

COMPONENTS OF U.S. FINANCIAL-SECTOR GROWTH, 1950-2013

- The U.S. financial sector grew steadily relative to the entire business sector from 1975 until its growth was interrupted in the recent financial crisis. Recovery has been tepid since.
- Large financial firms have had moderately higher average growth rates than small financial firms, especially since the 1990s. The shift followed regulatory changes that facilitated bank consolidation.
- Shadow banking grew rapidly at the expense of traditional banks, becoming a significant portion of the financial sector in the mid-1990s and peaking just before the crisis.
- The study's results show that growth in finance has mainly occurred in opaque, complex, and less-regulated subsectors of finance.

1. INTRODUCTION

There has been a resurgence of interest in the issue of whether financial-sector growth is necessarily good for the economy.¹ Earlier literature generally supported the idea that financial and economic development go together (King and Levine 1993; Rajan and Zingales 1998) or even that financial growth is a precondition for economic development (Wright 2002). More recently, the “dark” side of finance has been emphasized, with commentators questioning the social value of certain financial activities.² This change is an outcome, in part, of the experience of the recent financial crisis. For example, Turner (2010) argues that the financial sector extracts rent from the nonfinancial sector. Other studies (Philippon 2012; Greenwood

¹ See, for example, the symposium issue on “The Growth of the Financial Sector” in the *Journal of Economic Perspectives*, Spring 2013.

² Wouter den Haan, “Why Do We Need a Financial Sector?” *Vox*, October 24, 2011, <http://www.voxeu.org/debates/why-do-we-need-financial-sector>.

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and Scharfstein 2013; Philippon and Reshef 2013) find that, globally, the size of finance relative to gross domestic product (GDP) has been increasing and reached a historical maximum before the recent financial crisis. It is difficult to reconcile this fact with standard models of growth (Philippon 2012).

It is important to understand the evolution of finance and its subsectors since it weighs on many questions of policy interest. First, to what extent is credit being intermediated by shadow banks rather than by commercial banks, which have traditionally been the main conduits of funds to households and businesses?³ The relative growth of shadow banks has implications for regulatory policies geared toward enhancing the safety and soundness of commercial banks (such as those governing deposit insurance, central bank liquidity, and capital requirements). Second, what was the relative growth of large financial firms that pose risk for the rest of the economy? Third, what was the role of leverage in the growth of firms, especially of large firms, given that leverage constraints are now an important tool in bank regulation? Finally, to what extent has growth occurred within privately held firms that are more opaque than publicly listed companies?

To investigate these questions, we must first measure the size of the financial sector. So far, the literature has produced measures based on value-added and on liabilities of broad sectors using data from the Bureau of Economic Analysis (BEA) and the Federal Reserve Board's Flow of Funds Accounts (FOF).⁴ Others rely on aggregate wages and income. These measures, however, cannot be used to estimate accurately the growth of shadow banks or publicly listed firms. Accordingly, this paper provides new descriptive measures of financial-sector size using firm-level balance sheet data from the Center for Research in Security Prices (CRSP) and Compustat from the first quarter of 1975 to the first quarter of 2013. Our disaggregated approach allows us to examine how financial-sector growth relates to firm size, financing choice (whether equity or debt), and industry type.

The balance sheet data have the disadvantage of excluding private firms which are an important source of economic growth.⁵ To address this concern, we also measure the size of finance based on the FOF data reporting total liabilities for private and publicly listed firms at the sectoral level. In addition, we examine data for individual commercial banks

³ Shadow banks are entities such as structured investment vehicles that (like traditional banks) perform credit intermediation services, but (unlike banks) lack central bank liquidity or public sector credit guarantees (Pozsar, Adrian, Ashcraft, and Boesky 2013).

⁴ The FOF data release is now titled *Financial Accounts of the United States*.

⁵ The growth potential of private firms is indicated by evidence that these firms invest more than publicly listed firms of similar sizes (Asker, Farre-Mensa, and Ljungqvist 2013).

from the Federal Financial Institutions Examination Council's *Consolidated Reports of Condition and Income* (Call Reports) that include both private and publicly listed banks. These data provide a second source for examining the relative growth of the commercial banking sector.

Our measures are of the form $\frac{S}{F+NF}$, where S , F , and NF are sizes of a particular financial subsector S , the entire financial sector F , and the entire nonfinancial sector NF , respectively. When $S = F$, we are estimating the size of the finance sector relative to the total business (that is, financial plus nonfinancial) sector. By normalizing by the size of the business sector, we control for economy-wide factors that impact all firms. For firm-level or bank-level data, size is the value of firm or bank assets (comprising either debt plus equity or equity only).⁶ For FOF data, size equals the total liabilities of a sector.⁷

Using these measures, we find that the U.S. financial sector grew steadily relative to the entire business sector from 1975 until the recent financial crisis. Further, publicly listed financial firms had lower average size relative to the total business sector than private financial firms. For example, while publicly listed financial firms were about 50 percent of the business sector based on total asset values (representing debt plus equity) on average, financial-sector liabilities inclusive of private financial firms were almost 70 percent of total liabilities based on the FOF data.

We also measure the size of the credit intermediation subsectors, starting with shadow banks. Following an approach described in Financial Stability Board (2011) and Financial Stability Board (2012), we consider all nonbank credit intermediation activities and use FOF sector categories to identify the corresponding liabilities. For our CRSP-Compustat measures, we identify shadow banks by using the Standard Industrial Classification (SIC) and the North American Industrial Classification System (NAICS) codes that map to the FOF sectors. This broad measure of shadow banking is consistent with Financial Stability Board (2011, 3), which argues that "authorities should cast the net wide, looking at all nonbank credit intermediation to ensure that data gathering and surveillance cover all areas where shadow banking-related risks to the financial system might potentially arise." For comparison, we also report a narrower measure of shadow banking developed by Adrian and Ashcraft (2012) using specific types of FOF liabilities.

⁶ Many small publicly listed firms do not file with the Securities and Exchange Commission and, thus, we do not have debt data available. To account for these firms, we also report the equity-only measure of size.

⁷ Sectoral assets and liabilities need not be equal in the FOF data since these are not aggregated from firm-level balance sheets. However, our results are qualitatively the same whether we use assets or liabilities.

In keeping with the previous literature, we find that the share of shadow banking in the total business sector has grown from less than 4 percent in 1975 to a high of between 9 percent and 37 percent in recent years (depending on the measure). Growth in shadow banking has been fueled by rapid expansion in credit intermediation services performed by asset management and securities firms (including open-end investment funds and securities and commodities brokerages). We also see that housing-related credit intermediation (provided by real estate credit firms and real estate investment trusts [REITs]) is a substantial part of shadow banking, but its share has been declining since the 1980s. The average share of shadow banking in the business sector was at least twice as large when calculated with private liabilities (about 16 percent) than without (about 4 percent to 8 percent). Our results, which are qualitatively similar using broad and narrow definitions of shadow banking, emphasize the predominantly private nature of shadow bank liabilities and thereby heighten concerns about the opacity of the sector.

Shadow banks are a potential source of systemic risk (Adrian and Ashcraft 2012) in part because their activities are intertwined with those of traditional banks and depository credit institutions (DCIs) (Cetorelli and Peristiani 2012; Cetorelli, McAndrews, and Traina 2013). Boyd and Gertler (1995) find that between 1976 and 1993 the share of commercial banks in financial intermediation was stable. Recent evidence shows that shadow banks have grown relative to DCIs (Pozsar et al. 2013; Adrian and Ashcraft 2012). Greenwood and Scharfstein (2013) suggest that incremental growth in household credit origination was due to securitization, implying a growth in shadow banks at the expense of traditional banks. We measure the share of shadow banks in total credit intermediation (TCI) as $\frac{SB}{SB + DCI}$, where DCI (SB) is the size of the DCI (shadow banking) sector.

We find that the share of shadow banking in TCI grew from less than 9 percent in 1975 to a high of at least 33 percent in the period from 2004 to 2013. The estimate may understate the share of shadow banking in TCI because DCIs have increasingly acquired shadow banks, with this type of acquisition occurring at a greater rate than the reverse (Cetorelli et al. 2013). After being acquired, these shadow banks may be counted as part of the DCI sector, provided that DCI activity is considered the main business of the merged firm by SIC and NAICS. In this case, the shadow banking activity becomes part of the DCI sector.⁸

⁸In some cases, SIC codes may be reclassified and changed retroactively. We were unable to verify how frequently this occurs, but it appears that at least in some cases a firm will have different SIC and NAICS codes in different periods due to corporate structure changes, as discussed here.

Large financial firms (those in the top 10 percent of firms by value) were a substantially greater share of all large firms than small financial firms (those in the bottom 90 percent of firms by value) were of all small firms. Further, large financial firms had moderately higher average growth rates than small financial firms, especially since the 1990s. Size-related differences were most pronounced in the DCI sector, with large DCIs outgrowing small DCIs by an average of at least 3 percent over the sample period. Some of this shift followed regulatory changes that facilitated bank consolidation (such as the Riegle-Neal Act of 1994 and the Graham-Leach-Bliley Act of 1999).

The recent financial crisis adversely affected the size of the financial sector, but its impact differed by subsector and type of firm. For example, the shadow banking subsector did poorly relative to other sectors by most measures, with its size shrinking from the peak pre-crisis quarter to the trough crisis quarter more than that of the financial sector as a whole. These effects were even more pronounced when we excluded government-sponsored enterprises (GSEs) from our sample of financial firms. While small financial firms generally suffered the most of all firms during the crisis, larger shadow banks did worse than small shadow banks. Large DCIs actually grew in size during the crisis based on book values, especially during 2008 and 2009 when the Federal Deposit Insurance Corporation (FDIC) guaranteed the debt issuances by these firms. We estimate that the size of DCIs issuing guaranteed debt between October 2008 and October 2009 under this program increased by an average of roughly 11 percent compared with all other firms, an economically but not statistically significant number.

To understand the effect of balance sheet leverage on the size of financial firms, we look at total assets versus equity-only measures for publicly listed firms. We find that, on average, financial firms are three times smaller, shadow banks are one-and-a-half times smaller, and DCIs are five times smaller under equity-only measures than they are by total asset value, attesting to the importance of leverage in the capital structure of financial firms and of DCIs in particular.

This article contributes to the literature by proposing new firm-based and sector-based measures of financial-sector size in line with an approach by the Financial Stability Board (2012, 5), which recommends the use of more granular data and market prices “to adequately capture the magnitude and nature of risks in the shadow banking system.” While our metrics do not speak to risk exposures directly, they may be used as starting points for determining the location of vulnerabilities. Our findings also have policy implications, such as for the regulation of shadow banks, that we discuss more fully in the conclusion.

The remainder of our article is organized as follows. We review the literature in Section 2 and explain our measures of financial-sector size in Section 3. In Section 4, we describe our results on the size and growth of the financial sector. Section 5 discusses the effects of leverage, firm size, and financial regulation on financial-sector growth. Section 6 summarizes our findings. Results discussed in the article but not reported in the tables and charts can be found in the online appendixes.⁹

2. LITERATURE SURVEY

One of the earliest papers on trends in financial-sector size is Boyd and Gertler (1995), who use value-added data from the BEA and other measures to examine whether the commercial banking sector was declining or not. Already in the mid-1990s, there was concern over the growth of nonbank credit intermediaries—shadow banks, in today's terminology—and its effect on traditional banks. The authors conclude that the share of banking in total financial intermediation was generally stable, with small losses in the 1980s and 1990s, and that financial intermediation had grown relative to GDP. They suggest that the apparent decline in banking reflects the movement of activities from on-balance-sheet to off-balance-sheet as well as the significant increase in the share of foreign-owned banks in U.S. banking activity.

