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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 value of the 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 the commercial banking industry, some output is not sold for an explicit price, but rather is priced implicitly. The implicit prices take the form of interest rate margins that are incorporated in the rates charged for loans or paid on deposits. Some examples of the services that bank customers receive in exchange for paying a higher rate of interest on loans or accepting a lower rate of interest on deposits are record keeping, safekeeping, payment processing, intermediation between savers and borrowers, risk management and advice. Another key implicitly-priced service of banks is liquidity provision, defined as giving the customer the ability to access cash or means of payment whenever the need arises. Besides offering convenience, access to liquidity insures the ability to pay obligations without delay. Participants in certain lines of business are required to have this sort of insurance.

The absence of explicit prices for the services connected to deposit-taking and lending has led to much debate about how to define the output of commercial banks, but the need to include some sort of imputation for implicitly-priced intermediation services in the measure of banks' output is incontrovertible. A treatment of commercial banks with no imputation for implicitly-priced output would be implausible because it would portray the banks' employees and fixed capital stock as producing very little. The low measure of bank output that excluded implicitly-priced services would imply a negative level of gross operating surplus, resulting in a portrayal of banks as relying upon the income of others distributed to them in the form of interest to meet their operating expenses. 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 a loss-making enterprise kept alive by a steady flow of subsidies.

The 1993 System of National Accounts (SNA) introduced the term "FISIM" ("financial intermediation services indirectly measured") to refer to the implicitly-priced output of commercial banks, and this term is also used in the 2008 SNA (European Commission *et al.*, 2009, 6.163). To measure FISIM, 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 the implicit price paid by borrowers for the services connected with loans, and the shortfall of the deposit rate from the reference rate is the implicit price paid by depositors for services connected with deposits.

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 to include in the definition of FISIM

2.1 Alternative Proposals for the Definition of FISIM

The concept of FISIM is based on the principle that the net interest income received by banks represents implicit sales of financial intermediation services. Yet in accepting this principle, we do not go so far as to regard all of the net interest received by banks as implicit sales of services. After FISIM as measured by the reference rate approach has been removed from the bank's reported net interest income, we will normally be left with a residual representing "pure" net interest income. This residual, termed "SNA interest" in the 2008 System of National Accounts (6.164), represents property income received by the bank, not revenue from sales of implicitly-priced output.

Where to place the boundary between FISIM and SNA interest has been a matter of intense debate. Four alternatives that have been proposed are: (1) a broad definition of FISIM that comprises almost all of the banks' reported net interest income; (2) a definition that excludes assets that are not loans and liabilities that are not deposits; (3) a definition that replaces the single reference rate that the SNA recommends for domestic transactions with a family of maturity-matched reference rates; and (4) a conceptual definition that excludes returns to risk-bearing. The third and fourth alternatives are linked, as the proposal to use maturity-matched reference rates can be viewed as a practical idea for accomplishing the conceptual objective of excluding the return to risk-bearing from FISIM.

2.2 Broad Definition of FISIM

The broad definition of FISIM imputes implicitly-priced borrower services for all interest-bearing assets of banks, and it imputes implicitly-priced depositor services for all deposits and other interest-bearing liabilities of banks. This can be expected to result in most of the banking sector's reported net interest income being classified as FISIM, but the remainder that is classified as SNA interest should still be positive. The SNA interest is the property income component of the as-reported interest that banks receive from lending of *own funds* (funds supplied by stockholders not depositors or other creditors of the bank).

Some algebra shows that 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. Let A be the bank's interest-bearing assets, let L be its financial liabilities (such as deposits and borrowed funds), and let $W = A - L$ be the amount of assets acquired with the bank's own funds. Regulatory requirements that banks have positive net worth take into account more assets and liabilities than just 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 $r^A A - r^L L$. This total net interest income reported by the bank can be expressed as the sum of three components: (1) borrower FISIM of $(r^A - r^{ref})A$; (2) depositor FISIM of $(r^{ref} - r^L)L$; and (3) SNA interest representing the bank's receipts of property income of $r^{ref} A - r^{ref} L = r^{ref} W$. Therefore if the broad definition of FISIM is used, the national accounts will record the bank's property income from net receipts of interest as $r^{ref} W$ and classify the rest of the bank's reported net interest income as implicitly-priced output.

2.3 Restricting FISIM to Loans and Deposits

The least controversial alternative to the broad definition of FISIM limits the bank assets for which FISIM is imputed to loans only, and the bank liabilities for which FISIM is imputed to deposits only. Indeed, this approach is recommended in the 2008 SNA (6.165). The rationale for restricting calculations of FISIM to loans and deposits as is that only customers or clients who have direct interactions with a bank can be deemed as receiving services from the bank. For example, if a bank provides funds to a government by purchasing its bonds, the bank will generally have no direct relationship with the debtor government.

Requiring some sort of direct interaction between the bank and a customer for an instrument to be treated as a source of FISIM is reasonable. Yet—at least in the case of the US—the assumption that only deposits and loans involve direct interactions with a customer describes the banking system as it existed 40 years ago, not as it has existed in recent times. On the asset side of the balance sheet, loan securitization became common in the 1990s. Loans that are held by a bank in securitized form offer similar services to borrowers as ordinary loans.[1] On the liability side, repurchase agreements with bank customers offer similar services to deposits (though the protection against loss of funds if the bank fails is provided by collateral that the bank provides to the customer instead of deposit insurance.) 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 through repurchase agreements, and these kinds of customers may also choose to place their funds in repurchase agreements to obtain a slightly higher rate of interest than would be available on an insured deposit. Repurchase agreements are an important source of funds for commercial banks.[2]

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[1] In one respect the services are not exactly the same, however. A modification of the loan terms may be difficult for the borrower to obtain if the loan has been securitized.

[2] 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. This virtual bank run

Besides instruments not labeled as deposits that are the functional equivalent of deposits, there are instruments that are labeled as deposits that are the functional equivalent of bonds. Since the 1980s banks in the US have been able to raise funds by selling bond-like certificates of deposit (CDs) through stockbrokers. Though they are included in data on deposits, these brokered CDs involve no direct interaction of the bank with the customer and provide no liquidity services, as they often have long maturities and often are callable by the issuing bank in the event that interest rates fall.

