The Integrated Financial and Real System of National Accounts for the United States: Does It Presage the Financial Crisis?

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Abstract: The System of National Accounts (1993)—and the initial implementation of the system for the United States by the staff at the Bureau of Economic Analysis and the Federal Reserve Board—has two major advantages for economists studying secular trends and cyclical patterns in real and financial macroeconomic activity. First, the SNA are organized according to sectors of the economy defined by the economic agents that allocate. The SNA provides aggregate data separately for firms, financial institutions, consumers, governments and the rest of the world. Second, the accounts integrate real and financial information, so that one can track not only production and use of output but also net lending and borrowing and net worth by sector. We exploit these two features in the SNA accounts to examine US economic history leading up to the financial crisis of 2007 and 2008. First, we document the secular changes in household saving and investment in housing and relate them to the contemporaneous changes in the household balance sheet. We track these changes through the capital and current accounts of the SNA sectors. Second, we examine statistics on the financial businesses sector and, while the SNA data provide some indications that a financial storm was brewing, we argue that the accounts largely miss the rise in exposure to the US housing market as well as the critical factors that significantly spread and amplified the housing-market related changes throughout the financial system and the real economy. We conclude by suggesting a few ways in which the SNA data might be augmented with additional information to possibly presage a future crisis sharing key features with the current one.

Prelude to a Financial Crisis: An Analysis of the Integrated Financial and Real System of National Accounts for the United States*

by Michael G. Palumbo and Jonathan A. Parker

The U.S. national economic accounts *omnia divisa in partes tres sunt*. The National Income and Product Accounts (NIPA), produced by the Bureau of Economic Analysis (BEA), measure the production of goods and services, the use of these new goods and services, and the allocation of the income generated by their production. The BEA's International Transactions Account (ITA) shows the flow of goods and funds between the US and the rest of the world, as well as information on net asset balances (through data in the International Investment Position). Finally, the Flow of Funds Accounts of the United States (FFA), produced by Federal Reserve Board (FRB) staff, presents information about financial activity between major sectors of the economy, including the net acquisition (and the composition) of financial assets and liabilities and balance sheets for the household and nonfinancial business sectors. Although measurement concepts in the NIPA, ITA, and FFA are generally congruent, in places, these overlapping accounts track differently-defined sectors, omit some sectors of interest, and are not fully consistent with one another. In addition, macroeconomic data in the NIPA, ITA, and FFA are released in separate publications (at different times), store historical data on separate web sites, and use separate terminologies and quite distinct presentation styles.

In this paper, we discuss and analyze an innovative set of macroeconomic accounts for the United States that bring together information from these distinct sources and integrate financial

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and real data by aggregate economic sector using the System of National Accounts (SNA; 1993) framework.[1] These accounts are the results of a joint research project of BEA and FRB staff.[2] The organization of these accounts adheres closely – in presentation, terminology, and measurement concept – to the System of National Accounts (SNA), a detailed framework for integrated macroeconomic accounts constructed by a number of national statistical agencies around the world in coordination with the United Nations, Organization for Economic Cooperation and Development, the International Monetary Fund, and the World Bank.[3] The structure of these accounts differs radically (and initially, confusingly) from the organization of both the NIPA and FFA, from which the current accounts are entirely derived. But the SNA have two key advantages for macroeconomists.

First, the US SNA contain a full set of macroeconomic information broken down by sectors of the economy that are economic units of interest: Households (including nonprofit organizations that serve households), Nonfinancial noncorporate business (sole proprietorships and limited partnerships), Nonfinancial corporate business, Financial business, Federal government, State and local government, and Rest of world (foreign governments and businesses that engage in trade or financial transactions with domestic counterparts). In contrast for example, in the NIPA's familiar $C+I+G+NX$ organization, consumption and government spending cover economic units of interest, but investment does not – it is a grouping based on activity. Household consumption of housing services is in C but household investment in

[1] Annual data from 1960 through 2008 are available at: http://www.bea.gov/national/nipaweb/Ni_FedBeaSna/Index.asp and are updated by BEA and FRB staff after each quarter's publication of the Flow of Funds Accounts.
[2] See Albert M. Teplin, Rochelle Antoniewicz, Susan Hume McIntosh, Michael G. Palumbo, Genevieve Solomon, Charles Ian Mead, Karin Moses, and Brent Moulton (2006), and Charlotte Anne Bond, Teran Martin, Susan Hume McIntosh, and Charles Ian Mead (2007).
[3] Commission of the European Communities, International Monetary Fund, Organization for Economic Co-Operation and Development, United Nations, and the World Bank (1993).

