Casting Light on Shadow Banking: Measuring Implicitly Priced Services of Private Asset Backed Securities Issuers

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Paper prepared for the 34th IARIW General Conference

Dresden, Germany, August 21-27, 2016

Session 7A: Accounting for Finance in the Economy and the SNA I

Time: Friday, August 26, 2016 [Morning]

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Introduction

Private-label asset-backed securities (ABS) issuers have recently climbed from being a small segment of the credit intermediation market to a major player, peaking at around $4.5 trillion in assets in 2007.[2] This represents more than a four-fold increase from only a decade earlier, doubling the rate of increase of assets of private depository institutions. The credit intermediation performed by these entities takes the place of traditional credit intermediation performed by commercial banks, and importantly, may remove the loans, bonds, and associated income/expense flows from the books of the originator of the loans.[3] Because in the United States National Income and Product Accounts (NIPAs) the measurement of production of some financial intermediation services is limited to only commercial banks and similar depository institutions—and is based exclusively on loans held on these institutions' balance sheets—the growth of private-label ABS issuance may distort our picture of the output of intermediation activity by removing a portion of it from view.

In this paper, we provide estimates for the size and growth of the production of implicitly priced intermediation services ("FISIM" in the terminology of the System of National Accounts, European Commission *et al.*, 2008[4]) of private-label ABS issuers over the last two decades, expanding on the method of Corrado *et al.* (2014) by collecting and utilizing data specific to this particular industry. While the user-cost theory that underpins our approach is standard,[5] we must in the case of ABS issuers surmount several practical barriers that still obstruct the development of quality measures of output. Whereas banks are regulated strictly and are typically required to regularly report on condition and income to a supervisory authority, providing detailed comprehensive data, no such reporting requirements cover ABS issuers. Thus, we look to alternative sources. We take a novel approach that relies heavily on bond-level and deal-level data that ABS issuers are either required to report (by securities regulators) or voluntarily report to companies such as Bloomberg, Inc., which aggregates and

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[2] Source: Federal Reserve Board's Financial Accounts of the United States.

[3] The extent to which securitization may remove assets and liabilities from institutions' books depends on which accounting rules are applied. The issuance of FAS 166/7 by the FASB, for example, resulted in a change in how a very large collection of assets were accounted for, moving them from the books of ABS issuers to the books of the original owners of the loans. In general, the hope of the authors is that national economic accounts will be neutral in response to such accounting changes, and the proposed methodologies provide a large step in this direction.

[4] Hereafter, we will refer to the 2008 System of National Accounts as the SNA. We will reference specific parts of the SNA by way of paragraph numbers.

[5] We refer the reader to Fixler (1993) and Fixler, Reinsdorf and Smith (2003) for details of the reference rate approach to calculating indirectly measured financial intermediation services.

resells this information. Such data allow the construction of indices of interest yields, coupon payments, credit performance, principal balances, and issuance for various classes of ABS. These indices are combined to produce a measure of total nominal implicitly priced output of the industry, as well as an accounting of the related interest flows.

In general, an ABS is collateralized by a specific pool of assets (such as loans, leases, or receivables), and makes payments based on the performance of these assets. The most common type of ABS is the mortgage-backed security (MBS), and most mortgage-backed bonds are "public-label MBS," issued by Government Sponsored Enterprises (GSEs) such as Fannie Mae and Freddie Mac. Nevertheless, ABSs may be backed by many other categories of loans and the private-label ABS/MBS market has become quite large, growing to encompass large classes of loans not securitized by GSEs. Issuance of ABSs is dominated by commercial banks, but mortgage brokers, hedge funds, and consumer finance companies are also involved. The process of intermediation goes through a number of steps that are outlined by Pozsar *et al.* (2010) such as origination, warehousing, and pooling/structuring. Many of the institutions that perform these steps may be at one time funded using short-term and medium-term financial instruments. Nevertheless, the outcome of this process results in a situation in which the ABS issuer is funded by a collection of bonds that are designed as a whole to closely match the risk and maturity characteristics of the loans held as assets of the issuer. The intermediation services produced by private-label ABS issuers thus do not include any type of depositor services (as they are not directly funded through deposits or other deposit-like short term instruments), and so we may focus our efforts on designing a methodology to most effectively capture the borrower services produced by this industry.

The largest categories of loans in this sector are mortgages, auto loans, and credit cards. This paper will thus focus on these categories of loans. The methodology for each will differ slightly and will depend on the type of data available and how the different types of deals are structured.

We start by summarizing the major theoretical developments that underpin these estimates. Then, we discuss the SNA classifications of the institutions and flows, we discuss specific aspects of user cost theory that relates to these estimates, we develop a "vintage" concept for computing FISIM, and we discuss specific methods for each of the loan types. After this, we show results by loan type and totals. Finally, based on holdings, we will account for the users of private-label ABS FISIM, and thus compute its impact on GDP and other important quantities.

Methods and concepts

This paper draws from the literature on the user cost method for computing the services associated with financial instruments for which no explicit fees are charged. Such methods were pioneered by Barnett (1978), Donovan (1978), and Diewert (1974). Fixler (1993) applied the concept to national accounts, referring to it as the "reference rate" approach resulting from the use of a risk-free, service-free reference rate as the user cost of funds. Fixler, Reinsdorf and Smith (2003) describe adoption of the reference rate approach in the NIPAs; they also conduct an extensive review of the history of measuring

the services of commercial banks, citing the long-understood necessity of imputing a value for those services furnished to depositors (and later borrowers) without payments of explicit fees. Hood (2013) refines measures of interest and services in the presence of credit losses, and describes the methods that are currently used in the NIPAs.

One of the main differences between the methodology described herein and that applied to commercial banks is the absence of an imputation for services provided by ABS issuers to depositors. This is in spite of the fact that in the short term, some of the activities of these institutions may be financed through short-term "deposit-like" liabilities, mostly commercial paper and repurchase/reverse repurchase agreements. We elect to ignore such deposit-like liabilities when imputing services of private-label ABS issuers for three main reasons: (1) on a net basis, these liabilities are very small relative to the size of the total assets of the sector (Gallin, 2013); (2) these liabilities earn the institutions much smaller spreads than deposits earn banks, suggesting minimal services; and (3) whereas banks spend a great deal of resources providing teller transactions in expensive retail locations, large ATM networks, and other customer-related services, private-label ABS issuers provide little-to-none of these. In addition, while ignoring depositor services runs the risk of underestimating overall services of these institutions, it substantially simplifies the method to be applied.

User cost of money theory implies that borrower services output is given by the product of user cost spread, denoted s, and balance, denoted L. The spread is the difference between the rate of return or yield on the asset, r, and the user cost of the asset, u. In standard user-cost-of-capital theory, the user cost depends on the opportunity cost of the funds invested in the asset and any anticipated price fluctuations and depreciation. For financial assets, price changes and depreciation are generally ignored (anticipated price changes are already amortized into the rate of return), and we are left with finding an opportunity cost of funds, referred to as the reference rate. Below, we will discuss how such balances (L), yields (r), and references rates (r^{ref}) are defined for each subtype of MBS/ABS.

