



WP/12/162

IMF Working Paper

Leverage? What Leverage?
A Deep Dive into the U.S. Flow of Funds
in Search of Clues to the Global Crisis

Ashok Vir Bhatia and Tamim Bayoumi

IMF Working Paper

Strategy, Policy, and Review Department

Leverage? What Leverage?

A Deep Dive into the U.S. Flow of Funds in Search of Clues to the Global Crisis

Prepared by Ashok Vir Bhatia and Tamim Bayoumi ¹

Authorized for distribution by Siddharth Tiwari

June 2012

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the authors and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the authors and are published to elicit comments and to further debate.

Abstract

This paper questions the view that leverage should have forewarned us of the global financial crisis of 2007–09, pointing to several gearing indicators that were neither useful portents of the onset of the crisis nor of its ferocity. Instead it shows, first, that the use of ill-suited collateral in the secured funding operations of U.S.-based investment banks was the fatal link between the collapse of structured finance and the global malfunction of funding markets that turbocharged the downdraft; and, second, that this insight (and others) can be decrypted from the *Flow of Funds Accounts of the United States*.

JEL Classification Numbers: E4, G2

Keywords: Leverage, securitization, collateral, investment banking

Authors' E-Mail Addresses: abhatia@imf.org and tbayoumi@imf.org

¹ With thanks to William J. Lindquist (Office of the IMF Executive Director for the United States), John Kiff, Gian Maria Milesi-Ferretti and team, Martin Mühleisen, and Ranjit Teja (all IMF) for valuable feedback; and to Manju S. Ismael (IMF) for excellent research assistance. Any remaining errors are ours alone. The first author dedicates his contribution to the memory of Virbhan and Katharina Bhatia.

Contents	Page
Glossary	3
Executive Summary	4
I. Introduction: Our Search for the Smoking Gun	5
II. The Flow of Funds Accounts: From the Macro to the Financial	7
A. Nonfinancial Private Sector Net Worth: A Rational Gambit.....	7
B. Household Finances: Let the Good Times Roll	9
C. Nonfinancial Business Finances: The Cash Cow.....	11
D. Government Finances: Use that Firepower.....	13
E. Foreign Investors in the U.S. Credit Markets: Pay to Play	15
F. Gross and Net Credit Growth: Strong for Long	17
G. Financial Sector Size and “Churning” Activity: Inward We Look.....	19
H. Financial Sector Structure and “Shadow Banking”: Brave New World.....	21
I. Private-Label Securitization: Bankruptcy-Remote Indeed.....	23
J. The Secured Wholesale Funding Chain: In Collateral We Trust.....	25
III. Conclusion: Investment Banks as the Fulcrum.....	27
References.....	29
Figures	
1. Leverage? What Leverage?.....	6
2. Was it Debtor Leverage?	8
3. Was it Households as Net Debtors?.....	10
4. Was it a Borrowing Spree by Firms?	12
5. Was it Foreigners Buying U.S. Treasuries?.....	14
6. Was it Foreigners Buying Everything?.....	16
7. Was it Credit Growth?	18
8. Was it Financial Sector Size?	20
9. Was it “Shadow Banking”?	22
10. Was it the Bundling?.....	24
11. Was it the Funding Model?.....	26
12. In Summary.....	28

GLOSSARY

ABCP	Asset backed commercial paper
ABS	Asset backed security
BHC	Bank holding company
CP	Commercial paper
ETF	Exchange-traded fund
FDIC	Federal Deposit Insurance Corporation
Fed	Federal Reserve
GSE	Government sponsored enterprise
HF	Hedge fund
MBS	Mortgage backed security
MF	Mutual fund
MMMF	Money market mutual fund
OFHEO	Office of Federal Housing Enterprise Oversight
PE	Private equity
REIT	Real estate investment trust
RoW	Rest of the world
SEC	Securities and Exchange Commission
SPV	Special purpose vehicle

EXECUTIVE SUMMARY

A repeated game? The United States suffered financial market instability in 1987, 1998, and 2007–09—on a roughly ten-year cycle, each time with a global dimension, each episode more severe than the previous. Given the specter of more to come eventually, understanding “what really happened” in the years leading up to mid-2007 behooves further study. After the cataclysm of 2007–09, the economics profession mobilized in search of *ex post* explanations. Papers flowed, offering up long lists of weaknesses and vulnerabilities. While not wrong *per se*, we find the laundry lists unsatisfying—we much prefer the pointed analysis of Dudley (2009) on financial safety nets, and Gorton (2009) on securitization, secured funding, and the nexus between the two. Our own investigation yields the following main lessons:

- **Leverage.** Routinely blamed as a root cause of the crisis, we find leverage overrated. Asset-to-equity measures in the financial sector and analogous asset-to-net worth metrics in the private nonfinancial sectors are startling only for their failure to raise red flags. The fact is that the financial sector was highly profitable pre-crisis, and household asset values and net worth were inflated, leaving leverage as a lagging indicator of fragility.
- **Securitization.** Widely viewed as an innovation that became a problem, we come to a more nuanced view on private-label securitization. It served as a key conduit for foreign credit to U.S. households, but in so doing helped inflate the housing bubble. It saved on intermediation costs and provided higher returns on assets pre-crisis, but locked in rigidities that ramped up loss rates after the bust. Fundamentally, it made good times better and the tail event worse, with legacy costs still weighing on the housing sector.
- **Collateral.** This was the critical link between the implosion of structured finance and the malfunctioning of funding markets. In a financial system where more and more activity took place outside the perimeter of the official safety net, and where information on key areas such as derivatives was sparse, secured short-term funding became the norm. But the broader complacency wrought by the search for yield infected collateral-taking also, with private pool securities often accepted in lieu of Treasury or agency securities.
- **Investment banking.** This was the turbocharger of the crisis. Leading broker-dealers behaved like hedge funds, focusing more and more on dealing rather than broking, and rose to great systemic importance. They were by far the largest secured short-term borrowers, the makers of many critical markets, and the most egregious “diluters” of collateral quality. When investors fled structured finance products, secured lenders fled the investment banks—and the whole edifice came crumbling down.

The flow of funds. Our effort throughout this paper is to confine ourselves to data from the *Flow of Funds Accounts of the United States*, which we regard as an underutilized treasure trove of detailed information. Rather than tables and regressions, we provide a wealth of pictures. While some may require a good amount of staring at, we hope you will enjoy them.

I. INTRODUCTION: OUR SEARCH FOR THE SMOKING GUN

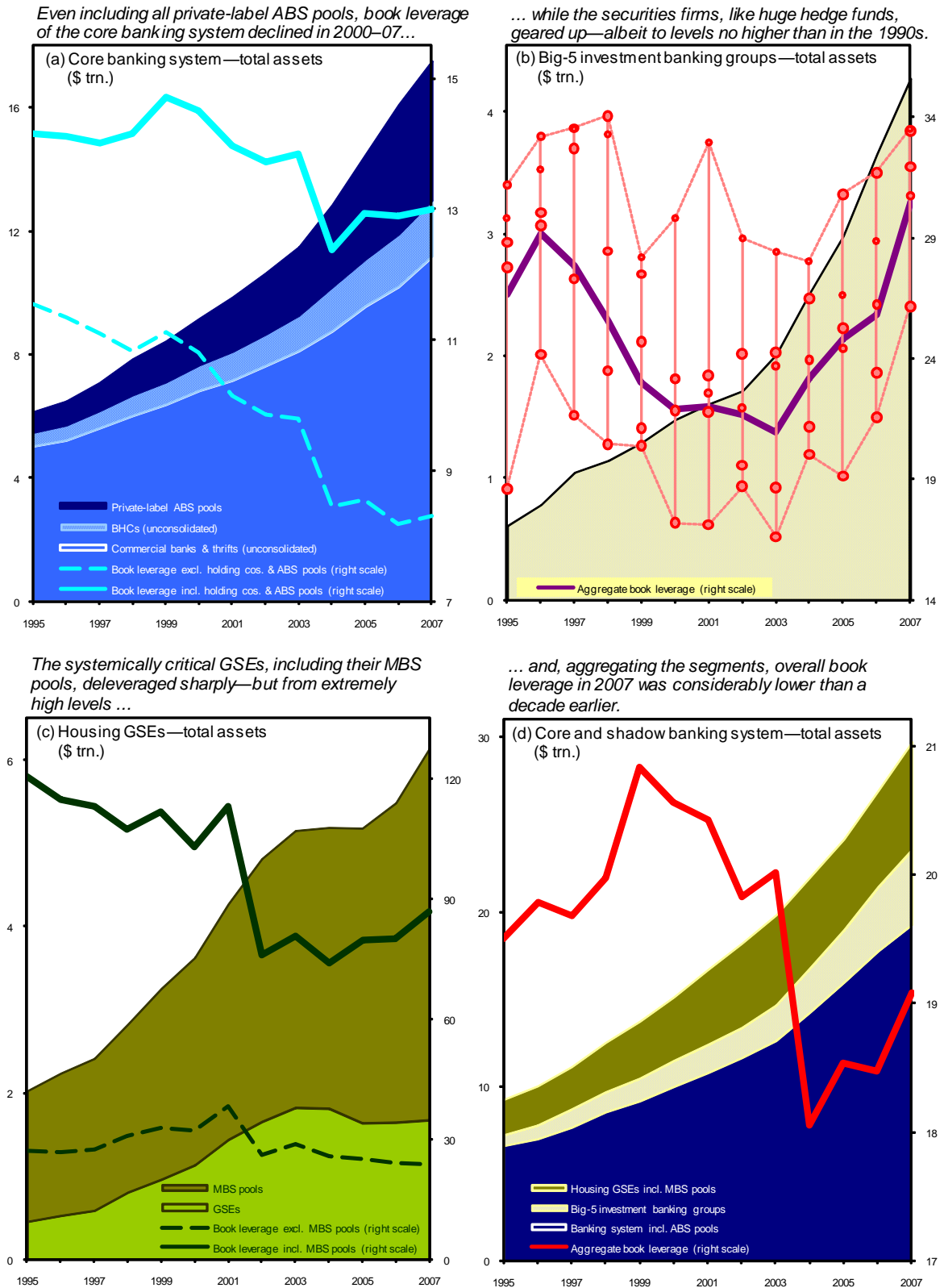
1. **The obvious suspect.** We begin with U.S. banking system leverage. Conscious that U.S. banks were, on the whole, profitable and well capitalized in the run up to the crisis, we survey a broader definition of the “banking system,” one that comprises banks, near-banks, and securitized asset pools (Figure 1). Our prior was that aggregating commercial banks, thrifts, bank holding companies (BHCs), the erstwhile big-five investment banking groups, the government sponsored enterprises (GSEs), and all securitization pools (GSE-backed and private-label alike) would reveal high, and rising, book leverage. For comparability, we set aside regulatory capital and look at the simplest metric: total assets to total equity (capital and surplus, at book value) per U.S. Generally Accepted Accounting Principles.

2. **Leverage?** As expected, we find investment banks more geared than the core depository system, but hardly more so in 2007 than a decade earlier (Panels 1a–1b). We also find the GSEs to be by far the most levered part of the system—especially after including their off-balance sheet (but explicitly credit guaranteed) securitization books—but note that regulatory pressure including the imposition of capital surcharges saw their leverage fall sharply in 2001–04 (Panel 1c). The big surprise, however, is that despite conservative assumptions (especially, that BHCs and securitization pools had no stand-alone capital, which was patently not the case) overall leverage did not rise—it actually fell substantially (Panel 1d). Of course, it may be countered that our metric misses the gearing embedded in many modern financial products, or indeed the leverage created by derivative activity, and we are aware that one can torture the data until leverage glows red. But the fact remains that, on our simple and comparable measure, banking system leverage was not the smoking gun.