In summary, the requirement of a direct interaction between the customer and the bank for FISIM to be present is only crudely captured by imputing borrower FISIM for loans only and depositor FISIM for deposits only. Loans that been repackaged as securities may indeed substitute some explicit fees (such as servicing charges) for implicit ones, but securitized loans 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, rates paid on repurchase agreements may indeed imply a lower value for implicitly-priced services than the rates paid on deposits, but the smaller magnitude of the implicitly-priced services from these deposit-like arrangements does not justify ignoring these services.

2.4 Maturity-Matched Reference Rates

Another proposal for calculating FISIM is to replace the single reference rate of the SNA with a family of reference rates that vary according to the term of the loan or deposit for which FISIM is to be measured. (See, for example, Colangelo and Mink, 2010. Basu, Inklaar and Wang, 2008, also use maturity-matched reference rates, though their goal in doing this is just to remove the risk premium from the measure of FISIM). In other words, the implicitly-priced services from a loan or deposit of a given maturity would be measured using a reference rate taken from a bond or money market instrument having a similar maturity.

On the asset side of the bank's balance sheet, one 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. Furthermore, to make the measure of a corporation's expenses for interest and financial services invariant to whether it obtains the funds it needs by issuing bonds or from bank loans, only the difference between the bank loan rate and the bond rate can be included in borrower FISIM.[3] 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.

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involved a broader class of institutions than just commercial banks; for example, Bear Sterns and Lehman Brothers operated as investment banks, not commerical banks.

[3] A corporation that obtained funds by selling bonds would also have to pay some fees to the underwriter of the bond issue, so an adjustment to a measure of borrower FISIM based on the spread over the bond rate might be necessary to take account of these fees.

Under normal conditions, interest rates become higher as the term lengthens (the "yield curve" has a positive slope). Therefore—assuming that the single reference rate is for an intermediate term—replacing the single reference rate of the SNA with a set of maturity-matched reference rates will normally have the effect of reducing the amount of FISIM imputed on loans of long maturity and deposits of short maturity. In the US national accounts, however, the reference rate comes from somewhat longer term securities. Under this circumstance, the reduction in the overall measure of FISIM from adopting maturity-matched reference rates would primarily occur in depositor services.

To match the maturity of the instrument used to determine the reference rate with the maturity of the loan or deposit for which FISIM is being measured, we must make the assumption that credit market instruments and bank instruments of the same maturity are indeed comparable. Yet differences in renegotiation costs and in rollover probabilities mean this assumption is frequently violated. The maturity, payment schedule, interest rate and other terms of a bond are impossible to modify if circumstances change, but loan terms can be modified or renegotiated at relatively low cost. Furthermore, when a loan reaches maturity, the debtor may have the opportunity to renew the loan. Commercial loan contracts are also likely to contain provisions giving the bank the right to declare the loan payable in full if certain contingencies occur, such as a decline in the borrower's financial condition. Thus, the maturity of a loan is a more flexible concept for both parties than the maturity of a bond.

Turning to the liability side of the bank's balance sheet, core deposits are a much more stable source of funding than credit market borrowings because depositors tend to leave their money in the bank even if the deposit is available for immediate withdrawal.[4] This means that funds from deposits are likely to remain at the disposal of the bank even under credit market conditions that would likely cause a cut-off of funding obtained through the issuance of short term credit market instruments. The low likelihood that the option to withdraw will be exercised makes a deposit of a given maturity a more attractive source of funding for a bank than commercial paper or bonds of the same maturity.[5] For example, in the financial crisis of 2007-2008, Northern Rock Bank in the UK (discussed by Shinn, 2009) and Dexia Bank in Belgium and France required government rescues because creditors suddenly stopped rolling over the short-term nondeposit liabilities that these banks relied on for their funding. In contrast, core deposits generally proved to be a stable source of funding for banks during the financial crisis.

A second problem with maturity-matched reference rates is that they would result in most of the liquidity provision services provided by banks being omitted from the measure of FISIM. Liquidity provision is explicitly identified as a financial service in the 2008 SNA (6.157), and it clearly is a part of the output of banks. Customers with short-term deposits or demand deposits obtain the security and convenience of prompt or constant access to cash, and they are willing to

[4] Sharpe (1997) and Hannan (2008), for example, find evidence that high switching costs are a significant factor in determining bank deposit rates. In the UK just 6 percent of households change banks each year (Office of Fair Trading, 2008, paragraph 5.1).

[5] Not all deposits have high rollover probabilities: very large certificates of deposit (CDs) and brokered CDs are generally viewed as having similar rollover probabilities to bonds or commercial paper. These kinds of bank liabilities are often referred to as "hot money" because of their tendency to vanish at the first sign of trouble or when financial markets become unsettled.

accept a low or zero interest rate to obtain this security and convenience. To provide such liquidity provision services, banks must devote labor and capital inputs to reserve and balance sheet management activities and forego some investments in high-yielding but illiquid assets. Yet the use of a short term rate from the money market (such as an overnight rate, for example) as the reference rate will result in estimate near zero for the value of the implicitly-priced services associated with these deposits.

Discussions of financial services provided by banks often also mention liquidity transformation. As a general rule, the desire for the security and convenience that comes from having immediate or prompt access to funds should the need arise causes households and businesses to prefer short maturities when they are the creditor, but long maturities when they are the debtor. Banks accommodate the desire on the part of their customers to lend short but borrow long by making illiquid longer term loans and financing them with short term liabilities that must continually be rolled over or replaced. Diamond and Dybvig (1983) termed this process "liquidity transformation."

Liquidity transformation is a broader concept than liquidity provision because it includes lending at long maturities. If the proposal to exclude returns to risk bearing from FISIM is accepted, the extra interest charged on longer term loans might be viewed as a kind of risk premium and hence excluded from the measure of borrower FISIM. This creates room for debate over whether all the elements of liquidity transformation should be regarded as output of banks. Nevertheless, liquidity transformation as a whole is often listed as part of the intermediation services of banks.

To call liquidity transformation a service of banks rules out the use of maturity-matched reference rates. Loans tend to have longer maturities than deposits, so if maturity-matched reference rates are adopted, in normal years borrower FISIM will be measured with reference rates that are, on average, higher than those used to measure depositor FISIM. This will result in the exclusion of liquidity transformation services from our overall measure of FISIM.

The main argument against regarding liquidity transformation as a whole as a service of banks is that financing long term debt securities with short term liabilities is something that could be done by any investor. Proponents of regarding liquidity transformation as a service must therefore explain why this activity should be counted as production only if it is done by a bank (where "bank" in this paper means a depository institution, not an investment bank).

