of consumer loan interest that can be deducted for federal income taxes.

ϕ = average 4-year ahead percent of consumer loan interest that can be deducted for federal income taxes.

SPREAD = change in the maturity adjusted spread between finance company and bank auto loan rates (loans for new cars).

DEDUCT = change in deductibility of consumer loan interest (see text for details).

REFDUM = tax reform dummy = 1 from 1987:Q1-1991:Q4.

REFDDUM = tax reform dummy = 1 in 1987:Q1 and 1987:Q2 only.

List of Variable Definitions
(continued)

CRMA = average change in a diffusion index of relative bank willingness to make consumer installment loans from t-4 to t-1 (from Federal Reserve surveys of large U.S. banks).

CCON = MPS model's credit control dummy = 1 in 1980:Q2 and 1/2 in 1980:Q3.

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