3. **Diving in.** The surprise motivates an investigative journey through the *Flow of Funds Accounts of the United States*. Produced quarterly by the Federal Reserve (Fed), these form the most comprehensive set of national financial accounts in the world, albeit with a level of precision that tends to be highest for sectors where regulation is strongest:

- We work with five sectors: U.S. households and nonprofit organizations; U.S. nonfinancial business; the consolidated U.S. government; the rest of the world (RoW); and the U.S. financial sector (from the Fed to funding corporations).
- We separate financial instruments into those we deem “debt-creating”—anything with a *de jure* or *de facto* promise to repay at par—and all else. In the former we include deposits, security repurchase (repo) agreements, money market mutual fund (MMMF) shares, credit market instruments, trade credit, and security credit. In the latter we have equities, mutual and pension fund shares, and miscellaneous claims.
- For each sector, data on debt-creating assets and liabilities by instrument are matched with (aggregate) data on issuers and holders of the instruments to estimate claims on and dues to other sectors. Although differences in portfolio preference are assumed away, sufficient granularity of instruments, we believe, assures a fair (though not precise) representation of inter-sectoral claims.

Figure 1. Leverage? What Leverage? Assets and Book Equity of U.S. Banks and Bundlers



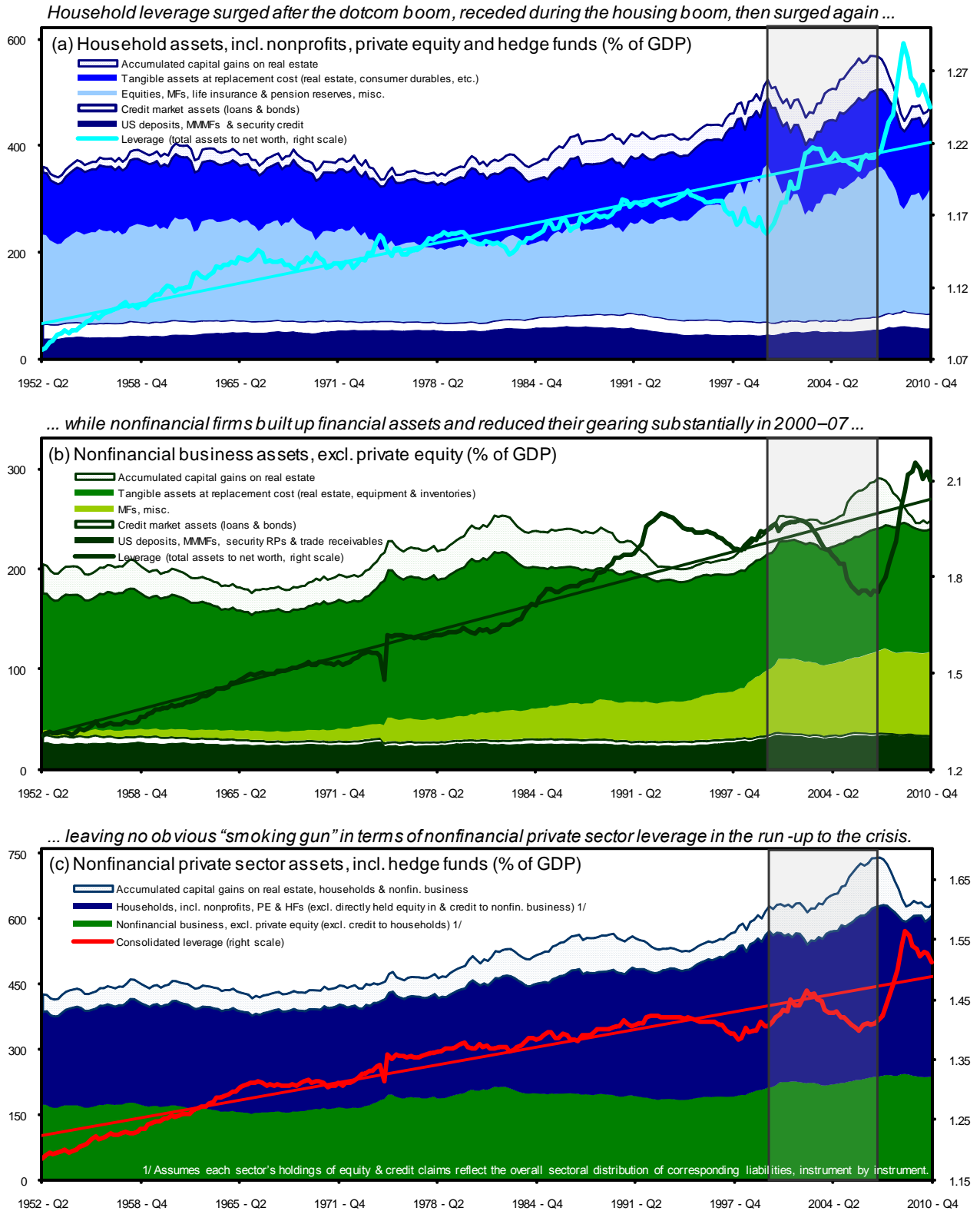
Sources: FDIC, *Statistics on Banking* (commercial bank and thrift equity); Fed, *Flow of Funds* (commercial bank, thrift, BHC, ABS, GSE, and MBS assets); OFHEO, *Reports to Congress* (GSE equity); and SEC, company filings (investment banking groups assets and equity).

II. THE FLOW OF FUNDS ACCOUNTS: FROM THE MACRO TO THE FINANCIAL

A. Nonfinancial Private Sector Net Worth: A Rational Gambit

4. **Was it debtor leverage?** If the banking system was not over-levered, and if excessive financial gearing indeed was at the root of the crisis, then the leverage must have sat with the borrowers. And so we turn to the U.S. nonfinancial private sector: households and nonfinancial business (Figure 2). Whereas in the main the *Flow of Funds* cover financial claims only, and thus cannot be used in isolation to derive, say, bank leverage, for these two sectors they provide full balance sheet information, including on tangible nonfinancial assets (real estate, equipment and software, and consumer durables, at replacement cost and at market value). We choose a leverage measure that mirrors the metric we used for banking: total assets to net worth. Thus net worth becomes for borrowers our analogue of equity capital for lenders—although the former is a book-value measure while the latter is derived from total assets at market prices less total debt at face value, embedding capital gains.
5. **Fat households, lean firms.** Two main observations emerge:
- Households were, and still are, the predominant owners of wealth in the economy (Panel 2a). Gross household assets were worth $5.7\times$ GDP at their peak at end-2006. Of these, “debt-creating” claims—bank deposits, MMMF shares, security credit, and holdings of credit market instruments—accounted for only 14 percent. Instead the main concentrations of household wealth are, first, in equities, mutual fund shares, and pension and life insurance reserves and, second, in real estate—with shares of 37–56 percent and 30–42 percent, respectively, over 1952–2010. After the dotcom bust, household leverage actually remained fairly flat as sharply rising equity and real estate values kept pace with mounting debt. Even when leverage spiked in the wake of the housing bust, at no point did debt exceed net worth by more than 28 percent.
 - The nonfinancial business sector, meanwhile, exemplified thrift (Panel 2b). Firms amassed “miscellaneous financial assets,” per the *Flow of Funds* taxonomy, especially after the dotcom episode. Leverage, although naturally always higher than for households, fell markedly in the run up to the crisis, with debt and gearing only picking up after the bust when tangible asset values deflated.
6. **Two shots, two misses.** Again our results fail to identify gearing as the culprit. Consolidating the household and nonfinancial business sectors (netting out cross-claims), we find that gross nonfinancial private sector debt grew robustly, but rising asset values on real estate and equities reduced leverage (Panel 2c). In both the dotcom and housing episodes, borrower leverage surged, but each time only after the event. Other concepts of leverage—e.g., the oft-used household debt service to disposable income ratio—of course tell different stories. But on our simple definition based on net worth, leverage can only be viewed as a backward-looking indicator: as vulnerabilities build, collateral effects mask them. We also note that, relative to the long-run trend, the post-crisis deleveraging process may yet have a way to go, especially for U.S. households given still-subdued housing prices.

Figure 2. Was it Debtor Leverage? Assets and Net Worth of the U.S. Nonfinancial Private Sector



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

B. Household Finances: Let the Good Times Roll

7. **Sources and uses of funds.** If neither banking system leverage nor nonfinancial private sector leverage was the smoking gun—as in, if rising collateral values obscured true gearing—then perhaps the culprit was simply the sheer volume of debt in the U.S. economy. As our next step, therefore, we embark on an analysis of inter-sectoral claims, focusing on what we call “debt-creating” contracts, in an effort to better grasp the web of interlinkages.

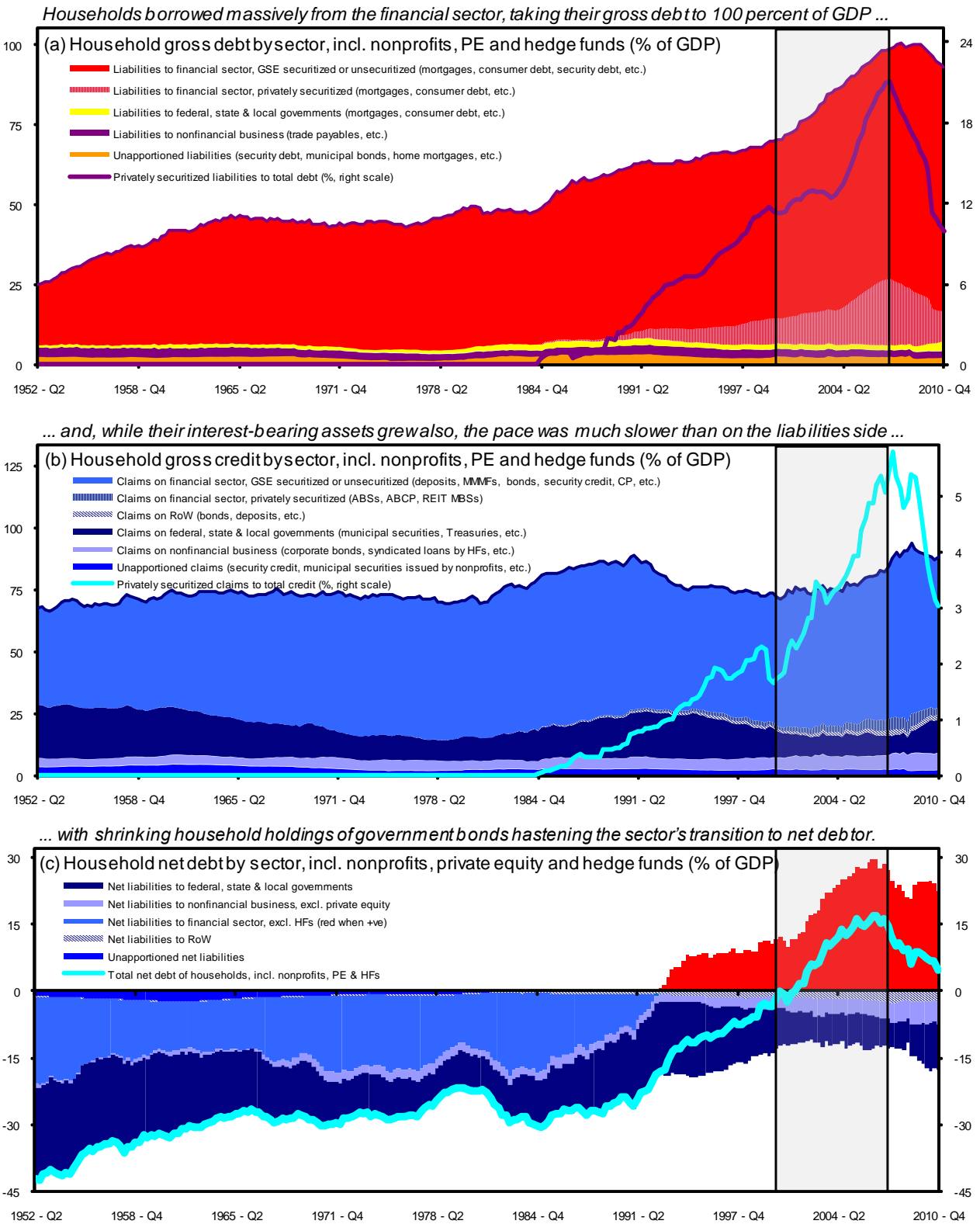
8. **Something new.** To be clear, the *Flow of Funds* provide two sets of tables: those on each sector’s financial assets and liabilities by type of instrument; and those on each financial instrument by type of issuer and holder. Our value added here is that we mesh the two, thereby approximating each sector’s claims on, and liabilities to, each other sector:

- For many instruments, the issuing sector is clear: e.g., consumer credit (households); Treasuries (government); foreign deposits (RoW); and domestic deposits, MMMF shares, and agency- and GSE-backed securities (financial sector).
- But for some others, we are forced to abstract from real-world portfolio preferences: e.g., when the household sector owns “corporate and foreign bonds,” we assume that its mix of foreign, U.S. nonfinancial sector, and U.S. financial sector bonds (and, within the latter, U.S. privately securitized bonds) reflects the shares of those bonds in total corporate and foreign bonds outstanding; similarly, on the liability side, we assume the ownership structure of, say, municipal securities issued by nonprofits is the same as that for municipal securities overall; and so on. Assembling the pieces, we get an imperfect picture, but one that we still think is useful.

