The Measurement of Banking Services in the System of National Accounts

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Abstract

The paper considers some of the problems associated with the indirectly measured components of financial service outputs in the System of National Accounts (SNA), termed FISIM (Financial Intermediation Services Indirectly Measured). The paper characterizes FISIM by a user cost and supplier benefit approach determining the price and quantity of various financial services in the banking sector. We examine the need for FISIM in the context of plausible alternative accounting schemes that could be used to account for financial services. The alternative accounting frameworks have implications for the labour and multifactor productivity of both the financial and nonfinancial sectors.

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1. Introduction

One of the most difficult to measure parts of the System of National Accounts and the Consumer and Producer Price Indexes is the measurement of the outputs (and the inputs) of the financial sector. The pricing of financial services is so controversial that there has not been general agreement on how to measure the *value* of various types of financial services like banking and insurance outputs and there is even less agreement on how to measure the *quantity* (or *price*) of financial services.[4] There is also disagreement on how to include financial services in the Consumer Price Index. Most Consumer Price Indexes, including the U.S. CPI, exclude many financial services because CPI methodology regards these services as costs of moving consumption from one period to another period and hence regards these costs as being out of scope. However, Fixler (2009; 239-241) makes a case for including these transactions costs in a CPI, arguing that since households are spending their resources on these financial services, they must be getting some benefit or utility from the purchase of these products and hence these products belong in the CPI. However, proponents of excluding these products from the CPI might argue in return that these products seem to be unconnected to this period's consumption so perhaps they should be regarded as part of the household's home production sector and hence be excluded from the current period CPI, which is supposed to measure the price of current consumption. This point of view could be accepted except that we need to ensure that these costs are captured somewhere in the household accounts. On the other hand, advocates of Fixler's position could respond by saying that it is well established that the inputs purchased by households for home production, which in turn produces final consumption services, are generally in scope for a CPI and so we are back to Fixler's position.

Fixler (2009) constructed a financial services price index for households in the U.S. by using the BEA's data base on Personal Consumption Expenditures. The two controversial components in Fixler's experimental household financial services index are imputed household bank deposit services and imputed household loan services. We will explain Fixler's theoretical user cost framework for modeling these two components of household financial services in some detail. We will also that for each financial sector user cost, there is a corresponding supplier benefit to the bank from supplying deposit and loan services. Unfortunately, these user costs and supplier benefits are only equal if sectoral opportunity costs of financial capital (or discount rates) are equal across sectors of the economy.

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[4] The best reference on measurement problems in the services sector in general, including financial services, is Triplett and Bosworth (2004). For a review of their work, see Diewert (2005). See also Basu (2009), Basu, Inklaar and Wang (2011), Berger and Humphrey (1997), Berger and Mester (1997), Fixler (2009) (2010), Hancock (1985) (1991), Inklaar and Wang (2010), Schreyer and Stauffer (2010), Wang (2003), Wang and Basu (2011), Wang, Basu and Fernald (2009) on financial services measurement problems.

Once the user cost approaches to modeling the demand for bank deposits and loans have been explained, we turn our attention to some of the treatments of bank services that have been suggested in a national income accounting literature.[5] In section 3, we start off by considering two alternative *cash flow approaches*; i.e., these approaches simply follow the financial flows that the banking sector generates in an accounting period. These cash flow approaches to modeling banking services in a system of national accounts prove to be problematic and so in section 4, the user cost approach to financial flows is introduced into the accounting framework. Section 5 modifies the approaches explained in section 4 by introducing *capital services* into the accounting framework; the financial flows in the system of accounts are viewed as facilitating the flow of *waiting services* to the nonfinancial production sector. Having presented the *nominal valuation* of bank services and how they are recorded in various sector accounts, we turn to a discussion of alternative approaches to the determination of the *real value of bank services* in Section 6. Section 7 concludes.

2. The User Cost and Supplier Benefit Approaches to Valuing Bank Services

2.1 Deposit Services

Following Fixler (2009), suppose that the *household reference rate of return on safe assets* is ρ_H for the period under consideration and the banking sector pays on average an interest rate of r_D on bank deposits. Then the *beginning of the period user cost* u_D of holding a dollar of deposits (on average) throughout the period is:

(1) $u_D \equiv 1 - (1 + r_D)/(1 + \rho_H) = (\rho_H - r_D)/(1 + \rho_H)$.

Thus a household that decides to hold one dollar of deposits throughout the accounting period gives up a dollar at the beginning of the period (and this dollar could be spent on general consumption) and in return, the dollar is returned to the consumer at the end of the period plus the rate of interest r_D that banks pay on deposits. But this end of period benefit of $1 + r_D$ is not as valuable due to the postponement of consumption for the period so this benefit must be discounted to the beginning of the period by 1 plus the opportunity cost of capital the household faces at the beginning of the period, $1 + \rho_H$. Thus the net cost to the consumer of holding a dollar of demand deposits over the accounting period is $1 - (1 + r_D)/(1 + \rho_H)$.[6] Usually, the household safe reference rate ρ_H will be greater than the bank deposit rate r_D.

[5] It should be noted that firms and the government sector hold bank deposits in addition to the household sector. We do not model this aspect of reality in the present paper in the interests of simplicity.

[6] This user cost of money dates back to Diewert (1974) and was further developed by Donovan (1978), Barnett (1978) (1980), Fixler and Zieschang (1991) (1992a) (1999), Barnett, Liu and Jensen (1997) and Fixler, Reinsdorf and Smith (2003). See Barnett and Chauvet (2010) for additional references to the literature. These presentations of the user cost framework use the concept of holding revenue/cost instead of simply the interest rate received/paid; the former has a larger scope and includes expected holding

As mentioned above, the costs and benefits of holding the bank deposit are discounted to the beginning of the period. However, it is possible to *reverse discount* the costs and benefits to the end of the period and this leads to the following (nominal) *household end of the period user cost* U_D of holding a deposit:[7]

(2) $U_D \equiv (1 + \rho_H)u_D = \rho_H - r_D$.

End of period user costs are more consistent with accounting conventions[8] and they are simpler to interpret so we will work with them in subsequent sections.

Given the end of period user cost for a bank deposit, U_D, and the (asset) value of household bank deposits V_D, the *imputed (nominal) value of bank deposit services from the household perspective*, S_{HD}, is defined as the product of U_D and V_D:

(3) $S_{HD} \equiv U_D V_D = (\rho_H - r_D)V_D$.

The end of period user cost of holding a bank deposit defined by (2) and the corresponding value of deposit services defined by (3) are derived using a household opportunity cost perspective. However, it is possible to rework the above analysis using the perspective of the bank. From the bank's perspective, the household's decision to hold a bank deposit over the course of the accounting period means that the bank has a relatively inexpensive source of financial capital, which presumably can be loaned out for a profit.[9] Thus the *beginning of the period benefit* to the bank b_D of the household supply of a dollar of deposits to the bank is equal to the beginning of the period benefit of the deposit, 1, less the discounted end of period repayment of the deposit to the household plus the deposit interest paid:

(4) $b_D \equiv 1 - (1 + r_D)/(1 + \rho) = (\rho - r_D)/(1 + \rho)$

where ρ is the bank's opportunity cost of capital (a nominal interest rate). Again, it is possible to *reverse discount* the costs and benefits to the end of the period and this leads to the following (nominal) *end of the period benefit to the bank* B_D of a dollar's worth of household deposits:

(5) $B_D \equiv (1 + \rho)b_D = \rho - r_D$.

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gains/losses. For our purposes the use of the interest rate paid/received is sufficient and we address the expected holding gains/losses dimension in Section 7.

[7] See Diewert (2005, 485-486) for a discussion of beginning and end of period user costs.

[8] See Peasnell (1981; 56).

[9] Of course, there are substantial costs associated with servicing the household deposit which reduce the apparent benefit of this seemingly cheap source of financial capital.

Given the end of period user cost for a bank deposit B_D and the (asset) value of household bank deposits V_D, the *imputed (nominal) value of bank deposit services from the bank's perspective*, S_{BD}, is defined as the product of B_D and V_D:

(6) $S_{BD} \equiv B_D V_D = (\rho - r_D)V_D$.

If the household and bank reference rates, ρ_H and ρ, are equal, then the household value of deposit services S_{HD} defined by (3) will equal the bank's imputed value of deposit services S_{BD} defined by (6).[10] However, if these reference rates are not equal, then setting up a consistent system of national accounts becomes difficult.

2.2 Loan Services

Fixler (2009), following Hancock (1985) (1991), went on to derive the *net benefit to a bank of making a loan*. The same user cost and supplier benefit methodology that was used in the previous section can now be applied to bank loans. Again, we will assume that the bank's opportunity cost of capital is the nominal discount rate ρ. Then the *beginning of the period supplier benefit* b_L to the bank of making a loan to a *nonfinancial business* is:

(7) $b_{BL} \equiv -1 + (1 + r_{BL})/(1 + \rho) = (r_{BL} - \rho)/(1 + \rho)$

where r_{BL} is the one period interest rate that the bank charges the business for the loan. Thus a bank that decides to make a loan of one dollar at the beginning of the accounting period to a business gives up a dollar at the beginning of the period and in return, the dollar is returned to the bank at the end of the period with an additional payment of r_{BL}, which is net interest rate that the borrower pays for the use of the funds during the accounting period.[11] But the end of period benefit to the bank of $1 + r_{BL}$ is not as valuable as a comparable beginning of the period benefit so this benefit must be discounted to the beginning of the period by 1 plus the bank's opportunity cost of capital, which is $1 + \rho$. Thus the net benefit to the bank of providing a loan of one dollar over the accounting period is $-1 + (1 + r_{BL})/(1 + \rho)$.[12] Note that we are using ρ_H and ρ to denote hypothetical opportunity costs of capital as opposed to the potentially observable market interest rates r_D and r_{BL}.

