Measurement of Implicitly-Priced Output of Commercial Banks in the US National Accounts

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1. What is FISIM and why do we include it in the National Accounts?

Measurement of the nominal output of a market producer of services is normally one of the most straightforward problems in national income accounting. The price or fee for which the services sell is their value. Yet in the case of commercial banking, an important part of the industry's output is not sold for an explicit price, but rather is priced implicitly via interest margins included in interest rates received from borrowers or paid to depositors. The measurement of the output of commercial banks therefore involves difficult conceptual and practical questions.

On a conceptual level, the absence of explicit prices for the services connected to deposit-taking and lending activities has led to much debate about how to define the output of commercial banks. One thing that is clear, however, is the need to include some imputation for implicitly-priced intermediation services in the measure of banks' output. A treatment of commercial banks with no imputation for their implicitly-priced output would implausibly portray the banks' employees and fixed capital stock as producing too little to cover the cost of employee compensation. To cover their negative gross operating surplus, banks would then be shown as relying upon distributions of the income of others in the form of interest. In short, without some sort of imputation for its unpriced output, the banking industry would, in the memorable words of Gorman (1969), be cast in the role of a leech on the income stream, similar in some ways to loss-making enterprises kept alive by a steady flow of subsidies.

The 1993 and 2008 versions of the System of National Accounts (SNA) explain how to measure the implicitly priced services provided as part of lending and deposit-taking by commercial banks. To measure "FISIM" (for "financial intermediation services indirectly measured"), the SNA recommends the use of a reference rate, defined as a risk-free rate that is not associated with any provision of services by the creditor to the debtor or by the debtor to the creditor. The excess of the lending rate over the reference rate is then the implicit price paid by borrowers for the services connected with their loans, and the shortfall of the deposit rate from the reference rate is the implicit price paid by depositors for services that they receive.

Under the reference rate approach, implicitly priced services to depositors are measured by the spread between the reference rate and the rate paid to the depositors, and implicitly-priced services to borrowers are measured by the spread between the lending rate and the reference rate. The theoretical justification for the reference rate approach views the reference rate as the opportunity cost of funds for both the bank's customers and for the bank. Taking the bank customer's point of view, consider a borrower who has the option of repaying a loan with an interest rate of r^A but who chooses instead to invest in a security that pays the reference rate r^{ref}. This borrower is implicitly choosing to pay a spread of $r^A - r^{ref}$ for the financial services associated with the loan. Similarly, a depositor who could invest in the reference rate security but instead earns the lower deposit rate of r^D is choosing to forego income $r^{ref} - r^D$ in exchange for depositor services.

Interest rate margins compared with the reference rate can also be interpreted as prices from the point of view of the bank. For the bank to be indifferent at the margin between lending and investing in the reference rate security, the cost of providing services to loan customers must be $r^A - r^{ref}$, and for the bank to be indifferent at the margin between obtaining reserves by selling the

reference rate security or accepting additional deposits, the cost of providing services to depositors must be $r^{ref} - r^{D}$. (For a more detailed theoretical justification of the reference rate approach based on the academic literature on the user cost approach to measuring capital services as applied to financial assets, see Fixler, Reinsdorf, and Smith, 2003.)

2. Debate over what belongs in the conceptual definition of FISIM

2.1 Broad Definition of FISIM

By including FISIM in our measure of bank output, we are accepting the principle that banks' net receipts of interest can represent implicit sales of financial intermediation services rather than true interest income. Yet this does not imply that the entire amount of these net receipts of interest must be so designated. Indeed, with the reference rate approach, a residual amount of net interest income will generally remain after FISIM has been deducted. This net interest income residual represents claims that the banks have on the income generated by the output of others, not implicit sales of their own output.

An explanation of the concept of FISIM would not be complete without a review of the abstract debate over where to place the boundary between pure net interest income and implicit sales of intermediation services. The main alternatives in this debate can be thought of as proposals to narrow down a broad definition of FISIM. We therefore start with the broad definition, and then we use it as a baseline to which the other definitions can be compared.

The broad definition of FISIM covers all the interest rate spreads over the reference rate on the banking sector's interest-bearing assets, plus the spreads under the reference rate on its financial liabilities. If the national accounts use this definition, most of the banking sector's reported net interest income will be treated as FISIM, but even under the broad definition of FISIM the accounts will normally record the bank as receiving a residual amount of pure interest income.

The difference between the amount of net interest income that banks report and the broad measure of FISIM equals the reference rate times the amount of "own funds" used for lending, where own funds are funds that come from the banks' stockholders, not depositors or other creditors of the bank. Let A be the bank's interest-bearing assets, let L be its financial liabilities (such as deposits and borrowed funds), and let $W = A - L$, the bank's own funds. Regulatory requirements that banks have positive net worth take into account more assets and liabilities than those in A and L, but those additional assets and liabilities are generally not important enough to allow A to be less than L. We can therefore assume that $W > 0$. Then if r^{L} is the average rate of interest paid on the bank's liabilities the amount of net interest income that the bank reports is $r^{A}A - r^{L}L$. Adding the borrower FISIM of $(r^{A} - r^{ref})A$ to the depositor FISIM of $(r^{ref} - r^{L})L$, then simplifying, shows that $(r^{A} - r^{ref})A + (r^{ref} - r^{L})L = r^{A}A - r^{L}L - r^{ref}W$. The difference between the bank's reported net interest income and total FISIM equals the reference rate times own funds. This is the amount of net interest income that the national accounts record as received by the bank under the broad definition of FISIM. If a narrower, more restrictive definition of FISIM is adopted, the amount of net interest income recorded as received by the bank will, of course, be greater.

2.2 Restricting the Definition of FISIM to Loans and Deposits

The first narrower alternative for defining FISIM includes the spread income on just loans and deposits, rather than on all interest-bearing assets and all financial liabilities. The rationale for including only loans and deposits in the calculation of FISIM is that only customers or clients who have direct interactions with a bank can be deemed as receiving services from a bank. For example, even though a government bond held by a bank may pay a rate of interest above the reference rate, the bank has no direction interactions with the borrower through which it could be supplying services.

Defining FISIM to require some sort of direct interaction between a bank and a customer is reasonable, but the assumption that only deposits and loans involve direct interactions with a customer describes the US banking system as it existed 40 years ago, not as it has existed in recent times. On the asset side, loan securitization became common in the 1990s. Though it fell dramatically in volume in the aftermath of the financial crisis of 2007-8, it is unlikely to disappear. Loans that are originated and service by a bank and held by that bank or some other bank in securitized form offer similar services to borrowers as loans that held as loans, so including them in FISIM is appropriate.

On the liability side, limiting FISIM to deposits would leave out deposit-like arrangements that offer the same services to customers as deposit accounts. Businesses, governments, and institutions that are too large to be adequately protected by deposit insurance (which before the financial crisis of 2007-8 was limited to $100,000) often place their funds in a bank via repurchase agreements, which provide collateral that protects them against losses in the event of a bank failure. These are legally structured as an agreement in which the investor purchases securities from the bank and the bank repurchases them on a later date for an amount that reflects the interest rate promised to the investor. Repurchase agreements continue to be an important deposit-like source of funds for commercial banks.[1] However, in the case of the US, the error from ignoring repurchase agreements when calculating depositor FISIM using just deposits would be partially offset by the presence of a kind of deposit that is functionally more like a bond sold in a securities market. Since the 1980s banks in the US have been able to raise funds by selling certificates of deposit (CDs) through stockbrokers as if they were bonds. Though they are included in data on deposits, these brokered CDs are bond-like instruments that involve no direct interaction of the bank with the customer.

