# Financial Services Output in the National Accounts: Evidence from US Banking Data[1]

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## I. INTRODUCTION

1. The value of current price or nominal financial services in the national accounts comprises a directly measured service charge and an indirectly measured service charge. The indirectly measured service charge is called financial intermediation services indirectly measured, or FISIM, and is significant in countries with financial centers. Since 2004 "Federal Reserve banks, credit intermediation, and related activities" activity has comprised about 3.5 percent of US GDP. Within that activity, FISIM is about half of the value added of deposit taking corporations (banks) and other financial intermediaries (e.g., finance companies). To compile FISIM, the international national accounting standard, the *System of National Accounts 2008* (2008 SNA), requires national accounts compilers to determine a reference rate of interest. However, while describing the reference rate in general terms, the 2008 SNA leaves national accounts compilers with a number of questions. Here we focus on one alternative for the reference rate—the accounting cost of funds or cost of capital studied in Zieschang (2013). The cost of capital approach enriches the microeconomic interpretation of FISIM, allowing its decomposition into account servicing, asset management, and risk intermediation components. Risk intermediation is generally the largest and most volatile of the three. It is associated with the monetary (liquidity) services concept promulgated by Barnett (1980) that underlies his Divisia monetary aggregates.

2. We compare results for the US commercial banking system and the US central bank over 2001Q1-2011Q2,[2] finding that the cost of capital reference rate generates FISIM for

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[1] *The views herein are those of the authors and do not reflect the views of the IMF, the IMF Executive Board, or the Bureau of Economic Analysis.* This paper was prepared for presentation at the American Economic Association meetings, January 5, 2013, and explores extensions of national accounting for the financial sector that are not included in official statistics. The authors would appreciate being consulted before the results of this paper are quoted, as we expect to make refinements in the near future. Some of the empirical results herein were previewed during presentation of a theoretical companion paper—FISIM Accounting—at the November 2012 conference of Australian Productivity Commission, and the Productivity Workshop at the University of New South Wales held the same month. See Zieschang (2013). Criticisms, comments, and suggestions from the participants in those meetings, and from Manik Shrestha of the IMF Statistics Department, are gratefully acknowledged—the authors are, of course, responsible for the point of view and any errors contained in this paper.

[2] This will be extended to the most recent available quarter of FDIC data in a subsequent version of this paper.

loan and deposit as well as other financial instruments that evolves plausibly over the period, which includes the end of the 2000 recession and the 2008-2009 financial and economic crisis. In particular, FISIM for neither the loan assets nor deposit liabilities of the banking system assumes a negative value in any quarter over the period, including during the 2008-2009 financial shock.

3. Of particular interest over the 2008-2009 crisis and its aftermath, in comparing US commercial bank with central bank FISIM, is the central bank's assumption of risk in compensation for the commercial banking system's rapid fall in profitability. This is evident from the divergent time paths of the risk intermediation component of FISIM, which craters for commercial banks at the same time it rapidly increases for the central bank via "unconventional monetary policy"—massive purchases of relatively risky assets such as asset backed securities by the central bank. US central bank policy effectively smoothed the impact of the financial shock, offsetting the fall in commercial bank FISIM with a partly offsetting rise in central bank FISIM.[3]

4. On a more novel but no less interesting note, we show some indicative empirical results for the contribution of the *nonfinancial* sectors to FISIM, which is almost exclusively in the form of risk intermediation. *Note that nonfinancial sector FISIM is currently not in scope for the national accounts*. However, nonfinancial enterprise FISIM *is* conceptually in scope when looking at the contribution of economic sectors to the provision of indirectly measured financial services in the economy that are logically analogous to the Divisia monetary aggregation concept of Barnett (1980) for financial corporations, and we could argue that it is required to treat nonfinancial enterprises consistently with financial enterprises given the SNA's FISIM principle. We find that the US "Nonfinancial corporate business" sector, whose overall size in value added is perhaps 15 times that of "Federal Reserve banks, credit intermediation, and related activities," contributed a substantial share of the total monetary (risk intermediation) services generated in the US during 2001Q1-

[3] The *2008 SNA* (paragraphs 6.151-6.156) provides for treatment of the central bank's "nonmarket" output at production cost rather than as part of FISIM, as long as a distinct nonmarket unit within the central bank can be identified, or where the central bank is considered a predominantly nonmarket producer. Nonmarket output is defined by the SNA as output sold at "economically insignificant prices," interpreted operationally as prices covering less than half of the cost of production. As a practical matter, this amounts to valuing nonmarket output at the sum of intermediate consumption, compensation of employees, and consumption of fixed capital, but *excluding* the interest component of the user cost of capital, because the *2008 SNA* does not recognize the latter as a production cost for *nonmarket* producers. The US central bank, the Federal Reserve System, comprises three components: the 12 Federal Reserve Banks, the Board of Governors of the Federal Reserve System, and the Federal Open Market Committee. In this paper, we do not attempt to identify such a nonmarket unit within the US Federal Reserve Banks, taken collectively, and treat all of their output as covered by FISIM. The 2008 SNA criteria for nonmarket elements of the central bank could be applied to the other components of the Federal Reserve System—The Board of Governors and the Federal Open Market Committee—but we do not consider these components here.

2013Q2, despite its lower leverage,[4] and that the time path of this component of liquidity was relatively volatile compared with that of the financial services industry. To provide users with information on FISIM production by leveraged nonfinancial enterprises, national accountants could include this aspect of FISIM in a so-called satellite account of, or as memorandum item to, the current core national accounting framework.

5. Finally, we consider decomposition of indirectly measured financial services output into price and volume factors. The price index factor in turn comprises two factors, the first of which is a user cost price index, the price dual of the Barnett (1980) monetary or liquidity services index, the latter also known as the Divisia monetary/credit aggregate. The second component of the price index can be seen as a residual or implicit factor, the ratio of the liquidity/credit index with the volume index for financial services. The precise form of the financial services price index depends on whether service volumes are measured directly as an index of service indicators, indirectly as the amount on account divided by a goods and services price index, or a combination of the two. Current convention is to adopt the second, "deflation" approach to service volume measurement.

## II. CONCEPTUAL FRAMEWORK

### A. Cash flow and balance sheet identities

We first define notation in Table 1, which uses variable names derived from the *2008 SNA* coding system where possible to reinforce the point that the concepts used here come for the most part directly from the prevailing national accounting standards.[5] Throughout, we denote interest and equity return rates with the letter *r* subsc8ripted with the financial asset or liability variable with which it is associated. Referencing Table 1, first define the "receipts equals expenses" or *cash flow* identity

$$p'y + r'_{AFA}AFA \equiv \overline{P2} + D1 + D29 - P51c + r'_{AFL}AFL \tag{1}$$

noting that *AFL* is the entire vector of liabilities, including owners' equity *AF*5*CL*, that $r_{AFL}$ thus includes the residually determined return on equity liabilities, and that the *2008 SNA* negative sign convention on consumption of fixed capital (CFC, a.k.a. depreciation) *P*51*c*

[4] In 2012 debt comprised 37 percent of the liabilities and net worth of Nonfinancial corporate business in the US Integrated Macroeconomic Accounts, and has hovered in that vicinity in recent years, while debt comprised 80-90 percent of the liabilities and net worth of Deposit taking corporations, based on FDIC data, depending on whether adjustment is made for book value accounting of nonfinancial assets in that dataset.

[5] *2008 SNA*, Annex 1.

## Table 1. Notation

| Concept | Flow | Liability | Asset |
|---|---|---|---|
| Output (total, in current prices) | $P1$ | | |
| Directly priced output prices (*m* vector) | $p$ | | |
| Directly priced output quantities (*m* vector) | $y$ | | |
| Intermediate consumption | $\overline{P2}$ [6] | | |
| Compensation of employees | $D1$ | | |
| Other taxes on production | $D29$ [7] | | |
| Consumption of fixed capital | $-P51c$ [8] | | |
| Nonfinancial assets | | | $AN$ |
| Financial instruments [9] | | $AFL$ [10] | $AFA$ [11] |
| Non-equity instruments | | $\overline{AFL}$ [12] | $\overline{AFA}$ [13] |
| Deposits [14] | | $AF2DL$ | $AF2DA$ |
| Debt securities | | $AF3L$ | $AF3A$ |
| Loans | | $AF4L$ | $AF4A$ |
| Equity capital | | $AF5CL$ [15] | $AF51A$ [16] |

[6] The 2008 SNA code for intermediate consumption is *P*2—the overbar notation denotes *P*2 *excluding* the FISIM services provided by other FISIM producers.

[7] Other than Taxes on products, D21.

[8] The *2008 SNA* convention is that this variable carries a negative sign (paragraph A1.17). Thus, to *add* depreciation as a component of cost, it will have to be *subtracted*.

[9] For simplicity, we limit the range of financial instruments here to deposits, debt securities, loans, and equity. The analysis straightforwardly extends to including the other SNA financial instruments on the balance sheet.

[10] *AFL* denotes the vector [*AF2DL*, *AF*3*L*, *AF*4*L*, *AF*5*CL*]' whose elements are defined in the subsequent lines of the table.

[11] *AFA* will designate the vector [*AF*2*A*, *AF*3*A*, *AF*4*A*, *AF*51*A*]'. We are not considering here the case of the central bank. Were we to do so, we also would bring in *AF*1—monetary gold and Special Drawing Rights (SDRs). We also ignore currency—*AF*21—here.

[12] $\overline{AFL}$ denotes the vector [*AF2DL*, *AF*3*L*, *AF*4*L*]'. By implication, $AFL = [\overline{AFL}, AF5CL]'$.

[13] $\overline{AFA}$ denotes the vector [*AF2DA*, *AF*3*A*, *AF*4*A*]′. By implication, $AFA = [\overline{AFA}, AF51A]'$.

