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ABSTRACT

This article presents an adaptation of the square social accounting matrix used in economic planning and programming to the rectangular or vertical transaction matrix used in post Keynesian monetary economics. The objective is to obtain a simple and intuitive framework to organize macroeconomic data in terms of the main institutional sectors of the economy, showing how production, distribution, demand, and financing are inter-related. The article presents the social accounting matrix of the U.S. economy as an example and use it to analyze the trends in net lending and household net income since 1960.

KEYWORDS

Social accounting matrix; U.S. economy; post Keynesian

One agent's expenditure is always another agent's revenue. Someone's asset is always someone else's liability. These basic principles of accounting give us a roadmap to show how effective demand determines income, how income is distributed, and how these two issues change the debt-income ratios of different agents, which in their turn influence effective demand itself in subsequent periods.

Post Keynesian monetary economics usually emphasizes the principle of effective demand and the consistency between the dynamics of stock and flow variables (Godley and Lavoie 2006), modeling the evolution of financial imbalances and leverage indexes (Minsky 1992). Despite the intuitive appeal of such view, its translation into applied models has been difficult due to the lack of easy data organized in terms of the stocks and flows of heterogeneous economic agents.

To develop the post Keynesian research agenda, this article presents a simplified social accounting matrix (SAM) that summarizes the main flow variables of an open economy. The objective is to develop a simple methodology for teaching and research. To illustrate its application, we will present a simplified matrix of the U.S. economy that links production, distribution, demand, and net lending of four institutional sectors.

Nelson H. Barbosa-Filho is a Professor at the Getúlio Vargas Foundation (FGV) and the University of Brasilia (UnB). The author would like to thank Lance Taylor and Rishabh Kumar for their comments and suggestions on a previous version of the matrix presented in this paper. The usual disclaimer applies.
Color versions of one or more of the figures in this article can be found online at www.tandfonline.com/mpke.

In terms of the post Keynesian literature on the topic, the matrix presented in this article is an adaptation of the usual "square" SAM first proposed by Stone and Brown (1962) and used in Structuralist Computable General Equilibrium models (Taylor 1990), to a "rectangular" or "vertical" framework to facilitate the interpretation of the numbers.

In other words, the analysis translates the square SAM proposed by Taylor (2004) into a vertical sequential SAM to show how one can move from production to net lending or vice versa, based on the U.S. data. The structure is also different from the transaction matrix proposed by Godley and Lavoie (2006), but it anyway complements it by disaggregating the income, tax, and transfers flows that alter income distribution substantially.

The matrix presented in this article is also an alternative way to organize the U.S. Bureau of Economic Analysis's (BEA's) Integrated Macroeconomic Accounts (IMA) in one simple framework.[1] The data come from the National Income and Product Accounts (NIPA) published by the BEA, and the Flow-of-Funds (FoF), or Financial Accounts of the United States (FAUS) published by the Federal Reserve (Fed).

The vertical SAM of the U.S. economy

The U.S. NIPA are currently organized in four main institutional sectors: households (HOU), business (BUS), government (GOV), and the rest of the world (ROW). The household sector includes households and nonprofit institutions serving households. Some households' series can be divided between these two subgroups, but to simplify the analysis we will follow the BEA and treat them as one institutional sector.[2] The business sector includes both financial and nonfinancial firms, as well as corporate and noncorporate businesses. As it happens to households, some of the business's series can be disaggregated, but we will not do this here to keep things simple.[3] The government sector includes the federal, state, and local administrations. Government enterprises are part of the business sector and the rest of the world represents all non-resident agents that interact with U.S. residents.

[1]According to the BEA's website, the IMA "are part of an interagency effort to further harmonize the BEA National Income and Product Accounts (NIPAs) and the Federal Reserve Board Financial Accounts of the United States (FAUS)." Bond et al. (2007) and Yamashita (2013) presented the methodology of the U.S. IMA. As the BEA itself warns, there are discrepancies between some numbers from IMA and NIPA sources. We will work only with NIPA numbers in this paper and indicate the source table accordingly. The data comes from the BEA NIPA tables, as of December 2016, and are available from the author upon request.

[2]The households sector can also be divided by income cohort, say, poor, middle, and rich, using household surveys (Taylor et al. 2014) or tax data (Piketty, Saez, and Zucman 2016) as a guide.

[3]In view of recent macroeconomic developments, the most useful division is between financial and nonfinancial firms, which has been recently expanded in the BEA's IMA (Kornfeld et al. 2016).

The starting point of the SAM is the definition of the value-added or gross domestic product (GDP) of the economy. However, to represent the four institutional sectors it is useful to rewrite it in terms of aggregate supply (GDP plus imports) and aggregate demand (domestic absorption plus exports). Formally, in nominal terms we have

$$P_Y Y + eP_M^* M = P_C C + P_I I + P_X X \tag{1}$$

where P_j represents the price index of real variable j, with j equal to GDP (Y), imports (M), consumption (C), investment (I), and exports (X). The nominal exchange rate "e" represents the domestic price of foreign currency and P_M^* is the foreign price of imports. For simplicity, I assumed that there is just one price deflator for each macroeconomic aggregate on the right-hand side of (1).[4]

From the demand data of the U.S. economy, we can divide consumption in two sectors (households and government) and investment in three sectors (households, business, and government). Formally:

$$P_Y Y + eP_M^* M = P_C(C_{HOU} + C_{GOV}) + P_I(I_{HOU} + I_{BUS} + I_{GOV}) + P_X X \tag{2}$$

where C_i and I_i represent the real consumption and investment of sector i.

Because by definition exports represent the final demand of the rest of the world for U.S. products, the right-hand side of Equation (2) already gives us the decomposition of aggregate demand by institutional sector. To obtain each sector's financial balance or net lending we have to divide the left-hand side of Equation (2) in the "final income" available for each sector; that is, the net income after interest, dividends, taxes, benefits, and any other factor and transfers payments between our four institutional agents. This reallocation of income is one of the main parts of the SAM and it is crucial to determine each sector's financial balance and analyze its final demand.