housing structures appears in *I*.[4]

Second, the US SNA integrates financial and real information. For each of a set of consistently-defined sectors, the SNA follows: a current account that tracks the flows of production/income and consumption; a capital account that tracks saving and capital formation; a financial account that tracks net acquisition of financial assets and net incurrence of debts; a revaluation account that tracks gains and losses on tangible and financial assets; and a balance sheet account that tracks the stocks of tangible assets, financial assets, and liabilities. Thus, the integrated macroeconomic accounts in the BEA/FRB implementation provide the information needed (albeit with some pieces missing) to track the sources of change in each sectors' net worth—the SNA presentation can be conceptualized as taking a balance sheet at the start of a period and detailing the evolution of that position during the year to get to the balance sheet at the end of the period. That is, between balance sheets, the system tracks the nature and volume of economic activity undertaken by economic units in the sector, the means of financing those activities, and revaluation. In the current U.S. NIPA and FFA for example, only a sophisticated user investing a significant amount of time could navigate the published tables to produce estimates of net lending and borrowing across the major sectors of the economy.

In this paper, we use the SNA accounts to study several important developments in the evolution of the economy prior to the financial crisis that developed in 2007 and contributed to the severe recession of 2008. First, we illustrate the organization and use of the SNA, by exploiting the integrated macroeconomic presentation to describe the dramatic secular changes in household financial positions up to 2007. Second, we track changes in net lending and net borrowing across all the sectors of the US economy that became evident in the latter 1990s and

[4] Although data in the FFA are highly disaggregated across financial subsectors and credit/equity instruments, their structure is not amenable to combination with NIPA into SNA sectors,

accelerated during the mortgage credit boom in the mid-2000s. Finally, we look for evidence of, increased risk-bearing, leverage, maturity mismatch, and counterparty exposure in the financial business sector as indicators of increased vulnerability.

Our empirical analysis emphasizes two broad findings. First, in the household sector, the SNA show signs of building financial vulnerability in the period leading up to the recent financial crisis. Toward the end of a 25-year downward trend in net saving, households' investment in tangible assets began to rise notably in the early part of this decade due largely to increased home construction. By the mid-2000s, the household sector's "financing gap" – the extent to which net investment exceeded net saving – reached an historically unprecedented five percent of disposable income. The consequent acceleration of household borrowing was almost exclusively in the form of mortgage debt. On net then the SNA show that household leverage increased. The SNA also clearly show that the increase in borrowing was funded by the nonfinancial corporate sector and, more significantly, by foreign governments and institutions.

Second, in the financial business sector – the other sector where the adverse effects have been most significant so far -- the SNA data show few signs of an increase in vulnerability to the housing market and mortgage credit collapse ahead of time. The aggregate SNA data do not show significant increases in factors indicative of leverage, balance sheet complexity, maturity mismatch, or counterparty risk-taking in the financial sector—factors that, in hindsight, seem critical for spreading and amplifying the housing market shock through the financial and real sectors of the US economy in the crisis. We conclude that line (instrument) and sectoral aggregation masks many of these trends. For example, as counterparty risk rose, the macro data netted it out, and as maturity mismatch rose, aggregation into asset classes largely masked this rise.

Finally, we end the paper with three suggestions for augmenting SNA data to provide tools for academics, policymakers, and other analysts to better monitor the risk of future crises of this type.

I. The household sector's shift from suppliers of capital to borrowers of capital

We begin by analyzing household net lending and net worth in the US SNA. For any sector of the economy, change in net worth is due to net lending or borrowing (38), net capital formation (32), and revaluation of existing stocks of real and financial assets (84 through 94).[5] As with other sectors, households' aggregate net lending or borrowing position is defined using the following (simplified) statement: Each period, its combined sources of funds must equal its combined uses of funds. Sources of funds include (a) current disposable income (26) and (b) borrowing from others sector (68); uses of funds include (c) current spending (outside of investment; 27), (d) investment (32), and (e) the acquisition of financial assets (lending or funds provided to other sectors; 39).

Net lending or borrowing appears in both the capital accounts and the financial account for each sector.

In the capital accounts (which are NIPA-based), a sector's net lending or borrowing position is defined as the difference between its net saving—essentially, disposable income (a) less current spending (c)—and its net investment (d; gross purchases on physical capital (33) less depreciation (36)). Sectors that invest, on net, more than they save out of current income are, then, net borrowers, as they require funding from other sectors to finance their own shortfall of saving to investment. Other sectors that invest less than they save out of current income are, of

[5] Throughout the paper, numbers in parentheses refer to SNA table or line numbers. See http://bea.gov/national/nipaweb/Ni_FedBeaSna/Index.asp. In this paper, we use data available as of the December 11, 2008, release of the Flow of Funds Accounts of the United States.

course, the net lenders.

