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# ECONOMIC POLICY REVIEW

SPECIAL ISSUE:

THE EVOLUTION OF  
BANKS AND FINANCIAL  
INTERMEDIATION

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## ECONOMIC POLICY REVIEW

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## SPECIAL ISSUE: THE EVOLUTION OF BANKS AND FINANCIAL INTERMEDIATION

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# THE EVOLUTION OF BANKS AND FINANCIAL INTERMEDIATION: FRAMING THE ANALYSIS

## 1. INTRODUCTION

While the term “the Great Recession” has been loosely applied to almost every economic downturn in the past twenty years, the crisis of 2007-09 has—more than most recessions—lived up to that name.<sup>1</sup> The crisis has been felt across virtually all economic sectors and in all parts of the world. Still, if its effects have been widespread, its origins were narrower: the crisis had its roots in the financial sector and manifested itself first through disruptions in the system of financial intermediation.

This story is in itself not new. Many economic crises in history have been the result of financial crises, and many financial crises in turn originated as failures of financial intermediaries. And in every instance the reference has been to *banks*, in their essential role as deposit-taking entities involved primarily in the business of lending. Thus, Reinhart and Rogoff (2008) identify some thirty separate instances of banking crises across many countries and at different points in time during the last 100 years.

Indeed, the terms *bank* and *financial intermediary* have normally been used interchangeably. However, what was new in this last crisis is that we witnessed many instances of financial

intermediation failure that did not necessarily, or at least not directly, result from bank failures. To be sure, many banks did indeed fail during the crisis and many more were left with impaired operations—outcomes that certainly exacerbated the scale and scope of the crisis. Nevertheless, major disruptions occurred among segments of financial intermediation activity that had in recent years been growing rapidly and that did not seem to revolve around the activity and operations of banks.

For instance, we have learned that the crisis originated as a run on the liabilities of issuers of asset-backed commercial paper (ABCP), a short-term funding instrument used to finance asset portfolios of long-term maturities (see, for example, Gorton [2008]; Covitz, Liang, and Suarez [2009]; Acharya, Schnabl, and Suarez [forthcoming]; and Kacperczyk and Schnabl [2010]). In this sense, ABCP issuers (conduits) perform typical financial intermediation functions, but they are not banks. Certainly, in many instances banks were the driving force behind ABCP funding growth, sponsoring conduit activity and providing the needed liquidity and credit enhancements. But the main point is that ABCP financing shifts a component of financial intermediation away from the traditional location—the bank’s own balance sheet. Similarly, and concurrently with the ABCP disruptions, financial markets also witnessed a bank-like run on investors that funded their balance sheet through repurchase agreement (repo) transactions, another form of financial intermediation that grew rapidly but did not take place on bank balance sheets (Gorton 2008; Gorton and Metrick 2010). Additionally, in the

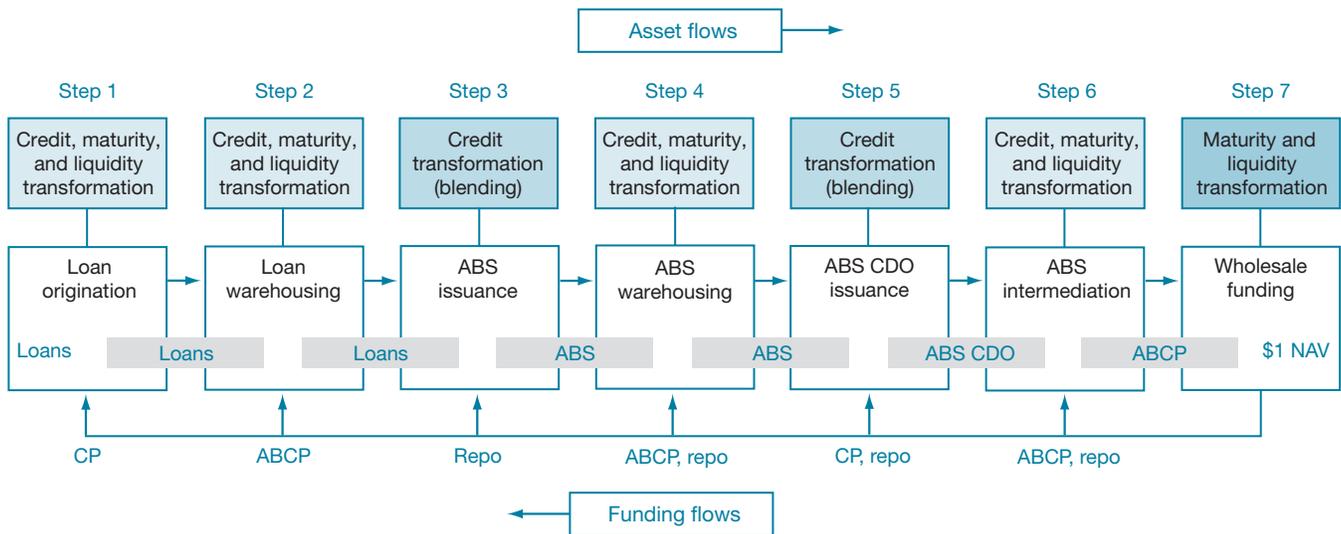
<sup>1</sup> The description of the 2007-09 crisis as “the Great Recession” is commonly attributed to Paul Volcker, who used the term in a speech in April 2009 (<http://sitemason.vanderbilt.edu/myvu/news/2009/04/21/paul-volcker-and-donald-kohn-discuss-the-economic-crisis-at-ogsm-forum.78224>). For the application of this term to earlier recessions, see <http://economix.blogs.nytimes.com/2009/03/11/great-recession-a-brief-etymology/>.

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## The Credit Intermediation Chain



Source: Pozsar et al. (2010).

Note: ABS is asset-backed security; CDO is collateralized debt obligation; CP is commercial paper; ABCP is asset-backed commercial paper; NAV is net asset value.

aftermath of Lehman Brothers' default, money market mutual funds, yet another class of nonbank entities that serve as financial intermediaries, experienced a run on their liabilities, an event that triggered in turn an even bigger run on ABCP issuers (Acharya, Schnabl, and Suarez, forthcoming).

The crisis has therefore exposed significant instances of financial intermediation failure but also an apparent disconnect between financial intermediation activity and banks. A new narrative has emerged, describing intermediation as a decentralized rather than a bank-centered system, one in which the matching of the supply of and demand for funds occurs along an extended *credit intermediation chain*, with specialized markets and nonbank institutions playing a part along the way.

This is the so-called shadow banking model of financial intermediation, as described, for instance, in Pozsar et al. (2010).<sup>2</sup> The authors characterize the transition from a bank-centered to a decentralized model in this way: "In essence, the shadow banking system decomposes the simple process of deposit-funded, hold-to-maturity lending conducted by banks into a more complex, wholesale-funded, securitization-based lending process that involves a range of shadow banks" (p. 13).

<sup>2</sup> The term *shadow banking* was apparently coined by McCulley (2007).

As the authors explain, the "backbone" of the new system is the credit intermediation chain. The exhibit above, from the Pozsar et al. paper, depicts the multiple steps in the chain. Loans are originated, but with a funding approach that involves a precise sequence of steps, during which they are removed from the balance sheet of the originator (warehousing), and then packaged into securities (asset-backed-security [ABS] issuance). This last step could expand into additional steps that may involve warehousing of the asset-backed securities themselves and further repackaging into more complex securities (for instance, collateralized debt obligations, or ABS CDO issuances).

This decentralization of activities opens up significant opportunities for economies of specialization, in which nonbank firms emerge as organizations that have a narrower scope than banks but perform an important function in finalizing securitization activity. In this alternative model, traditional banks may have a diminished role. Understanding the extent to which this is the case is important in and of itself, but it also raises key normative questions. Namely, what are the consequences of the new reality for the monitoring and regulation of financial intermediation? The system of controls that has been in place over time, certainly until the crisis

erupted, assumes that risks, especially in their systemic component, are mainly concentrated on the balance sheet of banks. If financial intermediation now occurs somewhere else, should we rethink the “boundaries” of regulatory control? To what extent will the new model of financial intermediation and its associated risks be subject to review and intervention with a bank-based regulatory approach?

These questions motivate the articles in this special issue of the *Economic Policy Review*. The thesis that unites all of the contributions in the volume is that banks—regulated banking institutions—have in fact *not* been bypassed in the modern process of financial intermediation. Indeed, we argue that banks have shown a remarkable capacity to adapt to the evolving system of intermediation, continuing to provide, albeit in new ways, those services needed to facilitate the matching of fund supply and demand. Moreover, we contend that when nonbank intermediation has come into play, banks have actually supported its growth.

Our thesis unfolds through two complementary approaches. First, we provide an in-depth analysis of the credit intermediation chain, focusing on the roles needed for a dollar of funding to be successfully intermediated through the new model, centered on asset securitization. Because each role is performed by a specific entity, this *role-based* approach allows us to assess the scale and scope of participation by banks—and nonbanks—in the process. The approach confirms that banks have indeed adapted naturally to the changing model of intermediation, redefining their “production function” while continuing to provide the type of services needed for intermediation to occur.

Second, we look at the same issues from the perspective of the organizational form of the banking firm itself. In particular, we posit that banks have adapted through a significant transformation of their organizational structure. If financial intermediation entails increasing participation by nonbank entities, then banks can adapt by integrating those nonbank entities in the same bank holding company (BHC) structure. This second approach, focusing on *entity type*, confirms that BHCs have allotted nonbank subsidiaries an increasingly important role in their activities, consistent with the view of adaptation through organizational changes.

Significantly, the structural changes initiated by banks have clear normative implications, since BHCs and financial holding companies are regulated by the Federal Reserve. If entities active in the credit intermediation chain have in fact been incorporated in BHCs, then we may need to reassess how much of modern financial intermediation has been overtaken by “shadow banking” and how much remains open to regulatory scrutiny.

## 2. FROM BANK-BASED TO SECURITIZATION-BASED INTERMEDIATION

As any textbook on money and banking would explain, the standard problem of external financing—that is, the matching of agents in possession of funds with those in need of funds—is resolved in one of two ways: 1) with *direct finance*, where fund suppliers support demand through ownership participation (acquisition of equity positions) and/or the acquisition of debt instruments (for example, bonds) directly issued by the agents demanding the funds; or 2) with *indirect finance*, where fund supply is funneled to “in-between” agents, the financial intermediaries, which are then responsible for the allocation to demand.

Direct finance grants agents an immediate participation in, and control over, investment activities, but it also entails dealing with a number of well-known informational and liquidity frictions. For instance, unless the agent seeking funds has an established track record of performance, *selection* requires learning about the agent and its intended use of funds. But even when a record of satisfactory performance exists, a supplier still needs to follow the investment project, *monitoring* activities throughout its life cycle. Moreover, before the supplier selects a specific investment opportunity, it must employ resources to *screen* available alternatives, evaluating the many dimensions of risk, return, business, scale, scope, and geography before making an informed decision. And because of these informational costs, funding constraints may still limit the ability of the supplier to *diversify* risks across a suitably large portfolio of alternative investment opportunities. Finally, even if the informational issues are successfully resolved, the fund supplier needs to factor in its own *liquidity* preferences, that is, the need to have funds available before the investment matures.

The wide range of costs associated with direct finance justifies the existence of financial intermediaries, traditionally understood to be *centralized agents* performing under one roof the roles of screening, selection, monitoring, and diversification of risk while simultaneously providing credit and liquidity services to fund suppliers. These services—the *credit, maturity, and liquidity transformations* of financial claims—presuppose all of the roles just described and show the intrinsic fragility of the intermediary’s activity: Given the nature of its operations, the financial intermediary never holds sufficient balances to guarantee full withdrawals, a condition that exposes it to potential “runs.” And because the investments of intermediaries are naturally opaque, it is difficult to distinguish the problems specific to one intermediary from problems affecting the industry as a whole, with the result that the observation of distress at one entity could lead to runs on

others as well. Hence, financial intermediation activity carries a significant social risk—the potential for systemic disruptions.<sup>3</sup>

The existence of this risk is one rationale, and perhaps the major one, for the fact that financial intermediation activity in modern history has been closely governed by laws and regulations and, more specifically, restricted to entities that are able to obtain explicit authorization in the form of a charter. In the United States, a charter permitting the taking of deposits is granted exclusively to entities organized as *commercial banks* (and similarly to thrifts and credit unions as well).<sup>4</sup> Moreover, because of the potential for systemic risk, the restricted bank charter also comes with exclusive access to liquidity and credit support by the taxpayer—made available, in the United States, through access to the Federal Reserve’s discount window and the insurance of deposit accounts by the Federal Deposit Insurance Corporation (FDIC), respectively. The existence of these official backstops is a significant factor strengthening investors’ confidence in banks.<sup>5</sup>

Hence, both the chartering restrictions and the official liquidity and credit guarantees have been key in making the traditional system of financial intermediation a *bank-centered* system. In this framework, risks reside on banks’ balance sheets, which is the main justification for a system of regulation and supervision that is likewise focused on banks.

### 3. A ROLE-BASED APPROACH TO UNDERSTANDING BANK EVOLUTION

As suggested earlier, however, the advent of asset securitization has broken down the traditional system of intermediation. The origination of loans is now just the first step in a longer sequence (recall the exhibit presented above), and in every subsequent step, specialized entities now perform specific roles. For instance, warehousing in step 2 is done through dedicated entities (for instance, the ABCP conduits mentioned earlier) that finance the acquisition of the long-term assets through the issuance of shorter-term liabilities. Because of the implied maturity transformation that this role involves, this stage would typically require the provision of some form of liquidity and credit enhancement—for the same reason that banks’ traditional

activity requires both liquidity and credit guarantees. Following warehousing, the assembly of the loans into securities and the related sale to investors require the services of several parties: an *issuer*, that is, a company that acquires the assets to be transformed into securities; an *underwriter*, the entity in charge of the packaging and sale of the securities; a *trustee*, an agent that acts on behalf of and looks after the interests of the securities buyers; and a *servicer*, a party that manages the income streams from the underlying assets and the related payments to the investors. Finally, along the whole chain, the process may also require further liquidity and credit enhancement to boost the quality of the issuances.<sup>6</sup>

Although these roles are now typically played by separate specialized entities, they are the same roles performed simultaneously, albeit in implicit form, by a bank in the traditional centralized model of intermediation: The bank is the loan originator, but it is also the implicit issuer and underwriter of the loan portfolio to its own investors, depositors, and equity holders. Likewise, the bank performs the role of trustee, as the delegated agent for its investors, and that of servicer, as it collects the revenue stream from the loan contracts. Finally, it provides credit enhancement to debt holders, represented by the existence of equity held on the balance sheet, and liquidity services, in fact on both sides of the balance sheet, to firms and depositors.

This continuity in roles is an important qualification, showing clearly that while the system has become decentralized and complex, it is still plainly financial intermediation at its core. Consequently, we can more clearly assess whether banks have in fact been eclipsed by other players by analyzing who performs each role along the credit intermediation chain.

We begin with loan origination. Traditionally the amount of loans found on bank balance sheets would be a reasonable measure of aggregate lending activity. Yet, the evolution to a securitized-based model has actually made it more difficult to quantify precisely how much lending is originated and by whom. For instance, if loans are increasingly originated to be sold quickly to feed the asset securitization machine—the so-called *originate-to-distribute model* of intermediation—then the balance sheet (given its static nature) could not capture the richer dynamics of origination and sales taking place in the background. Hence, the levels and trends in lending amounts observed in intermittent snapshots—that is, at every point in time banks are required to file—become increasingly uninformative about the extent to which banks actively engage in the new intermediation model.

Regulatory reporting data, such as banks’ quarterly *Consolidated Reports of Condition and Income* (“call reports”), provide a small window into the originate-to-distribute practice from the observation of banks’ *held-for-sale accounts*,

<sup>6</sup> Steps 4 through 6 in the exhibit represent more complex instances of securitization, but still require essentially the same roles.

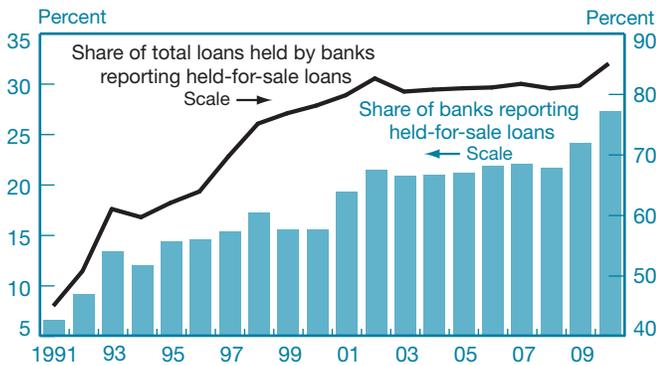
<sup>3</sup> See, for example, Ennis and Keister (2010) for a survey of the theoretical arguments on financial intermediation fragility.

<sup>4</sup> The first bank charter in U.S. history is probably that granted by the Continental Congress to the Bank of North America in 1781 (Knox 1900), although some earlier contenders for this distinction exist (for example, the Massachusetts Land Bank in 1739).

<sup>5</sup> “FDIC insurance is backed by the full faith and credit of the United States government. Since the FDIC was established in 1933, no depositor has ever lost a single penny of FDIC-insured funds.” See <http://www.fdic.gov/deposit/deposits/dis/index.html>.

CHART 1

### Commercial Banks Reporting Loans Held for Sale



Source: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*.

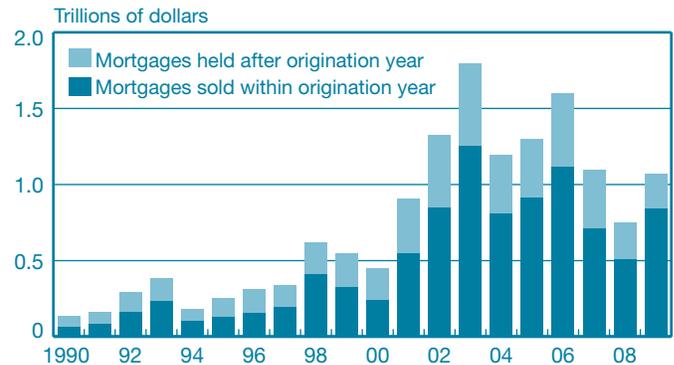
in which banks place loans that they intend to sell.<sup>7</sup> As Chart 1 shows, the fraction of banks reporting held-for-sale loans (represented by the bars) increased substantially from the early 1990s, even though at the peak of the crisis, still only about one in four banks did so. However, those banks accounted for roughly 80 percent of total commercial bank loans (the solid line) over the same period. This information seems to suggest that banks increasingly shifted to an originate-to-securitize model of lending and that they may have done more origination than the balance sheet would suggest.

Still, the amount of loans held for sale at a given point in time can only offer an indirect view of the underlying dynamics of origination and sale. Ideally, one would like to see data on actual origination trends, actual sales, and the purpose of the sale—information that is not collected in current regulatory data. Information reported under the Home Mortgage Disclosure Act (HMDA) provides some detail for at least the residential mortgage subset of these assets, revealing that actual loan origination by commercial banks has grown over time (Chart 2). Moreover, a majority of these loans are sold within the same calendar year. So, for instance, in the most recent years, for every one dollar of mortgages originated and held by banks, nearly four dollars of additional mortgages were originated and sold.

<sup>7</sup> The call reports (officially designated FFIEC 031/FFIEC 041) provide basic data on banks' financial condition; the forms originate with the Federal Financial Institutions Examination Council and are collected by the Federal Reserve. Note that the "held-for-sale" designation indicates only the *intent* to sell, so the size of this book is likely to depart from actual sales levels. Also, the held-for-sale books would not capture origination and sale dynamics occurring at a higher frequency than data reporting (for example, mortgage loans originated and sold all within two consecutive quarters of customary regulatory reporting). Nevertheless, the comparison of the trend in the size of these books with that of aggregate growth in securitization activity should give an indication of the participation of banks—as loan originators—in the process.

CHART 2

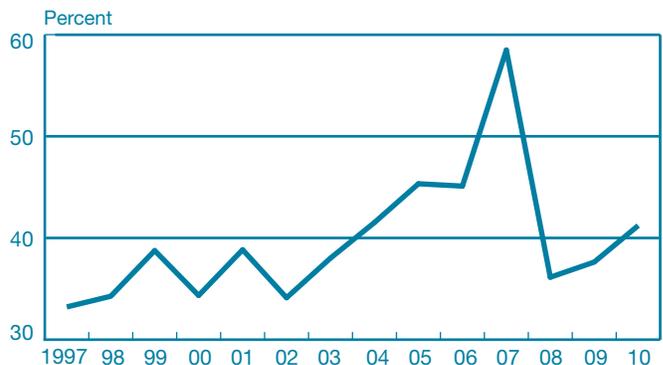
### Mortgage Originations by Commercial Banks



Source: Home Mortgage Disclosure Act.

CHART 3

### Mortgages Sold within Origination Year by Commercial Banks, as a Share of Total Residential Mortgage-Backed-Securities Issuance



Sources: Home Mortgage Disclosure Act; Securities Industry and Financial Markets Association.

This "churning" activity confirms quite effectively the increasing inadequacy of balance sheet data to gauge the actual importance of banks in the role of originator. Indeed, we reach the same conclusion when we compare the magnitude of residential mortgages sold in every origination year to the total new issuance of residential mortgage-backed securities (RMBS), as reported by the Securities Industry and Financial Markets Association (SIFMA).<sup>8</sup> Residential mortgages originated and subsequently sold by commercial banks account for between 30 and 50 percent of RMBS issuance in most years, though this figure was closer to 60 percent in 2006 (Chart 3).

<sup>8</sup> SIFMA figures for total RMBS issuance combine agency MBS issuance with nonagency RMBS issuance.

TABLE 1

## Banks' Provision of Support in Structured Finance

|                    | Top Fifty ABS Deals |                              | Top Fifty ABCP Conduits |                              |
|--------------------|---------------------|------------------------------|-------------------------|------------------------------|
|                    | Number of Deals     | Amount (Billions of Dollars) | Number of Deals         | Amount (Billions of Dollars) |
| Banks              | 27                  | 229.15                       | 47                      | 168.52                       |
| Nonbank affiliates | 16                  | 166.57                       | 11                      | 43.01                        |
| Other              | 30                  | 60.59                        | 6                       | 11.47                        |
| Total              |                     | 272.09                       |                         | 180.12                       |

Source: Moody's.

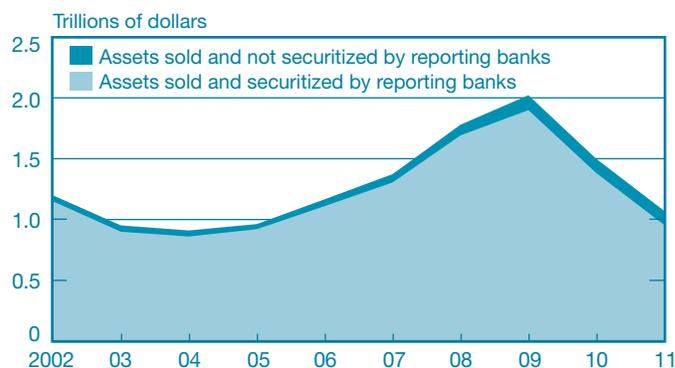
Note: ABS is asset-backed security; ABCP is asset-backed commercial paper.

Moving on to liquidity and credit enhancement, we consider the extent to which banks have ceded these roles to other entities. As noted earlier, bank-based intermediation is made relatively stable, despite its intrinsic fragility, by the existence of explicit official support from central authorities. This support takes the form of both liquidity guarantees (for example, central bank discount window access) and credit guarantees, that is, the protection of intermediaries' liabilities in the event of their default (for example, deposit insurance). By extension, the new securitized-based system, while shifting maturity transformation outside of bank balance sheets, could not thrive without receiving adequate similar support. Lacking access to official guarantees, the system requires the provision of such services from within the market itself. While various types of entities can provide, and have provided, such services, absorbing liquidity and credit risk for clients is again one of the defining characteristics of banks' business model. Moreover, banks are also natural providers of such services exactly because their sponsoring services are credible, owing to the official support they receive in turn.

The evidence seems to support the continuing importance of banks in these roles. Focusing on the ABCP market, we note that prior to the crisis, when conduits had expanded to reach a peak of about \$1.2 trillion, banks were the providers of support in almost 75 percent of the value outstanding (Acharya, Schnabl, and Suarez, forthcoming). And even after the crisis, although the volumes in this market have shrunk considerably (to less than \$400 billion in 2010), banks have maintained a dominant role. For instance, data from Moody's concerning the top fifty ABCP issuances in the United States at year-end 2010—amounting to approximately \$180 billion—

CHART 4

## Outstanding Principal Balance of Assets Sold by Commercial Banks with Servicing Retained or with Recourse or Other Seller-Provided Credit Enhancements



Sources: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*; Board of Governors of the Federal Reserve System, *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

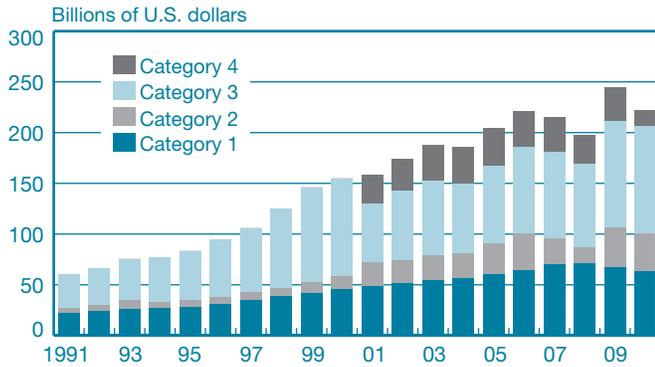
suggest that banks were the providers of support in forty-seven of such deals, for a total of \$168 billion (Table 1). As the table shows, banks were also significant providers of support in ABS issuance, and if we consider the entire holding company organization (including nonbank subsidiaries), banks figure even more importantly in the provision of this service.

Hence, banks seem to have been “private central bankers” to important components of shadow banking activity throughout the years of its growth. This is another way in which banks have asserted their renewed importance in the transformed mode of intermediation: If intermediation has migrated away from bank balance sheets, its growth still seems largely dependent on banks' support.

Further along the credit intermediation chain, to what extent have banks been engaged in the securitization process as issuers, underwriters, servicers, and trustees? This question is difficult to answer, because available regulatory data at best provide only some indirect evidence and only for the most recent period. For instance, through additions to the call reports introduced in 2001, we can derive at least a partial measure of banks' participation in asset securitization from the aggregate amount of assets sold in which banks retained a servicing role or provided some form of enhancement. As Chart 4 shows, this amount about doubles from the early 2000s to a peak in 2009 of about \$2 trillion. However, this figure does not explicitly take into account any of the other roles needed in asset securitization, and it misses the extent to which banks

CHART 5

Composition of Noninterest Income  
Commercial Banks, 1991-2010



Sources: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*; Board of Governors of the Federal Reserve System, *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

Note: The categories are defined as follows:

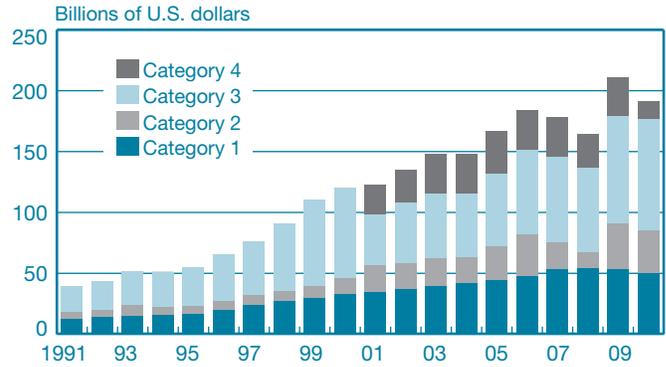
- Category 1 = income from fiduciary activities + servicing fees on deposit accounts
- Category 2 = trading revenue + other foreign transaction gains + venture capital revenue + insurance commissions and fees + investment banking fees
- Category 3 = other noninterest income + net gains on asset sales
- Category 4 = net servicing fees + net securitization income.

may have performed these roles in securitization activity that they did not originate. Some additional information can be gathered from observation of the sources of income reported by banks. The income statement, also part of the call report and also revised in 2001, now requires richer detail on the types of activities performed by banks and the relative contribution of these activities to bank income flows. In particular, banks have to report “fees from servicing securitized assets” and income from “securitizations, securitization conduits, and structured finance vehicles, including fees for administrative support, liquidity support, interest rate risk management, credit enhancement support, and any additional support functions as an administrative agent, liquidity agent, hedging agent, or credit enhancement agent.”<sup>9</sup> We report these figures in aggregate (Chart 5) and separately for banks in the top 1 percent and bottom 90 percent of assets (Charts 6 and 7, respectively). The charts do seem to suggest that banks were indeed highly involved in the many roles needed to complete the process of intermediation through asset securitization. This finding is confirmed by the Moody’s data on securitization services (other than credit enhancement) provided by banks in top ABS and ABCP issuances (Table 2).

<sup>9</sup> Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*, Reporting Form 031 Instructions, p. 35.

CHART 6

Composition of Noninterest Income  
Top 1 Percent of Commercial Banks by Assets, 1991-2010



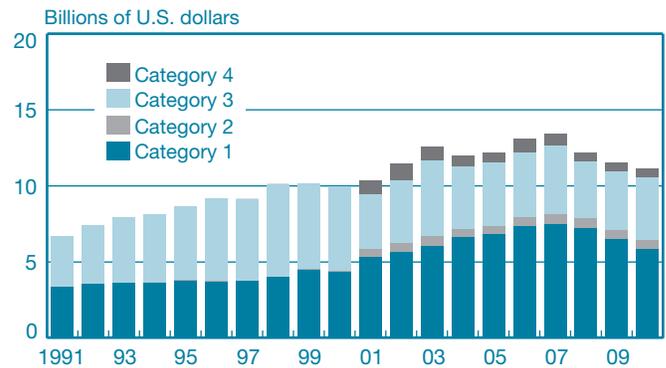
Sources: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*; Board of Governors of the Federal Reserve System, *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

Note: The categories are defined as follows:

- Category 1 = income from fiduciary activities + servicing fees on deposit accounts
- Category 2 = trading revenue + other foreign transaction gains + venture capital revenue + insurance commissions and fees + investment banking fees
- Category 3 = other noninterest income + net gains on asset sales
- Category 4 = net servicing fees + net securitization income.

CHART 7

Composition of Noninterest Income  
Lowest 90 Percent of Commercial Banks by Assets, 1991-2010



Sources: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*; Board of Governors of the Federal Reserve System, *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

Note: The categories are defined as follows:

- Category 1 = income from fiduciary activities + servicing fees on deposit accounts
- Category 2 = trading revenue + other foreign transaction gains + venture capital revenue + insurance commissions and fees + investment banking fees
- Category 3 = other noninterest income + net gains on asset sales
- Category 4 = net servicing fees + net securitization income.

TABLE 2

## Banks' Other Roles in Structured Finance

|                    | Top Fifty ABS Deals |                              | Top Fifty ABCP Conduits |                              |
|--------------------|---------------------|------------------------------|-------------------------|------------------------------|
|                    | Number of Deals     | Amount (Billions of Dollars) | Number of Deals         | Amount (Billions of Dollars) |
| Banks              | 40                  | 250.60                       | 29                      | 111.44                       |
| Nonbank affiliates | 44                  | 261.95                       | 26                      | 92.29                        |
| Other              | 42                  | 78.61                        | 4                       | 12.41                        |
| Total              |                     | 272.09                       |                         | 180.12                       |

Source: Moody's.

Note: ABS is asset-backed security; ABCP is asset-backed commercial paper.

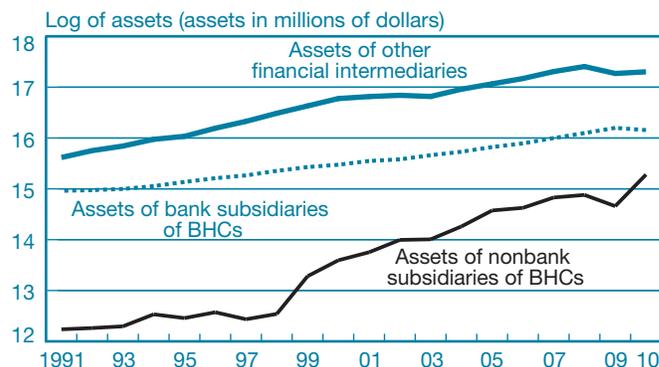
#### 4. ORGANIZATIONAL ADAPTATION: AN ENTITY-BASED VIEW

We have suggested that banks have adapted to the modern decentralized system of intermediation by engaging, to varying degrees, in the roles that have emerged along the new credit intermediation chain. This adaptation is also evident in the changes made by banks to their organizational structure. With intermediation services provided in a decentralized fashion and increasingly by nonbank entities, banking firms have responded by integrating such entities under common ownership and control. This potential expansion of the *boundaries of the banking firm*, in the sense articulated by Coase (1937), thus suggests shifting the focus of observation from commercial banks to bank holding companies. Banks' organizational adaptation occurred somewhat organically over time, even in the presence of the strict regulatory restrictions imposed by the Banking Act of 1933 (Glass-Steagall) on the type of activities allowed by chartered banking institutions, but it was then officially sanctioned with the passage of the Financial Modernization Act of 1999 (Gramm-Leach-Bliley) and the constitution of the financial holding company as the legal entity allowed to own and control both bank and nonbank financial entities.

What does financial intermediation look like once we broaden our scope to consider bank and financial holding companies as the unit of observation (for brevity, we refer to both types of holding companies as BHCs)? Chart 8 compares the asset growth rates of regulated bank entities with those of "other" financial intermediaries (OFIs), an aggregate aimed at capturing the evolution outside the world of banks. The OFI

CHART 8

#### Growth in Assets of Bank and Nonbank Subsidiaries of Bank Holding Companies and of Other Financial Intermediaries

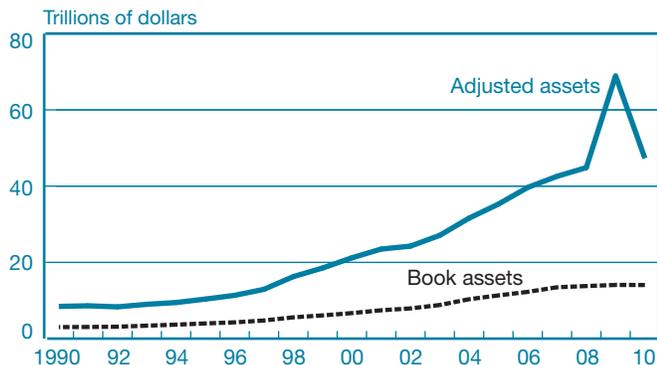
Sources: Board of Governors of the Federal Reserve System, *Flow of Funds Accounts* and *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

aggregate is constructed from the Federal Reserve's Flow of Funds data as the sum of total assets of funding corporations, insurance companies, finance companies, closed-end funds, exchange traded funds, pension funds, mutual funds, real estate investment trusts, money market mutual funds, brokers and dealers, and issuers of asset-backed securities. The total for commercial banks is from call report data. The aggregate numbers are expressed in natural logarithms, so that the line trend visualizes the growth rate of each series.

As the chart clearly shows, nonbank entities have grown substantially over the last thirty years and, most importantly, at a faster pace than commercial banks. It is also clear, however, that a significant chunk of the growth in the BHCs actually came from the nonbank subsidiaries that are consolidated on the balance sheet of the holding companies. Not surprisingly, the growth of these subsidiaries picked up in the late 1990s, with the process of deregulation mentioned earlier. The growth comparison across categories is also quite remarkable: OFI assets grew about 1.7 times from 1990 to 2010. Over the same period, commercial bank assets grew 1.2 times, while assets of nonbank subsidiaries grew more than 3.0 times.

Another way to assess the expansion in the scope of BHC activities is to consider the income data discussed earlier. Commentators have already suggested that the relative decline in banks' asset size was probably more a sign that bank assets were becoming increasingly uninformative about banks' business, rather than an indication of a true decline. In other words, banks have simply moved into alternative business lines, relying less on traditional interest-based revenues (which are reflected directly in asset holdings) and more on fee-based

CHART 9  
**Book Assets versus Adjusted Assets, 1990-2010**  
 Bank Holding Companies



Sources: Federal Financial Institutions Examination Council, *Consolidated Reports of Condition and Income*; Board of Governors of the Federal Reserve System, *Consolidated Financial Statements of Bank Holding Companies* (FR Y-9C data).

activities (which are not immediately related to asset size). In doing so, banks have preserved overall profitability and prevented their obsolescence. Boyd and Gertler (1994) made this point quite clear when they introduced the concept of “adjusted assets” as a way to quantify the importance of these non-asset-based banking business lines. From the rate of return on these activities, obtained from banks’ income statements, they performed the thought experiment of calculating how many extra units of book assets a bank would need in order to generate, through traditional interest-based activities, the same amount of fee-based income. We adapted their approach to compare the total book assets of BHCs with their computed adjusted assets. As BHCs expand and increasingly incorporate nonbank subsidiaries, whose activity is predominantly fee based, we would expect to see adjusted assets grow faster than total book assets. This is indeed the case: the gap between aggregate adjusted assets and aggregate book assets of BHCs has grown distinctly larger over time (Chart 9). While fee-based income contributed very little throughout the early part of the 1990s (hence the adjusted assets aggregate is about the same size as the book asset aggregate), the gap explodes after that. Even if we exclude the years after Lehman’s collapse, when some of the largest investment banks acquired BHC status, adjusted assets grew to be more than twice as large as total book assets.

This section’s focus on changes in entity type suggests that as the financial intermediation sector was evolving over the last three decades, “banks”—under the redefined organizational concept—did adapt, significantly expanding the boundaries of the traditional banking firm.

## 5. OVERVIEW OF THE VOLUME

Although this volume is motivated by the notion that financial intermediation has changed, we do not really investigate the drivers of innovation. Such an analysis would be a separate undertaking, and is beyond our scope. However, we would be remiss if we did not describe the major innovations in banking operations and in financial intermediation more broadly over the last thirty years or so. Hence, before presenting the volume’s main articles, we begin with a survey of the regulatory and policy decisions that have altered the institutions and instruments of credit intermediation and helped transform the role of banks in the process. “Regulation’s Role in Bank Changes,” by Peter Olson, suggests that government action—sometimes unintentionally—has spurred the evolution of financial intermediation.

The five articles that follow explore the idea of bank adaptation in more depth, presenting arguments and findings related to the volume’s dual emphasis on intermediation roles and changes in bank structure. In “The Rise of the Originate-to-Distribute Model and the Role of Banks in Financial Intermediation,” Vitaly Bord and João Santos focus on the role of loan origination and provide direct evidence of asset churning by banks. Using supervisory data on corporate loans, the authors are able to track the life of a loan from origination to subsequent sales. Equipped with information on the identity of the originator and the entities that acquire the loan at later stages, Bord and Santos nail down the actual role of banks in origination at the start of the modern credit intermediation chain. Their results confirm that banks play a much more important part in lending than what the balance sheet suggests. In addition, the results indicate that bank actions have actually fed the growth of the shadow bank entities involved in the subsequent steps of the credit intermediation chain.

The importance of banks in providing credit enhancements is the topic of analysis in “The Role of Bank Credit Enhancements in Securitization,” by Benjamin Mandel, Donald Morgan, and Chenyang Wei. The authors focus on the economics of credit enhancement: Why is it provided and what functions does it play? One argument, probably the most natural, is that the extension of such guarantees is a way to buffer investors—the buyers of loans repackaged as securities—to reduce their credit risk exposure. At the same time, enhancement may resolve some of the informational frictions discussed earlier by providing a signal of the quality of the underlying security. The two hypotheses imply a specific relationship between the amount of enhancement afforded and the ex post performance of the security. Namely, buffering would lead one to expect higher enhancements among more

poorly performing securities, while the signaling hypothesis would imply instead that high enhancements are associated with high performance. The authors' econometric analysis suggests that buffering investors is in fact the main motivation behind the provision of enhancement in asset securitization, thus corroborating the underlying argument that banks have played a fundamental role in supporting the modern intermediation process.

The article by Nicola Cetorelli and Stavros Peristiani, "The Role of Banks in Asset Securitization," completes the analysis of the roles implicit in the credit intermediation chain. Parsing a Bloomberg database that includes virtually the universe of asset-backed securities issued over time, and drawing on supplementary information from Moody's, the authors are able to identify the entities that play the roles of issuer, underwriter, trustee, and servicer. This "bean-counting" approach is necessary to establish the extent to which financial intermediation is now occurring "in the shadow"—that is, outside the realm of banks and beyond the scrutiny of regulators. Significantly, the evidence suggests that very little securitization-based intermediation is actually in the shadow, with much of it remaining within the scope of regulated bank entities.