Focusing on the supply, the initial income of each domestic institutional sector is the value it adds to intermediary inputs. The initial income of the rest of the world in relation to the United States is simply the U.S. imports and, to measure GDP in market prices, we also have to add net indirect taxes as an independent component of the nominal aggregate supply that belongs to the government. Formally:

$$P_Y Y + eP_M^* M = P_{HOU} Y_{HOU} + P_{BUS} Y_{BUS} + P_{GOV} Y_{GOV} + eP_M^* M + T \tag{3}$$

where Y_i is the real value added by sector i and T represents indirect taxes minus subsidies in nominal terms. Note that if we subtract imports from both sides of Equation (3), we have the usual identity between GDP at

[4]For example, private and government consumption have different price indexes, and so on. The NIPA data contains price deflators for almost all expenditures, but this would just complicate the analysis without changing its meaning.

Table 1. U.S. 2015 initial income flows by institutional sectors, in billions of USD dollars, receipts (+) or payments (−).

	HOU	BUS	GOV	ROW	Total
Initial income (GDP + imports)	1,324	13,313	3,400	2,786	20,823
Compensation of employees	852	7,155	1,697		9,704
Wages and salaries	705	5,997	1,164		7,866
Supplements	147	1,159	533		1,838
Gross operating surplus	472	6,157	523		7,152
Net operating surplus		4,575			4,575
Capital consumption	472	1,837	523		2,831
Statistical discrepancy		−254			−254
Net indirect taxes			1,181		1,181
Imports				2,786	2,786
Memo: initial income in % of row total	6.4	63.9	16.3	13.4	100.0

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU: households and nonprofit institutions; BUS: business; GOV: government; ROW: the rest of the world.

market prices and GDP at production prices plus net indirect taxes. As we proceed, it will become clear why it is better to start with an equation for total supply rather than for GDP to explain all the determinants of net lending.

Moving to the U.S. data, Table 1 presents the value of Equation (3) for 2015. The numbers indicate a total supply of $20,823 billion, with $18,037 billion from domestic sources (GDP) and $2,786 billion from the rest of the world (imports). The BEA data also allows us to decompose domestic GDP in the main components of the value added by each institutional sector.[5]

The compensation of domestic employees was $9,704 billion in 2015, paid mostly by the business and government sectors. Approximately 81% of this compensation consisted of wage and salaries, which are readily available for spending by households after taxes and transfers. The remaining 19% were employers' contributions to private pensions and insurance funds and to government social security, which represents a forced or compulsory saving by households.

Because all domestic sectors invest, all of them have an estimated income from capital consumption, which totaled $2,831 billion in 2015. To simplify the exposition, all net operating surplus was initially allocated to the business sector, $4,575 billion in 2015. Given the way in which the U.S. NIPA are structured, we have to start with this accounting assumption to calculate the net lending or borrowing of each institutional sector.[6] As we will see below, most of this surplus was reallocated to households as capital income.

[5]All data used in this paper come from 10 BEA tables: Tables 1.5.5, 1.10, 1.12, 1.13, 2.1, 3.1, 4.1, 5.1, 7.10, and 7.11.

[6]For some economies, we can start allocating part of the net operating surplus to households and the government. This is a point of attention in applying the methodology of this paper to other countries than the United States.

Table 2. U.S. 2015 reallocation of labor and capital income by institutional sector in billions of U.S. dollars, receipts (+) or payments (−).

	HOU	BUS	GOV	ROW	Total
1) Initial income (from production)	1,324	13,313	3,400	2,786	20,823
2) Reallocation of labor income	8,841	−7,155	−1,697	11	0
Domestic flows	8,852	−7,155	−1,697		0
International flows	−11			11	0
Wages and salaries received	7			−7	0
Wages and salaries paid	−18			18	0
3) Reallocation of capital income	4,026	−3,296	−513	−217	0
Proprietors' income	1,377	−1,377			0
Rental income	660	−660			0
Net dividend income	951	−841	20	−130	0
Receipts	951	578	20	183	1,733
Payments	0	−1,419	0	−314	−1,733
Net interest income	1,039	−672	−536	169	0
Receipts	1,303	1,769	88	324	3,483
Payments	−264	−2,441	−623	−154	−3,483
Net reinvested earnings received		255		−255	0
From ROW		338		−338	0
To ROW		−83		83	0
Government rents and royalties		−21	21		0
Current surplus of gov enterprises		19	−19		0
4) Income after factor reallocation (1 + 2+3)	14,191	2,861	1,190	2,581	20,823
Memo: % of row total	68.2	13.7	5.7	12.4	100.0

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU : households and nonprofit institutions; BUS : business; GOV : government; ROW : the rest of the world.

The gross operating surplus also includes a statistical discrepancy in the U.S. case, which corresponds to the difference between income registered from the production and income sides of the NIPA.[7] To complete the picture, all net indirect taxes goes to the government and all imports to the rest of the world.

In economic terms, Table 1 indicates that the business sector produced 63.9% of total supply at market prices in 2015, with the government coming in second with 16.3%, and the rest of the world in third with 13.4%. Households produced only 6.4% of total supply in 2015, but this was not their final income. In fact, all labor compensation goes to families and part of the business net operating surplus is redistributed across sectors as proprietors' income, rents, dividends, and other asset categories. To see how this happens, Table 2 shows the numbers for 2015.

In words, all labor compensation paid by the business ($7,155 billion) and government ($1,697 billion) sectors goes to the household sector. In addition to this, there are also labor receipts and payments between households' and the rest of the world due to the wages and salaries of non-resident workers. This kind of flow is usually a payment from business to workers, but it can be registered as a direct flow between the rest of the world and households to facilitate the analysis. In 2015

[7]The BEA's statistical discrepancy equals GDP minus gross domestic income (GDI). A negative statistical discrepancy means, therefore, that GDP was smaller than GDI in the period under analysis.

the U.S. made a net payment of $11 billion in wages and salaries to the rest of the world in 2015.

Moving to capital income, by definition the business sector pays all proprietors' and rental income of the household sector, which amounted to $1,377 billion and $660 billion in 2015, respectively. The next category is dividends, which is usually a net payment of the business sector to the other domestic sectors. Because the rest of the world also pays and receives dividends, its net income from this source can be positive, negative, or even zero. In 2015, the rest of the world paid $130 billion to the United States in net dividends, which together with the net payments of $841 billion by the U.S. business sector raised the households' income in $951 billion, and the government income in $20 billion.[8]

Table 2 also shows that, in addition to dividends, households received a net interest income of $1,039 billion in 2015, whereas the rest of the world received $169 billion. Because the values must cancel out, the net interest payments came from the business and government sectors, with $672 and $536 billion, respectively. The total amount of interest payments was $3,483 billion in 2015 (19% of GDP) and the BEA's data breaks these flows by institutional sector, as also shown in Table 2.[9]

The final three types of capital income are the intrafirm flows between the United States and the rest of the world and the government asset receipts and payments. In 2015, the rest of the world made a net payment of $255 billion to the business sector as reinvested earnings, whereas the business sector paid $21 billion to the government through rents and royalties. The government also had a negative capital income from government enterprises, which registered a current deficit of $19 billion in 2015.