[14] In the *2008 SNA*, deposits comprise transferrable deposits (*AF*22) and other deposits (*AF*29). Currency and deposits *AF*2 is appended with the letter '*D*' for 'deposits' and '*L*' for liabilities or '*A*' for assets, so $AF2DL = AF22L + AF29L$ and $AF2DA = AF22A + AF29A$.

[15] We define equity capital as equity (*2008 SNA AF*51) plus net worth (*2008 SNA B*90).

[16] Our definition of equity capital carries over to equity interests in other enterprises, including their net worth.

means that subtracting $P51c$ *adds* CFC to other production costs. In words, equation (1) says that directly measured output $p'y$ plus interest income on financial assets $r'_{AFA}AFA$, equals directly measured intermediate consumption $\overline{P2}$, plus compensation of employees $D1$, plus taxes on production $D29$, plus consumption of produced nonfinancial assets $-P51c$, plus interest and other financial expense on liabilities $r'_{AFL}AFL$, *the latter including the residually determined return to owners*. Finally, observe for future reference that the return on equity capital $AF5CL$ is defined by a rearrangement of equation (1) as

$$r_{AF5CL}AF5CL \equiv p'y + r'_{AFA}AFA - \overline{P2} - D1 - D29 + P51c - r'_{\overline{AFL}}\overline{AFL} \tag{2}$$

where, by implication, we define the rate of return on equity as

$$r_{AF5CL} \equiv \frac{p'y + r'_{AFA}AFA - \overline{P2} - D1 - D29 + P51c - r'_{\overline{AFL}}\overline{AFL}}{AF5CL} \tag{3}$$

and where the "bar" notation for $AFL$ refers to the vector of liability instruments *other than* owners' equity.

6. In addition to the cash flow identity comprising the components of income and expense, accounting for the wealth position of the enterprise involves an "assets equals liabilities" or *balance sheet* identity

$$\iota'AFA + AN \equiv \iota'AFL \tag{4}$$

where the notation $\iota'x = \sum_i x_i$ with $\iota$ a vector of ones commensurate with the dimension of vector $x$. Owners' equity is the balancing item of the balance sheet. The SNA decomposes it into Equity and investment fund shares ($AF5$) and Net worth, with Net worth residually determined, together comprising what we call Equity capital, $AF5CL$.[17]

[17] The 2008 SNA recognizes several types of nonfinancial assets whose market values are difficult to determine. Among produced assets ($AN1$), certain Intellectual property products ($AN117$), and a large part of nonproduced assets ($AN2$)—Natural resources ($AN21$), Contracts, leases, and licenses ($AN22$), and Purchases less sales of goodwill and marketing assets ($AN23$)—are examples of difficult to value items. An alternative approach to direct valuation of these items, where possible, is to value equity shares at market and determine the value of nonfinancial assets residually as the difference between total liabilities and financial assets.

## B. SNA-type FISIM

7. The *2008 SNA* (paragraph 6.164) describes FISIM thus:

> The implicit service charge is … the sum of the bank interest on loans less the SNA interest on the same loans plus the SNA interest on deposits less the bank interest on the same deposits.

We will broaden this in the more general context of our cash flow and balance sheet identities by characterizing "SNA-type FISIM" with the following identity across the entire financial balance sheet:

$$FISIM \equiv \left(r_{AFA} - \rho\iota\right)' AFA + \left(\rho\iota - r_{\overline{AFL}}\right)' \overline{AFL} \tag{5}$$

where $\rho$ is the reference rate of interest and $\overline{AFL}$ is, as above, the vector of liabilities other than equity capital. Our definition here harks back to the previous version of the SNA, the *1993 SNA*, which did not limit FISIM to deposits and loans only, excluding only "own funds" (which we interpret as equity capital $AF5CL$) from association with producing FISIM. In effect, the *2008 SNA* characterizes indirectly measured financial service output as (5), but eliminates all assets from $AFA$ other than loans $AF4A$, and all liabilities from $\overline{AFL}$ other than deposits $AF2DL$.[18]

8. Since the notion of the reference rate was introduced in 1993, there has been a running discussion among national accountants about how to determine it. The *1993 SNA* said it should be risk free and proposed the interbank loan rate, while the *2008 SNA* said it should reflect the risk and maturity structure of deposits and loans (thus would not be risk free), but still allowed the interbank rate as possibly suitable. Zieschang (2013) argues for determining the reference rate as the cost of funds, a notion we will define presently, which turns out to be essentially the cost of capital[19] for an individual enterprise.

## C. What is SNA FISIM?

9. We consider SNA FISIM not to be a monolithic concept, but to comprise three main components: account servicing on both asset and liability financial instruments, asset management on assets, and what we will call "risk intermediation" on liabilities. The

[18] Note that deposit *asset* FISIM and loan *liability* FISIM will be negative in general and associated with intermediate consumption rather than output.

[19] In the sense of, e.g.,, Modigliani-Miller (1958).

interpretation and treatment of the third component of FISIM can differ depending on how you view indirectly measured financial services, a subject to which we will turn later.

**Account servicing**

10. Account servicing comprises those services provided on individual account numbers or financial instruments. For deposit liabilities this would include indirectly charged check clearing, statement processing, fraud surveillance, and so on, and for loan assets it would include indirectly charged credit assessment and loan initiation services as well as payment processing, contract monitoring, and handling delinquencies.

11. We measure account servicing as the difference between the return on a balance sheet financial instrument and the rate of return on a reference instrument with the same maturity and risk profile but on which no account servicing is provided. Measurement of account servicing thus in principle implies a large constellation of instrument specific reference interest rates. Following Basu, Inklaar, and Wang (2011) and Colangelo and Inklaar (2012), we assume that debt securities and equity are associated with zero account servicing. By implication, the matched security rates for financial instruments of all kinds can come from debt and equity securities.

12. To derive account servicing FISIM from the cash flow identity (1), we subtract the total instrument specific reference interest cost of financial assets from both sides and add the total instrument specific reference interest cost of financial liabilities to both sides. The approach to FISIM of Basu, Inklaar, and Wang (2011) and Colangelo and Inklaar (2012) would be accommodated by this rearrangement of equation (1). In so doing, we can then identify the value of account servicing margins between individual financial asset returns and their "(account) service-free," interest returns (identified with caret notation), and between the "(account) service-free," interest cost of liabilities (identified with caret notation) and the monetary amounts received by lenders to and owners of the institution as

$$\begin{aligned} & p'y + \left(\hat{r}_{AFL} - r_{AFL}\right)' AFL + \left(r_{AFA} - \hat{r}_{AFA}\right)' AFA \\ & \equiv \overline{P2} + D1 + D29 - P51c + \left(\hat{r}'_{AFL} AFL - \hat{r}'_{AFA} AFA\right) \end{aligned} \tag{6}$$

where $\hat{r}_{AFL} \equiv \left[\hat{r}_{AF2DL}, \hat{r}_{AF3L}, \hat{r}_{AF4L}, \hat{r}_{AF5CL}\right]'$, $\hat{r}_{AFA} \equiv \left[\hat{r}_{AF2DA}, \hat{r}_{AF3A}, \hat{r}_{AF4A}, \hat{r}_{AF51A}\right]'$, $AFL \equiv \left[AF2DL, AF3L, AF4L, AF5CL\right]'$, $AFA \equiv \left[AF2DA, AF3A, AF4A, AF51A\right]'$, as per Table 1.[20]

[20] Equation (6) is equivalent to Diewert, Fixler, and Zieschang equation (45).

13. In words, directly measured output, $p'y$, plus total financial margins relative to reference rates on financial instruments, is equal to directly measured cost, comprising directly measured intermediate consumption $\overline{P2}$, plus compensation of employees $D1$, plus other taxes on production $D29$, plus consumption of produced nonfinancial assets, $-P51c$, *plus* a residual financial cost expression $\left(\hat{r}'_{AFL}AFL - \hat{r}'_{AFA}AFA\right)$. To interpret this last expression, note that

$$\begin{aligned}\left(\hat{r}'_{AFL}AFL - \hat{r}'_{AFA}AFA\right) &= \left(\frac{\hat{r}'_{AFL}AFL - \hat{r}'_{AFA}AFA}{\iota'AFL - \iota'AFA}\right)\left(\iota'AFL - \iota'AFA\right) \\ &= \left(\frac{\hat{r}'_{AFL}AFL - \hat{r}'_{AFA}AFA}{AN}\right)\cdot AN\end{aligned} \tag{7}$$

where

$$AN \equiv \iota'AFL - \iota'AFA \tag{8}$$

follows from the balance sheet identity (4) that total assets are identically equal to total liabilities.[21] Equation (7) thus interprets the financial residual as the internal rate of return on capital.[22] The residual determination of instrument specific reference interest received on nonfinancial assets in equation (7) is equivalent to saying that total instrument specific reference interest received on assets (including nonfinancial assets) is identically equal to total instrument specific reference interest distributed to funders on liabilities, as can be verified by the identity

$$\hat{r}'_{AFA}AFA + \left(\frac{\hat{r}'_{AFL}AFL - \hat{r}'_{AFA}AFA}{AN}\right)AN \equiv \hat{r}'_{AFL}AFL. \tag{9}$$

### D. The cost of capital reference rate

14. We calculate the cost of capital reference rate for an enterprise straightforwardly as the total security equivalent payments made to the holders of its liabilities, including equity

[21] Equation (7) is equivalent to Diewert, Fixler, and Zieschang equation (44).