In summary, the requirement of a direct interaction between the customer and the bank narrows the scope of assets and liabilities on which FISIM is calculated in a complicated way that includes more items than just loans and deposits. Assets like loans that been repackaged as securities may substitute some explicit fees (such as servicing charges) for implicit ones, but they still involve some implicitly priced services of banks to borrowers, who generally do not even know that their loan has been securitized. On the liability side, spreads on repurchase agreements are also commonly smaller than spreads on deposits, implying the presence of less implicitly-priced services, but the smaller size of the implicitly-priced services does not mean they should be ignored.

[1] Gorton and Metrick (2009) present research showing that virtual bank runs by providers of funds through repurchase agreements were a key contributor to the severity of the financial crisis of 2007-8.

2.3 Excluding Liquidity Transformation from the Definition of FISIM

Another debate concerns whether to replace the single reference rate used for all assets and liabilities by a family of reference rates from credit market instruments of various maturities. With maturity-matched reference rates, FISIM would be calculated as the spread between the interest rate on a loan or deposit and a reference rate for a risk-free security or money market instrument of similar duration. Bonds with longer maturities generally pay higher yields, so the proposal to use maturity-matched reference rates would have the effect of reducing the amount of FISIM imputed on longer loans and on deposits with short maturities. It would also increase the amount of FISIM imputed on short-term loans and on long-term deposits.

On the asset side, the rationale for the proposal to use maturity-matched reference rates is that the interest rate that could have been received by a passive investor in the credit markets who is willing to accept the same maturity as a loan offered by the bank must not contain any element of implicit payment for services, as passive investors do not supply services. On the liability side, the rationale is that the interest rate that the bank could have paid by issuing bonds or commercial paper of the same maturity as the deposit must not reflect any provision of unpriced services because investors in credit market instruments do not receive services.

One problem with this proposal is that bank loans and deposits have different characteristics and behavior from credit market instruments like bonds and commercial paper. Stated maturities of credit market instruments such as bonds cannot, therefore, be compared with stated maturities of bank loans or deposits because they do not have the same meaning. For example, commercial loans are likely to become payable in full if certain trigger events occur such as a decline in the borrower's financial condition, and loans of all types may to be subject to renegotiation or frequent changes in the interest rate. On the liability side, core deposits are a much more stable source of funding than credit market borrowings because they have a high likelihood of being rolled over upon maturity or converted into some other type of deposit.[2]

Yet a more fundamental problem with this proposal is that it rests on the mistaken presumption that liquidity provision is not a service. Ability to access funds whenever the need for cash arises provides security and convenience, for which households and businesses are willing to pay. Furthermore, to provide such liquidity services banks must devote labor and capital inputs to reserve management activities. The desire to have immediate or prompt access funds means that people prefer short maturities when they are the creditor, but long maturities when they are the debtor. Banks therefore accommodate the desire on the part of their customers to lend short but borrow long by financing longer term loans with short term liabilities that are continually rolled over or replaced. Diamond and Dybvig (1983) term this process "liquidity transformation" and identify it as one of the core services provided by banks.

[2] In contrast, many other kinds of liabilities are often referred to as "hot money" because of their tendency to vanish at the first sign of trouble or change in conditions. For example, excessive reliance on hot money doomed Northern Rock, and retail branch deposits were its most stable source of funding (Shinn, 2009).

A practical advantage of maturity-matched reference rates is that they can sometimes prevent negative estimates of FISIM on long-maturity liabilities or short-maturity assets. Yet these more satisfactory estimates of certain detailed components of FISIM come at the cost of underestimating its overall total. Loans tend to have longer maturities than deposits and deposit-like liabilities, so the effect of using matched-maturity reference rates will generally be to apply a higher average reference rate to the measurement of borrower FISIM than to the measurement of depositor FISIM. As a result, the total amount of FISIM calculated using maturity-matched reference rates will generally fail to include some of banks' liquidity transformation services.

To provide liquidity transformation services in a stable way is a difficult task that involves activities that require labor, human capital and fixed capital resources. Guaranteeing that depositors can have instantaneous access to their funds requires reserve management and management of a bank's own sources of liquidity. What is more, short term liabilities like demand deposits can be a stable source of funding for long term, illiquid loans only if the bank maintains a reputation for safety that inspires confidence in depositors and other providers of funds. Risk management activities are therefore also part of production of liquidity transformation services. To retain the confidence of providers of funds, a bank must devote inputs to making sound lending decisions and to managing credit relationships to keep them profitable (Diamond and Rajan, 2001).

2.4 Excluding Returns to Risk Bearing from the Definition of FISIM

Besides preferring short maturities, creditors tend to be averse to risk. Risk aversion causes investors to demand a risk premium in the form of a higher expected rate of return when the credit risk posed by the borrower adds a significant amount of variance to the return of their diversified portfolio. This risk premium compensates the investor for the disutility of risk-bearing, so it is in addition to the adjustment to the interest rate needed to recoup expected losses from defaults (credit losses).

Wang (2003) and Wang, Basu and Fernald (2004) develop a theoretical model in which bank loans to businesses include a risk premium component that is not an implicit fee for services. In their model, investor risk aversion implies that the value added of a business must be large enough to generate a rate of return on its capital stock compensates the investors for the risk that they bear. The required risk premium is invariant to whether the financing is intermediated by a bank, so if some the financing comes from bank loans, the interest rate on those loans must include a risk premium. But if this risk premium is included in the measure of implicitly priced services provided by the bank, it must be deducted from the value added of the borrower. Wang and her co-authors argue that this reduction violates the principle that the measure of a business's value added should be invariant to how the business is financed.

In a competitive equilibrium, the value of a firm's output should equal the cost of the inputs used, with the risk premium required to compensate investors for risk-bearing included the cost of capital inputs. If bank loans are one of the sources of finance for the business's capital investment needs, their interest rate will include a risk premium component that distributes part of this compensation for risk-bearing to the bank. To prevent this risk premium component from

being counted as a purchase of implicitly priced services from the bank, Wang and her co-authors argue that a risk premium term should be incorporated in the reference rate used to calculate borrower FISIM on risky loans. (To calculate depositor FISIM, they would either continue to use the risk-free reference rate or, if the bank itself is seen as at risk of failure, they would use a reference rate that is net of the risk premium needed to compensate depositors for bearing the risk of the loss of their deposits.)

