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## **Transformation of Corporate Scope in U.S. Banks: Patterns and Performance Implications**

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### **Abstract**

Using a novel database containing the time-series details of the organizational structure of individual bank holding companies, this paper presents the first population-wide study of the transformation in business scope of U.S. banks. Expanding scope has a negative impact on performance on average. However, we find that firms whose expansion keeps them closer to the prevailing “modal bank” are better off compared with those pursuing generic diversification. Moreover, we find that early expanders into particular activities benefit more, whereas late adopters, rather than benefitting by “fitting the norm,” lose out.

Key words: business scope, performance, diversification

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## I. Introduction

The US banking industry has changed profoundly over the last three decades. Factors including regulation, a shifting competitive landscape, and financial and technological innovation have combined to transform banks' business models. Indeed, the very definitions of what banks are, and what they do, have been called into question. This transformation has been reflected in massive changes to banks' organizational footprints, as they have progressively incorporated myriad subsidiaries spanning the entire financial industry and beyond.

This paper uses a newly created dataset detailing the organizational structure for the entire population of US bank holding companies ("BHCs"), allowing us to track each entity's subsidiaries over time (Cetorelli and Stern, 2015). We map entry and exit across sectors, and explore how different strategies of business scope transformation have performance implications that differ between firms and over time. Consistent with existing research, we find that scope expansion is associated, on average, with worse performance. More important, though, we also find great heterogeneity, with certain expansion strategies generating significant benefits.

The idea that banks have grown organizationally complex is not new, and there is much anecdotal evidence, especially for the largest institutions (Avraham, Selvaggi, and Vickery, 2012). However, our data reveals that this expansion has been systematically pursued within the *entire population*: Over the last 30 years, approximately 2,200 US BHCs, or roughly 55% of the total, have engaged in some form of scope expansion. Along the way, they have attained control of, or created, around 62,000 subsidiaries, with business activities spanning 362 unique industries (five-digit NAICS). At the same time, they have also exited 368 industries.

These developments have not gone unremarked. Boyd and Graham (1986) had already noted that the Federal Reserve System was in the process of expanding the concept of "permissible activities" for BHCs, allowing them to "control thousands of nonbank firms." Liang and Savage (1990) highlighted how the overall share of BHC assets devoted to nonbank activities had increased in the late 1980s. Many later contributions explained the main drivers for this (e.g., Boyd and Gertler, 1994; Gallo, Apilado, and Kolari, 1996; DeYoung and Rice, 2004), citing competitive pressure, innovation, and regulation—possibly in combination. Others have looked at the implications for profitability, risk, and probability of failure (e.g., Demsetz and Strahan, 1997; Stiroh 2004; Stiroh and Rumble 2006; Laeven and Levine, 2007; Baele, Jonghe, and Vennet, 2007; DeYoung and Torna, 2013). Scope and its implications for performance have also been

examined beyond banking, with similar findings (e.g. Morck, Schleifer, and Vishny, 1990; Montgomery, 1994; Comment and Jarrell, 1995; Lang and Stulz, 1994; Schoar, 2002; Graham, Lemmon, and Wolf, 2002; Villalonga, 2004a, b; Kuppuswamy and Vilallonga, 2015; Almeida, Kim, and Kim, 2015; Lieberman, Lee and Folta, 2016; Matvos, Seru, and Silva, 2016).

The extant literature generally finds that diversification of scope, on average, is associated with worse performance. The main explanations relate to agency frictions within the conglomerate and managerial empire building. That said, research has also highlighted three sources of potential value associated with broad scope. One relates to the ability of (horizontally) integrated firms to reallocate capital, with firms benefiting from broader scope during times of high external capital market frictions (Matvos, Seru and Silva, 2016; but also Khanna and Palepu, 2000; Kuppuswamy and Vilallonga, 2015; Almeida, Kim, and Kim, 2015). A second explanation has focused on the benefits of vertical integration, either from a competitive perspective (e.g., Perry, 1989) or, more frequently, following the transaction cost argument of relying on in-house supplies (Williamson, 1989). A third line of inquiry recognizes that synergies and economies of scope may result from combining various activities, beyond vertical integration (see Zhou, 2011). This could be because some resources (including brand, customer relations, or expertise) can be leveraged in additional sectors (Penrose, 1959, Rumelt, 1982), or that diversification and expansion gives rise to inter-temporal economies of scope (Helfat and Eisenhardt, 2004; Folta, Helfat, and Karim, 2016) that allow firms to redeploy resources and expertise (not just capital) across a wider array of uses.<sup>1</sup>