[22] Where "capital" in this context means SNA's Nonfinancial assets *AN* rather than our Equity capital liabilities *AF*5*CL*. Zieschang (2013) considers another formulation of the same identity that widens the definition of capital inputs beyond the nonfinancial assets *AN* shown as the factor in equation (7) to include additional, financial components.

and net worth, divided by the value of the enterprise. Expressed in terms of the account specific reference rates in equation (6), the cost of capital reference rate is just the average rate of return actually paid to liability holders—among which equity holders—inclusive of the account-servicing that they accept in-kind in lieu of monetary interest:

$$\overline{r}_{AFL} \equiv \frac{\hat{r}'_{AFL} AFL}{\iota' AFL}. \tag{10}$$

### E. Asset management, risk intermediation, and decomposing SNA-type FISIM

15. Having defined account servicing (equation (6)) and the cost of funds reference rate (equation (10)), we will be able to characterize SNA-type FISIM as comprising two additional components besides account servicing: asset management outputs/financial asset inputs (depending on sign), and risk intermediation. We begin by setting $\rho = \overline{r}$ in the definition of SNA-type FISIM in equation (5) and identifying account servicing within the resulting equation:

$$\begin{aligned}
FISIM &\equiv \left(r_{AFA} - \rho\iota\right)' AFA + \left(\rho\iota - r_{AFL}\right)' \overline{AFL} \\
&= \left(r_{AFA} - \overline{r}\iota\right)' AFA + \left(\overline{r}\iota - r_{AFL}\right)' \overline{AFL} \\
&= \left[\left(r_{AFA} - \hat{r}_{AFA}\right) + \left(\hat{r}_{AFA} - \overline{r}\iota\right)\right]' AFA \\
&\quad + \left[\left(\overline{r}\iota - \hat{r}_{\overline{AFL}}\right) + \left(\hat{r}_{\overline{AFL}} - r_{\overline{AFL}}\right)\right]' \overline{AFL} \\
&= \left(\hat{r}_{AFA} - \overline{r}\iota\right)' AFA + \left(\overline{r}\iota - \hat{r}_{\overline{AFL}}\right)' \overline{AFL} \quad \text{[account servicing]} \\
&\quad + \left(\hat{r}_{AFA} - \overline{r}\iota\right)' AFA \qquad \text{[asset management output (+)} \\
&\qquad\qquad \text{/financial asset input(–)]} \\
&\quad + \left(\overline{r}\iota - \hat{r}_{\overline{AFL}}\right)' \overline{AFL}\,. \qquad \text{[risk intermediation]}
\end{aligned} \tag{11}$$

As shown in equation (11), we then break what is left down into two additional components: asset management/financial asset input and risk intermediation.

16. For asset management/financial asset input, when the term $\left(\hat{r}_{AFA} - \overline{r}\iota\right)' AFA > 0$ we have a positive margin between the amount earned on financial assets $\hat{r}_{AFA}{}' AFA$ and the cost of funding them $\overline{r} \cdot \iota' AFA$. This is typical of the "expense ratio" service charge levied by investment funds for managing portfolios of assets. When the term $\left(\hat{r}_{AFA} - \overline{r}\iota\right)' AFA < 0$, we have the expression for the user cost rental value of capital services from financial assets as productive inputs, where the cost of capital to fund the assets $\overline{r} \cdot \iota' AFA$ is greater than the

holding income on the assets $\hat{r}_{AFA}{}' AFA$. Hence our label "asset management output (+)/financial asset input (–)."[23]

17. "Risk intermediation" is the amount below the cost of capital that non-equity holders forgo to lay off risk on equity holders, or equivalently, the premium they charge to accept this risk over the cost of capital that equity holders charge other funders. This can be seen by examining the components of $\bar{r}$ from its definition (10) as

$$\bar{r} \cdot \iota' AFL = \hat{r}'_{\overline{AFL}} \overline{AFL} + \hat{r}_{AF5CL} AF5CL.$$

So

$$\left(\bar{r} \cdot \iota - \hat{r}_{\overline{AFL}}\right)' \overline{AFL} + \left(\bar{r} - \hat{r}_{AF5CL}\right)' AF5CL = 0$$

and

$$\left(\bar{r} \cdot \iota - \hat{r}_{\overline{AFL}}\right)' \overline{AFL} = \left(\hat{r}_{AF5CL} - \bar{r} \cdot\right)' AF5CL. \tag{12}$$

Equation (12) says that the FISIM paid on non-equity liabilities, other than account servicing—$\left(\bar{r} \cdot \iota - \hat{r}_{\overline{AFL}}\right)' \overline{AFL}$—must be equal to the equity premium over the cost of capital—$\left(\hat{r}_{AF5CL} - \bar{r} \cdot\right)' AF5CL$. The equity premium is the amount equity holders require (at least in expected value) to accept the risk non-equity funders wish to lay off. A partly debt financed enterprise intermediates this risk transfer, hence the moniker "risk intermediation."

### F. Funders pay the spread: An alternative view of how sectors use FISIM

18. The 1993 and 2008 versions of the SNA *allocate* the uses of FISIM to institutional sectors of the economy according to the sector of the counterparty to the financial instruments on the enterprise balance sheet, including in particular the counterparties to the asset instruments such as loans. Thus, borrowers are presumed to pay account servicing and asset management charges when they are greater than the institution's cost of funds. In this section, we consider an alternative view to the 1993/2008 SNA treatment of FISIM on asset instruments that harks back to, though is more general than, the earlier, 1953 version of the SNA, which allocated FISIM according to the counterparty sectors of deposit liabilities.[24]

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[23] In this paper we touch on, but do not detail, how intermediate uses of FISIM are determined in the cost of funds framework. It is worth noting here that financial asset inputs comprise an intermediate consumption component (purchased from a financial corporation). Any residual financial asset input contributes to operating surplus. See Zieschang (2013).

[24] See Zieschang (2013), Fixler and Zieschang (1991), and United Nations (1953).

The argument in favor of this alternative is that it treats asset management and asset account servicing analogously to the way these components of FISIM are priced and recorded in the case when the liability risk intermediation and account servicing components of FISIM are zero and asset management and asset account servicing are thus made empirically visible. This case is the ordinary, equity financed investment fund or finance company, where asset management and asset instrument account servicing are paid by the investors in the fund or finance company, i.e., the funders of the investment fund rather than the counterparties of its financial assets.[25] Additional advantages of this approach are that it simplifies the calculation of FISIM by (1) allowing use of the measured loan rate rather than a security equivalent rate for the loan liability component of the cost of funds, and (2) not requiring us to identify the financial asset account servicing component of FISIM separately from the asset management component in the calculation of FISIM output.[26]

19. Recall that we identified account servicing on deposits and loans in terms of, in principle observable, equivalent debt security interest rates. By implication, there is by assumption no account servicing on debt securities. Recall also that we have assumed that equity is not associated with account servicing (no FISIM production associated with "own funds" or equity capital), following an SNA assumption going back to its earliest, 1953 version and maintained since. Thus, for clarity in terms of our above notation, $\hat{r}_{AF3L} = r_{AF3L}$ and $\hat{r}_{AF5CL} = r_{AF5CL}$ on the liability side, and $\hat{r}_{AF3L} = r_{AF3L}$ and $\hat{r}_{AF5CL} = r_{AF5CL}$ on the assets side, so under these assumptions the only nonzero terms in the account servicing equations (6) and (11) are associated with deposit and loan liabilities *AF*2*DL* and *AF*4*L* and assets *AF*2*DA* and *AF*4*A*.

20. We also make the following observation about the way loan services are typically priced: although account servicing on loans has to be covered in the interest rate charged on loans, the units *paying* for these services are the *funders* of the lending institution, *not* its *borrower* customers. Funders see loans as just another financial instrument, originated or produced by the lending institution at a cost which they in principle see and pay as part of an extended fee to manage the assets in an investment portfolio. Borrowers pay enough interest to cover this account servicing margin on loans, but do not distinguish this service charge from the property income (interest) they pay to the lender. Thus, funders pay not only the

[25] Real world examples of 100 percent equity financed investment funds specializing in loans and thus charging both asset management and asset account servicing to their investors are finance companies, most recently including commercial "peer-to-peer" lenders such as LendingClub.com and Prosper.com. In the case of 100 percent equity financed finance companies, these FISIM fees are implicit in the difference between the return on the loan portfolio and the return on equity. In the case of loan investment funds, these FISIM fees are explicit in the form of the so-called "expense ratio," an explicit service charge.

[26] Though separate calculation of asset management and asset account servicing may be of analytical interest in an operations research sense.

pure asset management component of FISIM, but also the account servicing component of FISIM for those assets; that is, *funders (investors) pay the spread between interest earnings on assets and the lending institution's cost of funds.*

21. Under "funders pay the spread," then, both account servicing on assets and the asset portfolio management fee are paid by the *funding* institutional units (or by the funding institutional sectors when we aggregate institutional units into institutional sectors). Funders thus pay all of FISIM: depositors pay account servicing on their accounts as well as risk intermediation, and a pro-rata share of asset management *plus* the account servicing on loan assets; while debt security holders and lenders to the institution pay risk intermediation and a pro-rata share of asset management *plus* account servicing on loan assets. We note as well that owners *also* pay a pro-rata share of asset management and loan account servicing. For entirely equity financed financial enterprises such as unleveraged investment funds *owners* or equity capital holders pay the *entire* asset management and loan account servicing fee.

22. Under "funders pay the spread," Zieschang (2013) shows that we can rewrite equation (11) in terms of the spread of financial asset earnings over the cost of funds as a fraction of total liabilities $\psi \equiv \frac{\left(\hat{r}_{AFA} - \overline{r} \cdot \iota\right)' AFA}{\iota' AFL}$ as

$$FISIM = \begin{cases} \left[\left(\overline{r} + \psi\right)\iota - r_{\overline{AFL}}\right]' \overline{AFL} + \psi \cdot AF5CL; \text{ if } \psi > 0 \\ \left[\overline{r} \cdot \iota - r_{\overline{AFL}}\right]' \overline{AFL}; \text{ otherwise} \end{cases} \tag{13}$$

Observe that if there is no debt and only equity funding, *FISIM* collapses to equity times the spread if the spread is positive, or zero otherwise. This is typical of mutual (unleveraged investment) funds, where $\psi$ is called the *expense ratio*.[27]

23. Thus *FISIM* is paid by the holders of the enterprise's funding (liability) instruments, and we allocate it to the economy's institutional sectors—nonfinancial corporations, financial corporations, general government, households, and nonprofit institutions serving households—according to the *FISIM* paid on sector holdings of those funding instruments, as given by equation (13). Zieschang (2013) notes that this principle of *allocating* (as opposed to *generating*) FISIM output to using sectors is more in the vein of the 1953 version of the SNA than the 1993 or 2008 versions.