9. **The household debt colossus.** We begin with “households and nonprofit organizations,” a sector that subsumes U.S. private equity and hedge funds—operations by individuals deemed wealthy and sophisticated enough to not need the consumer protections extended to retail investors (Figure 3). Our first observation is an obvious one: the sector borrowed voraciously, issuing home mortgages and consumer loans until its gross debt burden outweighed any since the Great Depression (Panel 3a). Our second observation is that, at the peak, one-fifth of this debt sat in private special purpose vehicles (SPVs), suggesting non-GSE securitization played a major role in increasing the credit supply.

10. **A long road to net debt.** Households also built up credit market assets in the end-run to the crisis, but not nearly as rapidly as debt (Panel 3b). As part of the broader quest for yield, they aggressively shed Treasuries for financial sector paper—including private-label asset backed securities (ABSs), the latter probably by hedge funds. Most fundamentally, on our broad definition of debt, households finally switched from net creditors to net debtors of the U.S. financial system in 1992, and to net debtors overall in 2001 (Panel 3c). Thus, in the last two decades as perhaps never before, U.S. households have ceased to serve as the stable net funding base of the U.S. financial sector, preferring equities, funds, and real estate. As we shall see, the financial sector responded by seeking out financing elsewhere.

Figure 3. Was it Households as Net Debtors? Gross and Net Debt of U.S. Households



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

C. Nonfinancial Business Finances: The Cash Cow

11. **Was it firms?** Next we turn to U.S. nonfinancial business, bringing together the nonfarm corporate, nonfarm noncorporate, and farm business sectors—but excluding private equity as noted earlier (Figure 4). As with all other sectors, our coverage of “debt-creating” financial assets and liabilities spans well beyond bank deposits and bank loans, to include bonds, commercial paper (CP), repo, security credit, trade credit, and MMMF shares. We thus reach from bank-dependent garage partnerships to blue-chip bond issuers, including instruments as obscure as “industrial revenue bonds” (issued by state and local governments to finance private investments, secured by the industrial end-users of the proceeds).

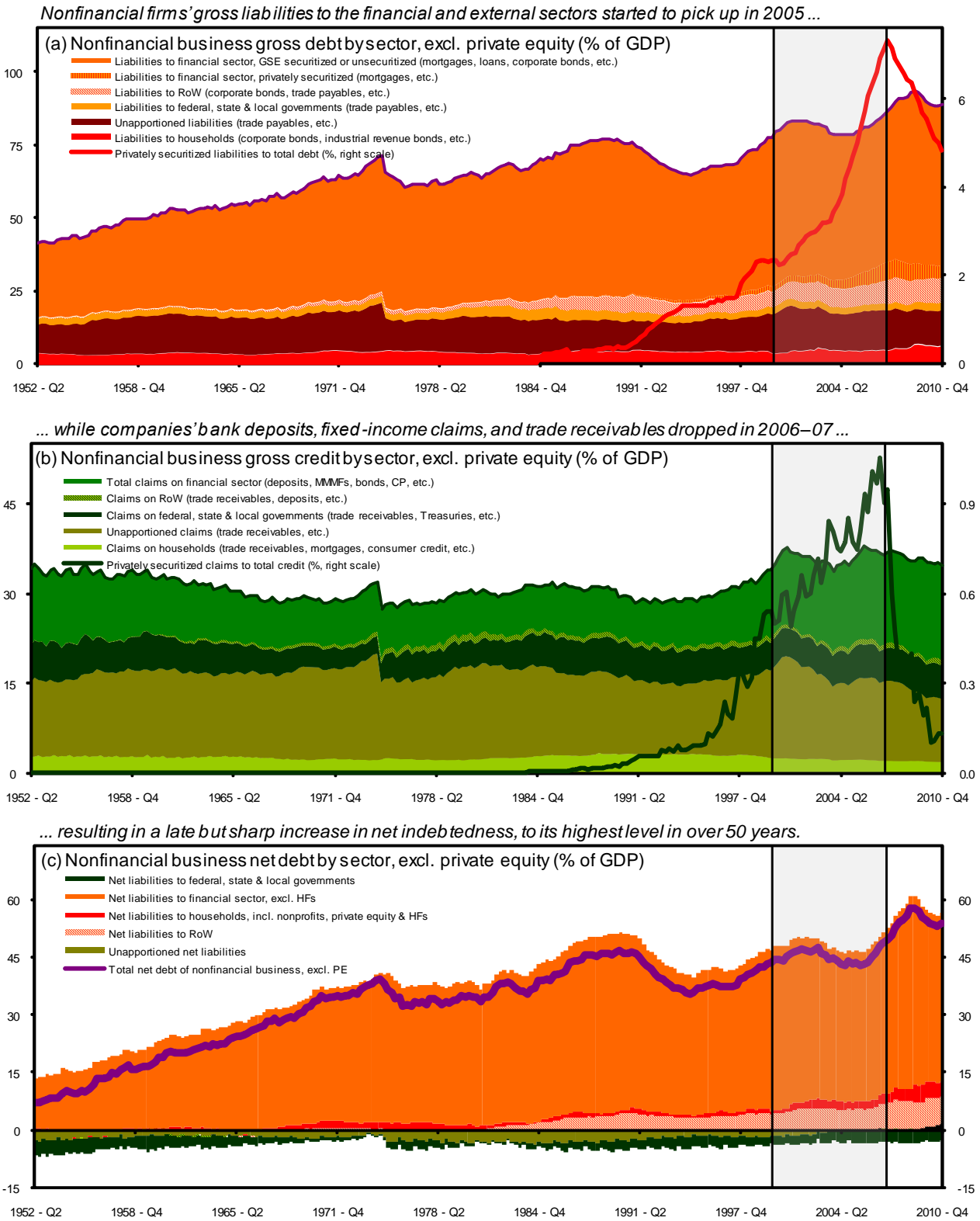
12. **Twice burnt, twice shy.** Starting with gross indebtedness, we observe a secular increase in U.S. nonfinancial business debt in 1952–73, brought to an abrupt end by the first global oil shock and associated U.S. recession in 1974, and then a re-leveraging in 1976–89, followed by another recession in 1990 (Panel 4a). Although gross debt increased by 17 percentage points of GDP over the second half of the 1990s, nonfinancial firms’ gross credit market assets increased by some 8 percentage points of GDP over the same period: the dotcom boom–bust was mostly an equity market event (Panels 4b–4c).

13. **Reassuring trends.** Between the dotcom and housing busts, as the corporate sector navigated the Enron and WorldCom scandals and the Sarbanes-Oxley Act, its indebtedness remained broadly flat. Gross debt, gross assets, and net debt all followed broadly similar trajectories in the run up to the housing crisis, dipping in 2002–05 and climbing thereafter:

- The key funding source remained the financial sector, as both purchaser of bonds and maker of loans; securitization played far less of a role than for the household sector, with only some 7 percent of gross debt held by SPVs at the peak in mid-2007.
- The late rise in indebtedness likely reflected some combination of bond issuance to lock in low long-term interest rates and drawings on contingent credit lines; in both cases large shares of the proceeds were simply stored as liquid assets.
- Trade receivables were (and are) the largest portion of what we count as “debt-creating” assets; these were (and are) followed by bank deposits and MMMF shares, in roughly equal amounts, with large firms becoming key money managers.
- Post-crisis, the shares of net nonfinancial business debt held by foreign investors and U.S. households has continued to climb; we imagine the former may predominantly be highly-rated bonds, and the latter more risky paper traded by hedge funds.

14. **Wholesale funding source.** In sum, it is clear that the crisis was not one of irresponsibility by U.S. nonfinancial business. In the run up, as households gorged on debt and the financial sector on profits, large U.S. corporations generally borrowed long and lent short—in similar amounts—directing funds to bank deposits, MMMF shares, and financial firms’ CP. In so doing, they became an important source of short-term wholesale funding to the financial sector, and to the so-called “shadow banking system” especially.

Figure 4. Was it a Borrowing Spree by Firms? Gross and Net Debt of U.S. Nonfinancial Business



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

D. Government Finances: Use that Firepower

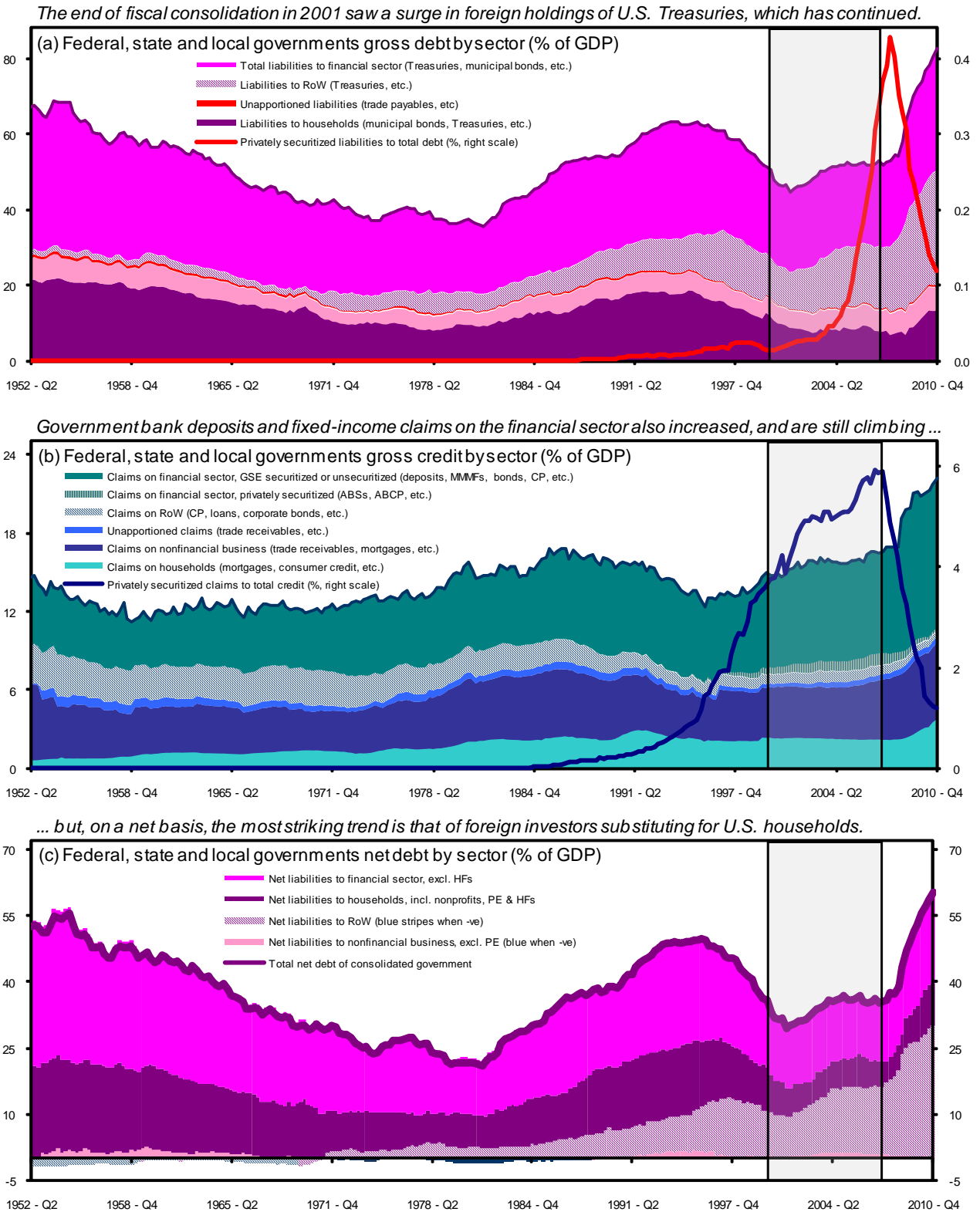
15. **A fiscal dimension?** In a story dominated by private sector imbalances, the U.S. government started off as a bystander, a sector whose creditworthiness investors take for granted and whose liabilities serve as the very bedrock of the global financial complex (Figure 5). Here is found the zero-risk return, the y-intercept for every portfolio manager, the reference rate, the apex collateral. Instruments comprise Treasury securities (liquid, predictably issued, bearing the full faith and credit of the United States); municipal bonds (neither federally guaranteed nor federally taxed, but underpinned by state-level balanced budget rules); and trade payables (included in our broad measure of debt).