While we test for all of these explanations, our interest lies particularly in the third. Specifically, we posit that expansion into *related* activities should be more likely to generate synergies. The degree of relatedness in business scope has been explored in the literature, primarily in the field of strategic management (see Palich et al, 2000). Previous research has considered relatedness as a firm-level construct (e.g., Caves, Porter, Spence, and Scott 1980; Montgomery and Hariharan, 1991; but also Robins and Wiersema, 2003, for some criticisms). However, this neglects the fact that *industries themselves* evolve in terms of both scale and scope, as changing technologies of production and organization—as well as regulatory evolution—can shift the comparative advantage from narrower to broader firms (Chandler, 1997), while at the same time throwing up new opportunities for activities to be reconfigured (Teece et al, 1994). The

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<sup>1</sup> Also, related diversification should allow efficient skills, routines, processes, and managerial styles developed in one segment to be leveraged in a related one, and avoid the corporate-level clash between practices developed in very different markets (e.g., entertainment and financial services) (Nelson & Winter, 1982; Capron and Mitchell, 2013).

benefits available from integration and diversification should therefore evolve as industry conditions change—a thesis supported by historical research (Chandler, 1997, Langlois, 2003) and further explored by institutional and evolutionary research (e.g. Jacobides and Winter, 2005, 2012).

This insight rings particularly true for US banking, where the mode of financial intermediation has shifted so dramatically over the last few decades. The sector has traveled from a model where commercial banks brokered supply and demand of intermediated funds to a decentralized system where the matching has increasingly occurred through much longer *credit intermediation* chains, with non-bank entities emerging as providers of specialized inputs along the way (Cetorelli, Mandel, and Mollineaux, 2012).<sup>2</sup> This, along with regulatory changes, has created many new opportunities over time for potential synergies to be developed across a variety of business types. For example, the prospect of combining commercial banking with securities dealing and underwriting, following the institution of Section 20 subsidiaries in the late 1980s/early 1990s (see, e.g. Cornett, Ors and Tehranian, 2002), may well have pumped up value-add in the run-up to the 90s technology boom. Likewise, the development of products that allow for better indemnification of credit or liquidity risk has likely enhanced the synergies between banks and insurance subsidiaries. Similarly, the proliferation in asset securitization throughout the 1990s and up to the financial crisis may have created the conditions for banking institutions to add specialty lenders, special purpose vehicles, and servicers, among others.<sup>3</sup> Hence, we argue that as the prevailing mode of intermediation evolves over time, banks that diversify to match such evolution will benefit more—in contrast to indiscriminate diversifiers, who will incur the cost of agency for little benefit.

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<sup>2</sup> This process is often described as the emergence of shadow banking (Poszar et al, 2013).

<sup>3</sup> There is abundant anecdotal evidence about the importance of this synergy-driven motive for scope expansion in banking (irrespective of whether or not *ex post* synergies are realized). For instance, the press release for the Citi-Travelers merger in 1998 said: “Mr. Reed and Mr. Weill [CEOs] also said that the companies expect to generate substantial incremental earnings from the significant cross-selling opportunities that will be created as well as cost savings that will be realized.” Similar considerations are made in middle-tier markets as well. For example, in the acquisition of Sterling Bancorp by Provident New York, the CEO, Jack J. Kopnisky commented on the deal, “This merger is a tremendous opportunity [and it] provides greater diversity of product sets, clients and revenues streams while presenting considerable potential to build our small-to-middle market and consumer client bases.” The acquisition was met by a 3% increase in shares value in market trading. Likewise, the importance of the potential synergies was also recognized on the regulatory side: Synergies were mentioned as a key justification to relax the restrictions for BHCs to establish Section 20 subsidiaries, as noted in 1997 by Governor Phillips, a member of the Board of Governors in a testimony before a U.S. Congress Subcommittee on Banking, Housing and Urban Affairs.