[27] Because investment funds typically publish their expense ratios, national accountants generally consider this version of FISIM to be an explicit service charge case, though it is simply a pole of the general FISIM formula.

## III. DATA

24. We will examine three datasets using the accounting results of the foregoing sections.

- To shed light on the impact of the cost of funds reference rate in calculating the nominal output of the SNA's "Other deposit taking corporations" sector (S122), we will use information from the Federal Deposit Insurance Corporation's (FDIC's) "Call Reports," which provide detailed quarterly financials and (very) limited production indicators on every FDIC insured depository institution in the US.

- To show the evolution of the interaction between the SNA's "Central bank" (Federal Reserve System) sector (S121) and the "Other deposit taking corporations" sector (S122), we also look at data from the audited Annual Financial Reports of the Federal Reserve System.[28]

- To examine the risk intermediation/liquidity services of not only the Financial corporations sector, but also the SNA Nonfinancial corporations sector, we examine the annual Integrated Macroeconomic Accounts (IMA) from the Bureau of Economic Analysis.

## IV. EMPIRICAL RESULTS

The empirical results of this paper do not cover the allocation of FISIM to using sectors, but do use the "funder pays the spread" principle to determine the cost of funds, namely, that the security equivalent interest cost of the loan liabilities of sectors is simply the measured loan interest. That is, it is not necessary to determine a security equivalent rate of interest for loans from the borrower perspective to calculate the cost of funds, because borrowers do not see the charge for loan account servicing—funders do, as part of the overall cost of asset management. Allocation of FISIM to sectors under "funder pays the spread" requires us to know sectors' participation in the liability portfolios of leveraged enterprise sectors by instrument. Some data of this type are available in the US flow of funds accounts, but they are not comprehensive. The US, as a member of the G-20, will be developing counterparty sector breakdowns, by instrument, of the IMA financial transactions and balance sheet accounts as part of the G-20 Data Gaps Initiative.[29]

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[28] Quarterly unaudited financial reports are available beginning in 2012.

[29] See Recommendation 15 of the Financial Stability Board and IMF to the G-20 Central Bank Governors and Finance Ministers at http://www.financialstabilityboard.org/publications/r_131014.htm.

## A. The US financial corporations sector

25. The SNA "Financial corporations" institutional sector (S12) is shown in the IMA as the "Financial business" sector. Data are provided annually from 1960 on the components of the cost of funds as well as balance sheet items needed to determine the cost of funds reference rate prevailing for this sector.[30] We implement the cost of funds equation (10) above by summing the interest paid by the Financial corporations sector, plus its account servicing on deposits, plus operating surplus (the income paid on equity—*AF*5*L*—and net worth—*B*90—liability positions).

26. We include account servicing on deposits because equation (10) is written in terms of the security equivalent returns on liability instruments. We have assumed above that debt securities (*AF*3*L*) and equity capital (*AF*5*L* + *B*90) are not associated with account servicing; thus their security equivalent return is equal to their measured return. Using "funders pay the spread" we have argued that, while loans (*AF*4*L*) do have an account servicing margin from the point of view of the issuing institution and its funders, and thus security equivalent returns different from (and lower than) their measured returns, $r_{AF4A} > \hat{r}_{AF4A}$, funders of the loan issuer also pay for that loan account servicing along with asset management services, and borrowers of the loan see nothing but interest. Hence, from the borrower side, the security equivalent return is just the return on the loan (otherwise the borrower would have issued a security). So for financial corporations (as other sectors), the security equivalent rate on loan *liabilities* equals the measured rate of interest, $\hat{r}_{AF4L} = r_{AF4L}$.[31]

27. For deposits—unlike for loans—interest paid is lower than the security equivalent value $r_{AF2DL} < \hat{r}_{AF2DL}$. Hence, to get the security equivalent rate on deposits, we have to impute it. By implication, we add the difference between the imputed security equivalent interest and interest paid on deposits (which is deposit account servicing) to interest paid on deposits. Our security equivalent imputation for deposits here is the rate the financial institution pays on its debt security liabilities.

28. Because Deposit taking corporations are quantitatively important generators of FISIM, we provide, in addition to financial corporations sector, estimates for the Central bank (SNA subsector S121)—the Federal Reserve System—and the Other deposit taking corporations sector (SNA subsector S122). Data for S121 subsector are available annually (and since 2012, quarterly, but on an unaudited basis) in various issues of the Annual Financial Report of the Federal Reserve System. Data for the S122 sector are available

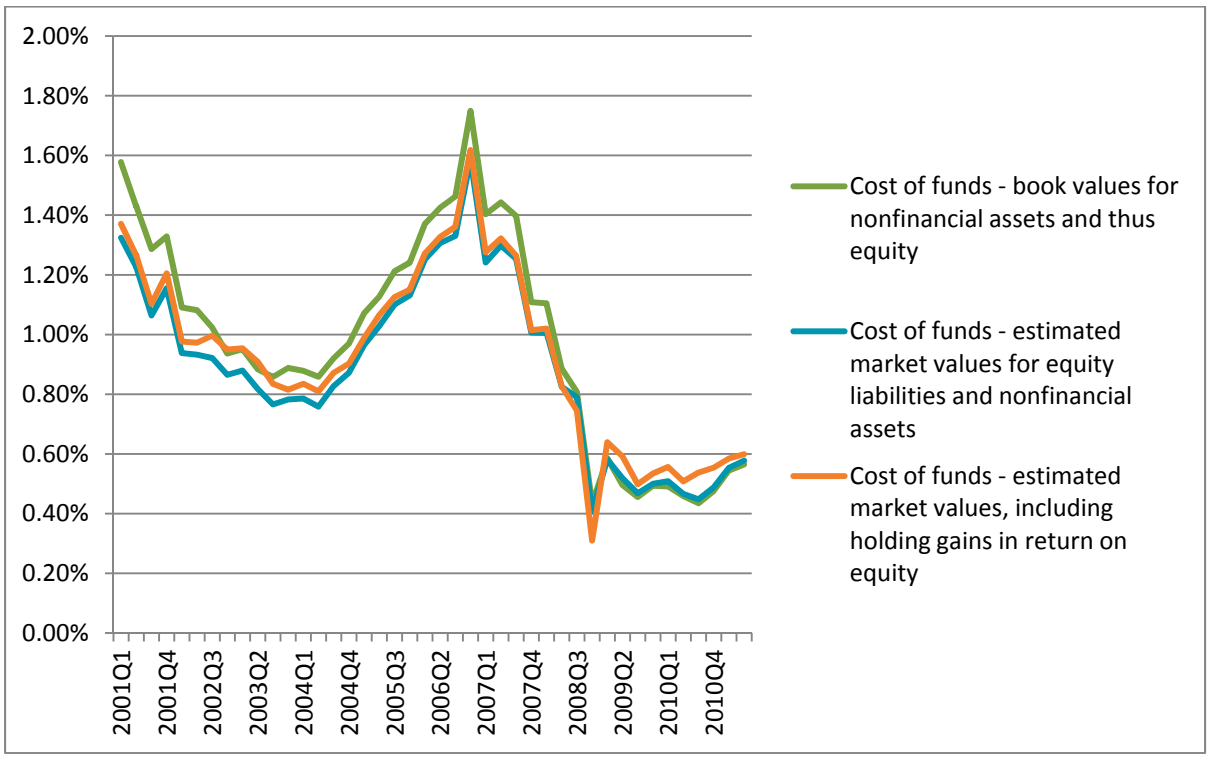
[30] The Integrated Macroeconomic accounts also are available at quarterly frequency, but at this frequency do not include a breakdown of property income into interest and other property income, which we will find useful.

[31] As just explained, the loan *assets* of the institution would be seen as having both an asset management charge and an account servicing charge, both paid by the institution's funders.

quarterly from the Federal Deposit Insurance Corporation (FDIC) website. Although FDIC data are available over a reasonably long history, we consider the data from 2001.

29. First we consider the "Other deposit taking corporations" sector (S122) for the US using quarterly data from the FDIC for 2001Q1-2011Q2. Figure 1 shows the cost of funds reference rate (equation (10)) computed using the FDIC information essentially as it is used in the US national accounts, a calculation of the cost of funds reference rate adjusting the historical costing of, particularly nonfinancial, assets in the FDIC data to market value (using market valuation of equity), and an estimate of the cost of funds reference rate taking account of holding gains and losses on financial assets reported to the FDIC. In principle, the SNA prescribes market valuation for all financial instruments except deposits, loans, and other accounts receivable/payable, as well as for nonfinancial assets. So the market valuation of equity in principle takes all of these into account. We market value bank equity using Thomson Reuters DataStream information on the price to book ratio for US financial corporations. In general, the market valuation adjustments have a small negative impact on the cost of funds reference rate, mainly because of the understatement of the value of nonfinancial assets in the FDIC and IMA Financial business data.