More recently, a number of papers that were part of a *Journal of Economic Perspectives* Spring 2013 symposium examined the evolution of finance. Specifically, Greenwood and Scharfstein (2013) and Philippon and Reshef (2013) propose metrics of financial-sector size and evaluate hypotheses on the sources of growth, while Cochrane (2013) argues that the focus should be on the functions of financial firms and not on their sizes. Separately, Philippon (2012) and Philippon and Reshef (2012) have also contributed to this literature.

Greenwood and Scharfstein examine financial-sector size using several measures, including value-added and liabilities data for broad sectors from the BEA and the FOF, as well as industry output, fees, and traded value for more specific sectors (such as asset management). They find that financial-sector growth has accelerated since 1980, fueled by the securities and credit intermediation sectors, and accounted for a quarter of the growth in the services sector as a whole. Considering the source of financial growth, the authors emphasize the role of asset management, which

grew as a class largely because of the increase in stock market valuations, and the provision of household credit, especially residential mortgages, which increased through fees derived from loan origination, underwriting, and trading activities. They also question the social value of this growth, given the high cost and persistent underperformance of professional asset management and the fallout from an excess of credit-financed consumption.

Cochrane (2013) argues that the growth in finance was an outcome of increased demand for financial services and higher wages for finance employees with scarce skills (although both these arguments appear to be inconsistent with the results of Philippon [2012], whose work is described below). Cochrane proposes a supply-and-demand model, based on Berk and Green (2004), to explain the underperformance of actively managed funds. He points to the persistence of proportional fees across different professions and over time to suggest that asset management fees may not represent suboptimal contracts. More generally, he makes an important distinction between form and function of firms that we discuss further in the conclusion.

Philippon (2012) shows that, while the income of financial intermediaries as a share of GDP has generally varied over time, it increased rapidly from 1980 to 2010. Using value-added data from the BEA, liabilities data from the FOF, and financial flow variables (such as for corporate issuance and mergers-and-acquisitions), he constructs a measure of financial-intermediation output as the weighted average of various types of credit, equity issuances, and liquid assets, with the relative weights based on theory. He finds that the annual unit cost of financial intermediation (defined as income over output) is around 2 percent and relatively stable over time. Philippon and Reshef (2012) examine wages, complexity of jobs, and skill levels in finance, relative to the economy, and find that they all follow a U-shaped pattern, peaking before World War II and then again from 1980 on. They point out, however, that growth in the financial industry and growth in skills and wages of finance employees did not always go together. Philippon and Reshef (2013) investigate the income share of finance in international data, using the ratio of bank loans to GDP as a proxy for financial-sector output.

These papers indicate the difficulty of measuring financial-sector output consistently over time and across countries in the context of financial innovation and other structural changes and given differences in accounting methodologies. Our balance-sheet-based measures are also open to the same critique, as they are affected by changes in accounting systems over time, assets moving off balance sheet, and changes in industry structure (in particular, mergers and acquisitions) that make industry classification ambiguous.

⁹ The online appendixes for this article are available at http://www.newyorkfed.org/research/epr/2014/1403anti_appendixA-D.pdf.

We discuss these issues further in the conclusion. The benefits of our measures, relative to the earlier literature, are the level of disaggregation (that is, firm-level observation) and the ability to use the same data sources (CRSP and Compustat) consistently for measuring sizes of all sectors. Previous papers use different data sets depending on which sector is being measured.

Unconventional measures have also been suggested, sizing the sector, for example, by the percentage of firms on the Forbes 400 list whose wealth is derived primarily from financial activities (Kaplan and Rauh 2013) or by the percentage of graduates from top colleges entering into financial services employment (Goldin and Katz 2008).

3. METHODOLOGY

We propose seven measures of financial-sector size, which are summarized in Table 1 along with their respective sample periods, data sources, and definitions. Appendix A describes the data used.

The first set of metrics is based on firm-level balance sheet data which are aggregated to the sectoral level to derive measures of sectoral size:

$$(1) \quad Size_t^S = \frac{\sum_{i \in S} Value_{i,t}}{\sum_{j \in F,NF} Value_{j,t}},$$

where $Value_{i,t}$ is the value of firm i in day or quarter t , S is either the entire financial sector or a financial subsector, F denotes the entire financial sector, and NF denotes the entire nonfinancial sector. In other words, we define the size of a sector S as the value of all firms in sector S relative to the value of all firms in the nonfinancial and financial sectors. Financial sectors S are classified using the SIC and NAICS systems, as described in Appendix B. When $S = F$, our metric is a measure of the size of finance relative to the total business sector. This methodology of calculating the size of a financial sector relative to the nonfinancial sector, similar to Philippon and Reshef (2012), controls for a spurious increase in the size of finance due to a general increase in the number of publicly listed firms over time.

The first four rows of Table 1 list the metrics derived from firm-level data, which correspond to whether we use equity value, total value (debt plus equity), the market value of equity (MVE), or the book value of equity (BVE).¹⁰ The measures

¹⁰ For asset management firms, we capture only liabilities of the firm, not funds held by a firm for other companies. So long as these funds belong to publicly listed companies in the same sector, the sectoral aggregates will remain unaffected.

TABLE 1
Relative Size Measures

Name of Measure	Sample	Formula
$Tsize - bv$	1975:Q1-2013:Q1	$Tsize - bv_t^S = \frac{\sum_{i \in S} (BVE_{i,t} + BVD_{i,t})}{\sum_{j \in F,NF} (BVE_{j,t} + BVD_{j,t})}$
$Tsize - qmv$	1975:Q1-2013:Q1	$Tsize - qmv_t^S = \frac{\sum_{i \in S} (MVE_{i,t} + BVD_{i,t})}{\sum_{j \in F,NF} (MVE_{j,t} + BVD_{j,t})}$
$Esize - bv$	1975:Q1-2013:Q1	$Esize - bv_t^S = \frac{\sum_{i \in S} BVE_{i,t}}{\sum_{j \in F,NF} BVE_{j,t}}$
$Esize - mv$	1950:Q1-2013:Q1	$Esize - mv_t^S = \frac{\sum_{i \in S} MVE_{i,t}}{\sum_{j \in F,NF} MVE_{j,t}}$
$Fsize$	1952:Q1-2013:Q1	$Fsize_t^S = \frac{\sum_{s \in S} Liabilities_{s,t}}{\sum_{j \in F,NF} Liabilities_{j,t}}$
AA	1990:Q2-2013:Q1	$AA = \frac{\sum_{k \in SB} Liabilities_{k,t}}{\sum_{j \in F,NF} Liabilities_{j,t}}$
$Csize$	1975:Q1-2013:Q1	$Csize_t = \frac{\sum_{i \in B} (BVE_{i,t} + BVD_{i,t})}{\sum_{j \in F,NF} Liabilities_{j,t}}$

Notes: This table defines the relative size measures used in this article and their sample periods.

The size of a sector is defined as the value of assets in the sector relative to the asset values of the financial and nonfinancial sectors.

MVE is market value of equity. The data for MVE are from the Center for Research in Security Prices.

BVE is book value of equity. BVD is book value of liabilities. The data for BVD and BVE are from Compustat.

For the $Tsize - qmv$ and $Esize - mv$ measures, an observation is the asset value of a firm i in day t belonging to a sector S .

Since BVD and BVE are only observed at the quarterly level, the quarterly value is repeated each day of the quarter for $Tsize - qmv$.

For the $Tsize - bv$ and $Esize - bv$ measures, an observation is the asset value of a firm i in day t belonging to a sector S .

When $S = F$ or $S = NF$, the F and the NF indicate the financial and nonfinancial sectors, respectively.

For $Fsize$, an observation is the liability of a sector S in quarter t .

For AA, the numerator is the liability of a financial instrument k aggregated over all shadow banking (SB) instruments. The SB instruments are commercial paper, repo, debt, pools of mortgages backed by government-sponsored enterprises, asset-backed securities, and money market mutual funds. The denominator of AA is the aggregate liabilities of the financial and nonfinancial sectors (which is the same as the denominator of $Fsize$). The data source for $Fsize$ and AA is the Federal Reserve Board's Flow of Funds Accounts.

For $Csize$, the numerator is the book value of assets of a commercial bank j , obtained from Call Reports data aggregated over the banking sector B.

The denominator of $Csize$ is the aggregate liabilities of the financial and nonfinancial sectors from flow-of-funds data (which is the same as the denominator of $Fsize$ and AA).

using equity value are $Esize - mv$ (based on MVE) and $Esize - bv$ (based on BVE). The measures using total value are $Tsize - qmv$ (based on MVE plus the book value of debt [BVD])¹¹ and $Tsize - bv$ (based on BVE plus BVD).

For firm i and day t , the MVE-based measures are:

$$(2) \quad Esize - mv_t^S = \frac{\sum_{ieS} MVE_{i,t}}{\sum_{jeE,NF} MVE_{j,t}},$$

$$(3) \quad Tsize - qmv_t^S = \frac{\sum_{ieS} (MVE_{i,t} + BVD_{i,t})}{\sum_{jeE,NF} (MVE_{j,t} + BVD_{j,t})},$$

Since MVE is reported daily and BVD quarterly, the latter is carried over for each day of the quarter in order to obtain a daily measure of $Tsize - qmv$. For comparability, all measures are reported at the quarterly frequency and so $Esize - mv$ and $Tsize - qmv$ are averaged quarterly. We focus on the MVE-based measures 2 and 3 for most of the paper.

For firm i and day t , the book-value based measures, discussed in Section 5.2, are:

$$(4) \quad Esize - bv_t^S = \frac{\sum_{ieS} BVE_{i,t}}{\sum_{jeE,NF} BVE_{j,t}},$$

$$(5) \quad Tsize - bv_t^S = \frac{\sum_{ieS} (BVE_{i,t} + BVD_{i,t})}{\sum_{jeE,NF} (BVE_{j,t} + BVD_{j,t})}.$$

A downside of our firm-level measures is that, because they comprise only publicly listed firms, the estimated sizes are affected by the relative shares of private firms in the financial and nonfinancial sectors. Over time, these effects are magnified if financial and nonfinancial firms go public at different rates. To address these concerns, we consider an additional measure based on FOF data, which captures most assets and liabilities in the economy, although it is available only at the sectoral level:

$$(6) \quad Fsize_t^S = \frac{\sum_{seS} Liabilities_{s,t}}{\sum_{jeE,NF} Liabilities_{j,t}},$$

where $Liabilities_{s,t}$ is the total liability of sector s in quarter t . Thus, for the shadow banking sector, for example, we sum the liabilities of the subsectors s making up the shadow banking industry and express that figure as

¹¹ We only calculate $Tsize - qmv$ when both CRSP MVE data and Compustat BVD data are available.

a ratio to the total liabilities of the business sector. When $S = F$, we are measuring total financial liabilities relative to total business sector liabilities.

To further address the potential biases of using only publicly listed firms, we provide an alternative measure of the size of the DCI sector using Call Reports data that include public and private banks:

$$(7) \quad Csize_t = \frac{\sum_{ieB} (BVE_{i,t} + BVD_{i,t})}{\sum_{jeE,NF} Liabilities_{j,t}},$$

where B is the commercial banking sector, equity and debt values of commercial banks are from Call Reports, and the denominator represents the total liabilities of the financial and nonfinancial sectors from the FOF data (which is identical to the denominator of equation 6).