Because it is borrowers that receive services, for the purposes of computing output, balances will always be defined as the balances of loans outstanding that are securitized, even if such loans are not funded through borrowings of the ABS issuer. While ABS issuers may not have equity or "own funds" like banks and finance companies do, credit enhancements and sellers' interests can effectively play the same role, causing loan assets to exceed bond liabilities. It is the loan assets which shall be used to compute services.

In general, the interest rates on loans (r) are computed based on interest paid by borrowers less any losses in principal associated with borrower default, hereafter referred to as "losses". The language for interest paid can differ for different types of loans. For mortgages, interest payments both from borrowers and to bondholders may be referred to as "coupons" of some type, whereas the term coupon does not generally appear in the nomenclature for credit card ABSs. We will use the term "yield," "loan coupon" or "collateral coupon" to refer to interest paid by borrowers into the loan pool, and "coupon" or "bond coupon" to refer to interest that is paid to bondholders. Below, we will discuss how each of these is derived for each loan type.

Current accounting rules require the reporting of losses on loan pools that back most publically issued MBSs and ABSs. The concept that we apply is similar to the one discussed by Hood (2013), in which contractual loan interest rates are offset by rates of anticipated credit losses from borrower default. Commercial bank accounting measures of charge-offs and provisions generally represent *ex post* measures of such losses, and are smoothed to construct measures of anticipated losses. Similar accounting measures are available for many types of ABS, and are used when possible. If such measures are not available, other indices proxy for current losses.

To compute user costs spreads associated with FISIM we must first select an appropriate reference rate, r^{ref}. The reference rate represents the opportunity cost to the lender of making funds available to the borrower, and not any direct costs associated with raising capital, monitoring and servicing the loans. Fortunately, ABSs are associated with a natural reference rate, as the securities backed by mortgage pools are sold to investors who do not play a role in servicing, origination, or maintenance of the loans (at least, by virtue of holding the securities, although there is nothing preventing the banks that securitize loans from purchasing some of the securities). For this reason, we use the pass-through or coupon rate of the bonds as a measure of the reference rate.

SNA Classifications

The institutions that are being discussed are all financial corporations (S12). Within this sector, they fall under the category of *other financial intermediaries, except insurance corporations and pension funds* (S125), which contains "financial corporations engaged in the securitization of assets" (SNA, 4.110).

The transactions that are recorded in national economic accounts are outlined in SNA paragraphs 6.163-6.169. In general, FISIM is regarded as market output (P11) that is divided among intermediate consumption (P2) and final expenditures (P3). The concurrent distributions "imputed interest payments/receipts" are recorded as property income (D41).

User cost theory

Because the methods discussed in this paper are slightly different from those used for depository institutions, we will start by reproducing some of the essential elements of user cost theory. For this, we will introduce a separate, simplified notation, so as not to confuse these concepts with the variables that are used in the remaining sections. This section will focus on borrower services, because as noted above, the institutions that are being discussed in this paper do not generally accept deposits.

User cost theory in general concerns returns on an asset. Suppose over some period, anticipated price appreciation of an asset is π, a risk-free interest rate is i, and the asset is anticipated to depreciate in value at rate δ. User cost theory suggests that the opportunity cost of owning the asset (and thus the required return) is given by $u = \pi - i - \delta$. For depositor and borrower services, an additional cost (or more accurately, cost plus markup) term, c, is added to the equation. This cost represents the service that is

provided by the intermediary. A bank must earn a yield (interest rate) of π-i-δ+c = u+c to justify originating and holding a loan.

For a loan asset or deposit liability, we generally ignore π and δ. δ is thought to represent physical depreciation or obsolescence. π, on the other hand, can be ignored only with an appropriate choice of time period, unless the return is indexed to i. The reason derives directly from the user cost theory above: If r = π-i+c is the (fixed) rate of interest charged on a loan, then if the loan's term is split up into sub-periods in which i changes, it's clear that one-for-one changes in π (or c) are needed for the equation to hold.

The goal of the reference rate approach is to measure c, the cost plus markup that the bank charges to provide services to the borrower. To measure this quantity, we can rearrange the user-cost formula, c = r-i-π. With perfectly accurate measures of r and i, π can be ignored only if it is always zero. For fixed-rate loans, the way to achieve this is to pick i at issuance, such that the price of the loan remains constant.

A methodology in which i is selected at issuance is not always available, and good measures of price changes are not available. For commercial banks, the NIPAs employ a solution to this problem which assumes that large short-term swings in user cost spreads (r-i) are spurious (Hood, 2013). In this case, loan rates are "book" rates—interest income divided by remaining principal balance. No attempt is made to match a reference rate to the loan portfolio; rather, it is assumed that banks' holdings of safe (Treasury and Agency) securities are chosen by the depository institution to match the maturity structure of their loan portfolio, such that we get an approximate match. A more appropriate approach would be to select a portfolio for the reference rate that is based on the vintages and maturities of the outstanding loan portfolio. We introduce such a method below.

The vintage concept

The method that is applied to the computation of implicitly priced commercial bank services is made possible based largely on the fact that commercial banks report their current condition and income in each quarter to regulatory authorities. The method relies on knowing incomes and balances for all loans, without regard to when such loans were originated.

In other cases, it may not be feasible to compute services in such a way, at least when constructing estimates for the historical period. Here, we describe a method that can be used to compute the services of a lender for which data on condition and income are not available, but other data that cover issuance and loan terms (at issuance) are available. This method will be known as the vintage method, because separate estimates of some quantities are recorded by loan vintage, and these quantities are averaged based on estimates of outstanding balances by loan vintage.

The vintage method is applied as follows: Suppose $L_{t,t}$ loans are made at time *t* with maturity M_t. We can compute the typical prepayment schedule for loans of maturity M_t, denoted $P_{t,t+s}$. $P_{t,t+s}$ is defined as

the proportion of outstanding balances that are paid off in period *t+s* to *t+s+1*. That is, in the absence of prepayment and default,

$$L_{t,t+s+1} = L_{t,t+s}*(1-P_{t,t+s}).$$

Suppose we have default losses between period *t+s* and *t+s+1* given by $D_{t,t+s}$ for each *s>0*. Then in the absence of prepayment, we have

$$L_{t,t+s+1} = L_{t,t+s}*(1-P_{t,t+s})*(1-D_{t,t+s}).$$

Suppose prepayment is denoted $X_{t,t+s}$. If prepayment is allowed, then we have

(1) $$L_{t,t+s+1} = L_{t,t+s}*(1-P_{t,t+s})*(1-D_{t,t+s})*(1-X_{t,t+s}).$$

With information on M_t (yielding $P_{t,t+s}$), and assumptions on $D_{t,t+s}$ and $X_{t,t+s}$, we may compute $L_{t,t+s}$ for each *s>0, t>0*. We denote these $\{L_{t,t+s}\}_{t>0,s>0}$.