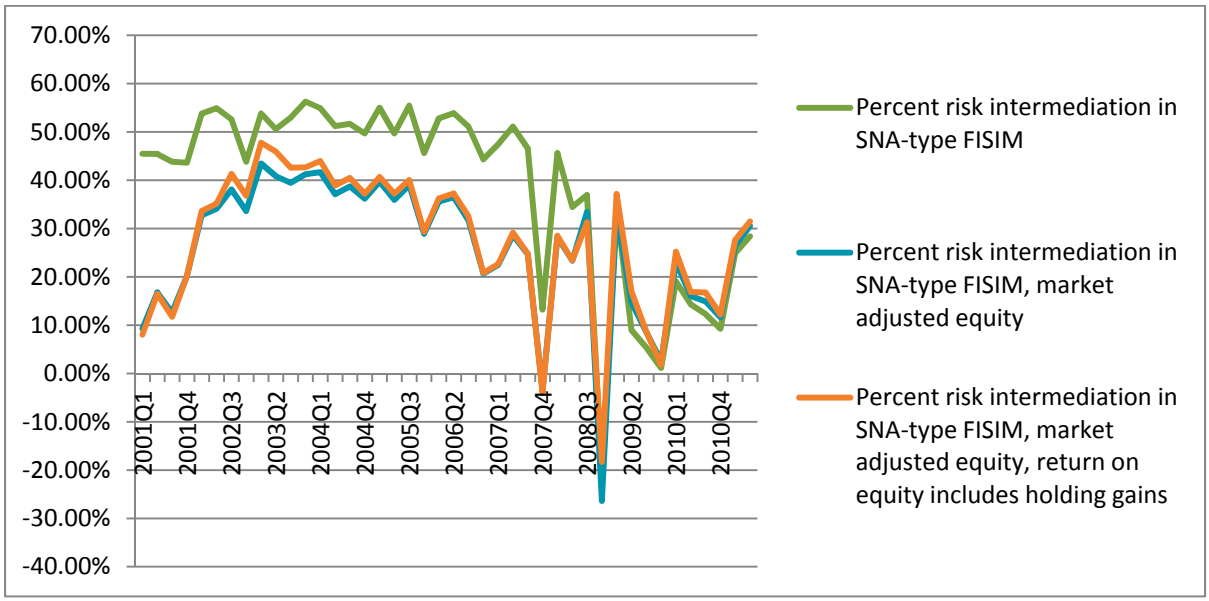
**Figure 1. Market valuation adjustments and the cost of funds reference rate for US Other deposit taking corporations (S122)**




30. Figure 2 shows the risk intermediation component of FISIM. Regardless of market valuation adjustments, risk intermediation is a substantial fraction of SNA-type FISIM in US

data ranging from a historical high of 50 percent (40 percent for market value adjusted data) to a low of 10 percent (post crisis), not surprisingly exhibiting substantial volatility during the 2007-2009 financial crisis period.

**Figure 2. The share of risk intermediation in FISIM for US Other deposit taking corporations (S122)**




31. Figure 3 shows the nominal level of FISIM for the Other deposit taking corporations sector (S122) during 2001Q1-2011Q2, including total FISIM, its risk intermediation component, and the sum of its asset management and asset and liability account servicing components. Figure 3 shows that asset management and account servicing are on a steady upward trend right through the financial crisis, while risk intermediation shows substantial business cycle sensitivity, cratering and then recovering to the previous trend.

32. Figure 4 shows the evolution of the cost of funds reference rate of the Federal Reserve System (S121) at annual frequency, compared with the FISIM of the Other deposit taking corporations (S122) sector aggregated to comparable annual frequency.

**Figure 3. Impact of risk intermediation on FISIM for US Other deposit taking corporations (S122)**

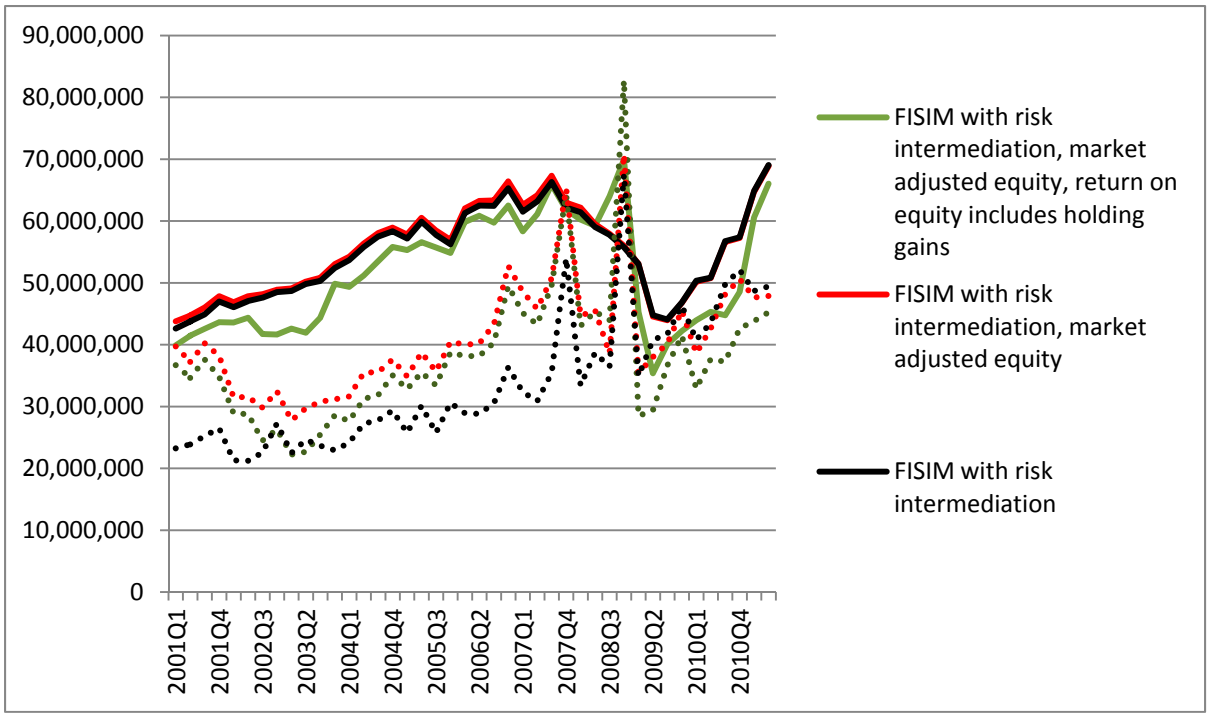



**Figure 4. Cost of funds of US Central bank (S121) versus Other depository corporations (S122)**


33. Of interest in this case is how the central bank (S121) cost of funds moved upward, countering the plunge in the cost of funds of Other deposit taking corporations (S122) FISIM during 2008-2010. The reason for the increase in the central bank cost of funds was the

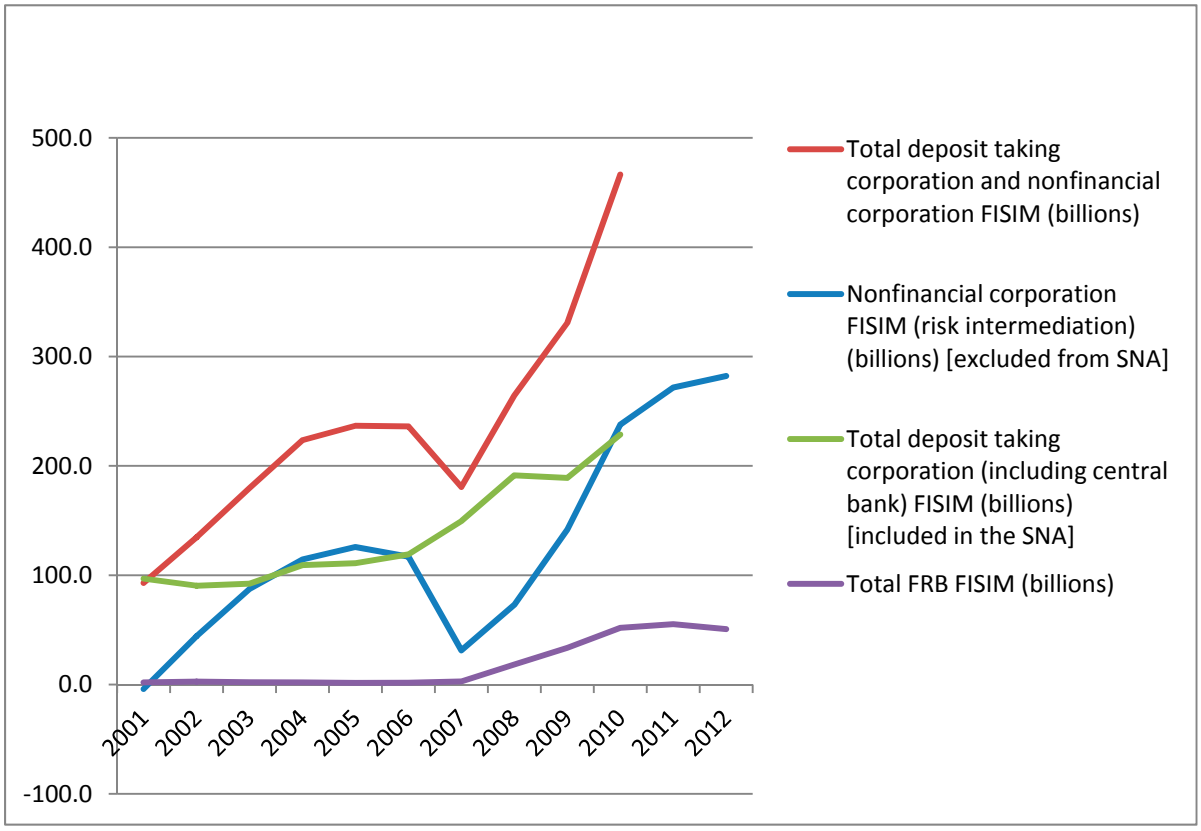
significant policy increase in the size of the central bank balance sheet, fueled by the accumulation of riskier and higher yielding assets, including eventually mortgage backed securities, which raised profitability, operating surplus, and thus the cost of funds for the central bank. Since interest costs on the debt components of the central bank's liability side did not rise, the rise in the cost of funds would have lifted the risk intermediation component of FISIM on the liability side of the central bank balance sheet as the gap between the central bank's cost of funds and the low interest rates paid on its liabilities widened, reflecting the increase in leverage risk the central bank was taking on.[32]

34. Figure 5 shows how FISIM using sector cost of funds reference rates has evolved during 2001-2011 based on the annual IMA data. The cost of funds in this case is calculated by considering the liability sides of the balance sheets, first, of the US Nonfinancial corporate business sector within the SNA Nonfinancial corporations (S11) sector, and second, of the US Financial business sector, equivalent to the SNA Financial corporations (S12) sector. As with the high frequency detail from the Deposit taking corporations (S121 and S122) subsectors of Financial corporations (S12),[33] we impute the security equivalent cost of funds

[32] The central bank's accumulation of higher yielding (and riskier) assets effectively raised its cost of funds by increasing its profits and operating surplus, while the interest cost of its liabilities remained minimal.