The last two articles in the volume focus on our second approach to the thesis of bank adaptation, centered on the organizational transformation of banks and the expanding role of BHCs. In "A Structural View of U.S. Bank Holding Companies," Dafna Avraham, Patricia Selvaggi, and James Vickery describe the organizational structure and history of U.S. bank holding companies. While the literature on this subject draws heavily on aggregate data on bank holding companies (obtained from the Federal Reserve's publicly available FR Y-9C regulatory reports), the authors of this article merge information from a number of more obscure regulatory sources to obtain a very detailed set of stylized facts that document changes in the size and complexity of BHCs over time. In particular, the authors demonstrate that while the number of nonbank subsidiaries is an order of magnitude larger than in the 1990s, most of the structural expansion beyond the traditional boundaries of commercial banking has been limited to the largest organizations—a development that signifies the existence of important economies of scale with this form of adaptation. In the final article in the volume, "Evolution and Heterogeneity among Larger Bank Holding Companies: 1994 to 2010," Adam Copeland tracks the changing activities of bank holding companies by analyzing data on BHC income streams. Adam shows the rising importance of fee-based income across the largest BHCs,

and—consistent with our thesis—the increasing importance of nonbank subsidiaries as a source of income for the larger organization.

## 6. SUMMARY AND NORMATIVE SUGGESTIONS

Financial intermediation has become very complex, and banks' balance sheets are now less reflective of actual intermediation activity. However, when intermediation is distilled down to its basic components, it is still the same system, with the same roles needed so that funding can be successfully matched with demand. The crucial difference is that these roles are performed in a new way, such that it becomes economically viable, and perhaps more efficient, for different entities to specialize in providing different services.<sup>10</sup>

This observation is important, since it has provided a key to analyze the evolution of banks. We have shown, through both a role-based and an entity-based approach, that regulated banking institutions have remained crucially involved in every step of the credit intermediation chain. This ability to adapt has occurred in large part through a significant expansion of the boundaries of the banking firm, with bank holding companies becoming increasingly broad in the number of their subsidiaries and the type of activities they have been engaged in.

Our findings take us back to the policy questions we raised earlier: With so many nonbanks involved in modern intermediation, and with systemic risk now spread along the chain, regulatory agencies around the globe are currently considering reforms to the principles governing the regulation and monitoring of financial intermediation.<sup>11</sup> These efforts are likely to lead to an expansion of the boundaries of prudential-based regulation and supervision to include entities and activities that contributed heavily to systemic events during the crisis.

However, the biggest challenge facing regulators is not redesigning current regulatory boundaries but delineating principles and guidelines for monitoring and identifying *future*

<sup>10</sup> We are aware, however, that this decentralization of roles brings with it new layers of agency/informational friction (see, for example, Ashcraft and Schuermann [2008]).

<sup>11</sup> For example, in response to an explicit mandate by the Group of Twenty, the Financial Stability Board (2011) is conducting a cross-jurisdiction exercise (still in process at the time of this article's publication) aimed at providing both monitoring and regulatory recommendations to pursue better governance of financial intermediation activities (see [http://www.financialstabilityboard.org/publications/r\\_120420c.pdf](http://www.financialstabilityboard.org/publications/r_120420c.pdf)).

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mutations in the system of intermediation—mutations that, if history has taught us anything, will at least in part be the result of the battery of regulatory fixes on the table now.

We believe that the results of our analysis can offer insights on this issue. The demonstrated ability of regulated banking institutions to adapt to the changing environment suggests that there may be much to learn about the future evolution of intermediation directly from the observation of banks. Risks are still likely to be concentrated in other parts of the system—

that is, outside of banks' balance sheets—but there is a good chance a bank will be involved in new mutations of the intermediation system, either directly or indirectly. This observation thus suggests a new role for bank supervisors: In addition to carrying out their main mandate of monitoring the health of banking firms, supervisors could contribute to dynamic and forward-looking oversight of the whole system of financial intermediation as it continues to evolve.

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# REGULATION'S ROLE IN BANK CHANGES

## 1. INTRODUCTION

**B**anks are heavily involved in facilitating the modern chain of market-based financial intermediation. This chain is long and complex: It involves loans originated to be securitized, special-purpose vehicles that purchase and bundle these loans, investors who buy the securities, entities that provide credit and liquidity enhancement to guarantee assets and make the corresponding securities more reliable, asset-backed commercial paper conduits that sell commercial paper, money market mutual funds that purchase that commercial paper, and the repo market, where highly rated securities have come to be a form of currency (Gorton and Metrick 2010). There are also many other steps, players, and processes.

The thesis set forth in the introduction to this volume (Cetorelli, Mandel, and Mollineaux 2012) is that financial intermediation technology has evolved in recent years and that banks have adapted to this evolution. However, the authors remain agnostic as to the causes of this technological evolution, focusing instead on documenting the evolving role of banks. The goal of this article is to acknowledge the importance of the regulatory environment as a main driver of such developments.

In 1986, Nobel Prize-winning economist Merton Miller spoke of how government action frequently played a role in the advent of financial innovation, arguing that the government provided the “grain of sand in the oyster” that led to the pearl. In fact, Miller went so far as to declare that “the major impulses to successful financial innovations over the past twenty years have come from regulations and taxes.”

This article is not an attempt to show that regulation has been the major impulse to innovation, nor does it reason at length on the endogeneity of regulatory changes (in some instances, rules are changed to match an evolving marketplace rather than the reverse, though even then we can learn much from the law of unintended consequences).<sup>1</sup> Rather, it argues that government involvement has been a significant factor, and describes a number of the regulatory, legal, and policy decisions that have influenced the development of this new financial intermediation landscape and shaped banks' roles within it over the past thirty to forty years.

## 2. THE EMERGENCE OF MONEY MARKET MUTUAL FUNDS

### 2.1 Increase in the Federal Funds Rate and Regulation Q

In January 1978, the federal funds rate was 6.5 percent. By year's end it had risen to 10 percent (Federal Reserve Bank of New York 2011). At the time, the interest rate that commercial

<sup>1</sup> Kroszner and Strahan explore the nature of regulatory change in a number of papers (1999, 2001, forthcoming). They argue that much of the banking deregulation in recent decades—and its timing—can be attributed to the power that private interests have in pressing for or stalling regulatory change.

banks could pay on deposits was capped by the Federal Reserve Board's Regulation Q (Gilbert 1986), so the rapid increase in the fed funds rate to such high levels created great demand for bank substitutes that were safe yet could deliver a higher yield than banks were legally permitted. In 1980, Congress passed the Depository Institutions Deregulation and Monetary Control Act, which mandated the lifting of Regulation Q. However, by the time the interest rate ceiling was completely phased out in 1986, money market mutual funds (MMMFs) were already flourishing. According to Gorton and Metrick (2010), MMMFs were created as "a response" to the interest rate caps on bank deposits.

## 2.2 Money Market Mutual Funds and Regulation 2a-7

Money market mutual funds gained a reputation for being very reliable, in part because their investments were legally restricted to "high-quality" assets. The creation of MMMFs dates back to the late 1970s and early 1980s, when certain mutual funds sought relief from the accounting rules of the Investment Company Act of 1940, which stipulated that the funds had to mark-to-market the values of their portfolios (Securities and Exchange Commission 1983). At first, the Securities and Exchange Commission granted such accounting exemptions on a case-by-case basis, but in 1983 it codified these rules in the form of Regulation 2a-7, which stated that, in exchange for restrictions on the types of assets in which they could invest, MMMFs were permitted to value their shares based on either 1) the amortized value, or 2) the current market value, but rounded to the nearest penny, with one share equaling one dollar (Securities and Exchange Commission 1983).

Regulation 2a-7 gave MMMFs a special status within the mutual fund world. Many investors came to believe that MMMFs were so thoroughly restricted by regulation that they had an implicit government guarantee, a viewpoint somewhat validated when the funds were essentially bailed out in 2008, as Gorton and Metrick (2010) have observed. These authors add that MMMFs do not pay insurance premiums to the Federal Deposit Insurance Corporation (FDIC) for this seeming guarantee—an advantage that has given them a competitive edge over commercial banks.

## 3. THE GROWTH OF THE REPO MARKET

### 3.1 Volatile Interest Rates

The dramatic move in the federal funds rate in 1978 was not an isolated event. Between 1976 and 1981, the funds rate swung from a low of 4.75 percent to a high of between 19 and 20 percent, then dropped back, slipping below 6 percent temporarily in 1986 (Federal Reserve Bank of New York 2011). According to Garbade (2006), the "rising volatility of interest rates . . . elevat[ed] the importance of risk management." Concerns about risk provided fertile ground for the repo, a contract with powerful hedging potential. For example, if an investor holding bonds was worried that those bonds might decline in value, he or she could short-sell securities and use a reverse repo to borrow the securities to be delivered against the short sale. If interest rates went up and the value of bonds in the marketplace decreased, the investor would lose money on the bonds he or she was holding long, but gain money off the fact that, when the repo contract came due, he or she could purchase securities at a lower price than that obtained on the short sale and use those securities to close out the reverse repo. If interest rates went down, the investor would lose money on the short sale, but that loss would be offset by the increase in the value of the bonds held long. The volatile interest rate environment made such hedging tactics more of a priority, and repo use grew as a result (Garbade 2006).

The repo market was not used solely for hedging purposes, however. According to Acharya and Oncu (2011), those wanting to invest large sums on a temporary basis found repos attractive because 1) funds in the repo market can earn a higher interest rate than funds in commercial bank deposits, and 2) funds in the repo market are safe (backed by collateral), whereas, beyond the FDIC-insurance limit, funds in commercial banks are not. Consequently, the rise of the repo market is directly relevant to commercial banks because the repo market is a substitute for commercial bank deposits. As Gorton and Metrick (2009) put it, "Repurchase agreements are economically like demand deposits; they play the same role as demand deposits, but for firms operating in the capital markets."

### 3.2 Bankruptcy-Remote Status for Repos

As repos grew in popularity, a major legislative event secured the efficacy of the repo contract. For years, ambiguity about whether the repo contract represented the formal sale of a

security or merely the lending of a security had served traders well; clients who did not want to purchase a security could be told that it was a loan, and vice versa (Stigum 1983). But there was the presumption that if an investment bank or other firm dealing a security through a repo contract went bankrupt, the security would remain firmly in the hands of the counterparty. If this were not the case and repos were subject to the automatic stay (the restriction that the assets of bankrupt firms be frozen until the court determines how those assets should be distributed), the value of the security could potentially fall in the interim while the counterparty waited to receive the asset. In short, having repos be subject to bankruptcy proceedings would dramatically decrease the usefulness of the repo contract, a mainstay of today's financial system (Garbade 2006; Stigum 1983).

In 1982, the issue finally arose in court and it was decided that repos were merely "secured loans" (Garbade 2006). This conclusion was worrisome to many, including Federal Reserve Chairman Paul Volcker. Prompted in part by Chairman Volcker's recommendation, Congress passed the Bankruptcy Amendments and Federal Judgeship Act of 1984, which, though it did not settle the loan/sale issue, protected repos involving Treasury and federal agency securities from the automatic stay (Schroeder 1996; Garbade 2006). Were it not for this legislation, repos would likely not be the foundational transaction tool they are today because being subject to the bankruptcy process would make them a far less sure form of collateral.

## 4. RISE AND GROWTH OF SECURITIZATION

### 4.1 Government-Sponsored Enterprises' Involvement in Mortgage-Backed Securities

As DeYoung (2007) has observed, "Securitization is a story about government intervention right from the beginning. Securitization began in the 1960s with the creation of the Ginnie Mae pass-through and exploded in the 1980s with the development of the collateralized mortgage obligation."

In 1968, Congress granted Ginnie Mae (the Government National Mortgage Association) the right to issue mortgage-backed securities, known as MBS (Oesterle 2010), and Ginnie Mae did so for the first time in 1970 (McConnell and Buser 2011). Freddie Mac (the Federal Home Loan Mortgage

Corporation) followed suit in 1971, and Fannie Mae (the Federal National Mortgage Association) adopted the practice ten years later (White 2004). Initially, MBS could be issued only on mortgages guaranteed or insured by the government, but the Emergency Home Finance Act of 1970 lifted that restriction for Freddie Mac and Fannie Mae, enabling them to buy mortgages with no government guarantee (Reiss 2008; Van Order 2000; Carrozzo 2005). Since then, Freddie Mac and Fannie Mae have securitized huge numbers of mortgages. As of 2009, total Freddie Mac and Fannie Mae outstanding MBS issuance stood at nearly \$4 trillion (Dyner and Gayer 2011).

### 4.2 Creation of the Real Estate Mortgage Investment Conduit

In 1983, the government-sponsored enterprises once again found themselves on the cutting edge of securitization practices when Freddie Mac became the first institution to issue collateralized mortgage obligations (CMOs), which are multi-class mortgage-backed securities—or, in other words, MBS with multiple tranches (McConnell and Buser 2011; Roll 1987). Before long, the private sector followed suit (Kolb 2011).

CMOs were useful because they allowed investors to purchase tranches with varying characteristics. For example, investors who were concerned about prepayment risk (the risk that a loan will be paid off early because of a decline in interest rates, thus leaving the investor in a poor environment for reinvesting those funds) could purchase securities designed to mitigate that risk (Hu 2011). A complicating factor facing multi-class trusts was that their payments were considered equity dividends, which are not tax deductible, whereas payments to a traditional nontranching, pass-through security were considered payments on debt, which are tax deductible (Fabozzi 2001). This meant that, when money flowed from the loans to the investors, not only did the investors have to pay taxes, but the trusts needed to as well. "The resulting double taxation . . . made the transaction economically impractical," notes Fabozzi (2001).

Collateralized mortgage obligations were an innovation because, as the name suggests, they were structured such that their payments were debt payments collateralized by traditional pass-through securities rather than equity payments, and were thus tax deductible for the trust issuing them (Fabozzi 2001; Hu 2011). However, the structural constraints on CMOs were burdensome (residual interests needed to be held, capital requirements needed to be met, and so forth), making it difficult to issue the securities efficiently (Fabozzi 2001).

In the tax reform of 1986, Congress eliminated the double-taxation problem by calling for the creation of the real estate mortgage investment conduit (REMIC), a tax-exempt special-purpose vehicle specially designated for issuing multi-class MBS.<sup>2</sup> REMICs are “the tax vehicle of choice” in the multi-class mortgage-backed-securities market today (Peaslee and Nirenberg 2001).

### 4.3 Increasing Bank Capital Requirements

In 1981, regulators decided to impose primary capital requirements equal to 5 percent and 6 percent of total assets on regional banks and community banks, respectively (Wall 1989). In 1983, capital requirements of 5 percent of total assets were applied to multinational banks (Wall 1989; Baer and McElravey 1993). Then, in 1988, the Basel Committee on Banking Supervision passed a set of stricter capital requirements that were intended to provide the international banking community with a consistent capital ratio framework. Basel I, as it is called, was fully phased in by 1992 and required banks to have capital reserves equal to 8 percent of their risk-weighted assets (Choudhry 2007).

However, this “stricter” set of requirements disproportionately favored mortgage-backed securities. For instance, cash had a risk multiplier of zero percent, so holding additional cash did not require a bank to hold additional capital, and MBS had a risk-weight of 50 percent, so acquiring an additional \$10,000 of MBS meant that a bank would need  $\$10,000 \times 0.5 \times 0.08 = \$400$  more capital. However, other “customer loans are 100 percent risk-weighted regardless of the underlying rating of the borrower or the quality of the security held” (Choudhry 2007).

It was in part to correct the oversimplified nature of Basel I that Basel II was developed. Among other changes, it gave banks the choice between three different capital frameworks. The “standardized approach” was essentially the same as Basel I, but it incorporated asset ratings and applied more risk-weighting gradations between different assets. Meanwhile, the “foundation and advanced internal ratings-based (IRB) approaches” allowed banks to use their own, more sophisticated models of risk (Choudhry 2007). It is important to note, however, that the Basel II standards had not been implemented in the United States when the financial crisis hit (Elliott 2010).

<sup>2</sup> CMOs essentially disappeared in the early 1990s, so today the term CMO generally refers to a REMIC structure (Hu 2011).

The introduction of capital requirements in 1981, and the various revisions of those requirements in the decades since then (under the Basel capital rules), has had the significant unanticipated consequence of motivating banks to move assets off their balance sheets in order to avoid the regulatory capital cost. Securitization provided an effective way to accomplish this. As Kroszner and Strahan (forthcoming) put it, “Efforts to avoid capital may in part explain the rise in off-balance-sheet banking during the 1980s. Similarly, the 1988 Accord may have encouraged banks to securitize loans in order to reduce required capital ratios.” Likewise, Choudhry (2007) argues that “the Basel I rules . . . have been a driving force behind securitization” and that banks now use securitization “to improve balance sheet capital management.”

### 4.4 Low Capital Requirements for Banks’ Liquidity Support of Asset-Backed Commercial Paper

Interpretation 46, issued by the Financial Accounting Standards Board in 2003, stated that all commercial banks needed to include information in their financial reports about the special-purpose vehicles for which they were the primary beneficiaries. This rule would have meant that banks needed to include in their capital requirement calculations the asset-backed commercial paper (ABCP) conduits to which they provided credit and liquidity support. However, in 2004, the Office of the Comptroller of the Currency, the FDIC, the Office of Thrift Supervision, and the Federal Reserve made ABCP conduits exempt from the consolidation rules. Instead, regulators decided that the liquidity guarantees extended to ABCP conduits required a capital charge of one-tenth the capital needed to hold an equivalent dollar value of loans on the balance sheet, though credit guarantees had capital requirements similar to on-balance-sheet loans (Acharya, Schnabl, and Suarez, forthcoming; Gilliam 2005).

According to Acharya, Kulkarni, and Richardson (2011), banks were able to “exploit a loophole in Basel capital requirements” and structure their guarantees as “so-called liquidity enhancements,” which were effectively credit guarantees but without the more stringent capital requirements. Thus, banks could move loans off their balance sheets, securitize them, and then provide them with liquidity support. This strategy would leave banks with one-tenth the capital charges but the same level of risk they would have had if they had held the loans on their balance sheets (Acharya, Schnabl, and Suarez, forthcoming).

## 5. CHANGES TO BANKING STRUCTURE

### 5.1 Laws Promoting Growth of Interstate Banking and Branching

As documented in the introduction to this volume, banks have adapted to recent changes in intermediation technology by expanding into nontraditional banking activities and taking up the many roles needed in the process of asset securitization. The existence of important economies of scale in adopting this different business model made growth in size a necessity; yet for much of the twentieth century, banks faced expansion restrictions. As Jayaratne and Strahan (1996) note, bank holding companies of one state were not allowed to engage in interstate banking (owning and operating banks in different states), and most states prohibited individual banks from intrastate branching (opening new branches within the state). Moreover, as pointed out by McLaughlin (1995), banks were prevented from engaging in interstate branching (opening branches in other states).

In 1978, Maine passed a law allowing bank holding companies of other states to purchase banks in Maine if those states would grant Maine's bank holding companies the same privilege in return. Other states followed suit, and by 1992—with the exception of Hawaii—all the states had passed such legislation (Strahan 2003; Jayaratne and Strahan 1998). The Office of the Comptroller of the Currency furthered this movement in the mid-1980s by allowing banks with national charters to branch into any state that permitted the unrestricted branching of savings institutions (Strahan 2003). Intrastate branching was permitted in many states in some form even before the 1970s, and the percentage of states for which this was true increased substantially over the subsequent decades. By 1992, statewide branching was permissible in almost all states (Strahan 2003; Jayaratne and Strahan 1998).

Finally, in 1994, Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act.<sup>3</sup> It required complete interstate banking by 1997 and encouraged states to permit interstate banking, which all states except Texas and Montana did (Strahan 2003). The interstate banking and branching deregulation commenced by the states and furthered by the federal government contributed to the consolidation of U.S. commercial banks. Indeed, DeYoung (2007) writes that, after Riegle-Neal was passed, “the immediate response was the highest ever five-year run of

<sup>3</sup> See <http://www.gpo.gov/fdsys/pkg/BILLS-103hr3841enr/pdf/BILLS-103hr3841enr.pdf>.

bank mergers in U.S. history in terms of both the number and the value” (Berger et al. 2004).

### 5.2 The Gramm-Leach-Bliley Act

In the wake of the catastrophic bank failures at the beginning of the Great Depression, legislators passed the Banking Act of 1933 (also known as the Glass-Steagall Act), which, among other things, segregated commercial banking activities from investment banking activities (Cornett, Ors, and Tehranian 2002; Spong 2000). From 1933 to 1963, banks largely adhered to the provisions of Glass-Steagall, but from 1963 to 1987 they challenged the restrictions on their ability to underwrite mortgage-backed securities, municipal bonds, and commercial paper—and often won in court. Then, with this “de facto erosion of the Glass-Steagall Act by legal interpretation,” in 1987 the Federal Reserve permitted bank holding companies to hold both commercial banks and investment banks, as long as no more than 5 percent of the investment banks' revenue was from “ineligible securities activities” (Cornett, Ors, and Tehranian 2002). This limit was increased to 10 percent in 1989 and to 25 percent in 1996.

This trend toward deregulation continued in subsequent years. In 1999, Congress passed the Financial Services Modernization Act (also known as the Gramm-Leach-Bliley Act), which created the financial holding company structure. Under this legislation, a financial holding company could have commercial banks, securities firms, and insurance companies as subsidiaries (Spong 2000). According to Spong, this act “[set] the stage for dramatic changes within the financial industry.” By permitting commercial banks to engage in a wide variety of fee-based activities such as equity and debt underwriting, securities brokerage, and insurance products, the Gramm-Leach-Bliley Act played a part in commercial banks' shift away from traditional on-balance-sheet banking toward off-balance-sheet, noninterest income sources (DeYoung 2007).

## 6. CONCLUSION

The government actions described in this article fall into a few distinct categories, and these categories reveal much about the growth of the financial intermediation industry as it relates to banks. In some cases, the government enacted restrictions that indirectly encouraged financial innovation by prompting

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banks and other actors to seek ways of circumventing the new rules. For example, Regulation Q led to the growth of money market mutual funds, while capital requirements indirectly promoted securitization and other off-balance-sheet activities.

Sometimes the government explicitly promoted or protected a particular entity, as it did when it declared asset-backed-commercial-paper conduits exempt from Interpretation 46, and again when it created the real estate mortgage investment conduit. In other instances, the government simply created an environment that proved fertile ground for innovation. Thus, the volatile interest rates of

the late 1970s and early 1980s encouraged the growth of repo contracts. And in the most obvious example of its involvement, the government put into practice its new vision of commercial banking by explicitly approving the consolidation of commercial banks through the Riegle-Neal Act and by expanding the banks' stock of permissible activities with the Gramm-Leach-Bliley Act.

In these and other ways, the guiding hand of policy and regulation has been influential in altering the institutions, contracts, and instruments used in financial intermediation and in reshaping the role that banks play in this process.

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# THE RISE OF THE ORIGINATE-TO-DISTRIBUTE MODEL AND THE ROLE OF BANKS IN FINANCIAL INTERMEDIATION

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## 1. INTRODUCTION

Historically, banks used deposits to fund loans that they then kept on their balance sheets until maturity. Over time, however, this model of banking started to change. Banks began expanding their funding sources to include bond financing, commercial paper financing, and repurchase agreement (repo) funding. They also began to replace their traditional originate-to-hold model of lending with the so-called originate-to-distribute model. Initially, banks limited the distribution model to mortgages, credit card credits, and car and student loans, but over time they started to apply it to corporate loans. This article documents how banks adopted the originate-to-distribute model in their corporate lending business and provides evidence of the effect that this shift has had on the growth of nonbank financial intermediation.

Banks first started “distributing” the corporate loans they originated by syndicating loans and also by selling them in the secondary loan market.<sup>1</sup> More recently, the growth of the market for collateralized loan obligations (CLOs) has provided

<sup>1</sup> In loan syndications, the lead bank usually retains a portion of the loan and places the remaining balance with a number of additional investors, usually other banks. This arrangement is made in conjunction with, and as part of, the loan origination process. In contrast, the secondary loan market is a seasoned market in which a bank, including lead banks and syndicate participants, can subsequently sell an existing loan (or part of a loan).

banks with yet another venue for distributing the loans that they originate. In principle, banks could create CLOs using the loans they originated, but it appears they prefer to use collateral managers—usually investment management companies—that put together CLOs by acquiring loans, some at the time of syndication and others in the secondary loan market.<sup>2</sup>

Banks’ increasing use of the originate-to-distribute model has been critical to the growth of the syndicated loan market, of the secondary loan market, and of collateralized loan obligations in the United States. The syndicated loan market rose from a mere \$339 billion in 1988 to \$2.2 trillion in 2007, the year the market reached its peak. The secondary loan market, in turn, evolved from a market in which banks participated occasionally, most often by selling loans to other banks through individually negotiated deals, to an active, dealer-driven market where loans are sold and traded much like other debt securities that trade over the counter. The volume of loan trading increased from \$8 billion in 1991 to \$176 billion in 2005.<sup>3</sup> The securitization of corporate loans also experienced spectacular growth in the years that preceded the financial crisis. Before 2003, the annual volume of new CLOs issued in the United States rarely surpassed \$20 billion. After

<sup>2</sup> According to the Securities Industry and Financial Markets Association, 97 percent of corporate loan CLOs in 2007 were structured by financial institutions that did not originate the loans.

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that, loan securitization grew rapidly, topping \$180 billion in 2007.

Investigating the extent of U.S. banks' adoption of the originate-to-distribute model in corporate lending has proved difficult because of data limitations. Thomson Reuters Loan Pricing Corporation's DealScan database, arguably the most comprehensive data source on the syndicated loan market and the source used by many researchers in the past, imposes serious limitations on the investigation of this issue. This database includes information available only at the time of loan origination, making it impossible to use it to investigate what happens to the loan after origination. Furthermore, DealScan has very limited information on investors' loan shares at the time of origination. The information on the credit shares that each syndicate participant holds is sparse, and even the information on the share that the lead bank—the bank that sets the terms of the loan—retains at origination is missing for 71 percent of all DealScan credits.

The Loan Syndication Trading Association database contains micro information on the loans traded in the secondary market, but it has no information about the identity of the seller(s) or buyer(s), ruling out its use to close the information gaps in DealScan. Financial statements filed with the Federal Reserve, in turn, contain information only on the credit that banks keep on their balance sheets and thus cannot be used to ascertain the volume of credit that banks originate. These statements contain information on the loans that banks hold for sale, but, as Cetorelli and Peristiani (2012) explain in detail elsewhere in this volume, this variable provides limited information on the extent to which banks have replaced the originate-to-hold model with the originate-to-distribute model in their lending business.<sup>4</sup>

We rely instead on a novel data source, the Shared National Credit program (SNC) run by the Federal Deposit Insurance Corporation, the Board of Governors of the Federal Reserve System, and the Office of the Comptroller of the Currency. Like DealScan, the SNC program is dominated by syndicated loans. In contrast to DealScan, however, the SNC program tracks

<sup>3</sup> Researchers have suggested several explanations for the development of the secondary market, including the capital standards introduced with the 1988 Basel Accord (Altman, Gande, and Saunders 2004), the standardization of loan documentation and settlement procedures that came about with the establishment of the Loan Syndication Trading Association in 1995 (Hugh and Wang 2004), and the increase in demand and liquidity resulting from the increasing involvement of institutional investors (Yago and McCarthy 2004). See Gorton and Haubrich (1990) for a detailed description of the loan-sales market in the 1980s.

<sup>4</sup> This variable does not distinguish corporate loans from all the other loans that banks may intend to sell. Further, since there is no information on when the loans held for sale were originated, ascertaining banks' relative use of the originate-to-distribute model based on this variable is difficult. Lastly, the variable reports only the loans that banks "intend" to sell, not the actual loans that they sold.

loans over time, and it has complete information on investors' loan shares over the life of the credit. We discuss the SNC database in more detail in the data section.

Our study of the change in banks' corporate lending model yields a number of significant findings. Although the data indicate that lead banks increasingly used the originate-to-distribute model from the early 1990s on, we conclude that this increase was limited to a large extent to term loans; in their credit-line business with corporations, banks continued to rely on the traditional originate-to-hold model. Further, we find that lead banks increasingly "distributed" their term loans by selling larger portions of them not only at the time of the loan origination, but also in the years after origination. For example, in 1988, the first year of our sample, lead banks retained in aggregate 21 percent of the term loans they originated that year. In 2007, lead banks retained only 6.7 percent of the term loans originated in that year. By 2010, lead banks had managed to further lower their share in the credits they had originated in 2007 to 3.4 percent.

Our investigation into the entities investing in bank loans confirms that other banks were not quick to step in and take over as lead banks reduced their stake in the loans they originated. Instead, we find that new loan investors, including investment managers and CLOs, increasingly assumed control of the credit business. In 1993, all together, nonbank investors acquired 13.2 percent of the term loans originated that year. In 2007, they acquired 56.3 percent of the term loans originated in that year, a 327 percentage point increase from fifteen years earlier.

The trends documented in this article have important implications. Banks' increasing use of the originate-to-distribute model in their term-lending business will lead to a transfer of important portions of credit risk out of the banking system. In the process, however, it will contribute to the growth of financial intermediation outside the banking system, including a larger role for unregulated "shadow banking" institutions.<sup>5</sup> It will also, over time, make the credit kept by banks on their balance sheets less representative of the still-essential role they perform in financial intermediation.

In addition, banks' increasing use of the originate-to-distribute model could lead to some weakening of lending standards. According to several theories—including those of Ramakrishnan and Thakor (1984), Diamond (1984), and Holmström and Tirole (1993)—banks add value because of their comparative advantage in monitoring borrowers. To carry out this task properly, banks *must* hold the loans they originate until maturity. If they instead anticipate keeping only a small portion of a loan, their incentives to screen loan

<sup>5</sup> See Pozsar et al. (2010) for a detailed account of the growth of shadow banking in the United States.

applicants properly and to design the terms of the loan contract will diminish.<sup>6</sup> They will also have less incentive to monitor borrowers during the life of the loan.<sup>7</sup> The growth of the CLO business has likely exacerbated these risks because CLO investors invest in new securities that depend on the performance of the “reference portfolio,” which is made up of many loans, often originated by different banks.<sup>8</sup>

Banks’ adoption of the originate-to-distribute model may also hinder the ability of corporate borrowers to renegotiate their loans after they have been issued.<sup>9</sup> This difficulty may arise not only because the borrower will have to renegotiate with more investors but also because the universe of investors acquiring corporate loans is more heterogeneous.

Finally, our evidence that banks continue to use the traditional originate-to-hold model in the provision of credit lines supports the argument that banks retain a unique ability to provide liquidity to corporations, possibly because of their access to deposit funding.<sup>10</sup> Our findings are in line with the theories advanced by Holmström and Tirole (1998) and Kashyap, Rajan, and Stein (2002) concerning banks’ liquidity provision to corporations. Still, as Santos (2012) documents, banks’ provision of liquidity to depositors and corporations exposes them to a risk of concurrent runs on both sides of their balance sheets.

The remainder of our article is organized as follows. The next section presents our data and methodology and characterizes our sample. Section 3 documents U.S. banks’ transition from the originate-to-hold model to the originate-to-distribute model in corporate lending over the past two decades. Section 4 identifies the relative role of the various investors that increasingly buy the credit originated by banks. Section 5 summarizes our findings and their larger implications.

<sup>6</sup> See Pennacchi (1988) and Gorton and Pennacchi (1995) for models that capture these moral hazard problems.

<sup>7</sup> Recent studies, including Sufi (2007), Ivashina (2009), and Focarelli, Pozzolo, and Casolaro (2008), document that lead banks in loan syndicates use the retained share to align their incentives with those of syndicate participants and commit to future monitoring.

<sup>8</sup> See Bord and Santos (2010) for evidence that the rise of the CLO business contributed to riskier lending.

<sup>9</sup> Borrowers often renegotiate their credits to adjust the terms of their loans (Roberts and Sufi 2009) or to manage the maturity they have left in their credits (Mian and Santos 2011).

<sup>10</sup> See Gatev, Schuermann, and Strahan (2009) and Gatev and Strahan (2006) for empirical evidence in support of banks’ dual liquidity role to depositors and corporations.

## 2. DATA, METHODOLOGY, AND SAMPLE CHARACTERIZATION

### 2.1 Data

Our main data source for this project is the Shared National Credit program, run by the Federal Deposit Insurance Corporation, the Federal Reserve Board, and the Office of the Comptroller of the Currency. At the end of each year, the SNC program gathers confidential information on all credits that exceed \$20 million and are held by three or more federally supervised institutions.<sup>11</sup>

For each credit, the SNC program reports the identity of the borrower, the type of the credit (term loan or credit line, for example), purpose (such as working capital, mergers, or acquisitions), amount, maturity date, and rating. In addition, the program reports information on the lead arranger and syndicate participants, including their identities and the share of the credit they hold.

The SNC data fit nicely with our goal of investigating the role that banks continue to play in the origination of corporate credit in the United States and the role they have played in the growth of financial intermediation outside the banking system. Since the SNC program gathers information on each syndicated credit at the end of every year, we can link credits over time and determine the portion of each credit that stays in the banking sector and the portion acquired by nonbank financial institutions both at the time of the credit origination and in each subsequent year during the life of the credit. In addition, since we have this information over the past two decades, we can investigate how the relative importance of the various players in the syndicated loan market has evolved over time.

We complement the SNC data with information from the Moody’s Structured Finance Default Risk Service Database and from Standard and Poor’s Capital IQ. The Moody’s database has information on structured finance products, including the size, origination date, and names. We rely on the Moody’s database to identify CLOs among the syndicate participants reported in the SNC program that do not have the letters *CLO* in their names. We use the Capital IQ database to identify private equity firms, hedge funds, and mutual funds among the syndicate participants.

<sup>11</sup> The confidential data were processed solely within the Federal Reserve for the analysis presented in this article.

## 2.2 Methodology

Our investigation into the effect of the originate-to-distribute model on the importance of banks in financial intermediation has two parts. We begin by investigating how the rise of that model affected the portion of each credit that the lead bank retains during the life of the credit. To this end, for each credit in the SNC program, we first compute the portion that the lead bank retains on its balance sheet at origination. Next, because banks sometimes sell or securitize part of their credits *after* they originate them, we compute the portion of the credit that the lead bank still retains on its balance sheet three years after the origination year.

In the second part of our investigation, we identify the buyers of bank credits and how the role of the various buyers has changed over the past two decades. For each credit, we compute the portion that the lead bank sells to other banks and the portion that it sells outside the banking sector, distinguishing in the latter case whether the acquiring institution is an insurance company, a finance company, a pension fund, an investment manager, a private equity firm, a CLO, or a broker or investment bank. This part of our investigation allows us to pin down the role that banks have played in the growth of financial intermediation outside the banking system in general and their role in the growth of shadow banking in particular.

Because the nature of the credit contract may affect the lead bank's ability to sell or securitize the credit, we distinguish between term loans and credit lines throughout our investigation. For a similar reason, we also categorize the credits according to their purpose: that is, whether they are to fund mergers and acquisitions or capital expenditures or whether they are to serve corporate purposes.

## 2.3 Sample Characterization

Our sample covers the period 1988-2010. On average, we observe 7,432 credits each year. Of these, 1,758 are new credits originated in the year, and 5,674 are credits originated in prior years. Even though the criteria for inclusion of a credit in the SNC program remained unchanged throughout the sample period, inflation and growth over the past two decades

contributed to an upward trend in the number of credits in the SNC database. In 1989, the SNC database had 5,402 credits, of which 1,368 were originated in that year. In 2007, at the peak of the business cycle, it had 8,248 credits, of which 2,114 were originated in that year.

To get a better sense of the SNC database coverage, we compare the annual value of credits included in that database with the annual value of credits in DealScan, the database mentioned above that has been extensively used for research on bank corporate lending in recent years.<sup>12</sup> Chart 1 reports the annual value of new credits—that is, credits originated in each year—in the SNC database and the annual value of credits reported in DealScan. Since SNC covers only credits above \$20 million, we also report the annual value of credits in DealScan above that threshold. To make the information from the two databases even more comparable, we further adjust the information reported from DealScan by excluding credits that are classified as “restatements” of previous credits, since this indicates a renegotiation of an existing credit.<sup>13</sup>

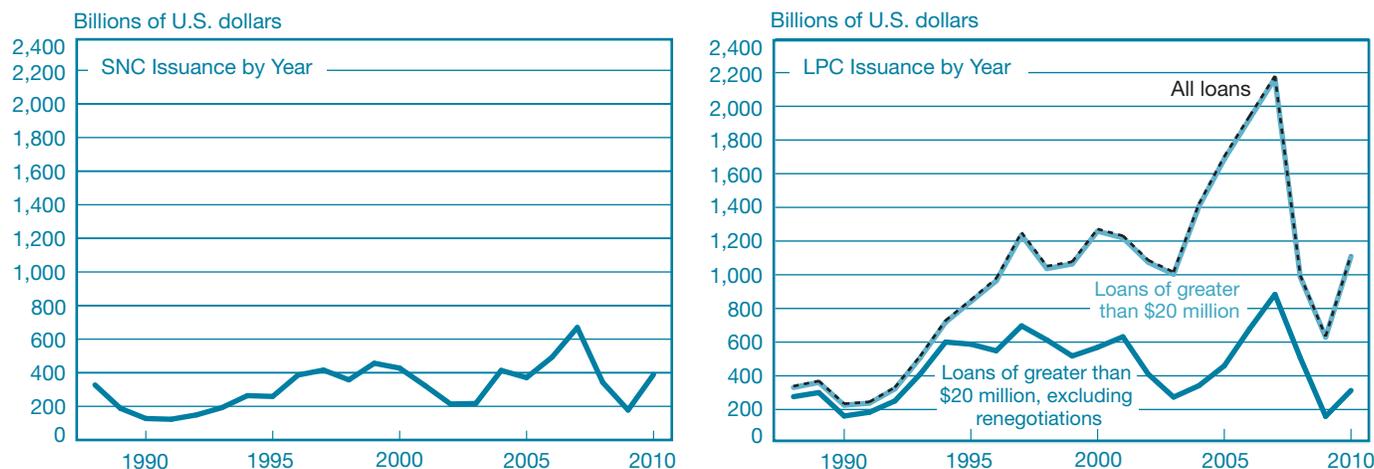
From Chart 1, it is apparent that both databases pick up the positive trend in the volume of credit as well as the effect of the three recessions in the United States during the sample period (1990-91, 2001, and 2008-09). It is also clear that the main difference between the two databases is that DealScan reports information on new credits as well as information on renegotiations of existing credits. The fact that SNC reports only credits above \$20 million while DealScan contains information on credits above \$100,000 does not constitute an important difference between the two databases. When we adjust the information reported in DealScan to “match” the credits reported in the SNC database, the difference between the two databases becomes very small. On average, each year the volume of credit reported in the SNC database is 37.2 percent of that reported in DealScan. When we restrict the credits in DealScan to those above \$20 million, that share increases to 37.8 percent; when we further drop renegotiations from DealScan, the share rises to 74.4 percent.

<sup>12</sup> Examples of papers that use DealScan include Dennis and Mullineaux (2000), Hubbard, Kuttner, and Palia (2002), Santos and Winton (2008, 2010), Hale and Santos (2009, 2010), Sufi (2007), Bharath et al. (2009), Santos (2011), Paligorova and Santos (2011), and Bord and Santos (2011).

<sup>13</sup> In SNC, renegotiations do not usually give rise to a new credit, while in DealScan they do.

CHART 1

## Loan Volumes Reported in the SNC and DealScan Databases



Sources: Shared National Credit (SNC) database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency; DealScan database, produced by Thomson Reuters Loan Pricing Corporation (LPC).

### 3. FROM ORIGINATE-TO-HOLD TO ORIGINATE-TO-DISTRIBUTE

In traditional banking, banks originate credits and hold them on their balance sheet until their maturity. Over time, however, banks began to replace the originate-to-hold model with the originate-to-distribute model, whereby they originate a credit and sell or securitize a portion of it at the time of origination or later. In this section, we investigate how the adoption of the originate-to-distribute model reduced the exposure of banks to the credits they originated over the past two decades.

#### 3.1 Distribution at the Time of Credit Origination

To investigate the effect of the originate-to-distribute model on the exposure of banks to the credits they originate, we begin by looking at the lead banks' market share of the credits they originate, at the time of the credit origination.