Nevertheless, the appropriateness of incorporating risk premiums in the reference rate is a matter of debate. One reason for this is that Wang's model is a theoretical model for pricing risky assets in frictionless capital markets. In the capital markets typically considered by the finance theory literature, securities are freely tradable because they have uniform characteristics and have risk profiles that are neither exogenous nor contingent on who owns them. In contrast, banks can and do undertake activities to reduce the riskiness of loans they hold. Moreover, bank borrowers tend to be idiosyncratic and to have match-specific levels of risk and expected returns. Often the bank holding a loan has match-specific advantages, such as a detailed understanding of the borrower's business or a long term relationship with the borrower. The bank also has a better ability than an outside investor would to work with the borrower in managing any problems that may arise, and a better ability to collect on the loan or sell the underlying collateral. Finally, bank loans to business are often bundled with liquidity services that most borrowers would not be able to obtain from securities markets, because the loans occur through drawdowns on lines of credit to finance inventories and receivables or to cope with seasonal fluctuations or unexpected events. (For example, some of the businesses affected by the volcano ash have undoubtedly drawn on bank lines of credit.)

In many cases, the borrower's business would either not exist at all or have reduced activities without the bank loans because no other form of financing would be possible. The principle that the measure of the borrower's value added should be the same as if it had used some other method of financing is inapplicable if the bank loans are—like financing in general in Keunig (1999)—an irreplaceable input into the production process. Furthermore, if risk bearing is not considered to be a service in the banking industry, treating the insurance industry in a way that is consistent with the treatment given to the banking industry will result in an implausibly small estimate of its value added. Indeed, even the banking industry would likely be shown as a kind of leech on the income stream if the risk bearing and liquidity transformation were not considered to be services.

3. Implementation of the Reference Rate Approach in the US National Accounts

The reference rate approach was implemented in the US National Income and Product Accounts (NIPAs) in December 2003. (For a detailed description of its implementation, see Fixler, Reinsdorf and Smith, 2003.) Before the NIPAs adopted the reference rate approach, they treated all of the net interest income of banks as implicitly-priced services to depositors. Thus the main direct effect of adopting the reference rate approach was to cause some of the FISIM previously treated as consumed by depositors to be treated as consumed by borrowers. For example, in the currently published NIPAs, borrower FISIM—shown as a negative number in NIPA Table 7.11 because it has the effect of reducing net interest received by banks—rises in absolute value from

around $99 billion in the recession year of 2001 to about $200 billion in 2006 on the eve of the financial crisis, but then declines to $150 billion two years later.

Interest rates in the FISIM calculations of the NIPAs are measured as ratios of interest flows during a quarter (year) for a particular type of asset or liability to the average book value of the stock of that asset or liability type during the quarter (year). The average rate received by banks on federal government and government agency bonds is used as the reference rate. An important practical advantage of these procedures is that they yield consistently positive estimates of FISIM both for depositors and for borrowers. In other words, the reference rate is consistently in between the average rate received on loans and the average rate paid on deposits (figure 1). Had the reference rate been defined as the inter-bank lending rate (the "federal funds" rate) rather than as the federal government bond rate, FISIM on some types of interest-bearing deposits would have been estimated to be negative, and the overall estimate of depositor FISIM would have been near zero. Inter-bank lending rates resemble deposit rates because creditors in the inter-bank loan market implicitly receive liquidity services similar to those received by depositors. The inter-bank loans have very short maturities (typically overnight), so they can be withdrawn in the event of a sudden need for cash almost as easily as demand deposits.

The broad definition of FISIM was selected to implement the reference rate approach in the NIPAs.[3] This avoided distortions in the measured growth rate of bank output from changes in the business practices, such as the rise of securitized lending and the growth in repurchase agreements as a source of funding. Although the broad approach includes some government bonds on the asset side and bank-issued bonds on the liability side that arguably provide no implicitly-priced services, in practice the estimates of FISIM for these bonds are negligible, as their rates of interest are usually close to the reference rate.

Adoption of the reference rate approach reduced the estimates of US GDP by increasing the share of bank output counted as intermediate and by reducing the overall estimate of FISIM. Households have more deposits than loans and businesses have more loans than deposits, so the splitting of FISIM that had formerly been attributed solely to depositor services into depositor services and borrower services components caused more of banks' unpriced output to be counted as intermediate consumption by business. Using 2001 as an example, at the time of the 2003 revision, $22.8 billion of implicitly priced output formerly included in GDP was classified as used for intermediate consumption (table 1). This made the estimates of depositor FISIM and borrower FISIM approximately the same, at about $93 billion each.

Besides the increase in the share of banks' implicitly priced output deemed to be an intermediate input, estimated GDP was also affected by reductions in the total amount of FISIM. In 2001, for example, the reference rate approach implies that banks received pure interest income of 19 billion dollars from the lending of their own funds. This pure interest income, which was previously included in FISIM, equals the reference rate multiplied by the value of banks' "own funds." Other things being equal, a bank with higher own funds will report higher net interest income. Banks do not incur any interest expense to obtain own funds, but this is not because the

[3] However, the conceptual framework for the implementation of FISIM came from an adaptation of the theory of user cost prices for measuring services of capital assets by Diewert (1974) and Barnett (1978), which was applied to banking by Hancock (1985), Fixler (1993), and Fixler and Zieschang (1999).

own funds are paid for with bartered services. Banks do not provide depositor services to the shareholders to whom the own funds ultimately belong.

Based on the accounts as they existed at the time of the 2003 comprehensive revision, another effect of adopting the reference rate approach on measured GDP in 2001 came from a decrease in the estimate of share of the total output of US banks attributed to their domestic branches and a decrease in the estimated output of the US branches of foreign banks. Although these effects were sizeable in 2001, amounting to a combined 37.1 billion dollars, they vary a great deal from year to year and at times the reference rate approach can yield higher estimates of the domestic share of production of banks with foreign branches or foreign headquarters.

4. Behavior of the Estimates of FISIM over the Longer Run

Measures of implicitly and explicitly priced services and of depositor and borrower services allow us to analyze the evolution of the US banking industry over the last half century. Although the share in US GDP of the value added of the commercial banking industry rose during most of the period from 1960 to 2005, the industry's share of the financial services value added fell after 1975; see figure 2. The source of the weakness was implicitly priced services, which represent traditional intermediation activities. The rise of money market mutual funds and of the commercial paper markets and the rise of securitized lending are among the factors contributing to the slower growth of the traditional intermediation services measured by FISIM. (Among the underlying factors facilitating the growth of disintermediated lending are cheaper computer power and new laws and regulations allowing banks to engage in previously impermissible activities.) Increased competition from financial markets has forced banks to substitute fee-based activities for the balance sheet intermediation activities (Allen and Santomero, 2001).[4] If the reference rate approach provides a meaningful breakdown of banks' implicitly priced output, the timing of the periods of weakness in the user cost measures of depositor and borrower services should reflect historical industry developments that differentially affected deposit-taking and lending. This does indeed seem to be the case.

The reference rate measures of depositor and borrower services imply that shrinking implicit depositor services were responsible for the initial phase of the slowdown in implicitly priced bank output. The growth of inflation-adjusted implicitly priced depositor services averaged about –18 percent per year from 1975 to 1981 (figure 3). Then, from 1982 to 1986 inflation-adjusted borrower services remained low compared with their level in 1980-1981. A short period of recovery ensued, but borrower services fell again in 1990-1992.