[33] Financial corporations includes a number of other types of financial corporations besides the deposit taking corporations considered here, including in addition Money market funds (S123), Non-money market investment funds (S124), Other financial intermediaries, except insurance corporations and pension funds (S125), Financial auxiliaries (S126), Captive financial institutions and money lenders (S127), Insurance corporations (S128), and Pension funds (S129).

**Figure 5. FISIM of Nonfinancial (S11) and Financial (S12) Corporations**




of deposit liabilities for the Financial corporations sector as the measured liability debt security rate of return from the IMA. Since only financial corporations have deposit liabilities, we need no imputations to compute the average cost of funds for the US Nonfinancial corporate business sector from the IMA data. Figure 5 also shows the FISIM calculated for the central bank (FRB). The central bank results in Figure 5 are predicated on the Federal Reserve Notes component of the Fed's liabilities paying no interest to the holders of these instruments as assets. [34]

[34] The accounts of the Federal Reserve Banks refer to payment of their profits to the central government, over and above a limited distribution to the commercial banks (S122) that are presumed to own them, as "Interest on Federal Reserve Notes." If, alternatively to the treatment in Figure 4 and equation (12), this payment is treated as interest on assets of the central government in the form of "Federal Reserve Notes" issued by the central bank and owned by the central government, the risk intermediation FISIM of the central bank would be significantly smaller than shown in Figure 4. Treated as in Figure 4, these profits are part of central bank operating surplus and thus are part of its risk intermediation FISIM, again referencing equation (12). While the two treatments imply the same cost of funds, the Figure 4 treatment of currency implies a much larger differential in returns paid to liability holders between currency (zero) and central bank net worth (all residuals earned by the central bank in excess of the amount paid to commercial banks), where central bank net worth is

(continued)

35. The takeaway from Figure 5 is that, although FISIM for the nonfinancial institutional sectors is not in scope for the SNA, they can produce substantial risk intermediation FISIM, on the same scale as that of Financial corporations, measured the same way SNA-type FISIM measures it for Financial corporations. These sectors' leverage (share of debt in total liabilities) is significantly lower than that of financial corporations, implying lower risk intermediation FISIM for the nonfinancial sectors, and they produce no asset management or asset account servicing FISIM. However, they together generate about 15 times the value added of financial corporations. Thus, even though their level of risk intermediation is comparable to that of financial corporations, it is much less important in their overall output than for financial corporations.

36. Again, the SNA does not consider FISIM to apply to sectors other than Financial corporations or to financial instruments other than deposits and loans, so the comparison shown here would constitute a "satellite" or "memorandum" to the core set of national accounts.

## B. The evolution of the price and volume of indirectly measured bank services in the US 2001-2012

37. The previous sections focused on the reference rate that should be used to compute FISIM. In this section we employ that reference to compute: the nominal value of bank output, the price index and the quantity index.

38. The approach to measuring is FISIM is grounded in the user cost of money approach developed by Diewert (1974), Donovan (1978), and Barnett (1978) as one way to impute the price of the implicit financial services.[35]

39. The form of the user cost price for deposits will be that charged by a bank[36]:

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presumed owned by the government. The alternative treatment to the one shown in Figure 5 would assign a large fraction of central bank profits as interest returns on currency (Federal Reserve Notes), leaving a smaller operating surplus residual earned by net worth.

[35] See Fixler and Zieschang (2001) for a discussion of the application of the user cost approach to CPIs.

[36] Our expression for the user cost of money is from the ex post perspective, reflecting end of accounting period measurements of the reference rate, financial instrument interest rates, and financial instrument valuations. The ex ante user cost expression, as its name implies, uses the values of these prices expected to prevail from the perspective of the beginning of the accounting period. The ex ante user cost expression also is divided by $(1 + \rho)$, discounting the income expected over the period back to the beginning of the period. See, e.g., Diewert (2005) and Diewert, Fixler, and Zieschang (2012).

$$p_D = \rho - r_D . \qquad (14)$$

The user cost price of the loan from a bank's perspective is thus:

$$p_L = r_L - \rho . \qquad (15$$

[37]

40. In the above characterizations of the prices of the loan and deposit implicit services, the idea is that the transaction is in effect repeating itself in each period. In the case of loans, the implicit charge represented by the interest rate differential is a per period charge because if the loan continues, that is if it is neither paid-off or canceled by the bank, then the borrower pays for the continued assumption of the credit risk by the bank for the outstanding balance. Similarly if the depositor leaves money on deposit then deposit services are repurchased in the period.

41. The user cost price concept can be applied to numerous financial services. In countries where universal banking (one-stop financial service centers) the set of financial products is quite large and thereby creates more possibilities for implicit financial services. The extension of the user cost approach to different kinds of financial services is in Schreyer and Stauffer (2003). In the example below we consider 5 financial products: deposit, debt security, and loan assets; and deposit, and the combination of debt security and loan liabilities. Thus we have three asset products and two liability products. These are broad aggregates that contain such important products as Federal Funds purchased and sold. In addition, our measure of bank revenue includes explicit fees in addition to FISIM.

42. The inclusion of interest rates in the user cost prices raises the general question of whether to use book or market rates. Some considerations are: (i) banks hold assets and liabilities over time so that the actual flow of interest expenses and receipts can be different from the one that is consistent with the market rate for any specific period; (ii) the detail available on the financial products held by banks may not permit an assignment of a correct market rate; and (iii) there is a national accounting convention to use book rates instead of market rates. Accordingly, interest rates here are computed in a way that reflects book rather than market values. More specifically, all interest rates used in the example below are computed by dividing some interest flow (receipt or expense) by the stock of the corresponding financial product at a point in time.[38] This method of computation implies

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[37] Holding gains or losses can also be included here and in principle in the deposit user cost as well. In the national accounts the inclusion of such values as part of valuation of financial services is currently being studied.

[38] As described in Fixler, Reinsdorf, and Smith (2003) the change in the valuation of implicit services in the national accounts also employed a unit value computation of interest rates.

that all of the interest rates used in the user cost prices average over the maturities of the underlying financial product that are represented in the institution's asset and liability portfolios, weighted by their portfolio shares.

43. As is well known, the nominal interest rate for a given financial instrument in any period is related directly to the expected rate of inflation in that period, which implies that the user cost-based financial service prices can be affected by inflation. As a result, the user cost prices are inflated by a general price index; the gross domestic purchases chain price index is used to inflate the user cost price relative between t and t-1.

44. In addition to the general price level changing over time, the characteristics of financial products change over time and thereby create a need for quality adjustment as well. For example, suppose that in period t a deposit product has a no foreign transactions requirement while in period t+1, this requirement is dropped and the service fee and or user cost price increased. Because there is a change in the quality of the service—the customer now is able to execute transactions denominated in foreign currencies without an explicit fee, one would want to adjust the change in s for the change in the quality of the service.[39] Fixler and Zieschang (1992) demonstrate one way of adjusting the user cost prices for changes in the quality of financial services. The price indexes constructed in the next section are not adjusted for change in the quality of the financial services because there is no readily available set of data that contains the information needed. This information is neither collected by the regulatory authorities, the prime source of data, nor by the Bureau of the Census in the Economic Census for banks. The example is intended to show how the FISIM component of a bank output price index might be constructed and how the resulting indexes behave rather than to provide augmentations to official estimates.

45. We use the Fisher Ideal formula, which is the geometric mean of a Laspeyres and Paasche price index because of its superlative index number and remains defined even when certain user cost prices episodically change sign. Let

[39] In some instances the characteristics of the financial product and the financial service coincide. If the characteristic set of a deposit product were amended to include internet banking, then there would simultaneously be a new form of transaction service. However it is viewed, a quality adjustment would be necessary. Removal of minimum balance requirements are sometimes cited as service quality increases but are generally treated microeconomically as a change in pricing arrangement from a scheme making the service price dependent on nominal account size (a two-part tariff) to one that does not generate such a dependency. Referencing applications of this in electric power pricing and the effect of tax deductibility of expenditures on charitable causes, such price indexes would recognize that revenue comprises the tariff "rate structure premium" (or, here, discount) and the marginal price of the part of the tariff structure in which a customer's account falls.

$p_A^{i,t}$ ≡ price of the ith asset in t

$p_L^{i,t}$ ≡ price of the ith liability in t

The form of these prices follows equations (14) and (15).