Note that one sector's payment is another sector's receipt in all factor income flows reallocated in Table 2. The sum of the reallocated flows is therefore zero in the last column of Table 2. The total value of the sectors' initial income remains the same in the last line of the same table, but its composition changed substantially. For example, the income of the household sector increased from $1,324 billion from production to $14,191 after the reallocation of labor and capital income. The offsetting reduction was concentrated mostly in the business sector, but the government and the rest of the world were also net payers of factor income in 2015.

Overall, when we include the reallocation of factor income in the analysis, the household sector received 68.2% of the total supply or demand in 2015.

[8]The current structure of the BEA's NIPA does not present bilateral dividends and interest flows. Because of this, Table 2 presents only the total receipts and payments by institutional sector.

[9]In 2015, 29% of the total interest payments ($1,010 billion) were imputed flows due to financial services and "owner-occupied-housing." In the later, households receive an imputed rent for the homes they own. For a detailed analysis of imputed interest in economic analyses of capital income, see Shaikh (2016, Appendix 6.7).

Table 3. U.S. 2015 taxes, social contributions, social benefits, and other current transfers by institutional sector in billions of U.S. dollars, receipts (+) or payments (−).

	HOU	BUS	GOV	ROW	Total
1) Income after factor reallocation	14,191	2,861	1,190	2,581	0
2) Taxes and transfers	−652	−715	1,206	161	0
Current taxes	−1,939	−515	2,476	−22	0
Contibutions to Social Insurance	−1,204		1,209	−5	0
Social benefits	2,627		−2,648	20	0
Other current tranfers	−137	−200	169	168	0
ROW to HOU	98			−98	0
ROW to BUS		1		−1	0
ROW to GOV			7	−7	0
HOU to ROW	−184			184	0
BUS to ROW		−39		39	0
GOV to ROW			−52	52	0
HOU to GOV (net)	−103		103		0
BUS to HOU (net)	51	−51			0
BUS to GOV (net)		−111	111		0
3) Final income (1 + 2)	13,539	2,146	2,396	2,742	20,823
Memo: % of row total	65.0	10.3	11.5	13.2	100.0

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU: households and nonprofit institutions; BUS: business; GOV: government; ROW: the rest of the world.

The shares of the business and rest-of-the-world sectors were 13.7% and 12.4%, respectively, whereas the government retained 5.7% of aggregate supply after its labor-compensation and net-interest payments.

The third step to build our vertical SAM is to include taxes and transfers in the analysis. To do this, we have to subtract direct tax payments and social contributions from the private sectors and add them to the government. In the reverse direction, we have to add social benefits to the private sectors' income and subtract them from the government. Table 3 shows the numbers for 2015.

Focus on the government column in Table 3. Total current taxes were $2,476 billion in 2015 and most of it came from the household sector. The same applies to the contributions for social insurance, which totaled $1,209 billion in 2015. In the reverse direction, the government paid $2,648 billion in social benefits during that year, with almost all of it going to the household sector. To complete the picture, all other current transfers represented an additional net income of $169 billion for the government and $168 billion for the rest of the world in 2015. The net payers were therefore the household and business sectors, with $137 billion and $200 billion, respectively.[10]

Table 3 also shows the final income of each sector, that is, the net income available for final expenditures on consumption, investment and exports. Note that in the case of the rest of the world, the concept of "final income" is a monetary revenue, that is, the sum of its exports to the United States with the net income and transfers that it receives from U.S. residents. The rest of the world obviously has other sources of monetary

[10]With four institutional sectors, we should have 12 bilateral flows of other transfers in Table 3. We present only nine bilateral flows because the BEA data contains only the net values of some transfers between our four institutional sectors.

Table 4. U.S. 2015 final income, final demand and net lending by institutional sector, in billions of USD, receipts (+) or payments (−).

	HOU	BUS	GOV	ROW	Total
1) Final income	13,539	2,146	2,396	2,742	20,823
2) Final demand	−12,972	−2,369	−3,218	−2,264	−20,823
Consumption	−12,284		−2,605		−14,889
Investment	−688	−2,369	−613		−3,670
Exports				−2,264	−2,264
3) Current-account balance (1–2)	567	−223	−822	477	0
4) Capital transactions	−13	−27	40	1	0
5) Net lending (3 + 4)	554	−249	−782	478	0
Memo: % of total fnal income	2.7	−1.2	−3.8	2.3	0.0

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU: households and nonprofit institutions; BUS: business; GOV: government; ROW: the rest of the world.

revenue, but from the perspective of the United States, the variable in Table 3 is the one that matters because it determines the U.S. current-account balance after we include U.S. exports in the analysis below.

By construction, the total final income is equal to the aggregate supply or demand, and its composition gives us one of the necessary variables to calculate the net lending of each institutional sector. Before we move to that, note that after the reallocation of factor income, taxes and transfers, the household final income represented 65% of total supply or demand in 2015. The rest of the world comes in second with 13.2%, and the government in third with 11.5%. The final income of the business sectors consists of undistributed net profits from domestic and foreign sources and it represented 10.3% of total supply in 2015.

Now, to obtain the net lending of each institutional sector, we have to subtract final expenditures from final income and add capital transactions to the analysis.[11] Table 4 shows the numbers for 2015 and it can be summarized as follows:

1. the household sector had a final income of $13,539 billion and a final demand of $12,972 ($12,284 billion in consumption and $688 billion in investment), with a current-account surplus of $567;
2. the business sector had a final income of $2,146 billion, spent $2,369 billion in investment, and had a current-account deficit of $223 billion;
3. the government had a final income $2,396 billion, spent $2,605 billion in consumption and $613 billion in investment, and also had a current-account deficit, of $882 billion; and
4. the rest of the world received $2,742 billion from its exports to the United States and its net income and transfers flows with U.S. residents, imported $2,264 billion in U.S. products, and registered a current-account surplus of $477 billion.