The period of weakness of deflated depositor services depicted in figure 3 was the time period when fierce competition with non-banks for the funds of savers caused disintermediation in the channeling of funds from savers to borrowers. In the mid-1970s, a large gap emerged between regulated rates paid on deposits and prevailing market interest rates, which made the user cost

[4] The declining role of credit market intermediation by banks is confirmed by the Federal Reserve Board's Flow of Funds accounts, which show that bank liabilities and currency declined from a high of 83.5 percent of the non-equity financial assets of the personal sector at the end of 1977 to a low of 46.2 percent in 1999. These figures exclude assets held in bank trusts, life insurance reserves and defined benefit pension funds.

price of deposits quite high. Investors responded by increasing purchases of Treasury notes, interests in mortgage pools issued by entities like GNMA, and other debt securities. At the same time as mispricing of depositor services created an opportunity for entry by non-banks, unprecedented volatility in stock and bond mutual funds generated pressure on mutual fund companies to offer a more stable type of fund. They therefore introduced the money market mutual fund, with great success.[5]

To retain deposits, banks needed to lower the user cost price of depositor services by raising the rates paid to savers. A gradual process of deregulation of deposit rates eventually allowed banks to offer rates competitive with money market mutual funds. The process started with limited offerings of NOW accounts in the mid-1970s, and culminated with the Depository Institution Deregulation and Monetary Control Act of 1980 and the emergence of money market deposit accounts with unlimited interest rates in 1982. Since the rebuilding of deposit service *volumes* was accomplished by a reduction in the price received for those services, the nominal value of depositor services stayed weak.

The timing of the periods of weakness in the reference rate measure of borrower services is also consistent with historical industry events. In the mid-1980s, the profitability of lending was pressured by regional recessions arising from major downturns in locally concentrated industries such as petroleum, agriculture and defense, negative spreads on older fixed rate loans, adverse effects of the 1986 tax reform on commercial real estate markets, poor loan underwriting decisions, and Latin American defaults. Soon after these sources of losses had depleted banks' capital, more stringent capital standards were enacted. Many banks were therefore obliged to curtail lending until they had higher capital ratios.[6] A sharp downturn in commercial real estate in New England also contributed to the weakness in borrower services in the early 1990s. By 1995, equity capital on a consolidated balance sheet for the commercial banking industry was back above 8 percent and bank output began to grow quickly.

5. Research at BEA on the Measurement of FISIM

5.1 Reducing Volatility of the Split between Borrower FISIM and Depositor FISIM

In the data used by the NIPAs, spreads between the loan rate and the reference rate and between the reference rate and the average rate paid on interest-bearing deposits are often 2 percentage points or less. With such narrow spreads, even a small change in a loan rate or a deposit rate will have a large effect on the growth rate of the corresponding component of FISIM if there is no matching change in the reference rate. Changes in loan and deposit rates that are not matched by the reference rate tend to occur in time periods when interest rates in general change direction either from rising to falling, or from falling to rising. The reference rate tends to exhibit inertia compared to the loan and deposit rates, so the turning point of the reference rate tends to occur

[5] Falling computer prices also helped to bring about the creation of the money market mutual fund. A possible explanation for why the episode of high margins on deposits that occurred before at the beginning of the 1970s did not result in the creation of money market mutual funds was that the data processing costs to run a money market mutual fund were still too high.

[6] Aggarwal and Jacques (2001) find that this helped to bring about the recession of 1991.

later than the turning points of the loan and deposit rates. The margins compared with the reference rate of the loan rate and the deposit rate are then temporarily compressed or expanded until all the rates are back on the same trajectory.

More depositor FISIM is included in final consumption by households and more borrower FISIM is used as an intermediate input, so when the depositor share of an unchanged level of total FISIM rises, the estimate of GDP rises. As a result, volatility in the split between the borrower and depositor portions of FISIM affects the estimate of GDP. Unfortunately, this volatility is unlikely to reflect genuine changes in the economy. It is not possible to measure high frequency (short run) changes in the split of FISIM into borrower and depositor components with precision because the effective interest rates that are received or paid in any quarter are averages of rates that were agreed to at various points of time in the past, not the rates offered during that quarter. Therefore, any short run volatility in the split of FISIM between borrowers and depositors that occurs is likely to be noise, not genuine information.

The total margin between the interest rate on loans and the interest rate on interest-bearing deposits is relatively stable, as can be seen from figure 1. We can therefore obtain appropriately smooth measures of borrower and depositor FISIM by stabilizing the position of the reference rate in between the loan rate and the deposit rate. This means damping the changes in the relative position of the reference rate ρ, defined as $\rho = (r^{ref} - r^D)/(r^A - r^D)$, where r^A is the rate received on loan assets and r^D is the rate paid on deposits. After the smoothed values of ρ have been calculated, they can be used to determine the smoothed values of the reference rate as convex combinations of r^A and r^D. Hood (2010) reports results from research on applying moving average smoothers to the relative position of the reference rate.

5.2 Adjusting for Credit Losses

Although the treatment of the component of interest on loans that compensates banks for bearing risk has been a topic of much discussion, the question of how to handle the component of interest that intended to cover the cost of losses from default (also known as "credit losses") has received almost no attention. This represents an important gap in the literature on measuring bank output because credit losses play a central role in the industry's performance and business strategies.

In national income accounting, transactions are generally recorded on an accrual basis, meaning that sales are registered when products are shipped to a customer, not when the customer actually pays the invoice. Of course, customers sometimes fail to pay, but measures of industry output and income are generally not adjusted for bad debts.

For most industries, bad debts are not part of the normal operating flows that the national accounts seek to measure, so national income accountants' practice of ignoring bad debt is appropriate. Furthermore, definitions of income in economic theory support this practice as long as bad debts are not a part of normal operations. Theoretical definitions of income in economic theory generally include anticipated or normal flows, but not surprise, or windfall, gains and losses. The discussion of the economic definition of income in Hicks (1939), for example, excludes windfall gains and losses and includes expected receipts.

Yet in the banking industry, bad debts **are** expected and a part of normal operations, much like claims for insured losses are expected and a part of normal operations in the insurance industry. In particular, contractual interest rates on loans are set on the assumption that some of the interest that banks collect from those who do repay will be needed to cover losses of principle and uncollected interest from those who do not repay. For example, one reason why credit card interest rates are high—they often exceed 20 percent—is the need to use receipts of interest to cover losses from defaults[7] In figure 6 (which comes from Hood, 2010) credit card loans have annualized charge-off rates that are typically around 5 percentage points higher than real estate loans and interest rates that are typically around 6 percentage points higher. In contrast, in normal years, commercial and industrial (C&I) loans have interest rates and charge off rates that are barely above those of real estate loans.[8]

Consider, for example, a bank that lends an aggregate amount of x to a large number of borrowers receiving some particular type of loan (credit card loans, for example) in the expectation of receiving back the aggregate amount y. If r is the contractual interest rate, δ_1 is the expected rate of non-repayment of principle due to defaults and δ_2 is the expected rate of non-payment of interest due to defaults, then $y = x + rx - \delta_1 x - \delta_2 rx$. The payments received by the bank that are labeled as interest equal $rx - \delta_2 rx$. The effective interest rates used to calculate borrower FISIM in the NIPAs do not include interest that has poor prospects of collection because the borrower is delinquent or in bankruptcy, so we can assume that the amount of interest that would be recorded in the NIPAs also equals $rx - \delta_2 rx$. However, from the bank's point of view, an economic definition of interest would equal the excess of the expected amounts received from the borrowers over the amount of principle that they borrowed, or $y - x = rx - \delta_1 x - \delta_2 rx$. The amounts labeled as interest exceed the economic interest by $\delta_1 x$, the amount of expected losses of principle due to the defaults.