[10] In a one household economy, these reference rates should coincide but in a many household economy, differences in these reference rates are likely.

[11] The net loan rate r_{BL} is equal to the gross interest *rate less the expected loss on a dollar's worth of loans due to default risk*. For simplicity, in this paper we will assume that expectations are realized and so ex ante user costs and benefits will always be equal to ex post user costs and benefits.

[12] The user cost or more accurately, the supplier benefit, of a loan is due to Donovan (1978) and Barnett (1978) (1980) for the case of household loans. For the case of business loans, see Hancock (1985) (1991) and Fixler and Zieschang (1992a) (1999).

In a similar fashion, we can assume that the bank makes loans to *households* at the one period household interest rate r_{HL} and that the *beginning of the period supplier benefit* b_{HL} to the bank of making a loan to a household is:

(8) $b_{HL} \equiv -1 + (1 + r_{HL})/(1 + \rho) = (r_{HL} - \rho)/(1 + \rho)$.

Instead of discounting costs and benefits to the beginning of the period in order to obtain net present values, we can anti-discount to the end of the accounting period and define *end of the period supplier benefit* to the bank B_{BL} of making a one dollar loan to a business and a similar end of period supplier benefit for loans to households B_{HL}:

(9) $B_{BL} \equiv (1 + \rho)b_{BL} = r_{BL} - \rho$; $B_{HL} \equiv (1 + \rho)b_{HL} = r_{HL} - \rho$.

Thus the end of the period supplier benefit B_{BL} of a one dollar loan is the beginning of the period supplier benefit b_{BL} multiplied by $1 + \rho$.

Given the end of period supplier benefit for a business bank loan, B_{BL}, and the beginning of the period asset value of business bank loans V_{BL}, the *imputed (nominal) value of business bank loan services*, S_{BL}, is defined as the product of B_{BL} and V_{BL}:

(10) $S_{BL} \equiv B_{BL}V_{BL} = (r_{BL} - \rho)V_{BL}$.

A similar set of definitions can be made for household loans. Given the end of period household user cost for a household loan, B_{HL}, and the beginning of the period asset value of household bank loans V_{HL}, the *imputed (nominal) value of household bank loan services*, S_{HL}, is defined as the product of B_{HL} and V_{HL}:

(11) $S_{HL} \equiv B_{HL}V_{HL} = (r_{HL} - \rho)V_{HL}$.

The above supplier benefits of loans are derived from the perspective of the bank. It is also possible to derive the corresponding costs to the business sector and the household sector of taking on loans. Thus the *beginning of the period user cost* to a nonfinancial business u_{BL} of taking on a loan of one dollar is:

(12) $u_{BL} \equiv 1 - (1 + r_{BL})/(1 + \rho_B) = (\rho_B - r_{BL})/(1 + \rho_B)$

where ρ_B is the nonfinancial business sector opportunity cost of capital (or the business sector reference rate) and r_{BL} is the business sector one period bank loan rate, which is potentially observable.[13]

[13] In a one household economy, we would expect $\rho = \rho_H = \rho_B$; i.e., we would expect all of the reference rates to equal the household reference rate.

The *beginning of the period user cost* to a household u_{HL} of taking on a loan of one dollar is can be defined in an analogous manner:

(13) $u_{HL} \equiv 1 - (1 + r_{HL})/(1 + \rho_H) = (\rho_H - r_{HL})/(1 + \rho_H)$

where ρ_H is the household opportunity cost of) and r_{HL} is the one period loan rate that the bank charges households for a loan.

The corresponding *end of period user costs of business and household loans* (from the business and household perspectives), U_{BL} and U_{HL}, can be defined in the usual way:

(14) $U_{BL} \equiv (1 + \rho_B)u_{BL} = \rho_B - r_{BL}$; $U_{HL} \equiv (1 + \rho_H)u_{HL} = \rho_H - r_{HL}$.

Finally, given the value of business loans V_{BL} and household loans V_{HL} for the period, the *imputed (nominal) value of bank loan services to businesses* from the perspective of the nonfinancial business sector can be defined as $U_{BL}V_{BL}$ and the *imputed (nominal) value of bank loan services to households* from the perspective of the household sector can be defined as $U_{HL}V_{HL}$.

It can be seen that the measurement of banking services in a system of national accounts is much more complicated that the measurement of the outputs and inputs in say the manufacturing sector: if the opportunity costs of financial capital differ across sectors, then the imputed service flows of banking outputs and inputs can differ across sectors depending on whether we use a supplier or demander approach to the valuation of the various financial services. How to reconcile these differing value flows in a consistent accounting system is beyond the scope of the present paper. Thus in what follows, we will attempt to set up an accounting framework for financial flows using the valuations for banking services that follow from taking the bank's perspective to the valuation of financial services.

2.3 Selecting the Reference Rates

There are at least four broad perspectives on choosing the bank's reference rate ρ.

First, the Hancock (1985; 864) *bank profit function approach* sets the reference rate at the highest rate possible that is consistent with nonnegative supplier benefit prices for its financial services over the banks in her sample of banks. Thus if the reference rate ρ is chosen to be too large, the bank's supplier benefit prices for loans defined by (9) above become negative and if ρ is chosen to be too low, the bank's supplier benefit prices for deposits defined by (5) will become negative so a ρ that makes both of these prices nonnegative seems reasonable. Hancock's methodology for choosing ρ led to nominal discount rates between 4.5 to 5.1 percent during the period 1973-1978 for a sample of New York and New Jersey banks.

A second approach to choosing ρ selects *a risk free rate*, which captures the impact of the risk free yield curve on the average risk free return possibility from the institution's balance sheet. The underlying idea is that banks view that rate as the opportunity cost of deposits, i.e., as the interest rate they would earn from holding an asset whose stable value and liquidity would allow them to meet depositor withdrawals on demand.

A third approach is *the cost of funds approach*. In this approach, the bank's reference rate is a weighted average of its cost of raising financial capital from debt, equity and deposits. For deposits, the cost of funds is expected to be greater than the interest depositors receive; hence the cost of funds approach employs an estimate of the full cost of deposits, for example, by matching deposits to borrowed funds on the liability side of the bank's balance sheet.

A fourth approach is the *credit market equivalence approach*, from Basu, Fernald, Inklaar and Wang (BFIW)[14]. These authors augment the risk free rate for each loan instrument on the asset side of an institution's balance sheet by the difference between a market interest rate for a comparable security (in maturity and systematic risk) and the risk free rate. The idea is that the bank observes from market information (the prices of the matched securities) the creditworthiness of borrowers, and so in fact does not bear the risk compensated by the calculated security risk premia when it provides credit services. The same principle applied to deposits results in the selection of a safe security rate for the reference rate, like the second approach. This credit market equivalence approach employs a potentially large constellation of reference rates.

The last approach to the reference rate can be expected to produce much smaller estimates of indirectly measured financial services than the cost of funds approach.

3. Preliminary Approaches to the Treatment of Banking Services in the System of National Accounts

In this section, we will discuss how the System of National Accounts 1993 proposed to measure banking services and their recording in different accounts. It should be noted that this discussion is independent of the foregoing discussion of the reference rate.

In order to understand the SNA treatment of banking services, it will be useful to construct a very simple model of the value flows in a three sector model of a closed economy (with no government and no rest of the world sectors). The three sectors are H, the household sector, B, the banking sector and N, the nonfinancial production sector. The price and quantity of explicitly priced banking services are P_B and Y_B and the price and quantity of nonfinancial consumption are P_N and Y_N respectively. The price and quantity of nonfinancial, nondurable primary inputs (e.g., labour) for the banking sector

[14] See Wang, Basu and Fernald (2009), Inklaar and Wang (2010), Basu, Inklaar and Wang (2011) and Wang and Basu (2011).

are W_B and X_B and for the nonfinancial sector are W_N and X_N respectively. Only consumers hold deposit balances of V_D dollars at the beginning of the period and the bank interest rate on deposits is r_D. The banking sector makes household loans that have the value V_{HL} at the one period interest rate r_{HL}. The nonfinancial sector borrows financial capital (to purchase capital stocks) from the household sector and from the banking sector. Households provide V_B dollars of financial capital to the banking sector and V_N dollars of financial capital to the nonfinancial sector and earn the net interest rates on these investments of r_{HB} and r_{HN} respectively.[15] The banking sector provides V_L dollars of loans to the nonfinancial sector at the net interest rate r_L (the bank loan rate). With the above definitions, we can now put together a picture of the intersectoral flows in the economy in Table 1.[16]

Table 1: Cash Flow Intersectoral Value Flows with no Imputations

Row	Type of flow	Households	Banking Sector	Nonfinancial Sector
	Net output			
1	**Goods and services**	$\mathbf{P_BY_B + P_NY_N}$	$\mathbf{P_BY_B}$	$\mathbf{P_NY_N}$
	Primary inputs			
2	**Compensation of employees**	$\mathbf{W_BX_B + W_NX_N}$	$\mathbf{W_BX_B}$	$\mathbf{W_NX_N}$
	Interest (Property income to owners of capital), ***of which***			
3	**Interest on business debt/equity**	$\mathbf{r_{HB}V_B + r_{HN}V_N}$	$\mathbf{r_{HB}V_B}$	$\mathbf{r_{HN}V_N}$
4	**Interest on deposits**	$\mathbf{r_DV_D}$	$\mathbf{r_DV_D}$	**0**
5	**Interest on household loans**	$\mathbf{-r_{HL}V_{HL}}$	$\mathbf{-r_{HL}V_{HL}}$	**0**

[15] These (net; i.e., after expected defaults) interest rates can be thought of as weighted averages of bond and equity rates of return. These rates of return can be interpreted as ex ante expected prices or ex post actual realized prices, depending on the purpose of the accounts.