A justification for treating banks differently is that liquidity transformation cannot be done in a safe and stable way by non-banks, as was recently illustrated in dramatic fashion by the role of the collapse of the so-called "shadow banking system" in the financial crisis (Brunnermeier 2009). To provide liquidity transformation services in a safe, stable way is a difficult task. Demand deposits and other short term liabilities can be a stable source of funding for long term, illiquid loans only if the bank maintains a reputation for safety. Therefore, besides management of reserves and other sources of liquidity, risk management activities are also an essential element of stable liquidity transformation. 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).

2.5 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 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 of the interest rate to include a component that covers the anticipated cost of 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 cannot be considered an implicit fee for services. In their model, risk aversion implies that the value added of a business must be large enough to generate a rate of return that compensates the investors for the risk that they bear. The risk premium that must be included in the rate of return is invariant to whether the financing is intermediated by a bank or provided directly by investors, so if the financing comes from bank loans, the interest rate on those loans will include a risk premium. Taking the entire spread between the risk-free reference rate and the loan rate as a measure of services to borrowers therefore has the effect of including a risk premium in the measures of the output of the bank and of the consumption of intermediate inputs of financial services by the borrower. This reduces the measure of the value added of the borrower, in violation of the principle that the measure of a business's value added should be invariant to how the business is financed.

To prevent the risk premium component of interest rates on loans 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.[6] For bank loans that are close substitutes for funding that could have been obtained through other means, this proposal seems conceptually appropriate, though it may not be feasible in practice for national accounts.

Yet most bank loans are not close substitutes for other forms of financing. The model that justifies excluding the return to risk bearing from FISIM comes from the literature on the pricing of risky assets in frictionless capital markets that do not resemble the markets in which most bank loans are made. To be freely tradable in capital markets, debt securities must have uniform characteristics and present a risk profile that is not contingent on the ability of the creditor to monitor the borrower or on the identity of the creditor. In contrast, banks can and do undertake activities to reduce the riskiness of loans they hold. Moreover, bank loans tend to be idiosyncratic and to have a lower level of risk if they are retained by the bank that has originated them than they would if the creditor were someone else. The originating bank may have special advantages in mitigating asymmetric information in assessing the borrower's riskiness and in monitoring and advising the borrower. Should the loan start to go bad, it may also have more ability to minimize losses because of its lower costs to take possession of the underlying collateral and its greater latitude to be flexible in devising solutions to problems, and because the

[6] To calculate depositor FISIM, they would continue to use the risk-free reference rate unless the bank is seen as at risk of failing and deposits are uninsured.

borrower's interest in maintaining a long term relationship may motivate increased efforts to repay the loan. Finally, most bank lending occurs through drawdowns on lines of credit or loans arranged at short notice, which means that the loans include liquidity services that can only be provided by a bank.

The principle that the measure of the value added generated by a production process should be invariant to whether the source of the financing for that process is a bank loan is inapplicable if no alternative to the bank loans exists. In many cases, a business would either not exist at all or have reduced activities without its bank loans because no other form of financing would be possible. Indeed, the lack of substitutes for many types of bank loans is one reason why declines in the supply of bank loans have been often a factor contributing to the severity or length of recessions and business downturns.

If the loans are critical for the production to take place, including the return to risk bearing in the value added of the lending bank rather than in the value added of the borrower provides an accurate picture of the bank's role in the production process.[7] Moreover, including the return to risk bearing in borrower FISIM makes the treatment of risk bearing in the banking industry consistent with the SNA's treatment of risk bearing in measuring the output of the non-life insurance industry and with its treatment of self-insurance—see Fixler and Zieschang (2010). Fixler and Zieschang also suggest that excluding more than a small fraction of the spread between the loan rate and the risk free rate from the measure of bank output would result in an implausibly small measure of the banking industry's value added and gross operating surplus. Finally, as a practical matter, variation over time in the estimates of the size of the adjustment needed to remove the risk premium from the measure of bank output could result in unacceptable volatility in the bank output estimates.

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 (Fixler, Reinsdorf and Smith, 2003). The conceptual framework that guided this adoption of the reference rate approach was the theory of user cost prices for measuring services of capital assets.[8] 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.

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[7] The different treatments of operating leases and financial leases in the SNA (17.302 and 17.304) reflect the principle that a more active role in management of the fixed asset makes the provider of finance a producer of services whose value would include a return to risk bearing. A bank loan that involves customized risk management, monitoring and advice gives the lender a more active role in the management of the business activity that was financed that would be the case for a purely passive provider of finance via the bond market.

[8] The user cost theory for financial assets was developed by Diewert (1974) and Barnett (1978), and applied to banking by Hancock (1985), Fixler (1993), and Fixler and Zieschang (1999).

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. 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 own funds. This SNA interest (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 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 can be used to analyze the historical evolution of the US banking industry. 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. Increased competition from financial markets forced banks to substitute fee-based activities for the balance sheet intermediation activities (Allen and Santomero, 2001). The rise of securitized lending also contributed to the slower growth of the traditional intermediation services measured by FISIM.

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 FISIM 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). 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 the rates that banks were allowed to pay on deposits and unregulated interest rates, so the user cost price of depositor services became quite high. Investors responded by withdrawing deposits and purchasing interest-bearing securities such as US government bonds and mortgage pools insured by the Government National Mortgage Association (Ginnie Mae). Further competition for banks came from the introduction of the money market mutual fund as a safe alternative to the stock funds and bond funds that mutual fund companies had traditionally offered.[9] A gradual process of deregulation of deposit rates ensued, culminating in the appearance of money market deposit accounts with unlimited interest rates. But because the rebuilding of deposit volumes was accomplished by reducing the implicit price of depositor services, the *value* of depositor services did not recover until 1982.

The timing of the periods of weakness in the reference rate measure of borrower services is also consistent with historical industry events. Inflation-adjusted borrower services were low in 1982

[9] High volatility of stocks and bonds was driving clients away from the traditional types of mutual funds. Also, falling computer prices made money market mutual funds more economical to operate. These funds did not emerge in the early 1970s when rates on deposits became uncompetititve because data processing costs were still too high.

to 1986, and after a short recovery, they fell again in 1990-1992. 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, 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.[10] A sharp downturn in commercial real estate in New England also contributed to the weakness in borrower services in the early 1990s.

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. In particular, at times when interest rates in general are reversing direction, changes in loan and deposit rates generally lead changes in the reference rate. In other words, the reference rate tends to exhibit inertia compared to the loan and deposit rates, so that the turning point of the reference rate occurs *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 artificially compressed or widened until the reference rate gets back on the same trajectory as the loan and deposit rates.