[11]Capital transactions consists of transfers of capital and other operations involving nonproduced nonfinancial assets.

Table 5. U.S. 2015 Vertical Social Accounting Matrix, in billions of USD, receipts (+) or payments (−).

	HOU	BUS	GOV	ROW	Total
1) Initial income (GDP + imports)	1,324	13,313	3,400	2,786	20,823
Compensation of employees	852	7,155	1,697		9,704
Gross operating surplus	472	6,157	523		7,152
Net indirect taxes			1,181		1,181
Imports				2,786	2,786
2) Reallocation of labor income	8,841	−7,155	−1,697	11	0
Domestic flows	8,852	−7,155	−1,697		0
International flows	−11			11	0
3) Reallocation of capital income	4,026	−3,296	−513	−217	0
Proprietors' income	1,377	−1,377			0
Rental income	660	−660			0
Net dividend income	951	−841	20	−130	0
Net interest income	1,039	−672	−536	169	0
Net reinvested earnings received		255		−255	0
Government rents and royalties		−21	21		0
Current surplus of gov enterprises		19	−19		0
4) Taxes and transfers	−652	−715	1,206	161	0
Current taxes	−1,939	−515	2,476	−22	0
Contibutions to Social Insurance	−1,204		1,209	−5	0
Social benefits	2,627		−2,648	20	0
Other current tranfers	−137	−200	169	168	0
5) Final income (1 + 2+3 + 4)	13,539	2,146	2,396	2,742	20,823
6) Final demand	−12,972	−2,369	−3,218	−2,264	−20,823
Consumption	−12,284		−2,605		−14,889
Investment	−688	−2,369	−613		−3,670
Exports				−2,264	−2,264
7) Current-account balance (5 + 6)	567	−223	−822	477	0
8) Capital transactions	−13	−27	40	1	0
9) Net lending (7 + 8)	554	−249	−782	478	0

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU : households and non-profit institutions; BUS : business; GOV : government; ROW : the rest of the world.

Still on Table 4, net lending is equal to the current-account surplus plus capital transactions. In 2015, the household and business sectors made a net payment of $13 and $27 billion in capital transactions, respectively, whereas the government had a net receipt of $40 billion and the rest of the world of $1 billion. In relative terms, the surpluses of households and the rest of the world represented 2.7% and 2.3% of aggregate supply of demand in 2015, respectively. The government deficit was 3.8% of the total, whereas the business sector had a deficit of 1.2% of aggregate demand.

Before we proceed to the U.S. time series, note that we can also rearrange Table 4 in terms of saving and investment, which are the usual concepts of economists to define net lending. To do this, one just has to separate capital from noncapital final expenditures and define final saving as the difference between final income and noncapital final expenditures.

Now, if we stack Tables 1 through 4 up we have a vertical SAM, that is, a map to move from the initial income from production (aggregate supply) to the net lending of each institutional sector. In this process, we allocate all labor and capital income and distribute all current transfers and final demand (aggregate demand) by institutional sector. Table 5 shows the

Table 6. U.S. 2015 Flow of Funds in billions of USD, net lending (+) or net borrowing (−) by financial instrument.

	HOU	BUS	GOV	ROW	Total
1) Net lending: from the BEA NIPA	554	−249	−782	478	0
2) Net Lending: from the Fed FOF	895	115	−725	79	365
US official reserves and SDR			−6	6	0
Checkable deposits and currency	149	−280	101	31	0
Time and saving deposits	502	−493	14	−23	0
Money-market fund shares	−45	31	12	1	0
Debt securities	157	69	−703	478	0
Loans	−450	332	119	0	0
Equities	36	348	5	−389	0
Mutual fund shares	58	−68	3	7	0
Life insurance reserves	36	−37			0
Pension entitlements	436	−436			0
US direct investment abroad		323		−323	0
Foreign direct investment in the US		−353		353	0
Other assets	17	679	−269	−63	365
3) Discrepancy (1–2)	−341	−364	**−58**	399	−365

Source: U.S. Bureau of Economic Analysis and author's definitions. HOU: households and nonprofit institutions; BUS: business; GOV: government; ROW: the rest of the world.

complete vertical SAM, with the consolidated values of some accounts to simplify the exposition. The columns show the determination of the net lending of each institutional sector, while the rows show the distribution of each macro variable or account across our four sectors.

Finally, because net lending is equal to the net acquisition of financial assets, we can add more lines to Table 5 to register how this is distributed in, say, money, bonds, equities, and other financial assets. The BEA does that in its IMA, but there are large discrepancies between the net-lending numbers estimated from the NIPA and the FoF sources. To show this, Table 6 presents the decomposition of each sector net lending by main financial instrument.[12] The data comes from the Fed's FoF and, to make it consistent with the NIPA, Table 6 also includes the discrepancies between the BEA and Fed numbers.

To facilitate the exposition, Table 6 details only the net changes in the assets for which the FoF data add up to zero, because the net increase of an asset held by one sector must be matched by a reduction in the holdings of the same asset by the other sectors. To assure macroeconomic consistency, all asset groups for which this accounting identity does not hold are grouped under the label "other assets," and its total value is, by definition, equal to the symmetric of the discrepancy between the NIPA and FoF numbers.[13]

To explain Table 6 in more intuitive terms, consider the household sector. According to the NIPA, the households' net lending was $554 billion

[12]For another way to match the NIPA with the FoF data, see Taylor (2004, chapter 1).

[13]According to the Fed's FoF, in 2015 most of this "instrument" discrepancy came from foreign deposits, fed-funds and repo operations, taxes payable and "miscellaneous assets."

in 2015, whereas according to the FoF data it was $895 billion. The BEA-FoF discrepancy is therefore minus $341 billion, as shown in the last line of Table 6. Focusing on the Fed's numbers, the U.S. households increased their holdings of money (currency and checkable deposits) in $149 billion, and of saving and time deposits in $502 billion. Households also reduced their shares in money-market funds in $45 billion, acquired more $157 billion in debt securities and took $450 billion in net new loans. To complete the picture, households also increased their holdings of equities ($36 billion), mutual-fund shares ($58 billion), life-insurance reserves ($36 billion), pension entitlements ($436 billion), and other assets ($17 billion).