16. **The broadest of investor bases.** Looking at general government gross debt, ownership is highly diversified—as one might expect for ultra-prime securities—and has become more so over the decades (Panel 5a). In 1952, when the *Flow of Funds* series began, the debt shares owned by the U.S. financial, household, and nonfinancial business sectors were about one-half, one-third, and one-tenth, respectively. Foreign investors streamed steadily into Treasuries starting in the 1970s, taking their ownership of U.S. general government debt to one-third of the total on the eve of the crisis (even as the share held by U.S. households, focused on municipal bonds, halved to 15 percent). Flight-to-safety considerations pulled the RoW share up further during and after the crisis, to 37 percent by end-2010 (mostly taking territory conceded by U.S. nonfinancial business).

17. **Government as asset manager.** As with the private sector, the various U.S. fiscal authorities also lend out a portion of their proceeds (Panel 5b). The value of government “debt-creating” claims has undulated around a long-run average of 14 percent of GDP in 1952–2010, jumping to 22 percent after the crisis. In addition to policy lending, federal, state, and municipal treasurers and endowment managers place money at banks and MMMFs and buy credit market instruments ranging from CP to mortgages to corporate bonds (including U.S. private pool securities, which accounted for 6 percent of government assets at the peak). On the asset side, the role of the RoW has evolved in opposite to that on the liability side, with the U.S. government’s debt-creating claims on non-U.S. residents falling from one-fifth of its gross credit in 1952 to a *de minimis* sum by 2010.

18. **War, taxes, and regulation.** Even as federal funding remains seamless, on a net basis the U.S. government is now more indebted than in the early 1950s—a time when deficit financing still benefited from the Fed’s “Reg Q” caps on savings account interest rates. On our measure, net debt stood at 53 percent of GDP in 1952 and 60 percent in 2010 (Panel 5c). Yet, as recently as 2001 net debt was only 30 percent of GDP. That was before the United States went to war and cut taxes both at once. Net debt climbed, just as many foreign central banks were ramping up reserves. Later, crisis-related bailouts and fiscal stimulus snapped the path upward, with foreign investors coming to own fully one-half of the net claims. Fiscal sustainability entered the lexicon, even as—innocently—regulatory reforms began to layer financial firms with liquidity ratios mandating larger holdings of government debt.

Figure 5. Was it Foreigners Buying U.S. Treasuries? Gross and Net Debt of the U.S. Government



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

E. Foreign Investors in the U.S. Credit Markets: Pay to Play

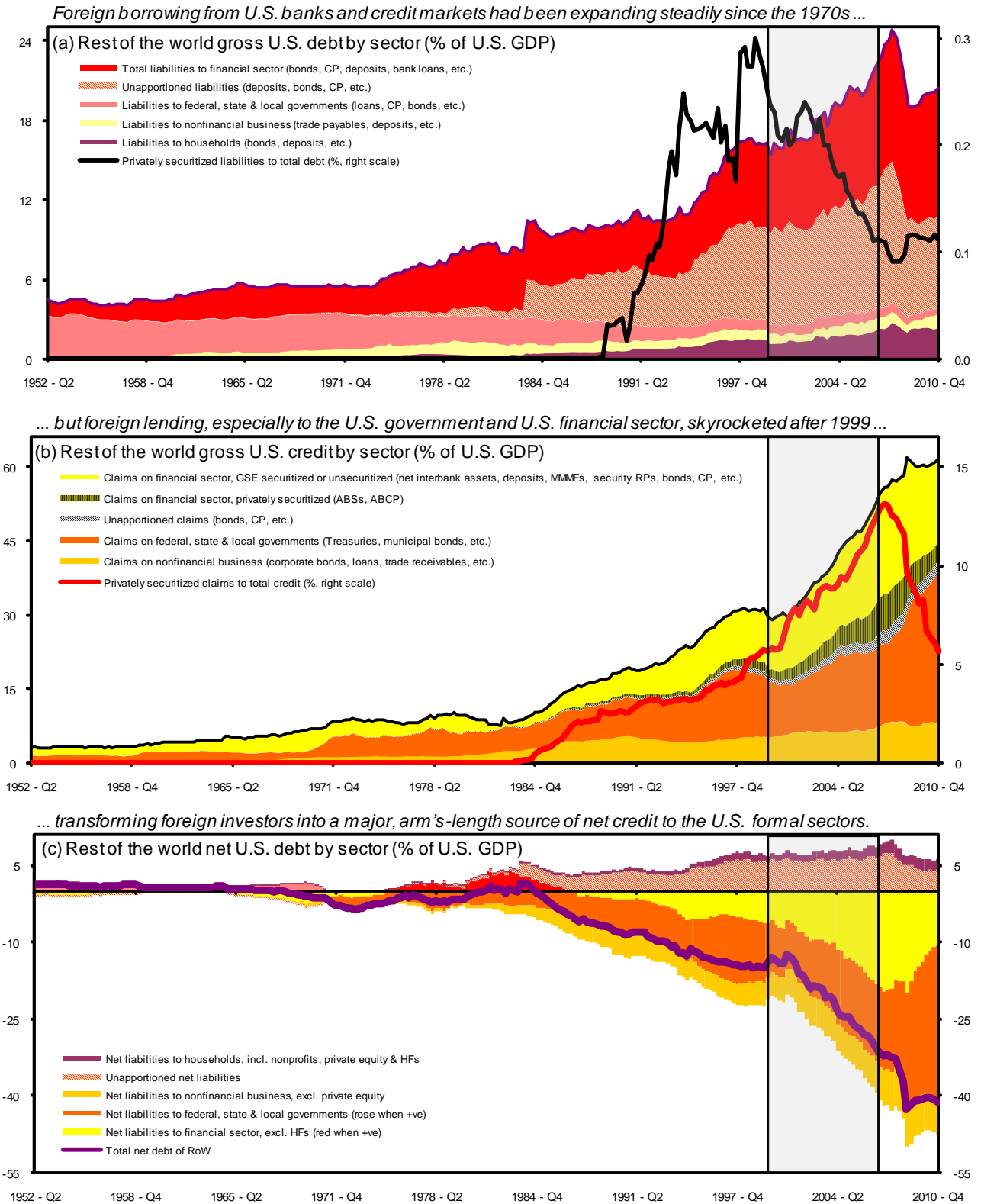
19. **Debt magnet.** Having noted the ramping up of RoW claims on the U.S. government, we next turn to foreign credit to the United States as a whole (Figure 6). Nonresident demand for U.S. debt, as we see it, is driven by three factors. The first is the mercantilist tendency of certain trading partners to support their exports through exchange rate management executed primarily through official purchases of foreign assets. The second is the worldwide need for liquid and safe securities as stores of value and as funding collateral. The third is a global search for more yield per unit risk. In our view, only U.S. financial markets have the size, diversity, and liquidity to meet this demand with the requisite volume of supply.

20. **Three trillion out.** First we look at U.S. credit to the RoW (Panel 6a). This has risen from the equivalent of 5 percent of U.S. GDP in 1952 to about four times that in 2010. But the numbers remain modest: \$3½ trillion at the peak. The U.S. government used to make up the bulk of the total but, as noted, has almost completely wound down its external credit. Instead, the U.S. household sector maintains increasingly large holdings of foreign bonds and bank deposits, perhaps dominated by hedge funds. In any case, by far the largest external creditor is the U.S. financial sector, which owns foreign bonds, CP, bank deposits, and loans adding up to about one-half of total U.S. debt-creating claims on the RoW.

21. **Nine trillion in.** Against its relatively modest credit to the RoW, the United States owes nonresidents three times as much in debt (Panel 6b). Asian central banks snap up U.S. Treasuries, agency bonds, and GSE mortgage backed securities (MBSs); European universal banks buy U.S. corporate bonds and CP, place bank deposits, and extend repo credit; foreign nonfinancial corporations invest in U.S. MMMF shares; and foreign real money investors are active in most of these markets. By debtor, the largest recipient of foreign credit on the eve of the crisis was the U.S. financial sector, followed closely by the government—a rank order that had switched by 2010. Importantly, at the pre-crisis peak, we estimate that fully one-quarter of foreign credit to the U.S. financial sector was in holdings of private-label pool securities, for a total of \$1 trillion or 13 percent of RoW gross credit to the United States.

22. **Global imbalances, global credit.** On net, the United States became the recipient of the largest cross-border funds flow in history (Panel 6c). After decades broadly in balance, net debt (including trade payables) began to grow in the mid-1980s, ballooning to 32 percent of U.S. GDP by mid-2007 and 41 percent by 2010. On the eve of the crisis, 61 percent of this was to the U.S. financial sector and 48 percent to the government (totals exceed unity due to net outward claims by other sectors); by end-2010, those shares had switched to 26 percent and 72 percent, respectively. U.S. nonfinancial businesses steadily owed about 7 percent of GDP in net external debt through this period, while U.S. households remained a small net external creditor. Although the *Flow of Funds* do not detail maturities, our sense is that U.S. external credit—MMMF holdings of foreign bank CP, etc.—is of much shorter average duration than U.S. external debt. Arguably, this borrow-long/lend-short “reverse maturity transformation” helps vest the United States with its safe-haven status.