For our purposes, "banks" are all institutions that are regulated and that perform the traditional bank roles of maturity and credit transformation. Thus, the banks discussed throughout our article refer to all commercial banks, bank holding companies (BHCs), thrifts and thrift holding companies, credit unions, and foreign banking organizations, including their domestic branches. Note that whether an

institution is classified as a bank may vary over time. For example, Morgan Stanley and Goldman Sachs are classified as banks only from January 1, 2009, when they became BHCs. For the period preceding this date, they are not counted as banks since they were operating as investment banks.

In 1988, the first year of the sample period, lead banks retained in aggregate a stake of 17.6 percent of the credits they originated in that year, including term loans and credit lines (Chart 2).<sup>14</sup> Beginning in 1990, when they retained in aggregate 22.2 percent, lead banks started to decrease their share of the credits they originated, reaching a low of 10.5 percent in 1999. During the 2000s, the aggregate shares varied with the business cycle but generally remained steady at around 13 percent.

The market share of the credits that lead banks retain at origination has clearly fallen, but the representation of this decline in Chart 2 is skewed by the large number of credit lines in our sample. As we can see from Chart 3, while banks have increasingly replaced the originate-to-hold model with the originate-to-distribute model over the past two decades, this substitution has been far more pronounced in the origination of term loans than of credit lines. To be sure, this difference was not immediately apparent: In 1988, lead banks retained in aggregate 17.6 percent of the credit lines and 21 percent of the

<sup>14</sup> Here, and throughout the rest of the article, we use the terms *market share* and *aggregate share* interchangeably. By lead banks' *market* or *aggregate share*, we mean the share of all credits that the lead banks, taken together, retain. It is computed as the sum of all the lead banks' retained credit amounts divided by the sum of all new credits they originated that year.

term loans they extended in that year. These shares declined to 10.3 percent and 10.0 percent, respectively, by 1999.

However, in the first decade of the 2000s, while lead banks continued the trend of decreasing their market share of term loans, they reversed the trend for credit lines. By 2006, the last year before the data pick up the effects of the most recent

CHART 2  
Lead Banks' Market Share of Syndicated Loans at Credit Origination



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

financial crisis, lead banks increased their market share of the credit lines they originated to 14.1 percent but decreased their market share of the term loans they originated to 8.8 percent.

These aggregate trends are consistent with the trends in the average share of the credit that the lead bank retains on its balance sheet. This share was equal to 32 percent for credit lines in 1988 and 31 percent for term loans in the same year. By 1999, these shares had declined to 17 percent and 16 percent, respectively. Then, in the first decade of the new century, the average credit-line share retained by the lead bank increased to 24 percent by 2006, whereas the average share retained in term loans increased slightly but essentially remained stable, at 17 percent, by the same year.

Since average retained shares are much higher than the aggregate (market) shares, the data indicate that banks tend to keep smaller shares of the larger credits that they originate. Recall that the average retained share is a simple average of the credit shares that banks keep on the balance sheet, while the aggregate share is a weighted average of these shares, with the weights defined by the size of the credits.

The disparity between the trends in lead banks' market shares of credit lines and term loans shows the effect of banks' increasing syndication and securitization of term loans. These trends, though suggestive of these effects, do not reflect the whole story, since they account only for the role of lead banks and exclude that of banks that participate in the loan syndicate (syndicate-participant banks). We discuss this issue further in a later section.

CHART 3  
Lead Banks' Market Share of Credits at Origination, by Credit Type



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

Even though banks substituted the originate-to-distribute model for the originate-to-hold model at a faster pace in their term-loan business, they did not use the former uniformly across all types of term loans. For instance, they varied their retention rates depending on the purpose of the loan, as can be seen in Chart 4. Over time, banks increasingly used the originate-to-distribute model when they extended loans for

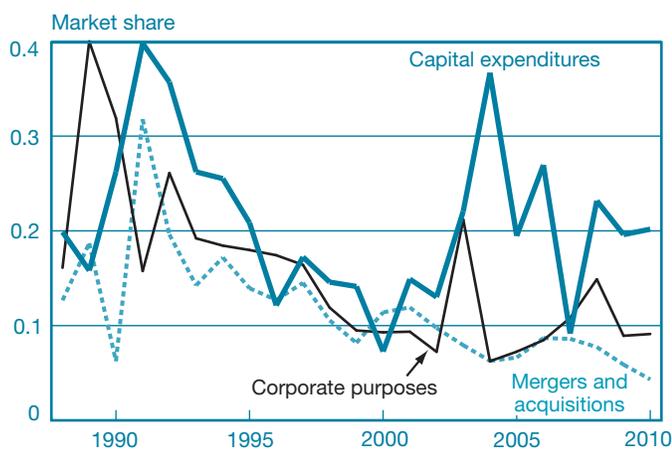
corporate purposes and in particular to fund mergers and acquisitions, possibly because of the additional risk such loans tend to carry. In contrast, they continued to use their traditional originate-to-hold model when they extended loans for capital expenditures.

### 3.2 Distribution after the Credit Origination

The decline in the share of credits that lead banks originate did not occur only at the time of the credit origination but continued throughout the life of the credit. To investigate this effect, we began by selecting *cohorts* of credits originated each year that we observed for at least three years. Next, we computed the market share of the credits that the lead banks retained at the time of origination and three years later. Both of these shares are depicted in Chart 5. The left panel shows the market shares for credit lines, while the right panel shows the market shares for term loans. To allow us to observe all the credits for three years, we end the chart with credits originated in 2007. Recall that our sample ends in 2010.

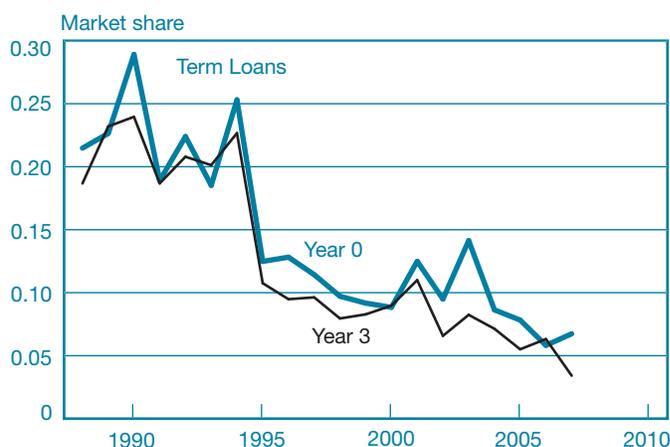
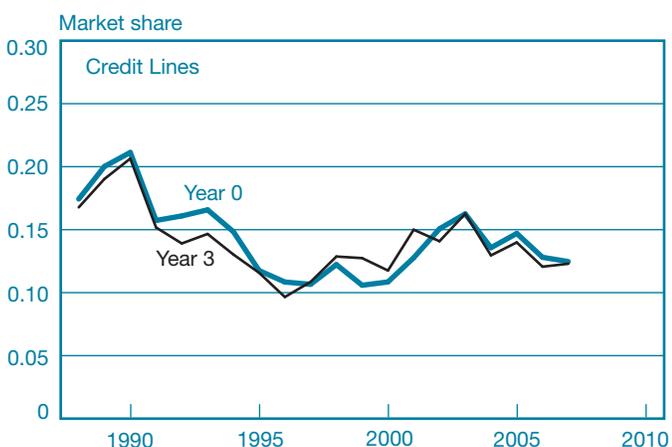
A quick look at Chart 5 shows two important results. First, in the years after credit-line origination, lead banks either did not sell off additional portions of the credit lines or sold off a very small (aggregate) share. This practice prevailed at the beginning of our sample period in the late 1980s and continued throughout the sample period, with the exception of the early-to-mid-1990s when lead banks seemed to have sold off more of the credit lines.

CHART 4  
Lead Banks' Market Share of Term Loans at Origination by Credit Purpose



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

CHART 5  
Lead Banks' Market Share of Credits at Origination and Three Years Later



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

Second, as the term loans held by lead banks aged, the banks increasingly reduced their aggregate exposure to them. In the previous section, we documented that, over time, lead banks retained at origination a smaller market share of the term loans they originated. Chart 5 shows that this decline continued even after the origination year. For example, of the term loans that banks originated in 1988, they retained in aggregate 21.4 percent at origination. Three years later, these banks had, in aggregate, 18.7 percent of these term loans on their balance sheet. In 2004, lead banks retained in aggregate 8.6 percent of the term loans they originated in that year. Three years later, the banks' aggregate exposure to the same set of term loans had been reduced to 7.1 percent. In 2007, the last year in our sample for which we conducted this exercise, lead banks retained a market share of 6.7 percent of their term loans at the time of origination. By 2010, they had lowered their market share of these same term loans to 3.4 percent.

We obtain similar results when we track the individual share of each credit that the lead bank retains on its balance sheet. For credit lines, lead banks either decreased their average retained shares very little or not at all. For example, of the credit lines originated in 1988, on average banks retained 30.5 percent at origination and 28.5 percent three years later. In 2004, lead banks retained, on average, 21.6 percent at origination and 21.2 percent three years later. For term loans, however, lead banks tended to cut back more of their credit exposure. Of the term loans originated in 1988, banks retained an average of 35.2 percent at origination and 30.7 percent three years later. In 2004, banks retained on average 19.2 percent at origination and 18.0 percent three years later.

In sum, the results reported in this section show that over the past two decades, banks largely continued to use the traditional originate-to-hold model when they extended credit lines to corporations but increasingly switched to the originate-to-distribute model for term loans. This evidence suggests that banks have a unique ability to provide liquidity to corporations by extending credit lines to them. It also highlights the need to reconsider the measures traditionally used to capture the importance of banks as providers of credit to corporations. As banks increasingly adopt the originate-to-distribute model, conventional measures of bank lending activity, which rely on the credit kept by banks on their balance sheets, will tend to understate the role they play in the credit-origination process. In the next section, we investigate which institutions are buying the credits that banks originate.

## 4. WHO BUYS BANK CREDIT LINES AND TERM LOANS?

Given our finding that over time lead banks are retaining a smaller and smaller portion of the credits they originate (especially in the case of term loans), a natural question to ask is, Who buys these credits? Answering this question—and, in particular, finding out whether banks or other institutional investors such as pension funds and hedge funds are buying these credits—is important because these institutions have quite different monitoring capabilities and incentives for renegotiating existing credits. Answering this question also helps us understand the growth of shadow banking in the past decade and the links of these institutions to the banking sector.

### 4.1 The Role of Banks as Credit Acquirers

We start by investigating whether, as the lead banks have lowered the share of credits they retain at origination, other banks have increased the share of credit they hold as syndicate participants. The left panel of Chart 6 shows for the total credit extended under credit lines each year, the portion that lead banks retained, the portion acquired by banks that are syndicate participants, and the portion acquired by the remaining investors. The right panel of the chart reports the same information for term loans.

As the chart shows, although the market share of credit lines retained by lead banks decreased through the 1990s and increased through the 2000s, the total market share held by all banks (both lead and syndicate-participant banks) remains fairly stable, at an average of 92 percent during the pre-crisis sample period. In fact, when lead banks' market share decreased in the 1990s, the syndicate-participant banks' market share increased, and that share increased more than the lead banks' share decreased. Similarly, from 2000 to 2010, syndicate-participant banks' market share decreased more than the lead banks' market share increased. In other words, credit-line provision continues to be in essence a “bank business.”

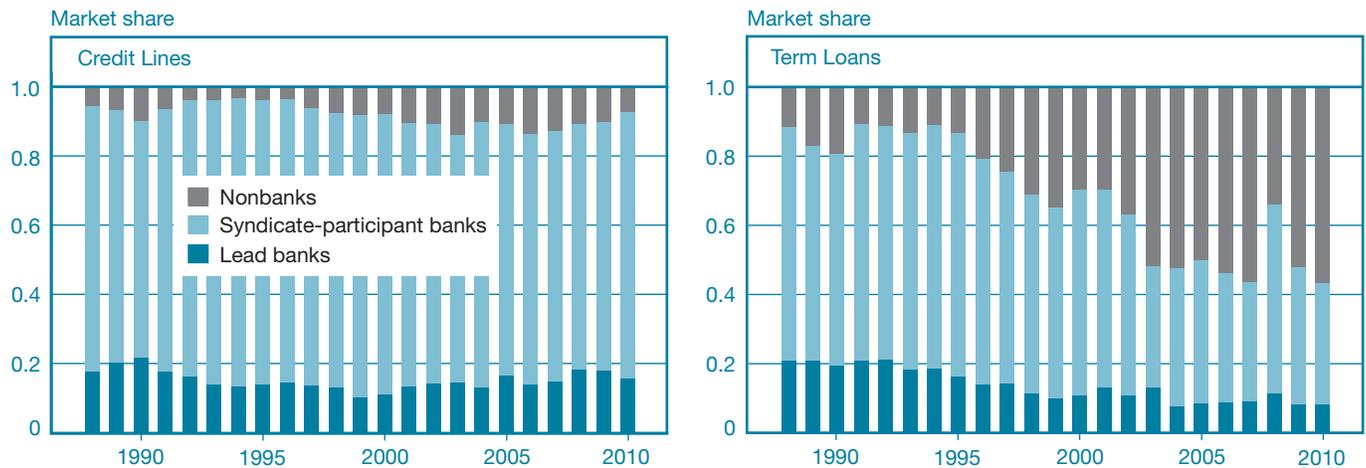
Term loans, however, present a different picture. As we can see from the right panel of Chart 6, the decline in the lead banks' aggregate retained share was accompanied by an even bigger decline in the share of the term loans acquired by other banks.<sup>15</sup>

<sup>15</sup> The picture is fairly similar when we consider the average share held by banks. For credit lines, the average share held by syndicate-participant banks remained stable at approximately 10 percent throughout the time period. By contrast, for term loans, the average share held by syndicate-participant banks decreased from its peak of 14 percent in 1991 (11 percent in 1988) to 6.3 percent in 2006.

Of the \$47 billion in term loans originated in 1988, banks, including lead banks and syndicate-participant banks, retained on their balance sheet 88.6 percent of the amount of credit. Of the \$315 billion in term loans originated in 2007, banks retained on their balance sheet 43.7 percent. Thus, banks (lead banks and syndicate-participant banks) more than halved their market share of term loans from 1988 to 2007.

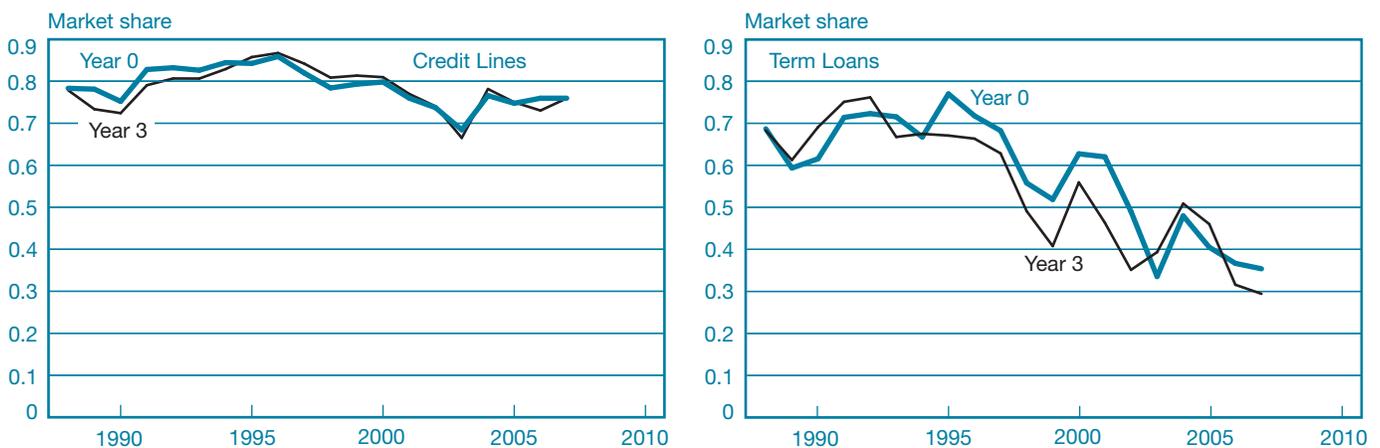
These patterns remain when we consider how the market share of bank investors changed over the life of the loan. As Chart 7 shows, syndicate-participant banks did not sell off their market share of credit lines during the lifetime of the loans but, apart from short periods in the early 1990s and mid-2000s, they did decrease their market share of term loans as the loans matured. In fact, for term loans that we observe for at least

CHART 6  
Banks' Retained Credits at Origination: Lead Banks versus Non-Lead Banks



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

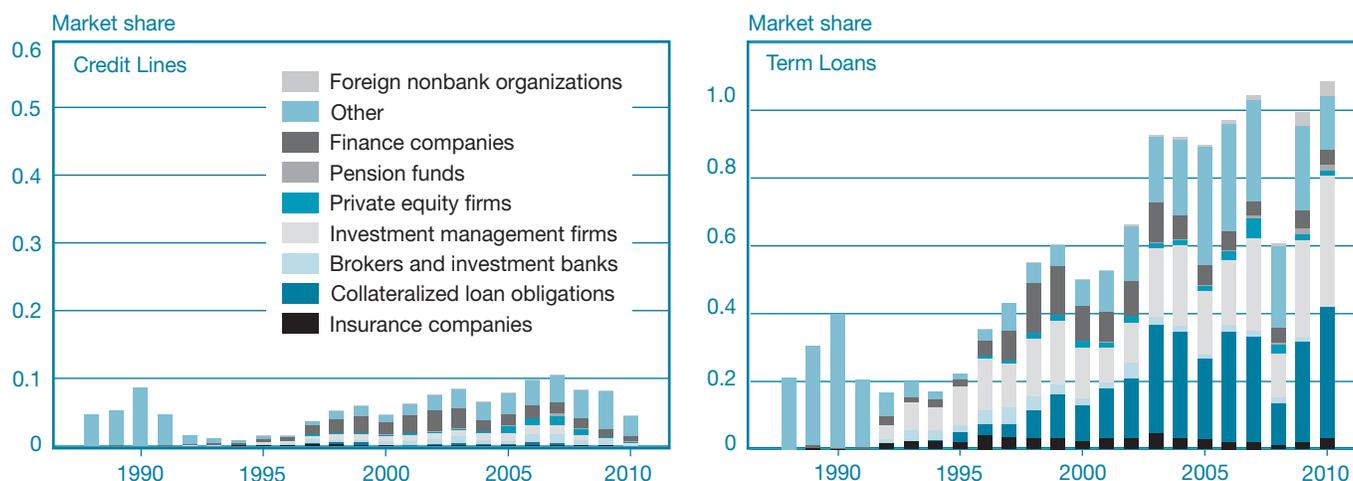
CHART 7  
Syndicate-Participant Banks' Market Share of Credits at Origination and Three Years Later



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

CHART 8

## Nonbank Investors' Market Share by Credit Type



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

three years, of the \$17 billion of such loans originated in 1988, banks (both lead and syndicate-participant banks) kept on their balance sheets 90.2 percent in 1988 but only 86.9 percent three years later. Similarly, of the \$17 billion in term loans issued in 2007, banks kept on their balance sheets 42.1 percent at origination but only 32.8 percent three years later.

Thus, for credit lines, syndicate-participant banks tended to offset the actions of the lead banks at origination, and they tended to hold the credit lines to maturity (or at least for three years). For term loans, in contrast, syndicate-participant banks, like lead banks, have been decreasing the market share they retain at origination and over the years after origination.<sup>16</sup>

### 4.2 The Role of Nonbank Financial Institutions

Given the decline in the portion of term loans retained in the banking sector, the next question to ask is, Who are the investors that have been increasing their presence in this market? To address this question, we report in Chart 8 the market shares at the time of credit origination in the credit-line market (left panel) and the term-loan market (right

panel) of the main nonbank investors in these markets: insurance companies, investment management firms, finance companies, collateralized loan obligation managers, private equity firms, brokers and investment banks, pension funds, and foreign nonbank organizations.<sup>17</sup>

Looking at the information on credit lines, we see that the market share of nonbank investors in credit lines is very small, less than 10 percent in each year. This finding was expected, given our previous evidence that banks continue to play a dominant role in the provision of liquidity to corporations through credit lines. The nonbank entities that have the highest market share are finance companies, pension plans, investment managers, and “other.”<sup>18</sup> Finance companies first appear in our credit-line data in 1992, when they held a market share of 0.2 percent. They reached their peak market share in 2002 with 3.2 percent of all credit lines originated.

<sup>17</sup> The different categories are identified in a variety of ways: by keyword; by information from the National Information Center run by the Federal Reserve System, which identifies banks, bank holding companies, foreign banking organizations, finance companies, insurance companies, and so on; by matching to the Moody’s Structured Finance Database, which allows us to identify CLOs; and by matching to Capital IQ to identify investment management firms and private equity firms. Investment management firms are identified as hedge funds, mutual funds, or asset managers. Note that institutions may shift across categories over time. For example, for most of our sample, Goldman Sachs and Morgan Stanley are identified as investment banks. However, after they officially converted their status to BHCs in the first quarter of 2009, they are classified as BHCs. Finally, note that for the remaining analysis, we exclude nonbank entities that are part of banking entities—for example, finance companies that are part of BHCs. (Including them does not substantially change our analysis.)

Turning our attention to term loans, we see from the right panel of Chart 8 that finance companies, CLOs, brokers, and investment managers have been increasing their share in the market for term loans and that nonbank investors—particularly, investment managers and CLOs—play a much bigger role in this market than in the credit-line market. Investment managers first appear in our data in 1992, when they acquired 2 percent of the term loans originated that year. Similarly, CLOs first appear in our data in 1994, when they held 0.3 percent of the term loans originated in that year. By 2007, these investors had acquired 13.6 percent and 15.5 percent, respectively, of the term loans issued in that year. Again, note that all of these numbers underestimate the true presence of each category in the market since the “other” grouping contains institutions that could not be accurately matched to any of the categories from our sources; nonetheless, most of these institutions probably do fall into one of these categories. Finance companies first appear in the term-loan data in 1989, when they acquired 0.03 percent of the term loans issued that year; at their peak in 1998, they held 7.3 percent of the term loans issued that year. Private equity firms currently represent a small share of the market (0.8 percent in 2010), but they have been steadily building their presence in this market, from 0.4 percent in 1996 to 3 percent in 2007. In contrast, insurance companies continue to play a minor role: the share of the term loans held by insurance companies increased from 0.2 percent in 1988 to 1.0 percent in 2007.

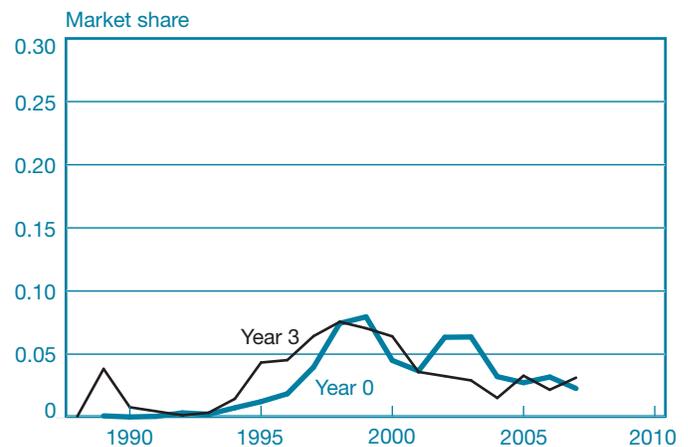
### 4.3 Nonbank Investors’ Shares after Loan Origination

We documented earlier that both lead banks and syndicate-participant banks continue to reduce the share of their term loans in the years following origination. In Charts 9 through 11, we examine the market shares of the top three nonbank investors in the syndicated loan market at the time of the credit origination and three years later. Because these nonbank investors invest mainly in term loans, we limit our analysis to the term-loan market.

Finance companies kept their share of the term-loan market more or less constant over the past decade. In contrast, CLOs and investment managers have been increasing their market

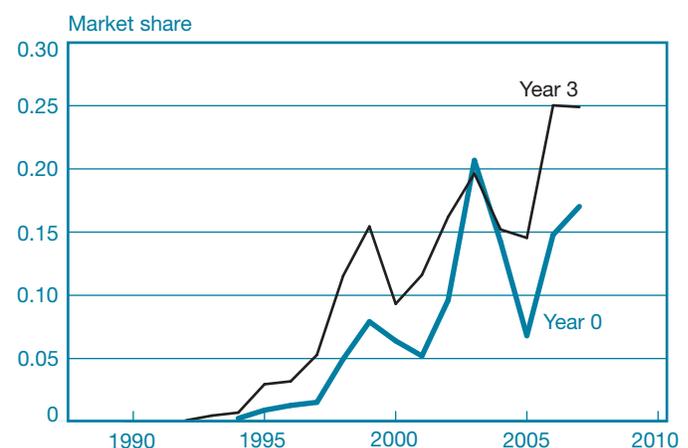
share of the term-loan business. These investors have been buying larger portions of the credits at the time of their origination, and they continue to increase such investments in the years after origination. From 2000 to 2007, on average, CLOs acquired 12.6 percent of the term loans originated in each year, while investment managers acquired on average

CHART 9  
Role of Finance Companies



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

CHART 10  
Role of Investment Managers

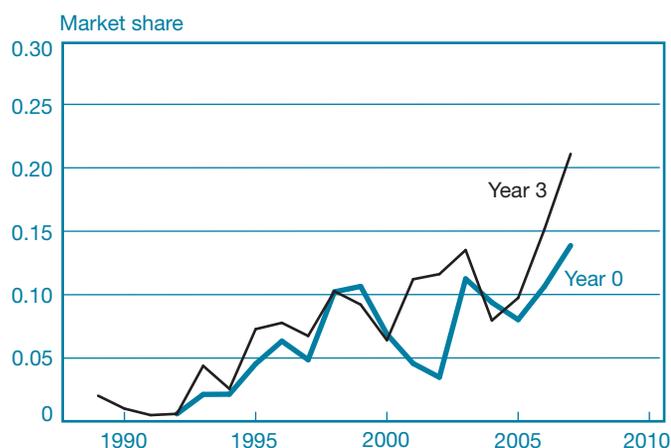


Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

<sup>18</sup> The majority of the institutions in the “other” category were not clearly identified by our sources as belonging to one of the categories discussed above. Because much of the identification was done through name matching, institutions for which the quality of the match was in question were also placed in the “other” category. Finally, the category also contains a very small number of Article XII New York investment companies, data processing servicers, individuals, and foundations.

CHART 11

## Role of Collateralized Loan Obligations



Source: Shared National Credit database, produced jointly by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency.

8.7 percent of this market. Three years later, such institutions held 18.2 percent and 12.9 percent of these loans, respectively. This evidence shows that over the past two decades, as banks have increasingly opted to retain on their balance sheet a smaller portion of the term loans they originated, they have been fueling the growth of nonbank institutions, in particular CLOs and investment managers.

## 5. FINAL REMARKS

Our analysis of banks' role in financial intermediation reveals that beginning in the early 1990s, lead banks increasingly used the originate-to-distribute model in their corporate lending business. This increase, however, was largely limited to term loans. In general, banks continued to rely on the traditional originate-to-hold model in the credit-line business. Further, we find that more and more lead banks "distributed" their term loans by selling larger portions of them, not only at the time of the loan origination but also in the years after origination.

Our investigation into the investors that bought the bank loans shows that traditional institutional investors and, in particular, new loan investors—including investment managers and CLOs—began taking over more of the credit business.

Our findings have several important implications for the theme of this volume. They show that in evaluating the importance of banks in financial intermediation, analysts must use measures of the credit that banks originate, as opposed to measures of the credit they retain on their balance sheets. Indeed, our findings confirm that measures of the importance of banks that rely on the credit held by banks on their balance sheets will increasingly understate the essential role that banks play in financial intermediation. Our findings also show that banks have been an important contributor to the so-called shadow banking system.<sup>19</sup> For example, in 1993, of the \$22.7 billion in term loans originated, banks sold \$2.2 billion to the shadow banking system. By comparison, in 2007, of the \$315 billion in term loans originated, they sold \$125 billion to the shadow banking system. In about two decades, the annual volume of term loans that banks supplied to nonaffiliated shadow-banking institutions increased by \$123 billion.

Lastly, our findings suggest some interesting questions for future research. Does the increasing presence of nonbank financial institutions in loan syndicates affect lending terms or hinder borrowers' ability to renegotiate their credits? Does the decline in a lead bank's retained share of the credits it originates affect the nature of its relationship with borrowers? What are the implications of the decline in a bank's retained share for its incentives to assess the creditworthiness of loan applicants or to track the viability of loans? Researchers have been using the share of a credit held by the lead bank at the time of origination as a proxy for the bank's monitoring incentives. As our evidence shows, however, this share may be a biased proxy for the bank's exposure during the life of a loan. It would be interesting to investigate the implications of the decline in the bank's credit share for its monitoring incentives during the life of the credit.

<sup>19</sup> For these computations, "shadow banking institutions" are defined as CLOs, brokers and investment banks, investment managers, private equity firms, finance companies, and foreign nonbank institutions.

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# THE ROLE OF BANK CREDIT ENHANCEMENTS IN SECURITIZATION

## 1. INTRODUCTION

Does the advance of securitization—a key element in the evolution from banking to “shadow banking” (Pozsar et al. 2010)<sup>1</sup>—signal the decline of traditional banking? Not necessarily, for banks play a vital role in the securitization process at a number of stages, including the provision of credit enhancements.<sup>2</sup> Credit enhancements are protection, in the form of financial support, to cover losses on securitized assets in adverse conditions (Standard and Poor’s 2008). They are in effect the “magic elixir” that enables bankers to convert pools of even poorly rated loans or mortgages into highly rated securities. Some enhancements, such as standby letters of credit, are very much in the spirit of traditional banking and are thus far from the world of shadow banking.

This article looks at enhancements provided by banks in the securitization market. We start with a set of new facts on the evolution of enhancement volume provided by U.S. bank holding companies (BHCs). We highlight the importance of bank-provided enhancements in the securitization market by comparing their market share with that of financial guaranties sold by insurance companies, one of the main sellers of credit protection in the securitization market. Contrary to the notion

<sup>1</sup> According to Federal Reserve Chairman Bernanke (2012), “Examples of important components of the shadow banking system include securitization vehicles.”

<sup>2</sup> See Cetorelli and Peristiani (2012) for analysis of banks’ role in other steps in the securitization process.

that banks were being eclipsed by other institutions in the shadow banking system, we find that banks have held their own against insurance firms in the enhancement business. In fact, insurers are forthright about the competition they face from banks:

*Our financial guaranty insurance and reinsurance businesses also compete with other forms of credit enhancement, including letters of credit, guaranties and credit default swaps provided, in most cases, by banks, derivative products companies, and other financial institutions or governmental agencies, some of which have greater financial resources than we do, may not be facing the same market perceptions regarding their stability that we are facing and/or have been assigned the highest credit ratings awarded by one or more of the major rating agencies (Radian Groups 2007, form 10-K, p. 46).*

Given the steady presence of bank-provided enhancements in the securitization market, we next study exactly what role enhancements play in banks’ securitization process. The level of credit enhancements necessary to achieve a given rating is determined by a fairly mechanical procedure that reflects the rater’s estimated loss function on the underlying collateral in the securitization (Ashcraft and Schuermann 2008). If estimated losses are high, then—all else equal—more enhancements are called for to achieve a given rating. Those mechanics suggest a negative relationship between

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the level of enhancements on a deal and the performance of securitized assets. Note that in this scenario, enhancements serve as a buffer against observable risk (as embodied in the estimated loss function).

We are interested in the idea that enhancements might also be used to solve part of the asymmetric information problems that may plague the securitization process. If banks are better informed than outside investors about the quality of the assets they are securitizing, as they almost certainly are, banks that are securitizing higher-quality assets may use enhancements as a signal of their quality. In other words, by their willingness to keep “skin in the game” to retain some risk, banks can signal their faith in the quality of their assets. Such signaling implies a positive relationship between the level of enhancements and the performance of securitized assets, just the opposite of the buffer explanation. Obviously, enhancements could, and probably do, serve both as a buffer against observable risk and a signal against unobservable (to outsiders) quality. However, since the buffer role is almost self-evidently true, we are interested in whether we can detect any evidence for the role of securitization enhancements as a signal.

Others have also considered the hypothesis that enhancements might play a signaling role. Downing, Jaffee, and Wallace (2009) observe that asymmetric information about prepayment risk in the government-sponsored-enterprise (GSE) mortgage-backed-security market should motivate the use of signaling devices.<sup>3</sup> Albertazzi et al. (2011) note the potential centrality of asymmetric information to the securitization process and conjecture that a securitizing sponsor can keep a junior (equity) tranche “as a signaling” device of its (unobservable) quality or as an expression of a commitment to continue monitoring. James (2010) comments that if asset-backed securities include a moral hazard (or “lemons”) discount due to asymmetric information, issuers have an incentive to retain some risk “as a way of demonstrating higher underwriting standards.”<sup>4</sup>

A variant of the question we are asking about credit enhancements showed up in earlier literature on the role of collateral in traditional (on-the-books) bank lending. A theoretical literature in the 1980s predicted that in the context of asymmetric information, safer borrowers were more likely to pledge collateral to distinguish themselves from riskier ones (Besanko and Thakor 1987; Chan and Kanatas 1985). However, an empirical study by Berger and Udell (1990) found strong evidence against the signaling hypothesis: that is,

<sup>3</sup> Because the mortgage-backed securities that the authors study are guaranteed, prepayment risk is the only risk investors need to worry about.

<sup>4</sup> In a paper that is somewhat related to ours, Erel, Nadauld, and Stulz (2011, p. 37) investigate why banks hold highly rated tranches of securitizations, and conclude that their doing so may partly serve as “a credible signal of deal quality to potential investors.”

collateral was associated with riskier borrowers and loans. In other words, when it comes to loans on the books, collateral seems to serve more as a buffer against observable risk than as a signal of unobservable quality.

We found only one other paper that looks at the relationship between enhancements and the performance of securitized assets. Using loan-level data, Ashcraft, Vickery, and Goldsmith-Pinkham (2010) find that delinquency on underlying subprime and Alt-A mortgage pools is positively associated with the amount of AAA subordination.<sup>5</sup> Those results are consistent with the hypothesis that subordination is used as a buffer against observable credit risk. Interestingly, however, the authors find that BBB subordination is negatively associated with mortgage performance on Alt-A deals, which they consider more opaque (hard to rate). The latter result seems consistent with the signaling hypothesis: the issuer of an opaque security submits to a high degree of subordination to signal its confidence in the quality of the assets it is selling.

We investigate our question from two angles. First, we look directly at the relationship between the performance of securitized assets and total enhancements in a panel analysis where we regress the fraction of securitized assets that are severely delinquent (delinquent for ninety or more days or charged off) on total enhancements per unit of securitized assets. We estimate the regression for seven categories of credit: residential real estate loans, home equity loans, credit card loans, auto loans, other consumer loans, all other loans, and total securitizations. We are not able to detect any evidence for the signaling hypothesis; when we find a significant relationship between delinquency on securitized assets and enhancements, the relationship is positive, consistent with the buffer hypothesis.

In the second part of our article, we test the hypotheses from the perspective of market participants. Specifically, we investigate how stock investors and the option market reacted when BHCs detailed for the first time their securitization activity in their 2001:Q2 regulatory reports, which include enhancements and aggregate loan performance (delinquencies) of the assets that BHCs securitized. We calculate the cumulative abnormal stock return around that date for each BHC that had positive securitization activity. We find first that abnormal returns are highly positively correlated with the extent of securitization activity at a BHC. That comes as no surprise, since securitization was presumably viewed at the time as positive net-present-value (NPV) activity. More interestingly, we find that the relationship between total credit enhancements and

<sup>5</sup> The amount of subordination at a given rating is the fraction of bonds that absorb losses before the bond in question. If 90 percent of the bonds in a deal are senior AAA bonds and 10 percent are junior, subordination of the AAA bonds is 10 percent.

cumulative abnormal returns depends on the delinquency rate on securitized assets; when the rate is below some threshold, cumulative abnormal returns are positively correlated with total credit enhancements. This result suggests that when the delinquency rate is relatively low, enhancements serve as a signal of quality (hence, the high cumulative abnormal return). However, when the rate is above that threshold, the relationship between enhancements and cumulative abnormal returns becomes negative. This finding suggests that when the delinquency rate is relatively high—meaning that securitized assets are *demonstrably* risky—enhancements serve as a buffer against observable risk.

We also examine how securitization activity and enhancements are related to BHC risk, as measured by the implied volatility of BHC stock prices. We find that securitization activity is positively correlated with implied volatility, suggesting that markets view securitization as a risky activity. We also find that total enhancements are positively related to implied volatility. This result implies that just as traditional originate-and-hold banking exposed bank shareholders to risk, so does banks' provision of credit enhancements.

## 2. BACKGROUND ON BANK-PROVIDED CREDIT ENHANCEMENTS

While credit enhancements can take many forms, Schedule HC-S, on which BHCs report on their securitization activity, includes fields for three types of enhancements.<sup>6</sup> The first is credit-enhancing, interest-only strips. Schedule HC-S instructions define these strips as:

- an on-balance-sheet asset that, in form or in substance,
- 1) represents the contractual right to receive some or all of the interest due on the transferred assets; and
  - 2) exposes the bank to credit risk that exceeds its pro-rata share claim on the underlying assets whether through subordination provisions or other credit-enhancing techniques.

Elsewhere, the HC-S instructions note that the field for credit-enhancing, interest-only strips can include excess spread accounts.<sup>7</sup> Excess spread is the monthly revenue remaining on

<sup>6</sup> To be clear, our article focuses on the three types of enhancements reported by bank holding companies on Schedule HC-S. For a more general discussion of enhancements, see Ashcraft and Schuermann (2008).

<sup>7</sup> Levitin (2011, p. 16) asserts that, in the context of credit card securitization, excess spread accounts are also referred to as credit-enhancing, interest-only strips.

a securitization after all payments to investors, servicing fees, and charge-offs. As such, excess spread—a measure of how profitable the securitization is—provides assurance to investors in the deal that they will be paid as promised. Excess spread accounts are the first line of defense against losses to investors, as the accounts must be exhausted before even the most subordinated investors incur losses.

The second class of enhancements, subordinated securities and other residual interest, is a standard-form credit enhancement. By holding a subordinated or junior claim, the bank that securitized the assets is in the position of being a first-loss bearer, thereby providing protection to more senior claimants. In that sense, subordination serves basically as a buffer or collateral. However, in the asymmetric information context, holding a subordinate claim gives the bank the stake that can motivate it to screen the loans carefully before it securitizes them and to continue monitoring the loans after it securitizes them. The bank's willingness to keep some risk may serve as a signal that it has screened loans adequately and plans to monitor diligently.

The third class of enhancements, standby letters of credit, obligates the bank to provide funding to a securitization structure to ensure that investors receive timely payment on the issued securities (for example, by smoothing timing differences in the receipt of interest and principal payments) or to ensure that investors receive payment in the event of market disruptions. The facility is counted as an enhancement if and only if advances through the facility are subordinate to other claims on the cash flow from the securitized assets.<sup>8</sup>

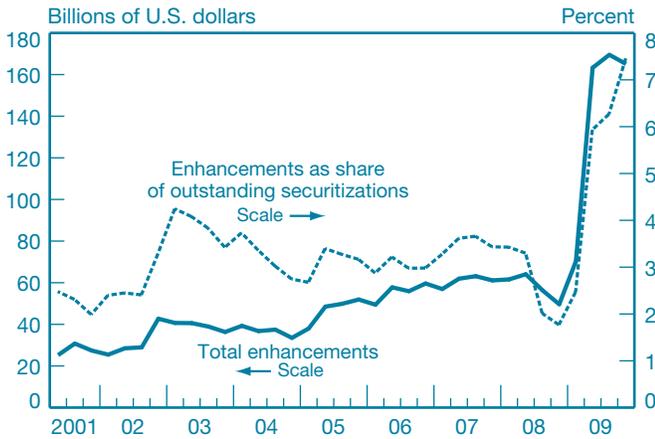
Although not technically classified as an enhancement, a fourth item on Schedule HC-S that we consider is unused commitments to provide liquidity. Unused commitments represent the undrawn balance on previous commitments. We include this variable simply as a control; we do not venture a hypothesis about how it will enter any of our regressions.

It is important to note that the HC-S data we study, particularly subordination, are measures of *risk retention* by BHCs and not necessarily a total credit enhancement for a securitization deal. For example, a deal could have 20 percent subordination (say, a \$1 billion mortgage pool divided into an \$800 million senior bond and a \$200 million junior bond) without the BHC holding (retaining) any of the subordinated piece. In that case, the enhancement would not show up in our data. Our basic question, however, remains: Is risk retention important because it is a buffer against observable risk or because it is a signal of unobservable quality? Indeed, Title 9 of the Dodd-Frank Act requires federal regulators to set

<sup>8</sup> Note that banks also provide enhancements in the form of representation and warranties that obligate the issuer to take back the loan if it defaults early in its life.