By analogy, the above reasoning can be applied to the other institutional sectors to map who lends to whom, in net terms and through which instrument, to analyze financial intermediation. In the same vein, we can deduct the flow changes in financial assets shown in Table 6 from its total changes from a financial wealth matrix to obtain the capital gains and losses by financial instrument (Godley and Lavoie 2006). Recent studies indicate that capital gains and losses tend to explain most of the changes in financial wealth in recent decades (Roth 2016), but this issue is beyond the scope of this paper and an item for future research.

Net lending and changes in the sources of U.S. household final income

The data presented in the previous section can be used to analyze many topics. This section gives a brief example on net lending and the sources of U.S. household income.

The U.S. NIPA time series start in 1929, with annual frequency, and in 1947, with quarterly frequency. The division of the U.S. economy in four sectors can only be done from 1960 onwards, because the BEA separates households' from firms' investment starting in that year. Earlier estimates can be obtained by adopting a proxy for the households' investment,[14] but we will focus mostly in the post-1960 period to use only official BEA data in this paper. Unless stated otherwise, all values are in terms of GDP.

Starting with the longest time series, Figure 1 shows the data for three institutional sectors since 1929: private, government and business. The numbers indicate that most of the fluctuations in the government deficit were absorbed by the private sector, not by the foreign surplus as assumed by the twin-deficits hypothesis.[15] The net lending by the rest of the world did increase since 1980, but this did not eliminate the high correlation between the private and government imbalances. The highest government

[14]For example, allocating all residential investment to households. The post-1960 data show that household and residential investment are close, but do not necessarily coincide.

[15]This confirms the analysis of Barbosa-Filho et al. (2014).

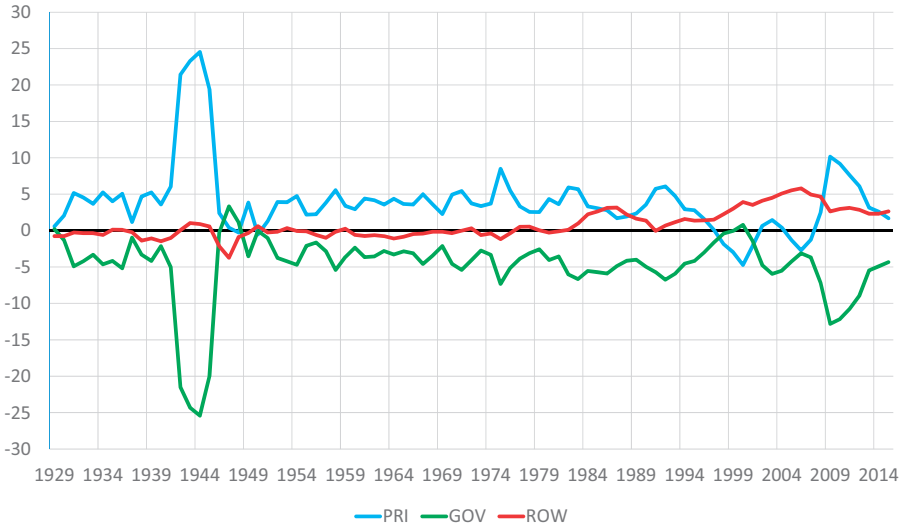

Figure 1. U.S. net lending in % of GDP.

net borrowing occurred during World War II (25.4% of GDP in 1944), followed by the Great Recession of recent years (12.8% of GDP in 2009).

Figure 2 also shows that the private sector became a temporary net borrower of funds only in recent decades, that is, during the private debt cycles of the late 1990s (the dot-com bubble) and the mid-2000s (the housing bubble). Excluding years of war and speculative bubbles, the government net borrowing fluctuated around 5% of GDP and the private sector absorbed most of it until 1980. Since then foreign saving has become an important source of funds for U.S. investment and consumption, representing 2.6% of the U.S. GDP in 2015.[16] It should also be noted that the U.S. business sector was a net lender during most of the period under analysis, which means that foreign saving was channeled basically to government securities and, in this way, it closed the identity between saving and investment.

Moving to our four institutional sectors, Figure 2 shows the net lending since 1960. The series for the government and the rest of the world are the same as in Figure 1. The breakdown of the private sector between households and business indicates that firms were the main private borrowers in the late 1990s (the dot-com bubble), whereas families assumed this role in the mid-2000s (the housing bubble). Government net borrowing fluctuated around 5% of GDP since the 1970s, but with an increasing volatility. The net borrowing of the business sector fluctuated around zero, but also with an increasing volatility. Excluding the recent and temporary demand

[16]This is approximately 0.7% of the rest of the world's GDP assuming that the United States currently represents 25% of nominal world income, as shown by the recent International Monetary Fund data.

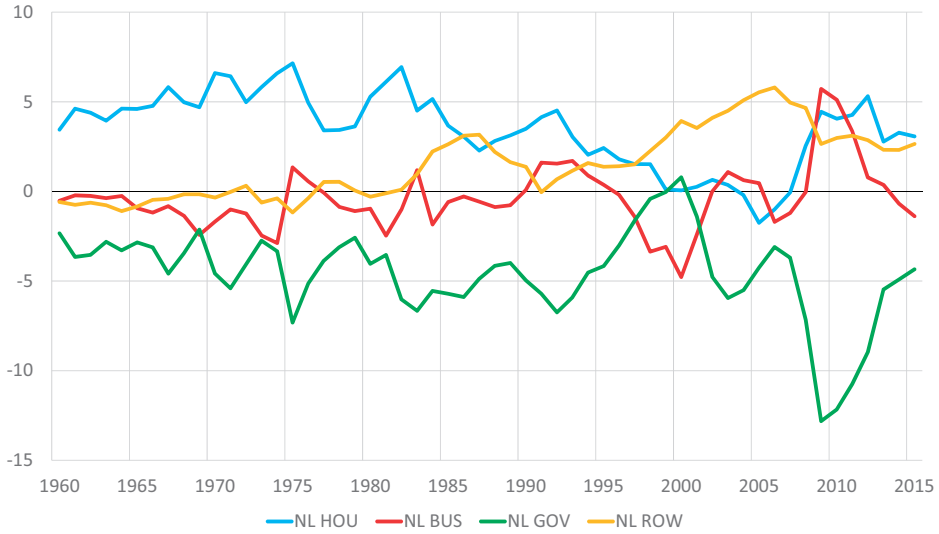

Figure 2. U.S. net lending in % of GDP.

expansion caused by the housing bubble, the household sector has been a net lender in the U.S. economy during most of the period under analysis, but with a clear reduction in its surplus after 1980. To compensate for this, the rest of the world became an important institutional net lender of funds since the 1980s.