Changes in the relative size of the borrower services and depositor services components of FISIM can cause volatility in the measure of GDP because depositor FISIM is predominantly consumed by households, while borrower FISIM is predominantly used as an intermediate input. When the reference rate rises relative to the rates on loans and deposits, the increased share of overall FISIM that is allocated to depositor services causes a rise in the estimate of GDP.

Short term fluctuations in the split between depositor and borrower services fail to correspond to changes in the value of these services as perceived by the bank and its customers because loans and deposits tend to be long-term arrangements. We can assume that when a loan is originated, the borrower values the bank's unpriced services no less than the expected average implicit price of those services as measured by the reference rate *over the life of the loan*. Similarly, the bank itself must expect that over the life of the loan, the average implicit price that it receives will at least cover the cost of providing unpriced borrower services. The average value of the borrower services over the life of the loan can, therefore, be measured by the reference rate method.

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

If loans and deposits are long-term arrangements, short run divergences between economic value of the borrower services and depositor services and the implicit price of those services as measured by the reference rate can easily occur. Loans often have contractual terms that extend out for several years. Similarly, because of high switching costs, depositors tend to leave their money in the same bank for long periods of time. Moreover, deposit balances do not change in response to short-run fluctuations in the spread between deposit rates and bond rates in the manner that would be expected if these balances were continuously adjusted to keep the marginal value of depositor services equal to the implicit price of these services. When a deposit account is opened, the depositor must therefore value the services that are expected to be received over the life of the account no less than the anticipated average implicit price for the depositor services.

Because banks and bank customers perceive the implicit price of services provided to depositors and borrowers as the average interest rate spread that is expected to prevail over the long run, short term fluctuations in the relative position of the reference rate ought not to be counted as changes in the value of depositor and borrower services. Furthermore, the effective interest rates that are received or paid in any quarter are moving averages of rates that were agreed to at various points of time in the past, so only longer term trends in agreed-to interest rate spreads can be measured with any precision.

The total margin between the interest rate on loans and the interest rate on interest-bearing deposits is relatively stable, as was seen in figure 1. We can therefore obtain sufficiently smooth measures of borrower and depositor FISIM by stabilizing the position of the reference rate in between the loan rate and the deposit rate. The relative position of the reference rate ρ, is 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. Smoothed values of ρ can be used to find smoothed values of r^{ref} calculated as convex combinations of r^A and r^D. Fixler and Reinsdorf (2006) used a weighted, centered moving average to smooth ρ and also found that an alternative definition of r^{ref} as a weighted average of a longer term rate on US government and government agency bonds and a short term inter-bank rate produces an even less volatile split between borrower and depositor FISIM.

5.2 Adjusting for Expected Credit Losses

Discussions of accounting for risk in measuring FISIM have primarily focused on the effect of the *variability* of credit losses (losses from defaults) on interest rates on loans, with little attention devoted to the effect of the expected *level* of these losses.[11] Nevertheless, for riskier types of loans, the component of the interest rate that is meant to cover the expected level of credit losses is likely to be larger than the component that is meant to compensate the bank for bearing risk. A paper by Hood (2010) therefore investigates how an estimate of the component of interest on loans that is meant to cover the cost of defaults can be excluded from the measure of borrower FISIM.

[11] An exception is Wang (2003, p. 8), which does adjust for the level expected credit losses in her estimates of bank holding company output.

In national income accounting, transactions are generally recorded on an accrual basis with no adjustment for bad debts. For most industries, bad debts are not part of the normal operating flows that the national accounts seek to measure. Furthermore, definitions of income in economic theory support the practice of ignoring bad debts that 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** an expected and normal part of 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. Credit card loans are a good example of this. Their interest rates are high—often over 20 percent—but a large fraction of the interest is used to cover losses from defaults[12] 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.[13]

Suppose that a bank that lends an aggregate amount x to a class of borrowers, such as credit card holders, 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 and δ_2 is the expected rate of non-payment of interest, then the equation for y is:

$$y = x + rx - \delta_1 x - \delta_2 rx.$$

The payments to the bank that are labeled as interest equal $rx - \delta_2 rx$, and the payments that are labeled as return of principle equal $x - \delta_1 x$. The effective interest rates used to calculate borrower FISIM in the NIPAs exclude interest that is not collected when due and that appears unlikely to be collected in the future, so we can assume that the amount of interest that is recorded in the national accounts is $rx - \delta_2 rx$. However, from the bank's point of view, an economic definition of interest would equal the excess of the 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 this economic interest by $\delta_1 x$, the amount of expected losses of principle due to the defaults. Furthermore, the revenue that bank views as available to cover the cost of providing borrower services is the loan rate of interest, less the opportunity cost of funds as measured by the reference rate, less the amount that is expected to be needed for credit losses at the time of the interest rate on the loan was decided. Thus, an estimate of expected

[12] 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.

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

credit losses should be deducted from the interest rate on loans used to calculate borrower FISIM.

Financial accounting practices in the banking industry reflect the need to exclude a provision for credit losses from measures of revenue and income. However the provisions for credit losses that banks report in their financial statements are not suitable for estimating the component of the contractual rate of interest that was intended to cover anticipated credit losses because these provisions include amounts set aside in response to *ex post* developments and are partly dictated by inflexible, backward-looking rules from bank accounting standards.

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 future outcomes equals a weighted average of the observed outcomes, with a weight on the outcome from t periods back of $\lambda(1-\lambda)^t$.) This approach implies that loans originated during a recession have higher expected credit losses, because once a recession has begun, charge-offs typically remain at elevated levels. One piece of evidence in favor of Hood's model is the close correspondence of the net percentage of senior loan officers reporting rising spreads and recent changes in charge-off rates. Expected charge off rates on credit cards estimated using this approach with quarterly $\lambda = 0.2$ are shown in figure 7.