Suppose that loans are made at time t with interest rate r_t, and that we can find a risk-free instrument with maturity M_t, having rate of interest r^{ref}_t. Then we may write the user cost spread at time *t+s* for loans issued at time *t* as

$$z_{t,t+s} = r_t - r^{ref}_t - D_{t,t+s}.$$

Using the quantities $z_{t,t+s}$ and $L_{t,t+s}$ we may express output as

$$Y_t = sum_{s>0}\{z_{t-s,t}*L_{t-s,t}\}.$$

This may also be written

(2) $$Y_t = sum_{s>0}\{z_{t-s,t}*w_{t-s,t}\}*L_t$$

where the w's represent weights, $w_{t-s,t} = L_{t-s,t}/L_t$, and L_t are total loan balances outstanding at *t*, $L_t = sum_{s>0}\{L_{t-s,t}\}$. In such a way, we can use an estimate of weights w to obtain a weighted average of user costs, but a different estimate of L_t (outstanding loans) to estimate total output, as we typically have such information.

To summarize, the main steps to computing FISIM using the vintage method are

(1) Use data/assumptions to compute $\{L_{t,t+s}\}_{t>0,s>0}$ (recursively) with equation 1
    a. Data on issuance ($L_{t,t}$)
    b. Data on maturity (M_t) yields $P_{t,t+s}$
    c. Assumptions on D, X (based possibly on data)
    d. Note: If $L_{t,t+s}$ or $w_{t,t+s}$ are data, then there is no need to use P and X (D must be used at some point, however, because it also affects income)
(2) Use information on interest rates (r) and a maturity-matched reference rate (r^{ref}), plus default rate information (D) to compute $\{z_{t,t+s}\}_{t>0,s>0}$, user cost spreads
(3) Take a weighted average of past user cost spreads based on L and z (equation 2)

(4) Compute output by multiplying outstanding loans by average user cost spreads (equation 2)

Data sources

The main data source that is used is Bloomberg, Inc.'s fixed income platform. Bloomberg collects information from a variety of primary data sources including investment prospectuses, regulatory reports, and reports obtained directly from issuers. These data are combined and redistributed to users via a searchable and downloadable database.

While Bloomberg presumably makes every attempt to ensure that their data are as complete as possible, when downloading the data, not all data fields populate for all bonds and deals. This could be for several reasons. Reporting requirements and criteria have changed over time for various types of bonds, generally yielding more complete data in recent years. Deals in which bonds are entirely privately placed may not report complete information. Thus, we are required to exclude certain deals and bonds from some calculations. In addition, the reporting of certain types of bonds differs from other types of bonds, and thus the terminology must be adjusted.

When obtaining these data, only US deals are included. Thus, we ignore any cross-border transactions. While undoubtedly many cross-border deals are occurring, we believe that we have captured the majority of the activity occurring within the US.

Bloomberg data are aggregated to obtain aggregate coupons, yields, and balances for each year. Because in structured finance, some bonds contain notional principal amounts, we have attempted to exclude such principal amounts from balance calculations. Interest payments from these bonds should, however, be included in aggregate interest payment computations.

In addition to Bloomberg, one other data source supplements our estimates of user cost spreads. The S&P/Experian auto loan loss index is used for auto loan losses, as the reported loss data from auto loan ABS populate only sparsely. This index uses a combination of sources to estimate loss rates on prime and subprime auto loans.

We use some of the Federal Reserve Board's Financial Accounts of the United States data to assign mortgage output to sectors. In addition, we use data from SIFMA (www.sifma.org) for total balances by year. SIMFA data are also used for some sectoring.

Methodological detail

In this section, we provide additional details about output computation. For auto ABS and MBS, the "vintage" concept is applied. For credit card ABS, we develop estimates based on contemporary (actual) spreads. There are some differences in precise methods even for similar estimates, however.

As noted above, a collection of data are needed to compute FISIM. These include: balances/weights, yield, reference rate, and losses. In the following section, we discuss how each of these quantities is derived from the data for each type of loan.

ABSs are structured as collections of bonds associated with pools of loans. For each pool, there are likely to be many bonds. These may represent what are known as tranches, where more senior tranches receive interest first, are paid back with priority, and/or take losses last. For our purposes, we wish to include all interest payments and losses attributable to bondholders irrespective of asset class or tranche. We also want to include all interest income attributable to the loan pool. Thus, we sum interest payments (bond coupons) over all bonds, and interest income (loan coupons, yields) over all deals.

The term "weights" refers to the proportions of balances by loan vintage (w, above). For example, if in 2005, 20% of loans outstanding were issued in 2003, then we assign a weight for 2003 of 0.2 in 2005. These weights are indexed by a pair of years, the current year, and the vintage or issue year.

Below, we discuss the concepts that are applied for each type of loan. Table 1 presents a summary:

Table 1: Methods employed (by category of loan)

Category	Weights	Yield	Reference	Vintage	Losses
Mortgages (MBS)	Vintage	WAC (orig.)	Coupon (orig.)	Historical	Actual
Credit cards (ABS)	Actual	Portfolio yield	Interest	N/A	Actual
Auto loans (ABS)	Vintage	WAC (orig.)	Coupon (orig.)	Average historical	Index (S&P/Experian)

Mortgage-backed securities

The method that we employ for mortgage-backed securities combines a number of the concepts that are discussed above. We construct gross spreads based on information at issuance. Constant gross spreads are maintained throughout the lives of the various bonds. Loan balances are estimated using a sample of the ten largest deals in each year. Past spreads are weighted by these loan balances. The same sample of deals is used to compute loss information. These loss rates are then subtracted from the gross spreads estimated above, to get net spreads. Net spreads are multiplied by total MBS outstanding from SIFMA to generate total MBS services.

SIFMA MBS outstanding balances are used to separate MBS services into residential and commercial MBS services. Commercial MBS services are furnished to business. Residential MBS services are further sectored into services furnished to businesses and consumers using Financial Accounts balances of

residential loan liabilities. Most residential MBS services are consumed by household business (owner-occupied housing and tenant-occupied housing).

Credit card asset-backed securities

Output from credit card ABSs (CC ABSs) is estimated somewhat differently from how services of MBSs and auto ABSs are. The terminology is somewhat different, as well, based on the terminology associated with the data that are reported by issuers. This is because of the variable nature of the balances, returns, and interest payments inherent in revolving debt. Rather than weighted average coupons on collateral, CC ABS issuers report portfolio yields; rather than bond coupons, CC ABS issuers report interest payments. Losses are reported, as well.

As a response to the variable nature of associated interest payments and balances, CC ABS issuers generally report substantially complete information to bondholders. Thus, we are able to estimate portfolio yields, interest rates, and loan losses for each bond/pool in each year. This means that the estimates are done in a way similar to the commercial banking sector.