Financial accounting practices in the banking industry reflect the need to exclude amounts set aside to cover default costs from measures of banks' revenue and income. Banks deduct provisions for credit losses from gross interest income to arrive at a measure of net interest income that allows for the amounts that the bank needs to set aside to cover expected losses from defaults. However these provisions for credit losses include amounts set aside in response to *ex post* developments and surprises (and they are partly dictated by inflexible, backward-looking rules from bank accounting standards).

The revenue that banks view as available to cover the cost of providing borrower services is the difference between interest spread on the loan and the amount that was expected to be needed for credit losses at the time of the interest rate (or interest rate formula) on the loan was set, normally the time of loan origination. Thus, an estimate of expected credit losses should be deducted from the interest rate on loans used to calculate borrower FISIM.

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[7] An even more dramatic example of using interest as a substitute for principle repayment comes from the subprime auto loan market studied by Adams et al. (2009). The majority of loans in this market end in default, but it is still profitable for the lender because the interest rates are in the 25-30 percent range.

[8] In 2001 and 2007 recessionary conditions caused high delinquencies in C&I loans, pushing down their effective interest rate, and 2008 was a year of high delinquencies in real estate loans.

How to classify the amounts intended to cover expected credit losses that are excluded from borrower FISIM is a difficult question. The simplest approach would be to include these amounts in the pure interest income received by the bank, just as has been proposed for the risk premium that rewards banks for bearing risk. Yet this would result in an overstatement of the true economic income of banking industry, as credit losses are a normal cost of doing business in this industry. Thus, an alternative approach would be to exclude expected credit losses from both FISIM and pure interest income of banks, so that amounts that are intended as substitutes for principle repayments are not recorded as income for the lender.

Yet even though the best measure of the income of the banking industry would exclude expected credit losses from both FISIM and pure interest received, such an exclusion would be difficult to fit into the conceptual framework of the national accounts. If a portion of the actual interest received from those who do not default represents neither an implicit payment for services nor economic interest income for the bank, it must, in effect, be used for current transfers to those who do default to cover the cost of loan write-offs. How equating debt forgiveness to a current transfer could be reconciled with the general principle in the SNA that debt forgiveness belongs in the "other changes in volume of assets" account is not obvious. Moreover, even though loan write-offs are at least partly expected and a factor that systematically increases the net worth of the borrowing sectors, whether they can be included in economic concepts of income and saving of the borrowing sectors is unclear.[9]

Empirical research on modeling expected credit losses has been conducted by Hood (2010). One piece of evidence in favor of the sort of model developed by Hood is the close correspondence of the net percentage of senior loan officers reporting rising spreads and recent changes in charge-off rates. Hood finds that a measure of *ex ante* expected credit losses can be constructed from time series on past realized credit losses based on an adaptive expectations model. (In this model, the expected charge off rate in the future is adjusted by a proportion λ of the deviation of a current period's outcome from its expectation. This implies that the expectation for the next time period's outcome equals a weighted average of the current and lagged outcomes, where the weight for the outcome from t periods back is $\lambda(1-\lambda)^t$.) Expected charge off rates on credit cards estimated using this approach with quarterly $\lambda = 0.2$ are shown in figure 7. Hood's approach effectively implies that loans originated during a recession have higher expected credit losses, because once a recession has begun, predicted charge-offs will typically remain at an elevated level for at least a year.

IV. Conclusion

This paper has considered a number of conceptual and practical questions that arise in measuring implicitly priced financial intermediation services of banks. It argues that the proposal to use maturity-matched reference rates would fail to give banks adequate credit for the liquidity services that they produce. It also provides some reasons to question the arguments that have been advanced to show that a risk premium should be excluded from borrower FISIM. Yet, on

[9] The difficulty of the question of how to treat interest payments that are intended to indemnify the lender for losses of pinciple is illustrated by the controversy over the inflation premium included in interest rates to compensate the lender for the effect of high inflation on the purchasing power of the principle. See Vanoli (2002), pp. 415-418.

the other hand, the component of the interest paid by risky borrowers that is intended to substitute for the missing principle repayments from those who default should clearly be excluded from borrower FISIM.

Table 1: Effect of Introduction of the Reference Rate Approach to Measuring FISIM on the Estimates for 2001

(based on national accounts as they existed in 2003; in billions of dollars)

	Estimate (using reference rate approach	Difference from previous estimate[a]
Total implicitly-priced output	186.6	-69.1
Final consumption	93.6	-91.9
Persons	78.8	-78.1
Government	5.4	-5.0
Rest of World	9.4	-8.9
Intermediate consumption	93.0	22.8
Financial corporations	7.3	-2.6
Nonfinancial corporations	45.2	3.9
Sole proprietorships and partnerships	20.3	1.5
Landlords, owner-occupiers and NPISHs	20.2	20.1

a. Changes in estimates of underlying assets and liabilities account for –13.0 billion of the total revision of –69.1 in implicitly priced bank output. Of the remaining –56.1 billion, –19 billion represents the services not imputed on own funds of US banks and –37.1 represent services newly attributed to foreign offices of US banks or reductions in the imputed output of US branches of foreign banks.

Figure 1: Position of the Reference Rate in between the Average Rates Received on Loans and Paid on Interest-Bearing Deposits