Figure 6. Was it Foreigners Buying Everything? Gross and Net U.S. Debt of the Rest of the World



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

F. Gross and Net Credit Growth: Strong for Long

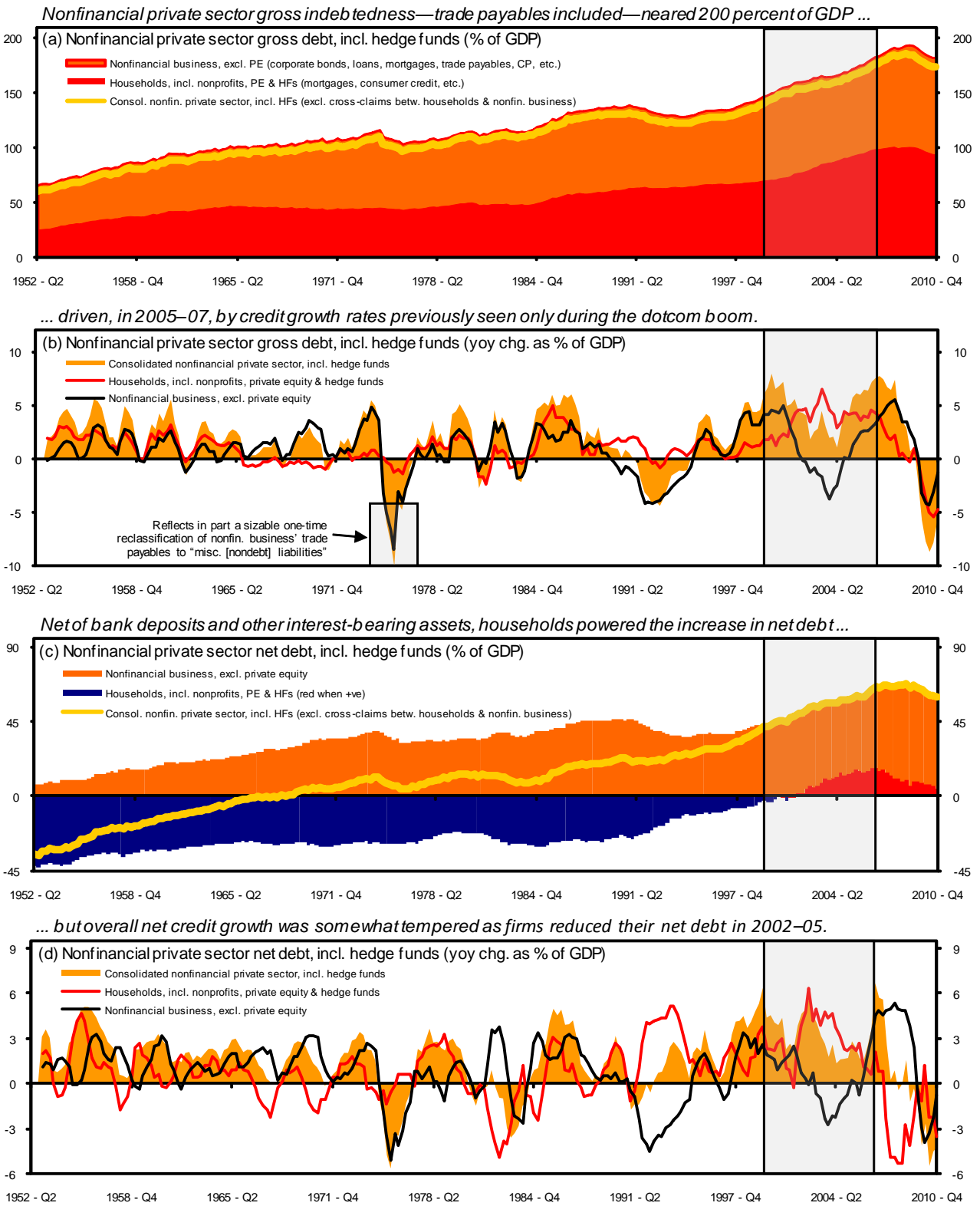
23. **Runaway credit growth?** If leverage is a lagging indicator of vulnerability when collateral values are rising, then perhaps credit growth is the more telling metric. Intuitively, when credit surges, loan officers tend to emphasize origination volume over due diligence, bond underwriters rely even more on third-party credit ratings, and the information advantage that defines banking is diluted—compounded by modern “originate to distribute” practices and the well-documented principal–agent issues that they bring. In this state of the world, the assumption always is that retained earnings will outpace credit losses, a calculus that holds for a finite period. Then comes the crash. Collateral values deflate, delinquencies consume allowances, capital fills the shortfall and, finally, capital itself falls short.

24. **Bonds included.** As we turn our attention to the stock and rate of growth of nonfinancial private sector debt, we find ourselves puzzled by the number of economists who continue to focus on narrow measures of bank credit. The U.S. financial system is anything but bank-based. Arm’s-length bond financing dominates: investors are the key creditors, be they leveraged or equity-financed, at home or abroad. Thus our analysis, again, is based on the broadest of all measures: total “end-user” debt, including trade payables, derived by consolidating the “debt-creating” financial liabilities of the household and nonfinancial business sectors, netting out cross-claims between the two (Figure 7).

25. **Up and down.** First we look at gross debt (Panels 7a–7b). Eyeballing the stock, we see a secular, almost unbroken ascent over many decades, a steeper slope (powered by households) beginning in the mid-1990s, record-high amounts outstanding in 2008–09, and then a drop. Turning to the rate of change, we confirm an extended period of rapid credit growth beginning circa 2000, subsiding in 2003–04 as nonfinancial businesses paid down their gross debt, then resuming again. Finally, 2010 ushers in the sharpest unwind since the *Flow of Funds* series began, with households and firms reducing their gross debt in concert.

26. **Offsetting patterns.** Next we look at net debt, deducting bank and MMMF deposits, credit market assets, repo credit, security credit, and trade receivables from the gross debt stock (Panels 7c–7d). The net debt owed by nonfinancial businesses surpassed the net credit extended by households in 1968. Decades later, in 2001, households themselves switched from being net creditors to net debtors (noted earlier). As with gross debt, overall net debt also peaked during the crisis and is now falling. In terms of growth rates (calculated as the rolling four-quarter difference divided by GDP), again we see a long and strong expansion beginning in the late 1990s, ebbing temporarily in 2003–04 as nonfinancial businesses amassed financial assets and reduced their gross debt, followed by a sharp post-crisis unwind. Household net debt contracted precipitously from mid-2007 to mid-2009, but nonfinancial business net debt jumped. It is only in 2010 that the two trajectories became more synchronized—both in negative territory—resulting in essentially the sharpest net credit contraction on record. Our other findings may have been ambiguous thus far, but here in these credit trends we observe a classic boom–bust pattern.

Figure 7. Was it Credit Growth? Gross and Net Debt of the U.S. Nonfinancial Private Sector



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

G. Financial Sector Size and “Churning” Activity: Inward We Look

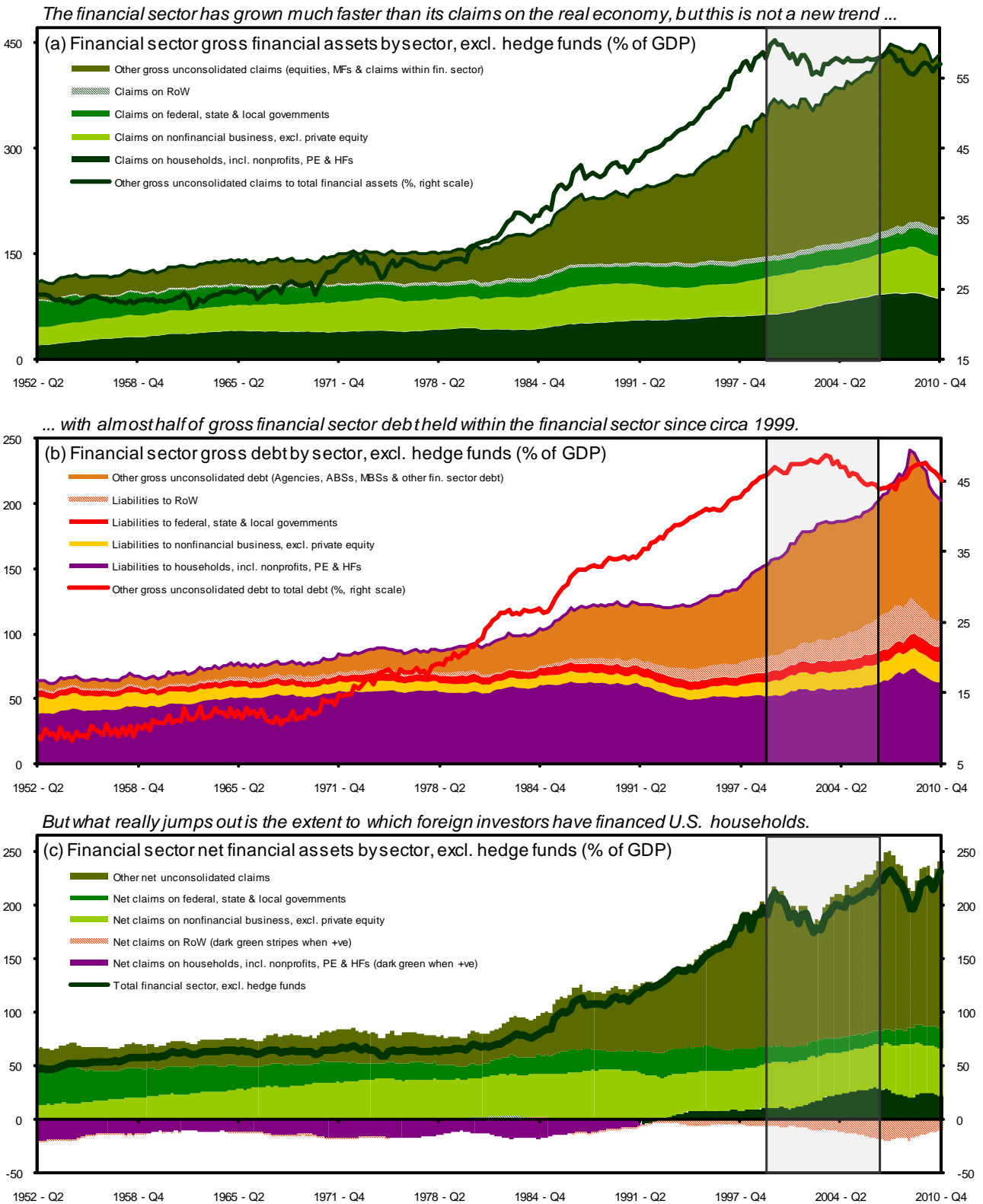
27. **Unto the breach.** Finally we turn to the U.S. financial sector (Figure 8). This, of course, is the “air traffic controller,” the place where savings are directed to consumption or investment, where loans become securities, where profligacy meets thrift. As we shall see, it is also the sector that has ballooned the most in asset size, eclipsing trends in the nonfinancial sectors. Here, at last, we make our leap from the macro to the financial.

28. **The Behemoth.** As before, we begin with the gross balance sheet (Panels 8a–8b). Total financial sector assets are calculated simply as the sum of the financial assets of each sub-segment: the Fed, the GSEs, depositories, and BHCs; MMMFs, ABS pools, broker-dealers, funding corporations, finance companies, and real estate investment trusts (REITs); and insurers, mutual funds, and pension funds. This aggregation is repeated on the liability side, excluding the equity funding of “real money investors” so as to maintain our focus on debt. Importantly, the data do not support any serious attempt at consolidation (i.e., the netting out of intra-financial sector claims). Onto total assets we superimpose gross credit to the U.S. household, nonfinancial business, and government sectors and to the RoW (calculated previously); similarly on the liability side. Several findings emerge:

- The financial sector’s total assets almost trebled as a proportion of GDP—and its total debt more than doubled as a proportion of GDP—between 1980 and the crisis.
- A growing share of the assets came to comprise either equity or credit claims by funds or—more importantly—claims by financial intermediaries on each other. Gross credit to the nonfinancial end-user sectors shrank as a proportion of total assets from about 70 percent in 1980 to only 40 percent on the eve of the crisis. Similarly, a growing slice of the debt came to comprise intra-sector liabilities (the share of bank deposits, in contrast, shrank to under one-third of total financial sector “debt”).
- Thus the financial sector’s vast expansion over 1980–2007 primarily reflected an explosion of claims between financial intermediaries. Credit did grow (as we saw earlier), but this paled in comparison with the frenetic rise in “internal” transactions. Even so, it is worth noting that this surge in financial “churning” activity peaked in 2000, and therefore makes for an unlikely proximate cause of the crisis.