As a check, we compare the total book value (BVE plus BVD) of banks for all our metrics and find that the mean is smaller using Call Reports data (about \$4.36 trillion) than with the FOF data (\$5.9 trillion) or the CRSP-Compustat data (about \$7.9 trillion). This discrepancy may be due to the fact that Call Reports provide data for individual commercial banks while the other data sets report information for bank holding companies.¹²

Finally, we also calculate an alternative measure of shadow banking using an approach developed by Adrian and Ashcraft (2012) based on specific types of FOF liabilities.¹³ The measure sums all liabilities recorded in the flow of funds that relate to securitization activity including mortgage-backed securities (MBS), asset-backed securities (ABS), and other GSE liabilities, as well as all short-term money market liabilities that are not backstopped by deposit insurance (such as repos, commercial paper, and other money market mutual fund liabilities). We adjust the aggregate to mitigate double-counting. So, we have:

$$(8) \quad AA_t^{SB} = \frac{\sum_{keSB} Liabilities_{k,t}}{\sum_{jeE,NF} Liabilities_{j,t}}.$$

¹² For more consistency across databases, we could have used Federal Reserve Y-9C forms that are filed by all bank holding companies of a certain size, which report consolidated data that include both commercial banking activity as well as other activity (such as investment banking) unrelated to commercial banking. Since we only want to focus on commercial banking activity, we prefer to use Call Reports.

¹³ We thank the authors for providing the data. The liabilities are described in Table 1.

where $Liabilities_{k,t}$ is a particular liability k (such as MBS) used by the shadow banking sector SB in quarter t . The denominator represents the total liabilities of the financial and nonfinancial sectors from the FOF data (which is identical to the denominator of equation 6).

4. THE SIZE AND GROWTH OF FINANCE AND ITS SUBSECTORS

In this section, we describe evolution of the aggregate financial sector, the DCI and shadow banking credit intermediation subsectors, and the remaining subsectors, in particular, asset management, securities, and insurance. While the subsets of asset management and securities firms involved in credit intermediation are included in the shadow banking sector, this analysis encompasses the asset management and securities industries as a whole.

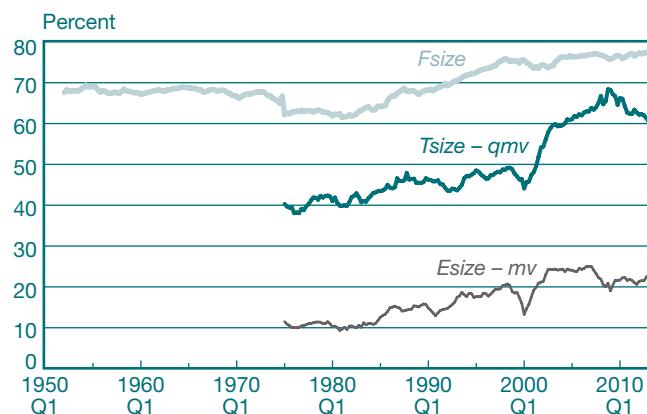
4.1 Growth of Finance

We find that, for all measures, the relative size of finance was growing consistently, particularly in the 1980s and from 2000 until just before the crisis in the third quarter of 2007. Chart 1 plots the values of $Tsize - qmv$, $Esize - mv$, and $Fsize$, while Table 2 reports summary statistics of these metrics for the full sample, pre-crisis (1980 to the third quarter of 2007), and crisis (the fourth quarter of 2007 to first quarter of 2013) periods. Chart 2 shows the median percent changes of the size measures for the pre-1980 period and subsequent decades. We report median instead of mean growth rates because the distribution of quarterly growth rates is skewed right, especially in the earlier part of the sample when some of our measures started from a low value (resulting in unusually high growth rates).

The financial sector was smaller but grew faster when measured using publicly listed firm assets instead of total (private and publicly listed) sectoral liabilities. Thus, the sample means for $Tsize - qmv$ of about 50 percent and for $Esize - mv$ of 17 percent were smaller than the mean for $Fsize$ of almost 70 percent (see Table 2). The average growth over the full sample in the size of finance using $Fsize$ was half that using public firm-based measures (0.40 percent for $Fsize$ versus more than 0.80 percent for $Tsize - qmv$ and $Esize - mv$) (Chart 2). Moreover, the growth in the relative size of publicly listed financial firms occurred even before 1980, whereas the $Fsize$ measure had negative median

CHART 1

The Relative Size of Finance



Source: Authors' calculations.

Notes: This chart shows measures of the size of finance relative to the financial and nonfinancial sectors. See Table 1 for variable definitions.

growth during this period. This result is consistent with that obtained by using BEA data (which also include private firm liabilities).¹⁴ Finally, the relative size of finance was larger using $Tsize - qmv$ instead of $Esize - mv$ (Chart 1), and the gap was increasing over time, which is indicative of rising leverage ratios for finance relative to the nonfinancial sector, as discussed further in Section 5.2.

As expected, the financial crisis had a deleterious effect on the size of the financial sector. From the peak pre-crisis quarter (the third quarter of 2007 for $Tsize - qmv$ and $Fsize$ and the first quarter of 2007 for $Esize - mv$) to the trough crisis quarter (the first quarter of 2009 for $Fsize$ and $Esize - mv$ and the first quarter of 2013 for $Tsize - qmv$), its total value shrank between 2 and 6 percentage points relative to the nonfinancial sector (Table 2).¹⁵ The $Esize - mv$ and $Fsize$ measures indicate that finance barely recovered to pre-crisis levels by the first quarter of 2013 whereas $Tsize - qmv$ shows that the relative

¹⁴ For example, Greenwood and Scharfstein (2013) and Philippon (2012) find that finance became prominent in the 1980s.

¹⁵ Unlike the other measures, $Tsize - qmv$ does not reach its minimum during the depth of the crisis (first quarter of 2009). However, the crisis period declines in finance remain similar across measures even if we use a common measurement period (such as the third quarter of 2007 to the first quarter of 2009). For the interested reader, the value for $Esize - mv$ in the third quarter of 2007 was 23.22 percent and the value for $Tsize - qmv$ in the first quarter of 2009 was 68.26 percent.

TABLE 2

The Relative Size of Finance

	Full Sample		
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
Observations	8,017,993	17,099,300	245
Mean	49.73	16.84	69.43
Median	46.5	17.36	68.18
Min / min quarter	38.04 / 1976:Q3	9.34 / 1980:Q4	61.47 / 1981:Q1
Max / max quarter	68.40 / 2008:Q4	25.03 / 2007:Q1	77.67 / 2013:Q1
Pre-crisis Period (1980:Q1-2007:Q3)			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
Observations	6,242,561	11,433,458	111
Mean	48.51	17.02	70.51
Median	46.41	16.26	71.54
Min / min quarter	39.8 / 1981:Q3	9.34 / 1980:Q4	61.47 / 1981:Q1
Max / max quarter	64.00 / 2007:Q3	25.03 / 2007:Q1	77.17 / 2007:Q3
Crisis Period (2007:Q4-2013:Q1)			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
Observations	1,293,724	3,487,929	22
Mean	64.34	21.4	76.68
Median	64.43	21.55	76.66
Min / min quarter	60.41 / 2013:Q1	19.05 / 2009:Q1	75.74 / 2009:Q1
Max / max quarter	68.40 / 2008:Q4	22.96 / 2013:Q1	77.67 / 2013:Q1

Source: Authors' calculations.

Notes: This table reports summary statistics of measures of the size of finance relative to the financial and nonfinancial sectors. Observation units are firm days for *Tsize – qmv* and *Esize – mv* and quarters for *Fsize*. Units for all other statistics are percentages. For *Tsize – qmv* and *Esize – mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

size of finance remains almost 2 percent lower than its peak in the pre-crisis quarter (Chart 2).

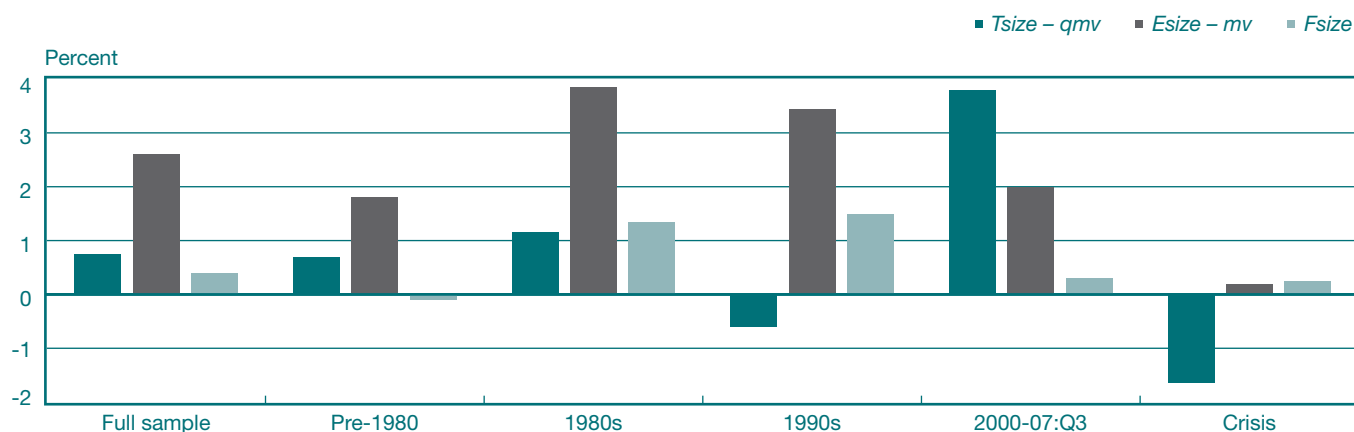
While the post-crisis recovery in finance has been tepid by any measure, it would have been even worse if we excluded GSEs from our sample. As discussed in Appendix B, we consider GSEs to be financial firms (in keeping with Financial Stability Board [2011] and Financial Stability Board [2012]). To examine the effect of GSEs on size measures, we recalculate our metrics excluding GSEs and agency- and GSE-backed mortgages from our definitions of both finance and nonfinance. Although they typically account for a small share

of finance, GSEs expanded greatly during the recent crisis in response to the credit crunch. For example, if we subtract GSEs, the peak in finance shifts from the first quarter of 2013 to third quarter of 2007 using *Fsize*.

While our results show that finance grew relative to the nonfinancial sector in the sample period, that increase may have been part of a general growth in services. Using SIC and NAICS codes to classify the services industry, we find that finance grew even relative to the nonfinancial services sector, consistent with Greenwood and Scharfstein (2013) and Philippon (2012).

CHART 2

Median Percentage Change in the Relative Size of Finance, by Period



Source: Authors' calculations.

Notes: This chart shows median annualized quarter-to-quarter percentage changes in the relative size of finance for each measure for specific periods. Size is relative to the financial and nonfinancial sectors. For *Tsize - qmv* and *Esize - mv*, we first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

4.2 The Size and Growth of Credit Intermediation

While credit intermediation has always been an essential component of finance, its nature has changed over time. Traditional credit intermediation is carried out by DCIs or banks that take insured deposits and give loans, and are regulated by and receive liquidity support from the central bank. Increasingly, though, shadow banks outside the purview of regulatory authorities intermediate credit. In this section, we discuss the growth of shadow banking and its sources, the size of the traditional banking and DCI sectors, and the relative share of shadow banking in total credit intermediation.