In each year, net spreads are computed by subtracting loss rates and interest rates from portfolio yields. Net spreads are then multiplied by outstanding credit card receivables from SIFMA data. It is assumed that all CC ABS services are consumed by households.

Table 2: Weights calculation example, auto ABS

Remaining balance data (average)

Years after issue	0	1	2	3	4	5	6	7
Remaining balance	1.0000	0.7591	0.4526	0.2169	0.0480	0.0112	0.0006	0.0004

Issuance data

Year issued	Issuance
1985	373376476.1
1986	9870120672
1987	6587198142
1988	6584626477
1989	8649417841
1990	13772897478
1991	18619497262
1992	25325536799

Oustanding balances by year (Issuance*Remaining balance)

	Current year							
Year issued	1985	1986	1987	1988	1989	1990	1991	1992
1985	373376476.1	283440986	168997959	80972924.2	17907845.2	4188313.283	230522.6364	153383.0564
1986		9870120672	7492696810	4467421915	2140500499	473389740.7	110717091.6	6093812.503
1987			6584626477	4998582230	2980338904	1427986215	315811196.6	73862389.05
1988				6584626477	4998582230	2980338904	1427986215	315811196.6
1989					8649417841	6566025646	3914906423	1875770704
1990						13772897478	10455408644	6233899875
1991							18619497262	14134604061
1992								25325536799

Weights by year

	Current year							
Year issued	1985	1986	1987	1988	1989	1990	1991	1992
1985	1.0000	0.0279	0.0119	0.0050	0.0010	0.0002	0.0000	0.0000
1986		0.9721	0.5259	0.2769	0.1139	0.0188	0.0032	0.0001
1987			0.4622	0.3099	0.1586	0.0566	0.0091	0.0015
1988				0.4082	0.2661	0.1182	0.0410	0.0066
1989					0.4604	0.2603	0.1124	0.0391
1990						0.5460	0.3001	0.1300
1991							0.5344	0.2947
1992								0.5280

Auto loan ABS

Automobile loans are typically fixed-rate installment loans of 2-8 year maturities. This loan category also contains loans for fleet purchases and loans for dealer stock, and so some of the services are furnished to businesses. Data from Bloomberg include bond coupons and weighted average collateral coupons (at origination). Issuance is known for each year, while balances can be tracked over the life of the loans.

Output of auto loan ABSs is estimated in a manner similar to output of MBSs. Spreads are estimated by fixing the coupon rate of the bond and the average coupon of the collateral at origination. The distribution of balances over time is computed using a combination of issuance data and the distribution of annual balances after issuance (see Table 2). For the latter quantity, averages are used for all loans, and the distribution is not varied over time.

SIFMA balances of auto loan ABSs outstanding are used to compute total services. SIFMA amounts of fleet and floorplan loans are used to determine intermediate consumption of auto ABS FISIM by businesses, whereas other amounts are assumed to be consumed by households.

Results

This section will first present results separately for each loan category. Afterward, aggregate results will be shown. Data quality is consistent starting in the mid-1990s, and so the estimates start in 1995.

Mortgage-backed securities

Figure 1 shows results for MBS. Spreads are shown in green (gross) and red (net). Note that the net spread drops precipitously between 2007 and 2009, in the aftermath of a collapse in home prices and volatility in the private-label MBS market. Output (blue) increases between the mid-1990s and 2007, with particularly rapid increases in the mid-2000s. The steep drop in services after 2007 follows a decline in both spreads and issuance.

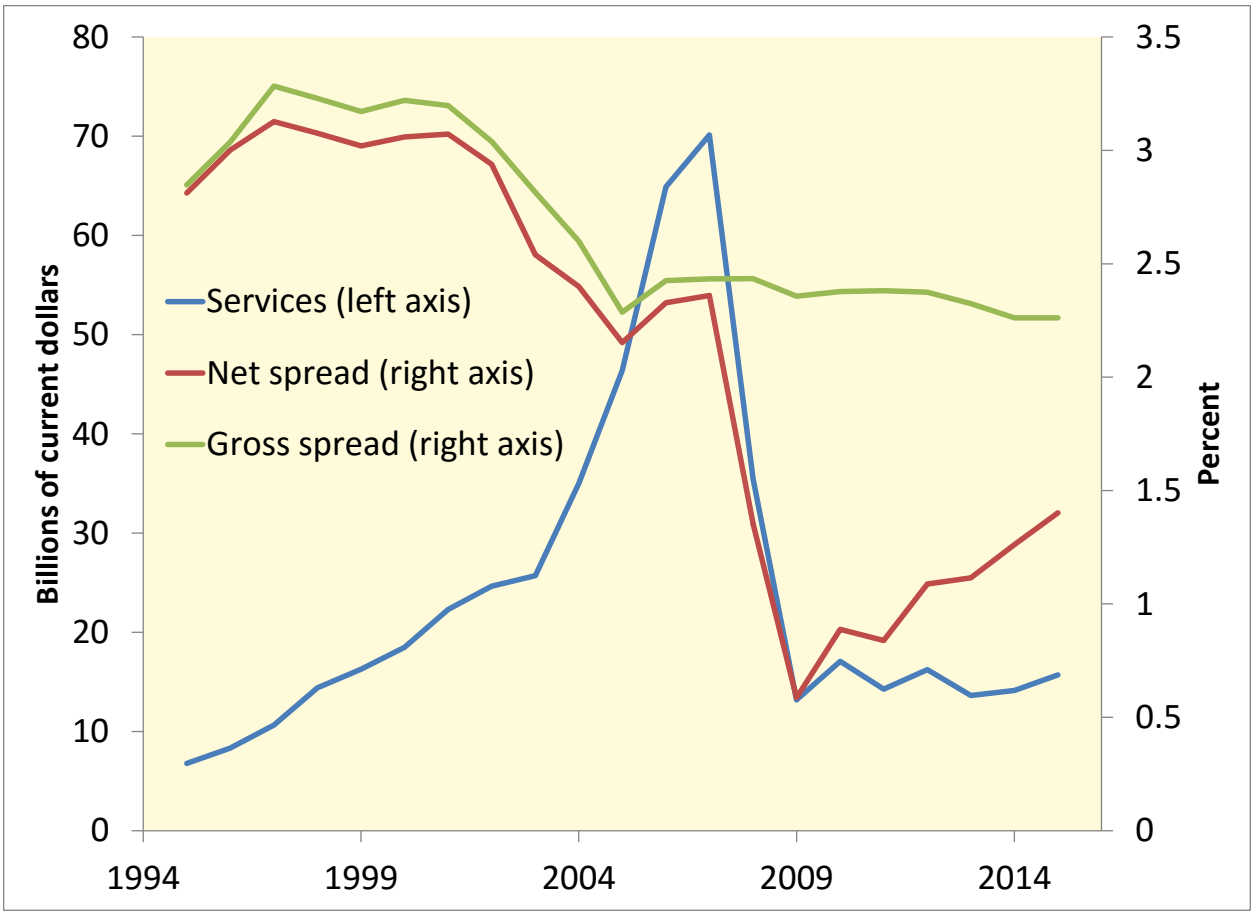

Figure 1: FISIM from private-label MBS and spreads.