[16] *SNA 1993* does not correspond precisely to the flows laid out in Table 1; i.e., neglecting the FISIM imputations, rows 3-6 in Table 1 would be consolidated in *SNA 1993* as *net operating surplus*, which in turn is equal to the row 1 entries less the row 2 entries. We will follow Rymes (1968) (1983) and regard net operating surplus as a repository for *interest waiting services*, which we regard as a primary input. Thus we have changed net operating surplus from a balancing item in the SNA to a reward for postponing consumption, a service whose price is the interest rate.

6	**Interest on business loans**	**0**	**$-r_L V_L$**	**$r_L V_L$**

The value flows in each row of column H (Households) in Table 1 are equal to the sum of the corresponding value flows in columns B (Banking Sector) and N (Nonfinancial Sector) so that each row reflects the fact that the value of household demand (or supply) for each commodity equals the corresponding aggregate production sector supply (or demand) for the same commodity.[17] We also assume for simplicity that the value flows in row 1 of the table are equal to the sum of the value flows in rows 2-6 of the table for each column so that there are no net savings or profits or losses in the economy.[18] These two sets of adding up assumptions[19] mean that we can estimate Net Domestic Product (NDP)[20] in nominal terms in any one of four ways:

- As the value in row 1 and column H (final demand NDP);
- As the sum of the values in row 1 and columns B and N (production accounts sum of value added across industries);
- As the sum of the values in rows 2-6 and column H (household net income), or
- As the sum of the values in rows 2-6 and columns B and N (production accounts distribution of primary factor income generated by production).

[17] Since the value flows in rows 1, 2 and 3 of Table 1 are not controversial, we have aggregated the various value flows across commodities to make the table smaller.

[18] The entries in row 1 and column 1 of Table 1 correspond to the value of final demand (expenditure approach) in the economy and these entries are equal to the sum of the corresponding entries in columns 2 and 3 (production approach). The entries in column 1 and rows 2-4 correspond to gross household sources of income and consists of labour (row 2) and interest income (rows 3 and 4). However, household interest payments on household loans (which are routed through the banking sector) need to be subtracted from other sources of income in order to obtain net income (row 5). Row 6 in the Table is added to show the flow of interest payments between the banking and nonfinancial sector and so the entry in the household column for this row is 0. Turning to the Banking sector, the entries in rows 1-4 of column 2 are straightforward; in particular, the entries in rows 2-4 show the payments of the banking sector to the household sector for labour services (row 2), for the services of equity and debt capital into the banking sector from the household sector (row 3) and payments of interest by the banking sector on deposits (row 3). The entries in rows 5 and 6 of column 2 are interest payments received by the banking sector and these entries might be more naturally be regarded as bank outputs and be placed in row 1. However, we are temporarily following SNA conventions for interest flows and recording all of these flows as primary input flows and so these flows appear with negative signs in row 5 (household interest loan payments) and row 6 (business loan payments) in column 2 of Table 1. If the entries in rows 3-6 of the banking column are consolidated into *net interest payments of the banking sector to other sectors*, this sum will typically be negative reflecting the fact that bank interest revenues typically exceed interest payments to other sectors.

[19] Any set of national accounts should satisfy these two sets of restrictions.

[20] We have not introduced a separate investment sector so it can be thought of as being part of the general nonfinancial production sector N. We are implicitly assuming that depreciation is treated as an intermediate input and acts as an offset to gross investment.

There is nothing problematic about the entries in rows 1-3 of Table 1. However, problems arise when we *consolidate* the interest flows listed in rows 3-6. The gross interest income received by households is the sum of interest (and imputed equity) income received directly from the banking sector and from the nonfinancial production sector, $r_{HB}V_{HB} + r_{HN}V_{HN}$, plus bank interest paid on household bank deposits, r_DV_D. The net interest income received by households is equal is equal to gross interest income less household interest payments to the banking sector, $r_{HL}V_{HL}$. All of this is not a problem nor is the fact that the nonfinancial sector pays out interest (and/or equity) payments of $r_{HN}V_{HN}$ to households and interest payments r_LV_L to the banking sector. The problem is that the consolidated net interest payments made by the banking sector to other sectors, $r_{HB}V_{HB}$ (interest and imputed equity payments to households) plus r_DV_D (interest payments to households for the use of their bank deposits) less r_LV_L (loan interest received from the nonfinancial production sector) less $r_{HL}V_{HL}$ will be a negative number in all real life economies.[21] This negative number will decrease the value added generated by the banking sector and if explicit fee revenue is zero, the value added of the banking sector will turn out to be zero as well (under our zero profits assumptions). Under these hypotheses, the nonfinancial primary inputs X_B being used by the banking sector seem to be contributing nothing to NDP. Thus the contribution of the banking sector to NNP seems to be understated.

The 1993 version of the System of National Accounts (SNA) recognized the above problem that banking sector output was understated in the SNA production accounts as they were originally designed.[22] It is worth quoting in some detail the solution that the 1992 SNA suggested for this problem:

"Some financial intermediaries are able to provide services for which they do not charge explicitly by paying or charging different rates of interest to borrowers or lenders (and to different categories of borrowers and lenders). They pay lower rates of interest than would otherwise be the case to those who lend them money and charge higher rates of interest to those who borrow from them. The resulting net receipts of interest are used to defray their expenses and provide an operating surplus. This scheme of interest rates avoids the need to charge their customers individually for services provided and leads to the pattern of interest rates observed in practice. However, in this situation, the System must use an indirect measure, financial intermediation services indirectly measured (FISIM), of the value of services for which the intermediaries do not charge explicitly.

"The total value of FISIM is measured in the System as the total property income receivable by financial intermediaries minus their total interest payable, excluding the value of any property income receivable from the investment of their own funds, as such income does not arise from financial intermediation. Whenever the production of output is recorded in the System, the use of that output must be explicitly accounted for elsewhere in the System. Hence FISIM must be recorded as being disposed of in one or more of the following ways—as intermediate consumption by enterprises, as final consumption by households, or as exports to non-residents. ...

"For the System as a whole, the allocation of FISIM among different categories of users is equivalent to reclassifying certain parts of interest payments as payments for services. This reclassification has important

[21] Formally, this will be true in our simplified model if explicit fee bank revenue, P_BY_B, is less than bank nonfinancial primary input payments, W_BX_B.

[22] Earlier versions of the SNA also recognized that there was a problem measuring banking output.

consequences for the values of certain aggregate flows of goods and services—output, intermediate and final consumption, imports and exports—which affect the values added of particular industries and sectors and also total gross domestic product (GDP). There are also implications for the flows of interest recorded in the primary distribution of income accounts." Eurostat, IMF, OECD, UN and the World Bank (1993, pp.139-140).

As can be seen from the above, it is not a trivial matter to make an imputation in the SNA. Unfortunately, the banking imputation solution suggested by SNA 1993 was soon attacked on the details of its implementation; it proved to be difficult to figure out how to do the imputations for banking services, taking into account *the exclusion of the property income generated by the banking sector's own funds*.[23] While the own funds issue was dropped in the recently issued 2008 version of the SNA by narrowing the application of FISIM to loans and deposits, as was noted above, how to determine the reference rate remains under discussion, and some analysts are not satisfied with the exclusion of financial assets other than loans and deposits from the indirectly measure financial services calculation. In this paper, we will not examine the details of the FISIM imputation, focusing instead on explaining how economic theory and the SNA deal with the understatement of banking sector output that would occur in the absence of FISIM.

As a first step towards a resolution of the banking problem, we could take the loan and deposit interest flows of the banking sector out of the primary input flows and instead, treat them as output or intermediate input flows. Thus in Table 2, we have taken rows 4,5 and 6 out of Table 1, changed the signs of these entries and inserted the resulting lines into the Net Output flows of the accounts. Note that this reclassification of primary input flows into net intermediate input flows does not change the profitability of each sector and the demand equals supply restrictions on the production and use of commodities are still maintained.[24]

Table 2: Reclassified Intersectoral Value Flows with no Imputations

Row	**Type of flow**	**H**	**B**	**N**
	Net output			
1	**Goods and services**	$\mathbf{P_B Y_B + P_N Y_N}$	$\mathbf{P_B Y_B}$	$\mathbf{P_N Y_N}$
2	**Interest on deposits**	$\mathbf{-r_D V_D}$	$\mathbf{-r_D V_D}$	**0**
3	**Interest on household loans**	$\mathbf{r_{HL} V_{HL}}$	$\mathbf{r_{HL} V_{HL}}$	**0**

[23] See Hill (1996) for an early influential criticism of the SNA's FISIM imputation and Sakuma (2006) for a comprehensive review of the criticisms of the FISIM imputation.

[24] The Table 2 accounting setup seems to be consistent with the Ruggles and Ruggles (1970) and Triplett and Bosworth (2004; 201) measure of bank output, which regarded banking as a margin industry similar to wholesaling or retailing.