Shadow Banking

Shadow banking is, in essence, any form of nondepository credit intermediation. Pozsar et al. (2013) explain that shadow banking credit is intermediated by a variety of nonbank financial specialists such as asset managers, broker-dealers, and finance companies. For the *Fsize* measure, we follow Financial Stability Board (2011) and Financial Stability Board (2012) and use FOF sector categories to define the shadow banking sector. For our CRSP-Compustat measures, we define equivalent sectors by using SIC and NAICS industry codes that map

to the FOF sectors.¹⁶ We also report an AA measure using the approach of Adrian and Ashcraft (2012), who size the shadow banking sector based on specific types of FOF liabilities (see Section 3 for more discussion).

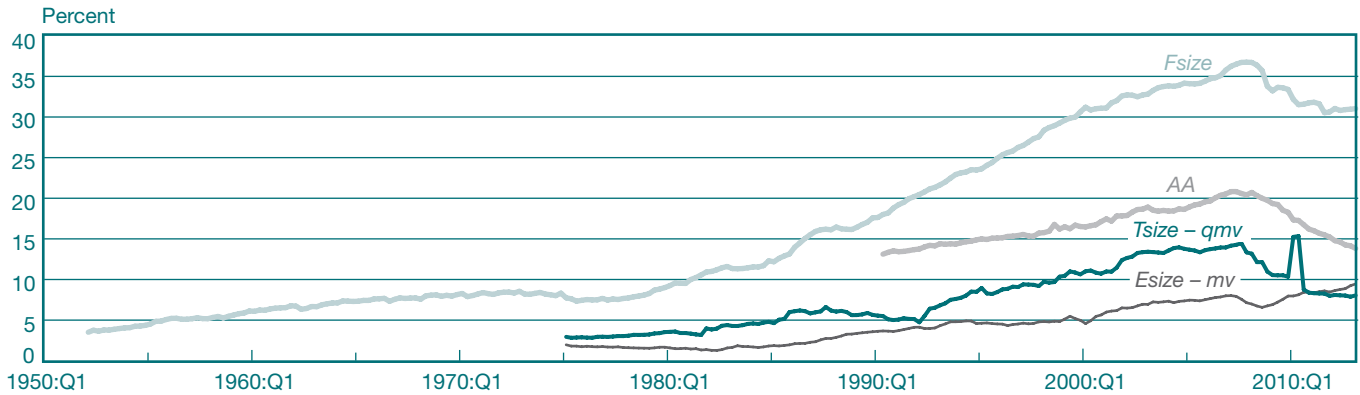
All measures show shadow banking growing relative to the rest of the economy from at least the 1980s until the recent financial crisis. The sector was small and growing unevenly in the 1970s. Then its growth accelerated in the 1980s and 1990s before slowing down in the 2000s and finally plummeting in the crisis (Charts 3 and 4). This result is consistent with Pozsar et al. (2013), Adrian and Ashcraft (2012), and Financial Stability Board (2012). The relative size of the shadow banking sector was less than 4 percent of the business sector in 1975 but reached a high of between 9 and 37 percent (depending on the measure) in the recent decade (Table 3). As for finance in general, the relative size of shadow banking is smaller when public firm-based measures are used. For example, the sample mean relative size of shadow banking is 8 percent based on *Tsize - qmv* and about 16 percent per the *Fsize* and AA measures.

The share of shadow banking in the business sector decreased during the recent financial crisis based on all measures, with pre-crisis peak quarter to crisis trough quarter declines of at least 6 percentage points by all measures except *Esize - mv* (Table 3). The average

¹⁶ Details of this mapping are in Appendix B.

CHART 3

The Relative Size of Shadow Banking

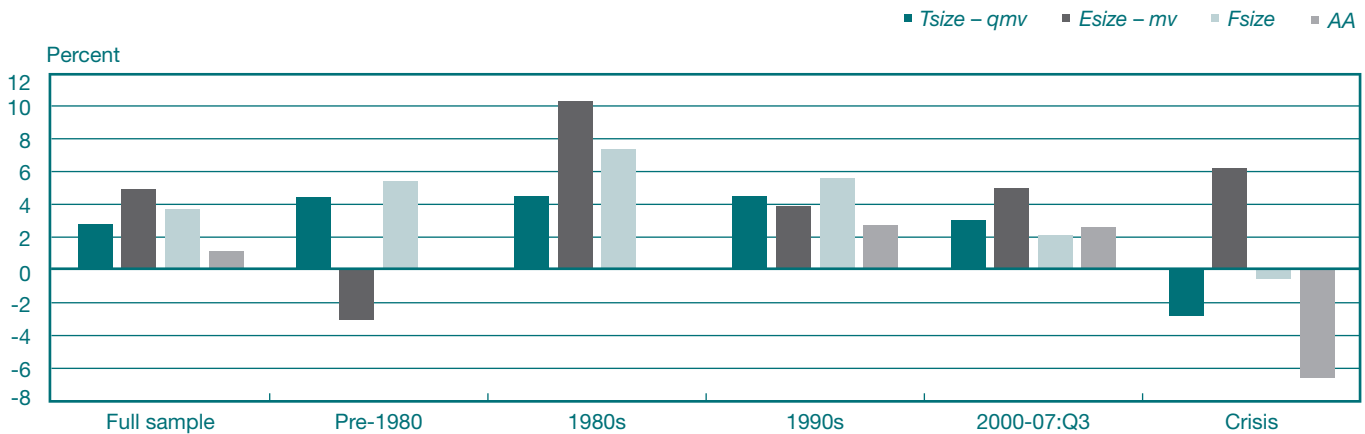


Source: Authors' calculations.

Notes: This chart shows measures of the size of shadow banking relative to the financial and nonfinancial sectors. See Table 1 for variable definitions.

CHART 4

Median Percentage Change in the Relative Size of Shadow Banking, by Period



Source: Authors' calculations.

Notes: This chart shows median annualized quarter-to-quarter percentage changes in the relative size of shadow banking for each measure for specific periods. Size is relative to the financial and nonfinancial sectors. For *Tsize - qmv* and *Esize - mv*, we first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

decline in the share of shadow banking during the crisis was particularly sharp using the *AA* measure, which is based on financial liabilities such as commercial paper and asset-backed securities that suffered the most during the crisis (Chart 4). In contrast, the *Esize - mv* measure shows only a modest decline from pre-crisis peak to crisis trough and, in fact, indicates a positive median growth rate in shadow banking since the crisis.

As for finance overall, the crisis effect was harsher for shadow banks when GSEs and agency- and GSE-backed mortgages are excluded. Indeed, when Fannie Mae and Freddie Mac are not counted, the crisis-period spike in *Tsize - qmv* (Chart 3) disappears entirely. However, the general trend of a growing shadow banking sector in the pre-crisis period is robust to whether GSEs are included or excluded from the sample.

TABLE 3

The Relative Size of Shadow Banking

Full Sample				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	1,524,082	7,186,652	245	91
Mean	7.85	4.49	16.36	16.71
Median	7.75	4.52	11.32	16.48
Min / min quarter	2.83 / 1975:Q2	1.27 / 1982:Q2	3.51 / 1952:Q1	13.12 / 1990:Q2
Max / max quarter	15.34 / 2010:Q2	9.45 / 2013:Q1	36.74 / 2007:Q4	20.82 / 2007:Q2
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	1,243,879	4,199,269	111	69
Mean	8.25	4.3	22.74	16.56
Median	7.61	4.51	22.93	16.36
Min / min quarter	3.17 / 1981:Q3	1.27 / 1982:Q2	9.25 / 1980:Q1	13.12 / 1990:Q2
Max / max quarter	14.46 / 2007:Q3	8.02 / 2007:Q3	36.72 / 2007:Q3	20.82 / 2007:Q2
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	165,822	2,311,902	22	22
Mean	10.2	7.99	32.71	17.19
Median	9.55	8.25	31.78	17.01
Min / min quarter	7.88 / 2012:Q4	6.57 / 2008:Q3	30.53 / 2011:Q3	13.82 / 2013:Q1
Max / max quarter	15.34 / 2010:Q2	9.45 / 2013:Q1	36.74 / 2007:Q4	20.72 / 2008:Q1

Source: Authors' calculations.

Notes: This table reports summary statistics of measures of the size of finance relative to the financial and nonfinancial sectors. Observation units are firm days for *Tsize – qmv* and *Esize – mv* and quarters for *Fsize*. Units for all other statistics are percentages. For *Tsize – qmv* and *Esize – mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

To understand the source of growth of shadow banking, we examine the types of credit intermediation that make up shadow banking: securities credit intermediation (SCI) (such as securities and commodities brokerages and investment banking), asset management credit intermediation (AMCI) (including mutual funds, closed-end funds, exchange-traded funds, and other financial vehicles), and real estate credit intermediation (RECI) (like mortgage credit, mortgage brokerages, agency GSEs, agency- and GSE-backed mortgages, and REITs). We define these sectors consistently in all our data sets (although, due to differences in data construction, it is unlikely that the

industry composition of sectors is identical in the different data sets). Table 4 reports the relative shares of various types of credit intermediation in shadow banking for the full sample and subsamples of interest.

We see that AMCI and RECI liabilities make up the bulk of total shadow banking liabilities, per the *Fsize* measure. For example, the share of AMCI liabilities in shadow banking (based on *Fsize*) grew from 28 percent in the 1980s to almost 43 percent in the crisis period of 2007-13. In contrast, and perhaps surprisingly, the share of RECI declined steadily from 42 percent in the 1980s to 32 percent in the crisis, based on *Fsize*. Of publicly listed

TABLE 4
Share of Shadow Banking, by Types of Credit Intermediation

	Full Sample		
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	29.04	15.02	8.64
AMCI	0.00	22.99	29.63
RECI	2.06	5.21	30.50
Other	68.89	56.78	31.23
Pre-crisis Period (Start-2007:Q3)			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	27.01	17.62	8.70
AMCI	0.00	27.97	28.36
RECI	1.96	6.08	30.35
Other	71.02	48.32	32.58
1980:Q1-1989:Q4			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	53.88	37.35	5.97
AMCI	0.00	28.55	28.22
RECI	2.76	12.73	42.04
Other	43.35	21.36	23.76
1990:Q1-1999:Q4			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	51.27	19.45	7.32
AMCI	0.00	36.04	36.72
RECI	3.69	9.72	36.14
Other	45.03	34.79	19.82
2000:Q1-2007:Q3			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	47.48	23.61	8.86
AMCI	0.00	29.29	38.24
RECI	2.78	6.05	31.95
Other	49.74	41.05	20.95
Crisis Period (2007:Q4-2013:Q1)			
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>
SCI	50.39	16.15	8.05
AMCI	0.00	69.62	42.97
RECI	3.12	2.3	31.97
Other	46.49	11.94	17.00

Source: Authors' calculations.