Credit card asset-backed securities

Figure 2 shows credit card ABS FISIM, and gross and net spreads. As above, gross and net spreads are depicted in green and red, respectively. Like MBSs, the net spread experiences a drop between 2007 and 2009; the recovery, however, is faster than for MBSs. In fact, levels of net spreads are higher after the recovery than before the crisis.

As with MBSs, services spike in 2007. There is a subsequent decline which is driven mostly by declining issuance.

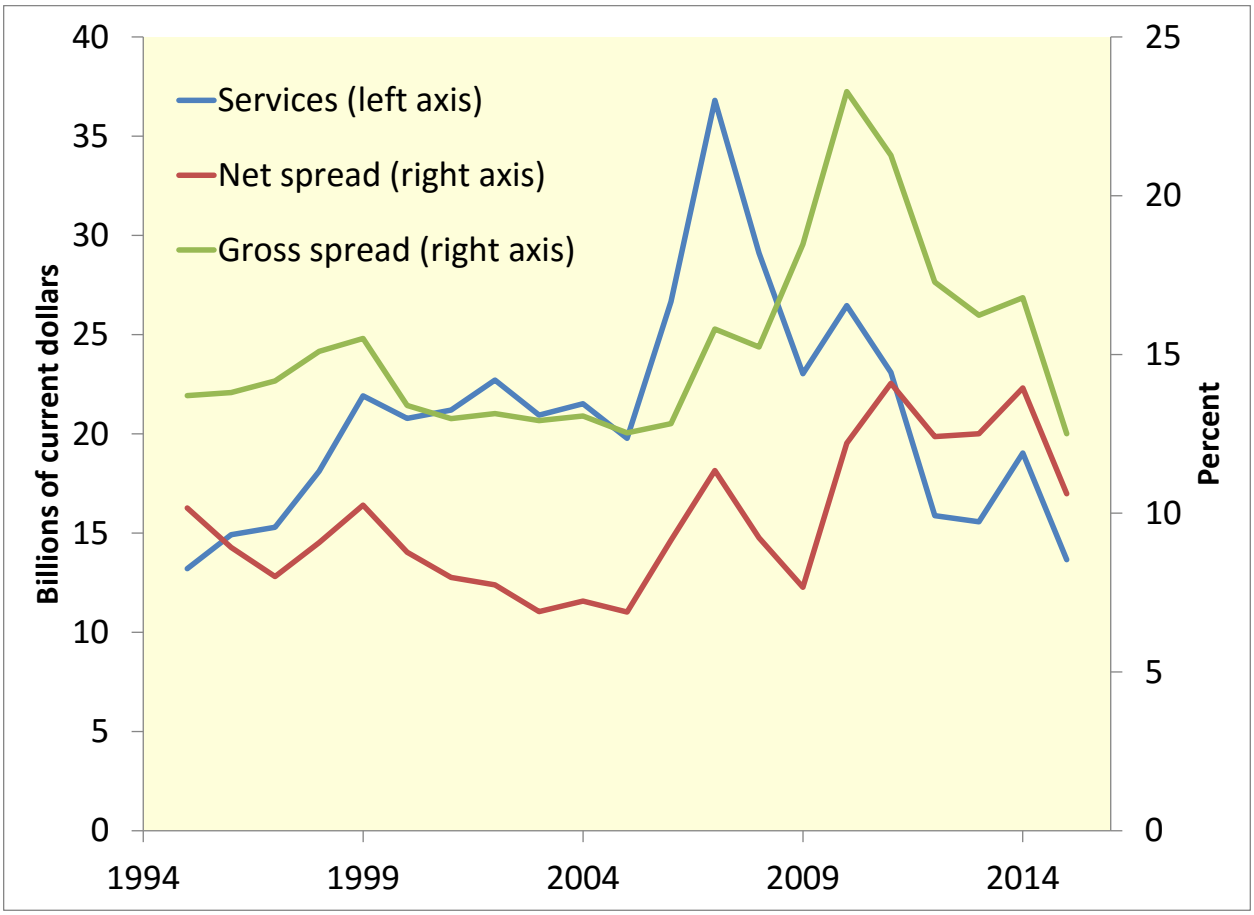

Figure 2: FISIM from credit card ABS and spreads.

Auto asset-backed securities

Results for auto loans are depicted in Figure 3. The picture is somewhat different than the ones above. Gross and net spreads appear to be more volatile, dropping in the late 1990s, picking up in the 2000s, dropping again starting in the mid-2000s before bottoming out at the end of the financial crisis, and then recovering after the financial crisis. Interestingly, the difference between gross and net spreads is not as volatile as it is for the other two loan types, suggesting that credit losses are not as cyclical. FISIM follows the pattern that the net spread follows, but with an increasing trend as issuance has trended upward for most of the sample.