The natural question from Figures 1 and 2 is what caused the changes in net lending or borrowing? To answer this using the concepts developed in the previous section, Figure 3 presents the final income and demand series of the four institutional sectors of the U.S. economy. The numbers clearly show a gradual increase in the household final income and a gradual reduction in the government final income since 1970. The final demand of both sectors moved in the same direction, with a temporary sharp fall in the household net lending before the 2008 financial crisis, and a temporary sharp increase in the government net borrowing immediately after it.

Comparing the early 1960s with recent years, the final income and demand of households increased in approximately 6% of GDP. The main drivers of this have been ageing—which reduces contributions to social insurance and raise its benefits—and the increase in household capital income, mostly through net interest and dividend income. On the other side, the government final income dropped in approximately 7% of GDP since the early 1960s, whereas its final demand fell in 4% of GDP.

The final income and demand of the business sector fluctuated around 13% of GDP during most of the period under analysis, with more volatile surpluses and deficits since 1990. In fact, the business sector was a net lender of funds up to 1975. Since then, it started to alternate surpluses and

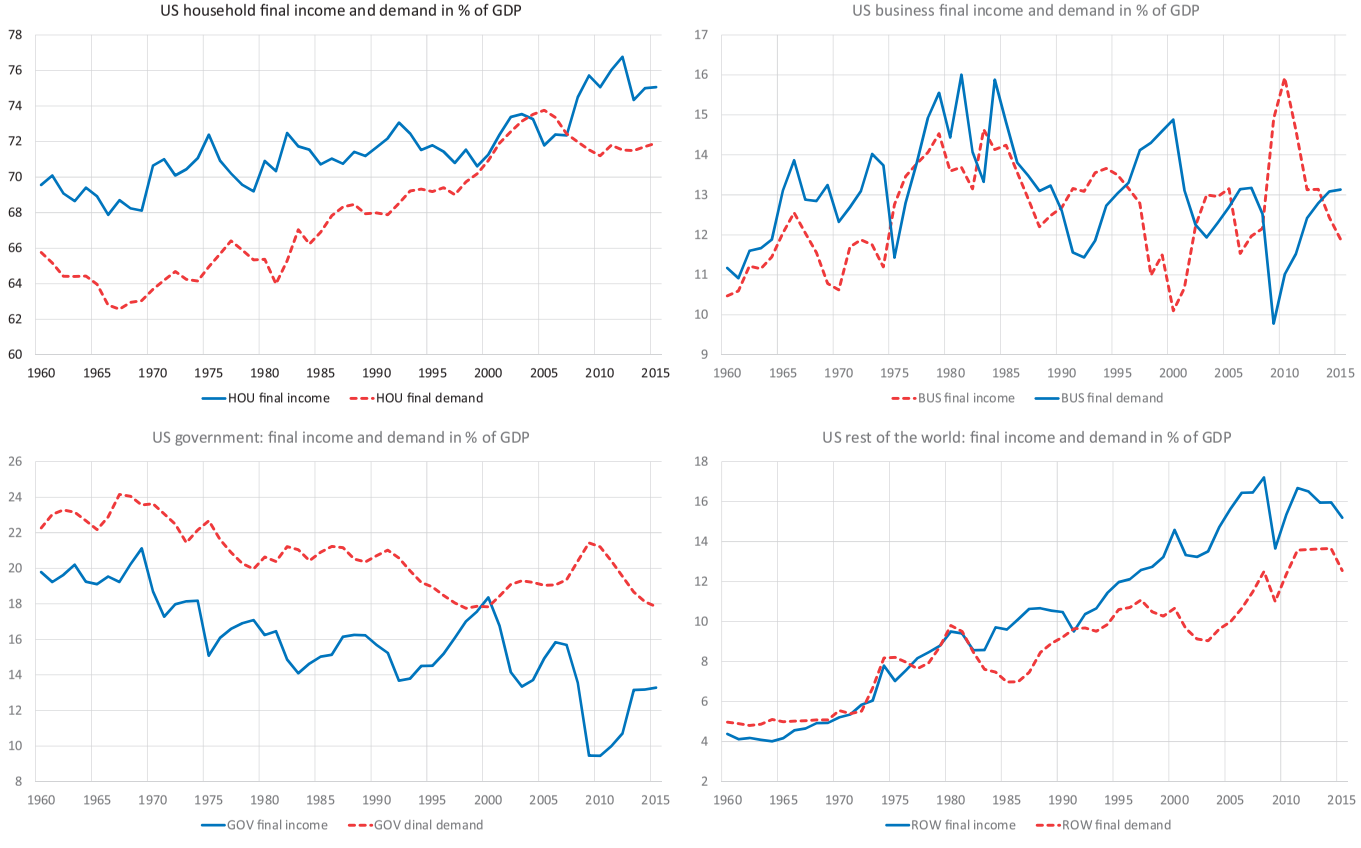

Figure 3. U.S. household final income and demand in % of GDP. U.S. business final income and demand in % of GDP. U.S. government: final income and demand in % of GDP. U.S. rest of the world: final income and demand in % of GDP.

deficits, with its final income and demand moving in almost opposite directions since 1990. The fluctuation in business net lending also tended to lead fluctuations in the level of economic activity during the period of analysis, following the dynamics of a profit-led profit-squeeze economy (Barbosa-Filho and Taylor 2006).

The final income and demand of the rest of the world show a positive trend between 1970 and 2010, with an increasing current-account deficit for the United States up until recently. More specifically, there were two clear cycles of increasing and decreasing current-account deficits for the United States since the 1960s: one between 1982 and 1991 and the other between 1991 and 2009. The first and short cycle is associated with the appreciation and depreciation of the U.S. dollar that marked the 1980s. The second and longest cycle is associated with financial liberalization across the world after the fall of the Berlin Wall and it reached its peak in 2006. There were periods of appreciation and depreciation of the U.S. dollar during the second cycle, which seems to have ended with the financial crisis of 2008. Since then, the net-lending of the rest of the world has stabilized around 2.6% of U.S. GDP, but the recent presidential election in the United States indicates that this may change in the near future.