Notes: This table shows the sample averages for the share of total shadow banking for which each type of credit intermediation accounts. All statistics are percentages of the total size of shadow banking. See Table 1 for variable definitions. AMCI stands for asset management credit intermediation, which we define as the component of asset management which occurs in the shadow banking sector. SCI and RECI are securities credit intermediation and real estate credit intermediation, respectively. Exact definitions of these types of credit intermediation can be found in Appendix B.

shadow banks, SCI firms accounted for the largest shares by $Tsize - qmv$ and $Esize - mv$. Greenwood and Scharfstein (2013) note that the rise of asset management firms is closely correlated with asset prices, which rose strongly in the 1990s. Consistent with this finding, publicly listed AMCI firms grew from about 29 percent in the 1980s to 36 percent in the 1990s, according to the $Esize - mv$ metric. Interestingly, the market capitalization of AMCI firms grew strongly even during the recent crisis, with their share using $Esize - mv$ jumping from about 29 percent of all shadow banking in the early 2000s to about 70 percent in the crisis. Since many of these AMCI firms are funds which do not file quarterly or annual reports with the Securities and Exchange Commission, we do not have balance sheet data for them and thus exclude them from all $Tsize - qmv$ calculations. The share of publicly listed “other” shadow banks was also large and growing in the pre-crisis period, mostly due to increases in assets of secondary market financing and general finance companies.

To determine how shadow banking has evolved relative to the traditional banking sector, we measure the share of shadow banks in total credit intermediation (TCI). In particular, we look at ratios of the form $\frac{SB}{SB + DCI}$, where DCI (SB) is either the asset or equity value of DCI (shadow banking) firms in CRSP-Compustat or the total liability of the DCI (shadow banking) sector in the FOF data.

The share of shadow banking in TCI has grown steadily since 1980 (Chart 5). While shadow banking has always made up a nontrivial portion of TCI (at least 9 percent), it grew to a peak of between 33 percent and 69 percent post-2004, depending on the measure) as Table 5 shows. By all measures except $Esize$, the share of shadow banking in TCI grew consistently until the period between 2000 and the third quarter of 2007, when the growth rate decelerated while remaining positive, and then turned negative in the recent crisis (Chart 6).

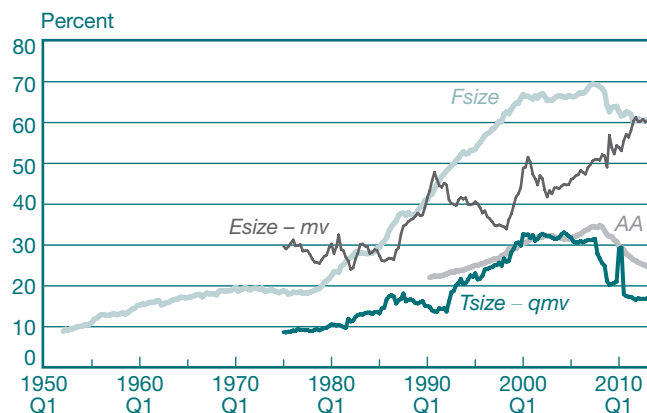
Depository Credit Intermediation

Did the DCI sector shrink over time or did it simply expand at a slower pace than shadow banking? To examine its size and evolution, we also consider the metric $Csize$, based on commercial bank assets reported in Call Reports (as described in Section 3).

The $Fsize$ and $Csize$ measures show a striking pattern of persistent decline for the DCI sector (Chart 7). These measures attain their peak early in the sample (the fourth quarter of 1954 for $Fsize$ and the fourth quarter of 1975 for $Csize$; see Table 6) and have negative average growth

CHART 5

The Share of Shadow Banking in Total Credit Intermediation



Source: Authors' calculations.

Notes: This chart shows measures of the share of shadow banking in total credit intermediation (TCI). The TCI sector is the sum of credit intermediation by the shadow banking sector and the depository credit institutions sector. See Table 1 for variable definitions.

rates over the entire sample period (-0.95 percent for $Fsize$ and -2.20 percent for $Csize$; see Chart 8). The median growth rates based on these measures became particularly negative in the 1980s and 1990s and were only mildly positive in the 2000s (Chart 8). Growth rates for publicly listed DCIs, per $Tsize - qmv$, were also negative on average. Only the $Esize - mv$ measure shows positive average growth for DCIs over the whole sample period.

4.3 Asset Management, Securities, Real Estate, and Insurance

We next focus on the size of the entire asset management, securities and real estate sectors, rather than specifically examining their credit intermediation components. We also examine the insurance sector. The results are not reported here but are available in Appendix C online.

For the asset management sector, Table C1 indicates almost 5.7 million firm-day observations for the $Esize - mv$ sample, but only about 600,000 firm-day observations in the $Tsize - qmv$ sample. This difference is because most open-end funds do not report balance sheet data, and so we exclude them from our $Tsize - qmv$ calculations (see Appendix A).

TABLE 5

Share of Shadow Banking in Total Credit Intermediation

Full Sample				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	1,524,082	7,186,652	245	91
Mean	19.94	39.58	35.53	28.58
Median	17.39	39.84	27.86	29.1
Min / min quarter	8.61 / 1975:Q2	24.07 / 1982:Q1	8.86 / 1952:Q1	22.04 / 1990:Q2
Max / max quarter	33.08 / 2004:Q2	61.26 / 2011:Q4	69.42 / 2007:Q2	34.81 / 2008:Q1
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	1,222,813	4,199,269	111	69
Mean	21.73	38.36	49.44	28.35
Median	20.67	39.62	52.33	29.1
Min / min quarter	9.73 / 1981:Q3	24.07 / 1982:Q2	22.53 / 1980:Q1	22.04 / 1990:Q2
Max / max quarter	33.08 / 2004:Q2	51.53 / 2000:Q3	69.42 / 2007:Q2	34.57 / 2007:Q2
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>AA</i>
Observations	165,346	2,311,902	22	22
Mean	20.69	55.9	63.15	29.31
Median	19.08	55.96	62.5	29.12
Min / min quarter	16.60 / 2011:Q4	49.01 / 2008:Q4	60.1 / 2011:Q3	24.56 / 2013:Q1
Max / max quarter	29.38 / 2010:Q2	61.26 / 2011:Q4	69.2 / 2007:Q4	34.81 / 2008:Q1

Source: Authors' calculations.

Notes: This table shows the summary statistics of measures of the share of shadow banking in total credit intermediation (TCI). TCI is the sum of credit intermediation by the shadow banking sector and the depository credit institutions sector. Observation units are firm days for *Tsize – qmv* and *Esize – mv* and quarters for *Fsize* and *AA*. Units for all other statistics are percentages. For *Tsize – qmv* and *Esize – mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions.

Accordingly, we place more emphasis on the results based on *Esize – mv* when evaluating the performance of the asset management sector.

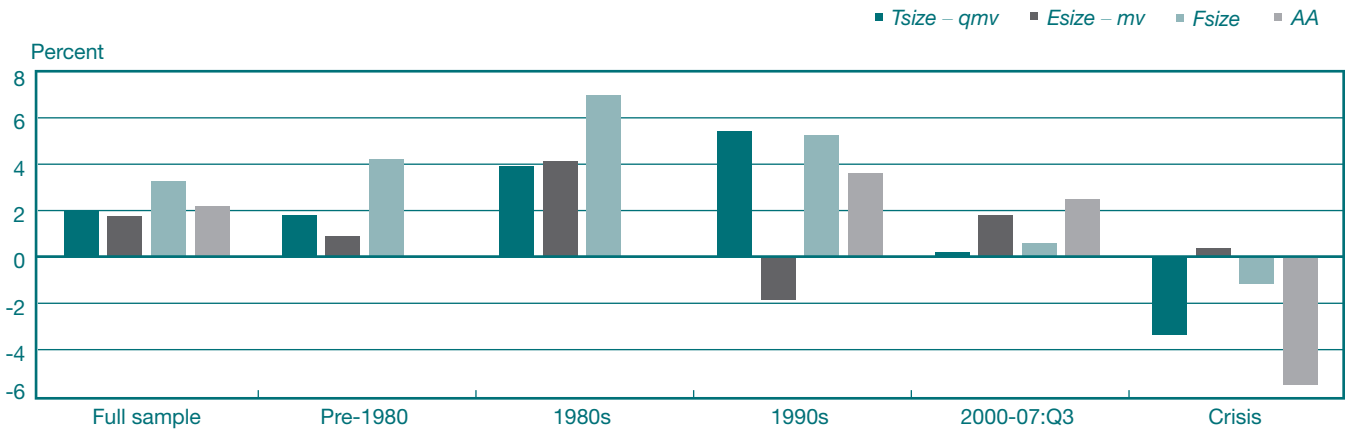
Asset management had a relatively small average share of the business sector ranging from about 2 percent to 3 percent using the MVE-based measures to 6 percent by *Fsize* (see Table C1). However, the sector has been growing rapidly by all measures except *Tsize – qmv*. The *Fsize* and *Esize – mv* measures show average growth rates of about 8 percent and 4 percent in the sample, respectively, including during the recent crisis (Chart C1). While the *Fsize* measure marks consistent growth in all decades, the

MVE-based measures suggest more intermittent growth that has surged since 2000, consistent with Greenwood and Scharfstein (2013), who find a similar pattern of rapid recent growth based on industry revenues.

The securities sector has been about 1 percent to 4 percent of the business sector on average, peaking at 2 percent to 8 percent just before the recent crisis (Table C2). We find a consistent pattern of growth in most decades, with an acceleration since 2000, in contrast with Greenwood and Scharfstein (2013), who find that securities growth peaked in 2001 (see Chart C2). Our measures unanimously show securities firms shrinking during the crisis.

CHART 6

Median Percentage Change in the Share of Shadow Banking in Total Credit Intermediation, by Period



Source: Authors' calculations.

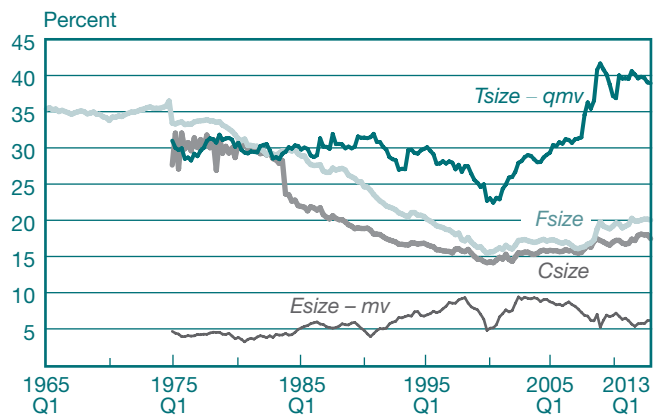
Notes: This chart shows median annualized quarter-to-quarter percentage changes in the share of shadow banking in total credit intermediation (TCI) for each measure over several periods. The TCI sector is the sum of credit intermediation by the shadow banking sector and the depository credit institutions sector. For *Tsize - qmv* and *Esize - mv*, we first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

The size and evolution of the real estate sector present sharply contrasting pictures depending on whether we use the MVE-based measures or the *Fsize* measure. Real estate firms were small relative to the universe of publicly listed firms over the whole period, based on *Tsize - qmv* and *Esize - mv*, with sample averages under 0.40 percent of total publicly listed firm assets (Table C3), but they have grown since the 1980s and especially during the crisis (Chart C3). In contrast, the *Fsize* metric shows that real estate accounted for more than 5 percent of total liabilities on average, with its share peaking at 12 percent in first quarter of 2003 (constituting almost a third of all shadow banking liabilities) before shrinking during the crisis (Table C3).