29. **Balancing item.** Churning activity aside, our key insight comes after deducting debt from assets to derive the financial sector’s net claims on the nonfinancial sectors (Panel 8c). This reveals a near-perfect scissor pattern between the U.S. financial sector’s net credit to U.S. households and its net debt to the RoW. Starting in 1992, U.S. households became larger and larger net debtors to the financial sector, and foreign investors became larger and larger net creditors to it—what is startling is that the amounts involved are almost identical. In effect, the vast net flow of RoW funds into the United States (discussed earlier) was dominated by a flow of credit from foreigners to U.S. households, intermediated through the U.S. financial sector. As we shall see, securitization—by transforming illiquid residential mortgages and consumer loans into portable securities—was the key facilitator.

Figure 8. Was it Financial Sector Size? Gross and Net Financial Assets of the U.S. Financial Sector



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

H. Financial Sector Structure and “Shadow Banking”: Brave New World

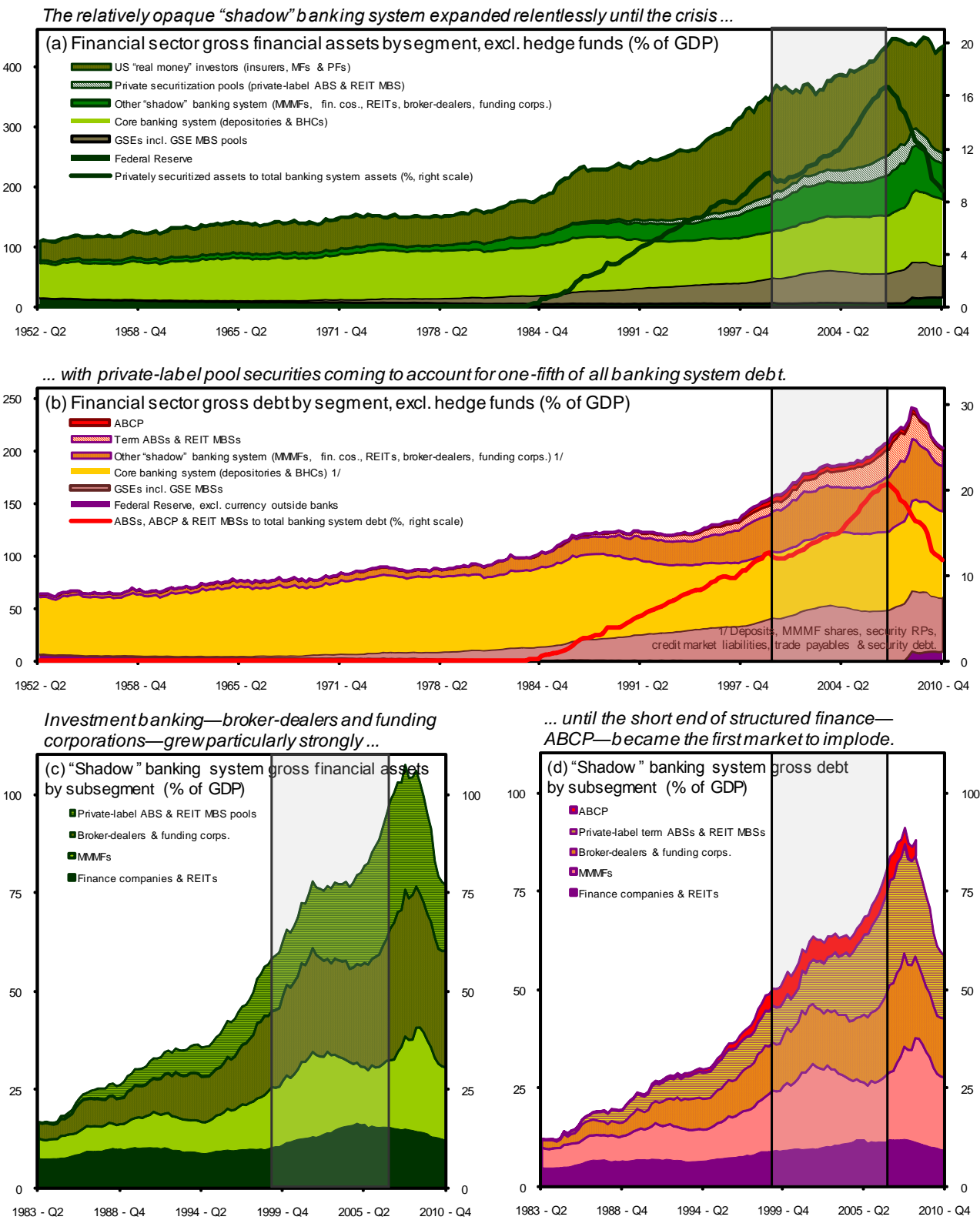
30. **New landscape, new challenges.** The surge in intra-financial sector claims after 1980 is best explained by delving into the institutional structure of U.S. finance (Figure 9). Since the advent of federal deposit insurance in the 1930s, the U.S. financial sector has had two segments that can be labeled as its “core” and its “real money periphery.” The core is federally supported; it includes the Fed, the GSEs (backed by the Treasury), and the banking system (with federal deposit insurance and Fed liquidity). The real money periphery is equity funded; it comprises mutual funds, pension funds, and insurers. In recent decades, however, a third segment has risen to prominence, dubbed the “shadow banking system”; this is a network of nonbank financial intermediaries that do not (normally) benefit from federal support but whose main business is leveraged maturity transformation—i.e., banking. The shadow banking system was at the heart of the crisis of 2007–09.

31. **Securitization and specialization.** We begin with a wide-angle lens (Panels 9a–9b). In 1952 two-thirds of system assets were held by the core and most of the rest by real money investors; there was some element of a shadow system, limited mostly to finance companies. In the 1970s MMMFs arose, primarily as a way around Regulation Q. In the 1980s the GSEs began to grow, launching the era of securitization; private players quickly learned the secrets of the trade, and in so doing unbundled themselves into chains of specialized firms ranging from originators to securitizers to servicers to dealers. Intra-sector claims multiplied as a natural corollary, with all of the new entities busily transacting with each other. And so the shadow banking system came to own almost one-quarter of financial sector assets on the eve of the crisis, by which time the asset share of the core had fallen to about one-third.

32. **Into the shadows.** Next we zoom into the shadow system (Panels 9c–9d). Often this is depicted as an unregulated darkness. With the notable exception of hedge funds, that is not true. On the contrary, most “shadow banks” are defined by the regulations that govern them: Rule 2a-7 of the Investment Companies Act for MMMFs, Rule 15c3-1 of the Securities Exchange Act for broker-dealers, Regulation AB under the Securities and Exchange Acts for private-label ABS issuers. What is true, however, is that none of these intermediaries is subject to day-to-day onsite prudential supervision of the sort applied routinely to large commercial banks, none benefits from standing access to the Fed’s discount window, and none may accept federally insured retail deposits. In other words, the shadow system is all about banking without backstops—profitable in good times, dangerous in bad times.

33. **A principle violated.** We consider systemic risk to be the risk that the actions of one financial intermediary, or set of similar placed intermediaries, will adversely affect others in the system and thence the economy at large. *In extremis*, we think this can be separated into “fire sale risk” (affecting all owners of financial assets) and “run risk” (for entities involved in leveraged maturity transformation). Many decades ago it was understood that banking is a confidence game in need of an official safety net—deposit insurance, a discount window, a payment system. In shadow banking this principle was violated. A run resulted.

Figure 9. Was it “Shadow Banking”? Gross Financial Assets and Debt of the U.S. Financial Sector



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

I. Private-Label Securitization: Bankruptcy-Remote Indeed

34. **The conduit.** As we noted earlier, securitization became the crossborder link between debt-hungry U.S. households and asset-hungry domestic and foreign investors (Figure 10). Its key contribution was to make retail loans portable. As bundling went from simple, single-tranche, GSE-guaranteed passthrough MBSs to multi-tranche, multiclass structures, a new element of alchemy was introduced: the ability to take loans of unknown credit quality, add over-collateralization and other credit enhancements, and issue top-rated ABSs. These securities were much in demand, especially when the supply of U.S. Treasuries was hardly growing: by risk-averse real money investors, by banks in jurisdictions with risk-weighted capital rules but not plain leverage ratios (e.g., Europe), and by shadow banks in need of funding collateral. In all, the process was so effective that it helped inflate the supply of credit to U.S. households (shown earlier), contributing to the U.S. housing bubble.

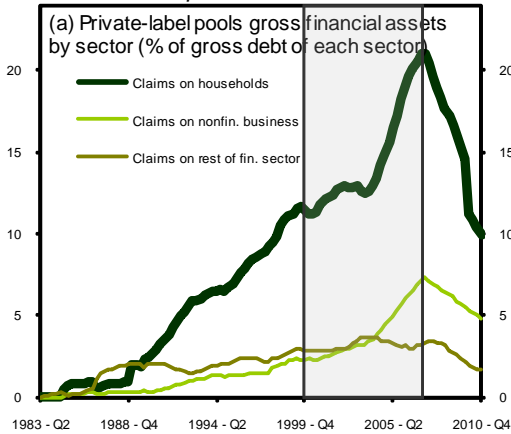
35. **The robotization of finance.** The basic principle of securitization is automation. The SPV is like a leveraged “bank,” albeit one where all decisions are made up front: the asset portfolio, the capital structure, the designated third-party servicer. The issuing entity is not only “bankruptcy remote” in that its assets cannot be clawed back into the bankruptcy estate of its arranger should the arranger become insolvent, it itself is designed to never fall under the provisions of the Bankruptcy Code and instead to follow a predetermined wind-up sequence should income fall short of promised payouts. Thus, from the moment of inception on, the pool is static. Everything is designed to minimize operating costs, with the resulting savings distributed as fees to the securitizer and a few extra basis points in yield to investors. The entire shadow banking system revolved around this technology—creating, funding, and trading private-label ABSs and asset backed commercial paper (ABCP).

36. **McMansions, flatscreens, and foreigners.** We eyeball the data (Panels 10a–10f). By borrower, one-fifth of U.S. household debt (an amount worth over 20 percent of GDP) was privately securitized as of mid-2007, compared with about 7 percent for nonfinancial business and 3 percent for the financial sector. By instrument, residential mortgages dominated SPV assets (followed by consumer credit and commercial mortgages), while term ABSs made up almost 80 percent of SPV liabilities. By lender, some 60 percent of U.S. private-label pool securities outstanding were owned by the U.S. financial sector, 22 percent by the RoW, and 13 percent by U.S. households (i.e., hedge funds)—but the largest risk exposure sat with foreign investors, whose holdings of U.S. private-label ABSs and ABCP comprised 13 percent of their gross credit market claims on the United States.

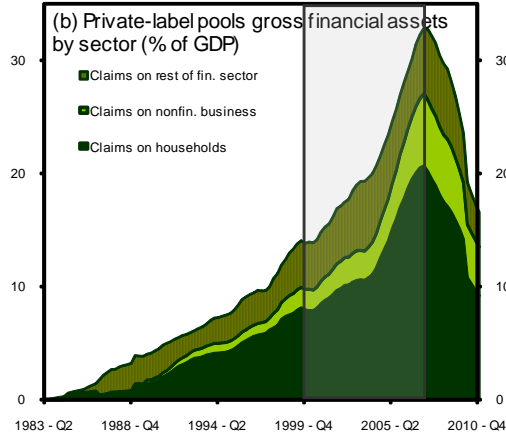
37. **Deadweight losses.** As U.S. house prices fell, confidence, investor demand, and issuance evaporated. ABCP were the first to run off; term ABSs followed. With servicers not incentivized to proactively restructure assets, or prohibited by indenture from doing so—and with no reorganizing role for the courts—losses were larger than for comparable, actively managed portfolios. These might have been absorbed had they been the sole problem. But, as we shall see, the role of ABSs as collateral triggered a systemic funding crisis.