If amounts intended to cover expected credit losses are excluded from borrower FISIM, they can either be treated as SNA interest, or they can be excluded from both FISIM and SNA interest and treated as current transfers from the bank to the defaulting borrowers. Leaving these losses in SNA interest would result in an overstatement of the economic income of banking industry, as credit losses are a normal part of operations in this industry. Yet this approach would not yield a good measure of saving for the borrowers. 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 default to cover the cost of loan write-offs. Equating debt forgiveness to a current transfer from the creditor seems impossible to reconcile with the SNA principles that debt forgiveness is not a transaction and that it belongs in the "other changes in volume of assets" account. To avoid a violation of these principles, the national accounts must be based on the perspective of the borrowers who pay the extra interest that is necessary to cover the anticipated cost of defaults, not on the perspective of the banks.[14]

IV. Conclusion

Many challenging conceptual and practical questions arise in the measurement of implicitly priced intermediation services of banks, or FISIM. Among these are the question of whether the

[14] 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.

single reference rate of the SNA should be replaced with a family of maturity-matched reference rates, and the question of whether the measure of borrower FISIM ought to be adjusted to exclude expected returns to risk bearing. This paper argues that the answer to the first question is no, because the use of maturity-matched reference rates would fail to give banks adequate credit for the liquidity provision services that they produce. As for the second question, an answer of yes is justifiable under an assumption that bank loans are close substitutes for financing that could have been obtained by issuing bonds or equity shares. Yet this assumption often fails to hold in practice. Moreover, excluding the risk bearing from the output of banks would cause an inconsistency with the way that risk bearing is included in the output of non-life insurance. There are also practical obstacles to implementing a procedure to adjust the estimate of FISIM for returns to risk bearing.

Besides the risk premium that compensates the bank for risk bearing, interest rates on risky loans contain another component that covers the expected levels of credit losses. This component of interest serves as a substitute for the repayments of principle that should have been made by those who default, not as part of the payment for implicitly-priced borrower services. Empirical estimates for the US by Hood (2010) confirm that a measure of borrower FISIM that is adjusted for expected credit losses behaves in a more plausible way than one that ignores credit losses, particularly at times when high interest spreads are needed to cover high expected credit losses.

Unlike the return to risk bearing, which must be treated as SNA interest if it is excluded from FISIM, the component of interest that covers the expected cost of credit losses should be excluded from *both* FISIM and SNA interest if the sole consideration is to obtain the most meaningful measures of the bank's income and saving. Nevertheless, the national accounts do not measure the output of banks in isolation, and they must provide correct measures of saving by the sectors that borrow from banks. Excluding the expected credit losses from both bank output and bank interest would cause a distortion in the measures of saving by the sectors that borrow from banks by counting their failure to repay a debt as saving. We can avoid this distortion while at least getting the measure of bank output right by treating expected credit losses as part of SNA interest.

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

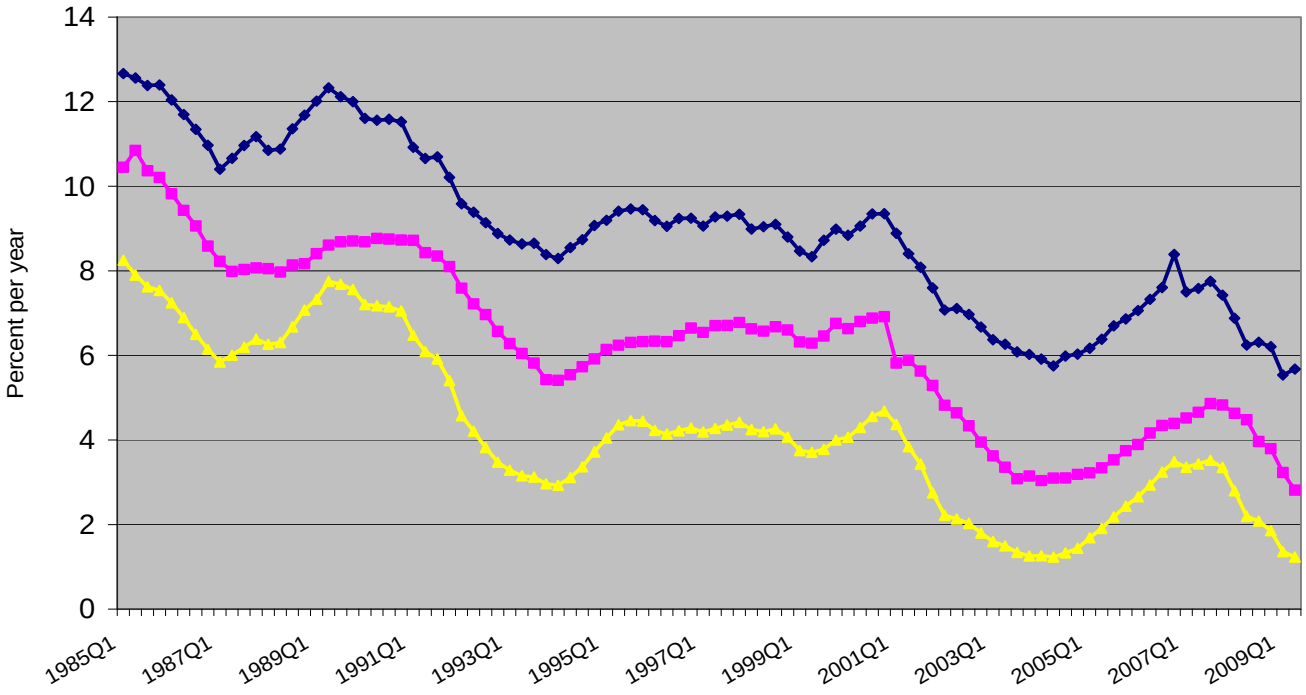


Figure 2: Value Added of Banks and of Financial Corporations, and Implicitly and Explicitly Priced Bank Services