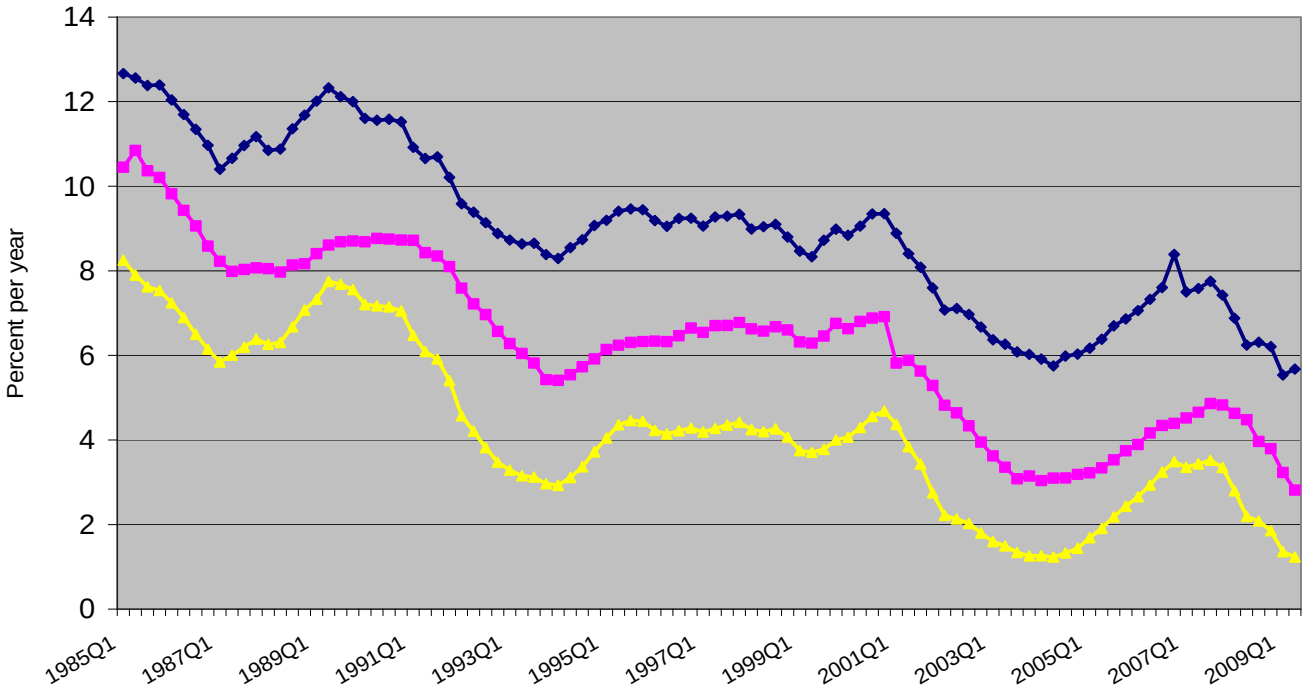


Figure 2: Value Added of Banks and of Financial Corporations, and Implicitly and Explicitly Priced Bank Services

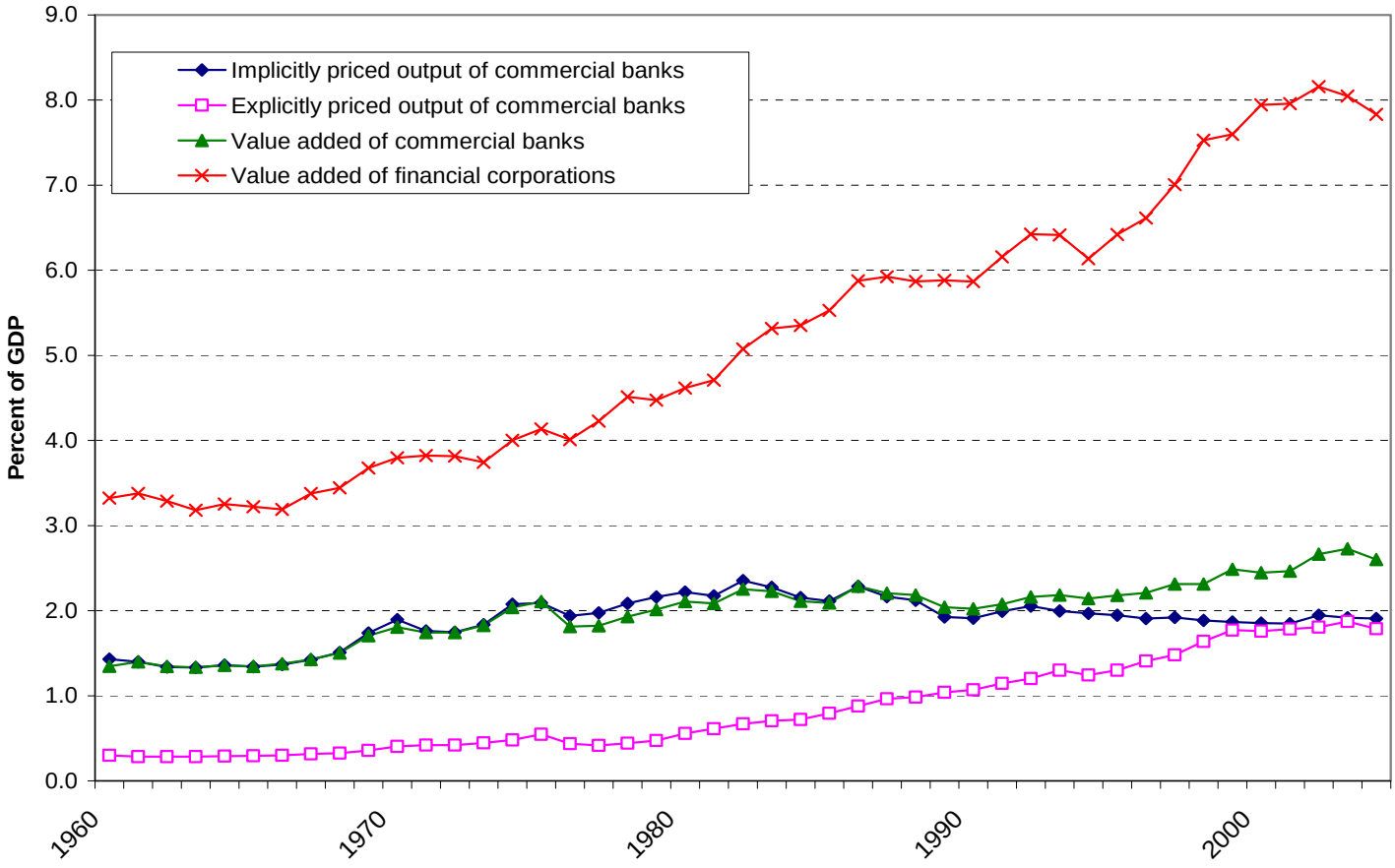


Figure 3: Growth of Depositor and Borrower Services
(Deflated by the Implicit Price Index for FISIM)