The increase in households' final income has happened together with a reduction in the labor share of income in the U.S. economy. To put this in historical perspective, Figure 4 shows the compensation of employees in terms of the net domestic product at producer prices. This variable corresponds to what mainstream economics associate with the labor-elasticity of the aggregate production function, but in reality it depends on many more things than technology (McCombie and Felipe 2013). For the purposes of this article, it should be noted that there was a clear upward trend in the labor share in the 1950s and 1960s—the period of financial repression—and a downward trend since 1980, when the current period of wage repression started.[17]

In fact, if we ignore the volatile 1930s and 1940s, the labor share rose in approximately 7 percentage points (pp) of the U.S. net product between the early 1950s and the early 1970s and fell 3 pp since then. This movement shows that some of the prolabor structural changes that happened in the United States during the 1950s and 1960s may be permanent or, at least, persistent.

Moving back to the institutional distribution of income, the procapital change in the composition of income also appears in our four-sector model.

[17]By wage repression, I mean structural changes that reduces workers' bargaining power in the labor market. In the United States, this has been driven mostly by four factors since the 1980s: technological change or the "information revolution," trade opening or "globalization," the relative increase in the demand for services, and the procapital changes in labor and tax legislation. For a model of employment and the labor share of income applied to the United States, see Barbosa-Filho (2015).

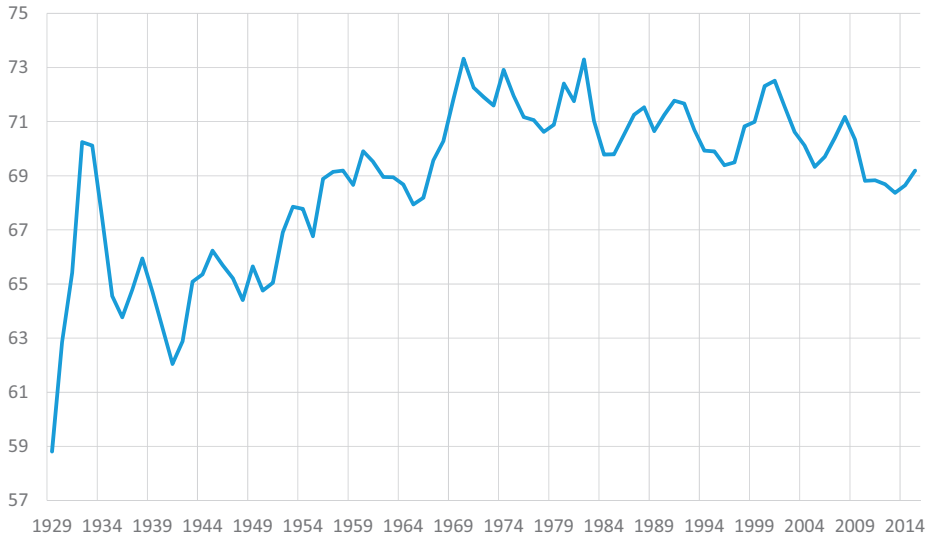

Figure 4. U.S. labor compensation in % of net domestic product at producer prices.

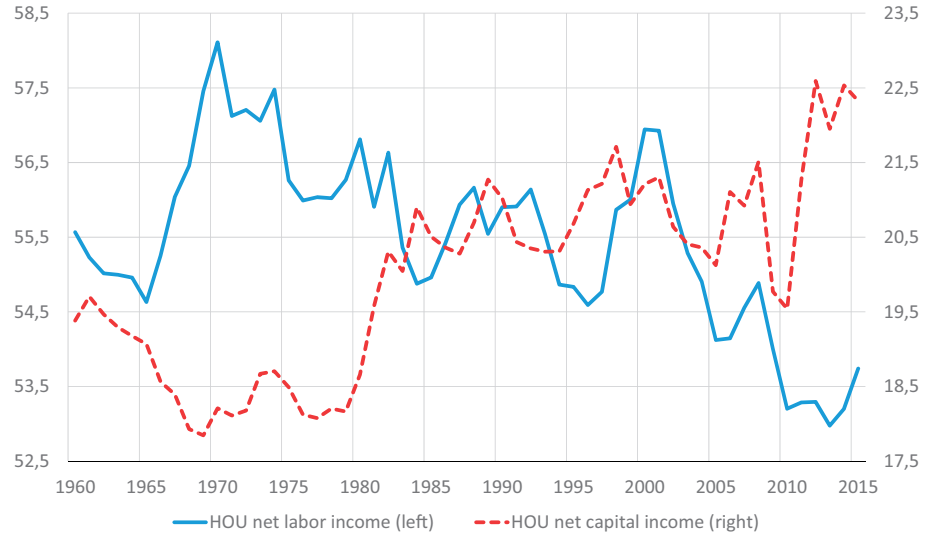

Figure 5. Household net labor and capital income in % of GDP.

To represent it, Figure 5 shows the share of the net labor and capital income of the household sector since 1960.[18] The net labor income is just the compensation of domestic employees plus the net wages and salaries

[18]The third component of household final income consists of net taxes, contributions, benefits, and other current transfers received, described in Table 3.

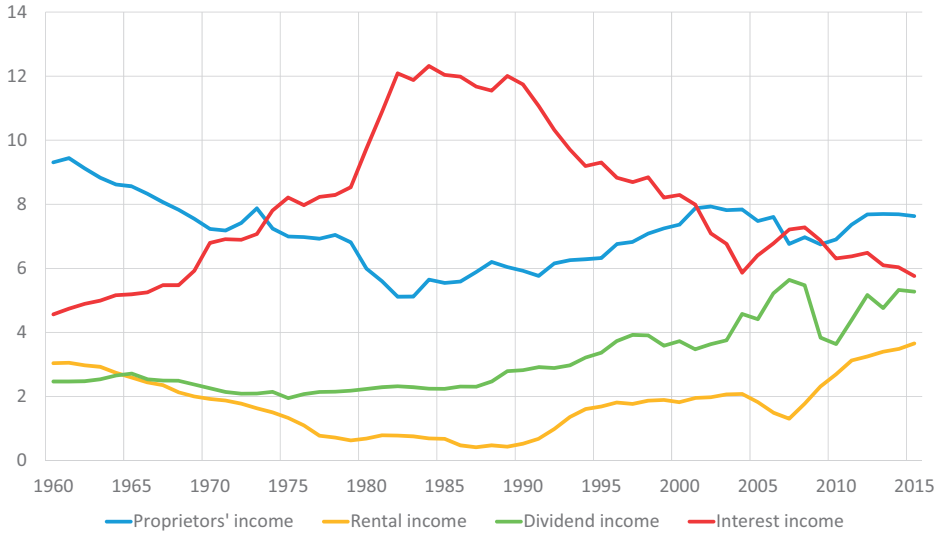

Figure 6. U.S. household net capital income in % of GDP.