The Laspeyres price index between period t and t-1 is given by

$$P_{Las}(t,t-1) = \sum_i \frac{p_A^{i,t} q_A^{i,t-1} + p_L^{i,t} q_L^{i,t-1}}{p_A^{i,t-1} q_A^{i,t-1} + p_L^{i,t-1} q_A^{i,t-1}}.$$

The Paasche price index is given by

$$P_{Pas}(t,t-1) = \sum_i \frac{p_A^{i,t} q_A^{i,t} + p_L^{i,t} q_L^{i,t}}{p_A^{i,t-1} q_A^{i,t} + p_L^{i,t-1} q_A^{i,t}}.$$

25. The Fisher Ideal price index is thus:

$$P_{Fis}(t,t-1) = \left[ P_{Las} \times P_{Pas} \right]^{1/2}$$

46. We compute a chain Fisher between 2001Q1 and 2011Q2. Because the interest rate components depend on inflation as well as the quantities to which they are applied, we deflate each element of the chain by $\delta$ where

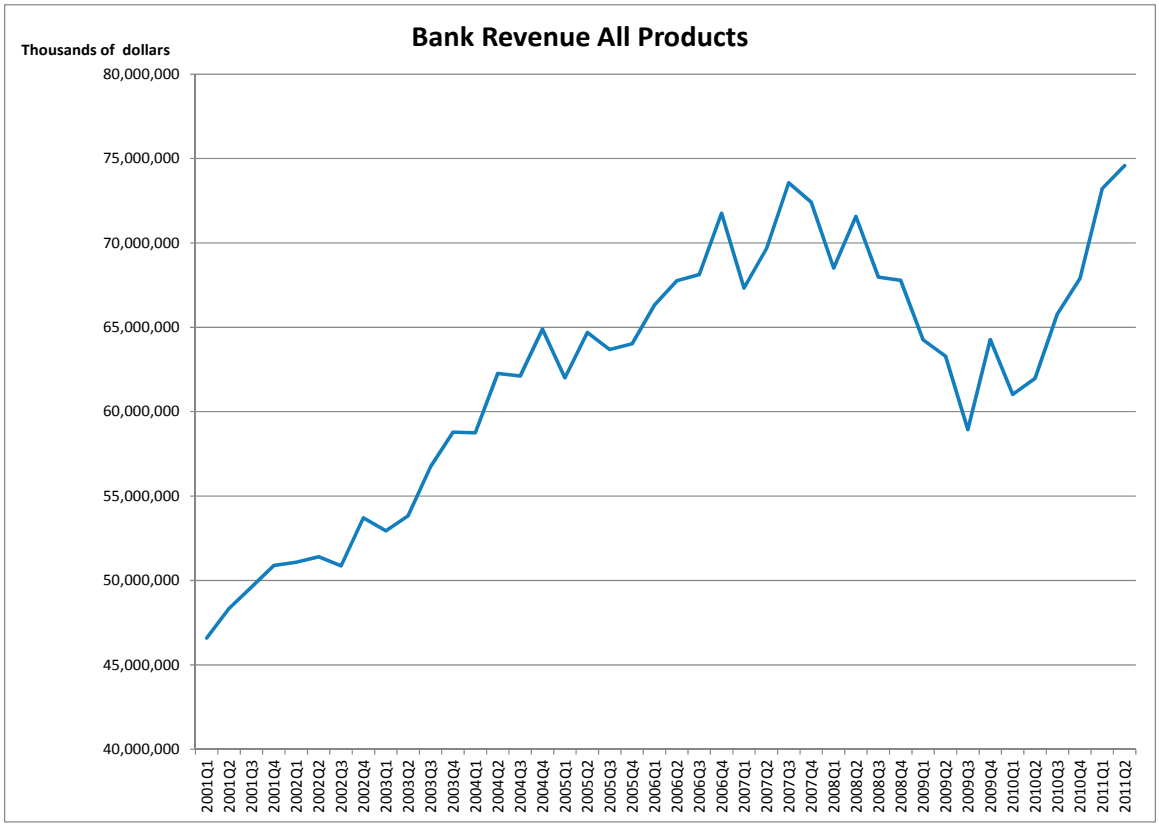
$$\delta(t,t-1) = \frac{\text{Gross Domestic Purchases Price Index (t, 2001)}}{\text{Gross Domestic Purchases Price Index (t-1, 2001)}}.$$ [40]

[40] Gross Domestic Purchases is defined as the market value of goods and services purchased by U.S. residents regardless of where those goods and services were produced. It is measured as Gross Personal Consumption Expenditures plus Gross Private Domestic Investment plus Government Consumption Expenditures and Gross Investment. Because this price index contains financial services it may appear that its use as a deflator for the user cost price relative is problematic. Inasmuch as financial services were about 3% of nominal Gross Domestic Purchases in 2011, it is not likely that there is not much of an effect.

47. We rebase the published Gross Domestic Purchase price index to 2001 Q1.

48. Figure 6 shows the path of bank revenue [assuming the cost of funds reference rate. Interestingly bank revenue declines in 2008 Q3 which corresponds to the failure of Lehman Brothers and the financial crisis. Bank revenue changed direction in 2010 Q4.

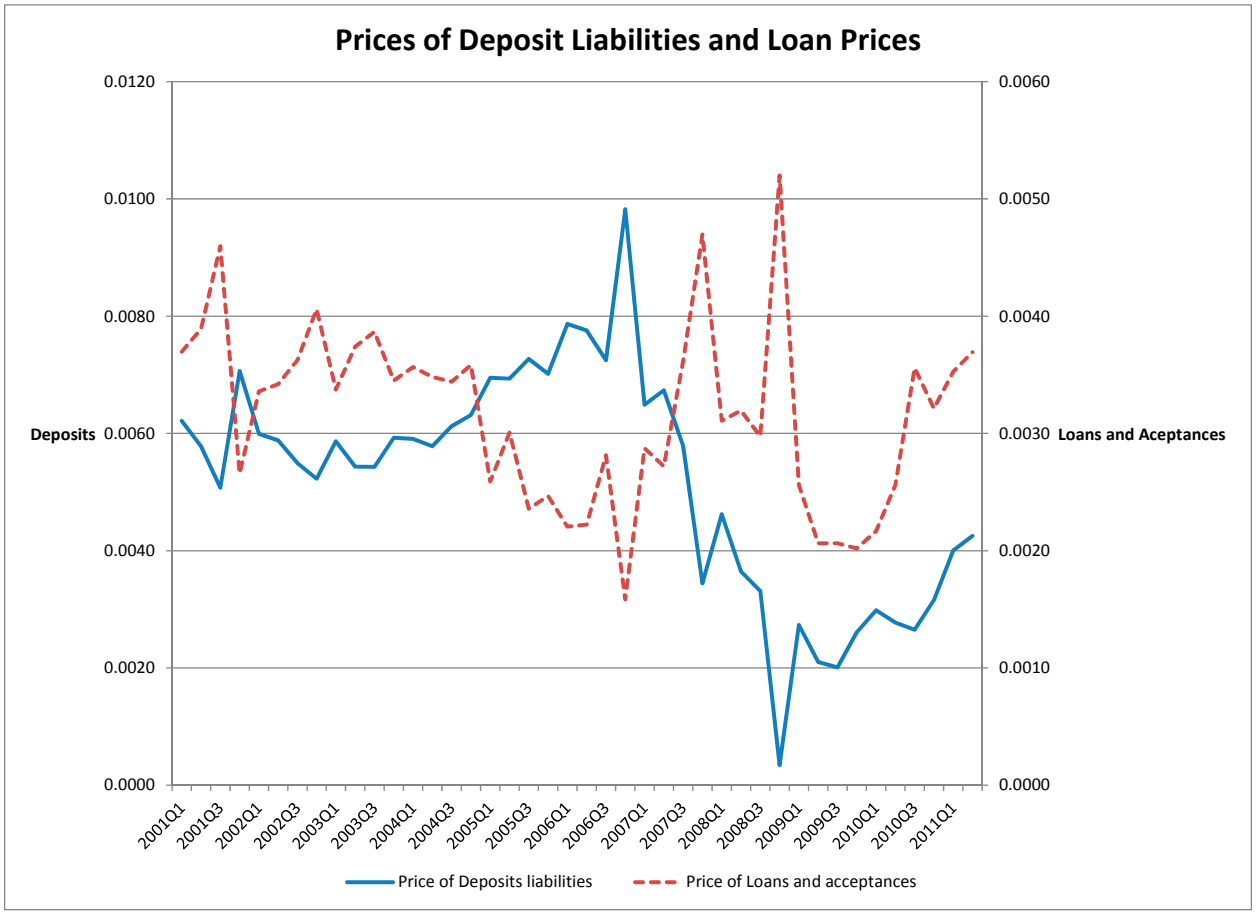
**Figure 6. SNA-type output of US Other deposit taking corporations (S122), including direct service charges and FISIM**




49. Figure 7 shows the prices of deposit liabilities and loan assets; these are the two products that form the basis for the SNA definition of FISIM. Note that they are largely mirror images of one another. Also observe in 2008 Q4, the time that the financial crisis worsened, that loan prices rise with the rise of credit risk[41] and deposit prices fall with the increased supply of deposits.