In the financial accounts (which are FFA-based), a sector's net lending or borrowing position is defined as the difference between its net acquisition of financial assets (e) and its net incurrence of debt (b). That is, by having spent less on investment than it saved out of current disposable income, a net lending sector must have been able to purchase a larger volume of financial assets (lending instruments), on net, than the amount of new debt (borrowing instruments) it incurred.

We now show three facts clearly visible in the SNA.

First, household saving has declined without a consequent decline in investment. Figure 1 shows household net saving (28), net capital formation (32), and net saving (28), each as a percent of disposable income (26). The secular changes in the blue line are familiar—after having fluctuated in the neighborhood of 10 percent from the early 1960s through the recession of 1982, the household saving rate has declined to near zero over the past 25 years. The orange line in the figure shows that net physical investment by the US household sector has not declined along with saving, but has remained relatively constant. In fact, in the recent boom years of the housing market (2002 through 2006), households' net investment in tangible assets, mainly net residential investment,

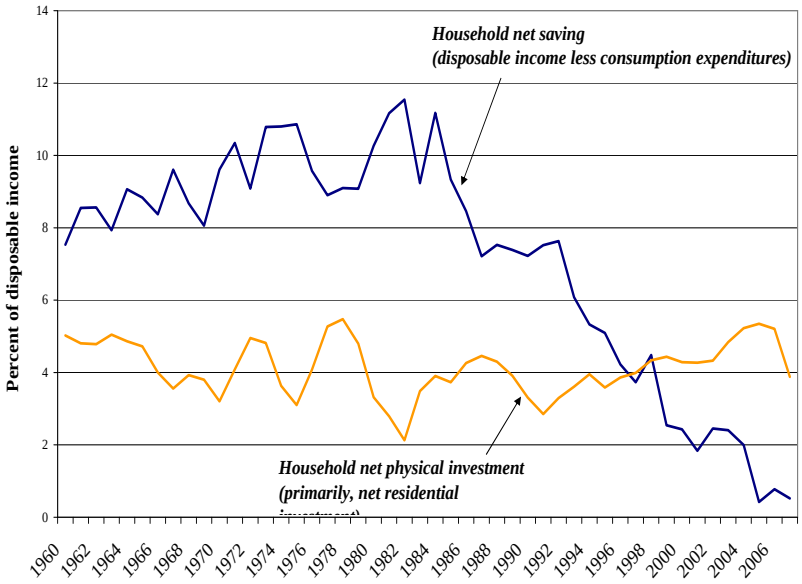

FIGURE 1. HOUSEHOLD SECTOR NET LENDING OR BORROWING IN THE SNA CAPITAL

has actually increased from 4 percent of disposable income to about 5½ percent in 2006, even as net saving dropped to essentially nil.

Second, and consequently, after having providing funding to other sectors on net, at an average annual rate of around four to five percent of disposable income from 1960 to 1990, households started borrowing on net in 1996. Figure 2 plots the difference between the household sector's net saving and net investment from the SNA's capital account. This series, the household sector's net lending or borrowing position reached net borrowing of 5 percent of disposable income in 2005 and 2006, and remained close to 4 percent in 2007.