Finally, the insurance sector is the largest of the noncredit intermediation sectors, with an average relative size of more than 21 percent over the sample period (peaking at 27 percent in first quarter of 1998) per *Fsize* and about 9 percent (peaking at 15 percent in the third quarter of 2004) per *Tsize - qmv* (Table C4). The sector grew steadily but moderately over most of the sample period and then crashed in the recent crisis (Chart C4).

CHART 7

The Relative Size of Depository Credit Institutions



Source: Authors' calculations.

Notes: This chart shows measures of the size of depository credit institutions relative to the financial and nonfinancial sectors. See Table 1 for variable definitions.

TABLE 6

The Relative Size of Depository Credit Institutions

Full Sample				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>Csize</i>
Observations	4,237,897	5,236,753	245	1,816,776
Mean	30.49	6.09	27.69	20.21
Median	29.88	5.81	29.7	17.28
Min / min quarter	22.43 / 2000:Q3	4.71 / 1976:Q3	15.44 / 2000:Q1	14.14 / 2000:Q3
Max / max quarter	41.66 / 2009:Q1	16.17 / 2013:Q1	36.59 / 1954:Q4	32.04 / 1975:Q4
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>Csize</i>
Observations	3,225,438	4,063,827	111	1,349,320
Mean	28.87	6.38	22.23	19.04
Median	29.37	6.04	20.87	16.79
Min / min quarter	22.43 / 2000:Q3	3.21 / 1980:Q4	15.44 / 2000:Q1	14.14 / 2000:Q3
Max / max quarter	31.94 / 1991:Q1	9.42 / 2002:Q3	31.81 / 1980:Q1	30.78 / 1980:Q4
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize – qmv</i>	<i>Esize – mv</i>	<i>Fsize</i>	<i>Csize</i>
Observations	745,412	766,541	22	166,487
Mean	38.89	6.28	19.05	17.12
Median	39.59	6.18	19.3	17.14
Min / min quarter	34.56 / 2007:Q4	5.23 / 2009:Q1	16.35 / 2007:Q4	16.05 / 2007:Q4
Max / max quarter	41.66 / 2009:Q1	7.18 / 2010:Q2	20.27 / 2011:Q3	18.08 / 2012:Q2

Source: Authors' calculations.

Notes: This table reports summary statistics of measures of the size of depository credit institutions relative to the financial and nonfinancial sectors.

Observation units are firm days for *Tsize – qmv*, *Esize – mv*, and *Csize* and quarters for *Fsize*. Units for all other statistics are percentages.

For *Tsize – qmv* and *Esize – mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

5. FIRM SIZE AND HETEROGENEITY, LEVERAGE, AND REGULATION

In this section, we examine the effects of firm size and heterogeneity, leverage, and regulation on financial-sector growth. Philippon and Reshef (2013) suggest that increased concentration in the banking sector may be responsible for the increasing income share of finance. Policy initiatives have sought to mitigate negative externalities generated by too-big-to-fail firms.¹⁷ Motivated by these concerns, we estimate our size measures for large and small financial firms separately. Regarding firm heterogeneity,

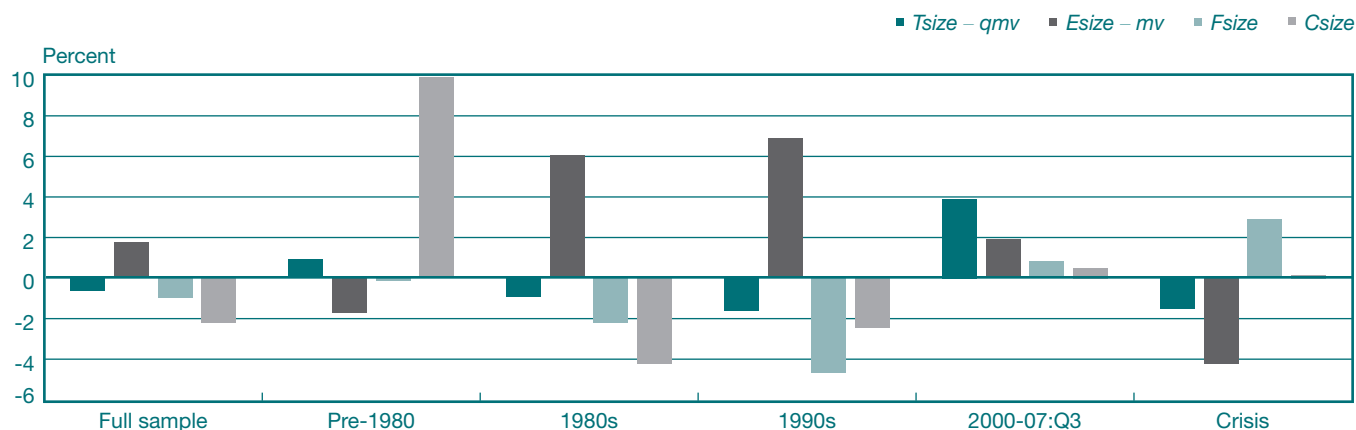
¹⁷ See http://www.federalreserve.gov/newsevents/reform_milestones.htm for examples of policy proposals for regulation of large and complex institutions.

Philippon (2012) notes that the mixture of new and old firms changes significantly over time, reflecting waves of technological change (Jovanovic and Rousseau 2005) and affecting measures of financial-sector size. We adjust for firm-level heterogeneity through firm fixed effects in a panel regression. Heightened awareness of the risks of leverage led to a minimum leverage ratio of 3 percent for banks under the Basel III regulatory framework as well as a proposal for additional capital requirements for large bank holding companies by U.S. regulators.¹⁸ Calomiris and Nissim (2012)

¹⁸ See <https://www.bis.org/publ/bcbs270.htm> for Basel III leverage ratio requirements and <http://www.federalreserve.gov/newsevents/press/bcreg/20130709a.htm> for the proposal to strengthen leverage ratio standards by the Federal Reserve, the FDIC, and the Office of the Comptroller of the Currency.

CHART 8

Median Percentage Change in the Relative Size of Depository Credit Institutions, by Period



Source: Authors' calculations.

Notes: This chart shows median annualized quarter-to-quarter percentage changes in the relative size of depository credit institutions for each measure for specific periods. Size is relative to the financial and nonfinancial sectors. For *Tsize - qmv* and *Esize - mv*, we first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

find that leverage is an important determinant of the market value of commercial banks. Thus, to investigate the effect of leverage on our size measures, we compare equity-only with total asset-based measures. Finally, we consider the effect of select financial regulations on changes in financial-sector size. Philippon and Reshef (2012) suggest that regulation discourages skilled workers and conclude that it is the main determinant of the demand for skill and wages in the U.S. financial sector. Philippon and Reshef (2013) find that, with some exceptions, countries that deregulate more also experience larger increases in the relative skill intensity in finance.

5.1 Firm Size and Heterogeneity

Our disaggregated data allow us to evaluate whether the growth of finance is mainly due to the growth of large financial firms or whether it is more broadly based. We first take a look at trends in the Herfindahl-Hirschman index (HHI) of market concentration for the financial and nonfinancial sectors. Both sectors show low levels of concentration that have changed little over time. Given the low and stable concentration in both the financial and nonfinancial sectors, we estimate the relative size of small and large financial firms separately. For each metric and each year, we partition firms at the beginning of the year into two subsets. Large firms are those in the top 10 percent of firms,

while small firms are defined as the remaining 90 percent of firms, based on *Tsize - qmv* or *Esize - mv*.¹⁹ We then estimate the share of value of large (small) firms in sector *S* as a percentage of the total value of large (small) firms in the financial and nonfinancial sectors.²⁰ Thus, for large firms *i* on day *t*, the size measure for sector *S* is:

$$(9) \quad Size_{Large,t}^S = \frac{\sum_{j \in S}^{Large} Value_{i,t}}{\sum_{j \in F}^{Large, NF} Value_{j,t}}$$

Similarly, for small firms *i* on day *t*, the size metric for sector *S* is:

$$(10) \quad Size_{Small,t}^S = \frac{\sum_{j \in S}^{Small} Value_{i,t}}{\sum_{j \in F}^{Small, NF} Value_{j,t}}$$

¹⁹ We also tried a lower cutoff for small firms (such the bottom 50 percent of firms) and obtained similar mean shares but substantially larger volatility in the shares from year to year.

²⁰ The share of finance in small firms may increase because large financial firms have decreased in size and become small, or vice versa. Likewise, an increase in the share of finance in large firms could be due to small financial firms growing and joining the large sample. Thus, growth in the share of finance in the large (small) firm sample need not be the same as the relative growth of large (small) finance firms. We use S^{Large} (S^{Small}) to denote the intersection of sector *S* with the top ten percent (bottom 90 percent) of all firms.

TABLE 7

The Relative Size of Large and Small Financial Firms

Full Sample				
	<i>Tsize - qmv_small</i>	<i>Tsize - qmv_large</i>	<i>Esize - mv_small</i>	<i>Esize - mv_large</i>
Observations	6,396,748	1,892,004	6,396,748	1,892,004
Mean	18.54	55.56	8.21	16.81
Median	19.25	51.44	8.34	16.43
Min / min quarter	8.76 / 1984:Q1	46.60 / 1976:Q3	3.41 / 1975:Q4	9.53 / 1981:Q3
Max / max quarter	27.86 / 1994:Q2	73.15 / 2008:Q4	12.94 / 2003:Q1	26.12 / 2006:Q3
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize - qmv_small</i>	<i>Tsize - qmv_large</i>	<i>Esize - mv_small</i>	<i>Esize - mv_large</i>
Observations	5,010,409	1,468,739	5,010,409	1,468,739
Mean	18.26	53.73	8.77	17.35
Median	19.14	50.96	9.53	16.43
Min / min quarter	8.76 / 1984:Q1	47.17 / 1983:Q1	3.81 / 1981:Q1	9.53 / 1981:Q3
Max / max quarter	27.86 / 1994:Q2	69.68 / 2007:Q3	12.94 / 2003:Q1	26.12 / 2006:Q3
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize - qmv_small</i>	<i>Tsize - qmv_large</i>	<i>Esize - mv_small</i>	<i>Esize - mv_large</i>
Observations	1,094,084	217,514	1,094,084	217,514
Mean	20.81	70.10	8.98	19.28
Median	20.76	70.09	8.67	19.52
Min / min quarter	19.20 / 2012:Q1	67.12 / 2013:Q1	8.20 / 2011:Q3	16.07 / 2009:Q1
Max / max quarter	24.03 / 2008:Q4	73.15 / 2008:Q4	11.05 / 2008:Q4	22.11 / 2007:Q4

Source: Authors' calculations.

Notes: This table reports, for each size measure, summary statistics of the relative size of large and small financial firms in the sample. For each year and each size measure, we rank all publicly listed firms by *Tsize - qmv*. The top 10 percent of firms are included in the large firm sample, while the remaining firms are included in the small firm sample. We estimate our size measures separately for the large and small firm samples. Observation units are firm days for *Tsize - qmv* and *Esize - mv*. Units for all other statistics are percentages. For *Tsize - qmv* and *Esize - mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

We find that financial firms are far more prevalent in the sample of large firms than they are in the sample of small firms. Within any period and for any measure, the relative size of finance is two to three times bigger in the large firm sample than in the small firm sample (Table 7). For example, by *Tsize - qmv*, large financial firms account for 56 percent of all large firms on average whereas small financial firms are 19 percent of all small firms on average for the full sample.