CHART 1

Total Credit Enhancements by Bank Holding Companies



Source: Federal Reserve System, Form FR Y-9C, Schedule HC-S.

mandatory retention standards for sponsors of asset-backed securities, suggesting that some policymakers believe that enhancements in the form of retentions can ameliorate the incentive and information problems endemic to securitization.

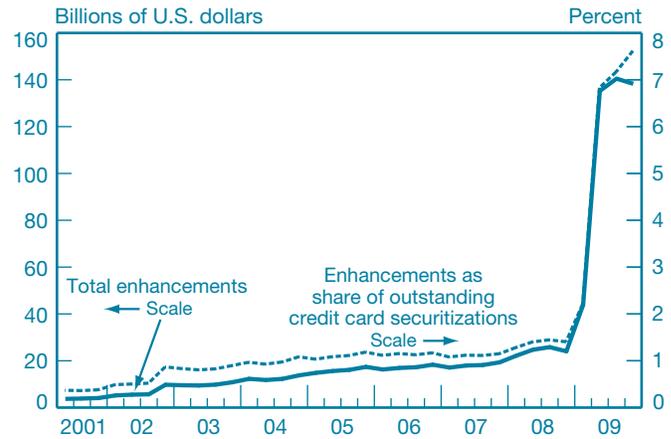
Because the enhancement data in Schedule HC-S have not, to our knowledge, been studied publicly before, we briefly examine the data in graphic form to get a sense of the size, trends, and volatility of enhancements by BHCs. The data run from 2001:Q2, when BHCs were first required to disclose securitization activity, to 2009:Q4, when BHCs were required, per Financial Accounting Standards Board ruling 167,<sup>9</sup> to bring securitized assets back on their balance sheets (and thus ceased to report most enhancements).

Chart 1 plots total enhancements in billions of dollars and as a percentage of outstanding securitizations. Measured per securitized asset, enhancements were more or less stable at between 2 and 3 percent until 2009:Q1, although there is a slight upward trend in the series to that point. In dollar terms, total enhancements trended upward from about \$25 billion in 2001:Q2 to about \$70 billion in 2009:Q1. In the following quarter, total enhancements more than doubled, to \$164 billion, and enhancements per securitized asset rose to about 6 percent.

Chart 2 shows that the abrupt increase in total enhancements in 2009 came about almost entirely because of a rise in enhancements on securitized credit card loans. The increase in credit card enhancements, in turn, came about because of increased enhancements at two BHCs: Bank of America and

CHART 2

Credit Card Enhancements by Bank Holding Companies



Source: Federal Reserve System, Form FR Y-9C, Schedule HC-S.

JPMorgan Chase (JPMC). The increase at Bank of America followed purchases of new securitization trusts after it acquired Merrill Lynch in 2009. More interestingly, perhaps, the increase in enhancements at JPMC in 2009 occurred primarily because several classes of notes issued by Chase Issuance Trust, one of its master trusts of securitized credit card assets, were placed on credit watch and one class of notes was downgraded.<sup>10</sup> That case illustrates how enhancements are used to maintain a given rating level, whether by providing a buffer against collateral losses, a signal of faith in the quality of the assets, or both.

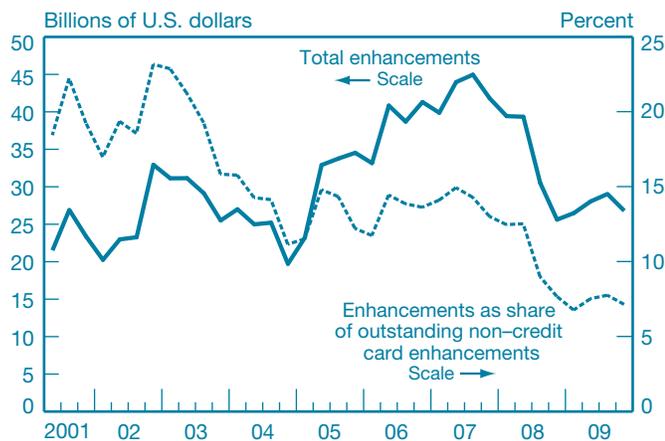
For completeness, Chart 3 plots the enhancements, both by level and per securitized asset, for non-credit card enhancements. The only feature of note is the downward trend in non-credit card enhancements per securitized non-credit card asset. That finding implies that the upward trend in overall enhancements per securitized asset evident in Chart 1 results from the upward trend in credit card enhancements per securitized asset evident in Chart 2.

Chart 4 breaks out total enhancements into enhancements of the BHCs' own securitized assets ("self-enhancements") and enhancements provided to third parties ("third-party enhancements"). Apart from the beginning and the end of the sample period, self-enhancements were roughly stable at between \$30 billion and \$40 billion. By contrast, third-party enhancements began trending upward in about 2004:Q4 to reach a peak of about \$25 billion in 2008:Q2. Third-party

<sup>9</sup> See [http://www.fasb.org/cs/ContentServer?c=FASBContent\\_C&pagename=FASB/FASBContent\\_C/NewsPage&cid=1176156240834](http://www.fasb.org/cs/ContentServer?c=FASBContent_C&pagename=FASB/FASBContent_C/NewsPage&cid=1176156240834).

<sup>10</sup> See "Fitch: Chase Increases Credit Enhancement in Credit Card Issuance Trust (CHAIT)," <http://www.reuters.com/article/2009/05/12/idUS260368+12-May-2009+BW20090512>.

CHART 3  
Non-Credit Card Enhancements



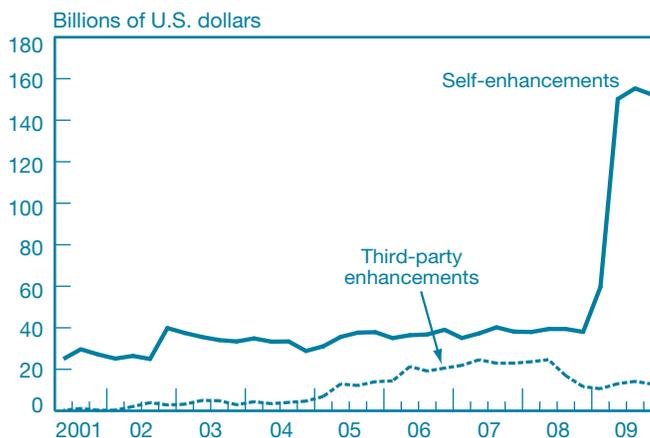
Source: Federal Reserve System, Form FR Y-9C, Schedule HC-S.

enhancements dropped noticeably during the financial crisis, presumably because BHCs' own solvency and liquidity came into question.

While Charts 1-4 tell us something about trends in enhancements within the banking industry, we were also interested in how enhancements by bank holding companies compared with those by financial institutions in the shadow banking system, namely, insurance companies. Insurance companies provide enhancements to structured finance products through guaranties and credit default swaps (CDS). As there is no central source of data on enhancements provided by insurance companies, we turned to their 10-K forms for data. Starting with the nineteen publicly traded insurance companies, we determined that only six or seven (depending on the year) provided guaranties for asset-backed securities. These included firms such as Ambac, MBIA, and Radian.<sup>11</sup> While the companies usually provided a reasonable breakdown of guarantee coverage—such as residential and consumer loans and the like—the classifications were not uniform across companies. Thus, for each company we summed guaranties across categories and then summed across companies to obtain the aggregate level of guaranties by publicly traded insurance companies in a given year.

<sup>11</sup> The sample excludes American International Group, Inc. AIG was a prominent seller of CDS protections on collateralized debt obligations (CDOs) through one of its subsidiaries, AIG Financial Products. AIG experienced a severe liquidity crisis due to its rating downgrade in late 2008, and the subsequent bailout resulted in a substantial decline in outstanding net notional amount of AIG's CDS portfolio written on CDO products. Including AIG in our analysis would therefore cause a more significant downward trend in insurance companies' presence in the financial guarantee market for the sample period. We exclude AIG to make a conservative comparison of the aggregate volumes of protection provided by banks and insurance firms in the securitization market.

CHART 4  
Self-Enhancements and Third-Party Enhancements



Source: Federal Reserve System, Form FR Y-9C, Schedule HC-S.

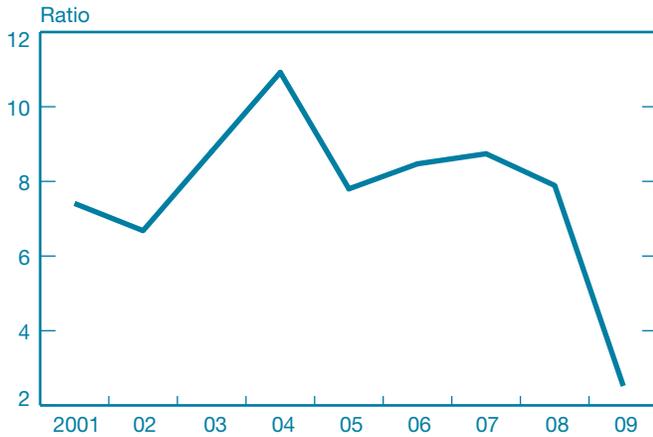
Chart 5 plots the ratio of guaranties by insurance companies to total enhancements provided by bank holding companies. The level of guaranties provided by insurance companies clearly swamps the level of enhancements provided by bank holding companies; at its peak in 2004:Q4, the ratio was more than ten to one. However, apart from some notable fluctuations, including a drop in 2009 because of the increase in credit card enhancements at JPMC and Bank of America, the ratio has been fairly trendless, indicating that banks have maintained (or perhaps increased) their share of the credit enhancement business.

As noted in the introduction, we found that insurers would often cite (in their 10-Ks) competition from banks for enhancement business. Here is another example:

*Financial guarantee insurance also competes with other forms of credit enhancement, including senior-subordinated structures, credit derivatives, letters of credit and guaranties (for example, mortgage guaranties where pools of mortgages secure debt service payments) provided by banks and other financial institutions, some of which are governmental agencies. Letters of credit are most often issued for periods of less than 10 years, although there is no legal restriction on the issuance of letters of credit having longer terms. Thus, financial institutions and banks issuing letters of credit compete directly with our Insurers to guarantee short-term notes and bonds with a maturity of less than 10 years. To the extent that banks providing credit enhancement may begin to issue letters of credit with commitments longer than 10 years, the competitive position of financial guarantee insurers could be adversely affected (MBIA Inc. 2008, form 10-K, p. 24).*

CHART 5

Guaranties to Asset-Backed Securities Provided by Insurance Companies/Credit Enhancements Provided by Bank Holding Companies



Sources: Federal Reserve System, Form FR Y-9C, Schedule HC-S; insurance companies' 10-K forms.

### 3. PANEL REGRESSION RESULTS

In this section, we investigate the relationship between the performance of securitized assets and the extent of credit enhancements. According to the buffer hypothesis, where enhancements are a buffer against observable risks, one would expect a negative relationship between enhancements and performance. Under the signaling hypothesis, where enhancements are a signal of unobserved quality, we would expect a positive relationship between enhancements and performance.

To investigate that question, we estimate the following fixed-effect regression models:

$$(1) \text{ SevereDelinquencyRate}_{it} = \alpha_i + \alpha_t + \beta \text{ TotalEnhancements}_{it} + \delta' \text{ Controls} + \varepsilon_{it}.$$

For each loan category (mortgages, credit card loans, and the like), the dependent variable is the sum of securitized assets ninety or more days past due and loans charged off, divided by total securitized assets outstanding at BHC  $i$  in quarter  $t$ . The main independent variable, *TotalEnhancements*, is the sum of the three types of credit enhancements discussed earlier scaled by total outstanding securitizations for each BHC in each quarter.<sup>12</sup> The controls are unused commitments divided by total loans in each category, the log of on balance sheet assets, leverage (total common equity divided by total balance sheet

TABLE 1

Summary Statistics

| Variable                                      | Observations | Mean  | Standard Deviation |
|---|--------------|-------|--------------------|
| <b>Severe delinquency ratio<sup>a</sup></b>   |              |       |                    |
| Residential real estate                       | 3,394        | 0.006 | 0.025              |
| Home equity                                   | 536          | 0.012 | 0.024              |
| Credit card                                   | 703          | 0.012 | 0.018              |
| Auto  | 686          | 0.005 | 0.011              |
| Other consumer                                | 444          | 0.027 | 0.032              |
| Commercial and industrial                     | 717          | 0.003 | 0.008              |
| All other                                     | 968          | 0.002 | 0.008              |
| Total   | 4,589        | 0.005 | 0.017              |
| <b>Total enhancements (ratio)<sup>b</sup></b> |              |       |                    |
| Residential real estate                       | 3,394        | 0.037 | 0.150              |
| Home equity                                   | 536          | 0.062 | 0.108              |
| Credit card                                   | 703          | 0.024 | 0.071              |
| Auto  | 686          | 0.060 | 0.104              |
| Other consumer                                | 444          | 0.063 | 0.095              |
| Commercial and industrial                     | 717          | 0.037 | 0.124              |
| All other                                     | 968          | 0.062 | 0.170              |
| Total   | 4,589        | 0.041 | 0.150              |

Source: Federal Reserve System, Form FR Y-9C, Schedule HC-S.

<sup>a</sup>Severe delinquency ratio = securitized loans ninety days past due plus charge-offs divided by total loans in that category.

<sup>b</sup>Total enhancements = sum of credit-enhancing, interest-only strips and excess spread accounts, subordinated securities, and other residual interest; standby letters of credit; and other enhancements divided by total loans in that category.

assets), ROA (quarterly net income divided by total balance sheet assets), and risk-weighted assets divided by total balance sheet assets (a measure of risk). All the variables in this and subsequent regressions are defined in the appendix. The BHC and time-fixed (quarter-year) effects control for constant differences in performance across BHCs and time. We report Huber-White robust standard errors for all quarter-BHC observations with nonmissing, nonzero outstanding securitization. The standard errors are clustered by BHCs. The equation is estimated from 2001:Q2 to 2007:Q2, that is, up to but not including the financial crisis. A BHC is included in the regression if it had nonzero securitization for a given loan type.

<sup>12</sup> Besides the aggregate enhancement, Schedule HC-S reports disaggregated numbers cross several categories, including retained interest-only strips, standby letters of credit, subordinated securities, and other enhancements, as discussed earlier. We focus on the aggregate amount, as discussions with professionals in this business sector suggest that the overall amount of enhancements is the most relevant term in the deal-making process.

TABLE 2

## Panel Regression Results

Dependent Variable: Severely Delinquent Loans/Total Securitized Loans

Pre-Crisis (2001:Q2 to 2007:Q2)

|                                   | Residential<br>Real Estate | Home<br>Equity    | Credit Card         | Auto               | Other<br>Consumer | Commercial<br>and Industrial | All Other           | Total             |
|-----------------------------------|----------------------------|-------------------|---------------------|--------------------|-------------------|------------------------------|---------------------|-------------------|
| Total enhancements                | 0.017<br>[2.54]**          | 0.09<br>[4.49]*** | 0.044<br>[1.07]     | 0.027<br>[2.38]**  | 0.037<br>[1.34]   | 0.003<br>[0.29]              | -0.007<br>[0.86]    | 0.015<br>[2.40]** |
| Unused commitments                | -0.083<br>[1.85]*          | -0.015<br>[1.22]  | 3.714<br>[1.92]*    | -0.009<br>[1.05]   | -0.034<br>[1.44]  | -0.004<br>1.05]              | -0.002<br>[0.85]    | -0.001<br>[0.17]  |
| Leverage                          | -0.047<br>[1.61]           | 0.015<br>[0.07]   | -0.125<br>[3.35]*** | 0.001<br>[0.11]    | 0.218<br>[1.18]   | 0.026<br>[0.55]              | -0.094<br>[3.64]*** | -0.04<br>[1.08]   |
| Return on assets                  | 0.226<br>[1.09]            | -0.11<br>[0.20]   | -0.52<br>[8.58]***  | 0.011<br>[1.26]    | 0.009<br>[0.03]   | 0.029<br>[0.17]              | -0.131<br>[1.39]    | -0.042<br>[0.49]  |
| Risk-weighted assets/total assets | -0.017<br>[1.75]*          | 0.006<br>[0.20]   | 0.01<br>[0.39]      | 0.028<br>[3.63]*** | -0.003<br>[0.05]  | -0.013<br>[0.83]             | 0.002<br>[0.24]     | 0.008<br>[0.91]   |
| Log asset size                    | 0.002<br>[0.92]            | 0.013<br>[1.36]   | 0.009<br>[1.36]     | -0.002<br>[0.88]   | 0.022<br>[1.15]   | 0.004<br>[1.49]              | -0.002<br>[0.71]    | 0.004<br>[1.36]   |
| Observations                      | 3,358                      | 532               | 703                 | 685                | 444               | 706                          | 960                 | 4,543             |
| Number of entities                | 166                        | 27                | 34                  | 32                 | 22                | 35                           | 48                  | 225               |
| R <sup>2</sup>                    | 0.04                       | 0.18              | 0.36                | 0.2                | 0.17              | 0.05                         | 0.06                | 0.06              |

Source: Authors' calculations.

Notes: Robust *t*-statistics appear in brackets. Time dummies are not reported. Variables are defined in the appendix.

\*\*\*Statistically significant at the 1 percent level.

\*\*Statistically significant at the 5 percent level.

\*Statistically significant at the 10 percent level.

Summary statistics are reported in Table 1, and the regression results are in Table 2. In the regressions, the point estimates on *total enhancements* are positive in every loan category but the residual “all other” and are significantly different from zero in four of the eight categories: residential real estate, home equity, auto, and total. Thus, we find no evidence for the signaling hypothesis and some evidence for the hypothesis that enhancements serve as a buffer against observable risk. It is possible that enhancements serve as both a buffer and a signal but the buffering role dominates.

Although we do not claim that the relationship between delinquency and enhancements is causal, it is still interesting to gauge the magnitude of the relationship between the two. To

do so, we calculate how much delinquency rates rise relative to the average when total enhancements increase by one standard deviation. Specifically, we calculate the product of the point estimate for each loan category and the standard deviation of total enhancements for that category; we then scale that product by the mean delinquency rate for that category. The result yields the estimated percentage change in delinquency (relative to the mean delinquency rate) per standard deviation change in total enhancements. The results imply a fairly stable relationship between total enhancements and delinquency rates in cases where the relationship was statistically significant: residential real estate (0.43), home equity (0.81), auto (0.56), and total (0.45).

#### 4. EVENT STUDIES: WHAT DO STOCK PRICE REACTIONS AND IMPLIED VOLATILITY TELL US ABOUT THE ROLE OF ENHANCEMENTS?

We next investigate the role of credit enhancements in securitization by looking at market reactions to the new disclosure requirement adopted in 2001:Q2 on BHCs' securitizations. Beginning in that quarter, BHCs started including in the quarterly "Reports of Condition and Income" a new schedule that detailed their securitization activities. The new schedule requires BHCs to disclose comprehensive information on the volume and performance<sup>13</sup> of seven categories of securitized assets (the same categories we study in the panel analysis above). Significantly, BHCs are required to report the maximum amount of credit exposure they face through the credit enhancements described above. This new information first became public after BHCs' reports for 2001:Q2 were disclosed in August and September 2001. This event provides a unique opportunity for assessing how banks' securitization and the associated credit exposure through enhancements affect shareholders.

We focus on the valuation and risk implications of the newly disclosed securitization activities. First, we conduct a standard event study on a sample of 267 BHCs. A one-factor market model is estimated for each firm using monthly return data from July 1996 to June 2001, with the S&P 500 index being the factor. Monthly abnormal returns are calculated for August and September 2001 and then summed to reach a two-month cumulative abnormal return (CAR) for each bank.

To see how the newly disclosed securitization activities and credit enhancements affect valuation, we relate the CARs to several securitization-related variables through the following regression:

$$(2) \text{CAR}_i = \alpha + \beta_1 \text{Securitization}_i + \beta_2 \text{Total\_Enhancements}_i + \beta_3 \text{Total\_Enhancements}_i \times \text{Delinquency}_i + \beta_4 \text{Delinquency}_i + \beta_5 \text{Unused\_Commitments}_i + \beta_6 \text{Stock\_Volatility}_i + \varepsilon_i .$$

The dependent variable  $\text{CAR}_i$  is the two-month cumulative abnormal return for bank  $i$ . All independent variables are constructed using data from the Federal Reserve Y-9C reports, which bank holding companies filed as of 2001:Q2 under the revised reporting rules.  $\text{Securitization}_i$  represents the outstanding principal balance of assets sold and securitized by bank  $i$ , with servicing retained or with recourse or other seller-provided credit enhancements, and is normalized by the bank's total outstanding loans on the balance sheet. This measure

<sup>13</sup> The performance metrics include past-due amounts, charge-offs, and recoveries on assets sold and securitized.

reflects the extent to which bank  $i$  has moved its loans off the balance sheet through securitization.  $\text{Total\_Enhancements}_i$  and  $\text{Unused\_Commitments}_i$  are defined in Section 3 (and the appendix). While the scale of securitization activities is captured by  $\text{Securitization}_i$ ,  $\text{Total\_Enhancements}_i$  reflects the extent to which bank  $i$  could still be "on the hook" should the securitized assets perform poorly. We measure performance by  $\text{Delinquency}_i$ , defined as the sum of past-due loan amounts and year-to-date net charge-offs divided by the total outstanding securitized assets. Last, to control for a BHC's risk, we include the stock volatility estimated using the daily returns in the 252 trading days prior to the disclosure period.

Equation 2 also includes an interaction between  $\text{Total\_Enhancements}_i$  and  $\text{Delinquency}_i$ . Per our earlier discussion, we postulated two hypotheses on the role of enhancements. Under the signaling hypothesis, keeping risk through enhancements signals bank  $i$ 's private knowledge of good loan quality, implying a positive relationship between high enhancements and CAR. Under the buffer hypothesis, banks securitizing riskier collateral need more enhancements to meet rating agencies' criteria. In this case, high enhancements are associated with observably riskier deals, implying a negative valuation impact. If loan performance is a reasonable proxy for the observable riskiness of the securitized assets, we expect the signaling effect to dominate among relatively better-performing (lower-delinquency) deals, where observable risk is less a concern, resulting in an overall positive relationship between  $\text{Total\_Enhancements}$  and CAR. When deals are performing poorly (high delinquency), however, concerns over "observable risk" would heighten and the buffer role of enhancements would dominate, leading to a negative relationship between  $\text{Total\_Enhancements}$  and CAR. As a result, we expect a positive coefficient for  $\text{Total\_Enhancements}$  ( $\beta_2$ ) and a negative coefficient for the interaction  $\text{Total\_Enhancements} \times \text{Delinquency}$  ( $\beta_3$ ).

Table 3 presents the least-squares regression coefficient estimates with Huber-White robust standard errors. Each model estimated includes one of two versions of the  $\text{Delinquency}_i$  variable. Models 1 and 2 use a delinquency measure based on all past-due loans, while models 3 and 4 use one that includes severe delinquencies only. The cross-section variation of the CARs appears to be significantly associated with the securitization-related variables. The impact of  $\text{Securitization}$  is significantly positive in all specifications, suggesting that more favorable market reactions are associated with larger-scale securitizations as first disclosed by banks in 2001. This finding is consistent with the notion that securitization transactions were generally viewed as positive-NPV (that is, profitable) projects in 2001 and that the market reacted more favorably

TABLE 3

### Regression Analysis of Cumulative Abnormal Equity Returns

Dependent Variable: Cumulative Abnormal Equity Returns, August 2001–September 2001

|   | (1)               | (2)                  | (3)                | (4)                  |
|---|-------------------|----------------------|--------------------|----------------------|
| Constant                                    | -0.002<br>[0.34]  | -0.0034<br>[0.57]    | -0.0016<br>[0.28]  | -0.0027<br>[0.0059]  |
| Securitization                              | 0.04<br>[3.48]*** | 0.032<br>[2.62]***   | 0.042<br>[3.88]*** | 0.036<br>[2.99]***   |
| Total enhancements                          | 0.047<br>[0.58]   | 0.295<br>[4.40]***   | 0.06<br>[0.82]     | 0.168<br>[3.45]***   |
| Delinquencies (all)                         | -0.106<br>[0.46]  | 0.499<br>[1.59]      |                    |                      |
| Delinquencies (all) × total enhancements    |                   | -10.933<br>[3.06]*** |                    |                      |
| Delinquencies (severe)                      |                   |                      | -0.337<br>[0.78]   | 0.759<br>[1.50]      |
| Delinquencies (severe) × total enhancements |                   |                      |                    | -15.567<br>[3.32]*** |
| Unused commitments                          | 0.014<br>[0.20]   | -0.122<br>[2.31]**   | 0.005<br>[0.08]    | -0.041<br>[0.83]     |
| Stock volatility                            | -1.498<br>[1.53]  | -1.33<br>[1.36]      | -1.496<br>[1.53]   | -1.374<br>[1.41]     |
| Observations                                | 267               | 267                  | 267                | 267                  |
| R <sup>2</sup> (percent)                    | 5                 | 7                    | 5                  | 7                    |

Source: Authors' calculations.

Notes: Robust *t*-statistics appear in brackets. Variables are defined in the appendix.

\*\*\*Statistically significant at the 1 percent level.

\*\*Statistically significant at the 5 percent level.

\*Statistically significant at the 10 percent level.

when banks reported that a higher portion of their assets was being securitized.

In columns 1 and 3 of Table 3, *Total Enhancements*, *Delinquency*, *Unused Commitments*, and *Stock Volatility* are all statistically insignificant. *Securitization* is the only significant variable in those models.

Models 2 and 4 suggest that the insignificance of *Total Enhancements* in models 1 and 3 is likely due to the omitted interaction between enhancements and loan performance. In both models 2 and 4, *Total Enhancements* alone is significantly positive and has a strongly negative interaction effect with loan performance, *Total Enhancements* × *Delinquency*. A simple numerical exercise further illustrates the importance of the

interplay between enhancement and loan performance in determining which of the two hypotheses dominates. Using model 4 as an example, we can compare the relationship between the market reaction (CAR) and enhancements at different levels of severe loan delinquencies off the balance sheet. For example, with no severe delinquency (*Delinquency* = 0 percent), the overall effect of *Total Enhancements* is  $0.168 + (-15.567) \times 0 = 0.168$ , a positive wealth effect of enhancements consistent with the signaling hypothesis. As the severe delinquency ratio rises, however, the effect of *Total Enhancements* weakens monotonically but remains positive until severe delinquency reaches  $0.168/15.567 = 1.08$  percent.<sup>14</sup> Once the delinquency rate exceeds 1.08 percent, the net effect of *Total Enhancements* on CAR becomes increasingly negative as delinquency further rises. For example, when severe delinquency is 1.18 percent,<sup>15</sup> the net effect of *Total Enhancements* on CAR becomes  $0.168 + (-15.567) \times 1.18 \text{ percent} = -1.6$  percent. This negative relationship is consistent with the notion that investors become increasingly concerned when a bank with poorly performing securitized assets discloses a high level of credit enhancements, just as the buffer hypothesis would predict.

We next focus on the risk implications of banks' securitization activities. Specifically, we examine changes in option-implied volatilities around the event period. For fifty-one banks in our sample, we obtained data from the OptionMetrics Ivy database, which features implied volatilities calculated using the Cox, Ross, and Rubinstein (1979) binomial model adjusted for dividends. Because some banks have numerous exchange-traded options, we impose a number of widely used sample restrictions.<sup>16</sup> We calculate weighted-average implied volatilities at the firm level, using each option's *vega* as the weight (Latané and Rendleman 1976). We then run the following regression:

$$\begin{aligned}
 (3) \Delta [\log (\text{implied\_vol}_i)] & \\
 &= \alpha + \beta_1 \text{Securitization}_i + \beta_2 \text{Total\_Enhancements}_i \\
 &\quad + \beta_3 \text{Total\_Enhancements}_i \times \text{Delinquency}_i \\
 &\quad + \beta_4 \text{Delinquency}_i + \beta_5 \text{Unused Commitments}_i \\
 &\quad + \beta_6 \text{Stock Volatility}_i + \varepsilon_i .
 \end{aligned}$$

<sup>14</sup> This number corresponds to the 90th percentile of the severe delinquency ratio in our sample.

<sup>15</sup> This number corresponds to the 92nd percentile of the severe delinquency ratio in our sample.

<sup>16</sup> Specifically, several studies (see, for example, Patell and Wolfson [1981]) report that implied volatility estimates behave erratically during the last two to four weeks before expiration and also that options with a very long time to expiration are less sensitive to volatility changes). We therefore study only those options with expiration dates between 28 and 100 days away from the event day, with the latter criterion due to Deng and Julio (2005). Last, we require each option to have nonzero trading volume in the event window.

TABLE 4  
**Regression Analysis of Changes in Implied Volatility**  
 Dependent Variable:  $\Delta[\log(\text{Implied Volatility})]$

|  | (1)                  | (2)                  | (3)                  | (4)                  |
|--|----------------------|----------------------|----------------------|----------------------|
| Constant   | 0.414<br>[5.12]***   | 0.404<br>[4.95]***   | 0.418<br>[5.37]***   | 0.41<br>[5.25]***    |
| Securitization   | 0.045<br>[2.21]**    | 0.043<br>[1.80]*     | 0.049<br>[2.39]**    | 0.047<br>[2.12]**    |
| Total enhancements   | 0.279<br>[2.64]**    | 0.367<br>[2.06]**    | 0.289<br>[2.62]**    | 0.316<br>[2.64]**    |
| Delinquencies (all)  | -0.137<br>[0.27]     | 0.15<br>[0.15]       |                      |                      |
| Delinquencies (all) ×<br>total enhancements                  |                      | -4.744<br>[0.44]     |                      |                      |
| Delinquencies (severe)                                       |                      |                      | -0.538<br>[0.71]     | -0.125<br>[0.08]     |
| Delinquencies (severe) ×<br>total enhancements               |                      |                      |                      | -5.53<br>[0.38]      |
| Unused commitments   | 0.187<br>[2.32]**    | 0.145<br>[1.53]      | 0.177<br>[2.10]**    | 0.172<br>[1.92]*     |
| One-year lagging<br>daily stock return<br>standard deviation | -10.945<br>[3.46]*** | -10.626<br>[3.39]*** | -10.952<br>[3.55]*** | -10.726<br>[3.48]*** |
| Observations   | 52                   | 52                   | 52                   | 52                   |
| R <sup>2</sup> (percent)                                     | 29                   | 30                   | 30                   | 30                   |

Source: Authors' calculations.

Notes: Robust *t*-statistics appear in brackets. Variables are defined in the appendix.

\*\*\*Statistically significant at the 1 percent level.

\*\*Statistically significant at the 5 percent level.

\*Statistically significant at the 10 percent level.

The dependent variable  $\Delta[\log(\text{implied\_vol}_i)]$  measures the change in  $\log(\text{implied\_vol}_i)$  from the beginning of August 2001 to the end of September 2001. All the independent variables remain the same as in equation 2.<sup>17</sup>

Overall, the significantly positive coefficient estimates for *Securitization* suggest that higher securitization activities are associated with higher risk as perceived in the forward-looking option market (Table 4). This result, coupled with the positive valuation effect of securitization just noted, suggests that securitization was generally viewed as increasing both shareholder value and risk. *Unused commitments* were also

<sup>17</sup> We cannot control for market movement in the current regression setup. As an alternative, we define *excess implied volatility* as the difference between each option's implied volatility and market volatility and use it to calculate the dependent variable. The results are quantitatively similar to those in Table 4.

associated with higher risk, despite the lack of valuation effect (see Table 2). *Total Enhancements* are always positive and significant, which is sensible given that enhancements represent exposure to the securitizing bank. Unlike the analysis of valuation impact, we do not observe any significant interaction effect between *Total Enhancements* and *Delinquency* in the risk effect of credit enhancements. Overall, the evidence suggests that both securitization activities and the associated credit enhancements are perceived to add risk to the securitizing bank, even though underlying assets have been moved off the balance sheet.

## 5. CONCLUSION

This article focuses on credit enhancements provided by banks in the U.S. securitization market. Contrary to the impression that banks have been surpassed by other financial institutions in the shadow banking system, we show that banks have held their own relative to monoline insurance companies in the business of providing credit enhancements.

Having shown that banks are still important in providing enhancements, we also investigate the role of bank enhancements in the securitization process. Enhancements obviously serve as a buffer against observable risk, but we are interested in the hypothesis, commonly advanced by academics, that enhancements also serve as a signal of unobservable quality. By keeping “skin in the game,” banks offering enhancements may signal to investors or raters that the assets being securitized are of high quality.

Our event study of banks' first-time disclosure in 2001 of their securitization activities finds evidence that the buffer effect and the signal hypothesis could both be at play, with the dominant effect depending on the riskiness of the securitized assets. Specifically, we find that stock prices reacted favorably to high enhancement provisioning among banks with better-performing (lower-delinquency) securitizations, consistent with the signaling hypothesis. Among banks with poorly performing securitizations (high delinquency), however, stock prices reacted negatively to higher levels of enhancements, suggesting that the buffer role of enhancements dominates under observably risky securitizations.

Evidence from cross-sectional regressions favors the buffer hypothesis of enhancements. There we find a positive relationship between delinquency rates on banks' securitized assets and credit enhancements, contrary to what the signaling hypothesis suggests. Of course, it could be that enhancements do serve a signaling role, but that role is dwarfed by the buffering role.

## APPENDIX: VARIABLE DEFINITIONS

*Delinquencies (All)*: Securitized loans thirty or more days past due plus charge-offs divided by total securitized loans in the category.

*Delinquencies (All) × (Total Enhancements)*: Delinquencies (all) times total credit enhancements.

*Delinquencies (Severe)*: Securitized loans ninety days past due plus charge-offs divided by total securitized loans in the category.

*Delinquencies (Severe) × (Total Enhancements)*: Delinquencies (severe) times total credit enhancements.

*Leverage*: Total common equity divided by total balance sheet assets.

*Log Asset Size*: Natural log of total balance sheet assets.

*Risk-Weighted Assets/Total Assets*: Total risk-weighted assets divided by total balance sheet assets.

*ROA*: Quarterly net income divided by total balance sheet assets.

*Securitization*: Total securitized loans divided by total balance sheet loans.

*Severely Delinquent Loans/Total Securitized Loans*: Securitized loans ninety days past due plus charge-offs divided by total securitized loans in the category.

*Stock Volatility*: One-year lagging daily stock return standard deviation.

*Total (Credit) Enhancements*: Sum of interest-only strips, subordinated securities, and other residual interest; standby letters of credit; and other enhancements divided by total loans in the category.

*Unused Commitments*: Unused commitments to provide liquidity divided by total loans in the category.

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# THE ROLE OF BANKS IN ASSET SECURITIZATION

## 1. INTRODUCTION

It is probably safe to assume that Frank Capra's intentions in his classic film *It's a Wonderful Life* were to exalt the fundamental virtues of the human character and to caution us against the perils of material temptations. And yet, almost seventy years later, his film remains one of the best portrayals in Hollywood cinematic history of the role and importance of banks in the real economy. This film could easily be used in a classroom to describe a traditional model of financial intermediation centered on banks, defined here as deposit-taking institutions predominantly engaged in lending.<sup>1</sup>

The typical bank of the 1940s is embodied in the film's Bailey Building and Loan Association, a thrift institution that takes deposits and invests them in construction loans that allow the local residents to disentangle themselves from the clutches of the greedy monopolist, Henry F. Potter. We also see a bank run developing, and we learn of banks' intrinsic fragility when George Bailey, the film's main character and the manager of the thrift, explains to panicked clients demanding withdrawals that their money is not in a safe on the premises, but rather is, figuratively speaking, "in Joe's house . . . that's right next to yours."

The film debuted in 1946, but Bailey's bank has remained the dominant model of banking throughout the decades that

<sup>1</sup> See, for example, the Council of Economic Education article, "It's a Not So Wonderful Life," <http://www.econedlink.org/lessons/index.php?lid=698&type=student>.

followed. Indeed, it is by and large the model that has inspired the supervisory and regulatory approach to financial intermediation, at least until recent times. Because of the significant social externalities associated with banks' activities, close monitoring of the banks' books is warranted in order to minimize the risk of systemic events (there is indeed even room for a bank examiner in the film!).

However, if we were to remake the film and fit it into the current context, many of the events would need significant adaptation. For instance, we could still have the bank, but it would be an anachronism to retain the idea that depositors' money is in their neighbors' houses. Most likely, the modern George Bailey would have taken the loans and passed them through a "whole alphabet soup of levered-up nonbank investment conduits, vehicles, and structures," as McCulley (2007) incisively puts it when describing financial intermediation's evolution to a system now centered around the *securitization of assets*.

Under the securitization model, lending constitutes not the end point in the allocation of funds, but the beginning of a complex process in which loans are sold into legally separate entities, only to be aggregated and packaged into multiple securities with different characteristics of risk and return that will appeal to broad investor classes. And those same securities can then become the inputs of further securitization activities.

The funding dynamics of such activities diverge from the traditional, deposit-based model in several ways. Securitization structures develop the potential for separate funding

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mechanisms, such as issuance of commercial paper backed by the securitized assets. And the creation of these new classes of securities fuels the growth of other nonbank-centered, secured intermediation transactions, such as repurchase agreements and securities lending, in need of what Gorton (2010) calls “informationally insensitive” collateral.

Under such a complex configuration, traditional banks may no longer be needed, as we witness the rise of what McCulley—apparently the first to do so—calls “shadow banks.” The goal of our article is to delve more deeply into the analysis of asset securitization activity in order to address the following fundamental question: Have regulated bank entities become increasingly marginalized as intermediation has moved off the banks’ balance sheets and into the shadows? Aside from the insights gained, furthering our understanding of the evolution of financial intermediation has first-order normative implications: If regulated banks are less central to intermediation and if intermediation is a potential source of systemic risk, then a diminished bank-based system would require a significant rethinking of both the monitoring and regulatory fields.

This study provides, for the first time, a complete *quantitative mapping* of the markets and entities involved in the many steps of asset securitization. Our findings indicate that regulated banks—here defined at the level of the entire bank holding company—have in fact played a dominant role in the emergence and growth of asset-backed securitization and that, once their roles are explicitly acknowledged, a considerable segment of modern financial intermediation appears more under the regulatory lamppost than previously thought.

Using micro data from Bloomberg, we perform an exhaustive census of virtually the entire universe of nonagency asset-backed-securitization activity from 1978 to 2008. For each asset-backed security (ABS), we focus on the primary roles in securitization: issuer, underwriter, trustee, and servicer. These four roles are critical in the life of an asset-backed security, extending from issuance through maturity, and therefore are also critical for the existence of a securitization-based system of intermediation.

We show that the degree of bank domination varies according to product type and securitization role. Banks are inherently better suited to compete for the data-intensive trustee business, capturing in most cases more than 90 percent of these services. Having a strong role in securities underwriting, banks are able to exploit their expertise to capture a significant fraction of asset-backed underwriting as well. Naturally, in issuing and servicing the different segments of the securitization market, banks face competition from nonbank mortgage lenders and consumer finance companies. Nevertheless, we show that banks were able to retain a significant and growing share of issuance and

servicing rights as well. Despite the greater complexity of a system of intermediation based on asset securitization, which appears to have migrated and proliferated outside of the traditional boundaries of banking, our findings suggest that banks maintained a significant footprint in much of this activity through time.

Our article is organized as follows: In the next section, we outline the principal roles in securitization. Section 3 describes our sources of information for the vast number of asset-backed securities. In Section 4, we briefly review the explosive growth and evolving nature of the securitization market. Section 5 documents the dominant role of commercial banks and investment banks in securitization. Section 6 concludes.