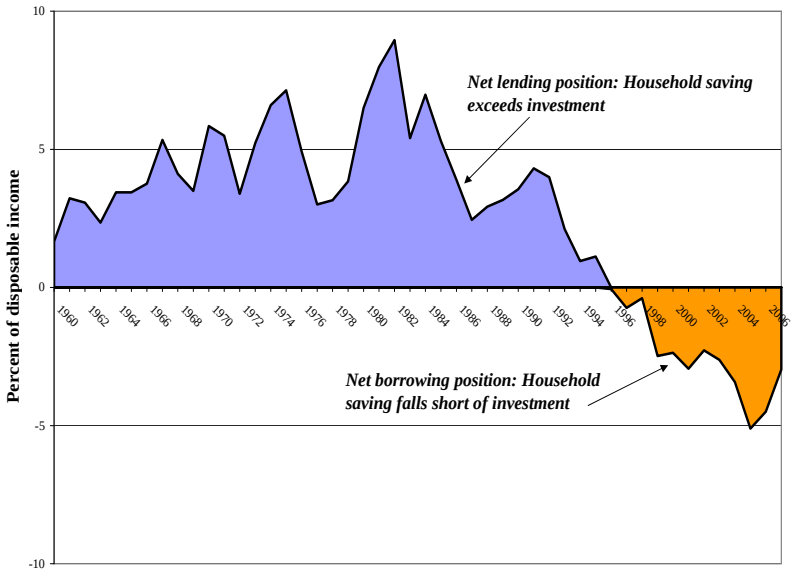

FIGURE 2. NET LENDING (+) OR BORROWING (-) BY US HOUSEHOLDS IN THE SNA CAPITAL ACCOUNT

Third, the SNA financial account makes clear that the shift to a deep net borrowing position from 2003 through 2006 was driven primarily by a sharp net increase in household debt, in unprecedented volumes above 13 percent of income in each of those years. This is shown in

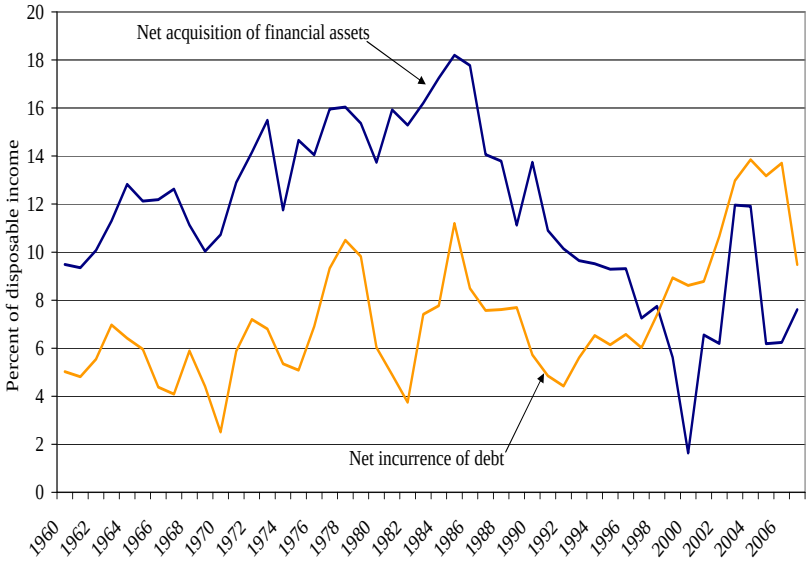

FIGURE 3. HOUSEHOLD NET LENDING AND BORROWING IN THE SNA FINANCIAL ACCOUNT

Figure 3 which graphs the two components of household net lending or borrowing using data in the SNA financial account—households' net qcquisition of financial assets appears in blue, the sector's net incurrence of debt in orange (for both, units are percentages of disposable income)

In sum, the household sector over twenty-five years transitioned from a net lender to a net borrower – a swing of ten percent of disposable income. So how did households borrow so much in aggregate over the past decade?

In the household sector, the answer appears as mortgage borrowing. Line 139 of the household balance sheet show a large net increase in mortgage debt, which rose steadily by forty percent of disposable income over the forty years from 1960 to 2000 (from 0.31 to 0.70), and then by another forty percent over only seven years from 2000 to 2007 (to 1.09). This rapid acceleration was facilitated by the rise of the securitization of household debt —first, via securitizations backed by the government-sponsored enterprises (Fannie Mae, Freddie Mac, and Ginnie Mae) and later by a rapid increase in funding through non-agency MBS and CDOs for a growing number of mortgage originations that did not conform to the GSEs underwriting criteria.

Thus, over the last decade, as households became net borrowers, they rapidly accumulated mortgage debt while only slightly raising the net purchase of real assets, primarily housing. In this sense, we observe in the SNA data a significant rise in balance sheet leverage by the household sector that, at least in hindsight, seems to signal exposure of consumer demand to decreases in the value of housing and financial assets.

Turning to exposure, the changes in household wealth from revaluation are significantly larger than those due to saving rates, at least in the short term.[6] While the scale of the recent revaluations in home prices and, more recently, equity is historically large, in general revaluation

[6] These revisions do not historically lead to much movement of consumption, which is the core of the equity premium puzzle.

often leads to changes in household net worth that dwarf those due to non-secular changes in household saving.

Figure 4 shows revaluation of total assets as the sum of that on financial assets (dark shaded region) and nonfinancial assets (light shaded region), primarily real estate, all as a share of disposable income. In the SNA, change in wealth is equal to net capital formation (32) plus net lending or borrowing (37) (the sum of these two is net saving (28) + capital transfers) plus revaluation of assets (nonfinancial 84, financial 88, and total 94) plus other volume changes (includes durables goods, 80). What is immediately striking is the magnitude of these effects relative to those in Figure 1: In peak years revaluation is half of disposable income. Fully offsetting the accounting effects of revaluation would require, in single years, household saving rates on the order of 20 percent or minus 60 percent of disposable income.