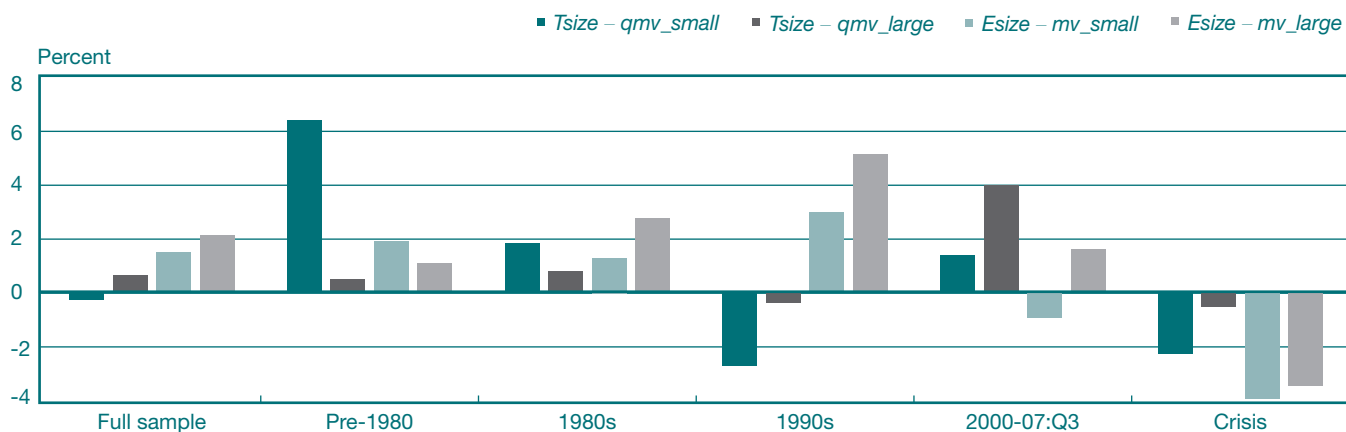
Median annualized growth rates show the relative size of large financial firms growing moderately more than the small financial firms (Chart 9). According to *Tsize - qmv*,

small financial firms grew more until the 1990s, but large financial firms have grown more (or declined less) since then. *Esize - mv* shows large financial firms growing more in every decade since the 1980s. Both metrics show that small financial firms did worse than large financial firms during the crisis.

Large shadow banks also make up a larger proportion of all large firms than do small shadow banks of all small firms, although the difference is not as pronounced as for financial firms in general. Thus, the sample mean of the relative size of large shadow banks is over 8 percent whereas it is less than 3 percent for smaller shadow banks, according to *Tsize - qmv* (Table 8).

CHART 9

Median Percentage Change in the Relative Size of Large and Small Financial Firms



Source: Authors' calculations.

Notes: This chart shows, for each size measure, the median annualized quarter-to-quarter percentage changes in the relative size of large and small financial firms in the sample. We estimate our measures separately for the large and small firm samples. We first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

The corresponding means for $Esize - mv$ are 3 percent of the large firm sample and 2 percent of the small firm sample. The share of large shadow banks in the large firm sample has grown more than the share of smaller shadow banks, although the difference is moderate according to $Esize - mv$ (Chart 10). We do see that the recent crisis had a harsher effect on large shadow banks whose share in the large firm sample declined by more than 4 percent during the crisis, while the share of smaller shadow banks grew in the same period.

Large DCIs are a bigger share of all large firms than are small DCIs of all small firms, and the difference is substantial. For example, the sample mean of the relative size of large DCIs is about 34 percent by $Tsize - qmv$, more than three times the sample mean of 11 percent for small DCIs (Table 9). In addition, the gap between the relative shares of small and large DCIs has been increasing. We see in Chart 11 that the relative size of small DCIs has been declining over time, whereas the reverse is true for large DCIs. Moreover, large DCIs have consistently outgrown small DCIs in most decades since the 1980s. In the recent crisis period, small DCIs shrank more than large DCIs by $Tsize - qmv$ while the opposite was true based on $Esize - mv$.

Firm-size effects illustrate the impact of firm heterogeneity generally. Since our measures are aggregated up to sectors from firm-level data, the sectoral means are potentially

affected by firm-level heterogeneity. To account for this, we estimate a firm-level panel regression using firm size (relative to the total size of the business sector, as in the denominator of equation 1) as the dependent variable. We include all financial firms in the sample and regress the relative firm-size variable upon period and firm fixed effects. Chart 12 shows estimates of these period fixed effects, divided by the estimate of the regression intercept, using $Tsize - qmv$ as the size measure. We find that, when firm-level heterogeneity is accounted for, financial-sector growth becomes more consistent. In particular, the dips in size around 2000, and during the crisis, are considerably muted, suggesting that these may have been largely firm-level effects.

To quantify the effect of firm heterogeneity on the size of different credit intermediation subsectors, we regress estimates of the period fixed effects, in a second stage, on sector-level dummy variables, omitting the nonfinancial sector. The results confirm the descriptive statistics. Specifically, the coefficient on the shadow banking sector is positive and significant for all measures, while the coefficient on the DCI sector is negative and significant for $Fsize$ and positive and significant for $Tsize - qmv$, indicating the relative expansion of the shadow banking sector and the relative decline of the DCI sector per the $Fsize$ measure.

TABLE 8

The Relative Size of Large and Small Shadow Banking Firms

Full Sample				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	1,372,634	195,870	1,372,634	195,870
Mean	2.81	8.63	1.81	2.68
Median	2.68	8.42	1.56	2.3
Min / min quarter	1.46 / 1981:Q4	2.98 / 1976:Q2	0.91 / 1975:Q4	0.64 / 1975:Q4
Max / max quarter	4.64 / 1998:Q3	17.02 / 2010:Q2	3.56 / 1997:Q4	6.28 / 2004:Q1
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	1,129,896	148,134	1,129,896	148,134
Mean	3.00	9.07	2.09	3.01
Median	3.02	8.34	1.91	2.54
Min / min quarter	1.46 / 1981:Q4	3.65 / 1981:Q3	0.95 / 1981:Q4	0.74 / 1982:Q1
Max / max quarter	4.64 / 1998:Q3	16.09 / 2007:Q3	3.56 / 1997:Q4	6.28 / 2004:Q1
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	135,935	33,416	135,935	33,416
Mean	2.29	11.22	1.12	2.73
Median	2.19	10.51	1.10	2.78
Min / min quarter	1.9 / 2008:Q4	8.64 / 2012:Q4	0.91 / 2009:Q1	1.77 / 2009:Q1
Max / max quarter	2.9 / 2012:Q4	17.02 / 2010:Q2	1.33 / 2012:Q4	4.31 / 2007:Q4

Source: Authors' calculations.

Notes: This table reports, for each size measure, summary statistics of the relative size of large and small shadow banking firms in the sample. For each year and each size measure, we rank all publicly listed firms by *Tsize* – *qmv*. The top 10 percent of firms are included in the large firm sample, while the remaining firms are included in the small firm sample. We estimate our size measures separately for the large and small firm samples. Observation units are firm days for *Tsize* – *qmv* and *Esize* – *mv*. Units for all other statistics are percentages. For *Tsize* – *qmv* and *Esize* – *mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

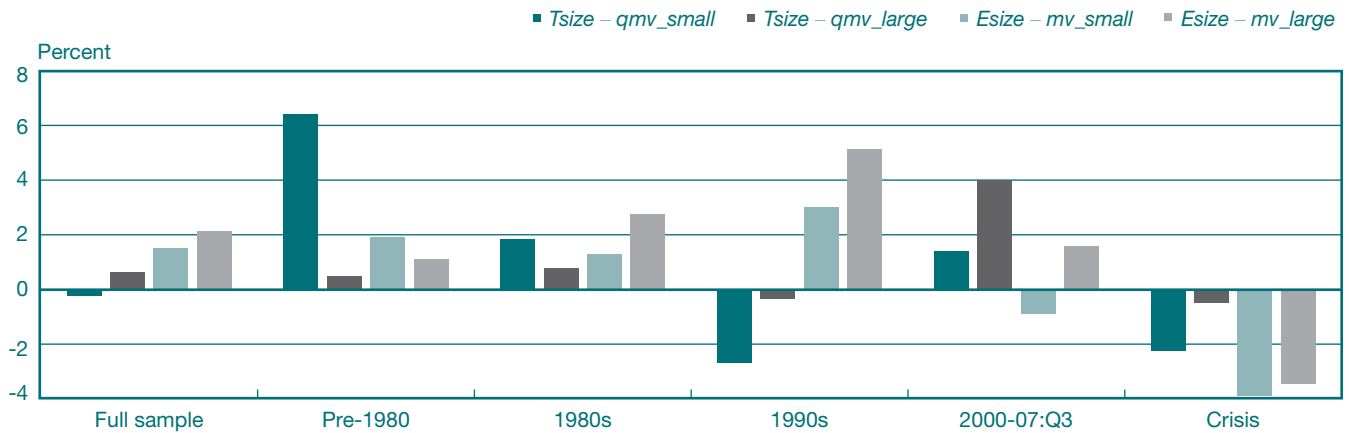
5.2 Leverage

To examine the effect of leverage on the growth pattern of financial firms, we consider the equity-only metrics *Esize* – *mv* and *Esize* – *bv* and compare them with the total value measures *Tsize* – *qmv* and *Tsize* – *bv*, respectively. The *Esize* – *bv* and *Tsize* – *bv* measures use the BVE rather than the MVE of firms, as shown in Table 1. The BVE-based results are reported in Appendix D online.

The equity-only measures show finance to be smaller than the total liabilities measures, but growing at a faster rate. Thus, *Esize* measures had sample means of 19 percent or less (Tables 2 and D1) compared with at least 50 percent using the *Tsize* measures. The difference increased during the crisis, with the *Esize* measures being 40 percentage points lower than the respective *Tsize* measures. This result indicates that balance sheet leverage has become relatively more prevalent in the capital structure of financial firms

CHART 10

Median Percentage Change in the Relative Size of Large and Small Shadow Banking Firms

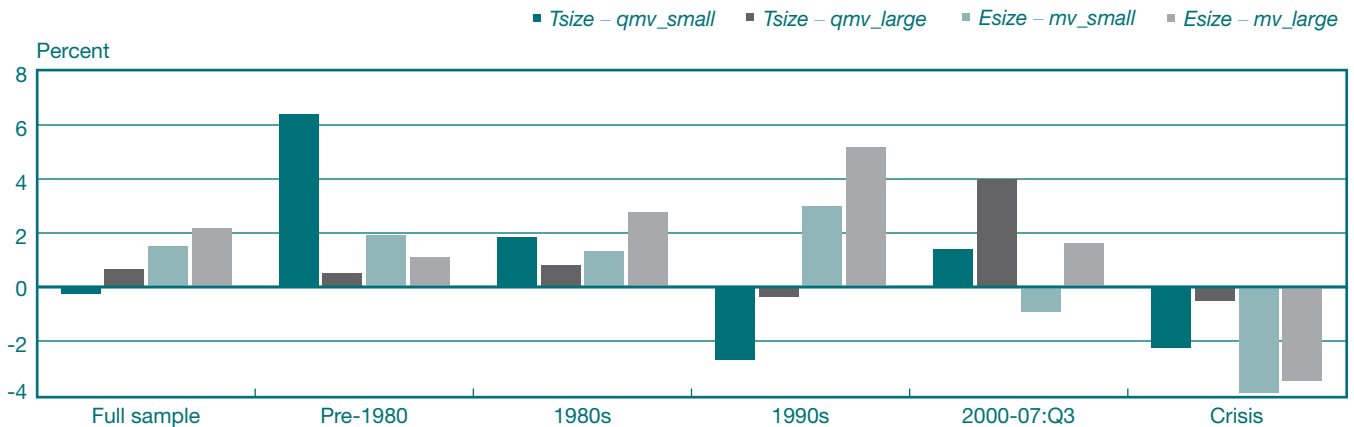


Source: Authors' calculations.