4	**Interest on business loans**	**0**	$\mathbf{r_L V_L}$	$\mathbf{-r_L V_L}$
	Primary input flows			
5	**Compensation**	$\mathbf{W_B X_B + W_N X_N}$	$\mathbf{W_B X_B}$	$\mathbf{W_N X_N}$
6	**Property income (interest) to owners of capital**	$\mathbf{r_{HB} V_B + r_{HN} V_N}$	$\mathbf{r_{HB} V_B}$	$\mathbf{r_{HN} V_N}$

Note that our reclassification of some of the primary input income flows into net intermediate input flows has the effect of changing NDP; i.e., the new NDP is equal to the sum of row 1 the initial NDP) and rows 2 and 3 down column H (and of course, there are three other ways of calculating NDP) which is $P_B Y_B + P_N Y_N - r_D V_D + r_{HL} V_{HL}$ which will be more than the Table 1 NDP of $P_B Y_B + P_N Y_N$ if $r_{HL} V_{HL} - r_D V_D > 0$ (less if < 0). Generally, the bank interest rate on deposits is very small so that the value of bank household loans (net of expected default) revenue will generally exceed the value of bank interest paid on deposits so the net effect of the change will be to increase NDP. The net output of the banking sector is now the sum of explicit fee income, $P_B Y_B$, plus its loan interest revenue, $r_L V_L + r_{HL} V_{HL}$, less its deposit interest payments to households, $- r_L V_L$. Thus the banking sector's net interest income is the difference $r_L V_L + r_{HL} V_{HL} - r_D V_D$, and thus the industry is treated as a kind of financial margin industry, similar to wholesaling or retailing, except that the product being bought and sold is the use of financial capital for one period instead of specific goods.[25] The net output of the nonfinancial production sector is now the value of nonfinancial goods and services produced less loan interest payments, $P_N Y_N - r_L V_L$, which is (much) less than the corresponding contribution to NDP in Table 1, which was $P_N Y_N$. Thus the net effect of the above reclassifications is to:

- Change NDP (most likely increase it);
- Decrease the contribution of the nonfinancial production sector to NDP and
- Increase the contribution of the banking sector to NDP so that even if explicitly priced bank services are zero, the banking sector will make a positive contribution to production.

The accounting framework defined by Table 2 seems at first sight to be satisfactory but there are some residual problems remaining:

- Household banking deposit services do not contribute anything to NDP; in fact, they are regarded as a *drain* on NDP;

[25] A big difference between the banking industry and the retailing industry is that $V_L + V_{HL}$ will generally exceed V_D by a substantial margin whereas in the retailing industry, sales of products will generally be fairly close to good purchased for resale.

- The output of the banking sector now seems to be too large compared to the output of the nonfinancial production sector, whereas before, it appeared to be too small[26] and
- Explicit financial services of the banking sector to both households and to the nonfinancial sector (of the type discussed by Fixler (2009)) are not recognized in the above accounting framework.

We can now relate the above material to the contributions to the banking literature in Fixler (2009) and Wang, Basu and Fernald (2009). Fixler suggests that the contribution of deposit services to NDP should be $(\rho - r_D)V_D$ where ρ is the bank's reference interest rate instead of the present negative contribution of $-r_DV_D$. Using the supplier benefit concept applied to the bank loans to sector N, it appears that the banking sector's *services* in providing loan services to the nonfinancial sector should be $(r_L - \rho)V_L$ instead of r_LV_L and its services in providing loan services to the household sector should be $(r_{HL} - \rho)V_{HL}$ instead of $r_{HL}V_{HL}$. Here is where we run into one of the banking controversies mentioned in section 3 above. Wang, Basu and Fernald (2009) suggest that the bank's reference rate ρ should be a rate that is *greater* than Fixler's (2009) suggested reference rate, which was a risk free rate.[27] Basically, Wang and her coauthors argue that a risk premium should be included in the bank's reference rate since households take all the risks in the economy; banks have only a screening and monitoring of loans function, and the price for this service is collected via a (smaller) interest rate margin, $r_L - \rho$. For the present, we will not recommend a specific reference rate for the banking sector, focusing instead on the implications of the user cost approach to financial services for a simplified sectoral presentation of the national accounts.

4. The Introduction of Financial User Costs and Benefits into the System of National Accounts

Our task now is to show how the accounts in Table 2 can be modified to deal with the three difficulties noted above. Basically, our strategy will be to assume that the bank's supplier benefit measures derived in sections 2 and 3 are appropriate for the System of National Accounts and then figure out how to go from Table 2, by adding imputations, to Table 3, where the appropriate user costs and benefits will appear in the accounts. It should be noted that the presentation below does not depend on the perspective one takes on the choice of the reference rate ρ. As noted above, the magnitudes of the various financial flows will be affected but not the structure of the accounts.

[26] Conversely, the output of the nonfinancial sector now appears to be too small. The problem resides with the row 4 entries: all of the waiting services that are provided to sector N by bank loans, r_LV_L, are now regarded as intermediate input services and deducted from the value of output in sector N, leading to a much reduced contribution to NDP from sector N. Waiting services are really a primary input and hence should (perhaps) be classified as a primary input into sector N rather than an intermediate input service.

[27] Fixler follows Hancock (1985) in assuming a risk free opportunity cost of capital for banks.

We assume that the appropriate value of bank deposit services is $(\rho - r_D)V_D$ and the appropriate values of banking loan services to the business sector and to the household sector are $(r_L - \rho)V_L$ and $(r_{HL} - \rho)V_{HL}$ respectively. We can obtain the entry $(\rho - r_D)V_D$ in row 2 and column H of Table 3 by adding ρV_D to the corresponding entry in Table 2. In order to offset this imputation and to ensure that the value of output is equal to the value of input by sector, we need to also add ρV_D as an extra imputed income for the household sector; we do this in Table 3 by adding ρV_D to household income in a new row 9, which accounts for our income imputations. But these two imputations to the household column of the accounts have upset the net demand equals net supply restrictions that our system of production accounts should possess. Hence we also need to add ρV_D to rows 2 and 7 of the banking column of our accounts.

A similar set of imputations will work for bank loans to the business sector. Thus subtract ρV_L from row 4 of column B in Table 2 and obtain $(r_L - \rho)V_L$, which is the Wang and coauthors suggested measure of nominal banking loan services if the bank reference rate ρ contains a risk premium or we obtain the Fixler measure of loan services if it does not. In order to ensure that the value of banking outputs equals the value of banking inputs, we need to subtract ρV_L from the income components of the banking column and so we do this in row 8 of Table 3. Again, these two imputations to the banking column of the accounts have upset the net demand equals net supply restrictions that our system of production accounts should possess. Hence we also need to add ρV_L to rows 4 and 8 of the N column of our accounts. A similar set of imputations will work for the supply of bank loans to the household sector. After making these twelve imputations, the resulting system of accounts is given in Table 3.[28]

Table 3: Reclassified Intersectoral Value Flows with Imputations: Primary Income Generated Presentation

Row	**Type of flow**	**H**	**B**	**N**
	Net output			
1	**Goods and services**	$\mathbf{P_B Y_B + P_N Y_N}$	$\mathbf{P_B Y_B}$	$\mathbf{P_N Y_N}$
2	**Indirectly measured deposit services to households**	$\mathbf{(\rho - r_D)V_D}$	$\mathbf{(\rho - r_D)V_D}$	**0**
3	**Indirectly measured loan**	$\mathbf{(r_{HL} - \rho)V_{HL}}$	$\mathbf{(r_{HL} - \rho)V_{HL}}$	**0**

[28] A limitation of our analysis is that the nonfinancial sector does not hold any bank deposits. However, following our earlier logic, the reader can see how to relax this assumption. The cost of relaxing this assumption will be an additional four imputations.

	services to households			
4	**Indirectly measured loan services to business**	**0**	$(r_L - \rho)V_L$	$-(r_L - \rho)V_L$
	Primary input flows			
5	**Compensation**	$W_B X_B + W_N X_N$	$W_B X_B$	$W_N X_N$
6	**Interest (property income to owners of capital)**	$r_{HB} V_B + r_{HN} V_N$	$r_{HB} V_B$	$r_{HN} V_N$
7	**SNA interest[29] on loans to households**	$-\rho V_{HL}$	$-\rho V_{HL}$	**0**
8	**SNA interest on loans to business by banks**	**0**	$-\rho V_L$	ρV_L
9	**Rent of financial capital (deposits) from households by banks (SNA interest)**	ρV_D	ρV_D	**0**

The value of banking sector outputs in Table 3 now consists of four output terms instead of the previous three output terms (and one intermediate input term) in Table 2. The new measure of bank output is the sum of explicitly priced services $P_B Y_B$, the value of bank deposit services to households $(\rho - r_D)V_D$, bank loan margin services to business $(r_L - \rho)V_L$ and bank loan margin services to households $(r_{HL} - \rho)V_L$. NDP in Table 3 will be larger than NDP in Table 2 if $\rho V_D > \rho V_{HL}$; i.e., if the imputed value of household deposit interest is greater than the imputed value of household loan interest. It is not certain that this inequality will hold for all economies.

The disadvantage of the Table 1 setup was that the banking sector made no contribution to NNP. One advantage of the Table 3 setup over the Table 2 setup is that the separate contributions of the banking sector to the provision of deposit services and loan services to both households and businesses are now explicit whereas in Table 2, we can see only an aggregate services contribution. Of course, a disadvantage of the Table 3 framework is

[29] The SNA refers to interest flows at the reference rate as "SNA interest" (see 2008,SNA, paragraphs 6.164-6.168 at http://unstats.un.org/unsd/nationalaccount/sna2008.asp) .

that we now have to specify a reference interest rate for the banking sector and this may prove to be contentious.

Looking at rows 6-9 of the above Table, it can be seen that the banking sector raises financial capital V_B directly from households through equity shares and bonds (row 6) and from the household bank deposits V_D (row 9). It reallocates this financial capital by making household loans V_{HL} (row 7) and nonfinancial sector business loans V_L (row 8).