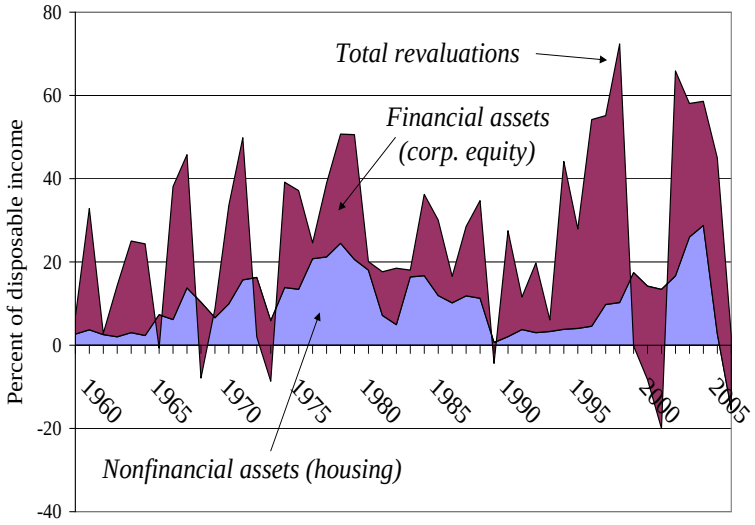

FIGURE 4. REVALUATIONS OF HOUSEHOLD ASSETS

In the 2000's, the effects of net appreciation of households' nonfinancial assets were significantly positive, but they were not unprecedented. Nonfinancial revaluation was of a similar magnitude in the second half of the 1970s. However, the precipitous drop in house prices in the second half of 2006 and in 2007 produced an unprecedented two-year downward revaluation of nonfinancial assets relative to disposable income.

Two other points deserve mention. First, the revaluation of financial assets is more volatile than that of tangible assets, reflecting the high historical volatility of the stock market. Second, to some extent the positive revaluations since 1995 excluding around the recession of 2001 are consistent with increases in wealth due to revaluation leading to net borrowing by the household sector. To some extent however, they are not, as households continued to borrow through the 2001 recession.

In summary, in the lead-up to the financial crisis, neither housing revaluation nor housing investment were significantly out of line with historical patterns. What changed dramatically was the volume of lending to the household sector and the sector's shift from on net supplying capital to fund the investment of other sectors in the economy to on net borrowing capital in the form of mortgages.

II. Which sectors did the households stop lending to and start borrowing from?

Across sectors of the economy, those in a net lending position spend less than they earn, allowing their surplus funds to be used to finance net borrowing positions in other sectors. Except for statistical discrepancies, net lending and borrowing across all sectors, including the foreign sector, sum to zero each period.

Table 1 reports net lending and borrowing across the 7 major sectors of the U.S. economy over each of the past 5 decades (decade-average values, in constant dollars, are shown). The top panel relies on the SNA capital account; the lower panel relies on the SNA financial account. From the 1960s through the 1990s, the nonfinancial business sectors (lines 3 and 4) and the government sectors (lines 6 and 7) were consistently net borrowers, meaning their rates of investment almost always exceeded their rates of saving out of current income (saving being income less consumption expenditures). In the 1960s and 1970s, the rest of the world was on

balance a net borrower as well, with the household and the financial business sectors serving as the net lenders to all the other sectors. The primary change into the 1980s and 1990s was in the external sector: foreign institutions (line 8) become significant net lenders to US businesses and government.

Table 1. SNA Net Lending and Borrowing in the United States, by Sector and Decade: 1960 through 2007

	SNA Capital Account Net lending (+) or borrowing (-) by sector	1960s	1970s	1980s	1990s	2000s
1	All U.S. sectors	9	-41	-139	-197	**-472**
2	Households	74	146	213	54	**-251**
3	Nonfinancial noncorporate business	-48	-73	-83	-41	**-71**
4	Nonfinancial corporations	-4	-49	-16	-22	**20**
5	Financial businesses	18	27	-1	14	**110**
6	Federal government	-13	-84	-239	-169	**-201**
7	Municipal governments	-18	-5	-10	-34	**-75**
8	Rest of the world	-18	-8	103	116	**526**
9	Statistical discrepancy	9	51	35	82	-56

	SNA Financial Account Net lending (+) or borrowing (-) by sector	1960s	1970s	1980s	1990s	2000s
1	All U.S. sectors	9	-46	-140	-26	**-572**
2	Households	127	217	329	153	**-311**
3	Nonfinancial noncorporate business	-48	-73	-83	-41	**-71**
4	Nonfinancial corporations	-48	-114	-123	11	**44**
5	Financial businesses	13	8	7	25	**19**
6	Federal government	-13	-89	-266	-189	**-227**
7	Municipal governments	-18	3	-6	12	**-28**
8	Rest of the world	-13	-8	86	124	**543**

Note: Data taken from Table S.2, "Selected Aggregates for Total U.S. Economy and Sectors" (lines 34-50).