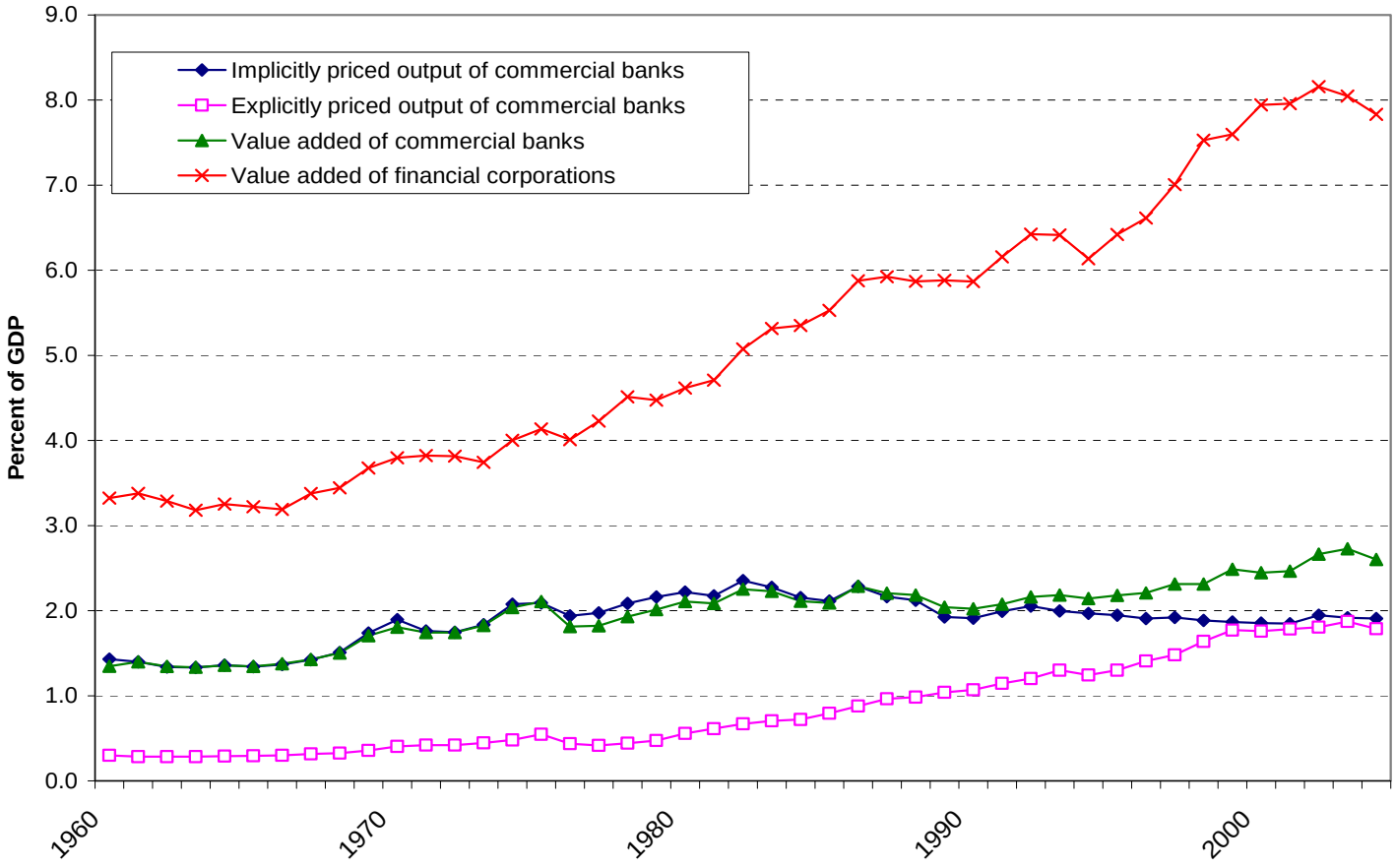


Figure 3: Growth of Depositor and Borrower Services
(Deflated by the Implicit Price Index for FISIM)