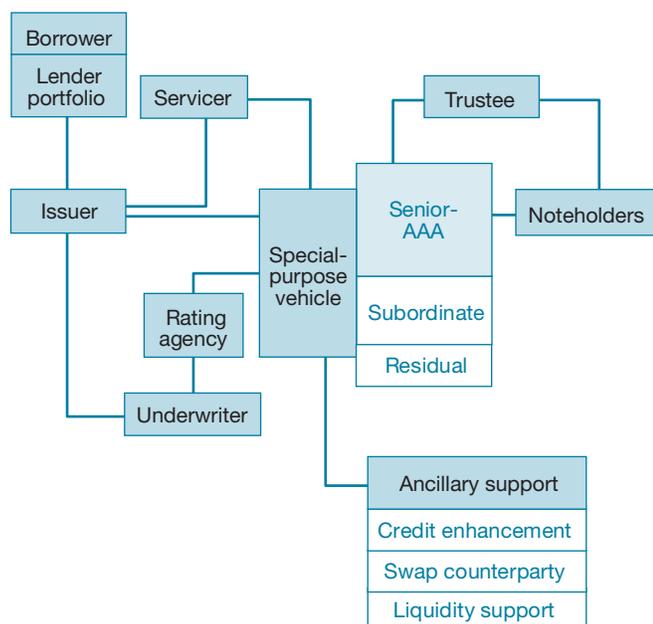
## 2. PRIMARY ROLES IN ASSET SECURITIZATION

The securitization process redistributes a bank’s traditional role into several specialized functions (see the appendix for details on the evolution of asset securitization and for basic terminology). The exhibit highlights the key roles in the securitization process: issuer, underwriter, rating agency, servicer, and trustee.<sup>2</sup> The *issuer* (sometimes referred to as sponsor or originator) brings together the collateral assets for the asset-backed security. Issuers are often the loan originators of the portfolio of securitized assets because structured finance offers a convenient outlet for financial firms like banks, finance companies, and mortgage companies to sell their assets.

In the basic example of securitization represented in the exhibit, all of these assets are pooled together and sold to an external legal entity, often referred to as a *special-purpose vehicle*. The SPV buys the assets from the issuer with funds raised from the buyers of the security tranches issued by the SPV. The transfer of the assets to the SPV has the legal implication of obtaining a true sale opinion that removes issuer ownership and insulates asset-backed investors in the event of an issuer bankruptcy. The SPV often transfers the assets to another special-purpose entity—typically a trust. This second entity actually issues the security shares backed by those assets

<sup>2</sup> The lines connecting the different roles (boxes) in the exhibit represent transaction flows of securities, assets, payments, information, and other services. Sometimes these flows are two-way. For example, investors buy security notes issued by the special-purpose vehicle (SPV) in lieu of cash. Admittedly, the securitization example presented is fairly generic, depicting a representative structure of the securitization process. This basic exhibit often varies according to the type of collateral or the complexity of the security. Some asset-backed securities can be more exotic, involving very complex interactions among the involved parties. Even intricate securities—such as synthetic collateralized debt obligations, in which the role of originator is blurrier—rely on an SPV/trust structure.

## A Representative Securitization Deal



under GAAP sale rules outlined in the Financial Accounting Standards Board's Statement No. 125.

Another important role in the securitization process is performed by the *servicer*, the party responsible for processing payments and interacting with borrowers, implementing the collection measures prescribed by the pooling and servicing agreements and, if needed, liquidating the collateral in the event of default. In cases in which the issuer is also the lender of the underlying assets, there is a greater likelihood that the issuer would retain these servicing rights.

In addition to managing payment flows, servicers are expected to provide administrative help to the *trustee*. The trustee is an independent firm with the fiduciary responsibility for managing the SPV/trust and representing the rights of the investors (that is, the noteholders). The primary role of the trustee is to disperse payments to investors and to oversee the security on behalf of the investors by collecting information from the servicer and issuer while validating the performance of the underlying collateral.

The role of *underwriters* in structured finance is similar to that in other methods of securities issuance. Asset-backed-security underwriters fulfill traditional arranger roles of representing the issuer (here, the SPV or trust). The primary job of the underwriter is to analyze investor demand and design the structure of the security tranches accordingly. Consistent with traditional, negotiated cash-offer practices, underwriters of asset-backed bonds would buy at a discount a specified amount of the offer before reselling to investors. In addition to

marketing and selling these securities, underwriters provide liquidity support in the secondary trading market. Because asset-backed securities trade in over-the-counter markets, the willingness of underwriters to participate as broker-dealers by maintaining an inventory and making a market enhances the issuance process.

Working closely with the *rating agencies*, the underwriter helps design the tranche structure of the SPV to accommodate investors' risk preferences. Under the guidance of rating agencies, the expected cash flows from securitized assets are redirected by the underwriter into multiple tranches. The rating agencies played a critical role in the rapid growth of structured finance in the United States over the past two decades. Rating agencies provide certification services to investors who need to carry out a due-diligence investigation of the underlying assets and evaluate the structure of the security. Ratings are necessary because many large institutional investors and regulated financial firms are required to hold mostly investment-grade assets.

Although asset-backed-security ratings of subordination structures vary across product types, most of them rely on a common blueprint. These securities are typically structured into several separate tranches. Asset-backed tranches usually have different risk ratings and different maturities derived from the same pool of assets. The diversity in tranches makes them more appealing to a heterogeneous pool of investors with various risk preferences and investment objectives. The core components of each security include a number of senior tranches rated AAA, a class of subordinate tranches with a rating below AAA, and an unrated residual equity tranche. The senior tranches receive overcollateralization protection, meaning that credit losses would initially be absorbed by these subordinate classes. Sometimes junior (mezzanine) below-AAA classes that are subordinate to senior classes may also have a buffer of protection from the residual tranche or receive other credit enhancements. The remaining cash flows are distributed to the residual (equity) certificateholders. The residual investors receive any leftover cash flows, but have no claim on the collateral until all obligations to the more senior classes of securities are fully met.

In addition to overcollateralization cushions, several other *ancillary enhancements* are put in place to further protect investors from default and other risks (such as liquidity risk, currency fluctuation risk, and interest rate risk). In contrast to overcollateralization buffers that are built into the security internally, these credit enhancements are provided for a fee from a third party. For example, it was a common practice in the early years of nonagency mortgage securitization to buy credit bond insurance (often referred to as a wrap) from

independent insurance providers. Foreign exchange and interest rate swaps are sometimes used to improve the overall risk profile of the security, making it more attractive and easier to price for investors. In addition, the SPV may lower risk exposures by obtaining a letter of credit or an asset-swap agreement.

Focusing on this taxonomy of roles allows us to better understand the “shadowy” financial system of securitization. Essentially, we argue that structured finance retains all the unique facets of financial intermediation. Leaving aside rating agencies, we show that securitization requires the primary services of issuer, trustee, underwriter, risk enhancer, and servicer. At the same time, banks perform exactly the same roles in the traditional model of intermediation: They are loan issuers and implicitly underwrite the loan portfolio to investors (the depositors and equityholders). They serve in the role of trustee as the delegated agent for their depositors and provide credit enhancement, represented by the existence of equity held on their balance sheets. They provide liquidity services, on both sides of the balance sheet, to firms and depositors. And they act as a servicer, collecting loan payments and paying interest to depositors.

Although a bank in the traditional model of intermediation performs all these roles, its compensation is determined implicitly by the asset-liability contracts. With asset securitization, however, the same roles can be played by multiple entities, each compensated separately for its services. This proliferation of markets and entities involved in the securitization process is perhaps the main reason why the modern system of intermediation seems so hard to decipher. We hope this study contributes to enhanced understanding of its main dynamics.

### 3. DATA

To analyze the full extent of the securitization market, we combine several databases that provide extensive information on the SPV structure. The primary source for this security-specific information is Bloomberg L.P. Recall that tranches represent the basic building blocks of the SPV. Most asset-backed securities are sold as separate tranches with different risks and corresponding prices. To accommodate this feature of asset-backed securities, CUSIP identifiers are assigned at the tranche level.<sup>3</sup> The Bloomberg database tracks around 153,000 nonagency asset-backed tranches issued globally between 1983

<sup>3</sup> This coding system was implemented in 1964 by the Committee on Uniform Security Identification Procedures (CUSIP) to promote more efficient clearing and settlement of U.S. and Canadian securities.

and 2008, corresponding to roughly 19,600 asset pools of SPVs. Similarly, the Bloomberg database traces the issuance of about 130,000 private-label tranches between 1978 and 2008, corresponding to roughly 10,300 multiclass pools.

The Bloomberg mortgage and asset-backed information modules include an array of variables describing the characteristics of the issue (including face value, interest rate, maturity, and ratings at issuance). The database also provides a snapshot of the outstanding balance of the security (for example, amount outstanding, tranche prepayment-rate history, and defaults); however, it offers limited historical information on the performance of the various security tranches. To fill some of the historical performance gaps, our analysis uses the Moody’s database of asset-backed securities. The information from Moody’s focuses primarily on the securities it rates and therefore does not span the entire population of asset-backed securities available in Bloomberg.

More important for our analysis, the Bloomberg and Moody’s databases offer extensive information on the primary institutional parties outlined in our earlier exhibit. Information on these parties allows us to determine the importance of banks as well as other financial intermediaries in the securitization market. Most of the information available on issuers, underwriters, and other parties to the transaction is collected from the prospectus (or related documents). Typically, the prospectus summarizes the underlying structure of the asset-backed security and the parties involved.

In contrast to the traditional bond or equity offerings, in which the corporate issuer is a well-defined entity, the identity of the issuer in asset-backed offerings is often concealed behind the name of the SPV or trust that is legally assigned this role. Thus, while the Bloomberg and Moody’s information on underwriter, servicer, and trustee roles is fairly accurate, the true identity of the issuer is masked by the SPV/trust legal name. For instance, throughout the period of our study, Lehman Brothers issued about 4,000 securities identified under the name of about seventy-five sponsoring SPVs or trusts. At times, these issuing programs revealed their Lehman Brothers affiliation (for example, Lehman XS Trust or Lehman ABS Corp); however, the majority of these issuers did not have a recognizable association to Lehman Brothers.

A major task of our empirical analysis was to identify the true issuer of the asset-backed securities. Much of this information was obtained manually using various sources. The detailed information compiled from Bloomberg, Moody’s, and other sources allows us essentially to perform an exact quantitative mapping of the asset-backed-securities universe and the types of institutions involved.

#### 4. THE EMERGENCE OF NONAGENCY STRUCTURED FINANCE

Structured finance (agency and nonagency securities combined) was one of the most important sources of debt financing in the United States over the last decade, representing about 30 percent of the aggregate U.S. debt outstanding. Chart 1 shows the explosive growth in the nonagency securitization market over this period. The pace of securitization was particularly strong for mortgage-backed securities (MBS) and home equity products (HELOANs and HELOCs), retail asset-backed securities, and collateralized debt obligations (CDOs), which collectively surged from around \$400 billion in 1998 to nearly \$1.7 trillion in 2006. (See the appendix for formal terminology of the different categories of asset-backed securities.) However, the implosion of the subprime mortgage market in 2008 not only caused the collapse of nonagency MBS, it also adversely affected all other security products.

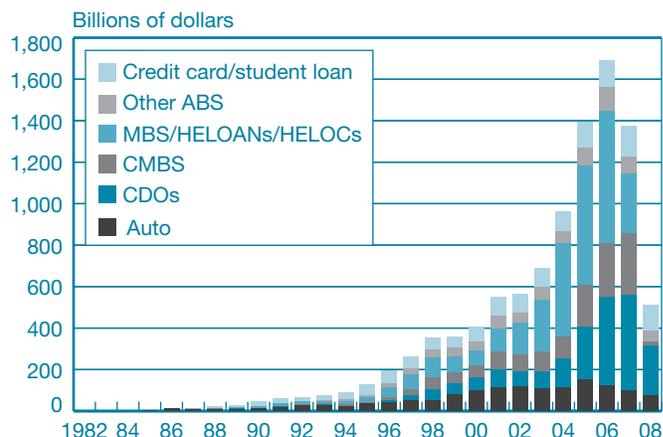
Chart 2 offers a breakdown of issuance by product for subprime MBS and home equity products, retail ABS, and CDOs. It traces the share of each category from 1987 to 2008, excluding the earlier low-volume and more erratic 1983-86 period. The “Other ABS” category includes some of the more unusual cash flow securities (such as equipment leasing, aircraft leasing, trade receivables, royalties, and small-business loans). Notably, in the early years of nonagency securitization, most of the growth came from retail ABS products, particularly auto loans and credit card receivables. This initial trend indicates a pent-up need to securitize outside the mortgage sector, especially in consumer lending. The slower securitization in nonagency MBS was also partly dictated by supply factors, as most originated loans in this earlier period were conforming or prime mortgages and therefore fell under the jurisdiction of the government-sponsored enterprises or the private-label market.

By the mid-2000s, however, subprime MBS, home equity securities, commercial mortgage-backed securities (CMBS), and CDOs became the dominant outlet in securitization. At the peak of the securitization market in 2006, subprime MBS and home-equity-related products represented 26 percent of total nonagency issuance, and CMBS amounted to about 30 percent of the market issuance.<sup>4</sup> The most striking rise in activity was

<sup>4</sup>Admittedly, comparing the aggregate dollar volume of issuance across the different categories of structured products sometimes yields misleading results. For instance, securities backed by credit card receivables require the issuer to maintain a large pool of reserves. Most credit card ABS are structured as stand-alone or master trust SPVs. In the late 1980s, securitization was done mostly by the stand-alone method, which directs cash flow from receivables to a trust representing a single security. Today, the most preferred method is the master trust structure, which allows the issuer to channel cash flow to multiple securities from the same trust. Because of the fluid nature of credit card receivables, the issue manager is expected to maintain a large pool of receivables and is obligated to replenish the trust with new collateral.

experienced in CDO products, where volume reached \$500 billion in 2007, roughly doubling from 2006. The surge in CDO issuance was in part spurred by a sharp rise in global

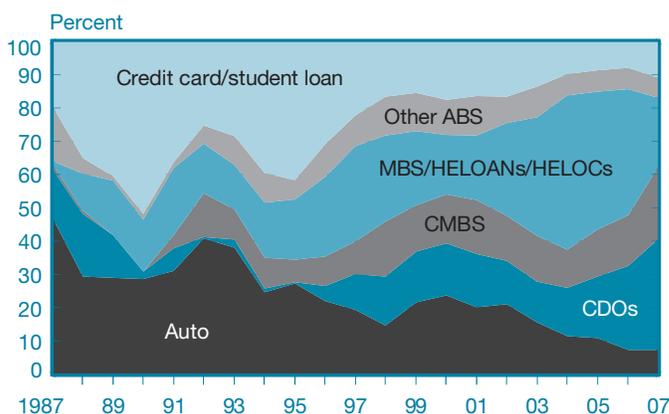
CHART 1  
Nonagency Asset-Backed Issuance by Type of Collateral, 1982-2008



Sources: Bloomberg L.P.; authors' calculations.

Notes: The chart shows nonagency asset-backed issuances for the major securitization products. It does not include originations in the private-label market. ABS are asset-backed securities; MBS are mortgage-backed securities; HELOANs are home equity loans; HELOCs are home equity lines of credit; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

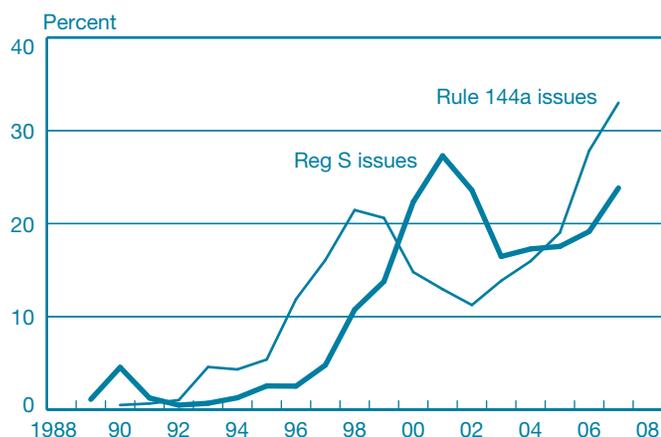
CHART 2  
Share of Nonagency Asset-Backed Market Issuance by Type of Collateral, 1987-2007



Sources: Bloomberg L.P.; authors' calculations.

Notes: The chart shows nonagency asset-backed issuances for the major securitization products. It does not include originations in the private-label market. ABS are asset-backed securities; MBS are mortgage-backed securities; HELOANs are home equity loans; HELOCs are home equity lines of credit; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

CHART 3  
Share of Nonagency Asset-Backed Issues  
Offered Offshore or Placed Privately, 1990-2007



Sources: Bloomberg L.P.; authors' calculations.

Notes: The chart shows the share of nonagency securitizations offered under Rule 144a (private offerings) and Regulation S (off-shore security issues). It does not include private-label originations.

buyout activities that reemerged over this period. Most leveraged buyout transactions were financed by leveraged syndicated loans that were eventually packaged into CDOs. The reported value probably represents a lower bound of CDO volume because it does not include private CDO deals arranged between banks and other counterparties.

#### 4.1 Offering Structure of Nonagency Securities

Depending on investor demand, the underwriter may decide on a public offering or opt for a Rule 144a private issue directed exclusively to qualified institutional buyers. The asset-backed bond can also be sold under Regulation S to investors outside the United States (a so-called offshore transaction).

Chart 3 reveals that the fraction of asset-backed securities falling under Rule 144a and Regulation S has gradually increased over the past three decades. By the end of 2008, 34 percent of asset-backed bonds were offered privately to qualified institutional buyers; about one in four securities were sold offshore. Table 1 reveals that much of the growth in overseas securitization issuance (representing issuers domiciled outside the United States) took place in the Cayman Islands. To be sure, a large fraction of the Cayman Islands issuance stems from the growth of CDOs, especially synthetic

TABLE 1  
Volume of Asset-Backed Issuance by Country,  
1983-2008

| Country        | Volume<br>(Billions of Dollars) | Share<br>(Percent) |
|----------------|---------------------------------|--------------------|
| United States  | 7,089                           | 73.1               |
| Cayman Islands | 1,227                           | 12.7               |
| Ireland        | 304                             | 3.1                |
| Netherlands    | 254                             | 2.6                |
| Great Britain  | 198                             | 2.1                |
| Italy          | 167                             | 1.7                |
| Spain          | 165                             | 1.7                |
| Luxembourg     | 79                              | 0.8                |
| Other          | 213                             | 2.2                |
| Total          | 9,697                           |                    |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table summarizes total nonagency issuance by country of issuer. The aggregates represent the volume of originations for all securities with a specified country of origin.

transactions, which were often sponsored by U.S. financial institutions. Together, the United States and the Cayman Islands accounted for more than 85 percent of the asset-backed-issuance volume.

A goal of Rule 144a and Regulation S is to allow companies to raise funds quickly without having to go through the public registration process mandated by the Securities and Exchange Commission (SEC). While Rule 144a and Regulation S issues are exempt from SEC registration rules, the issuer still needs to provide information to potential investors through a prospectus document; nevertheless, given the heterogeneity in these informal filings, private or Regulation S offerings are generally less transparent.

#### 4.2 Private-Label Securities

Recall that the private-label market was a significant component of nonagency structured finance during this period. In a way, the private-label market can be viewed as the complement of the subprime MBS market in nonagency securitizations, encompassing all prime nonconforming and Alt-A mortgage-based products.<sup>5</sup> The main building block of

<sup>5</sup> Alternative-A (Alt-A) mortgages are an intermediate category of loans falling between the prime and subprime classes. Although Alt-A borrowers typically have fairly good credit histories, their income may not be fully documented. Furthermore, Alt-A loans are characterized by riskier loan-to-value and debt-to-equity ratios, and the borrowers have lower credit scores.

TABLE 2

## Issuance in Private-Label Mortgage Market

| Year            | Number of Tranches,<br>Non-U.S. | Number of Tranches,<br>U.S. | Volume, Non-U.S.<br>(Billions of Dollars) | Volume, U.S.<br>(Billions of Dollars) | Share, U.S.<br>(Percent) |
|-----------------|---------------------------------|-----------------------------|---|---------------------------------------|--------------------------|
| 1995            | 23                              | 1,567                       | 22.5                                      | 28.9                                  | 56.2                     |
| 1996            | 45                              | 2,187                       | 5.4                                       | 37.6                                  | 87.4                     |
| 1997            | 135                             | 2,636                       | 17.6                                      | 55                                    | 75.8                     |
| 1998            | 186                             | 5,086                       | 21.9                                      | 140.1                                 | 86.5                     |
| 1999            | 251                             | 3,939                       | 43.1                                      | 98.5                                  | 69.6                     |
| 2000            | 384                             | 3,060                       | 71.8                                      | 78.4                                  | 52.2                     |
| 2001            | 414                             | 5,833                       | 97  | 168.6                                 | 63.5                     |
| 2002            | 489                             | 7,462                       | 134.7                                     | 247.2                                 | 64.7                     |
| 2003            | 958                             | 9,638                       | 290.9                                     | 333.4                                 | 53.4                     |
| 2004            | 1,067                           | 10,377                      | 315.1                                     | 420                                   | 57.1                     |
| 2005            | 1,284                           | 14,476                      | 369                                       | 645.9                                 | 63.6                     |
| 2006            | 1,918                           | 12,286                      | 555.9                                     | 641.9                                 | 53.6                     |
| 2007            | 1,970                           | 12,391                      | 739.7                                     | 701.7                                 | 48.7                     |
| 2008            | 850                             | 1,209                       | 880.3                                     | 64.2                                  | 6.8                      |
| Total (1978-08) | 10,033                          | 105,462                     | 3,569.90                                  | 3,909.60                              |                          |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The private-label market includes prime and Alt-A nonagency securities. The table summarizes private-label originations between 1995 and 2008. The bottom row presents total originations since the inception of the private-label market in 1978. The aggregates represent only the number and volume of originations for securities with a specified country of origin.

private-label MBS is the so-called jumbo loan, which is a loan with an original balance greater than the upper bound of the conforming mortgage limit for government-sponsored enterprises. Although private-label MBS were first issued in the late 1970s, the market remained fairly small compared with the agency-sponsored market. With the robust rise in housing prices in the United States over the last few decades, however, nonconforming jumbo loans became a critical segment in housing finance.

Table 2 depicts the growth and increasing importance of the private-label market in the period from the mid-1990s through the end of 2008. Like nonagency MBS, private-label securities are offered overseas. But in contrast to nonagency MBS, which are offered primarily in the United States, private-label MBS have a strong foothold overseas, especially in the United Kingdom. In fact, total private-label activity between 1995 and 2008 is more or less evenly split between U.S. and overseas issues. One striking difference highlighted by the table is that the structure of prime MBS offered overseas is significantly more concentrated: The average overseas tranche is about ten times the size of the comparable U.S. tranche.

### 4.3 Security Summary Statistics at the Tranche Level

The various categories of securities in Table 3 indicate that credit card receivable ABS tranches are generally larger, reflecting the shorter average life of the underlying cash flow assets. The average tranche size for MBS is about \$62 million, relatively similar to the average for private-label MBS. The minimum tranche size of zero often indicates the presence of a more complex subordination payment structure, such as residual tranches or excess spread tranches that typically have zero balances at the time of issuance.

The significant difference between the mean and median statistics suggests that the face value of issuance is skewed to the right. The degree of skewness is particularly evident in private-label MBS, where the maximum offering is greater than \$40 billion, in contrast to a relatively tiny \$8 million median offering. Many of these gigantic tranches were originated in Europe. For instance, a \$40.7 billion floating-rate tranche was issued in the Netherlands by Rabobank, and it consisted of roughly 198,000 mortgages.

TABLE 3  
Tranche-Level Summary Statistics by Type of Security

| Variable                               | Mean  | Median | Minimum | Maximum  |
|--|-------|--------|---------|----------|
| <b>Auto ABS</b>                        |       |        |         |          |
| Face value                             | 198.3 | 110.0  | 0.0     | 5,519.0  |
| Maturity                               | 63.6  | 60.9   | 1.9     | 415.7    |
| Weighted average life                  | 26.2  | 24.0   | 0.8     | 270.6    |
| Weighted average maturity              | 59.7  | 55.0   | 4.0     | 660.0    |
| Weighted average coupon                | 11.3  | 10.2   | 1.0     | 30.2     |
| <b>Credit card ABS</b>                 |       |        |         |          |
| Face value                             | 345.5 | 165.8  | 0.0     | 4,504.0  |
| Maturity                               | 96.3  | 89.6   | 5.1     | 450.4    |
| Weighted average life                  | 56.1  | 59.3   | 4.8     | 239.4    |
| Weighted average maturity              | 56.6  | 57.0   | 6.0     | 110.0    |
| Weighted average coupon                | 10.3  | 9.6    | 3.9     | 19.6     |
| <b>Student loan ABS</b>                |       |        |         |          |
| Face value                             | 138.9 | 82.0   | 0.0     | 2,910.0  |
| Maturity                               | 301.2 | 334.4  | 12.2    | 495.2    |
| Weighted average life                  | 91.3  | 84.0   | 6.1     | 337.4    |
| Weighted average maturity              | 151.1 | 140.0  | 65.0    | 278.0    |
| Weighted average coupon                | 7.2   | 7.3    | 3.8     | 20.7     |
| <b>Other ABS</b>                       |       |        |         |          |
| Face value                             | 132.7 | 52.7   | 0.0     | 5,064.8  |
| Maturity                               | 162.1 | 121.3  | 1.0     | 1,137.3  |
| Weighted average life                  | 52.9  | 42.0   | 1.0     | 383.4    |
| Weighted average maturity              | 96.0  | 56.0   | 2.0     | 550.0    |
| Weighted average coupon                | 8.8   | 8.3    | 2.8     | 20.0     |
| <b>Collateralized debt obligations</b> |       |        |         |          |
| Face value                             | 90.2  | 27.0   | 0.0     | 16,600.0 |
| Maturity                               | 269.6 | 182.6  | 2.9     | 1,205.3  |
| Weighted average life                  | 90.7  | 93.4   | 1.2     | 604.8    |
| Weighted average maturity              | 142.2 | 98.0   | 1.0     | 405.0    |
| Weighted average coupon                | 6.5   | 5.8    | 1.9     | 29.9     |
| <b>Commercial MBS</b>                  |       |        |         |          |
| Face value                             | 156.0 | 64.0   | 0.0     | 4,199.0  |
| Maturity                               | 283.6 | 304.5  | 1.8     | 751.9    |
| Weighted average life                  | 75.3  | 69.8   | 0.6     | 387.6    |
| Weighted average maturity              | 118.4 | 109.0  | 0.0     | 443.0    |
| Weighted average coupon                | 6.8   | 6.4    | 0.0     | 68.0     |
| <b>MBS/HELOCs/HELOANs</b>              |       |        |         |          |
| Face value                             | 62.2  | 19.4   | 0.0     | 8,882.0  |
| Maturity                               | 355.6 | 366.0  | 0.9     | 698.7    |
| Weighted average life                  | 54.5  | 56.9   | 0.2     | 706.6    |
| Weighted average maturity              | 320.6 | 349.0  | 1.0     | 477.0    |
| Weighted average coupon                | 8.6   | 8.2    | 2.7     | 18.5     |
| <b>Private-label MBS</b>               |       |        |         |          |
| Face value                             | 66.1  | 8.3    | 0.0     | 40,720.6 |
| Maturity                               | 359.3 | 367.1  | 1.8     | 1,145.3  |
| Weighted average life                  | 75.6  | 63.6   | 0.1     | 420.0    |
| Weighted average maturity              | 329.2 | 357.0  | 4.0     | 792.0    |
| Weighted average coupon                | 6.7   | 6.6    | 0.0     | 22.5     |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table presents summary statistics for asset-backed securities (ABS) at the tranche level. Tranche face value is measured in millions of dollars; weighted average life and maturity are measured in months; weighted average coupon is measured in percent. MBS are mortgage-backed securities; HELOCs are home equity lines of credit; HELOANs are home equity loans.

## 5. THE ROLE OF FINANCIAL INSTITUTIONS IN SECURITIZATION

This section investigates the primary functions of asset-backed securitization: issuer, underwriter, servicer, and trustee.

Because of limited data availability, we are unable to examine the various ancillary services in structured finance (institutions providing credit, currency, and liquidity risk enhancements). While the rating process is very important in the asset-backed transaction, this role is confined to a handful of independent, specialized credit-rating agencies and is therefore outside the scope of this article.

### 5.1 Asset-Backed-Security Issuers

The first step in the securitization process is issuance, the process of assembling the underlying collateral creating the asset-backed security. The issuer is closely linked with the lender, and sometimes these two functions overlap. The structure therefore depends on the type of collateral. Consumer auto finance lenders and large retail banks would be expected to dominate auto securitizations, while banks, nonbank mortgage lenders, and thrifts would compete more effectively in the private-label and MBS sectors.

These concentrations in securitization activities are evident in Table 4, which presents the distribution of asset-backed issuance by type of financial institution. Consistent with our expectations, auto loan issuances are dominated by consumer finance companies, especially captive auto finance companies (Ford Motor Credit, for example) and, to a lesser degree, by retail commercial banks. Over the entire sample period 1983-2008, consumer finance companies accounted for 68.4 percent of auto loan securitizations. Most of the remaining auto loan securities were originated by banks.

Turning to credit card receivables, we find that this segment is mostly under the control of banks, which are responsible for 93.9 percent of the issuance, corresponding to about an 88.3 percent Herfindahl-Hirschman Index (HHI) of market concentration. Not surprising, student loan securities are issued primarily by government-sponsored agencies, such as Sallie Mae, and banks participating in government student-lending programs. The residual category "Other ABS" represents an assortment of assets, ranging from trade and leasing receivables to small-business loans. The largest issuers in this heterogeneous category of securitizations are consumer finance companies, insurance firms, nonfinancial firms (for example, computer and airline companies), and banks.

TABLE 4

## Distribution of Asset Securitizations by Type of Issuer, 1983-2008

|                    | Banks             | Investment Banks | Mortgage Brokers | Hedge Funds     | Consumer Finance | Government      | Total   | HHI  |
|--------------------|-------------------|------------------|------------------|-----------------|------------------|-----------------|---------|------|
| Auto ABS           | 409.1<br>(29.4)   | 14.4<br>(1.0)    | 15.1<br>(1.1)    | 2.3<br>(0.2)    | 952.8<br>(68.4)  | 0<br>(0.0)      | 1,393.6 | 55.4 |
| Credit card ABS    | 1,095.0<br>(93.9) | 10.1<br>(0.9)    | 0.8<br>(0.1)     | 6.9<br>(0.6)    | 53.9<br>(4.6)    | 0<br>(0.0)      | 1,166.6 | 88.3 |
| Student loan ABS   | 54.3<br>(22.8)    | 0<br>(0.0)       | 0<br>(0.0)       | 0<br>(0.0)      | 33.7<br>(14.1)   | 150.4<br>(63.1) | 238.4   | 47.0 |
| MBS/HELOCs/HELOANs | 1,134.3<br>(39.0) | 651.9<br>(22.4)  | 758.5<br>(26.1)  | 64.2<br>(2.2)   | 296.8<br>(10.2)  | 2.9<br>(0.1)    | 2,908.6 | 38.4 |
| CMBS               | 740.4<br>(53.5)   | 415.7<br>(30.0)  | 84.7<br>(6.1)    | 37.5<br>(2.7)   | 80.2<br>(5.8)    | 25.8<br>(1.9)   | 1,384.4 | 37.6 |
| CDOs               | 772.4<br>(38.9)   | 119.8<br>(6.0)   | 61.8<br>(3.1)    | 927.3<br>(46.7) | 103.5<br>(5.2)   | 2.4<br>(0.1)    | 1,987.2 | 28.1 |
| Other ABS          | 228.5<br>(29.9)   | 36<br>(4.7)      | 44.9<br>(5.9)    | 39.6<br>(5.2)   | 323.8<br>(42.4)  | 91.2<br>(11.9)  | 764.1   | 29.2 |
| Private-label      | 5,077.6<br>(66.8) | 837.7<br>(11.0)  | 824.2<br>(10.9)  | 85.0<br>(1.1)   | 604.8<br>(8.0)   | 167.5<br>(2.2)  | 7,596.6 | 46.5 |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table presents a cross-tabulation of asset-backed securities (ABS) by product type and issuer type. Numbers in parentheses represent market shares, measured in percent. The variable HHI denotes the Herfindahl-Hirschman market concentration index. The HHI can take a value of between 0 and 100, with 100 representing a market dominated by a single firm. MBS are mortgage-backed securities; HELOCs are home equity lines of credit; HELOANs are home equity loans; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

Commercial banks, investment banks, and mortgage lenders have sponsored most MBS and home equity issuances, which represent the largest consumer retail segment. In particular, commercial banks and investment banks are responsible for close to 62 percent of the volume, while most of the remaining issuances were initiated by mortgage lenders and consumer finance companies. MBS issuances are moderately concentrated, with a 38.4 percent HHI, dominated by a small group of financial institutions led by Countrywide, Lehman Brothers, and Morgan Stanley, which collectively accounted for 25 percent of the overall volume.

Interestingly, much of the MBS issuance among consumer finance companies can be attributed to GMAC, the finance arm of the world's largest automaker, General Motors. GMAC was the third-largest issuer, with roughly \$215 billion of MBS during 1983-2008. Most of GMAC's MBS securitization activities were done by its subsidiary Residential Capital LLC (ResCap). Like most other large issuers of MBS, this mortgage unit was eventually overwhelmed by the collapse of subprime mortgages, further contributing to GMAC's financial difficulties.

## 5.2 The Issuance Structure in CMBS

The securitization methods used in CMBS are similar to those employed in MBS, but with the difference that the underlying collateral consists of commercial mortgages that derive their principal and interest cash flows from property assets. However, there are some distinct operational and structural features in CMBS. For one, CMBS do not burden the investor with significant interest rate risks because commercial mortgages do not generally have a prepayment feature. Commercial real estate lending is dominated by banks and life insurance companies. Banks typically lend shorter-term financing; in comparison, life insurance firms, motivated by the long-dated structure of their liabilities, prefer to provide longer-term real estate loans. Although investment banks are not typically large providers of commercial real estate credit, they are important in the credit intermediation process of real estate finance as lead underwriters in the syndicated loan market.

Considering the importance of commercial and investment banks in lending and arranging commercial real estate credit, it is not surprising that these institutions dominate CMBS issuances with a combined market share of more than 83 percent. Although life insurers are significant credit

providers in real estate, they typically prefer not to securitize these loans, leaving this responsibility to the commercial and investment banks that have the financial expertise to sponsor a wide variety of asset-backed securities.

The HHI for CMBS issuances is around 37.6 percent, very similar to the level of concentration achieved in the MBS sector. The largest issuer of CMBS during 1983-2008 was Credit Suisse (with close to a 13 percent market share), followed by Lehman Brothers (9.2 percent) and JPMorgan Chase (8.3 percent). The remaining list of top issuers is dominated by large global banks.

### 5.3 CDO Issuers

Arguably, CDO securities represent some of the most unique and intricate securitization structures. The typical MBS derives its cash flow from a large pool of homogenous mortgage loans. In contrast, the most basic CDO comprises a small number of corporate debt obligations. The CDO collateral may include business loans (leveraged loans, revolving credit facilities, and term loans), corporate bonds, and even other asset-backed securities.<sup>6</sup> In addition to the usual benefits of securitization outlined previously, CDO sponsors may be motivated by arbitrage incentives, aiming to profit from purchasing and securitizing corporate debt or other assets at favorable prices.<sup>7</sup> Most of the earlier CDOs were static, meaning that the underlying collateral was held over the life of the security. Concerned by the rise in corporate distress during the 2000s, some investors preferred a *managed CDO* structure, in which the issuer was more proactive in managing credit exposure.

Another important innovation in structured finance is the synthetic CDO, in which the cash flows stem from a credit default swap (CDS) derivative contract written on a reference portfolio of corporate bonds, loans, and CDS indexes. The role of the issuing SPV in a synthetic CDO is very different. In contrast to the more traditional asset-backed structure, in which the SPV draws cash flows from a pool of underlying assets, in a synthetic CDO the entity sells protection on the reference portfolio.<sup>8</sup> The SPV and its investors derive cash flows from the premiums paid by the CDS protection buyers (typically a commercial or investment bank), but are liable for all credit events.

<sup>6</sup> Often, the CDO collateral consists of other existing CDO securities. If a substantial fraction of the underlying asset portfolio stems from existing CDOs, these deals are referred to as CDO<sup>2</sup> or “CDO squared.”

<sup>7</sup> Such a CDO security is typically referred to as an *arbitrage CDO*. If the originator securitizes its own assets (corporate loans, bonds, and other large receivables), then the CDO is known as a *balance sheet CDO*. For a more detailed discussion of CDO securities, see Bond Market Association (2004).

<sup>8</sup> For a more detailed discussion, see Adelson and Whetten (2004).

These more complex managed or synthetic CDO structures are more demanding on issuers. Managed CDOs require expertise in corporate debt markets in order to deal with credit exposures. Issuers of synthetic CDOs need to properly price the CDS protection of the reference portfolio. In light of these additional responsibilities, the role of the issuer in CDOs is typically referred to as *collateral manager*.

Table 4 shows that banks were responsible for close to 39 percent of CDO securitizations, sponsoring \$772 billion of securities during 1983-2008. It is evident that large sophisticated banks with a large footprint in syndicated lending and bond underwriting are well suited to be CDO collateral managers. The table also reveals that hedge funds accounted for more than half of the CDO issuances. Hedge funds are natural candidates for the role of collateral manager because they often have experience trading corporate securities and CDS derivative contracts. In the case of *arbitrage CDOs*, the responsibilities of collateral managers are very similar to those of hedge fund managers, whose trades seek to take advantage of relative value opportunities.

In general, the CDO issuance market is relatively less concentrated than other markets, having an HHI of close to 28 percent. Hedge funds have been able to compete successfully in this segment, originating nearly half of the CDOs. However, most of the top-tier positions in the league CDO tables are occupied by large and sophisticated bank holding companies and investment banks, such as Goldman Sachs, Credit Suisse, Deutsche Bank, and Société Générale-TCW.

### 5.4 The Role of Servicer

Throughout the life-span of the structured securities, the servicer has several fiduciary responsibilities: 1) to collect payments generated from the underlying assets, 2) to transfer payments to accounts managed by the trustee, and 3) to manage deposits and investments of the revenue streams on behalf of the trustee.<sup>9</sup> This specialized role requires the servicer to retain all loan or security-specific information in order to collect and divert cash flows as well as track performance. These duties are therefore easier to perform for an entity associated with the lender of the asset-backed-security collateral.

The close links between servicing, issuing, and lending suggest that these roles are often combined. Thus, consumer finance companies not only were the dominant issuers of

<sup>9</sup> In addition to the traditional servicer function (sometimes referred to as primary or master servicer), some ABS transactions may involve variations of these responsibilities. Sometimes the primary or master servicer responsibility may be transferred to a special or backup servicer if the loan or other asset in the security defaults.

TABLE 5

## Distribution of Asset Securitizations by Type of Servicer, 1983-2008

|                    | Banks | Investment<br>Banks | Mortgage Lenders | Hedge Funds | Consumer Finance | Government | HHI  |
|--------------------|-------|---------------------|------------------|-------------|------------------|------------|------|
| Auto ABS           | 26.6  | 1.1                 | 0.8              | 1.2         | 70.3             | 0.0        | 56.5 |
| Credit card ABS    | 88.6  | 0.0                 | 0.2              | 0.4         | 10.8             | 0.0        | 79.8 |
| Student loan ABS   | 13.0  | 0.0                 | 0.0              | 0.0         | 3.0              | 84.0       | 72.4 |
| MBS/HELOCs/HELOANs | 54.2  | 2.0                 | 22.2             | 5.3         | 16.3             | 0.0        | 37.3 |
| CMBS               | 48.8  | 0.2                 | 45.3             | 1.5         | 4.2              | 0.0        | 44.6 |
| CDOs               | 71.8  | 0.9                 | 11.4             | 10.3        | 5.6              | 0.0        | 54.2 |
| Other ABS          | 21.1  | 0.0                 | 13.2             | 5.6         | 52.0             | 8.1        | 34.2 |
| Private-label      | 79.6  | 0.3                 | 14.7             | 1.2         | 3.2              | 1.0        | 40.9 |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table presents a cross-tabulation of asset-backed securities (ABS) by product type and servicer type. Market shares are measured in percent. The variable HHI denotes the Herfindahl-Hirschman market concentration index. The HHI can take a value of between 0 and 100, with 100 representing a market dominated by a single firm. MBS are mortgage-backed securities; HELOCs are home equity lines of credit; HELOANs are home equity loans; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

auto ABS; they also serviced 70.3 percent of these securities (Table 5). Being the largest lenders of revolving credit card debt, banks were able to capture close to 88.7 percent of the credit card ABS servicing (resulting in a 79.8 percent HHI for this class of asset-backed securities).

The data-intensive specialty link between lending and servicing is further evident in real estate securitizations. Large bank lenders are dominant in MBS, CMBS, and CDO servicing, having market shares of 54.2 percent, 48.8 percent, and 71.7 percent, respectively. Although investment banks and hedge funds are also significant issuers in these segments, their capacity to serve as servicer is more limited because they have to build the information infrastructure to compete for these services.

## 5.5 Underwriters of Asset-Backed Securities

The underwriter is the entity that assumes responsibility for structuring the asset-backed security (for example, designing the composition of tranches, and the size and type of credit and liquidity enhancements) based on the characteristics of the collateral and existing market conditions. Underwriters are also in charge of the actual securities sales, typically acquiring the securities from the special-purpose entities and therefore bearing some of the initial risks associated with the transactions.