The 2000s, however, saw a substantial shift in the average sectoral pattern of net lending and borrowing in the US, as households swung heavily into a net borrowing position for the first time. On average in this decade, nonfinancial corporations also became net lenders, but, with the federal and municipal governments generally continuing to run sizable investment shortfalls, a large inflow of foreign (financial) capital—line 7—provided the lion's share of the net lending --

the “global saving glut.”

In sum then, the SNA show in an integrated fashion the flows of funds across sectors and highlight the offsetting changes in the saving behavior of households and the rest of the world that allowed the US to maintain residential and commercial investment rates, maintained a strong dollar, and raised market returns. But also did not raise the costs of the borrowing or stem the rush to leverage and short-term debt financing.

III. The financial sector of the SNA and the prelude to the financial crisis

The financial market crisis began in 2007 when recent vintages of securitized mortgages began to default at elevated rates and house prices decelerated nationally and began to fall (in nominal terms) in a number of local markets. Mortgage-related assets lost significant value, and fewer institutions were willing to hold or buy them as the securities were significantly downgraded and the complexity of some structures clouded valuations. Financial institutions with significant exposures to mortgage-related assets lost capital, questions about the solvency of specific companies arose, and a range of financial institutions became vulnerable to—and experienced—a withdrawal of short-term funding.

Thus the origin of the crisis in the financial sector was exposure to real estate and mortgage credit, but the core losses were exacerbated by four factors: high leverage (which amplifies the effect of price movements on balance sheets and can lead to margin calls that require unwinding positions pushing prices lower and making losses greater still), complexity of assets and the balance sheet (which hides solvent institutions from credibly communicating this and so accessing credit cheaply or avoiding runs), maturity mismatch (which leads to increased debt payments when credit becomes expensive which reduces liquid assets further and can lead to bankruptcy), and reliance on business models with significant exposure to any counterparty risk

(creates the risk of a sort of bank run: when counterparties suspect a firm may not be solvent, it cannot conduct business, which can effectively make it insolvent).[7]

As the crisis has progressed, house prices have continued to fall and the US is, as we write, mired in a year-long recession. Many prominent financial companies have failed or been taken over or have undertaken significant reorganizations.

In this section, we argue that, although helpful for many macroeconomic analyses, reliance on the SNA data would surely not have been sufficient to appreciate the substantial vulnerabilities that accumulated in the financial system during the 2000's or to anticipate the repercussions of the shock that initiated the current crisis and deep recession.

There are a few reasons that data in the SNA are not helpful in measuring the exposure of the financial sector to house price risk. The SNA do not distinguish between lending or borrowing using different types of corporate bonds or commercial paper. Structured financial products—such as collateralized debt obligations, asset-backed securities, non-agency mortgage-backed securities, and certain types of asset-backed commercial paper (namely, structured investment vehicles and securities arbitrage programs)—generally carry significantly more volatile returns than traditional corporate bonds and the most senior structured securities and are more vulnerable to correlated losses in the underlying pool of assets backing them. While the SNA does shows assets that consist of long-term loans (102), which are primarily mortgages, mortgages also show up in bonds and other assets as they are securitized. In fact, assets that are long-term loans decline as a fraction of total assets for the sector from 1990 on. Thus, due largely

[7] We omit other important potential explanations that cannot be measured in national accounts, such as lack of attention to risk and expected returns, herd mentality, and mismanaged conflicts in interest between employees, customers, and investors.

to aggregation across asset classes, exposure of the financial sector to the real-estate market through structured MBS is masked in the SNA data.