Notes: This chart shows, for each size measure, the median annualized quarter-to-quarter percentage changes in the relative size of large and small shadow banking firms in the sample. We estimate our measures separately for the large and small firm samples. We first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

CHART 11

Median Percentage Change in the Relative Size of Large and Small Depository Credit Institutions



Source: Authors' calculations.

Notes: This chart shows, for each size measure, the median annualized quarter-to-quarter percentage changes in the relative size of large and small depository credit institutions in the sample. We estimate our measures separately for the large and small firm samples. We first aggregate from the firm level to the sector level and then calculate quarterly changes. See Table 1 for variable definitions.

than in that of nonfinancial firms. The median annualized growth rate for finance was higher using the equity-only metrics, being 2.6 percent to 3.6 percent for the whole sample according to the *Esize* measures compared with 0.75 percent to 1.9 percent for the *Tsize* measures (Charts 2 and D1).

Our measures also highlight the importance of balance sheet leverage for the DCI subsector, more so than for shadow banks. For example, the mean relative size of DCI over the sample period is between 6 percent and 9 percent for the equity-only measures (Tables 6 and D3) and between 30 percent and 33 percent

TABLE 9

The Relative Size of Large and Small Depository Credit Institutions

Full Sample				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	3,199,397	1,140,087	3,199,397	1,140,087
Mean	10.75	34.36	2.30	7.60
Median	12.35	34.35	2.20	7.40
Min / min quarter	2.99 / 1984:Q2	23.99 / 2000:Q3	0.35 / 1984:Q3	4.66 / 1980:Q4
Max / max quarter	17.37 / 1994:Q2	44.75 / 2011:Q3	4.97 / 2003:Q1	11.12 / 2003:Q4
Pre-crisis Period (1980:Q1-2007:Q3)				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	2,413,211	903,242	2,413,211	903,242
Mean	10.07	32.23	2.35	7.76
Median	12.15	33.21	2.25	7.52
Min / min quarter	2.99 / 1984:Q2	23.99 / 2000:Q3	0.35 / 1984:Q3	4.66 / 1980:Q4
Max / max quarter	17.37 / 1994:Q2	37.73 / 1980:Q2	4.97 / 2003:Q1	11.12 / 2003:Q4
Crisis Period (2007:Q4-2013:Q1)				
	<i>Tsize</i> – <i>qmv_small</i>	<i>Tsize</i> – <i>qmv_large</i>	<i>Esize</i> – <i>mv_small</i>	<i>Esize</i> – <i>mv_large</i>
Observations	663,933	91,295	663,933	91,295
Mean	12.12	42.47	2.62	8.15
Median	12.21	43.64	2.45	8.30
Min / min quarter	10.31 / 2013:Q1	37.37 / 2007:Q4	2.19 / 2011:Q2	6.33 / 2009:Q1
Max / max quarter	15.62 / 2008:Q4	44.75 / 2011:Q3	4.19 / 2008:Q4	9.49 / 2010:Q2

Source: Authors' calculations.

Notes: This table reports, for each size measure, summary statistics of the relative size of large and small depository credit institutions in the sample. For each year and each size measure, we rank all publicly listed firms by *Tsize* – *qmv*. The top 10 percent of firms are included in the large firm sample, while the remaining firms are included in the small firm sample. We estimate our size measures separately for the large and small firm samples. Observation units are firm days for *Tsize* – *qmv* and *Esize* – *mv*. Units for all other statistics are percentages. For *Tsize* – *qmv* and *Esize* – *mv*, we first sum over firms, then average across days for each quarter, and finally take means and medians of quarterly averages. See Table 1 for variable definitions. Min (max) quarter refers to the quarter in which the measure achieves its minimum (maximum) value in the sample.

for the total value-based measures. While the shadow banking subsector also had a larger measured size based on leverage, its dependence on balance sheet leverage was not as stark.²¹ However, given the importance of off-balance-sheet leverage for shadow banks, this result need not indicate a lower overall dependence on leverage of shadow banks.

²¹ For example, the sample means of the relative size of shadow banks using the equity-only measures were about 3 to 6 percentage points (Tables 3 and D2) smaller than those using total value measures. The two DCI measures differed by more than 20 percentage points.

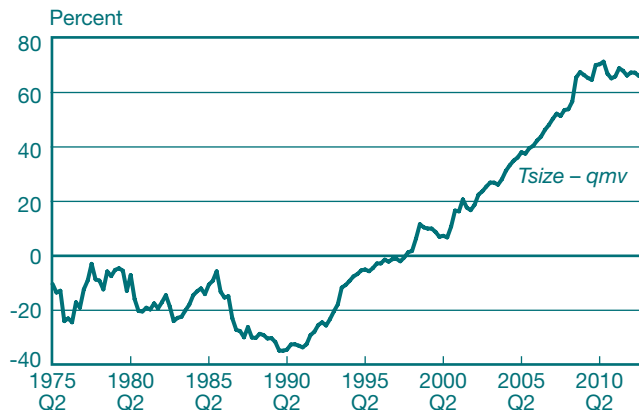
5.3 Regulation

We examine the effects of three important pieces of banking regulation on financial-sector size: the Riegle-Neal Act, the Gramm-Leach-Bliley Act, and the FDIC program of debt guarantees. The Riegle-Neal Act repealed interstate bank branching restrictions and allowed interstate bank mergers, while the Gramm-Leach-Bliley Act rolled back additional restrictions on bank consolidations.²² By facilitating bank mergers and

²² See http://en.wikipedia.org/wiki/Bank_Holding_Company_Act.

CHART 12

The Relative Size of Finance, Accounting for Firm Heterogeneity



Source: Authors' calculations.

Notes: This chart shows estimates of period fixed effects as a percentage of the estimated intercept from these regressions. Using only finance firms, we create a quarterly firm-level panel of relative size, as measured by $Tsize - qmv$. We estimate a panel regression of $Tsize - qmv$ on firm level and period fixed effects. See Table 1 for $Tsize - qmv$ definition.

consolidations, these acts may have led to an increase in the relative share of large banks in all large firms, as compared with the relative share of small banks in all small firms. We find evidence consistent with this hypothesis. For example, before the fourth quarter of 1999, the relative share of large DCIs in all large firms compared with small DCIs in small firms was about 1.4 percentage points higher on average (by $Tsize - qmv$). But after that time, the relative share of large DCIs in all large firms was 6.6 percentage points higher on average than that of small DCIs in small firms. This difference of five percentage points is statistically significant. We see a similar increase in the relative size of large DCIs after the passage of the Riegle-Neal Act.

The shrinkage of finance during the crisis may have been mitigated, at least temporarily, by the FDIC's Temporary Liquidity Guarantee Program (TLGP) program, which backed in full the senior unsecured debt issued by participating entities between October 14, 2008, and October 31, 2009.²³ We investigate the effect of the TLGP program by comparing banks that issued guaranteed debt under the program with the rest of the firms in our sample. We find a positive treatment effect that is economically meaningful (that is, an 11 percent increase in the

book value of banks issuing guaranteed debt compared with all other firms), but statistically insignificant.²⁴

6. CONCLUSION

In this article, we provide a comprehensive picture of the historical growth of finance and its subsectors using a variety of firm- and sector-level size measures. We define financial-sector size relative to the business sector (financial plus nonfinancial). We find that, with one exception, finance grew relative to the nonfinancial sector, especially from the late 1980s, whether one considers publicly listed firm liabilities or total sectoral liabilities (inclusive of private firms), equity or total asset values, large or small firms, or book or market values. The only exception is that, based on total value (market value of equity plus book value of debt), small financial firms did not increase their relative size on average, mainly due to the effects of the recent financial crisis. Indeed, the finance sector shrank relative to the nonfinancial sector during the recent crisis, and its recovery has been tepid.

Our analysis further shows that shadow banking grew rapidly at the expense of traditional banks, becoming a significant portion of the financial sector in the mid-1990s, and peaking just before the crisis, consistent with the literature. The growth in shadow banking was driven by the securities and asset management subsectors, and we find that small and large shadow banks grew similarly. The traditional banking sector, in contrast, declined by some measures, with growth in this sector being mostly explained by large banks.

Finance was smaller but grew faster when measured based on the liabilities of publicly listed firms than when measured based on the liabilities of all firms. That financial liabilities make up a substantially larger portion of total liabilities when private firms are included may be of importance to policymakers. Private firms not only face less regulation than publicly listed firms, but also operate with far less transparency. Indeed, comprehensive and reliable data on private firms are not available and most private firms are not required to submit quarterly financial statements to regulators. Similar concerns have been raised about shadow banks, leading to an internationally coordinated effort to collect data on shadow banks as well as proposals to regulate

²³ See <http://www.fdic.gov/regulations/resources/TLGP/index.html>.

²⁴ We used a two-period difference-in-difference specification, where the dependent variable was the change in average relative size from the year of the TLGP (fourth quarter of 2008 to fourth quarter of 2009) to the year preceding the program (third quarter of 2007 to third quarter of 2008). It was regressed on a dummy for the program year, a dummy for the issuing banks, and an interaction term between the two. Results are available upon request.

the sector (Financial Stability Board 2012). However, no such initiative exists generally for private firms. While many private firms are small and may not pose significant systemic risk presently, opacity can hide the buildup of vulnerabilities.

Financial firms are relatively larger based on their total asset values (equity plus debt) than on their equity values only. Large traditional banks are particularly dependent on balance sheet leverage, which indicates that the leverage restrictions on banks, as proposed under the Basel III agreement, can be effective policy tools for restricting the size of banks. By contrast, shadow banks are less dependent on leverage, suggesting that policymakers might need a different toolkit to monitor and regulate them.

A concern with our approach (and of the literature) is the inability to distinguish sufficiently between form and function (for example, when considering how to categorize a traditional bank that carries on shadow banking activities).

We use NAICS and SIC codes to classify firms into industries. These classifications are based on the primary business of a company, which may lead to classification errors in some cases. For example, though many financial holding companies may be bank holding companies, if NAICS has determined that banking is not their primary business, we do not categorize them as banks or DCIs but rather as “finance, other.”

Fortunately, given the small number of firms in this category, these potential misclassifications have little effect on our results. Moreover, we can mitigate these errors to some extent. In some cases, we use Call Reports to identify banks directly. In particular, if our mapping indicates that a publicly listed company is a Call Report–filing commercial bank, then we call it a DCI regardless of what NAICS calls it. Further, to the extent that market prices accurately incorporate information about a firm’s activities, our use of market values may mitigate this concern. Nevertheless, more research is needed on this issue.²⁵

²⁵ Cetorelli and Peristiani (2012) and Cetorelli, McAndrews, and Traina (2014) are important steps in this direction. Cetorelli and Peristiani (2012) find that regulated banks played a dominant role in all aspects (issuance, underwriting, trustee, and servicing) of the securitization of asset-backed securities between 1978 and 2008. Cetorelli, McAndrews, and Traina (2014) find that banks expanded horizontally by acquiring shadow banking firms.

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