If we allow the reference rate for the banking sector to include a risk premium, then it appears that the series of imputations made going from Table 2 to 3 is one way of implementing the Wang and coauthors view of the world where the banking sector mostly acts as a mechanism for transferring income generated by the nonfinancial production sector to the household sector.[30]

An advantage of the Table 3 imputations framework is that *it can be readily integrated with a coherent system of sectoral productivity accounts*. The *System of National Accounts 2008* makes provisions for capital services to appear in the production accounts. If we attempt to model the provision of capital services using the Table 2 accounting framework, we will have to convert the financial flows in rows 4 and 6 (which are the intermediate and primary input interest flows) into the waiting services part of the user cost of capital,[31] so that capital services will appear in *both* the intermediate and primary input parts of the accounts. On the other hand, if we use the Table 3 framework, the flow of waiting services of capital will be collected together in rows 6 and 8 of the nonfinancial production sector accounts so that all of these capital services will appear *only* in the primary input accounts of the industries that *use* the capital services.[32]

Note that if the Table 3 accounting framework is used in constructing productivity accounts, then bank deposits held by households should be treated as a capital asset in these accounts.

The presentation of the economy's value flows of interest earned by the sectors in Table 3 is organized according to the primary *income generated* by each sector. In particular, the entry ρV_L in row 8 and in the nonfinancial column N corresponds to the imputed interest income (equal to waiting services) generated by sector N. It is also possible to present the information in Table 3 according to an *ownership* principle; i.e., only interest flows that correspond to owned capital are listed as primary input flows. Thus the interest

[30] However, as Schreyer (2009; 322) notes in his discussion of Wang, Basu and Fernald (2009), the activities of banks can reduce risks to the household sector; i.e., banks are more than bill collectors and monitors; i.e., in addition to transferring financial capital from households to businesses and households, banks reduce individual household lending risks through their risk pooling activities. It should also be noted that while our views on nominal financial flows in the accounts are not that far removed from those of the Wang group, our views on the deflation of these nominal financial flows into corresponding real flows differ substantially as we shall see in section 6 below.

[31] Recall that we are assuming that the depreciation part of the user cost of capital appears as an intermediate input rather than as a primary input.

[32] We will introduce capital services explicitly in the following section.

flows that correspond to loans in Table 3 (see rows 7 and 8) can be regarded as intermediate input flows and they can be taken out of the primary inputs category (with a sign change) and added to rows 4 and 6 of Table 3. The resulting table simplifies to Table 4 below.

Table 4: Reclassified Intersectoral Value Flows with Imputations: Ownership Presentation

Row	**Type of flow**	**H**	**B**	**N**
	Net output			
1	**Goods and services**	$\mathbf{P_B Y_B + P_N Y_N}$	$\mathbf{P_B Y_B}$	$\mathbf{P_N Y_N}$
2	**Indirectly measured deposit services to households**	$\mathbf{(\rho - r_D)V_D}$	$\mathbf{(\rho - r_D)V_D}$	**0**
3	**Indirectly measured loan services to households**	$\mathbf{(r_{HL} - \rho)V_{HL}}$	$\mathbf{(r_{HL} - \rho)V_{HL}}$	**0**
4	**Rental of financial capital to households by banks (SNA interest)**	$\mathbf{\rho V_{HL}}$	$\mathbf{\rho V_{HL}}$	**0**
5	**Indirectly measured loan services to business**	**0**	$\mathbf{(r_L - \rho)V_L}$	$\mathbf{-(r_L - \rho)V_L}$
6	**Rental of financial capital to business by banks (SNA interest)**	**0**	$\mathbf{\rho V_L}$	$\mathbf{-\rho V_L}$
	Primary input flows			
7	**Compensation**	$\mathbf{W_B X_B + W_N X_N}$	$\mathbf{W_B X_B}$	$\mathbf{W_N X_N}$
8	**Rent of financial capital (equity)**	$\mathbf{r_{HB} V_B + r_{HN} V_N}$	$\mathbf{r_{HB} V_B}$	$\mathbf{r_{HN} V_N}$

	from households			
9	**Rent of financial capital (deposits) from households (SNA interest)**	ρV_D	ρV_D	**0**

If we consolidate the entries on lines 3 to 6 of Table 4, we obtain the following Table, which has eliminated all of the banking service margins with the exception of deposit services:

Table 5: Consolidated Ownership Presentation

Row	**Type of flow**	**H**	**B**	**N**
	Net output			
1	**Goods and services**	$P_B Y_B + P_N Y_N$	$P_B Y_B$	$P_N Y_N$
2	**Indirectly measured deposit services to households**	$(\rho - r_D)V_D$	$(\rho - r_D)V_D$	**0**
3	**Rental of financial capital loans to households by banks**	$r_{HL} V_{HL}$	$r_{HL} V_{HL}$	**0**
5	**Rental of financial capital (loans) to nonfinancial business by banks**	**0**	$r_L V_L$	$- r_L V_L$
	Primary input flows			
7	**Compensation**	$W_B X_B + W_N X_N$	$W_B X_B$	$W_N X_N$
8	**Rent of financial capital (equity) from households**	$r_{HB} V_B + r_{HN} V_N$	$r_{HB} V_B$	$r_{HN} V_N$
9	**Rent of financial capital (deposits) from households**	ρV_D	ρV_D	**0**

	by banks (SNA interest)			

Thus in Table 5, banking loan services are treated as gross interest flows and the gross interest expenses of the nonfinancial sector due to its bank loans appear as an intermediate input flow. This appears to correspond to the actual treatment of leasing services provided by the banking sector to the nonfinancial sector.

Table 5 turns out to resemble Table 2 above, except that the treatment of household deposits is different (and more appropriate). However, comparing Tables 4 and 5 with Table 3, it can be seen that the value added of the banking sector is now greatly augmented and the value of added of the nonfinancial sector is correspondingly reduced. There is nothing illogical about the ownership presentation in Table 4 as opposed to the income generated presentation in Table 3 but users should be made aware that not only is sectoral value added affected by these alternative presentations but also sectoral Labour Productivities and Total Factor Productivities will be affected.

In the following section, we drive home the differences between Tables 3 and 5 by introducing capital services into the picture.

5. Capital Services in the SNA

In order to illustrate that there are some real differences between the uses and ownership presentations of the System of National Accounts, we will assume that the nonfinancial sector N uses its equity and borrowed financial capital to purchase a physical capital input which has the price P_K. Thus the household value of financial capital directly invested in sector N, V_N, is replaced by its equivalent capital value, $P_K K_N$. Similarly, the value of bank loans to sector N, V_L, is replaced by $P_K K_L$, so that the nonfinancial sector uses the total amount of capital, $K_N + K_L$. We also assume that household loans are used to buy housing capital and we replace the value of household loans, V_{HL}, by $P_H K_H$ where P_H and K_H are the price and quantity of housing capital purchased by the loan.[33] Now replace V_{HL}, V_N and V_L by $P_H K_H$, $P_K K_N$ and $P_K K_L$ respectively and Table 5 above becomes Table 6 below.

Table 6: Consolidated Ownership Presentation with Business and Housing Capital

[33] For an accounting framework for a banking sector that allocates financial capital in a more complete intertemporal model of the temporary equilibrium with depreciable capital, see Diewert (1977; 84). See also the following section for a more detailed discussion on alternative methods that could be used to deflate financial flows.

Row	Type of flow	H	B	N
	Net output			
1	**Goods and services**	$\mathbf{P_B Y_B + P_N Y_N}$	$\mathbf{P_B Y_B}$	$\mathbf{P_N Y_N}$
2	**Indirectly measured deposit services to households**	$\mathbf{(\rho - r_D)V_D}$	$\mathbf{(\rho - r_D)V_D}$	**0**
3	**Rental of financial capital to households from banks**	$\mathbf{r_{HL}P_H K_H}$	$\mathbf{r_{HL}P_H K_H}$	**0**
5	**Rental of financial capital to business from banks through loans**	**0**	$\mathbf{r_L P_K K_L}$	$\mathbf{-r_L P_K K_L}$
	Primary input flows			
7	**Compensation**	$\mathbf{W_B X_B + W_N X_N}$	$\mathbf{W_B X_B}$	$\mathbf{W_N X_N}$
8	**Rent of financial capital (equity) from households**	$\mathbf{r_{HB}V_B + r_{HN}P_K K_N}$	$\mathbf{r_{HB}V_B}$	$\mathbf{r_{HN}P_K K_N}$
9	**Rent of financial capital (deposits) to business (SNA interest)**	$\mathbf{\rho V_D}$	$\mathbf{\rho V_D}$	**0**

Note that the presentation of the accounts given by Tables 4, 5 and 6 has increased NDP substantially over the NNP in Table 3 due to the appearance of household loan interest payments. Thus some care should be taken to avoid double counting of housing services, which generally appear in the SNA as the sum of rental payments plus imputed rents for Owner Occupied Housing.[34]

As was mentioned in the previous section, the payment flows in row 5 of Table 6 appear to follow present ownership conventions in the present System of National Accounts where a large proportion of the capital that is owned by the Finance sector is leased to

[34] Part of the user cost of Owner Occupied Housing appears in row 3 of Table 6 so this part of the user cost should not appear in row 1.

other sectors. These leasing revenues appear as intermediate input payments in the SNA.[35] Thus the total capital services payments made by the nonfinancial sector, $r_{HN}P_KK_N$ in row 8 plus $r_LP_KK_L$ in row 5, are split between primary input waiting services and intermediate input services. This is not a problem per se but if we want to compare the labour productivity or Total Factor Productivity of the nonfinancial sector in our economy with its peers in other economies, the comparisons will not be "fair" if one economy has a different proportion of leased capital versus owned capital. This problem of "unfair" sectoral comparisons can be avoided if we follow the treatment that was recommended in the Table 3 presentation. Thus replace V_{HL}, V_N and V_L by P_HK_H, P_KK_N and P_KK_L respectively and Table 3 above becomes Table 7 below.