Turning to the propagating factors, the SNA also largely hides sectoral leverage. First, aggregation across the sector hides leverage of commercial and investment banks. Balance sheet leverage in the aggregate financial sector of the SNA—say, as measured by the ratio of asset values to equity capital—is an amalgam of institutions that employ very little leverage—such as mutual funds, pension funds, money market funds, and insurance companies (and that, together, account for a substantial amount of security holdings)—and others that employ significant leverage—such as broker/dealers, commercial banks and saving institutions, and government-sponsored enterprises (Fannie Mae, Freddie Mac, and the Federal Home Loan Banks). Although implicit leverage in the financial system undoubtedly increased substantially during the mid-2000s, the SNA aggregate data for the financial sector show just a slightly faster increase in liabilities than assets, implying only a small increase in leverage.

According to Tobias Adrian and Hyun Song Shin (2008), during the credit boom of the mid-2000s balance sheet leverage increased among the primary dealers and major investment banks while leverage decreased among commercial banks. Moreover, some large commercial banks and bank holding companies—particularly those with significant broker/dealer functions—increased their balance sheet leverage, even as the (sub)sector as a whole generally did not. Ultimately those firms that increased leverage most aggressively in the credit boom were hardest hit by the turmoil and seem to have amplified the crisis (Markus Brunnermeier, 2008).

Second, leverage is difficult to observe because risk is difficult to observe. The distinction between collateral and a risky investment is in the eye of the beholder. As in most macro-

financial accounts produced around the world, the SNA reports lending and borrowing between sectors using broad categories of credit instruments—instruments that, for example, embed very different degrees of credit risk and implicit leverage, key propagation mechanisms that can vary significantly across many hard-to-measure dimensions. For example, many mortgages originated during the credit boom carried nontraditional loan terms (option ARMs) and were underwritten using more lenient criteria (no money down, no documentation of income/assets, etc) that ultimately exposed investors to unprecedented losses. Although the SNA data clearly tracked the exceptional rate of growth of mortgage credit during the boom, they did not convey information needed to assess the likelihood or magnitude of the deterioration in credit quality that might have been expected to accompany a downturn in the housing market or a sharp reduction in refinancing opportunities.

Heterogeneity in leverage during the credit boom—and the adverse consequences of it during the bust—was also stark in the household sector and to some extent missed by national accounts. For example, the aggregate home loan-to-value ratio—a measure of homeowner leverage—did not rise much at all as home prices and mortgage borrowing were accelerating in the housing market boom years of 2004 through 2006. However, loan-level data has made clear that a significant fraction of new mortgages were extended with very little down payments and, thus, with exceptionally high leverage. Of course, once home prices began to fall and mortgage underwriting tightened substantially, many homeowners and lenders who seem to have relied more on price appreciation and refinancing opportunities than on traditional underwriting (based on ability-to-repay metrics) ran into problems making loan payments, resulting in unprecedented volumes of serious delinquencies and foreclosures..

Aggregation to the broad sectoral level and to broad asset classes also masks changes in balance sheet complexity of different institutions. For accounts data to be useful in these sorts of assessments requires nonlinear aggregation and reporting based on complex analyses of the holdings of financial institutions. We expect both that this is beyond what government statistics can usefully accomplish and that such information probably was not needed from the government -- the complexity was largely known. That is, it seems likely that everyone knew that Bear Stearns was a complex institution, but potentially everyone did not appreciate how this complexity could make Bear insolvent in the face of large but indeterminate losses that could not credibly be communicated to the market. We only see a role for aggregate data in terms of disclosing industry concentration and activity, and hope that equity holders who can analyze the complex institutions that they own understand the importance of balance sheet transparency where possible and the value of sufficient collateral or safe assets.

In terms of maturity mismatch, as emphasized by David Bowman and Daniel Covitz (2008) and by Brunnermeier (2008), during the credit boom, financial engineering allowed a range of financial institutions, hedge funds, and money managers to earn outsized returns (in an environment in which interest rates were generally very low by historical standards) “borrowing short” and “lending long.” Borrowers benefitted from low cost of capital and were able to fund more overall debt with less capital but bore the risk that lenders would withdrawal their funding. Firms that rely on short-term (liquid) debt for funding long-term (potentially illiquid) assets are vulnerable to runs—sudden withdrawals of funding that may or may not have be triggered by news about or investors’ perceptions of the borrower’s underlying credit quality or ability to repay debts. During the credit boom many leveraged firms (broker/dealers and subsidiary broker/dealers of major commercial banks) took on extremely mismatched maturity structures;

they relied on *overnight* debt (in the form of repurchase agreements) because this funding that was inexpensive (very small "haircuts" or margins on non-government collateral used to secure repo loans). In addition, they invested in risk long-term securities with limited liquidity, such as asset-backed commercial paper conduits. In the crisis, as doubts about the values of a range of securities were called into question, and investors pulled back from "rolling" their short-term investments and financial institutions were pushed to the edge of bankruptcy.