Investment banks have traditionally fulfilled this role in bond and equity financing, arranging and selling the offering for issuing firms. Commercial banks bring an additional dimension to the underwriting process by enhancing certification stemming from joint-production informational advantages (gathered primarily from screening and monitoring borrowers) that can be shared with investors. These certification benefits also are present in asset-backed securities such as CMBS or collateralized loan obligations, where the bank has private information on the credit quality of the borrower. Essentially, a bank is an information specialist that can bridge the certification gap between issuers and investors.

The importance of expertise in securities underwriting is quite evident in asset-backed securitization, where commercial and investment banks dominate. Table 6 shows that, together, commercial and investment banks were responsible for nearly all of the underwriting in retail ABS. Because of their significant presence across many of the securitization product segments, banks were better placed to retain a larger share of the underwriting. For instance, banks were able to attract 69.5 percent of the underwriting business in auto ABS, a market in which security issuance was attributable mostly to consumer finance companies. Although investment banks have a very small presence in mortgage lending, they managed to capture a considerable fraction of MBS underwriting.

TABLE 6

### Distribution of Asset Securitizations by Type of Lead Underwriter, 1983-2008

|                        | Banks | Investment<br>Banks | All Others | HHI  |
|------------------------|-------|---------------------|------------|------|
| Auto ABS               | 69.4  | 29.7                | 0.9        | 57.1 |
| Credit card ABS        | 65.7  | 32.9                | 1.4        | 54.0 |
| Student loan ABS       | 88.6  | 10.4                | 1.0        | 79.5 |
| MBS/HELOCs/<br>HELOANs | 56.1  | 41.4                | 2.5        | 48.7 |
| CMBS                   | 55.2  | 41.1                | 3.7        | 47.4 |
| CDOs                   | 63.7  | 32.4                | 3.9        | 51.1 |
| Other ABS              | 60.8  | 35.7                | 3.5        | 49.8 |
| Private-label          | 71.8  | 24.9                | 3.3        | 57.8 |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table presents a cross-tabulation of asset-backed securities (ABS) by product type and lead underwriter type. Market shares are measured in percent. The variable HHI denotes the Herfindahl-Hirschman market concentration index. The HHI can take a value of between 0 and 100, with 100 representing a market dominated by a single firm. MBS are mortgage-backed securities; HELOCs are home equity lines of credit; HELOANs are home equity loans; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

## 5.6 Trustee Services

The transactions of the special-purpose entity that buys the loans are typically handled by a trustee. The trustee guarantees that the transactions are administered in accordance with the related documentation and, in a cost-effective manner, takes care of the physical delivery of the securities, follows compliance and performance-related matters, and handles cash and information processing for the noteholders. Significantly, a trustee must work closely with the issuer and servicer to protect the welfare of the investors. In contrast to the roles of issuer or servicer, which can be combined, a trustee should be an independent entity whose sole purpose is to represent the investor and thus eliminate any conflict-of-interest problems.

Given the administrative nature of the trustee business, this service is best suited to large custodian banks with a cost-effective back-office infrastructure to process the information. Table 7 demonstrates the importance of custodian banks across all types of asset-backed securities. The high market concentration measures (the HHI is over 80 percent for most product types) indicate that a handful of banks are responsible for the securitization trustee business. Although not evident from the table, the hierarchy of bank trustees differs across the various types of asset-backed products, reflecting the heterogeneous character of the collateral and its payment infrastructure.

TABLE 7

### Distribution of Asset Securitizations by Type of Trustee, 1983-2008

|                    | Banks | All Others | HHI  |
|--------------------|-------|------------|------|
| Auto ABS           | 97.9  | 2.1        | 95.9 |
| Credit card ABS    | 98.0  | 2.0        | 96.0 |
| Student loan ABS   | 98.7  | 1.3        | 97.5 |
| MBS/HELOCs/HELOANs | 96.7  | 3.3        | 93.5 |
| CMBS               | 99.3  | 0.7        | 98.6 |
| CDOs               | 93.2  | 6.8        | 87.2 |
| Other ABS          | 92.1  | 7.9        | 85.3 |
| Private-label      | 83.5  | 16.5       | 71.6 |

Sources: Bloomberg L.P.; authors' calculations.

Notes: The table presents a cross-tabulation of asset-backed securities (ABS) by product type and trustee type. Market shares are measured in percent. The variable HHI denotes the Herfindahl-Hirschman market concentration index. The HHI can take a value of between 0 and 100, with 100 representing a market dominated by a single firm. MBS are mortgage-backed securities; HELOCs are home equity lines of credit; HELOANs are home equity loans; CMBS are commercial mortgage-backed securities; CDOs are collateralized debt obligations.

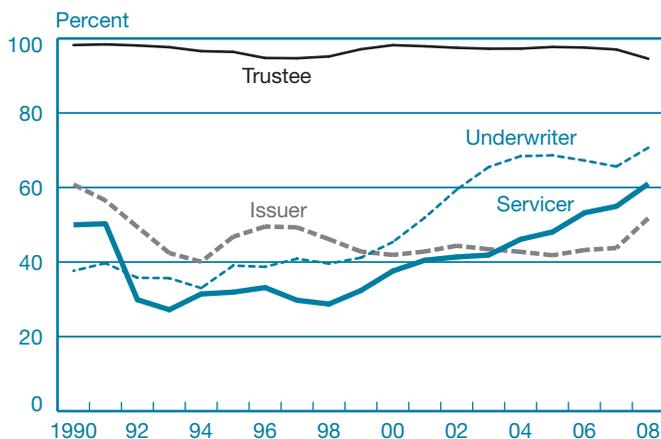
The top four trustees in MBS and home equity products are BNY Mellon, Deutsche Bank Trust, U.S. Bank National Association, and Wells Fargo. BNY Mellon remains the largest trustee for CDO securities, achieving close to a 38 percent market share. However, BNY Mellon is not very active in the CMBS market, which is dominated by LaSalle National Bank and Wells Fargo.

## 5.7 A Historical Overview of the Securitization Role of Banks

Our findings to this point indicate that banks are by far the predominant force in the securitization market. To further explore the importance of banks, we examine more closely the evolution of their market shares for the principal functions of securitization. We have already highlighted the fact that trustee business in securitization is dominated by a small group of custodian banks. Throughout the entire 1990-2008 period, banks' market share remained well over 90 percent. These trustee banks are best suited to processing information and acting on behalf of investors.

We also find that, typically, banks have issued about half of the nonagency asset-backed securities. Banks were therefore a significant force in these shadow banking segments related to securitization all along. Although banks had to compete with nonbank institutions throughout the different phases of

CHART 4  
Nonagency Asset-Backed Securities: Bank Share of Primary Roles, 1990-2008



Sources: Bloomberg L.P.; authors' calculations.  
Note: The chart shows the market share of banks for the four primary securitization functions in the nonagency securitization market.

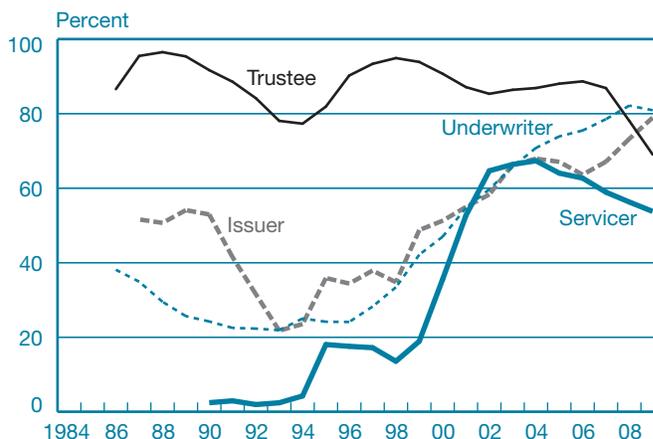
securitization, they remained formidable players. In contrast to the asset-backed-issuance business, in which they managed to retain a constant market share, banks were more aggressive in expanding servicing and underwriting, increasing their market shares from the early 1980s to the peak of the securitization market in 2007 (Chart 4).

Much of the banks' success in underwriting can be attributed to the Gramm-Leach-Bliley Act (1999), which formally removed many of the legal barriers put in place by the Glass-Steagall Act (1933); Glass-Steagall had prohibited commercial banks from participating in equity and bond underwriting. Actually, the Federal Reserve authorized banks, through their Section 20 subsidiaries, to have limited participation in these underwriting and other ineligible securities activities starting in the late 1980s. After the enactment of Gramm-Leach-Bliley, large banks made a concerted push to expand their securities underwriting business, raising their asset securitization market shares to nearly 70 percent.

Banks also gradually increased their presence in servicing from less than 10 percent in the early 1990s to around 60 percent by the end of 2008. The stronger presence in servicing stems from the changing character of the securitization market, which shifted from retail ABS products to CMBS, MBS, and CDO products in which the underlying collateral and information are primarily originated and kept by bank lenders.

In addition to dominating these key segments of the nonagency asset-backed markets, banks also managed to retain significant trustee business in the private-label market (Chart 5).

CHART 5  
Share of Banks in the Private-Label Mortgage Market



Sources: Bloomberg L.P.; authors' calculations.  
Note: The chart shows the market share of banks for the four primary securitization functions in the private-label market.

Relying on their Section 20 subsidiaries, banks expanded their underwriting activities aggressively in this sector starting in the early 1990s to achieve a market share of over 80 percent by the end of 2008. In addition, banks raised their market share of issuance from 20 percent in the early 1990s to 75 percent in 2008. The success of banks in competing and dominating most services in the private-label market can be attributed to their ability to effectively dominate lending in the nonconforming prime mortgage sector.

## 6. CONCLUSION

Financial intermediation has grown increasingly complex in recent decades. The system of financial intermediation, which traditionally had centered on banks simultaneously playing the many roles needed to guarantee an efficient match between supply and demand for funds, has become decentralized, and those roles can be played separately by more specialized entities. This transformation in intermediation raises legitimate questions about the role of banks and the role of bank-based supervision and regulation, as systemic risk may be migrating out of the reach of regulators and policymakers.

The thesis here, however, is that a proper assessment of financial intermediation's evolution and its now more complex characterization needs to be done through a proper quantification of the main roles—and thus potential new markets and entity types—involved in the process.

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We took our thesis to the data and analyzed in detail the system of asset securitization, which represents the core of the modern system of financial intermediation. For the first time, we have a true quantitative mapping of which party does what along the crucial steps in the credit intermediation chain. Our analysis has focused on four principal functions of securitization: issuer, underwriter, servicer, and trustee. We demonstrate that large bank holding companies—and, to a lesser extent, investment banks—have been significant contributors to all phases of this process. Although much of the securitization activity appears to have been done outside the

regulatory boundaries of banking, we find strong evidence to the contrary.

The modern system of financial intermediation appears less complex than it did at first glance. Despite the multiple steps needed for a dollar of funding to reach its destination, the system still requires the same set of basic intermediation functions. And when looked at closely, banking firms—identified according to their broader organizational structure—are still playing a central role. These considerations should be relevant in any future assessments of the role of financial system supervision and regulation.

### THE SECURITIZATION MARKET

Securitization is a financial innovation with a long history in U.S. capital markets and in several economies overseas. It involves the issuance of securities that derive their cash flow from underlying assets. The most common asset-backed structure sells shares in this securitized pool to investors. The novelty of asset securitization is that the performance of the security is determined by the cash flow of the pledged collateral and in theory should not depend on the financial strength of the asset issuer.

### AGENCY MORTGAGE-BACKED SECURITIES

Structured finance techniques were the foundation of the *agency mortgage market*, which began in the early 1970s when the Government National Mortgage Association (Ginnie Mae) used these techniques to pool government-sponsored mortgage loans. These structures were later embraced by the Federal Home Loan Mortgage Corporation (Freddie Mac) and the Federal National Mortgage Association (Fannie Mae). The key mechanism in the agency securitization market was the pass-through mortgage-backed security, which facilitated the seamless transfer of cash flows from mortgage lenders to investors.

Another important phase of asset securitization in the United States emerged in the mid-1980s and was aimed at satisfying investors looking for more diverse mortgage securities with different maturities and different interest rate characteristics. Initially, securitization products, such as collateralized mortgage obligations and multiclass structures, were used to transform and resecuritize existing agency mortgage-backed securities. The resecuritization of agency securities greatly expanded the role of Freddie Mac and Fannie Mae, which were chartered by Congress with the mandate of

supporting the secondary market in mortgage debt and enhancing credit availability in the housing finance market (Fabozzi and Dunlevy 2001).

### NONAGENCY ASSET-BACKED SECURITIES

The traditional agency securitization structures offered a mechanism for the creation of a nonagency securitization market that began to flourish in tandem with the agency market in the mid-1980s. A key catalyst in this process was the Tax Reform Act of 1986, which enabled the creation of *real estate mortgage investment conduits* (REMICs). The authorization of REMICs was a watershed event in the agency resecuritization and nonagency market. This accounting vehicle essentially allows the transfer of assets into a bankruptcy-remote trust that is insulated from the performance of the asset issuer.<sup>a</sup>

The REMIC spurred the explosive growth in the securitization of nonconforming mortgage-backed securities using alternative credit enhancement structures. The nonconforming mortgage market, more commonly referred to as the *private-label* securities market, consists of loans that are too large to meet the agencies' size limits. In 1995, the longstanding Community Reinvestment Act was modified to encourage the securitization of lower-credit-quality loans. An environment of lower interest rates also made homeownership affordable, allowing borrowers to refinance and consolidate their debt.

Technological innovations and advanced credit-scoring systems also played a critical role in automating underwriting procedures and lowering borrowing costs. These financial innovations and lower underwriting standards spurred the rapid growth of the subprime mortgage market, which surged from roughly \$65 billion in 1995 to about \$1.3 trillion in 2007, according to *Inside Mortgage Finance*.

<sup>a</sup> The Tax Reform Act of 1986 required income from REMICs to be treated as regular interest and specified several rules concerning the taxation of the residual payments from REMIC investments.

A key requirement in a REMIC is that the underlying collateral must be static—that is, a real property or a real property derivative. The REMIC structure cannot be applied to a large subset of cash-flow-producing assets, such as car loans, revolving credit card receivables, lease receivables, student loans, corporate debt, and commercial real estate loans. To fill this gap, asset securitization has relied on several alternative bankruptcy-remote structures. The primary mechanisms for securitizing nonmortgage assets are provided by a variety of common-law *trusts* and revolving special-purpose entities such as *master trusts* and *commercial paper conduits*.<sup>b</sup>

### CLASSIFICATION OF NONAGENCY SECURITIES

This study follows the Securities Industry and Financial Markets Association (SIFMA) classification and terminology for nonagency asset-backed securities. While it is true that the term *asset-backed security* (ABS) is sometimes used to describe any structured security that is backed by an asset’s cash flows, SIFMA uses this definition more narrowly to refer to any asset receivables other than direct mortgage loans. According to this designation, the ABS class represents a wide variety of consumer finance assets (automobile loans, credit card

receivables, student loans, consumer loans, and other, more exotic, lease financing receivable structures). The ABS class also encompasses home equity loan (HELOAN) and home equity lines of credit (HELOC) products. Securities backed by mortgages are commonly described as *mortgage-backed securities*, or MBS (sometimes known as RMBS, for residential MBS).

Recall that there are two large subgroups of MBS: private-label MBS (based on prime or Alt-A nonagency mortgage products) and subprime MBS (derived from subprime mortgages). Because subprime MBS, HELOAN, and HELOC securities are all inherently collateralized by the value of a home, our analysis lumps these asset classes together. Finally, structures backed by commercial real estate loans are referred to as *commercial mortgage-backed securities* (CMBS).

Another important asset-backed class is the *collateralized debt obligation* (CDO), which includes securities backed by debt instruments. In particular, CDOs backed by corporate loans or bonds are referred to as *collateralized loan obligations* (CLOs) or *collateralized bond obligations* (CBOs), respectively. Many of the recent and complex multiclass CDO securities that were based on existing nonagency MBS are often referred to as “CDO squared.” Over the last few years, an important category to emerge is synthetic CDOs. This class of CDOs relies on credit derivatives (typically, credit default swaps) to transfer asset risks and cash flow payments between investors and issuers.

<sup>b</sup> Static trusts are typically created as *grantor trusts* or as statutory entities referred to as *owner trusts*. In many ways, a grantor trust is similar to a pass-through security in that it facilitates the transfer of income from the underlying asset (for example, automobile interest rate payments and principal) to investors. A grantor trust must be passive, with no management responsibilities for the investors, and limited in the number of asset classes. In comparison, an owner trust sells certificates to investors, allowing for a more complex structure of ownership between senior and subordinate investors and sequential payment distributions according to the maturity of the different tranches. Revolving structures are often very useful for credit card and home equity line asset-backed securities. In a revolving master trust, the principal and interest cash flows are distributed in phases (initially a revolving and subsequently an amortization phase).

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# A STRUCTURAL VIEW OF U.S. BANK HOLDING COMPANIES

## 1. INTRODUCTION

Large banking organizations in the United States are generally organized according to a bank holding company (BHC) structure. In this article, we describe the organizational structure of large U.S. bank holding companies and present summary statistics that document the increasing size, complexity, and diversity of these organizations. We also outline the different types of regulatory data filed with the Federal Reserve by U.S. bank holding companies and describe the strengths and weaknesses of these data, as a source for researchers and others interested in these organizations.

A BHC is simply a corporation that controls one or more banks. Typically, a large U.S. parent BHC owns a number of domestic bank subsidiaries engaged in lending, deposit-taking, and other activities, as well as nonbanking and foreign subsidiaries engaged in a broader range of business activities, which may include securities dealing and underwriting, insurance, real estate, private equity, leasing and trust services, asset management, and so on.

Chart 1 illustrates the rapid growth in the size and scope of BHCs over the past twenty years. As shown in the chart, nearly all U.S. banking assets are controlled by bank holding companies, and U.S. BHCs as a group (inclusive of firms whose ultimate parent is a foreign banking organization) control well over \$15 trillion in total assets, representing a fivefold increase since 1991.<sup>1</sup> By comparison, nominal GDP increased by only around 150 percent over the same period.

Notably, assets held in nonbanking subsidiaries or directly by the BHC parent account for a progressively larger share of total BHC assets over time (the gray area in Chart 1, panel A). This trend reflects a significant broadening in the types of commercial activities engaged in by BHCs and a shift in revenue generation toward fee income, trading, and other noninterest activities (Stiroh 2004). These trends are attributable in part to important changes in the regulatory environment, as discussed in Section 2.

Partly the result of a wave of mergers, the share of BHC assets controlled by the ten largest firms has more than doubled over the past two decades, from less than 30 percent to more than 60 percent (see Chart 1, panel B). The total number of firms organized as BHCs has declined from 5,860 in 1991 to 4,660 as of fourth-quarter 2011, also reflecting industry consolidation. See Copeland (2012) for a further discussion of trends in banking consolidation and income generation.

Chart 2 provides a window into the organizational complexity of large BHCs. One simple measure of complexity

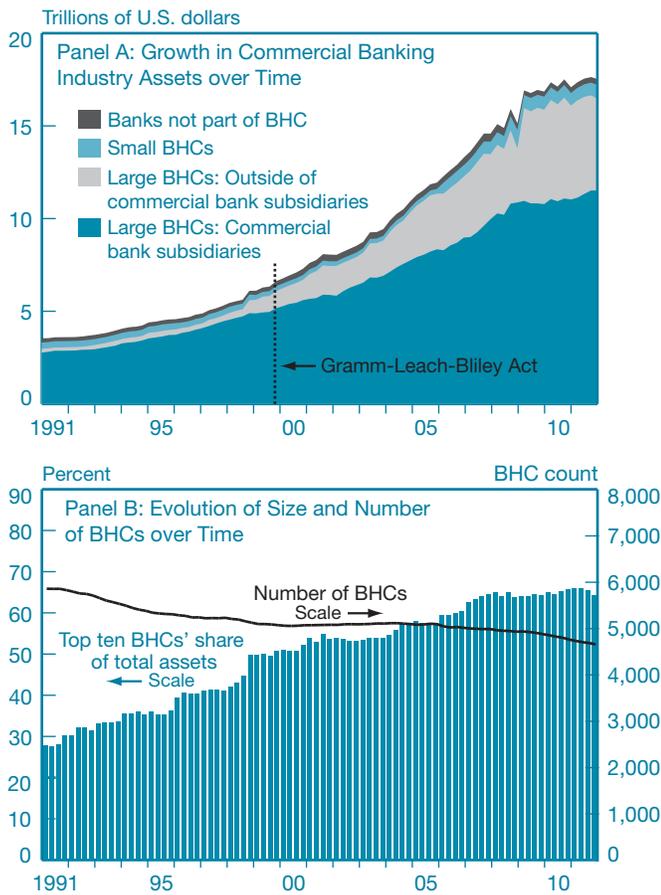
<sup>1</sup> Recent growth in industry assets plotted in Chart 1 in part reflects the conversion of several firms to a BHC organizational form (for example, Goldman Sachs, Morgan Stanley, Ally Financial, American Express) as well as out-of-industry acquisitions by BHCs (for example, JPMorgan Chase's acquisition of Bear Stearns, an investment bank, and Bank of America's acquisitions of Merrill Lynch and Countrywide Financial, an investment bank and savings bank, respectively). The sizable increase in total assets and nonbank subsidiary assets in first-quarter 2009 reflects the fact that this is the quarter in which Goldman Sachs and Morgan Stanley first file BHC regulatory reports. The bulk of the assets of these two firms are held outside their bank subsidiaries.

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CHART 1  
Trends in Number and Total Size of U.S. Bank Holding Companies

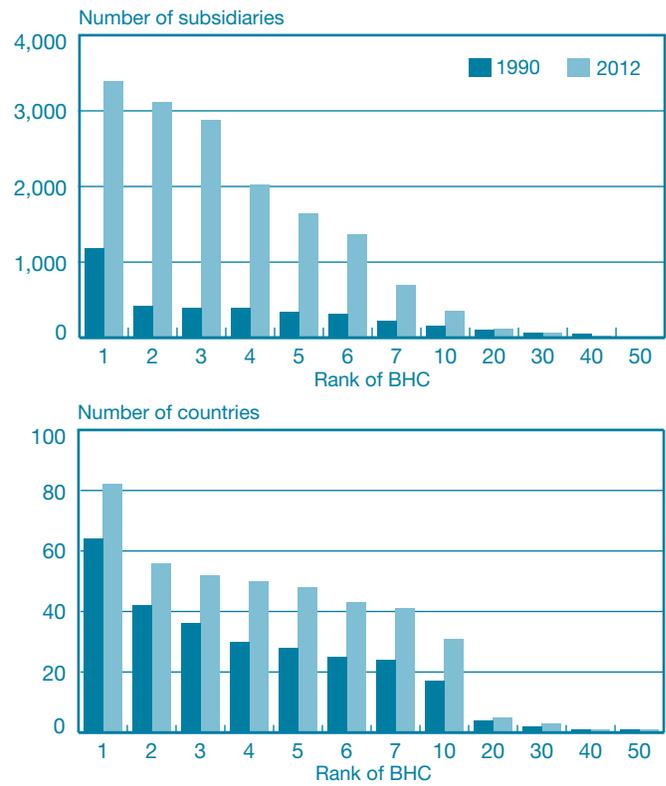


Sources: National Information Center; FR Y-9C; FFIEC 031; FFIEC 041.

Notes: The chart presents financial data up to fourth-quarter 2011. A large bank holding company (BHC) is defined as a top-tier BHC that files a Y-9C report (in recent years, this report has been required of BHCs with at least \$500 million in total assets). Commercial bank assets of large BHCs in panel A are measured as the sum of consolidated assets reported by each banking subsidiary in its Call Report filing. It is a slight overestimate because of double-counting of any related party exposures between banks controlled by the same BHC. Nonbank assets of large BHCs are the difference between total assets as reported in the Y-9C and commercial bank assets as defined above. Assets of small BHCs reflect only their commercial bank subsidiaries (which is, however, likely to be a good approximation of BHC assets for this class of firms). In panel B, the number of BHCs is a count of Y-9C filers plus the number of distinct high holders of commercial banks filing a Call Report, exclusive of banks that are their own high holder or have a Y-9C filer high holder. See the online appendix for more details.

in this context is the number of separate legal entities in the BHC. This variable is plotted in the top panel, sorted in rank order across firms. Today, the four most complex firms measured on this dimension each have more than 2,000 subsidiaries, and two have more than 3,000 subsidiaries.

CHART 2  
Organizational Complexity and International Reach of Large U.S. Bank Holding Companies



Sources: National Information Center; FR Y-10.

Note: Data are as of February 20, 2012, and December 31, 1990, and include the top fifty bank holding companies (BHCs) at each of these dates. See the online appendix for more details.

In contrast, only one firm exceeded 500 subsidiaries in 1991. BHCs have also expanded their geographic reach; each of the seven most internationally active banks controls subsidiaries in at least forty countries.

Building on these stylized facts, in Section 2 we describe the origins of the BHC organizational form and discuss several key pieces of legislation that have shaped the scope and size of the U.S. commercial banking industry. Section 3 outlines the typical organizational structure of large BHCs and presents a primer on the types of regulatory data filed by these firms. Making use of these data, Section 4 presents additional stylized facts about the organizational complexity and scope of large BHCs. Section 4 also includes preliminary statistical analysis of the determinants of organizational complexity, proxied by the log number of subsidiaries. The analysis suggests that complexity is positively related to BHC size and weakly positively related to the diversity of the BHC's activities. Section 5 concludes.

## 2. HOW DID WE GET HERE?

Changes in the legislative and regulatory environment have been a key driver of the trends toward greater BHC size, scope, and industry consolidation documented in Charts 1 and 2. The evolution of U.S. financial legislation in turn reflects a long-running public debate about the appropriate size and scope of banking organizations. As discussed in detail below, there has been a secular trend in recent decades toward enlarging the allowable scope of BHC activities. However, recent legislation represents something of a reversal of this trend; most prominently, the “Volcker rule” provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) prohibit BHCs from engaging in proprietary trading and limit their investments in hedge funds, private equity, and related vehicles.

The primary legislation defining the allowable scope of BHC activities is the Bank Holding Company Act of 1956 (BHCA, 12 U.S.C. § 1841). The Act establishes conditions under which a corporation may own a U.S. commercial bank and invests responsibility for supervising and regulating BHCs with the Federal Reserve.<sup>2</sup>

A key original goal of the BHCA was to limit the commingling of banking and commerce, that is, to restrict the extent to which BHCs or their subsidiaries could engage in nonfinancial activities (more details and historical background are found in Omarova and Tahyar, forthcoming; Santos 1998; Aharony and Swary 1981; and Klebaner 1958). This separation is intended to prevent self-dealing and monopoly power through lending to nonfinancial affiliates and to prevent situations where risk-taking by nonbanking affiliates erodes the stability of the bank’s core financial activities, such as lending and deposit-taking (Kroszner and Rajan 1994; Klebaner 1958). To further enhance stability, BHCs are also required to maintain minimum capital ratios and to act as a “source of strength” to their banking subsidiaries, that is, to provide financial assistance to banking subsidiaries in distress.<sup>3</sup>

<sup>2</sup> Ownership of banks by nonbanks was lightly regulated under the earlier 1933 Banking Act. The Glass-Steagall Act also prohibited firms principally engaged in investment banking from affiliating with member banks. The original 1956 BHC Act addressed only multibank holding companies, that is, corporations controlling 25 percent or more of the voting shares of at least two commercial banks. The 1970 amendment to the BHCA extended the Federal Reserve’s authority to single-bank holding companies.

<sup>3</sup> The BHCA (§ 225.28) defines source of financial strength to mean, “the ability of a company that directly or indirectly owns or controls an insured depository institution to provide financial assistance to such insured depository institution in the event of the financial distress of the insured depository institution.” Ashcraft (2008) presents evidence that affiliation with a multibank holding company reduces a bank’s probability of financial distress, consistent with the view that the source of strength doctrine improves financial stability. Regulation Y sets out the procedural rules that apply to BHCs to ensure they act as a source of strength.

BHCs today engage in a significantly broader range of activities than the narrow limits set out in the 1956 BHCA, enabled through subsequent amendments to the Act.<sup>4</sup> For example, in 1970 the BHCA was amended to allow multibank holding companies to engage either directly or indirectly through subsidiaries in activities that are “closely related to banking” (Aharony and Swary 1981).<sup>5,6</sup> BHCs may invest in nonfinancial firms, although their stake cannot generally exceed 5 percent of the company’s outstanding voting stock.

The passage of the Gramm-Leach-Bliley Act (GLBA) of 1999 further amended the BHCA to enable a BHC to register as a financial holding company (FHC), thereby allowing the firm to engage in a broad range of financial activities, including securities underwriting and dealing, insurance underwriting, and merchant banking activities.<sup>7</sup> Today, virtually all large BHCs are registered as FHCs. While it is difficult to prove causality, it is notable that the striking growth in the size and importance of nonbank BHC subsidiaries dates almost entirely to the period after the passage of the GLBA (see Chart 1, panel A).

The Federal Reserve holds regulatory responsibility for umbrella supervision of FHCs, as it does for other BHCs. However, the GLBA provides for functional regulation of a FHC’s nonbank financial subsidiaries. For example, broker-dealer subsidiaries of a financial holding company are primarily regulated by the Securities and Exchange Commission (SEC), and insurance subsidiaries by state insurance regulators.

Most recently, the passage of the Dodd-Frank Act represents a significant shift toward strengthening regulations governing financial service providers and restricting the scope of activities that BHCs may engage in. Most notably, the “Volcker Rule” provisions of the Act (§619) introduce two key types of restrictions: 1) banks are prohibited from engaging in proprietary trading (that is, short term trading on the bank’s own account) on many types of financial instruments; and

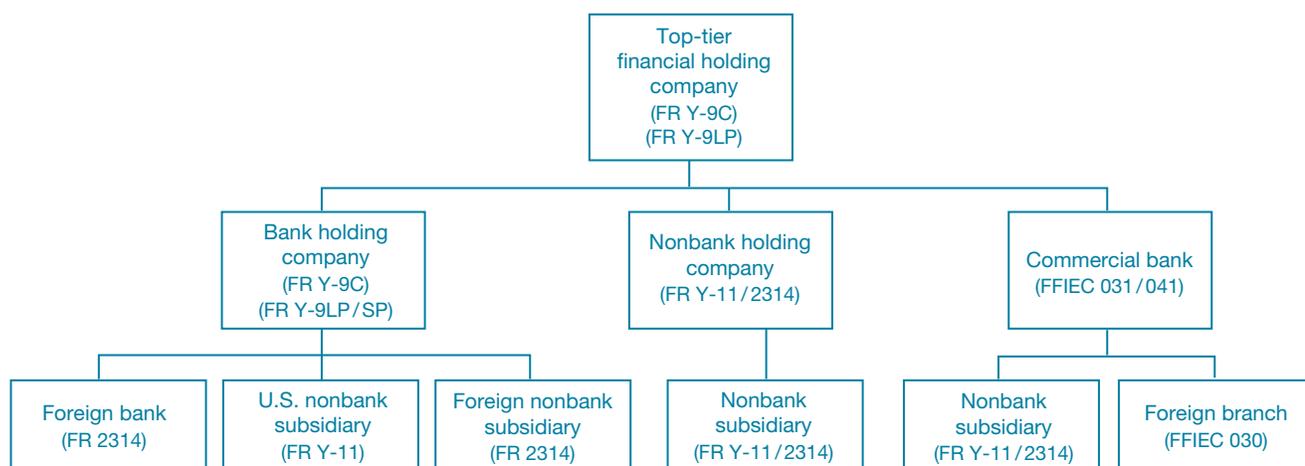
<sup>4</sup> Omarova and Tahyar (forthcoming) offer a detailed discussion of the evolution of the BHCA, particularly the changes in the statutory definition of a “bank” within the Act.

<sup>5</sup> As defined in Subpart C of Regulation Y (§225.28), this list of permissible related activities includes mortgage banking, consumer and commercial finance, loan servicing, leasing, collection agency, asset management, trust company services, real estate appraisal, and financial and investment advisory activities.

<sup>6</sup> While expanding the range of permissible activities for multibank holding companies, the 1970 amendment to the BHCA had the opposite effect of constraining the scope of activities for single bank holding companies, since these firms were not subject to the BHCA until the passage of the 1970 amendment. As discussed in Omarova and Tahyar (forthcoming), this difference in regulatory treatment had led to a rapid growth in single bank holding companies after the original passage of the BHCA in 1956.

<sup>7</sup> In order to register as an FHC, the holding company as well as all subsidiary depository institutions must be well-managed and well-capitalized, and be in compliance with the Community Reinvestment Act, among other requirements (see Regulation Y (§225.84)).

## Stylized Structure of a Large Bank Holding Company



2) limits are placed on banks' ownership or sponsorship of private equity firms, hedge funds, venture capital funds, and certain other privately offered funds and pooled investment vehicles.<sup>8</sup>

Another ongoing debate about BHC scope concerns firms' commodity trading operations. The BHCA restricts holding companies' ability to own or trade physical commodities, or to own hard assets related to commodity trading such as storage tanks, shipping containers, and warehouses. But a "grandfathering" exemption in the GLBA allows an investment bank that converted to holding company status after 1999 to continue to trade or own physical assets if it did so before September 1997. This exemption has allowed a number of the largest BHCs to operate large, profitable commodity trading businesses. However, the legal scope of the exemption is widely seen as ambiguous. For example, it is unclear to what extent it allows firm to purchase new hard assets related to an existing commodities business, or to expand into new commodities markets. Many speculate that the Federal Reserve may tighten its treatment of the exemption.<sup>9</sup>

These recent developments represent a notable reversal of the trend over the past several decades toward expanding the range of permissible activities for U.S. BHCs. They also emphasize that concerns about the separation between banking

<sup>8</sup> Specifically, the Act restricts the bank from owning more than 3 percent of the fund, places an overall limit of 3 percent of the bank's Tier 1 capital invested in private funds, and introduces other limitations relating to the name of the fund and affiliated transactions.

<sup>9</sup> For a detailed discussion, see David Sheppard, Jonathan Leff, and Josephine Mason, "Insight: Wall Street, Fed Face Off over Physical Commodities," Reuters newswire, March 2, 2012, available at <http://www.reuters.com/article/2012/03/02/us-fed-banks-commodities-idUSTRE8211CC20120302> (accessed April 9, 2012).

and commerce, and debates about the appropriate scope of BHC activities, remain as active as ever. In addition, restrictions on the scope of large banking organizations are being considered in other countries in the wake of the financial crisis. For example, in the United Kingdom, the Independent Commission on Banking has recommended "ring-fencing" retail banking activities inside separately capitalized subsidiaries (see Independent Commission on Banking 2011).

### 3. STRUCTURE AND DATA SOURCES

Chart 2 illustrates that, as well as increasing in size, the largest BHCs have become significantly more organizationally complex over the past two decades, at least as measured by the number of separate legal entities within each firm and the geographic reach of these organizations. This section sheds some light on the organizational structures of large BHCs and describes key types of regulatory data available regarding different entities within the BHC, to serve as a guide for researchers and other analysts.

The exhibit above presents a stylized picture of the organizational structure of a typical large BHC, including both banking and nonbanking subsidiaries. It also lists (in parentheses) the key regulatory reports filed by different legal entities within the structure. A more detailed table summarizing regulatory data filed by BHCs and their subsidiaries is compiled in Appendix A to this article.

The exhibit is simplified by necessity, because in practice the most complex BHCs control up to several thousand separate

subsidiaries. A snapshot of the organizational structure of each BHC is reported annually as part of the FR Y-6 *Annual Report of Bank Holding Companies*; this report requires BHCs to file an organizational chart, intercompany ownership and control relationships, and data on domestic branches, among other information. In addition, on the FR Y-10 *Report of Changes in Organizational Structure*, top-tier BHCs report, as they occur, any changes to the firm's worldwide organizational structure including mergers, acquisitions, or transfers of interests in other entities, internal reorganizations, commencements of new activities, and openings, closings or relocations of branches or subsidiaries.<sup>10</sup> By combining these two reports, it is possible to generate at any point in time an updated picture of the organizational structure of the firm. Data from these two reports are publicly available through the National Information Center repository.<sup>11</sup>

In determining the set of entities controlled by the ultimate parent BHC, banking regulations use a definition of control which differs from that used for financial reporting purposes under U.S. Generally Accepted Accounting Principles (GAAP).<sup>12</sup> Thus, regulatory reports vary in terms of which definition of control is used. For example, the FR Y-6 and Y-10 reports require firms to use the supervisory definition of control when determining the set of subsidiaries controlled by the BHC. However, the consolidated financial statements of the BHC are prepared based on U.S. GAAP consolidation definitions. (See the "Consolidation Rule" column of Appendix A.) End users should bear these differences in mind when interpreting regulatory data.

The key source of consolidated financial data on U.S. BHCs is the FR Y-9C *Consolidated Report of Condition and Income*, which is completed on a quarterly basis by each BHC with at least \$500 million in total assets. The Y-9C provides data on the financial condition of the firm, based on U.S. GAAP consolidation rules, as well as the capital position of the consolidated entity. The balance sheet and income data include items similar to those contained in SEC filings; however, the Y-9C also contains a rich set of additional information, including data on regulatory capital and risk-weighted assets, off-balance sheet exposures, securitization activities, delinquency statistics on different types of loans, and so on. Since comparability across firms is important for regulatory purposes, the Y-9C and other reporting forms tend to be more prescriptive about the way financial data is measured and reported than U.S. GAAP-based reporting.

<sup>10</sup> A top-tier BHC is the ultimate domestic parent organization (that is, a BHC that is not controlled by another domestic BHC).

<sup>11</sup> See <http://www.ffiec.gov/nicpubweb/nicweb/NicHome.aspx>.

<sup>12</sup> For example, U.S. GAAP determines that control has been established if the parent owns more than 50 percent of the voting stock of the firm, while for supervisory purposes, this limit is only 25 percent.

The top-tier BHC, shown at the top of the exhibit, also submits a separate quarterly report known as the FR Y-9LP, prepared on an unconsolidated basis. Note that the parent BHC depicted in the exhibit is also registered as a financial holding company (FHC). As we discussed in Section 2, this FHC status allows the firm to control entities engaged in a broader range of financial activities.

Each domestic commercial bank, like the one depicted on the right side of the exhibit, files a detailed set of quarterly financial reports commonly known as "Call Reports" (FFIEC 031, if the bank has both foreign and domestic offices, or FFIEC 041, if it has only domestic offices). Like the Y-9C, Call Reports are prepared on a consolidated basis, but at the level of the bank, rather than the BHC. Many similarities exist between the structure of the Y-9C and Call Reports, although the set of information reported does differ between the two reporting forms in important ways. For example, the Call Report provides additional information on core banking activities, such as the composition of deposit liabilities. Conversely, the Y-9C provides additional information on broader financial activities, such as insurance and reinsurance.

Foreign bank subsidiaries, such as the one depicted at the far bottom left of the exhibit, also report regulatory data on their activities, but on a standalone rather than a consolidated basis.<sup>13</sup> Large foreign subsidiaries, whether banks or nonbanks, report balance sheet and income data through the FR 2314 report, while smaller subsidiaries (those below a set of reporting thresholds) report a small number of data items in the FR 2314S. Foreign bank branches not incorporated into a separate subsidiary (as depicted at bottom right of the exhibit) file the FFIEC 030 report.

A BHC's banking subsidiaries are "special" in a number of ways relative to nonbanks; for example, they are able to raise insured deposits and can borrow at the Federal Reserve's discount window. However, these entities are also bound by separate capital requirements and face additional regulation. Furthermore, although the GLBA has expanded the activities that BHCs may engage in, many of these activities, such as underwriting, commodities dealing, and insurance, must generally occur outside of the BHC's commercial bank(s) or their subsidiaries, a factor contributing to the organizational complexity of BHCs.

Financial information on each large nonbank subsidiary is filed in the FR Y-11 report (if a domestic subsidiary), or the FR 2314 (if a foreign subsidiary).<sup>14</sup> An exception is made,

<sup>13</sup> In this context, "standalone" means that the accounts of the firm are based only on the entity itself, without consolidating the assets and liabilities of any subsidiaries.

<sup>14</sup> Smaller subsidiaries instead file an FR Y11S (if domestic) or 2314S (if foreign), based on size thresholds. See Appendix A for more details. Note that the FR 2314/2314S is the same report filed by foreign banking subsidiaries.

however, for securities and insurance affiliates facing separate functional regulation; such subsidiaries are exempt from filing the FR Y-11 and instead file reports on their activities and financial position with their functional regulator.