Figure 10. Was it the Bundling? Gross Assets and Debt of U.S. Private-Label Securitization Pools

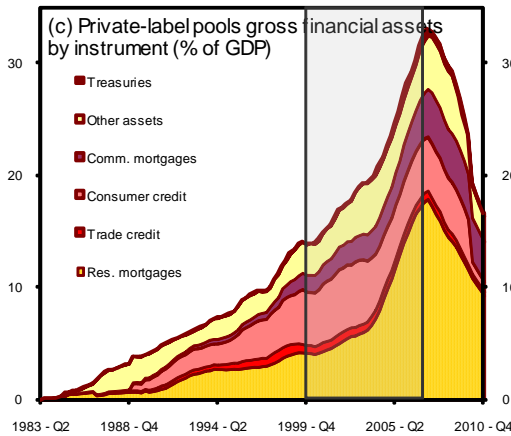
At the peak, one-fifth of all U.S. household debt was parked in private-label securitization pools ...



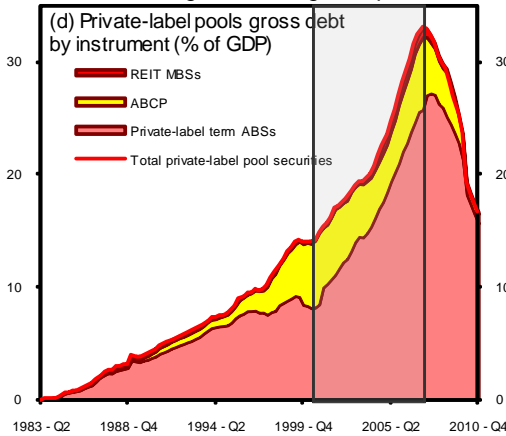
... such that claims on households still form the bulk of financial assets held "bankruptcy remotely" ...



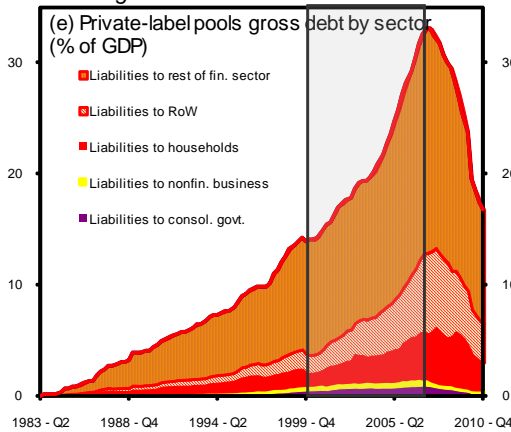
... and residential mortgages remain by far the "most-bundled" financial instrument.



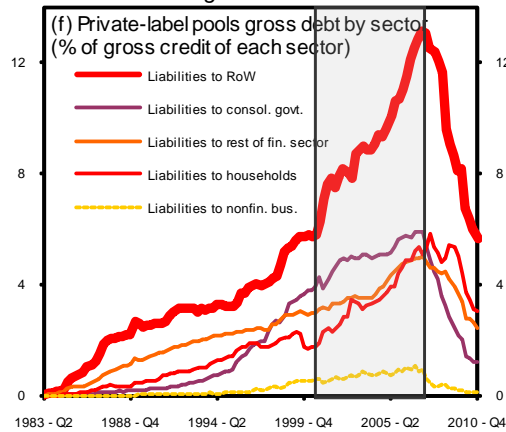
While most pools issued term ABSs, there was also a large ABCP segment pre-crisis.



The rest of the world emerged as a key buyer of U.S. private-label ABSs during the housing boom ...



... with such holdings peaking at over one-tenth of all foreign credit to the United States.



BORROWERS



LOSS OF:
 ▶ Information
 ▶ Managerial flexibility
 ▶ Workout framework



LENDERS

Sources: Fed, Flow of Funds; and Fund staff estimates.

J. The Secured Wholesale Funding Chain: In Collateral We Trust

38. **When the music stopped.** Having estimated the financial sector’s total holdings of ABSs, we now ask which segments of the system were most exposed, how they funded themselves, and whether the exposures and the funding were somehow linked (Figure 11). As before, we apply the overall share of private-label ABSs in “corporate and foreign bonds” outstanding to bond portfolios across all financial industries, and similarly for ABCP as a share of “open market paper.” Results suggest that in mid-2007 the largest holders of U.S. private pool securities were the RoW, U.S. insurance companies, and U.S. hedge funds (Panel 11a). As a share of each sector’s or industry’s total financial assets, the largest risk exposure sat with MMMFs (which also owned the largest dollar amount of ABCP), then hedge funds, then insurers. It is unsurprising, therefore, that the collapse of U.S. structured finance swiftly caused instability abroad, and that U.S. MMMFs took significant losses.

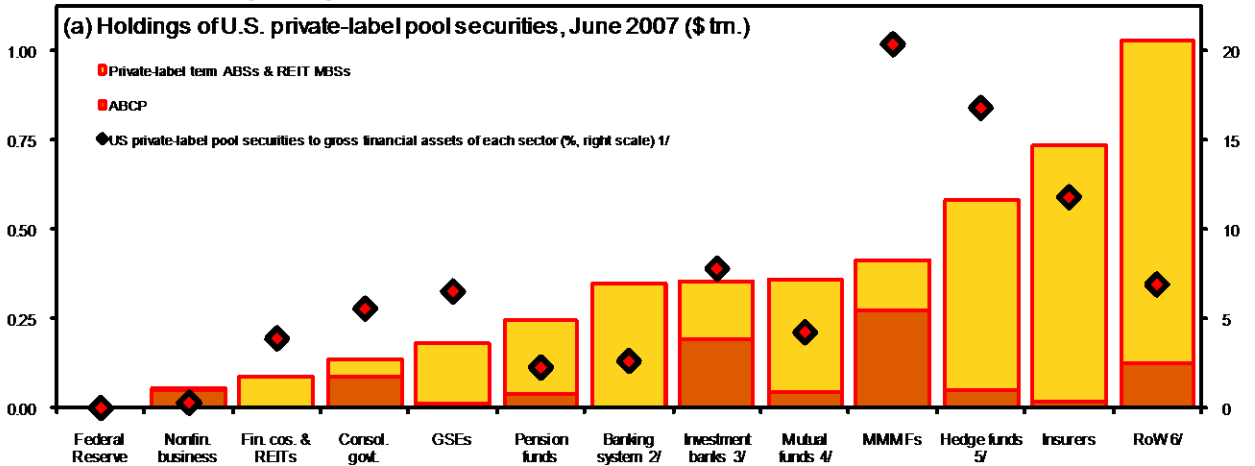
39. **Private insurance, private money.** Next, we detour into the logic of secured financing. From the perspective of the wholesale cash lender, federal deposit insurance limits (\$100,000 per depositor per bank, now \$250,000) give little comfort—spreading cash across multiple banks is cumbersome, and may still not assure full protection. Instead, the notion of credit against good collateral has obvious appeal: the fully-private version of insured demand deposits, executed in the repo or security lending markets. From the borrower perspective, secured overnight credit is the cheapest of all financing—highly flexible, and not conditional upon detailed counterparty risk disclosures. All that should really matter is the quality and “attachability” of the collateral, with the latter supported by the designation of both repo and security credit as “qualified financial contracts” under the U.S. Bankruptcy Code.

40. **The chain.** Secured credit grew dramatically in the early 2000s—triparty repo, interdealer repo, security lending by prime brokers to hedge funds, and more—with *Flow of Funds* data capturing only the proverbial tip of the iceberg. Still, the data bring to life the now-famous wholesale funding chain (Panel 11b). Cash would flow from MMMFs, foreign market participants, and U.S. hedge funds at one end to the core banking system and U.S.-based investment banks at the other; collateral would flow in the opposite direction. Importantly, the big broker-dealers were not only the largest net users of short-term secured funding, they were also key cash providers, active on both sides of the market. This was a high-volume, high-frequency business, affording little time for due diligence. Most of the collateral was in the form of “information-insensitive” Treasury or agency securities.

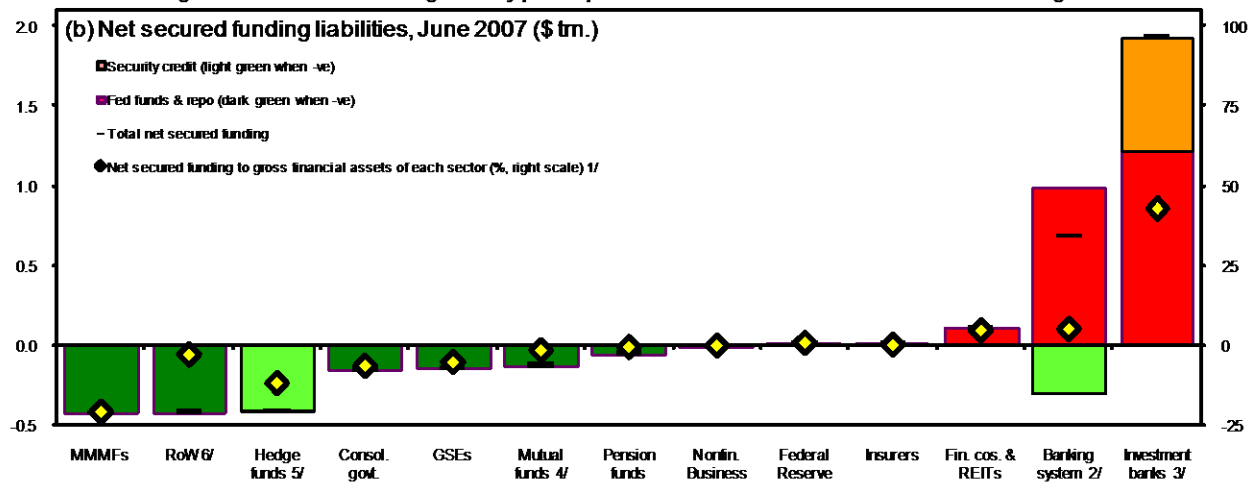
41. **Not so insensitive.** Finally, we meld exposures to private pool securities and reliance on secured funds (Panel 11c). The one industry that stands out—strikingly—is investment banking; here we find a combination of significant holdings of ABSs and ABCP and heavy dependence on net repo and security credit funding. We know the big-five U.S. investment banking groups were hit hard by the financing turmoil; now we see that they owned material amounts of structured assets. Our suspicion is that such assets were allowed to dilute their collateral pools, and that the subsequent funding runs were (mostly) runs on collateral.

Figure 11. Was it the Funding Model? Private-Label Pool Securities and Secured Funding

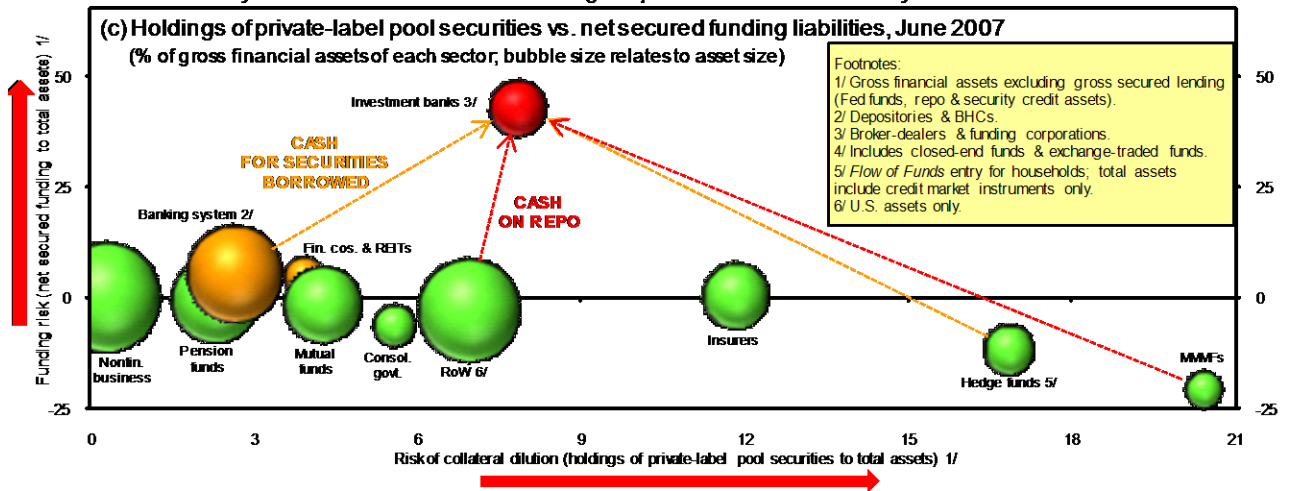
A trillion dollars of privately securitized U.S. claims were held abroad on the eve of the crisis ...