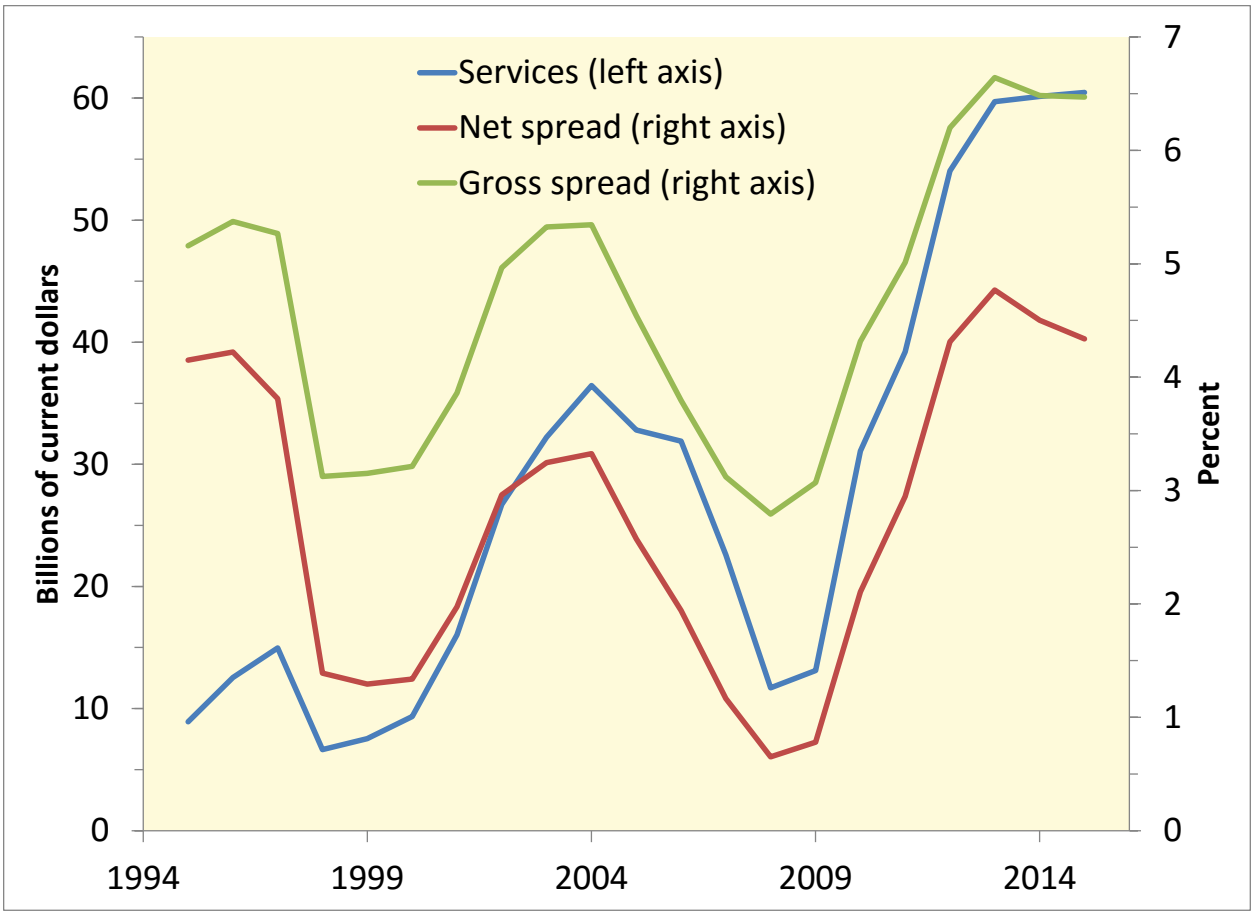

Figure 3: FISIM from auto ABS and spreads.

Totals

Figure 4 shows the output numbers from Figures 1-3, as well as the grand total, as percentages of borrower services of commercial banks (underlying current published NIPA data). Interestingly, there is a downward trend overall. From 1995 to 2000, the trend was negative. In the early-mid 2000s, there was a rapid increase in total output, such that the FISIM generated by these institutions was equal to all borrower services of commercial banks. There was a rapid decline following the financial crisis, driven largely by MBS and a continuing decline in auto ABS. A recovery after the crisis in auto ABS corrected the drop, with MBS and CC ABS output remaining rather flat.

Figure 5 shows total output for this sector, decomposed by type of consumer. For most of this period, final expenditures by households make up the bulk of FISIM. Final expenditures by households also account for the bulk of the recovery after the financial crisis. The increase in output in the 2000s was driven by MBS FISIM, which is largely consumed by household business (owner-occupied housing). Businesses (excluding household business) consume the smallest part. Figure 6 shows just final consumption expenditures on private-label ABS/MBS FISIM. Overall, there is an upward trend to the

contribution of this sector to GDP. The drop after the financial crisis is apparent, but the recovery is rapid and sustained.

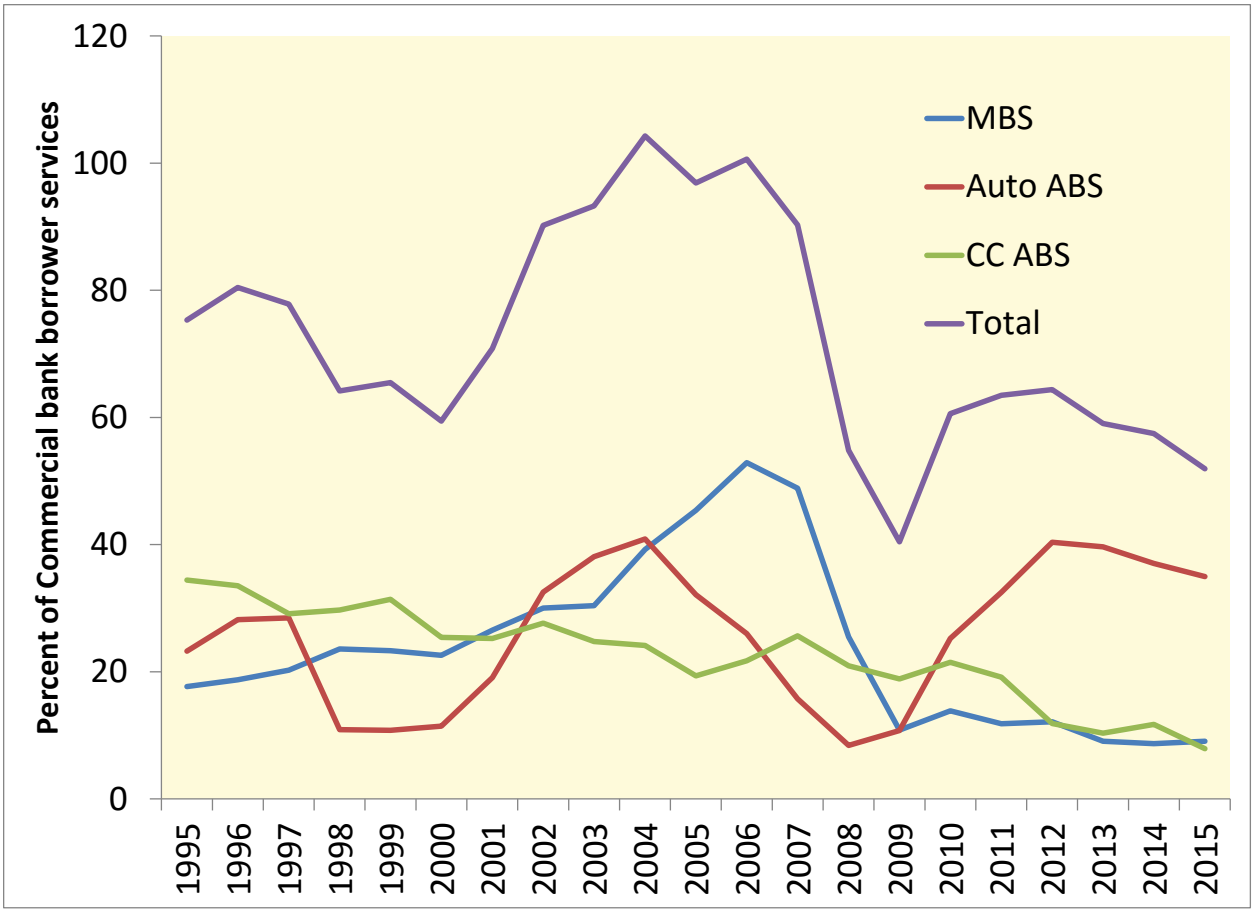

Figure 4: FISIM by loan type and total, private-label MBS and ABS, as a percent of commercial bank borrower services.