The SNA aggregation across institution types and asset classes largely masks the rise in reliance on short-term funding. The SNA do measure net short term borrowing, but these data show only a long-term trend. Net liabilities that are short–term debt (121) rise from 2 percent of total assets (86) for the sector in 1960 to about 7 percent in 2007 (Figure 3). Apart from falling in the 1980's however, this is a trend that does not show any significant difference between the 1990's and 2000's that would raise an alarm ex ante. There is also a trend increase rather than any recent changes in commercial paper obligations (119) to total assets (also Figure 3). We conclude that aggregation across the sector hid large exposure to maturity mismatch in some financial firms. Thus, the third key propagation mechanism that operated forcefully in the financial market turmoil – a large reliance on short-term debt to fund long-term projects built up substantially during the credit boom in a manner that the aggregated data in the SNA did not emphasize.

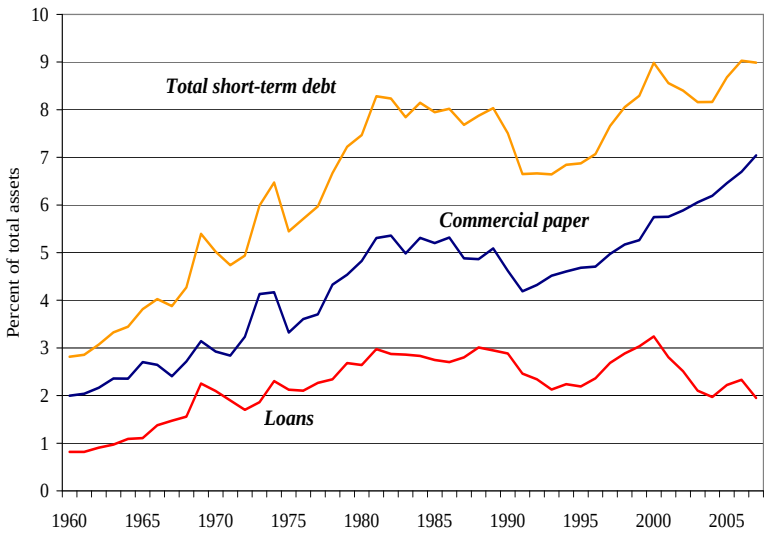

FIGURE 5. SHORT-TERM DEBT OF THE SNA FINANCIAL SECTOR

Finally, in terms of counterparty risk, sectoral aggregation completely masks the gross, largely short-term counterparty exposure that made the financial system vulnerable to the fear that a bank might enter bankruptcy.

In sum, then the SNA have three shortcomings for conveying key factors that presage the breadth and severity of the financial crisis. First, the financial sector covered by the SNA is too broad—it covers too many distinct subsectors. Second, aggregate information in the SNA masks substantial—and important—heterogeneity among firms and households. Finally, The SNA presentation does not differentiate among similar debt instruments with different risk characteristics.

IV. Conclusion

The credit boom in the U.S. economy left a pronounced footprint in the SNA. In the household sector, the SNA shows an unprecedented swing to a significant net borrowing position. Also, in the past decade, the SNA show historically-large increases in housing investment and accumulation of mortgage debt. What cannot be gleaned from the SNA is the extent to which mortgage risk rose disproportionately more than leverage due to looser underwriting.

In the SNA financial business sector, building exposure to real estate and institutional vulnerabilities were even less visible. This highlights a major shortcoming of the current SNA data for predicting the current crisis.

What improvements can be made?

First, while it seems unrealistic to ask that national accounts measure the riskiness of assets, more detailed classification of assets would be useful, such as into different classes of

mortgage assets. It also seems feasible to separate out structured financial products.

Second, because average net positions mask changes in the tails of the distribution, the SNA would benefit from having statistics describing the extent of extreme leverage, extreme lack of diversification, or more generally statistics about the extent to which a significant fraction of a sector has a large exposure.

Third, the sector aggregation could be significantly improved. The SNA should separate the asset holdings of households from those of the financial sector when the financial sector purchases assets that households directly own. When a mutual fund or hedge fund purchases a security, that security should appear on the household balance sheet not the balance sheet of the financial sector. Only firms that provide a significant level of financial intermediation and are not simply conduits for households should be in the financial sector.

Finally, the financial sector could be split into those that can use leverage and those that cannot. So insurance companies and pension funds should be a different sector, if a sector at all. While entities like AIG and products like credit default swaps blur this distinction significantly, it remains feasible for national accounts to construct such a breakdown.

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