... and foreign investors were among the key participants in a massive secured wholesale funding chain ...



... in which only investment banks combined large exposure to ABSs and heavy reliance on secured funds.



Sources: Fed, Flow of Funds; and Fund staff estimates.

III. CONCLUSION: INVESTMENT BANKS AS THE FULCRUM

42. **The secured creditors.** Our final picture brings together key lenders and key borrowers in the wholesale funding chain (Figure 12). On the creditor side, we have hedge funds (represented by the credit market portfolio of the U.S. housing sector), the RoW, and U.S. MMMFs. All three segments ramped up their holdings of ABSs and ABCP ahead of the crisis—to an aggregate amount worth 15 percent of U.S. GDP at the peak—and offloaded them thereafter (Panel 12a). Whereas MMMFs and the RoW extended repo credit, hedge funds provided security credit, borrowing securities from their prime brokers to fund short positions and lending cash in return; together, the three segments’ secured credit claims reached 10 percent of GDP at the peak; later, as they took losses and themselves became liquidity constrained, they cut back sharply—to nil in the case of the RoW (Panel 12b).

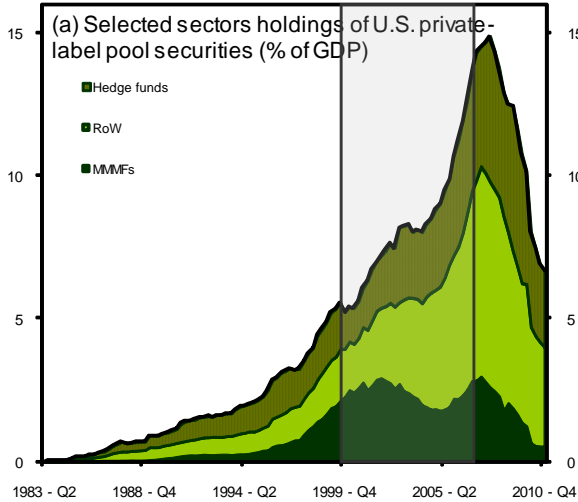
43. **The secured borrowers.** On the debtor side, as noted, the main actors are the core banking system (commercial banks, BHCs, thrifts, and credit unions) and the U.S.-based investment banks (broker-dealers and funding corporations). The contrast between them is stark (Panels 12c–12d). While the core banking system expanded in the run up to the crisis, driven by retained loans, the investment banks positively exploded in size, ramping up their holdings of agency bonds, agency MBSs, ABSs, and—overwhelmingly—“other financial assets” (which we assume are trading assets, equities included). Led by the big-five U.S. groups—but including large broker-dealers owned by U.S. BHCs or foreign banks—total assets of the industry catapulted from 2 percent of GDP in 1980 to 35 percent in 2007, the latter figure equivalent to one-third of the assets of the core banking system. Back in 1980 U.S. broker-dealers would focus on fee-based broking (as does Rule 15c3-1); by 2007 they had become huge, leveraged securities dealers—like hedge funds, only vastly larger.

44. **Fulcrum of fear.** We conclude by thinking through the *modus operandi* of any one of these mega-dealers. On the asset side, we see surplus liquidity, invested in MMMF shares or lent out as repo or security credit; high-risk securities held for yield; and low-risk securities held as funding collateral. On the liability side, we count cheap overnight secured funding; more-costly unsecured bonds, loans, and CP; and an expensive sliver of equity capital. The “trick,” so to speak, is to pass off higher-yielding nongovernment securities as funding collateral, at a low or zero haircut. Top-rated ABSs were the obvious candidates—and triparty repo market data confirm that they were accepted. Now look closely at the assets of the U.S. investment banking industry, with claims shown in declining order of credit quality from the bottom up and with net secured funding depicted by a red line (Panel 12d). It is all but certain that ABSs, and even equities, were widely used as collateral. When investors fled structured finance, the presence of these securities in the collateral pools triggered mass withdrawals of secured funding. Given that the borrowers were deeply interconnected market-making firms with trillion-dollar balance sheets, that became everyone’s problem.

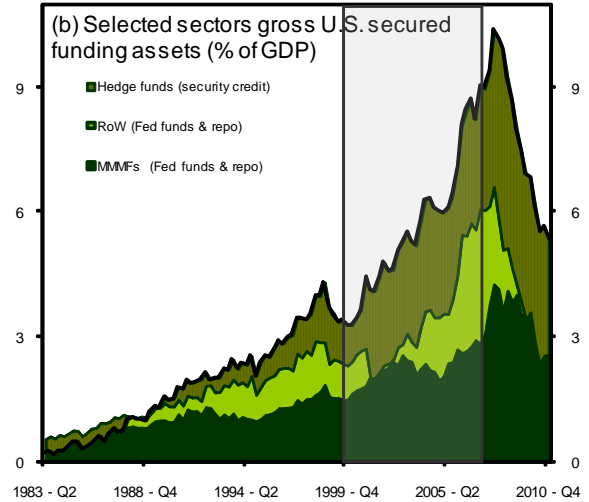
45. **The sequel.** Our next paper will be on safety nets, the regulation and supervision of investment banking, and other policy remedies that flow from the analysis herein.

Figure 12. In Summary. Asset Structures, Collateral, and Secured Funding

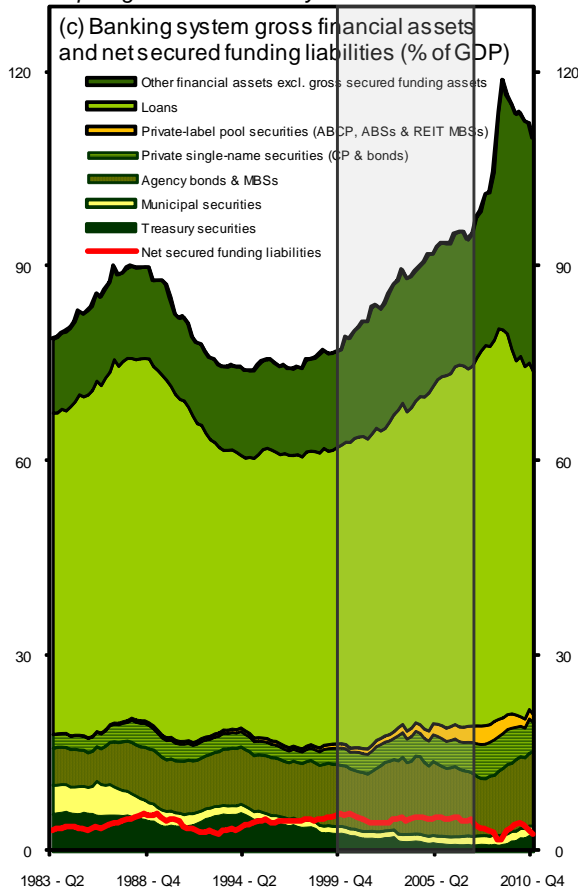
A few sectors were both heavily invested in U.S. private-label ABSs and ABCP...



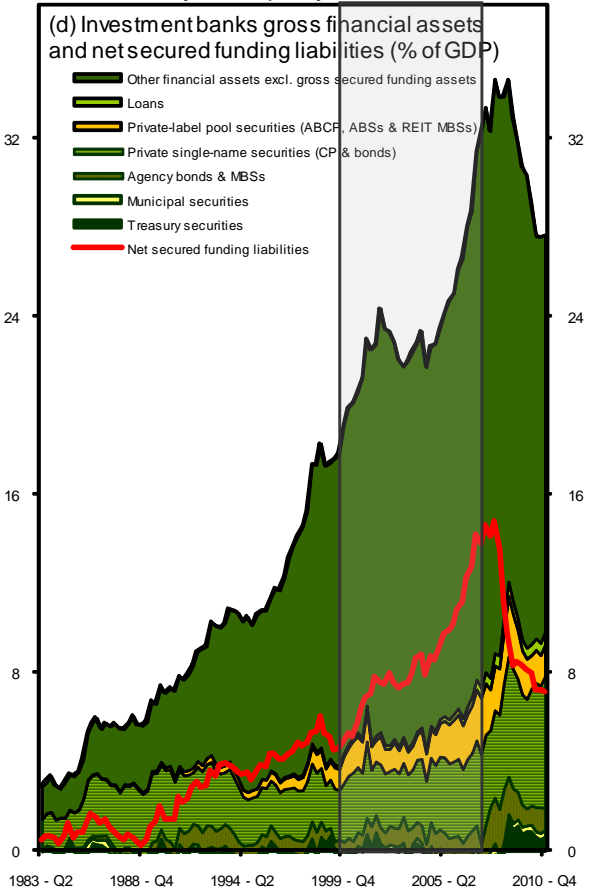
... and key providers of short-term secured wholesale funding via the repo and security credit markets.



In the aggregate, secured borrowing by the core depository system was more than covered by holdings of pledgable "near-money" credit market securities ...



... whereas, as an arithmetic fact, the dramatic expansion of the investment banks must have been fueled by lower-quality collateral.



Sources: Fed, *Flow of Funds*; and Fund staff estimates.

REFERENCES

- Bernanke, B.S., 2007, Federal Reserve Board, “Financial Regulation and the Invisible Hand,” Remarks at the New York University Law School (April 11).
- Bhatia, A.V., 2007, “New Landscape, New Challenges: Structural Change and Regulation in the U.S. Financial Sector,” IMF Working Paper 07/195.
- , 2011, “Consolidated Regulation and Supervision in the United States,” IMF Working Paper 11/23.
- Chailloux, A., 2012, “The Rise and Fall of the Repo Empire,” IMF Working Paper (forthcoming).
- Copeland, A., A. Martin, and M. Walker, 2010, “The Tri-Party Repo Market before the 2010 Reforms,” Federal Reserve Bank of New York Staff Report No. 477.
- Diamond, D.W., and P.H. Dybvig, 2000, “Bank Runs, Deposit Insurance, and Liquidity,” in *Federal Reserve Bank of Minneapolis Quarterly Review*, Vol. 24, No. 1 (Winter).
- Dudley, W.C., 2009, Federal Reserve Bank of New York, “More lessons from the crisis,” Remarks at the Center for Economic Policy Studies Symposium, Princeton, New Jersey (November 13).
- Gorton, G.B., 2009, “Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007,” paper presented at the 2009 Financial Markets Conference of the Federal Reserve Bank of Atlanta (May 9).
- , and A. Metric, 2009a, “Haircuts,” Yale International Center for Finance Working Paper No. 09-15.
- , 2009b, “Securitized Banking and the Run on Repo,” Yale International Center for Finance Working Paper No. 09-14.
- Gorton, G.B., and N.S. Souleles, 2006, “Special Purpose Vehicles and Securitization,” in *The Risks of Financial Institutions* (University of Chicago Press).
- Pozsar, Z., 2011, “Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System,” IMF Working Paper 11/190.
- Reinhart, C.M., and M.B. Sbrancia, 2011, “The Liquidation of Government Debt,” National Bureau of Economic Research Working Paper 16893.
- Singh, M., and J. Aitken, 2010, “The (sizable) Role of Rehypothecation in the Shadow Banking System,” IMF Working Paper 10/172.