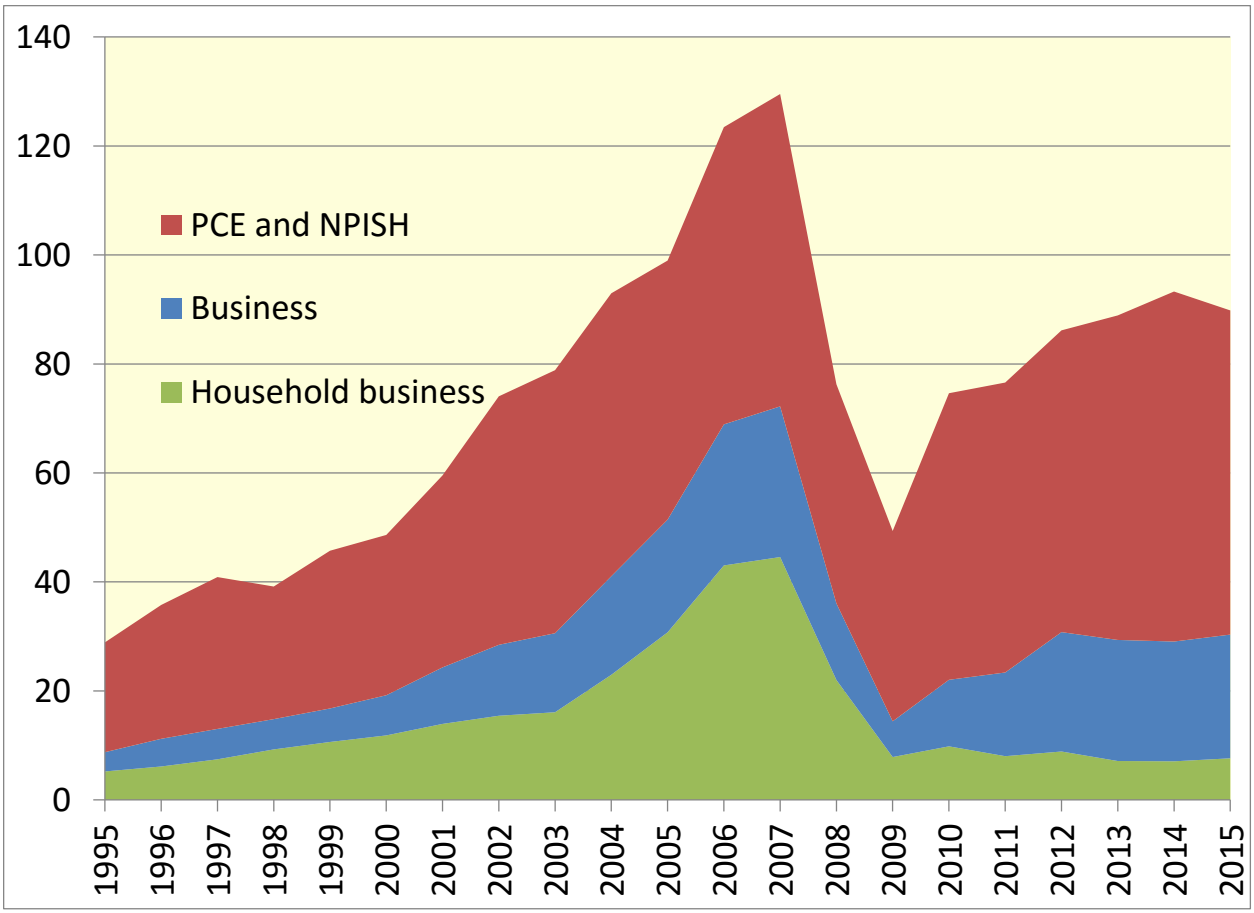

Figure 5: FISIM, private-label ABS and MBS, by type of consumer.

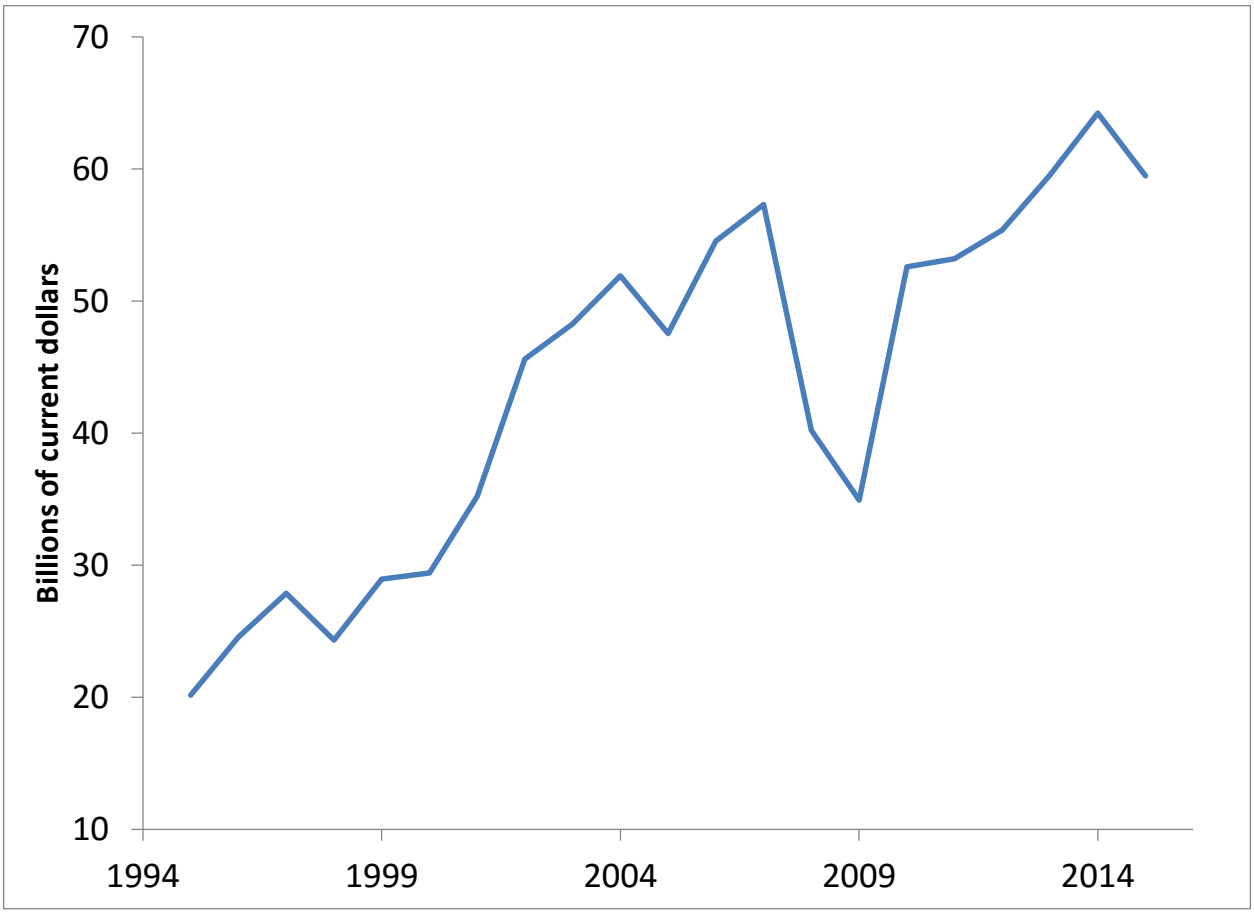

Figure 6: Final expenditures, all private-label ABS and MBS.