Table 7: Primary Income Generated Presentation with Imputations and Business and Housing Capital

Row	Type of flow	H	B	N
	Net output			
1	**Goods and services**	$\mathbf{P_BY_B + P_NY_N}$	$\mathbf{P_BY_B}$	$\mathbf{P_NY_N}$
2	**Indirectly measured deposit services to households**	$\mathbf{(\rho - r_D)V_D}$	$\mathbf{(\rho - r_D)V_D}$	**0**
3	**Indirectly measured loan services to households**	$\mathbf{(r_{HL} - \rho)P_HK_H}$	$\mathbf{(r_{HL} - \rho)P_HK_H}$	**0**
4	**Indirectly measured loan services to nonfinancial business**	**0**	$\mathbf{(r_L - \rho)P_KK_L}$	$\mathbf{-(r_L - \rho)\ P_KK_L}$
	Primary input flows			
5	**Compensation**	$\mathbf{W_BX_B + W_NX_N}$	$\mathbf{W_BX_B}$	$\mathbf{W_NX_N}$

[35] There is an operational problem associated with the present SNA treatment of leasing and rental service of the financial sector in the input output accounts if the national statistical agency also produces multifactor productivity accounts. The problem is that these leasing services are usually aggregated into a single row in the supply and use tables of the I-O accounts when they should be disaggregated into major types of capital services in order to correspond with the disaggregation of capital services in the industry productivity accounts.

6	**Rent of financial capital (equity) from households**	$\mathbf{r_{HB}V_B + r_{HN}P_KK_N}$	$\mathbf{r_{HB}V_B}$	$\mathbf{r_{HN}P_KK_N}$
7	**Rent of financial capital (loans) from banks by households (SNA interest)**	$\mathbf{-\rho P_HK_H}$	$\mathbf{-\rho P_HK_H}$	**0**
8	**Rent of financial capital (loans) from banks by nonfinancial business (SNA interest)**	**0**	$\mathbf{-\rho P_KK_L}$	$\mathbf{\rho P_KK_L}$
9	**Rent of financial capital (deposits) from households (SNA interest) by banks**	$\mathbf{\rho V_D}$	$\mathbf{\rho V_D}$	**0**

Note that of the seven presentations, the banking sector plays a relatively modest role in this last depiction of the economy, earning margins on its demand deposit activities and on its lending activities with all "financial rent" flows grouped into primary inputs rather than shown within the boundary for current production. Also housing interest flows are less likely to be double counted in the above presentation.

Finally, if the above income generated version of the accounts is used, then an international comparison of sectoral productivity levels makes sense: real value added per unit of primary input services used by the sector will be comparable across countries. Note that if the nonfinancial sector switches from using owned capital to generate capital services to leasing capital services, its nominal and real value added will change if the ownership version of the accounts is used whereas if the income generated version of the accounts is used, value added will remain virtually unchanged.[36] For our highly simplified economy The presentation of financial service production and consumption in Table 7 is very much in the spirit of the 1953, 1993, and 2008 versions of the SNA,[37]

[36] There will be a small change due to the markups charged by the financial sector.

[37] The 1968 version of the SNA considered aggregate indirectly measured financial services as the net interest plus dividends and rent earned by financial institutions, like the 1953 and 1993 versions, but provided no basis for allocating it among final consumers or between services flowing from different instrument classes on the financial balance sheet. The 1953 version of the SNA could be considered similar to the 1993 version with the additional assumption that the reference rate is the average rate earned on

with the exception that it allows for a possibly different reference rate for deposits as compared with loans.

6. The Volume of Bank Services

Sections 2-4 above dealt mainly with the problems associated with computing the *nominal* value of bank services and showing how they are recorded in the accounts. We now turn to the even more controversial issues associated with computing *real bank services*. That computation is complicated by the fact that the nominal value of a bank financial service is a product of two nominal values; the user cost (or supplier benefit) price, which in turn is a function of (nominal) interest rates and a stock of deposits or loans.

A further complication is that it is possible to develop measures of *real banking services* from two distinct perspectives:

- The perspective of the demander of the services and
- The perspective of the supplier of the services.

We will consider each perspective in turn.

6.1. Real Bank Services: the Demander's Perspective

At the beginning of section 2.1, we developed the (nominal) user cost formula U_D defined by (2), which gave the cost to the household of holding a dollar's worth of bank deposits during the reference period. The average stock of bank deposits held by the household sector was V_D and so the total value of bank deposit services to the household sector was $U_D V_D$. If the household purpose in holding bank deposits is to buy consumer goods and services, then it seems reasonable to deflate V_D by the corresponding consumer price index (excluding financial services), P_C say, to obtain the real deposit balances upon which the financial services are provided, Q_D, as follows:[38]

(15) $Q_D \equiv V_D/P_C$.

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assets, making output and its consumption by sector proportional to the holdings of deposits only; see Fixler and Zieschang (1991).

[38] Feenstra (1986) provided a formal model of a cash in advance economy that justifies the deflation of nominal household bank balances by a consumer price index. Alternatively, we can make a simple opportunity cost argument to justify deflating V_D by P_C: by holding deposits, the household gives up consumption.

Now deflate the value of household deposit services, $U_D V_D$, by Q_D in order to obtain the *final price for bank deposit services from the household perspective* P_D defined as follows:

(16) $P_D \equiv U_D V_D / Q_D = (\rho_H - r_D) P_C$

using (2) and (15). It should be noted that Fixler did not use a consumer price index P_C in order to form real balances Q_D; instead, he used the U.S. gross domestic purchases chain price index as his deflator.

Recall definition (3) where we defined the *imputed (nominal) value of bank deposit services*, S_D, as the product of U_D and V_D:

(17) $S_D \equiv U_D V_D = (\rho_H - r_D) V_D$.

Thus in period t, using (16) and (17), we have SDtQDt and applying the Frisch (1930) product rule yields:

(18) SDt/SDt–1 = PDtQDt/ PDt–1QDt–1 = PD*(t–1,t)QD*(t–1,t)

where the asterix denotes an index. Note that the price index for deposit services is a function of the consumer price for goods and services, the household reference rate and the deposit interest rate. An implicit quantity index could be obtained by dividing the ratio of nominal deposit services by the price index.[39]

The deflation of V_D in (15) by an index of the prices of goods and services captures the idea that the value of deposit services is proportional to the purchasing power of money (a suitable price index). Thus if deposits increase by an amount equal to a change in the purchasing power of money, then using a real balance view of the demand for money, the quantity of the monetary units upon which the deposits services are based does not change.[40] But note that is not the same as saying the quantity of financial services has not changed; the change in the quantity of financial services over time derives from the change in the user cost of deposit services. Thus changes in the price index P_D derive from changes in the purchasing power of money, the reference rate and the deposit rate. Both the reference rate and deposit rate can change with money market conditions, in addition to changes in the purchasing power of money. It should also be noted that the deposit interest rate can also be cast as a function of product characteristics. For example deposits products with few services could offer a higher interest than those that provide

[39] We have ignored business deposits. A similar approach could be applied to them and the two deposit products would then be aggregated to get a single deflator for deposit services.

[40] To see how the deflation works, suppose that in the initial period with zero inflation the nominal (real) value of deposits is given by $(\rho_H - r_D)V_D$. Now suppose that at the end of the next period, the consumer price index has increased from unity to $1+\pi$. Suppose further that all interest rates move by the inflation rate π. The nominal value of deposit services would then be equal to $[\rho_H + \pi - (r_D + \pi)]V_D(1 + \pi) = [\rho_H - r_D]V_D(1 + \pi)$. Thus V_D would have to be deflated by $1+\pi$, which is given by the price index, to yield the real value of bank services.

many services. As a result adjusting for product characteristics will be important to casting the correct movement in the price index.[41]

We turn our attention to the derivation of *real prices and quantities for loan services* using a demander perspective. At the end of section 2.2, we derived the end of period user costs of business and household loans (from the business and household perspectives) by (14), $U_{BL} = \rho_B - r_{BL}$ and $U_{HL} = \rho_H - r_{HL}$ respectively, where ρ_B and ρ_H were the business and household sector reference interest rates and r_{BL} and r_{HL} were the business sector and household sector market interest rates on loans.

Consider first the case of household loans. The value of loans held by the household sector was V_{HL} and so the total value of household loan services was $U_{HL}V_{HL}$. If the purpose for taking out the loans is to purchase houses, then it seems reasonable to deflate V_{HL} by the corresponding house price index, P_H say, to obtain *household real loan services from the perspective of the household sector*, Q_{HL}:[42]

(19) $Q_{HL} \equiv V_{HL}/P_H$.

Now deflate the value of household loan services, $U_{HL}V_{HL}$, by Q_{HL} in order to obtain the *final price for loan services from the household perspective*, P_{HL}, defined as follows:

(20) $P_{HL} \equiv U_{HL}V_{HL}/Q_{HL} = (\rho_H - r_{HL})P_H$

using (14) and (19).

Now consider the case of business loans from the perspective of the borrowing sector. The value of loans held by the business sector was V_{BL} and so the total value of business loan services was $U_{BL}V_{BL}$. If the purpose for taking out the loans is to purchase components of the capital stock, then it seems reasonable to deflate V_{BL} by the corresponding capital stock price index, P_K say, to obtain *business real loan services from the perspective of the borrowing sector*, Q_{BL}:[43]

(21) $Q_{BL} \equiv V_{BL}/P_K$.