Another way to examine the foreign activities of U.S. BHCs is to study their exposure to foreign individuals, firms, and governments, instead of studying the country in which each subsidiary is domiciled. This approach is relevant because a BHC's domestic subsidiaries may engage in significant foreign lending. Cross-border exposures of bank holding companies are reported on the FFIEC 009, *Country Exposure Report*. This report presents a consolidated view of the distribution by country of claims (including derivative exposures) on foreigners, including foreign subsidiaries of the BHC. As an application of these data, Cetorelli and Goldberg (2011) use FFIEC 009 reports to analyze liquidity management and internal capital markets among internationally active U.S. banks during the Great Recession. A second instrument, the *Treasury International Capital* (TIC) reports, provides data on the foreign portfolio exposures of the BHC's U.S. subsidiaries. These data reflect the geographic location of the exposure itself, rather than the location of the legal entity holding the security. Together these two reports provide a global picture of the BHC's activities and exposures.

To summarize, while BHCs are organizationally complex, a range of detailed data is available to regulators, researchers, and other analysts to help analyze the scope, size, complexity, and global reach of these organizations. This section has presented a (nonexhaustive) list of many of these data sources. We now make use of these reporting data to construct simple summary statistics on the structure and characteristics of large U.S. BHCs.

## 4. STYLIZED FACTS

We focus on the fifty largest BHCs, which together make up a large fraction of total industry assets. Our intention is to present stylized facts on the organizational complexity and structure of these organizations and to illustrate some of the many ways in which regulatory reporting data can be used to shed light on the activities of bank holding companies. All the statistics are based on the most updated information, reported as of February 20, 2012.<sup>15</sup>

Table 1 presents some simple summary statistics on a sample of large BHCs, sorted in order of total assets and combining several of the regulatory reports discussed above. Six of the seven largest BHCs control more than a thousand subsidiaries; nearly all of these subsidiaries are nonbanks,

and many are foreign firms. These subsidiaries have been created for a variety of purposes: 1) for regulatory reasons, for example, because separate subsidiaries are required in each country in which the firm operates, or for particular activities; 2) to limit taxation, for example, by shifting certain activities into lower-tax jurisdictions; 3) to manage the regulatory burden of the firm, for example, to avoid burdensome laws or regulatory regimes; 4) to secure or limit the position of different claimholders on the firm in the case of bankruptcy. (See Section 4.4 for further discussion.)

While BHCs control a large number of nonbank subsidiaries, most assets are generally held in a small number (between one and five) of domestic commercial banks. For example, the largest BHC by total assets, JPMorgan Chase, controls 3,391 subsidiaries; of the 2,940 subsidiaries that are domestically domiciled, only four are domestic commercial banks. These banks and their subsidiaries do, however, hold 86 percent of the firm's total assets.<sup>16</sup>

The fraction of total assets held within the BHC's banking subsidiaries varies significantly across firms. For smaller BHCs, this fraction is close to 100 percent. For MetLife, Goldman Sachs, and Morgan Stanley, which engage in relatively little traditional lending and deposit-taking, banking subsidiaries contain a strikingly small fraction of the firm's assets (3.2 percent, 11.2 percent, and 10.5 percent, respectively). For the other largest BHCs, which have large retail banking operations but also engage in securities dealing and underwriting, insurance, and so on, the fraction of bank assets falls between these two extremes, varying between 69 percent and 93 percent of firm assets among the four largest firms.

### 4.1 Industry Breakdown

Charts 3 and 4 present an industry breakdown of the activities of the subsidiaries of large BHCs. Appropriate regulation of the

<sup>15</sup> Each firm's organizational structure as reported in the 2011 FR Y-6 was updated for any structural changes that occurred up to February 20, 2012. (Recall that each change in structure must be reported by the BHC through an FRY-10 filing.) Financial data are reported quarterly and thus reflects each firm's financial position as of December 31, 2011. Note that two large firms, Taunus Corporation and RBC USA Holding Corporation, lost their BHC status in early 2012. Even though both firms were among the top fifty BHCs as of December 2011, they were not BHCs as of February 20, 2012, and thus are not included in our statistics.

<sup>16</sup> These estimates of commercial banking assets are calculated by simply summing total assets, as reported in the Call Reports of each commercial banking subsidiary. From a consolidated BHC perspective, this calculation will overstate commercial bank assets in cases where there are related party exposures among commercial banks within the same BHC (since these should in principle be "netted out" from a consolidated perspective). However, we believe this overstatement will generally be small in practice.

TABLE 1

## Number and Distribution of Subsidiaries: Selected Top Fifty Bank Holding Companies

| BHC Rank | Name                                    | Number          |        |         | Asset Value |  |   |
|----------|---|-----------------|--------|---------|-------------|--|---|
|          |   | Domestic        |        |         | Total       | Domestic Commercial Bank (Percentage of Y-9C Assets) | Consolidated Total Assets (Y-9C) (Billions of U.S. Dollars) |
|          |   | Commercial Bank | Other  | Foreign |             |  |   |
| 1        | JPMorgan Chase & Company                | 4               | 2,936  | 451     | 3,391       | 86.1   | 2,265.8   |
| 2        | Bank of America Corporation             | 5               | 1,541  | 473     | 2,019       | 77.9   | 2,136.6   |
| 3        | Citigroup Incorporated                  | 2               | 935    | 708     | 1,645       | 68.8   | 1,873.9   |
| 4        | Wells Fargo & Company                   | 5               | 1,270  | 91      | 1,366       | 92.5   | 1,313.9   |
| 5        | Goldman Sachs Group, Incorporated       | 1               | 1,444  | 1,670   | 3,115       | 11.2   | 923.7   |
| 6        | MetLife, Inc.                           | 1               | 39     | 123     | 163         | 3.2  | 799.6   |
| 7        | Morgan Stanley                          | 2               | 1,593  | 1,289   | 2,884       | 10.5   | 749.9   |
| 10       | The Bank Of New York Mellon Corporation | 3               | 211    | 146     | 360         | 83.2   | 325.8   |
| 20       | Regions Financial Corporation           | 1               | 35     | 4       | 40          | 97.1   | 127.0   |
| 30       | Comerica Incorporated                   | 2               | 72     | 2       | 76          | 99.8   | 61.1  |
| 40       | First Horizon National Corporation      | 1               | 35     | 1       | 37          | 99.1   | 24.8  |
| 50       | Webster Financial Corporation           | 1               | 21     | 0       | 22          | 99.8   | 18.7  |
| Total    |   | 86              | 13,670 | 5,847   | 19,603      | 70.4   | 14,359.1  |

Sources: National Information Center; FR Y-9C; FR Y-10; FR Y-11; FR 2314; FFIEC 031; FFIEC 041.

Notes: Structure data are as of February 20, 2012. Financial data are as of fourth-quarter 2011. The number of subsidiaries of each bank holding company (BHC) is determined based on the Regulation Y definition of control. Asset data include approximately 3,700 of the more than 19,600 subsidiaries belonging to the top fifty BHCs that meet particular reporting threshold criteria. See the online appendix for more details.

scope of BHCs' activities has been an important and prominent public policy issue for many decades, as discussed in Section 2. These figures are based on combining structural data from the FR Y-10 and financial data from the FR Y-11, FR 2314, and FFIEC 031 and 041 reports. Industry is classified according to the North American Industry Classification System (NAICS).<sup>17</sup>

Based on raw counts (Chart 3), the most common industry categories are "Funds, Trusts, and Other Financial Vehicles" and "Securities, Commodity Contracts, and Other." Weighted by assets, however, the most important category is "Credit Intermediation and Related Activities." This breakdown is consistent with Table 1. Large BHCs have a large number of subsidiaries for managing trusts and investment funds as well as many other purposes; however, the majority of BHC assets relate to "traditional" credit intermediation activities.

Again, these two charts illustrate enormous variation in industry composition across firms. For example, perhaps unsurprisingly, Morgan Stanley and Goldman Sachs, which focus more heavily on investment banking activities, have a

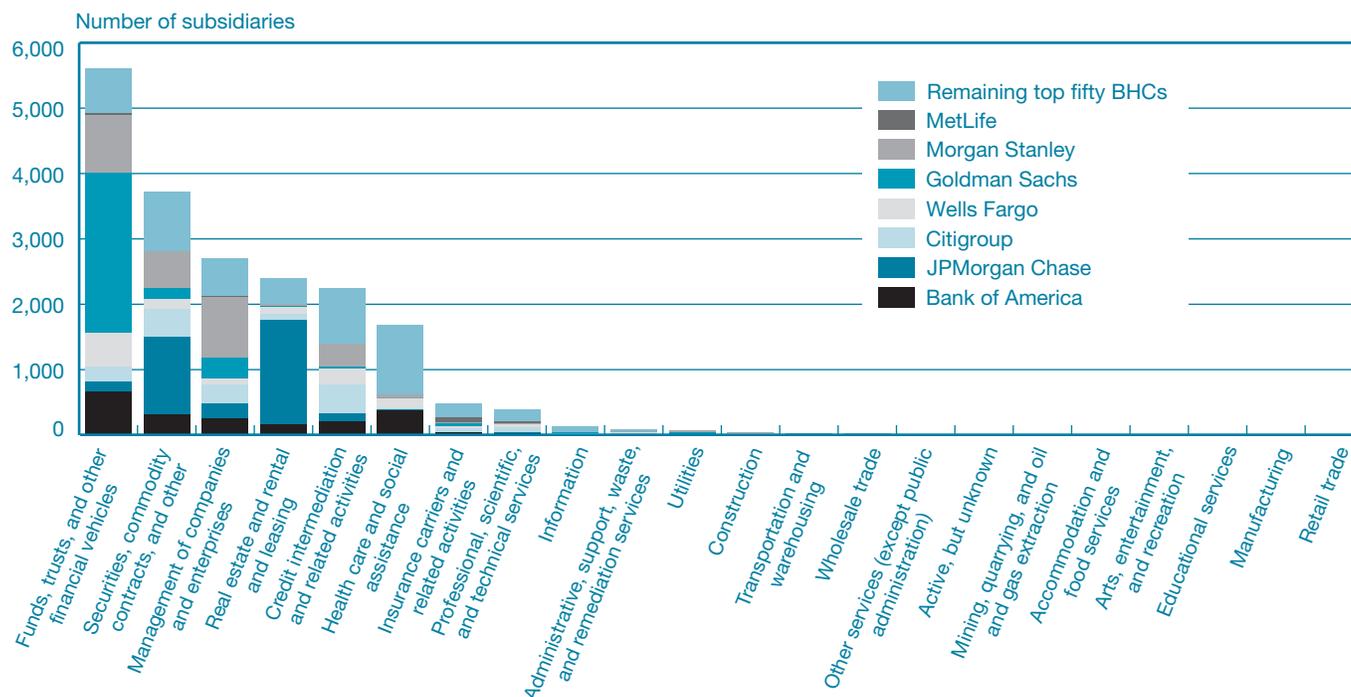
<sup>17</sup>NAICS codes are used to classify firms by their primary economic activity. The codes range from two to six digits in length, in which two-digit codes represent the broadest categories and six-digit codes represent the most specific categories. We use two-digit NAICS codes, except for the finance and insurance industry, which we break out further using three-digit NAICS codes.

large volume of subsidiaries in the "Funds, Trusts, and Other Financial Vehicles" category and have a smaller fraction of assets held in subsidiaries engaged in credit intermediation. In addition, few assets are reported for MetLife, since a large fraction of firm assets are held in insurance subsidiaries that do not submit FR Y-11 reports.

Also notable is a "tail" of BHC subsidiaries engaged in activities that are not obviously closely related to banking. For example, BHCs own a number of subsidiaries engaged in "Health Care and Social Assistance" and "Professional, Scientific, and Technical Services." Ownership of such subsidiaries can arise in a number of ways; for example, a bank may acquire a firm that it has lent to as the outcome of bankruptcy proceedings. In general, these nonfinancial subsidiaries do not make up a significant share of total firm assets. (Note: Information on the industry distribution of BHC subsidiaries is also tabulated in Appendix B.)

As an illustration of the richness of these regulatory data when compared with other data sources, we have constructed similar industry figures using Capital IQ, a widely-used data vendor that compiles data from firm's SEC filings and other sources. The number of subsidiaries captured in Capital IQ is significantly smaller than that from the regulatory data. For

CHART 3  
Industry Breakdown of Subsidiaries



Sources: National Information Center; FR Y-10.

Notes: Data are for the top fifty bank holding companies and are as of February 20, 2012. See the online appendix for more details.

example, for the seven largest BHCs, 3,890 subsidiaries are recorded in Capital IQ, of which asset data are reported for only 53. In contrast, for the same seven firms, 14,583 subsidiaries are recorded in BHC regulatory filings, and asset data are available for 2,981 subsidiaries. A table in the online appendix also shows that the sum of subsidiary assets reported in Capital IQ significantly understates the corresponding sum from regulatory reports for six of the seven largest BHCs.<sup>18</sup>

## 4.2 Geographic Breakdown

Another important dimension of BHC scope is the geographic reach of firms' activities. Chart 2, panel B showed that the most internationally active BHCs control subsidiaries in

<sup>18</sup> The exception is MetLife, for which the sum of subsidiary assets is actually larger in Capital IQ than in their regulatory filings. The reason is that, as mentioned above, MetLife has large insurance subsidiaries that do not file a Y-11 report of their financial position because they are functionally regulated by state insurance regulators (see the discussion in Section 3). For the other six largest BHCs, the sum of reported subsidiary assets in Capital IQ are only 4 percent to 77 percent as large as in the same firm's regulatory filings.

forty-to-eighty separate countries. Data on the geographic composition of these subsidiaries are reported in Table 2, panel A (based on the FR Y-10), which reports geographic data at the country level. For exposition, we have grouped countries by geographic region.

A large majority of total BHC assets, 75.82 percent, are held in the United States. Perhaps unsurprisingly, the fraction of foreign assets and subsidiaries is significantly higher for the largest BHCs than for smaller firms. Europe is the most important location for foreign-held BHC assets (making up 15.40 percent of assets), followed by the Caribbean (3.15 percent of assets), Asia (2.79 percent of assets), and Latin America (1.55 percent of assets).

Table 2, panel B, reports aggregate foreign exposures of U.S. BHCs, based on data originally reported in the FFIEC 009 report. Note that foreign exposures may differ significantly from the fraction of assets domiciled overseas, for example, because domestic BHC subsidiaries may lend to or engage in derivatives transactions with foreign organizations. Indeed, the table shows that 62 percent of all foreign exposures are held within domestic BHC subsidiaries.

TABLE 2

## Geographic Distribution of Bank Holding Company Assets and Exposures

Panel A: Geographic Location of U.S. BHC Subsidiaries

| Region        | Top Seven BHCs |                              | Remaining Top Fifty BHCs |                              | Top Fifty BHCs |                              |
|---------------|----------------|------------------------------|--------------------------|------------------------------|----------------|------------------------------|
|               | Number         | Assets<br>(Percent of Total) | Number                   | Assets<br>(Percent of Total) | Number         | Assets<br>(Percent of Total) |
| United States | 9,761          | 70.92                        | 3,954                    | 89.12                        | 13,715         | 75.82                        |
| Europe        | 1,828          | 18.47                        | 526                      | 7.08                         | 2,354          | 15.40                        |
| Caribbean     | 1,518          | 3.42                         | 164                      | 2.41                         | 1,682          | 3.15                         |
| Asia          | 593            | 3.80                         | 154                      | 0.07                         | 747            | 2.79                         |
| Latin America | 377            | 2.04                         | 67                       | 0.25                         | 444            | 1.55                         |
| Australia     | 227            | 0.58                         | 47                       | 0.32                         | 274            | 0.51                         |
| Africa        | 153            | 0.26                         | 13                       | 0.00                         | 166            | 0.19                         |
| Canada        | 126            | 0.52                         | 95                       | 0.75                         | 221            | 0.58                         |
| Total         | 14,583         | 100.00                       | 5,020                    | 100.00                       | 19,603         | 100.00                       |

Panel B: Foreign Exposures of U.S. BHCs

| Region                      | Total (Billions<br>of U.S. Dollars) | Exposures by Subsidiary Type (Percent of World Total) |         |        |
|-----------------------------|-------------------------------------|---|---------|--------|
|                             |                                     | Domestic  | Foreign | Total  |
| Europe                      | 2,017.2                             | 35.73   | 16.19   | 51.92  |
| Asia                        | 970.3                               | 11.22   | 13.75   | 24.98  |
| Latin America               | 349.4                               | 4.19  | 4.81    | 8.99   |
| Caribbean                   | 205.6                               | 5.16  | 0.13    | 5.29   |
| Canada                      | 163.5                               | 2.53  | 1.68    | 4.21   |
| Australia                   | 147.7                               | 2.28  | 1.52    | 3.80   |
| Africa                      | 26.3                                | 0.34  | 0.34    | 0.68   |
| International organizations | 5.1                                 | 0.13  | 0.00    | 0.13   |
| World Total                 | 3,885.1                             | 61.58   | 38.42   | 100.00 |

Sources: National Information Center; FR Y-10; FR Y-11; FR 2314; FFIEC 031; FFIEC 041; E.16.

Notes: Structure data are as of February 20, 2012. Financial data are as of fourth-quarter 2011. Asset data in panel A reflect approximately 3,700 of the more than 19,600 subsidiaries controlled by the top fifty bank holding companies (BHCs), which meet particular reporting threshold criteria. Aggregate data in panel B are drawn from the E.16 Country Exposure Lending Survey and Country Exposure Information Report, which in turn is based on data from FFIEC 009. See the online appendix for more details.

### 4.3 Caveats and Limitations

When interpreting the above statistics on industrial and geographic scope, it is worth reiterating some limitations of the underlying regulatory data:

1. Assets for each nonbank subsidiary reported in the FR Y-11/FR 2314 are based on treating the subsidiary in question as a standalone entity. Given this treatment, asset and liability positions with related entities (for example, a loan to or equity position in a subsidiary) will be included as part of the subsidiary's balance sheet, even though such positions net out to zero from a consolidated BHC perspective. For this reason, summing up reported

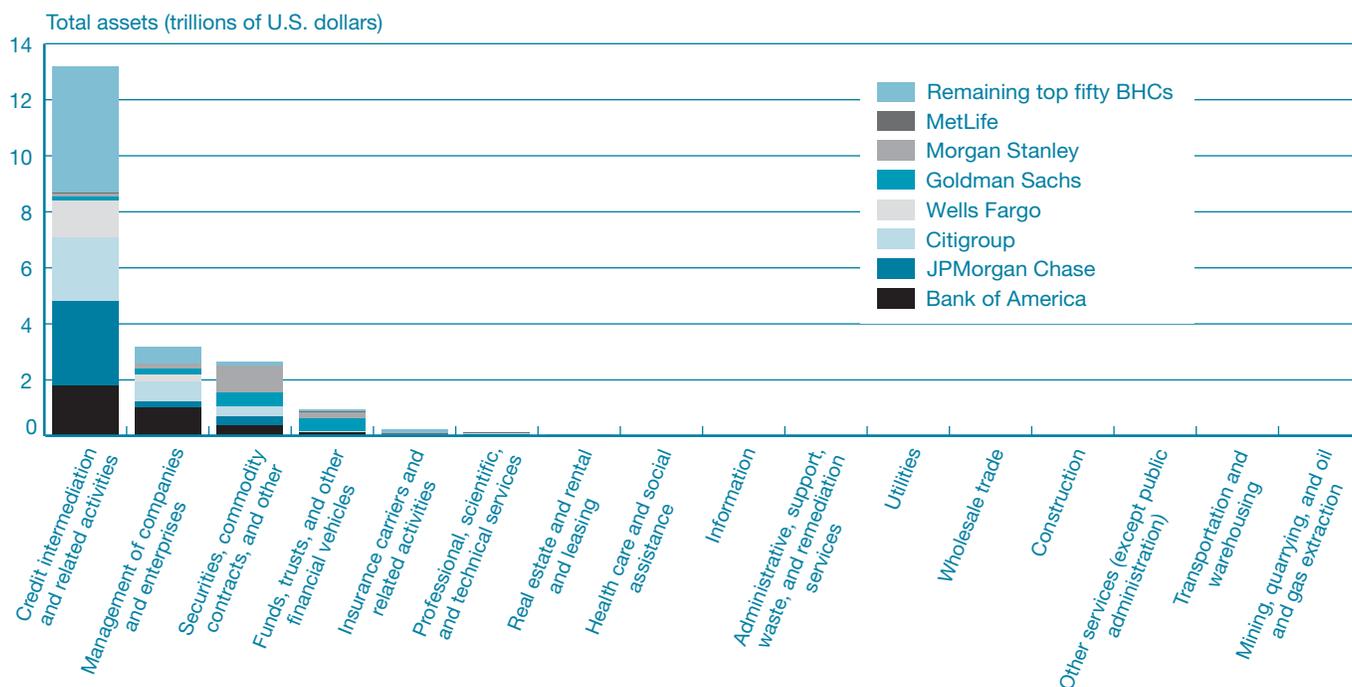
assets for each subsidiary will tend to overstate the total assets of the firm as a whole—particularly in a highly tiered structure. It is not possible to fully correct this double-counting.<sup>19</sup>

2. As described in Section 3, some (potentially large) U.S. nonbank subsidiaries do not file a Y-11 because they instead report separately to their U.S. functional regulator. This practice is primarily relevant for securities and insurance subsidiaries, which are significant in size for

<sup>19</sup> Balances with related entities are disclosed in the FR Y-11/FR 2314. However, the item "Claims on related entities" includes related entities whether or not they are consolidated by the ultimate parent under U.S. GAAP. Therefore, using this line item to offset related party holdings may generate an overadjustment.

CHART 4

## Industry Breakdown by Assets



Sources: National Information Center; FRY-10; FRY-11; FR 2314; FFIEC 031; FFIEC 041.

Notes: Data are for the top fifty bank holding companies (BHCs). Structure data are as of February 20, 2012. Financial data are as of fourth-quarter 2011. Asset data include approximately 3,700 of the more than 19,600 subsidiaries belonging to the top fifty BHCs that meet size thresholds and other requirements for reporting asset data. See the online appendix for more details.

some BHCs. These separate filings are in general not available to analysts outside the functional regulator.<sup>20</sup>

- Small subsidiaries that are below reporting thresholds are not required to file asset data.

These data limitations are likely to introduce some bias into the asset-weighted statistics reported in Chart 4 and Table 2, panel A.

### 4.4 Causes and Consequences of Complexity

Earlier in this section, we posited a number of drivers of BHC organizational complexity: regulation (and regulatory arbitrage), tax management, and the determination of control rights and priority of claims in bankruptcy. A full examination of each of these drivers is outside the scope of this article. However, as a first step, below we present a simple cross-sectional regression analysis of the correlates of BHC complexity, as proxied by the total number of subsidiaries.<sup>21</sup>

<sup>20</sup> For example, broker-dealer subsidiaries of BHCs are required to file balance sheet and income data with the SEC, their primary regulator, in the form of a FOCUS (Financial and Operational Combined Uniform Single) report. Information in these FOCUS reports is not publicly available, however, unless voluntarily disclosed by the broker-dealer.

Specifically, we regress the log of the number of subsidiaries controlled by each of the top fifty BHCs on measures of size (total assets and log total assets) and the concentration of activities: the fraction of commercial bank assets and indexes measuring the industry and geographic concentration of the firm's assets. Our expectation is that larger BHCs, as well as those engaged in a more diversified range of activities, are likely to be more organizationally complex. We estimate a simple linear model using least squares, using robust standard errors to account for heteroskedasticity. The results are presented in Table 3.

The number of subsidiaries is strongly positively and statistically significantly related to BHC size. The coefficient on log assets is consistently less than unity, however, implying that a given percentage increase in BHC size is associated with a smaller-than-proportionate increase in the number of subsidiaries. In other words, larger BHCs, on average, have larger individual subsidiaries.

<sup>21</sup> We readily acknowledge that the number of subsidiaries is likely to be a noisy measure of organizational complexity, and that it only measures one dimension of the complexity of BHCs. Studying other dimensions (for example, the complexity of the firm's assets or derivatives positions) would be a fascinating topic for future research, but is outside the scope of this article.

TABLE 3

## Determinants of Bank Holding Company Complexity

| Independent Variables                            | Dependent Variable: Log Number of Subsidiaries |                     |                     |                     |                     |                     |
|--|--|---------------------|---------------------|---------------------|---------------------|---------------------|
|  | 1  | 2                   | 3                   | 4                   | 5                   | 6                   |
| Total assets (trillions of U.S. dollars)         |  |                     |                     |                     | 0.333<br>[0.26]     | 0.33<br>[0.26]      |
| Log total assets                                 | 0.889***<br>[0.097]                            | 0.861***<br>[0.087] | 0.851***<br>[0.085] | 0.912***<br>[0.075] | 0.751***<br>[0.13]  | 0.741***<br>[0.12]  |
| Industry concentration index (three-digit NAICS) | -0.895<br>[0.74]                               |                     |                     |                     | -0.18<br>[0.81]     | -0.158<br>[0.79]    |
| Geographic concentration index (region)          |  | -1.23<br>[0.97]     |                     |                     | -0.786<br>[1.18]    |                     |
| Geographic concentration index (country)         |  |                     | -1.232<br>[0.86]    |                     |                     | -0.969<br>[1.05]    |
| Percent of domestic commercial bank assets       |  |                     |                     | -0.752<br>[0.66]    | -0.333<br>[0.86]    | -0.194<br>[0.87]    |
| Constant   | -11.03***<br>[2.26]                            | -10.18***<br>[2.28] | -9.999***<br>[2.14] | -11.54***<br>[1.72] | -8.193***<br>[2.68] | -7.995***<br>[2.60] |
| Observations                                     | 50   | 50                  | 50                  | 50                  | 50                  | 50                  |
| Adjusted $R^2$                                   | 0.77   | 0.78                | 0.78                | 0.77                | 0.77                | 0.77                |

Source: Authors' calculations.

Notes: The table reports estimates from linear regression models of the correlates of bank holding company (BHC) complexity, measured by the log of the number of total subsidiaries. Data are for the top fifty BHCs and are as of February 20, 2012. Linear regression, heteroskedasticity-consistent standard errors are presented. The dependent variable is the natural logarithm of the number of subsidiaries. Robust standard errors are in brackets.

\*\*\* $p < 0.01$

\*\* $p < 0.05$

\* $p < 0.1$

Indexes measuring industry and geographic concentration are constructed similarly to a Herfindahl-Hirschman Index. To create the industry concentration index, we identify the subset of subsidiaries for which total assets are reported; we then compute the share of these assets related to each industry  $i$  (measured at the three-digit NAICS level), and calculate the index as the sum of the squared industry shares  $\sum_i s_i^2$ . A high index value (close to 1) means that the subsidiaries are highly concentrated in one industry, whereas a low value (close to 0) means that the subsidiary assets are spread across many different industries. The same approach is used to construct the two geographic concentration indexes, one based on world region weights and another on country weights.

The coefficients on all three concentration indexes are consistently negative in each column of results. However, they are not statistically significant at the 10 percent level. Similarly, a smaller share of BHC assets located in “traditional” banking subsidiaries is also associated with greater complexity, although again the coefficient is not statistically significant.<sup>22</sup>

Together, these results may be interpreted as some evidence, albeit weak, that organizational complexity is positively related to the diversity of the BHC’s activities, across both industrial sectors and geographic locations. In future research, it would be interesting to analyze this question in more depth, making use of a larger sample of firms as well as time-series variation in organizational structure, rather than just a single cross section.

Outside the scope of this article are important questions regarding the consequences of BHC organizational complexity. For example: To what extent is organizational structure largely irrelevant, conditional on the asset and liability structure of the consolidated entity? Would simplifying the organizational

<sup>22</sup> We have also estimated a range of other specifications; for example, using the total number of subsidiaries, rather than its log value, as the dependent variable. Our findings are generally similar. One disadvantage of our benchmark approach is that asset data are not available for all subsidiaries. We also experimented with constructing concentration indexes based on the number of subsidiaries (rather than using asset shares). However, this approach generally does not seem reliable; for example, it dramatically underweights the activity share of commercial banking, because the average commercial banking subsidiary is much larger in size than average nonbank subsidiaries.

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structure of BHCs make these firms easier to reorganize in bankruptcy? Are any costs and benefits associated with BHC complexity internalized (so that the BHC is “optimally” complex), or do they generate externalities for counterparties or others?

One interesting paper related to these questions is Goetz, Laeven, and Levine (2011), which studies frictions associated with BHC geographic scope, one dimension of complexity. Goetz et al. find that greater geographic reach has a negative effect on BHC valuations. The authors’ preferred interpretation is that geographic diffusion makes the firm more difficult to monitor, thus weakening corporate governance. Another relevant contribution is Morgan (2002), which argues that banks are more opaque than other types of firms. In future research, it would be interesting to use the data described above to understand whether opacity and organizational complexity are related.

## 5. CONCLUSION

The size, scope, and complexity of large U.S. bank holding companies have grown significantly in recent decades, shaped by consolidation, legislative changes, and growth in the overall size of the financial system. In this article, we have described the typical structure of large BHCs, as well as many of the main types of regulatory data they file. As we have illustrated by way of some simple summary statistics, these data can be used to provide a rich picture of the financial condition, composition, and organizational structure of BHCs and represent a valuable resource for researchers and others interested in these important firms.

## APPENDIX A: REGULATORY REPORTS<sup>a</sup>

This appendix provides information, including a brief description, unit of observation, filing frequency, rules of consolidation (U.S. GAAP or statutory rules), and public availability, for the bank holding company (BHC) reports listed below. Links to the forms are available at <http://www.newyorkfed.org/banking/reportingforms/index.html>.

### FINANCIAL DATA ON BHCs AND THEIR SUBSIDIARIES

FR Y-9C, *Consolidated Financial Statements of Bank Holding Companies*

FR Y-9LP, *Parent Company Only Financial Statements for Large Bank Holding Companies*

FR Y-9SP, *Parent Company Only Financial Statements for Small Bank Holding Companies*

FFIEC 031, *Consolidated Reports of Condition and Income for a Bank with Domestic and Foreign Offices*

FFIEC 041, *Consolidated Reports of Condition and Income for a Bank with Domestic Offices Only*

FR Y-11/FR Y-11S, *Financial Statements of U.S. Nonbank Subsidiaries of U.S. Bank Holding Companies*

FR 2314/S, *Financial Statements of Foreign Subsidiaries of U.S. Banking Organizations*

FFIEC 030/030S, *Foreign Branch Report of Condition/Abbreviated Foreign Branch Report of Condition*

### ORGANIZATIONAL STRUCTURE AND ATTRIBUTES

FR Y-6, *Annual Report of Bank Holding Companies*

FR Y-10, *Report of Changes in Organizational Structure*

### FOREIGN EXPOSURES OF U.S. BHCs AND THEIR SUBSIDIARIES

FFIEC 009/9a, *Country Exposure Report/Country Exposure Information Report*

Treasury International Capital (TIC) Data

### U.S. ENTITIES CONTROLLED BY FOREIGN BANKING ORGANIZATIONS OUTSIDE A U.S. BHC STRUCTURE

FR Y-7Q, *The Capital and Asset Report for Foreign Banking Organizations*

FR Y-7N/S, *Financial Statements of U.S. Nonbank Subsidiaries Held by Foreign Banking Organizations*

FFIEC 002, *Report of Assets and Liabilities of U.S. Branches and Agencies of Foreign Banks*

FFIEC 002S, *Report of Assets and Liabilities of Non-U.S. Branches Managed or Controlled by U.S. Branch or Agency of Foreign Bank (based on U.S. GAAP)*

### MISCELLANEOUS

FFIEC 101, *Risk-Based Capital Reporting for Institutions Subject to the Advanced Capital Adequacy Framework*

FR 2436, *Semiannual Report of Derivatives Activity*

<sup>a</sup>This appendix provides a high-level overview of each reporting form. For more granular information on the description, unit of observation, frequency, rules of consolidation, and public availability of each form, refer to the form instructions. To access publicly available forms, visit the following sites: NIC (<http://www.ffiec.gov/nicpubweb/nicweb/nichome.aspx>), FFIEC (<https://cdr.ffiec.gov/public/Default.aspx>), and FOIA (<http://www.federalreserve.gov/generalinfo/foia/request.cfm>).

## APPENDIX A: REGULATORY REPORTS<sup>a</sup> (CONTINUED)

### U.S. Bank Holding Companies and Their Subsidiaries

Panel A

| Name of Report                                       | Description   | Unit of Observation   | Frequency  | Consolidation Rule   | Data Availability                                  |
|--|---|---|--|--|--|
| <b>Financial Data on BHCs and Their Subsidiaries</b> |   |   |  |  |  |
| FR Y-9C  | Balance sheet, income, and other financial data on a consolidated basis for domestic BHCs, incorporating both domestic and foreign subsidiaries. Reporting threshold for filing: \$500 million in assets (\$150 million pre-2006).  | Consolidated top-tier domestic BHCs   | Quarterly  | Consolidated (GAAP basis)  | Public   |
| FR Y-9LP, FR Y-9SP                                   | Balance sheet, income, and other financial data information for large domestic BHCs (those with less than \$500 million in assets) on parent-only basis. FR Y-9SP collects balance sheet and income statement information for small domestic BHCs (more than \$500 million in assets) on parent-only basis. | FR Y-9LP: Parent company of large BHCs<br>FR Y-9SP: Parent company of small BHCs                                    | FR Y-9LP: Quarterly<br>FR Y-9SP: Semiannually  | Unconsolidated   | Public   |
| FFIEC 031, FFIEC 041                                 | Commonly known as the "Call Reports." FFIEC 031 collects balance sheet, income, and other financial data on consolidated basis for commercial banks with domestic and foreign offices. FFIEC 041 includes the same data but is filed by banks with domestic offices only.                                   | FFIEC 031: Commercial banks with domestic/foreign offices<br>FFIEC 041: Commercial banks with domestic offices only | Quarterly  | Consolidated at bank level (GAAP basis)  | Public   |
| FR Y-11, FR Y-11S                                    | Balance sheet, income, and other financial data for certain large U.S. nonbank subsidiaries of domestic BHCs (for example, if subsidiary assets exceed \$1 billion). FR Y-11S collects four financial data items for certain smaller subsidiaries and is required only if parent files a Y-9C.              | Large U.S. nonbank subsidiaries of domestic BHCs  | FR Y-11: Quarterly<br>FR Y-11S: Annual   | Unconsolidated, by legal entity  | Public   |
| FR 2314, FR2314S                                     | Balance sheet, income, and other financial data for direct or indirect foreign subsidiaries of U.S. BHCs or other U.S. banking organizations. FR 2314S collects four financial data items for smaller, less complex subsidiaries.   | Foreign subsidiaries of U.S. banking organizations  | Quarterly or annually (based on reporting thresholds)                                  | Unconsolidated, by legal entity  | Public   |
| FFIEC 030, FFIEC 030S                                | Data on the structure and geographic distribution of foreign branch assets, liabilities, derivatives, and OBS items. 030S collects five financial data items for smaller and less complex branches (those with between \$50 million and \$250 million in total assets).                                     | Foreign branches of insured U.S.-chartered commercial banks   | FFIEC 030: Quarterly or annually (based on certain thresholds)<br>FFIEC 030S: Annually | Reported at branch level with option to aggregate branches within same country                       | Public aggregate data, but private microdata       |
| <b>Organizational Structure and Attributes</b>       |   |   |  |  |  |
| FR Y-6   | Includes organizational chart, verification of domestic branches, and information on principal shareholders, directors, and executive officers.   | Top-tier BHCs   | Annually   | Set of controlled entities determined based on regulatory definition of control, not GAAP definition | Public, unless BHC requests confidential treatment |
| FR Y-10  | Data on changes in organizational structure, including establishment, opening, closing, relocation, acquisition, merger, reorganization, transfer, sale, liquidation, and other changes of interests.   | Variety of financial institutions, such as BHCs, state member banks, Edge and agreement corporations, and FBOs      | As needed  |  | Public   |

Key: BHC = bank holding company; FBO = foreign banking organization; OBS = off-balance-sheet; FHC = financial holding company; OTC = over-the-counter

## APPENDIX A: REGULATORY REPORTS<sup>a</sup> (CONTINUED)

### U.S. Bank Holding Companies and Their Subsidiaries (*Continued*)

Panel B

| Name of Report  | Description  | Unit of Observation  | Frequency   | Consolidation Rule   | Data Availability   |
|---|--|--|---|--|---|
| <b>Foreign Exposures of U.S. BHCs and Their Subsidiaries</b>                                  |  |  |   |  |   |
| FFIEC 009, FFIEC 009a   | Data on distribution by country of claims on foreigners held by U.S. commercial banks and BHCs. FFIEC 009a is a supplement that provides information on the institution's exposures in certain countries.  | FFIEC 009: U.S. commercial banks, BHCs holding more than \$30 million in claims on residents of foreign countries<br>FFIEC 009a: Subset of 009 filers based on exposure thresholds | Quarterly   | Consolidated (GAAP basis)  | Published aggregate data, but private microdata                               |
| Treasury International Capital (TIC) Data   | Information on cross-border financial flows and positions between U.S. and foreign entities. The data cover a variety of financial information, such as transactions in long-term securities, claims and liabilities reported by institutions, and financial derivatives transactions. | Any individual, corporation, or organization located in the United States  | Depends on type of data                             | N/A  | Published aggregate data, but private microdata                               |
| <b>U.S. Entities Controlled by Foreign Banking Organizations Outside a U.S. BHC Structure</b> |  |  |   |  |   |
| FR Y-7Q   | Regulatory capital data for all FBOs organized under foreign law and that engage in banking in the United States through various types of financial institutions, such as branches or agencies and subsidiary banks.   | FBOs that engage in banking in the United States   | Quarterly or annually (based on FHC status)         | Consolidated at FBO level  | Public, unless FBO requests confidential treatment                            |
| FR Y-7N, FR Y-7NS   | FR Y-7N collects balance sheet, income statement, and OBS information for U.S. nonbank subsidiaries held by FBOs other than through a U.S. BHC or bank. FR Y-7NS collects four financial data items for smaller and less complex subsidiaries.   | FBOs with nonbank subsidiaries   | Quarterly or annually (based on certain thresholds) | Unconsolidated by legal entity   | Public  |
| FFIEC 002, FFIEC 002S   | Balance sheet and OBS information on U.S. branches and agencies of foreign banks. No income data are reported. FFIEC 002S is a supplement that collects balance sheet information from non-U.S. branches of U.S. branches or agencies of foreign banks.                                | FFIEC 002: U.S. branches and agencies of foreign banks<br>FFIEC 002S: Non-U.S. branches controlled by U.S. branches and agencies of foreign banks                                  | Quarterly   | Each branch files separately unless in same state and district. Each branch is consolidated. | FFIEC 002: Public<br>FFIEC 002S: Private microdata, occasional aggregate data |
| <b>Miscellaneous</b>  |  |  |   |  |   |
| FFIEC 101   | Data on components of capital and risk-weighted assets for banks, savings associations, and BHCs that qualify for and adopt Basel II in determining their risk-based capital requirements.   | Banks, savings associations, and BHCs that qualify for and adopt Basel II  | Quarterly   | Consolidated (GAAP basis)  | Private   |
| FR 2436   | Data on notional amounts and gross market values of outstanding OTC derivatives. Used to compute comprehensive and internationally consistent information on size and structure of global OTC derivatives market.  | Five of the large U.S. dealers of OTC derivatives (reporting is voluntary)   | Semiannual  | Consolidated (GAAP basis)  | Published aggregate country data, but private microdata                       |

Key: BHC = bank holding company; FBO = foreign banking organization; OBS = off-balance-sheet; FHC = financial holding company; OTC = over-the-counter

## APPENDIX B: DISTRIBUTION OF SUBSIDIARIES BY INDUSTRY

| Industry   | Number   |         |        | Assets (Billions of U.S. Dollars) |          |           |
|--|----------|---------|--------|-----------------------------------|----------|-----------|
|  | Domestic | Foreign | Total  | Domestic                          | Foreign  | Total     |
| Funds, trusts, and other financial vehicles              | 3,694    | 1,911   | 5,605  | 281.71                            | 673.99   | 955.70    |
| Securities, commodity contracts, and other               | 2,365    | 1,355   | 3,720  | 802.32                            | 1,836.23 | 2,638.55  |
| Management of companies and enterprises                  | 1,437    | 1,263   | 2,700  | 2,440.23                          | 736.76   | 3,176.99  |
| Real estate and rental and leasing                       | 2,239    | 149     | 2,388  | 19.26                             | 39.79    | 59.04     |
| Credit intermediation and related activities             | 1,564    | 683     | 2,247  | 11,899.93                         | 1,286.89 | 13,186.82 |
| Health care and social assistance                        | 1,682    | 0       | 1,682  | 4.27                              |          | 4.27      |
| Insurance carriers and related activities                | 315      | 164     | 479    | 2.00                              | 234.59   | 236.59    |
| Professional, scientific, and technical services         | 228      | 164     | 392    | 33.22                             | 77.63    | 110.85    |
| Information  | 68       | 64      | 132    | 1.36                              | 1.79     | 3.16      |
| Administrative, support, waste, and remediation services | 23       | 60      | 83     | 0.48                              | 2.67     | 3.15      |
| Utilities  | 51       | 15      | 66     | 1.36                              | 0.37     | 1.73      |
| Construction   | 41       | 2       | 43     | 1.56                              |          | 1.56      |
| Wholesale trade  | 14       | 4       | 18     | 1.64                              | 0.07     | 1.71      |
| Transportation and warehousing                           | 11       | 7       | 18     | 0.24                              |          | 0.24      |
| Other services (except public administration)            | 14       | 1       | 15     | 1.09                              |          | 1.09      |
| Active, but unknown                                      | 1        | 4       | 5      |                                   |          |           |
| Mining, quarrying, and oil and gas extraction            | 5        | 0       | 5      | 0.17                              |          | 0.17      |
| Educational services                                     | 0        | 1       | 1      |                                   |          |           |
| Arts, entertainment, and recreation                      | 1        | 0       | 1      |                                   |          |           |
| Accommodation and food services                          | 1        | 0       | 1      |                                   |          |           |
| Manufacturing  | 1        | 0       | 1      |                                   |          |           |
| Retail trade   | 1        | 0       | 1      |                                   |          |           |
| Total  | 13,756   | 5,847   | 19,603 | 15,490.83                         | 4,890.79 | 20,381.62 |

Sources: National Information Center; FR Y-10; FR Y-11; FR 2314; FFIEC 031; FFIEC 041.