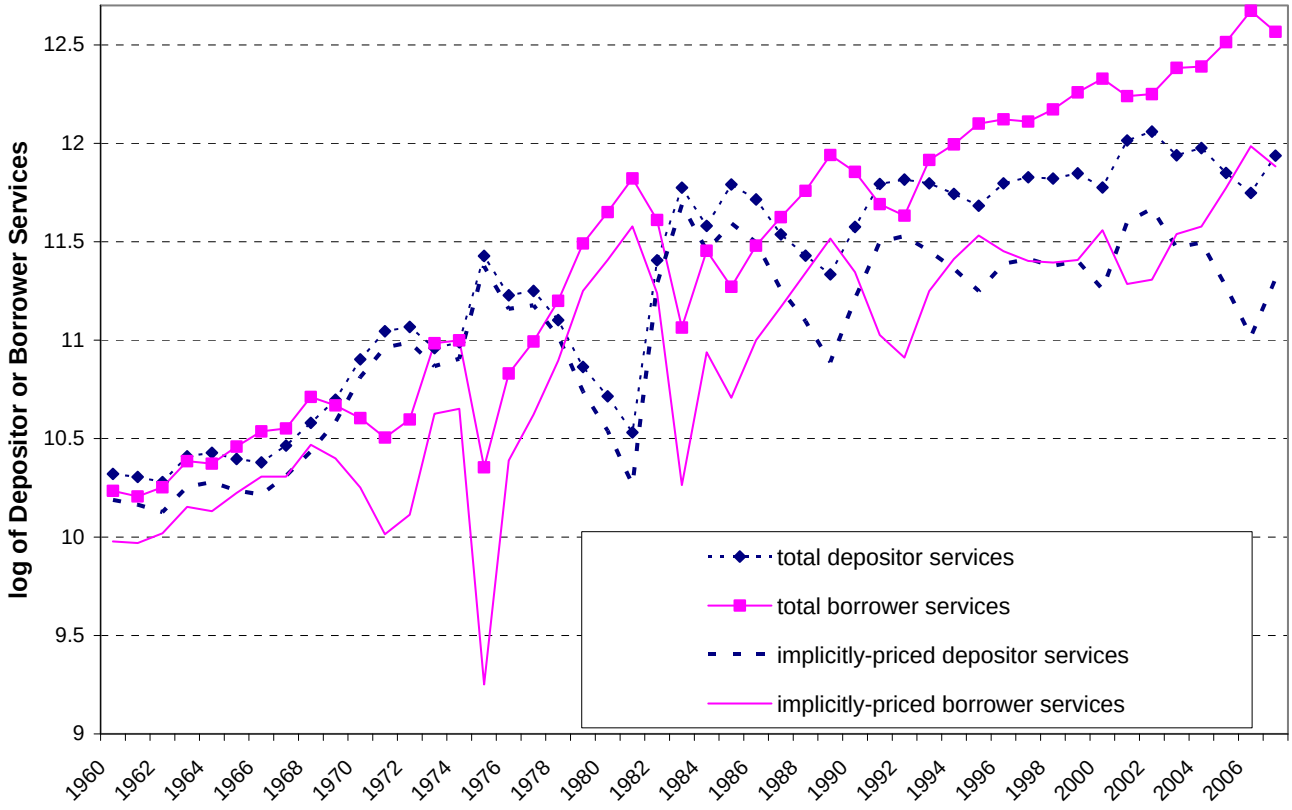


Figure 4: Borrower Services, Quarterly Imputed Gross Output

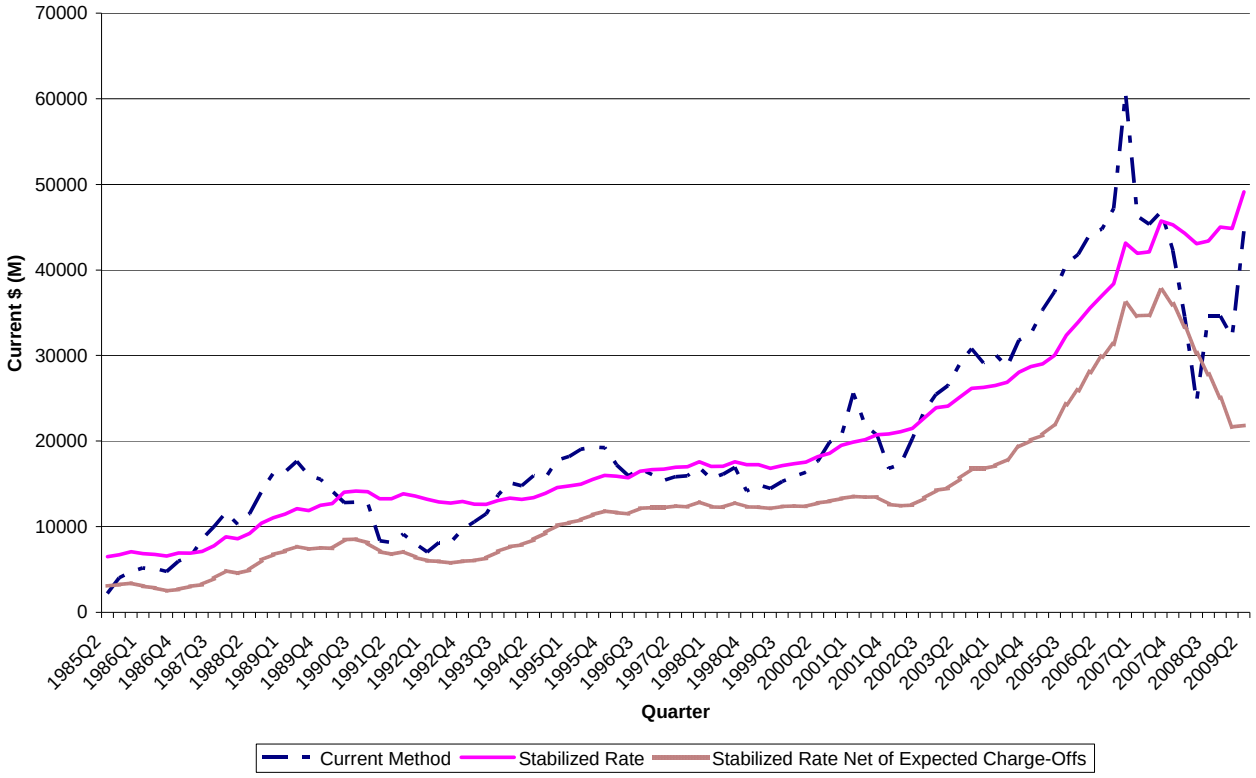


Figure 5: Depositor Services, Quarterly Imputed Gross Output

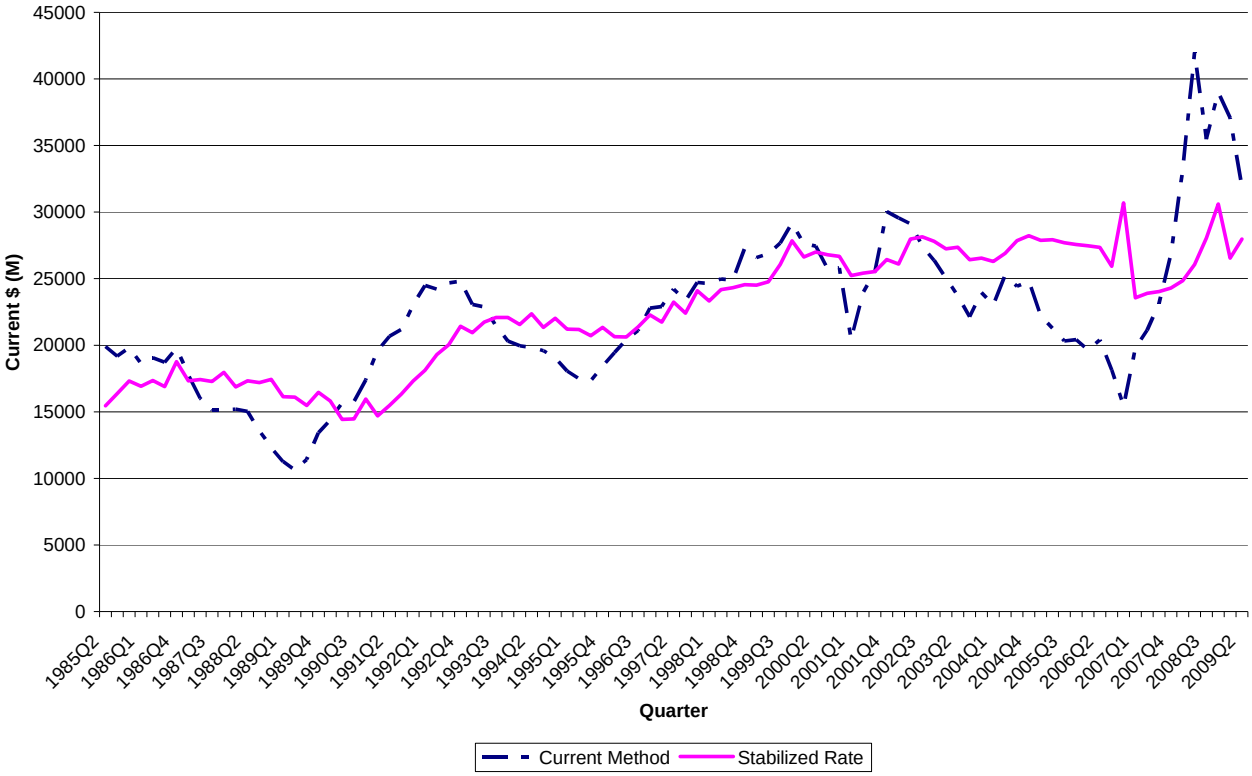