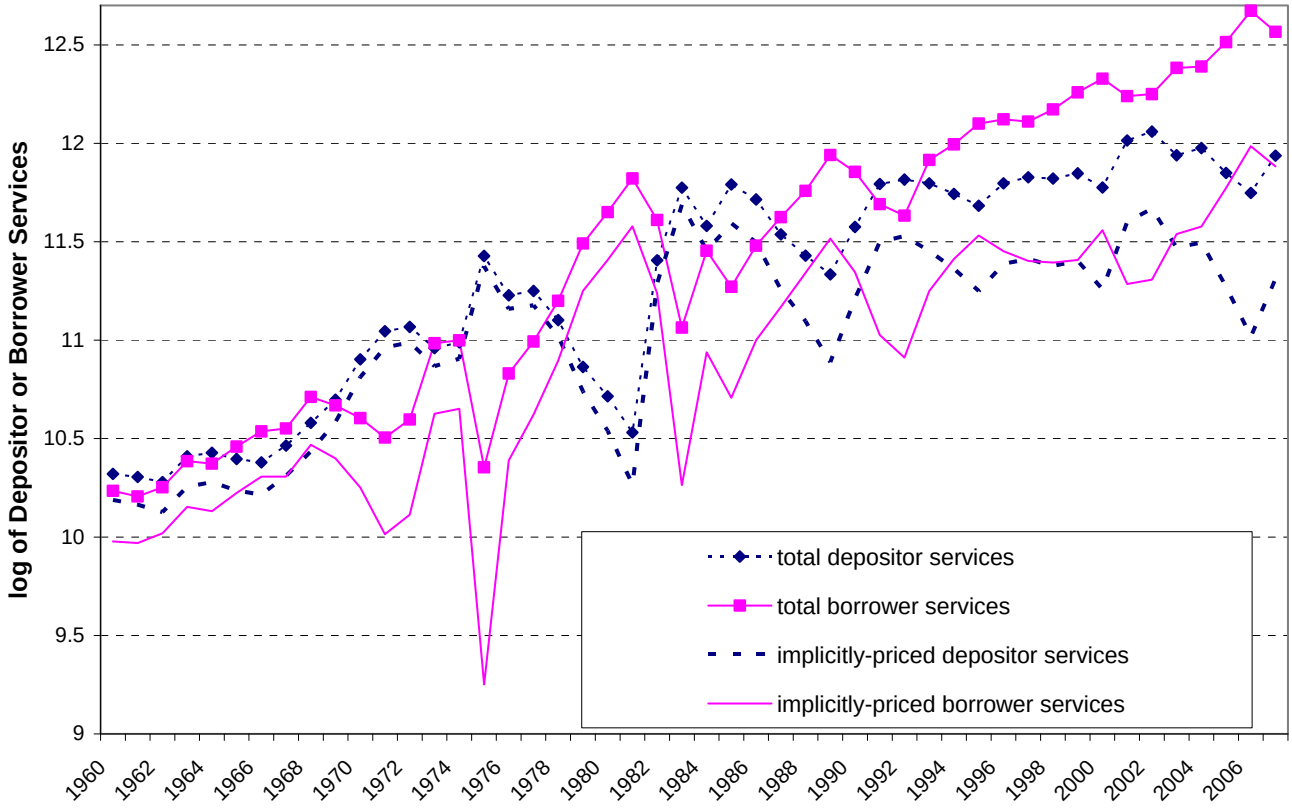


Figure 4: Borrower Services, Quarterly Imputed Gross Output

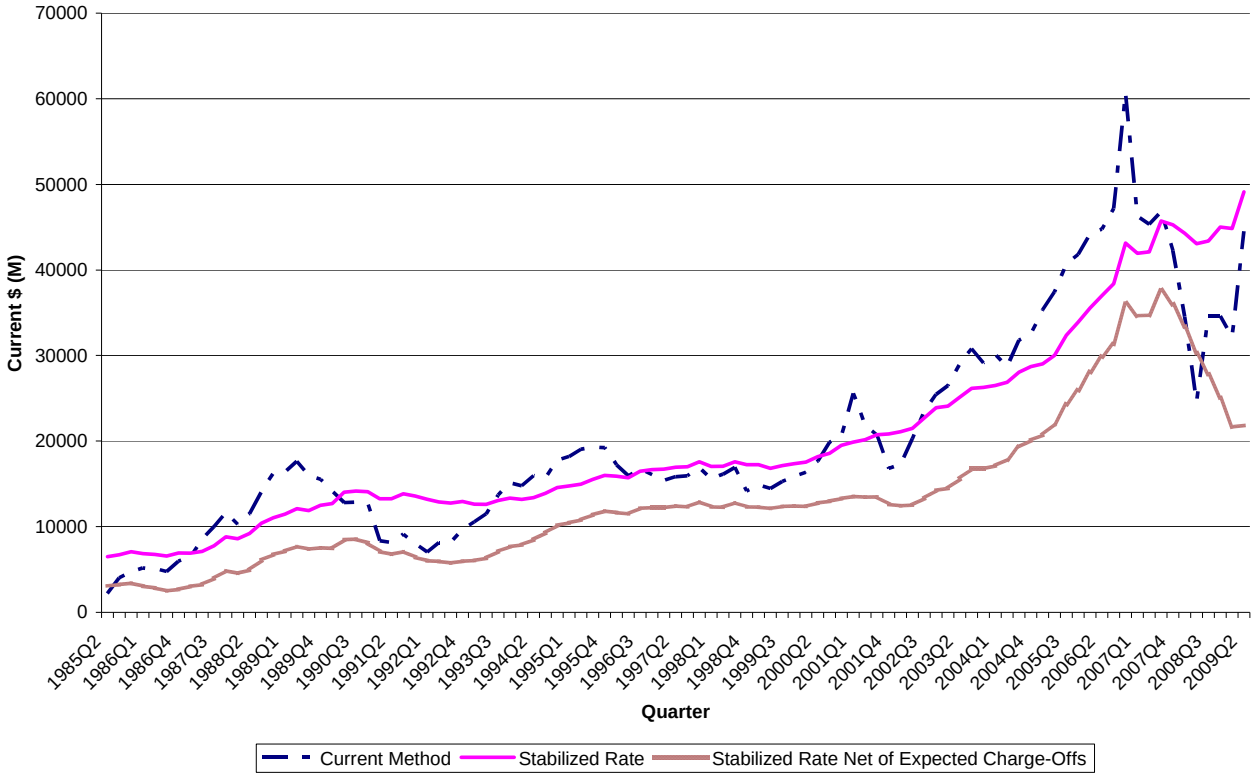


Figure 5: Depositor Services, Quarterly Imputed Gross Output

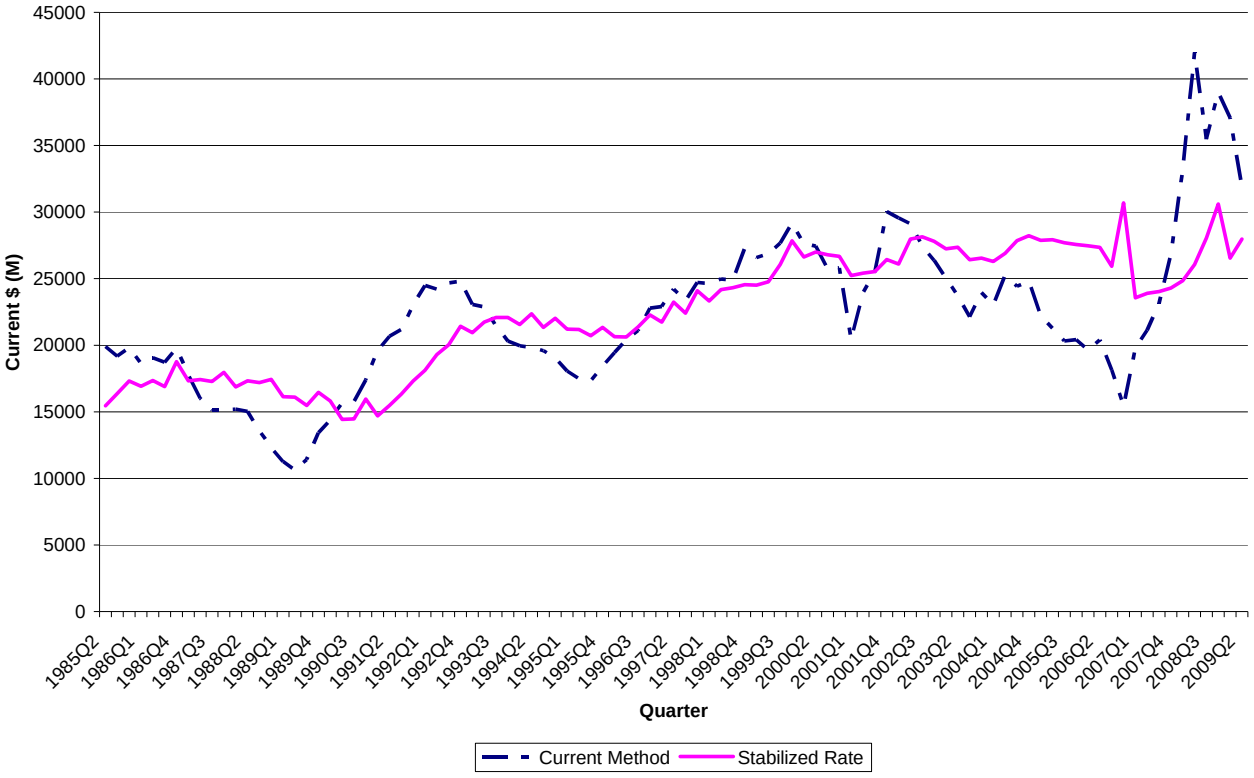