Now deflate the value of business loan services, $U_{BL}V_{BL}$, by Q_{BL} in order to obtain the *final price for business loan services from the borrower's perspective*, P_{BL}, defined as follows:

(22) $P_{BL} \equiv U_{BL}V_{BL}/Q_{BL} = (\rho_B - r_{BL})P_K$

[41] See Fixler and Zieschang (1992b)

[42] Household loans are made for a variety of purposes so the price index P_H should in principle match up with these purposes.

[43] Although Fixler deflated V_L by the same deflator that he used to deflate household bank deposits, it is simple enough conceptually to deflate V_{BL} by the more appropriate deflator, P_K.

using (14) and (21).

Define the period t value of the service flow of household loans S_{HL}^t as $P_{HL}^t Q_{HL}^t$, the period t value of the service flow of business loans S_{BL}^t as $P_{BL}^t Q_{BL}^t$ and the period t total value of loan services as $S_L^t \equiv S_{HL}^t + S_{BL}^t$. Then as in the case of deposits, the ratio of the period t value of loan services to period t–1 loan services decomposes into the product of a price and quantity index:

(23) $S_L^t / S_L^{t-1} = P_L^*(t-1,t) Q_L^*(t-1,t)$

where $P_L^*(t-1,t)$ is an index of the loan prices defined by (20) and (22). This price index will move with changes in the goods prices index, the loan interest rates and the reference rate. Again, the characteristics of the loan service could affect the loan interest rate and so it may be necessary to do some quality adjustment of the prices.

Basu (2009; 267), in his commentary on Fixler (2009), notes the ambiguity in choosing the deflator for converting nominal financial values into real ones:

"But what is the right price index? One might divide by the GDP deflator, on the grounds that it is the most comprehensive, or by the CPI, on the grounds that consumers use bank deposits to buy consumption goods. When issues of this importance are left ambiguous, it is usually a sign that more detailed theorizing is necessary."

In other words, what are the appropriate price deflators to convert nominal financial service flows into real flows? In particular, should these deflators be the *same* across the suppliers and users of financial capital? The problem is that "practical" price statisticians and national income accountants need answers which are at least approximately consistent with economic theory (and relatively simple so that they can be explained to the public) but there is little professional consensus on what the "right" model is.

The Basu et al (BFIW) approach to modeling bank outputs and inputs is critical of the above deflation based user cost approach to modeling the price and quantity of financial services presented in this section.[44] Rather than defining the real quantity of financial services as being proportional to suitably deflated stocks of financial assets held by banks or households, BFIW suggest that *direct measures* of the services rendered by consuming financial services be constructed and then the nominal service flows would be deflated by these direct measures, yielding an implicit price index for the services, as an alternative to deflating nominal asset holdings by a price index.

How can the two approaches to the deflation of nominal bank service flows be reconciled? It turns out that we will first have to reconcile the computation of the nominal value of bank services between the perspectives of a demander and a supplier. Recall

[44] Note that our deflators for depositor services and for loan services came from the demand side of the market rather than the supply side with the bank being the supplier of financial services. In section 6.2 below, we will argue that a bank has no particular interest in the real value of the services that it provides; it only cares about the nominal values of the financial services that it provides.

that in section 2 we looked at the user cost of deposit and loan services from the perspective of the demanders of deposits and loans. We also developed a bank *supplier* perspective to valuing the services of deposits and loans and this supplier perspective is approximately consistent with the BFIW transactions oriented approach. We will now outline this alternative supply side approach to the deflation of financial service flows.

6.2 Real Bank Services: the Supplier's Perspective

Suppose that we now take the bank's perspective on the decision to offer deposit services and loan services. We begin by considering the supply of deposit services. As indicated in section 2.1, from the bank's perspective, the bank's nominal imputed revenues from supplying V_D dollar's worth of deposits was S_{BD} defined by (6), which was equal to the bank's supplier benefit B_D times V_D and this expression turned out to equal $(\rho - r_D)V_D$, where ρ is the bank's reference rate and r_D is the market deposit interest rate. Note that the expression for the bank's imputed revenues from supplying deposit services, S_{BD}, was equal to the corresponding expression for the household's imputed cost of deposit services defined by (3), which was S_{HD} equal to $(\rho_H - r_D)V_D$, provided that the bank's reference rate ρ is equal to the household reference rate ρ_H. In section 6.1 above, we indicated how the household's imputed deposit flow of services S_{HD} could be decomposed into price and quantity components using the household's motivation for holding the deposits. We now want to provide a similar decomposition of the bank's imputed deposit flow of services S_{BD} into price and quantity components from the bank's perspective.

However, when we attempt to decompose the bank's deposit flow of services into price and quantity components using the perspective of the bank, we encounter a significant problem: there does not appear to be a simple way of doing this! The problem can be explained in a simplified way as follows. Suppose that we abstract from the bank's lending activities and just look at the bank's provision of deposit services of a certain well specified type. The one period market interest rate which the bank offers depositors is r_D and the bank's opportunity cost of capital is ρ as usual. The bank has a cost function, $C(V_D, w)$, which is increasing in the dollar amount of deposits V_D and it depends on the vector of input prices, w (prices of labour, capital and materials that the bank needs to service the deposits). The bank's (competitive) one period profit maximization problem[45] is to choose V_D in order to maximize imputed deposit revenues less cost, $(\rho - r_D)V_D - C(V_D, w)$. From the bank's perspective, there is *no natural deflator* for its production of

[45] A monopolistic competition version of the bank's profit maximization problem would look at varying r_D as well and also modeling the household demand to hold deposits in the bank. This more complicated optimization problem would not change the basic point that from the bank's profit maximization problem involves only nominal financial revenue flows.

deposit services: the bank's optimization problem involves only nominal financial revenues.

One possible way of implementing the supplier perspective to the deflation of nominal bank service flows would be to construct *an index of the real costs* of providing nominal deposit services of various types over the two time periods being considered.[46] We will consider this problem in a bit more detail below but we note that this bank's supply side perspective will probably deliver very different estimates of financial sector output as opposed to our preferred deflation approach which is based on a demander perspective.[47] Note that Wang and her coauthors generally agree that user costs and benefits give the "right" nominal answer (except there is some disagreement on what reference rates to use) so the controversy between the Wang camp and the deflation oriented approach explained in section 6.1 is *mostly* about how to deflate these nominal user cost flows; an implicit issue is whether the quantity of services is proportional to monetary units. It seems to us that both approaches have some merit and there are some problems with both approaches.

Suppose we take the BFIW approach as being the right one. Then to get consistent double entry real national accounts, we would have to use the bank cost of production deflator on the household side of the accounts as well as on the bank side of the accounts. This seems very awkward! This is the other side of the problem we had with using our suggested deflation approach; i.e., we recommended the use of a demander oriented deflator in the production accounts, which is also awkward.[48] It is difficult to obtain an appealing consistent set of real accounts when we consider financial flows in the production and household accounts.

We will conclude this section by considering the bank input cost approach to deflating bank service flows. First, we consider the problem of constructing a deflator for a vector of (nominal) deposits V_D that a particular bank might supply to the household sector. As indicated above, it is possible to take an approach that is similar to the approach taken to price government nonmarket services; i.e., the output price index for these nonmarket services is set equal to the corresponding input price index. Let $C(V_D, z, w, t)$ denote the

[46] This same approach is used in the System of National Accounts in order to obtain prices for unpriced government services; see Diewert (2011).

[47] See Inklaar and Wang (2010) for empirical estimates of the differences between the demand side deflation approach and an approach incorporating 'engineering' indicators of financial service delivery. Under the direct and indirect service charge regimes typically observed in banks, the earlier-cited approach of Fixler and Zieschang (1992b) provides a theoretical framework and an empirical strategy for incorporating these types of indicators into factoring relative change in FISIM plus direct service charges into price and quantity components. The problem, as Fixler and Zieschang pointed out, is the lack of data on key 'engineering' indicators of financial service delivery.

[48] But our demand side deflation approach seems less awkward in the sense that banks do not really care which deflator is used to deflate their (implicit) financial service flows so we might as well use deflators that come from the demanders side of the market.

period t cost to the bank of supplying a vector of bank deposits V_D with a vector of quality characteristics z in period t, given that the bank faces the vector of input prices w. Let w^0 and w^1 be the bank's input price vectors for periods 0 and 1. Then a *family of Konüs type input price indexes* P_W between periods 0 and 1 is defined as follows:

(24) $P_W(w^0, w^1, V_D, z, t) \equiv C(V_D, z, w^1, t)/C(V_D, z, w^0, t)$.

Let $V_D{}^0$ and $V_D{}^1$ be the vectors of deposits produced by the bank in periods 0 and 1 and let z^0 and z^1 be the associated vectors of quality characteristics for the deposits. As usual, the *Laspeyres and Paasche special cases* of the above index, P_{WL} and P_{WP}, are of special interest and are defined as follows:

(25) $P_{WL} \equiv P_W(w^0, w^1, V_D{}^0, z^0, 0)$;
(26) $P_{WP} \equiv P_W(w^0, w^1, V_D{}^1, z^1, 1)$.

Our preferred deflator for the aggregate nominal value of deposit services for the bank is the geometric mean of the above two indexes, the following *Fisher like index*:

(27) $P_{WF} \equiv [P_{WL}\, P_{WP}]^{1/2}$.

It can be seen that the above algebra provides a possible methodological framework for a transactions oriented approach (or real cost of production approach) to deflating the value of depositor services. However, in order to implement it, it is necessary to estimate empirically bank cost functions for the provision of deposit services.