Figure 6: Charge-offs and Interest Rate Margins, 2001-2009

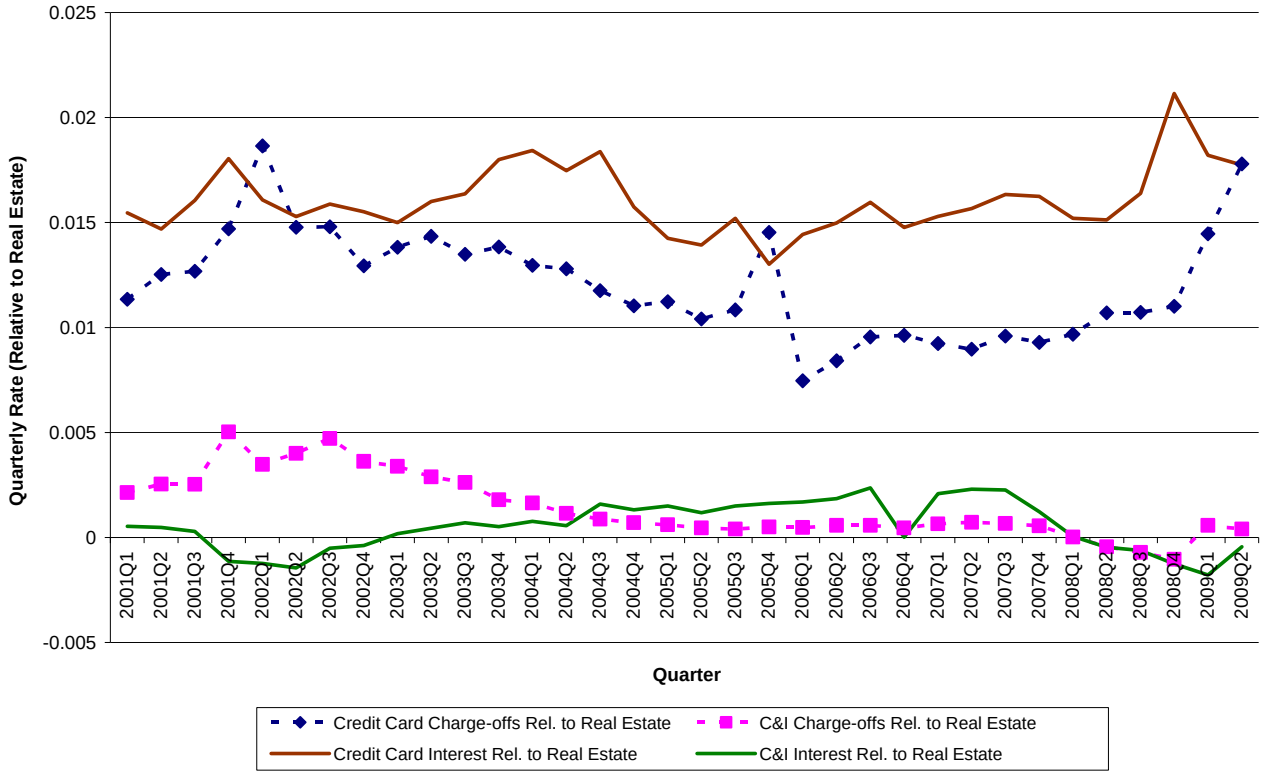
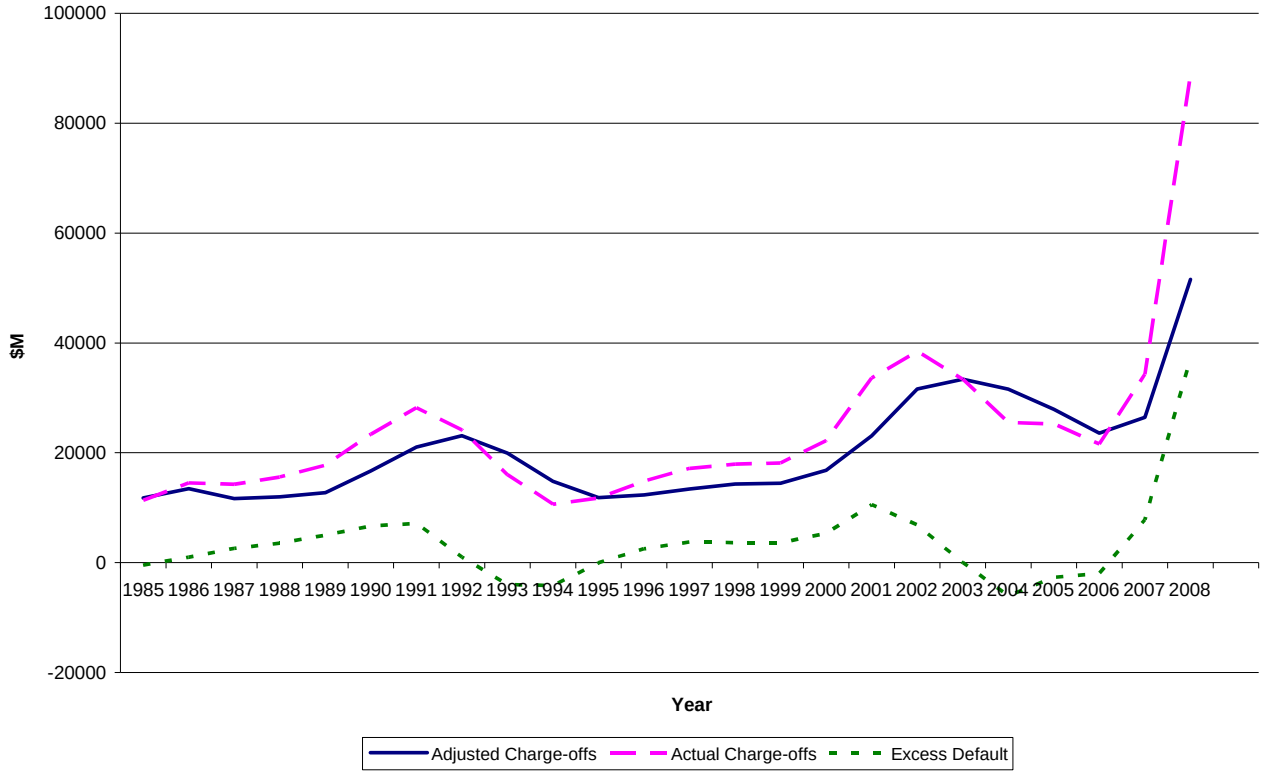


Figure 7: Actual and Adjusted Charge-offs



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