Table 3 shows how these calculations would affect the main NIPA t-accounts in 2013. Because we have only calculated borrower services, the contributions are quite simple. Enterprises (consumers) trade interest receipts (interest payments) for operating surplus (consumption expenditures). Gross domestic product and income go up by equal amounts.

Table 3: T-accounts: Contribution of revised estimates, 2013, billions of current $

Account 1. Domestic Income and Product Account

Line			Line		
1	Compensation of employees, paid	0.0	15	Personal consumption expenditures	59.6
2	Wage and salary accruals	0.0	16	Durable goods	0.0
3	Disbursements	0.0	17	Nondurable goods	0.0
4	Wage accruals less disbursements	0.0	18	Services	59.6
5	Supplements to wages and salaries	0.0	19	Gross private domestic investment	0.0
6	Taxes on production and imports	0.0	20	Fixed investment	0.0
7	Less: Subsidies	0.0	21	Nonresidential	0.0
8	Net operating surplus	59.6	22	Structures	0.0
9	Private enterprises	59.6	23	Equipment and software	0.0
10	Current surplus of government enterprises	0.0	24	Residential	0.0
11	Consumption of fixed capital	0.0	25	Change in private inventories	0.0
			26	Net exports of goods and services	0.0
12	Gross domestic income	59.6	27	Exports	0.0
			28	Imports	0.0
13	Statistical discrepancy	0.0	29	Government consumption expenditures and gross investment	0.0
			30	Federal	0.0
			31	National defense	0.0
			32	Nondefense	0.0
			33	State and local	0.0
14	**GROSS DOMESTIC PRODUCT**	59.6	34	**GROSS DOMESTIC PRODUCT**	59.6

Account 2: Private Enterprise Income Account

Line			Line		
1	Income payments on assets	0.0	19	Net operating surplus	59.6
2	Interest and miscellaneous payments	0.0	20	Income receipts on assets	-59.6
3	Dividend payments to ROW	0.0	21	Interest	-59.6
4	Reinvested earnings on FDI in US	0.0	22	Dividend receipts from ROW	0.0
5	Business current transfer payments (net)	0.0	23	Reinvested earnings on US direct investment abroad	0.0
6	To persons (net)	0.0			
7	To government (net)	0.0			
8	To the ROW (net)	0.0			
9	Proprietors' income with inventory valuation and capital consumption adjustments	0.0			
10	Rental income of persons with capital consumption adjustment	0.0			
11	Corporate profits with inventory valuation and capital consumption adjustments	0.0			
12	Taxes on corporate income	0.0			
13	To government	0.0			
14	To ROW	0.0			
15	Profits after tax with inventory valuation and capital consumption adjustments	0.0			
16	Net dividends	0.0			
17	Undistributed corporate profits with inventory valuation and capital consumption adjustments	0.0			
18	**USES OF PRIVATE ENTERPRISE INCOME**	0.0	24	**SOURCES OF PRIVATE ENTERPRISE INCOME**	0.0

Account 3: Personal Income and Outlay Account

Line			Line		
1	Personal current taxes	0.0	10	Compensation of employees, recd	0.0
2	Personal outlays	0.0	11	Wage and salary disbursements	0.0
3	Personal consumption expenditures	59.6	12	Domestic	0.0
4	Personal interest payments	-59.6	13	ROW	0.0
5	Personal current transfer payments	0.0	14	Supplements to wages and salaries	0.0
6	To government	0.0	15	Employer contributions for employee pension/insurance	0.0
7	To the ROW	0.0	16	Employer contributions for government social insurance	0.0
			17	Proprietors' income IVA and CCA	0.0
8	Pesonal saving	0.0	18	Rental income of persons with IVA and CCA	0.0
			19	Personal income receipts on assets	0.0
			20	Personal interest income	0.0
			21	Personal dividend income	0.0
			22	Personal current transfer receipts	0.0
			23	Government social benefits	0.0
			24	From business (net)	0.0
			25	Less: Contributions for government social insurance, domestic	0.0
9	**PERSONAL TAXES, OUTLAYS, AND SAVING**	0.0	26	**PERSONAL INCOME**	0.0

Discussion

In this paper, we describe the construction of estimates for services produced by private-label ABS issuers in the United States, for three large loan categories: Mortgages (MBSs), and credit card and auto loan ABSs. The method that is introduced is novel for its use of a data source based on securities rather than on institutions' financial statements. In addition, we have introduced the vintage concept for estimating FISIM based on data that are known at issuance/origination, and have applied versions of this concept to some loan types (mortgages and auto loans).

Estimates show an interesting pattern. There is a large drop-off in output after the financial crisis for all loan types, although auto loan ABS services start dropping earlier. There is a very large decline in MBS FISIM, corresponding to a drop-off in issuance of sub-prime and non-prime securities. Both credit card ABS and MBS FISIM show little recovery after the financial crisis. However, a rapid recovery in auto loan ABS FISIM causes the contribution of this sector to GDP to recover to pre-crisis levels. Thus, in spite of a lack of recovery in a large portion of this sector, it has a continuing, upward trend in its effect on GDP, with a major but ultimately temporary dip during the financial crisis.

It should be noted that there is more work to do before these estimates are ready to be included in national accounts. First of all, some ABSs are included on the balance sheets of certain lenders. When these institutions purchase, consolidate, and securitize loans, they may be required by accounting rules to keep some of these loans on their balance sheets. This is especially true of credit card loans. Thus, ongoing work must attempt to obtain information on how much of these are already being included in FISIM numbers for commercial banks. In addition, some services are being used by these institutions. For example, loan servicing by commercial banks is counted as production. Thus, one needs to properly account for inputs that are used by these institutions when balancing input-output relationships. Finally, this is a small part of a larger, ongoing project to develop quality FISIM estimates for all non-depository financial intermediaries (NDFIs), including this sector as well as finance companies and GSEs. This paper supplements estimates by Corrado *et al.* (2014) which together may provide the basis for estimating FISIM produced by so-called "shadow banks," so that we can develop a clearer picture of recent developments in production of services related to credit intermediation, and their role in the financial crisis of 2007-2008 and subsequent recession.

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