Notes: Structure data are as of February 20, 2012. Financial data are as of fourth-quarter 2011. The number of subsidiaries for each bank holding company (BHC) is determined based on the Regulation Y definition of control. Asset data include approximately 3,700 of the more than 19,600 subsidiaries belonging to the top fifty BHCs (that is, those meeting thresholds for reporting asset data). The sum of total assets reported significantly exceeds Y-9C total assets in Table 1 of the article because of related-party transactions between subsidiaries. See the online appendix for more details.

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# EVOLUTION AND HETEROGENEITY AMONG LARGER BANK HOLDING COMPANIES: 1994 TO 2010

## 1. INTRODUCTION

Over the past two decades, there has been a transformation in the U.S. financial sector. Alongside the deregulation of this industry, financial intermediation has shifted from a bank-centered process to one where nonbanks play an increasing role. Given these changes, questions arise about how banks have adapted and to what degree their traditional roles in financial intermediation have changed (see Cetorelli, Mandel, and Mollineaux [2012]). In this article, I provide a general perspective on this broad question by documenting how banks have evolved in terms of income. I measure the amount by which banks have changed their income-generating strategies in response to the transformation of the U.S. financial sector. Further, I describe the heterogeneity in responses across banks to recent changes in the industry.

In this analysis, I focus on bank holding companies (BHCs) because, among banks, the BHC legal form of organization dominates over this period, especially for larger banks.<sup>1</sup> Comparing BHCs over the past two decades is difficult, however, because there has been rapid consolidation. This results in dramatic differences over time in the set of large BHCs (as measured by assets). To control for selection effects and better measure how BHCs have evolved over time, I create a sample related to the top fifty BHCs in 2006. (Section 2 describes how this sample is constructed.)

<sup>1</sup> Stiroh (2000) reports that by 1997, 83 percent of FDIC-insured assets were held by BHCs. He also details the organizational advantages of BHCs relative to independent banks.

For this sample of BHCs, I begin by using the standard measures of interest and noninterest income to infer the degree to which BHCs' income mix has changed. In 1994, near the beginning of the current transformation in the financial sector, these BHCs were fairly homogenous, earning the vast majority of their revenue from interest income. Over time, however, these BHCs pursued different income strategies, so that by 2006 there is a wide disparity in the relative importance of interest income. Some continue to earn the vast majority of their revenues from interest income, while for others interest income no longer accounts for most of their revenues. For this latter group, this shift in the mix of income suggests that these BHCs may have started earning income from new financial services, or at least changed the way they provide and charge for traditional banking services.

To better analyze BHCs' different income strategies, I turn to detailed income data available since 2001. With these data, I categorize income sources into three groups: traditional, securitization, and nontraditional. These categories are constructed so that income earned from new financial services would fall into either the securitization or nontraditional category. The securitization category captures income related to creating, servicing, or selling securitized assets, while the nontraditional category contains, roughly speaking, sources of income related to the capital markets.

Analyzing these three income categories, I find that there is a positive relationship between the relative importance of nontraditional income sources and asset size. Over the 2001-10 period, the largest BHCs earn a substantially larger share

of their total income from the nontraditional category compared with their smaller peers. These results demonstrate that larger BHCs have been much more active in offering new financial services, and suggest that the transformation in the financial industry has influenced larger BHCs to a greater extent.

Building on the above result, I show that large BHCs also earn substantially larger shares of their interest and noninterest income from their noncommercial bank subsidiaries. Consequently, large BHCs seem to be organizing themselves differently from their smaller peers.<sup>2</sup> Consistent with this result, Avraham, Selvaggi, and Vickery (2012) report that the largest BHCs are substantially more complex organizations relative to their smaller peers.

Altogether, these results strongly suggest that overall changes in the financial sector have most heavily influenced the larger BHCs. From an income perspective, the smaller BHCs have not changed much over the past two decades. Their mix of income continues to rely heavily on traditional banking sources, and income is still mostly generated by the commercial bank subsidiary. The larger BHCs, in contrast, have undergone a significant change, resulting in a reliance on new sources of income and on income generated by the BHC's noncommercial bank subsidiaries.

## 2. DATA

I use BHC data from Federal Reserve Y-9C regulatory filings covering the period 1994 to 2010.<sup>3</sup> The start date was chosen for two reasons. First, beginning the sample in the early 1990s allows me to observe a period of time when BHCs were still somewhat constrained by regulation and therefore fairly homogenous, providing a good reference point for any heterogeneity across BHCs that is later observed. Second, by 1994 the largest banks, the focus of this article, were organizing themselves as BHCs, as opposed to being stand-alone commercial banks (which are required to file different regulatory forms). From the Y-9C filings, I use mainly the income data as well as the information on organizational structure to track mergers over time.

Tracking mergers over time is crucial to the analysis in this study, because I intend to describe the evolution of the largest BHCs while controlling for selection effects. Because of the

<sup>2</sup> Clark et al. (2007) also highlight how the largest U.S. banks may be organizing themselves differently from other banks. They describe how retail banking has become an area of strategic focus for the largest U.S. banks, which are building large branch networks and investing in other retail banking infrastructure.

<sup>3</sup> For detailed information on the Y-9C filings, see [http://www.federalreserve.gov/reportforms/ReportDetail.cfm?WhichFormId=FR\\_Y-9C](http://www.federalreserve.gov/reportforms/ReportDetail.cfm?WhichFormId=FR_Y-9C).

wave of mergers that occurred among BHCs over this period, the top fifty BHCs in 1994 look quite different from the top fifty in 2010 along many dimensions. Examples include the entry of several large, foreign-owned BHCs midway through the sample as well as Goldman Sachs and Morgan Stanley at the end of the sample.

To control for selection, I pick the top fifty BHCs in 2006 and construct a data set of bank holding companies that are linked to these specific BHCs through mergers. Consequently, in 2006 I have data on exactly fifty BHCs. In any previous year, more than fifty BHCs are in my sample because I include all the BHCs that merged into and became part of the top fifty in 2006. For example, if two BHCs merged in 2005 to become a top fifty BHC in 2006, then both BHCs would be in the sample in 2005. Similarly, in 2007 and later, there are fewer than fifty BHCs in the data because of continued mergers among these BHCs, in addition to exits.<sup>4</sup> I chose the top fifty BHCs in 2006 because this is the latest year before the recent financial crisis.

The table reports the total number of BHCs in the constructed data set for each year in the sample. The massive consolidation among BHCs is readily apparent—268 BHCs in 1994 had merged into 50 BHCs by 2006. This consolidation is almost completely responsible for the concentration in assets. In 1994, the 268 BHCs that are linked to the top 50 in 2006 control 58 percent of total assets held by BHCs that file Y-9C regulatory filings. In 2005, there are sixty-four BHCs linked to the top fifty, and they control 58 percent of total assets held by BHCs. Hence, while there has been growth in the value of assets held by BHCs over this period, this growth has been equally distributed between those in the sample and all those outside of it. In 2006, there is a large jump in the percentage of assets held in the BHC sample, but this is driven by a change in the rules that lowered the number of BHCs required to file Y-9C reports. Specifically, before March 2006 all BHCs with more than \$150 million in assets were required to file Y-9C reports, while after March 2006 this asset threshold was raised to \$500 million.

With this sample of BHCs, the analysis in this article focuses on income reported in the Y-9C regulatory filings. Typically, analysis of BHC income relies upon the structure inherent in the regulatory filings, and so focuses on measures such as interest income and noninterest income. While I discuss the evolution of these two aggregate income measures, I also highlight changes in income sources related to offerings of new financial services. The interest and noninterest income grouping does not allow for a clean measurement, because new financial services will show up in both categories. As such, I construct a different categorization of income sources,

<sup>4</sup> Some BHCs reclassified themselves and consequently were no longer considered BHCs. For example, Charles Schwab Corporation became a savings and loan holding company in 2007 and so exited the sample.

## Statistics on the Constructed Bank Holding Company Data Set

| Year | Summations over BHC Sample |                              | Comparison of Sample to All BHCs |                  |
|------|----------------------------|------------------------------|----------------------------------|------------------|
|      | Total (Units)              | Assets (Billions of Dollars) | Total (Percent)                  | Assets (Percent) |
| 1994 | 268                        | 2,673                        | 20                               | 58               |
| 1995 | 256                        | 2,916                        | 18                               | 58               |
| 1996 | 238                        | 3,139                        | 17                               | 59               |
| 1997 | 214                        | 3,508                        | 14                               | 60               |
| 1998 | 170                        | 4,406                        | 11                               | 62               |
| 1999 | 146                        | 4,855                        | 9                                | 58               |
| 2000 | 127                        | 5,405                        | 7                                | 57               |
| 2001 | 106                        | 6,056                        | 6                                | 58               |
| 2002 | 91                         | 6,413                        | 4                                | 57               |
| 2003 | 82                         | 7,134                        | 4                                | 57               |
| 2004 | 69                         | 8,546                        | 3                                | 56               |
| 2005 | 64                         | 9,405                        | 3                                | 58               |
| 2006 | 50                         | 10,646                       | 5                                | 86               |
| 2007 | 43                         | 11,592                       | 4                                | 85               |
| 2008 | 40                         | 11,780                       | 4                                | 85               |
| 2009 | 39                         | 11,828                       | 4                                | 74               |
| 2010 | 38                         | 11,818                       | 4                                | 73               |

Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

Notes: The first pair of columns displays summations over the BHCs in the sample. The second pair of columns reports the ratio of the summations in the sample of BHCs over the comparable summations for all the BHCs that file FR Y-9C regulatory forms, as a percentage.

leveraging the increase in income source detail reported after 2000. For the 2001-10 period, I group income sources into three categories: traditional, securitization, and nontraditional. The main goal of this new categorization is to have income from new financial services fall into either the securitization or nontraditional category. By analyzing these two categories, then, I can estimate the relative importance of new financial services both overall and across BHCs.

The traditional category contains the classic sources of income that most banks have relied upon over time, such as interest and fee income on loans, service charges on deposit accounts, fees for providing payments services, and income from fiduciary activities. (See the appendix for a full mapping of income sources in the Y-9C filings to each of the income categories I construct.) These income sources capture services that BHCs have historically offered; hence, this category should not contain income derived from the newer financial services banks offered during the recent transformation of the banking sector.

The securitization category tries to capture income generated from banking activities related to the securitization of assets. In the past two decades, the creation, servicing, and sale of securitized assets have developed into an important part of banking.<sup>5</sup> Indeed, a well-known trend in banking is to substitute away from an originate-and-hold strategy for loans (particularly mortgages) to an originate-to-sell strategy. The first strategy involves holding loans on the balance sheet of BHCs. The second strategy uses financial market expertise to pool loans and create an asset-backed security that could be sold to investors. I include income from three sources in this category. The first two are fees earned from the securitization of loans and the servicing of financial assets held by others. The third source captures a BHC's net interest income from investing and holding mortgage-backed securities (MBS) on its balance sheet. I measure this third source of revenues as the interest and dividend income on MBS minus an approximation of the associated interest expense. The approximation is the fraction of interest and dividend income on MBS to total interest income, multiplied by total interest expense. Hence, I assume that interest expenses at a BHC are proportionately divided across all interest income activities.

I view the securitization and traditional categories as substitutes. Income related to securitization is focused on process—how a BHC manages its assets—as opposed to product. In both the originate-and-hold and originate-to-sell examples, the BHC is providing the same service—loans to customers. But under the first strategy, the BHC employs the “traditional” technology of holding and managing the loans on its balance sheet, while under the second it transforms the loans into a security. Under the first strategy, the resulting earned income will be classified as traditional, while under the second strategy the income will fall into the securitization category.

The nontraditional category captures income from, loosely speaking, capital market activities. I argue that most of the new financial services that BHCs began to offer in the past two decades were mainly related to capital market services. The five income sources in this category are net interest income from trading assets, trading revenues, venture capital revenues, investment banking, and insurance income. Net interest income is computed as interest income from trading assets minus an approximation of the interest expense associated with this activity. Once again, this approximation is the fraction of interest income from trading assets divided by total interest income, all multiplied by total interest expense.

<sup>5</sup>Cetorelli and Peristiani (2012) describe in detail the role of securitization within the banking industry.

### 3. EVOLUTION AND HETEROGENEITY AMONG BHCs

This section analyzes how the largest BHCs, from an income perspective, have evolved over time. I begin by examining changes in BHCs using the typical measures employed in the literature—for example, interest and noninterest income. I then complement this analysis by using the three income categories described in Section 2. In particular, I emphasize that the largest BHCs have a mix of income sources significantly different from that of other BHCs. Finally, I present evidence that the largest BHCs are organized quite differently from other ones.

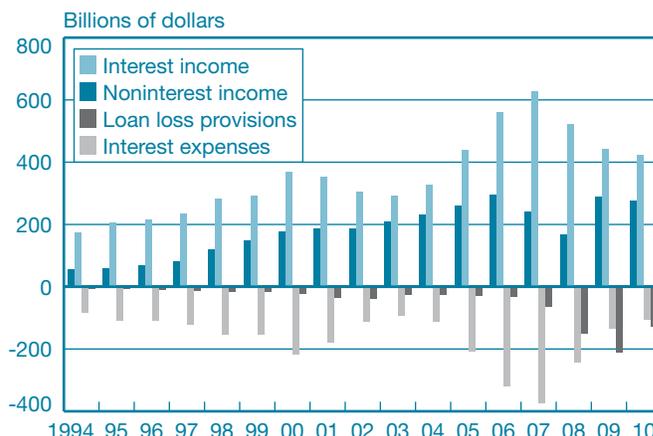
#### 3.1 An Analysis of BHC Income Using Standard Measures

I start by focusing on a commonly used measure of BHC income: operating revenue and its components. Operating revenue is equal to interest income minus interest expense plus noninterest income minus loan loss provisions. The first two variables are also called net interest income and together they roughly capture the income BHCs earn on the spread between the interest rate they earn from lending versus the interest rate they pay from borrowing. Noninterest income covers a wide variety of revenue sources, but is typically considered revenues the bank earns from providing fee-based services. Since 1994, noninterest income generated by BHCs has steadily increased, except for a dip during the financial crisis (Chart 1).<sup>6</sup> In addition, noninterest income has grown as a share of operating revenue, reaching 59 percent in 2010. This change in the mix of income has been presented as a shift away from banking services based on interest income and toward a fee-based operating model of banking (see, for example, DeYoung and Rice [2004]).

There is, however, a lot of heterogeneity among the largest BHCs with respect to this greater reliance on noninterest income. Chart 2 plots the joint distribution of the log of assets and the ratio of noninterest income to operating revenue for BHCs in 1994 and 2006. There are two interesting patterns revealed. First, the rightward shift from circle to triangle markers illustrates the massive consolidation that occurred among BHCs between 1994 and 2006. This is visually reinforced by the contrast in the number of data points; there were 268 BHCs in 1994 that through mergers became 50 in

<sup>6</sup>Stiroh and Rumble (2006) analyze BHCs' shift toward noninterest income. They find that the gains from having a more diversified mix of income are more than offset by the costs associated with the volatility of noninterest income.

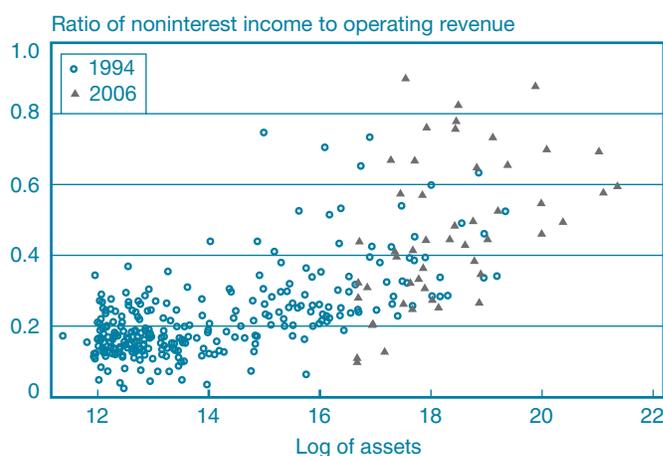
CHART 1  
Evolution of the Components of Operating Revenue



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

Notes: Operating revenue is equal to interest income minus interest expense plus noninterest income minus loan loss provisions. The sample is all bank holding companies linked to the top fifty BHCs in 2006.

CHART 2  
Heterogeneity in the Importance of Noninterest Income across Bank Holding Companies



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

Note: There are 268 BHCs plotted in 1994 and 50 BHCs plotted in 2006.

2006. Second, in 2006 BHCs look more diverse. In 1994, for a strong majority of BHCs the ratio of noninterest income to operating revenue was less than 0.4. For the most part, then, BHCs in 1994 relied on interest income as the main source of operating revenue. In contrast, the BHCs in 2006 are much more evenly spread between the high and low ratios of noninterest income to operating revenue. The recent evolution

in banking, then, has produced greater variety among BHCs, as institutions have pursued different strategies with respect to their reliance on noninterest income.

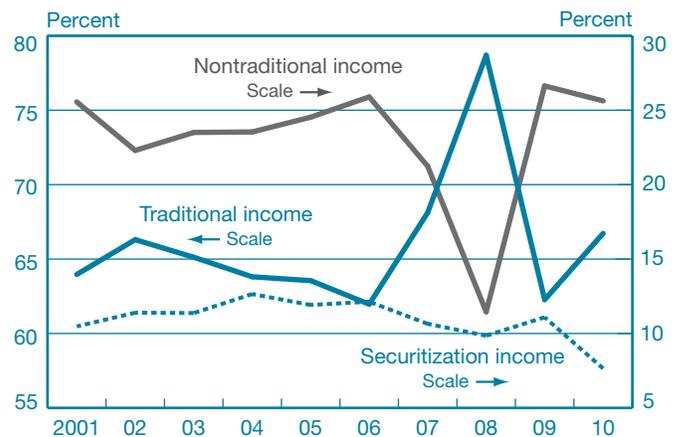
### 3.2 An Analysis of BHC Income Using New Measures

To better understand what is driving the heterogeneity in BHCs' sources of income, I turn to the detailed income numbers reported in regulatory filings from 2001 onward. I look for evidence that increased variety across BHCs is related to the larger changes occurring in the financial sector. An important trend in the sector has been the ability of banks to offer a number of new financial products to customers.<sup>7</sup> Using the detailed income data, I intend to measure if income earned from new financial services is a substantial amount and to what degree it impacts BHCs' mix of income sources. To this end, I use the disaggregated data to construct three categories of income: traditional, securitization, and nontraditional (as described in Section 2). These categories are constructed so that new financial services show up in the securitization or nontraditional category.

I first look at aggregate measures of traditional, securitization, and nontraditional income from 2001 to 2010 to see if overall trends inform us about the impact of new financial services on BHCs' mix of income. If new financial services are an important source of total BHC income, then we would expect to see upward trends in securitization's and nontraditional's shares of total income. Chart 3 presents these shares: the percentage contribution of each income category to total income over the sample period. Leading up to the crisis, the share of each income category to total income is roughly constant, with traditional income accounting for the majority of total BHC income. During the crisis, nontraditional income's share of total income fell dramatically, with a corresponding rise in traditional income's share. Post-crisis, however, nontraditional income has bounced back and contributes to total income at the same level observed in 2006. Securitization income started to fall with the advent of the crisis and has not yet recovered. Its share of total income dropped to about 7 percent of total income by 2010, its lowest level over the sample period. The financial crisis, then, appears to have had a lasting dampening effect on securitization income, in contrast to what we observed with nontraditional income.

<sup>7</sup>Before passage of the Gramm-Leach-Bliley Act of 1999, BHCs were restricted from owning both commercial and investment banks and were limited to providing services closely related to banking. Afterward, BHCs were able to own both commercial and investment banks and offer customers a wide variety of financial services.

CHART 3  
Evolution of Traditional, Securitization, and Nontraditional Income



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

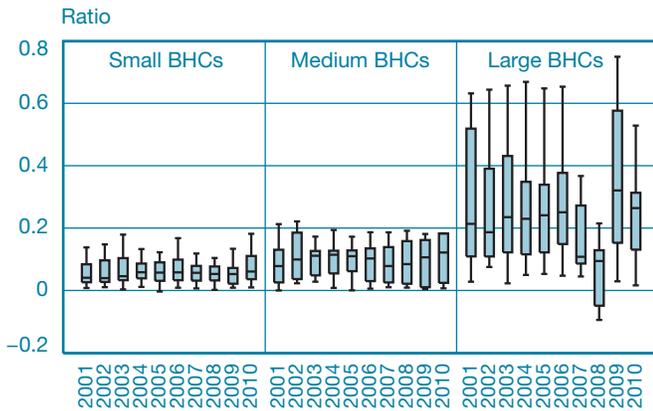
Unfortunately, these aggregate dynamics do not inform us about the impact of new financial services. The constant trends may indicate that the introduction of new financial services had little impact on BHCs' mix of income. However, BHCs may have already begun offering new financial services before 2001, in which case their income mix may have already adjusted. We may, however, be able to learn something by using the disaggregated data and analyzing the heterogeneity across BHCs over this period. Before the banking sector started its transformation and before the deregulation in the 1990s, BHCs were constrained to be fairly homogenous in their mix of income. For 2001 onward, then, we can interpret differences across BHCs in their reliance on securitization and nontraditional income as a function of differences in BHCs' willingness to introduce new financial services and to develop these new sources of income.

A main result from this approach is a positive relationship between size (as measured by assets) and reliance on nontraditional income sources. To illustrate this heterogeneity, I group BHCs into three categories based on asset size. I label "large" those BHCs that are linked to the top ten BHCs in 2006. "Medium" are those BHCs linked to the bank holding companies whose asset size ranks from eleven to twenty in 2006 and "small" are the remaining BHCs. As a point of reference, the median asset sizes in 2006 across these three groups of BHCs were \$505 billion, \$147 billion, and \$43 billion, respectively.

Charts 4-6 illustrate the income heterogeneity across BHCs. They present "box-and-whisker" plots of the ratios of nontraditional, traditional, and securitization income to total

CHART 4

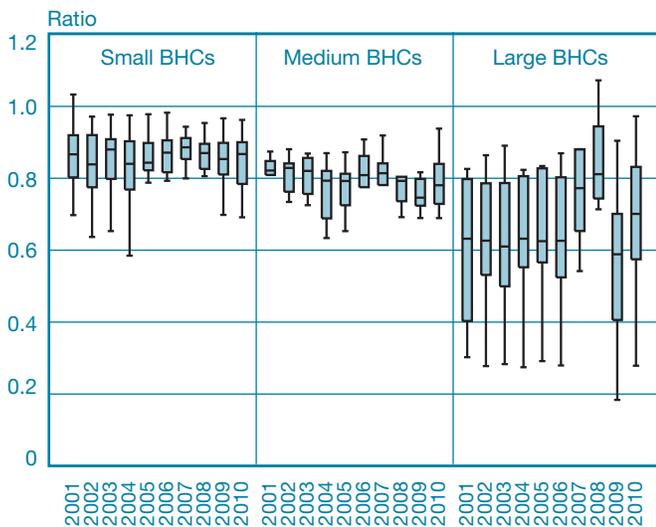
Ratio of Nontraditional to Total Income



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

CHART 5

Ratio of Traditional to Total Income



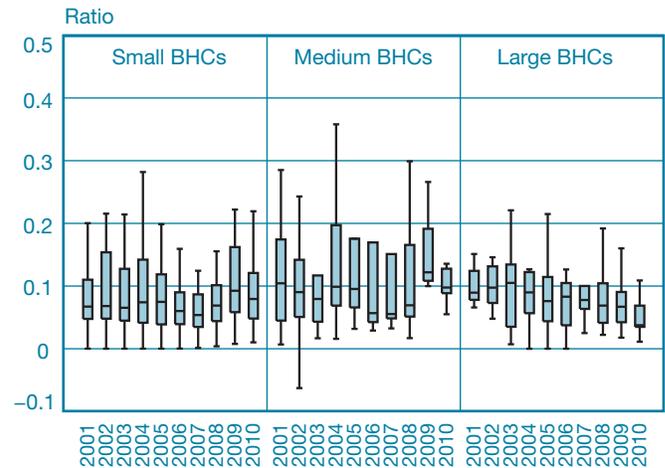
Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

income for each group of BHCs from 2001 to 2010.<sup>8</sup> For large BHCs, nontraditional income accounts for a significantly larger portion of total revenues. From 2001 to 2010, the median

<sup>8</sup>The "box-and-whisker" format is a convenient way to characterize a distribution. The "box" portion comprises the 25th, 50th, and 75th percentiles. Consequently, the box contains half of the observations in a category, and the length of the box provides a measure of the dispersion (heterogeneity) among them. The "whiskers" plot upper and lower adjacent values, defined hereafter. Let  $x$  represent the variable of interest. Define  $x_i$  as the  $i$ th ordered value of  $x$ , so that  $(x_{25}, x_{75})$  represent the 25th and 75th percentiles, respectively. Let  $U = x_{75} + \frac{3}{2}(x_{75} - x_{25})$ . The upper adjacent value is defined as  $x_i$  such that  $x_i \leq U$  and  $x_{i+1} > U$ . The lower adjacent value is defined similarly.

CHART 6

Ratio of Securitization to Total Income



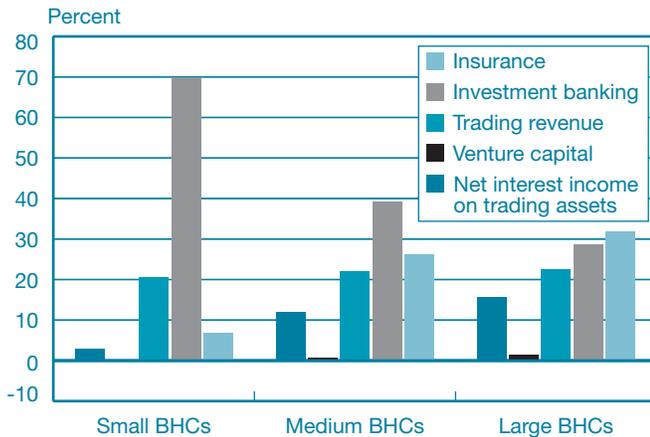
Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

ratio of nontraditional to total revenues was 0.05 and 0.11 for small and medium BHCs, respectively. In contrast, the median ratio was 0.21 for large BHCs. These stark differences across BHC groupings are mirrored in Chart 5, which plots the ratio of traditional to total income. Except for 2008, when the financial crisis was in full swing, the median ratio for large BHCs was significantly below those for small and medium BHCs. Surprisingly, all three types of BHCs rely on securitization to the same degree (Chart 6).

I argue that the significant heterogeneity between large BHCs and the remaining BHCs indicates that new financial services have had a substantial and uneven impact. The result suggests that the largest BHCs have most aggressively built up new sources of income. Small BHCs, in contrast, continue to rely mainly on the same sources of income available to them historically. Overall, then, this finding suggests that large BHCs have been impacted by the larger transformations within the financial sector to a much greater extent than their smaller counterparts.

Another interesting feature of Charts 4-6 is the greater diversity of income shares within large BHCs compared with shares within medium and small BHCs. As illustrated in Chart 4, the 75th percentile of large BHCs earn in the neighborhood of four-tenths of total income from nontraditional sources (of course, 2008 is a significant exception). In contrast, small and medium BHCs are more homogenous, as evidenced by the narrower range between the 25th and 75th percentiles (the length of the "box" portion of the "box-and-whiskers" plots). This result supports the idea that large BHCs are experimenting with and developing new financial services with varying degrees of success, while small

CHART 7  
Components of Nontraditional Income, 2001-06



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

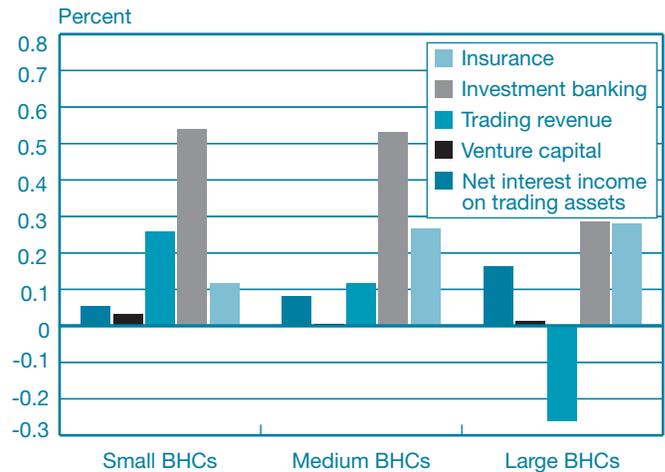
and medium BHCs continue to earn income from the same traditional services.

To better understand the differences in nontraditional income across BHC groupings, I turn to the disaggregated data. Recall that nontraditional income comes from five sources: net interest income from trading assets, venture capital revenues, investment banking, insurance income, and trading revenues. Because the recent financial crisis had a large impact on these income sources, I analyze the periods 2001-06, 2007-08, and 2009-10 separately.

From 2001 to 2006, there is a wide difference across the three BHC types in their reliance on specific income sources (Chart 7). As a group, small BHCs received over 60 percent of their nontraditional income from investment banking. In contrast, medium and large BHCs relied upon trading revenue, investment banking, and insurance income to a roughly equally extent. Further, net interest income from trading assets is substantially higher for medium and large BHCs relative to small ones.

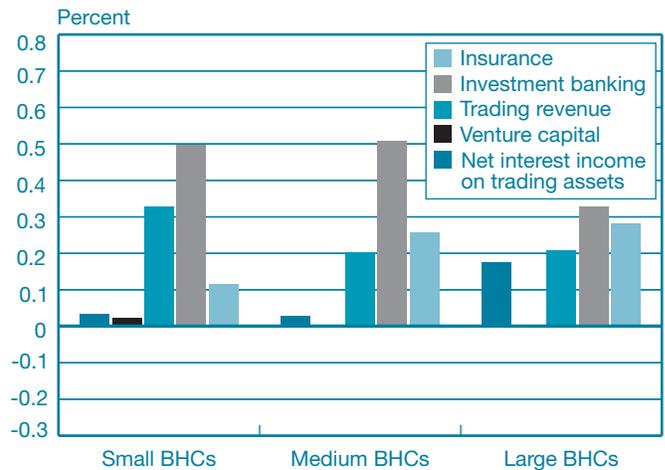
From 2007 on, there is a shift such that small and medium BHCs now look similar. Both types of BHCs rely on investment banking to generate half of their nontraditional income (Charts 8 and 9). Large BHCs, meanwhile, look significantly different. Unlike the other two types, large BHCs incurred massive losses in trading revenue during the financial crisis. Furthermore, they rely equally on investment banking and insurance to generate more than half of their nontraditional income, and they rely on net interest income on trading assets to a larger extent.

CHART 8  
Components of Nontraditional Income, 2007-08



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

CHART 9  
Components of Nontraditional Income, 2009-10



Sources: Federal Reserve System, Form FR Y-9C regulatory filings; author's calculations.

In summary, by analyzing the disaggregated data, I find that large BHCs have developed significantly different income sources relative to medium and small ones. While their smaller peers continue to rely on traditional income sources that have been available to BHCs historically, large BHCs have offered new financial services and have so developed new sources of income. The changes occurring in the financial sector, then, seem to have impacted large BHCs the most.

### 3.3 The Importance of Noncommercial Bank Subsidiaries in BHCs

The above analysis has focused on income sources of BHCs, regardless of where in the BHC entity the income was earned. Historically, the commercial bank subsidiary of a bank holding company has been dominant, earning the vast majority of a BHC's income. But a well-known feature of the current evolution in banking is the rising importance of noncommercial bank entities (see Boyd and Gertler [1994]). BHCs have the organizational flexibility to incorporate noncommercial bank subsidiaries, and so in this section I measure the importance of these subsidiaries in terms of income.<sup>9</sup> The main result is that large BHCs rely on commercial bank subsidiaries for income to a much lesser extent than do smaller BHCs. This finding reinforces the previous result that long-run changes in the financial industry have had a significant, but differential, impact on BHCs.

To measure how much BHCs rely on their commercial bank subsidiaries for income, I compute the fraction of interest and noninterest income earned by the commercial bank subsidiaries within a BHC compared with the BHC's total interest and noninterest income.<sup>10</sup> Charts 10 and 11 plot the median value of each fraction in each year of the sample by type of BHC.

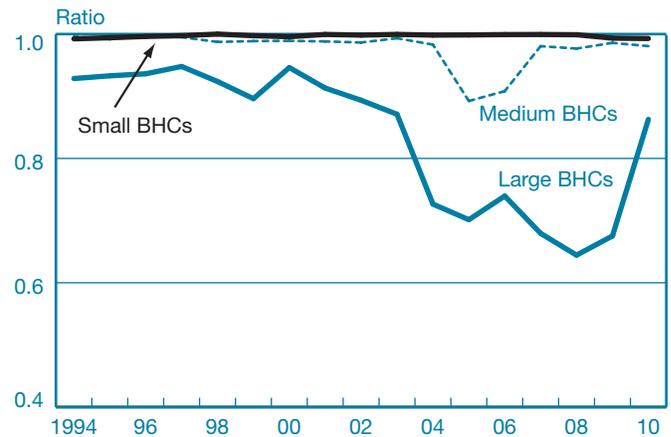
Despite the rising importance of noncommercial bank entities in the financial sector, small BHCs continue to almost exclusively rely on their commercial bank subsidiaries for interest income (Chart 10). The same is true for medium BHCs, except for 2005 and 2006. In contrast, large BHCs dramatically decreased the share of interest income earned from their commercial bank subsidiaries. From 2005 to 2009, noncommercial bank subsidiaries in large BHCs accounted for roughly one-quarter of total BHC interest income.

A similar story holds for noninterest income (Chart 11). In this case, small and medium BHCs have slightly decreased the role of commercial bank subsidiaries in generating income over time. But this is nowhere near the extent seen for large BHCs, where commercial bank subsidiaries have gone from producing almost all BHC noninterest income in the late 1990s to only about 60 percent in 2009 and 2010.

<sup>9</sup>Boyd and Graham (1986) also consider the significance of nonbank subsidiaries to BHCs. Rather than focus on income, they empirically examine whether nonbank subsidiaries increase a BHC's risk of failure. They find no evidence that increased involvement in nonbank business systemically changes a BHC's risk of failure.

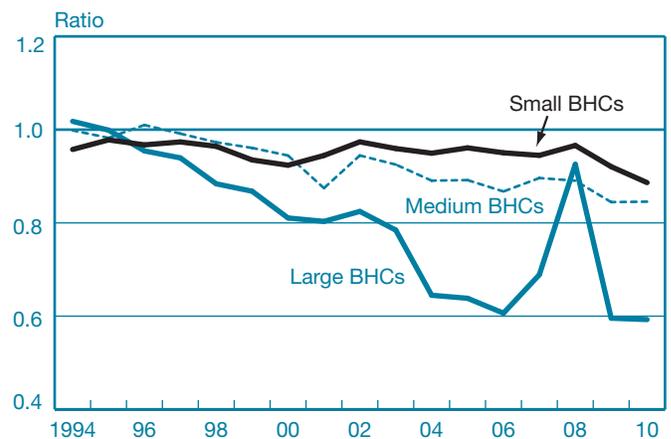
<sup>10</sup>The income earned by commercial banks is reported in the Consolidated Reports of Condition and Income (the "Call Reports"). Further, these filings provide information that allows me to link the commercial bank to its BHC. For detailed information on the Call Reports, see <http://www.fdic.gov/regulations/resources/call/>.

CHART 10  
Ratio of Bank to Bank Holding Company Interest Income by BHC Type



Sources: Federal Reserve System, Form FR Y-9C and call report regulatory filings; author's calculations.

CHART 11  
Ratio of Bank to Bank Holding Company Noninterest Income by BHC Type



Sources: Federal Reserve System, Form FR Y-9C and call report regulatory filings; author's calculations.

These findings demonstrate a variety of approaches across BHCs in their strategies to earn income. For large BHCs—and only for large BHCs—noncommercial bank subsidiaries play a substantial role in generating income. These results are consistent with those of Avraham, Selvaggi, and Vickery (2012), who report that the complexity of a BHC's structure increases with size. Furthermore, these results reinforce the earlier claims that the transformation of the financial sector has impacted large BHCs to a much larger extent than medium or small ones.

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#### 4. CONCLUSION

This article uses detailed income data from the Federal Reserve Y-9C regulatory filings to describe the evolution of BHCs' income mix from 1994 to 2010. I find that bank holding companies have become more diverse over time, as large BHCs have developed new sources of income by offering new financial services. Furthermore, large BHCs have

developed income sources outside of their commercial bank subsidiaries to a much larger extent than their smaller counterparts. I argue that these results demonstrate that the transformation of the financial sector over the past two decades has had a substantial and uneven impact on BHCs. Specifically, it is the large BHCs that have been most affected, at least as measured by income.

## APPENDIX: INCOME SOURCES

This appendix lists the income sources reported in the Federal Reserve Y-9C regulatory filings that are attributable to the three income categories used in the article. This mapping works only for those filings from 2001 and thereafter. Before 2001, reporting on income sources lacked sufficient detail to make this categorization possible.

For interest and dividend income on mortgage-backed securities (in the securitization category) and interest income from trading assets (in the nontraditional category), I compute an associated interest expense in order to arrive at a net interest measure. For interest income from trading assets, the interest expense term is equal to the fraction of interest income from trading assets to total interest income, multiplied by total interest expense. Similarly, for interest and dividend income on mortgage-backed securities, the interest expense term is equal to the fraction of interest and dividend income on mortgage-backed securities to total interest income, multiplied by total interest expense. These approximations are driven by the assumption that interest expenses at a bank holding company are divided proportionately across all interest income activities. The remaining portion of interest expense is assigned to the traditional category.

### 1. Traditional income sources:

- (a) Interest and fee income on loans
- (b) Income from lease financing receivables
- (c) Interest income on balances due from depository institutions
- (d) Interest and dividend income on securities (except for mortgage-backed securities)
- (e) Interest income from federal funds sold and securities purchased under agreements to resell
- (f) Other interest income
- (g) Income from fiduciary activities
- (h) Service charges on deposit accounts in domestic offices

- (i) Net gains (losses) on sales of loans and leases
- (j) Net gains (losses) on sales of other real estate owned
- (k) Net gains (losses) on sales of other assets (excluding securities)
- (l) Realized gains (losses) on held-to-maturity securities
- (m) Realized gains (losses) on available-for-sale securities
- (n) Interest expense (excluding the amounts assigned to securitization and nontraditional income categories)

### 2. Securitization income sources:

- (a) Net servicing fees
- (b) Net securitization income
- (c) Interest and dividend income on mortgage-backed securities minus associated interest expense

### 3. Nontraditional income sources:

- (a) Trading revenue
- (b) Investment banking, advisory, brokerage, and underwriting fees and commissions
- (c) Venture capital revenue
- (d) Insurance commissions and fees
- (e) Interest income from trading assets minus associated interest expense

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