Figure 6: Charge-offs and Interest Rate Margins, 2001-2009

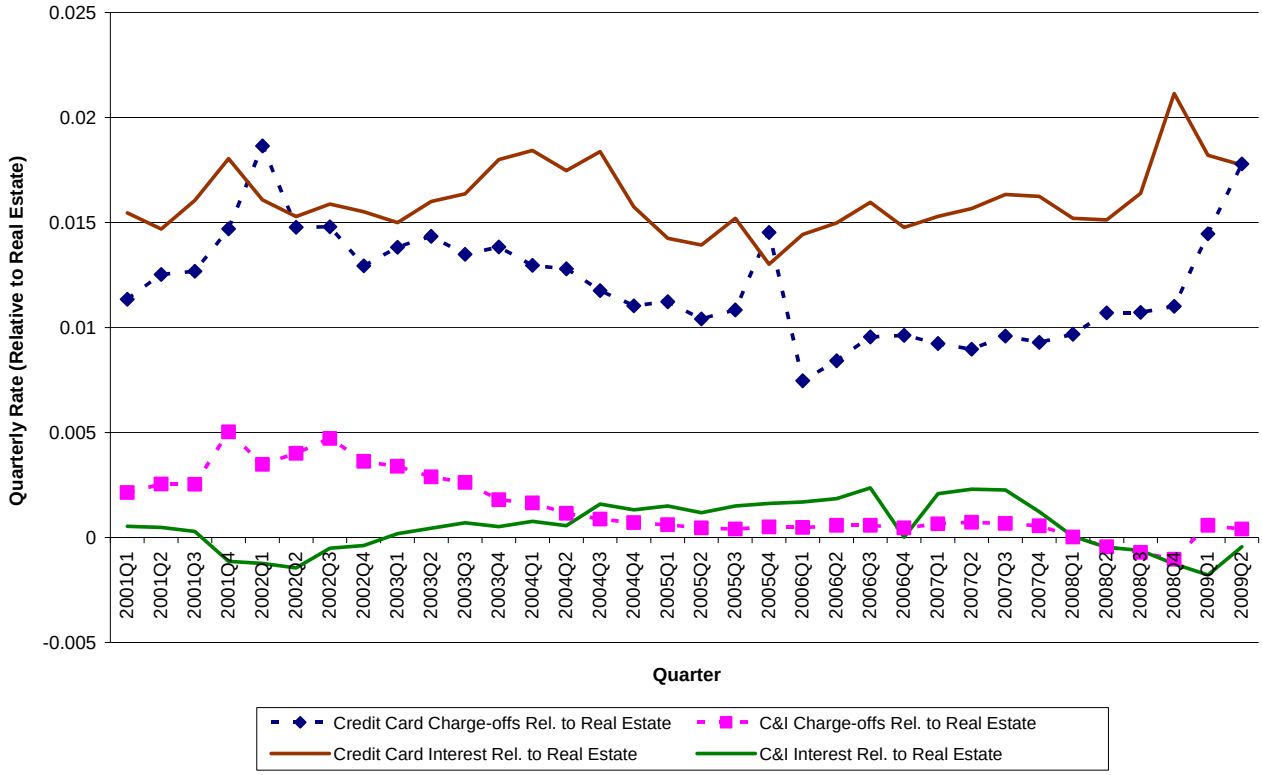
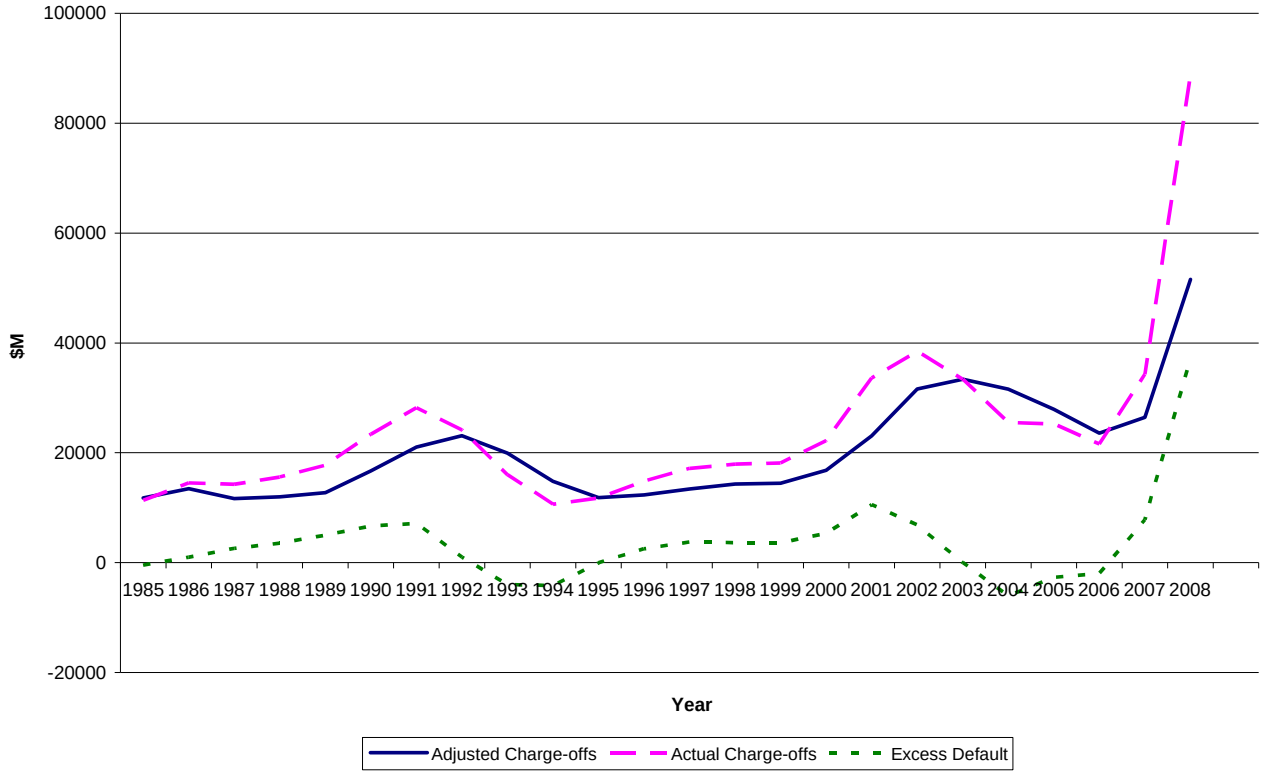


Figure 7: Actual and Adjusted Charge-offs



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