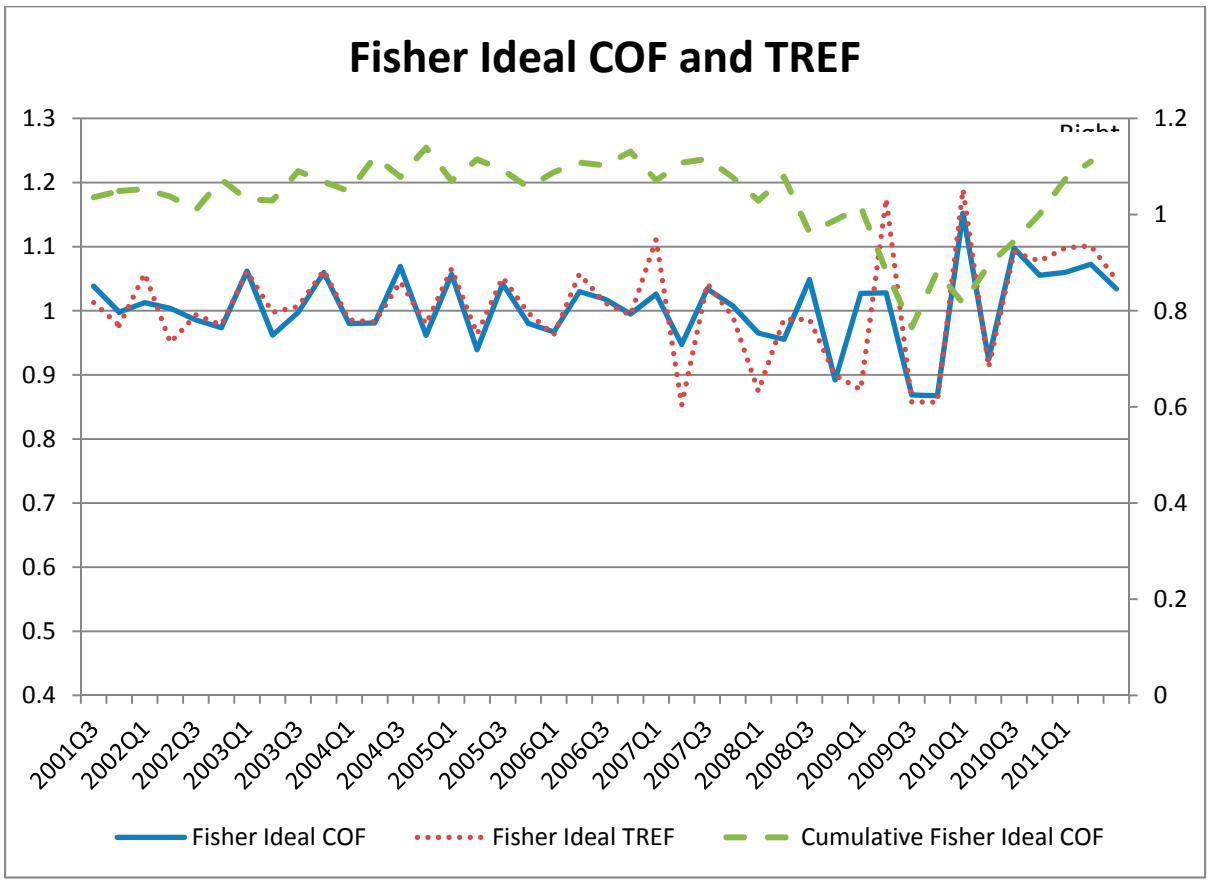
[41] We adjust loan returns for actual loan chargeoffs, following BEA practice, except that we do not use a moving average of the chargeoff rate.

**Figure 7. Prices of deposit liabilities and loan prices**



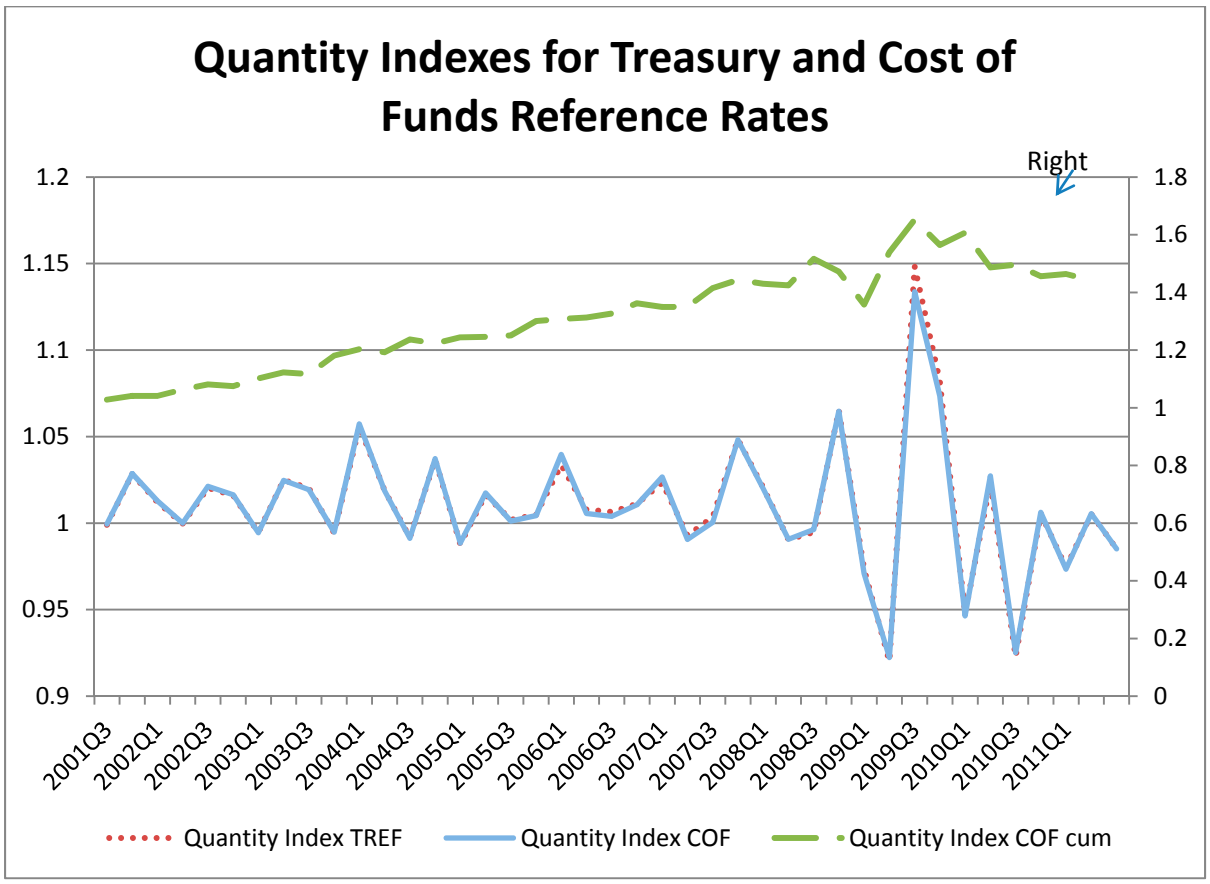

50. Figure 8 shows the Fisher Ideal price index that includes the 5 financial products and explicit service fees, where COF denotes use of the cost of funds reference rate and TREF denotes a calculated securities rate methodology similar to that Bureau of Economic Analysis (BEA) uses in official estimates for the Financial corporations sector. Observe how the volatility increased in the latter part of 2008 as the financial crisis began to take hold. End to end, FISIM prices were about 11 percent higher in 2011Q2 as compared with 2001Q1.

**Figure 8. Fisher Ideal price index**




51. Figure 9 shows the quantity index obtained via deflation of revenue in Figure 6 by the price index in Figure 8 where COF denotes use of the cost of funds reference rate for the user cost prices and TREF denotes use of the BEA reference rate.

**Figure 9. Volume index covering all financial instruments (except equity liabilities)**




52. As shown in Figure 9, the implication of user cost of capital price deflation plus deflation by a "general price index" implies growth in indirectly measured US financial service output for the deposit taking corporations sector of around 4 percent per year, with a significant downward deviation from trend during the financial crisis, and a sustained downward trend beginning in 2010.

53. Fixler and Zieschang (1992), showed how additional indicators on service delivery might be incorporated into the price-volume factoring of relative revenue change, if such information were available. Examples of useful indicators would be numbers of deposit and loan accounts, as well as, on deposit accounts, average number of checks cleared and average number of ATM transactions per account, and on asset management, number of funder accounts. These would be useful for the account servicing component of FISIM, but indicators of this nature for the risk intermediation component of FISIM appear less obvious.

## V. Conclusion

54. This paper provides tentative results for compiling indirectly measured, nominal financial service output for deposit taking corporations, using US data, and a preliminary

exploration of the implications of measuring FISIM for partly debt financed nonfinancial corporations, which is not currently within the SNA production boundary.

- Perhaps our most immediately useful result is providing a micro-theoretic basis for setting the SNA reference rate for FISIM calculation at the cost of funds (or cost of capital), and demonstrating with publicly available US data that this reference rate is straightforwardly calculated from financial enterprise balance sheets and income statements.

- A further implication of the cost of funds reference rate is that FISIM decomposes into account servicing, asset management, and risk intermediation components; the paper provides evidence on the risk intermediation component of FISIM for US banks, finding that it is arguably the most volatile and pro-cyclical component of FISIM, and ranges from 10 to 50 percent of SNA-type FISIM during the 2001-2010 decade.

- The paper explores the empirical implications of FISIM for measuring central bank output, finding that movements in US central bank FISIM during the financial crisis were countercyclical and tended to offset the movements in "Other deposit taking corporations" FISIM. Federal Reserve FISIM is entirely risk intermediation and deposit account servicing, and in the aftermath of the 2008 financial crisis was strongly influenced by the policy induced expansion of the asset side of the central bank balance sheet into higher yielding "unconventional" financial assets.

- The paper explores the empirical importance of the implication of the micro theory of indirectly measured financial services, that not only financial corporations but also nonfinancial corporations can produce FISIM in the presence of debt financing. Using the US Integrated Macroeconomic Accounts, our indicative finding in comparing the deposit taking subsector (S121 and S122) of the SNA Financial corporations sector (S12) with the "Nonfinancial corporate business" subsector of the Nonfinancial corporations sector (S11) is that, while "Nonfinancial corporate business" has a much smaller fraction of (risk intermediation) FISIM in its (expanded) total output, the sector nevertheless has much more total output than financial corporations. As a result, "Nonfinancial corporate business" has roughly equal FISIM to that of Financial corporations, but exhibits more pro-cyclicality and volatility.

- The paper examines the deflation of "Other deposit taking corporations" (S122) FISIM using a price index that, broadly following the SNA[42], is the product of two factors: a financial instrument user cost rate index number, and a "general price index." The price index results using cost of funds reference rate were broadly similar

[42] 2008 SNA, paragraph 15.114.

to those using a reference rate calculated with the method currently used by the Bureau of Economic Analysis, which is based on securities returns from bank income statements and balance sheets. Differences in results tended to occur during turbulent times for the financial industry (a period after the 1999-2000 recession, and shortly before and for sometime after the 2007-2008 financial crisis).Our exploration of FDIC data using this traditional SNA methodology for deflation of FISIM output shows that the trend in financial service prices has been about 1 percent per year over the 2001-2010 decade, but with significant quarter to quarter variations. The volume index has trended at about 4 percent annual growth in FISIM output over the 2001-2010 decade, but has declined since the first quarter of 2010, and is somewhat smoother, quarter to quarter, than the price index.

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