received from abroad, whereas the capital income is the sum of all proprietors', rent, net-interest, and dividend income that we mentioned in Table 2 of the previous section. To facilitate the analysis, labor income is measured on the left scale, and capital income on the right scale of Figure 5. The numbers clearly show a reduction in employee's compensation—from 57% to 53% of GDP between the late 1960s and the early 2010s. The numbers also show a symmetric increase in household capital income—from 18% to 22% of GDP in the same period. Because most of capital income goes to the richest cohorts of the population, the procapital shift depicted in Figure 5 is an alternative way to represent the worsening in the personal distribution of U.S. income since the 1980s (Piketty 2014).

To explain the increase in the household capital income, Figure 6 presents its main components since 1960. Four trends appear clearly in the data. First, there was a sharp and substantial increase in net interest income after the "Volcker shock" of the early 1980s. In fact, presumably rich households received approximately 12% of the U.S. GDP during the 1980s. Net interest payments fell since then and are now at 6% of GDP, which was their level at the end of the 1960s.

Second, proprietors' income diminished gradually from 9% of GDP in the early 1960s to 5% of GDP in the mid-1980s, pulled by the relative reduction in farm income.[19] After that, proprietors' income took up and

[19]Other BEA series indicate that half of this fall was due to the reduction in farm income in terms of GDP.

reached 8% in the early 2000s because of the rise in nonfarm self-employment that accompanied wage repression.

Third, household dividend income reached its lowest relative level in 1975, 2% of GDP, and started to grow gradually in the subsequent twenty years. This trend accelerated in the early 2000s, when households' dividend income peaked at almost 6% of GDP. The financial crisis diminished dividends temporarily after 2008, but this source of capital income rose back to its precrisis level in recent years. If the current trend continues, dividend income will soon become the second most important source of capital income for households, below proprietors' income and above net interest.

Finally, household net rental income seems to track inflation and the stock of residential capital. More specifically, because of the acceleration of inflation, this source of fixed income fell from 3% of GDP, in the late 1960s, to less than 1% of GDP, in the early 1980s. Personal rental income started to recover only in the 1990s and, because of the recent low inflation and rise in residential capital, it reached its highest historical level in 2015—3.7% of GDP.

To complete our analysis of the sources of household final income, Figure 7 shows the net-tax, social-contribution, and social-benefit income by institutional sector since 1960. Naturally, the government is the net receiver of this kind of flows, with business and households as the main net payers. The net current taxes paid by business fell from 4% of GDP in the 1960s to 3% of GDP in recent years. This reduction is small compared to what happened with the net payments by households: after peaking in the early 2000s—at approximately 9% of GDP—household net taxes and

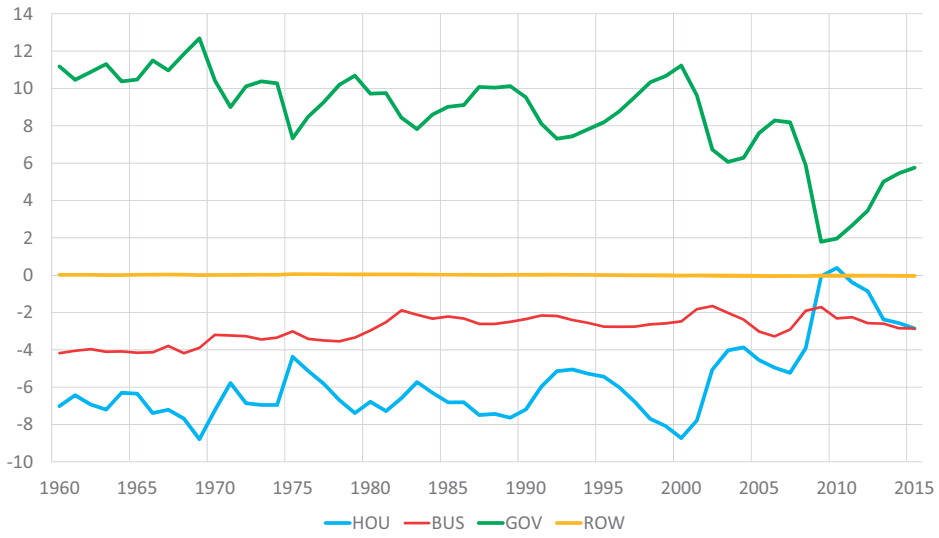

Figure 7. Net current tax, social contributions and social benefits received in % of GDP.

contributions fell to just 3% of GDP in recent years. In fact, immediately after the 2008 crisis, households temporarily received more in social benefits than they paid in taxes and social contributions. The long-run main drivers of this change have been the ageing of the U.S. population and the regressive changes in direct taxation since the 1980s. As a result, the government net income from taxes and social contributions is currently half of what it used to be in the late 1960s, when measured in terms of GDP.

Conclusion

The methodology of SAMs has been laid out a long time ago and used extensively for economic planning, especially in association with Leontief input-output matrices (Pyatt 1985). In addition to such use, SAMs can also be applied to analyze income distribution and financial flows (Taylor 2004) because it constitutes the basis or "macrofoundation" of post Keynesian monetary economics (Godley and Lavoie 2006).

Most SAMs are presented in a square form because of its Leontief inspiration, but its structure and interpretation becomes much simpler in a rectangular or vertical monetary form as presented in this article. In fact, the vertical SAM gives us a summary of production, distribution, demand, and financing in an open economy, which can be used to analyze many macroeconomic issues in a consistent or general-equilibrium framework. The vertical form can also be easily complemented by flow-of-funds data on the allocation of net lending by financial instrument.

To give an example of the application of SAMs, this article presented the U.S. data in terms of four institutional sectors and analyzed the changes in the main sources of household income since 1960. The data show an increase in the volatility of financial imbalances since 1990s and a structural procapital change in household income since the 1980s. These two results are consistent with the higher macroeconomic volatility and income inequality associated with financial liberalization and wage repression that marked the U.S. economy in recent decades.

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