Suppose we take the above formalization of a real cost of production approach to measuring real deposit output as being the right one. Then to get consistent double entry real national accounts, we would have to use the bank cost of production deflator on the household side of the accounts as well as on the bank side of the accounts. This is not consistent with the usual cash in advance model for the demand for money that is used by Feenstra (1986) and other monetary theorists (whereas our preferred deflation approach is consistent with cash in advance models).[49]

We now turn our attention to the issue of deflating the nominal user benefit of a bank loan from the viewpoint of the bank. Here the bank is the supplier of the loan and the nonfinancial sector or the household sector is the demander of the loan of financial capital for one period. The nominal value of business loans S_{BL} was given by (10), $(r_{BL} - \rho)V_{BL}$, and the nominal value of household loans S_{HL} was given by (11), $(r_{HL} - \rho)V_{HL}$. Note that the reference rate is the same in both cases. In section 6.1, we suggested looking to the borrowers in order to find deflators for these nominal flows; i.e., look to

[49] At our present stage of knowledge, there does not seem to be a completely satisfactory double entry approach to deriving a consistent set of real financial accounts across sectors.

the purposes for the loans and construct a suitable index using the purposes for which the loan was made. Thus in our preferred view, the deflator for these loans comes from the demand side for the loans and the price indexes P_K^1/P_K^0 and P_H^1/P_H^0 can be formed in order to deflate the ratio of the financial service flows that correspond to the period 0 and 1 values defined by (10) and (11).

But as Inklaar and Wang (2010) point out, it is possible to take a supply side perspective here as well as for the bank deposit flows. The methodology for developing a bank loan price index from the supply side perspective is similar to the above deposit methodology. We now require the bank's cost function for making and monitoring a vector of bank loans, V_L. Let $C^*(V_L, z^*, w, t)$ denote the period t cost function for the bank of supplying a vector of (nominal) bank loans V_L with a vector of quality characteristics z^* in period t, given that the bank faces input costs w. Now repeat the above definitions (24)-(27) with V_L replacing V_D, C^* replacing C and z^* replacing z.

Some problems remain in implementing this alternative bank supplier oriented approach to the deflation of bank nominal deposit and loan services. In particular, the cost functions for servicing loans and deposits are likely to share substantial amounts of (overhead) inputs and these inputs would have to be allocated somewhat arbitrarily between the various bank functions or the above theories would have to be generalized. It would also be also be of some interest to derive the properties of the cost functions and this in turn will depend on the properties of the underlying technology sets. Data constraints would also be a problem. There would also be some difficulties in aggregating over banks and deposit types. All in all, our demand oriented approach to financial flows deflation seems to be conceptually simpler and simpler to implement in practice.

We note that it is possible to have bank productivity improvements in this setup (because it is assumed that we can observe V_D, V_L and z); see Diewert (2008) (2011).

7. Conclusion

There are many issues raised by the measurement of bank output and input and the FISIM imputations. As noted by Schreyer (2009), some researchers focus on the *flow of financial services* whereas other researchers focus on banks as *providers of financial capital* to borrowers. Differences show up even in a user cost framework where Wang and her coauthors take a credit market equivalence approach to the determination of the real quantities of financial services whereas other user cost advocates prefer a deflation approach to the construction of real financial services where the deflator is related to the purpose of the financial transaction. Both points of view appear to have some merit. Schreyer also raised a number of other interesting issues that arose out of the Wang, Basu, and Fernald (2009) paper:

- Do financial institutions take on any risk themselves or do the risks simply flow through to householders (or more generally, the sectors that make up final demand)? This issue bears importantly on how the reference rate(s) is (are) determined in the FISIM calculation. Wang and her coauthors propose instrument-specific reference rates for financial assets as well as for deposits that effectively purge maturity and risk remuneration from FISIM . In a cost of funds approach, all assets have the same cost of funds, since money is fungible in the absence of regulatory or contractual constraints otherwise. This cost of funds is determined by the position-weighted average of the rates paid on the instruments on the liability side of the balance sheet, which will include an institutional risk premium. For banks, these liabilities include, importantly, deposits. Including the institutional risk premium in the reference rate for financial assets will lower financial asset (including loan) FISIM by giving credit for risk bearing to the institution's creditors and owners. On the other hand, in the institutional cost of funds approach, the bank continues to be remunerated for covering the term risk inherent in managing an asset portfolio of potentially longer maturity than the liability portfolio. Further, the impact of the institutional risk premium on the reference rate for deposit services will tend to raise deposit FISIM. This latter effect pays for the bank's cost of providing depositors with in-kind insurance services in lieu of paying them the institutional risk premium that other creditors receive.[50]
- What is the scope of financial services? In the European Union, Schreyer notes that the SNA measure of financial services is based solely on bank deposits and loans whereas the U.S. national accounts takes a wider perspective and considers all assets and liabilities that earn interest or imputed interest. We favour the wider perspective, noting that it will not necessarily imply larger estimates for FISIM, particularly considering holdings of safe securities in banks' asset portfolios that support, inter alia, insuring depositors against risk.
- Our user cost expressions for deposit services (2) and loan services (14) make no mention of holding gains and losses. Our exclusion of holding gains and losses simplifies the analysis, but we otherwise have not taken a position here on valuation of these instruments and the effect of holding gains and losses on the value of the services associated with them.[51] Conceptually, the user cost value of

[50] One implication of the institutional cost of funds approach, however, is that because the reference rate is higher than the risk free rate by the institutional risk premium. financial corporations that, unlike banks, do not provide in-kind services to their creditors in return for a discount on their creditors' lending rate will show lower FISIM on their asset products and thus lower total FISIM than would be the case if a risk free reference rate used.

[51] We note that the 2008 SNA considers deposits and loans to be nontradeable instruments and thus not susceptible to routine market valuation. It therefore records deposits and loans on the balance sheet at historical cost, no matter how many times they are bought or sold. Consequently, the SNA recognizes holding gains on deposits and loans only if and when they are transacted, and then only as redistribution

services associated with any financial instrument or nonfinancial asset would include the effect of the anticipated or expected one period holding gain/loss receivable by the owner of the instrument or asset, which would be recorded on the balance sheet at market value.[52] Schreyer (2009) and Schreyer and Stauffer (2002) address this point. Taking this forward would require developing a consensus among national accountants on the merits of the user cost approach to valuing the services associated with financial instruments and nonfinancial assets. Beyond this, the ramifications of incorporating expected holding gains into the transactions accounts of the current national accounting standard are complex and would require substantial research on how credible estimates might be developed and implemented.[53]

- There are some subtle issues involving the accounting treatment of loan services. According to Wang, Basu and Fernald (2009), the loan services provided by a bank are monitoring and screening services. However, the screening service occurs just before the loan occurs. If banks were able to charge a specific fee for this screening service, then there would be no accounting problems for the bank (but there would be accounting problems for the borrower since this transactions cost should probably be spread over the life of the loan, leading to an accounting problem). However, since banks are usually not able to charge a specific fee for their screening services, in this case, the imputed fee is equal to the discounted present value of the excess interest margins that they earn on the loan times the declining value of the loan. It will

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between seller and buyer. Nevertheless, *expected* holding gains are an important component of the return on most financial instruments, including loans. We also note that the SNA records financial instruments other than deposits, loans, and accounts receivable/payable at market or fair value. Were the scope of financial instruments considered under FISIM broadened, as in the second bullet above, the effect of holding gains and losses would need to be included in user cost-based FISIM for these instruments, regardless of the valuation principle for deposits and loans.

[52] For asset financial instruments, the user cost value of the associated services is the nominal interest rate on the asset net of counterparty risk losses, plus the expected holding gain(+)/loss(-), less the opportunity cost of money (reference rate). For example, for a loan this translates into the market interest rate on the loan net of the expected default loss (probability of default), plus the expected holding gain, less the reference rate.

[53] National accountants have agreed that the question whether holding gains and losses should affect the SNA's definition of income be considered in developing future versions of the SNA. However, this is seen as a difficult subject with wide-ranging implications. Including the effect of expected holding gains in the user cost calculation for asset services (such as FISIM) would affect output, value added, primary income, saving, and net lending. It also would affect the relative importance of the capital/financial and revaluation accounts in explaining the difference between the closing and opening balance sheets. The capital and financial accounts would include expected holding gains and losses. The revaluation account would contain, not actual holding gains and losses, but the difference between actual and expected holding gains and losses, whether realized or unrealized. While all of these would affect the evolution of well-known, current price (or nominal) national accounts aggregates such as gross domestic product (GDP) and national income, the volume (or real) growth effects on goods and services aggregates such as GDP would likely be comparatively muted.

not be straightforward to calculate this expected present value in the period when the loan will be made and thus again, there is an accounting problem.

- The final problem that Schreyer (2009) raised is how to estimate the size of the risk premium. Empirical estimates of the risk premium seem to be too small but these estimates are based on expected utility maximization problems. Research has shown that we need to move to non-expected utility maximization frameworks in order to obtain more realistic estimates of the equity risk premium.

It can be seen that the measurement of banking sector outputs and inputs raises many significant methodological problems, not only for price measurement, but also for the System of National Accounts. We showed that the uses and ownership perspectives to the treatment of banking services can lead to some problems of comparability when the productivity of particular sectors of the economy are compared across countries; i.e., if the ownership perspective is adopted, then sectoral value added and productivity will vary substantially depending on the ratio of leased and rented capital to owned capital across the economies being compared.

It can be seen why the determination of banking sector output is such a controversial topic: even in a very simple framework, many complexities emerge. The framework developed above needs a great deal of further work. Some of the remaining problems that need to be addressed include the following:

- The model needs to be extended to an open economy;
- The model needs to add a government sector;
- More detailed consumer and producer choice models need to be developed;
- Balance sheet accounts to accompany the present flow accounts need to be added;
- The model needs to deal explicitly with uncertainty.

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