Testing such conjectures requires a level of data detail that has simply not been historically available. The Cetorelli and Stern (2015) database on BHCs' organizational structure is ideal, allowing us to track the evolving “*modal*” bank, as specific activities become more or less popular in the population. Using this as an indicator of relatedness, we can trace firm-specific strategies for scope transformation and assess the impact on performance. Note that, in the spirit of Bryce and Winter (2009), this industry benchmark emerges *from the data itself*, rather than our own theories or assumptions.

The results strongly confirm the assertion that indiscriminate scope expansion can be detrimental, but at the same time they demonstrate significant heterogeneity in how firms change their scope, and whether they benefit. In particular, we find that expanding for its own sake (a form of indiscriminate empire building) is systematically associated with worsening performance. However, expanding while “renewing resources”—i.e., pursuing a parallel exit strategy—positively impacts performance. More significantly, we find that expanding in industry-modal sectors is beneficial, and that as the relative modality of specific sectors changes over time, so does the relative impact of expanding into them. This confirms that the benefits of scope evolve as the technological, regulatory, and competitive landscape changes.

However, there may be no true synergies among modal activities. Instead, modality may simply reflect firms' desire to look similar to one another. In this scenario, firms benefit by becoming “isomorphic,” as economic sociologists suggest— because stakeholders expect it (DiMaggio & Powell, 1991). Since trust is paramount in banking, it may be that depositors, lenders, and corporates prefer to do business with a firm that “looks like a bank,” as opposed to an unusually narrow or broad BHC that engages in eccentric segments.

Our setup allows us to distinguish between the two alternative arguments by “slicing” the data across a different dimension. Instead of comparing the relative impact *across* activities (modal vs. non-modal), we look at early and late expanders into the *same* activity. If the sociological explanation is correct, we should expect that early adopters will be penalized for their “innovation,” or deviation from the norm, whereas latecomers will enjoy a performance boost as the activity becomes more mainstream. Conversely, if the relative modality of activities reflects shifts in the “technology” of intermediation, and thus the benefits that can be reaped from combining such activities, early expanders should do better. We find the latter, and also find that

early expansion is particularly beneficial when the new NAICS will ultimately become modal, reinforcing the thesis of the importance of synergistic expansions.

## II. Data description

### II.1 Introducing a new database

The Federal Reserve is the principal regulator of US BHCs. By virtue of that authority, all registered BHCs are required to report *any* change to their structure, including subsidiaries entering or exiting the organization due to acquisitions of going concerns, de novo formations, sales, changes in ownership status, liquidation, or becoming inactive. For the first time, all this information has been assembled in a consistent panel covering the entire population.

Given our objective, we analyze the period 1992–2006. It ends before the financial crisis of 2007–09, during which we would expect very different behavior and overall performance drivers.<sup>4</sup> Likewise, the beginning of the period coincides with the end of a severe, decade-long banking crisis “...of a magnitude not seen since the Great Depression...” (FDIC, 1997). The crisis culminated with the passage of the FDICIA Act in 1991, marking the start of modern banking regulation (Spong, 1994). Another important point is that US banking exited the 1980s ready to undertake, *for the first time*, a relatively unencumbered process of organizational transformation: US banks had been effectively restricted for decades in their business activities by the Glass-Steagall Act of 1933. Interestingly, though, the laws left regulators significant interpretative leeway to define “permissible banking activities.” This discretionary power itself evolved over time, and by the second half of the 1980s the perimeter of permissible activities was at its largest (Omarova, 2009). Hence, it is really from this point on that BHCs could operate in an unrestricted environment for the first time.<sup>5</sup>

Because we intended to focus on firms’ performance, we merged the database with information on BHCs’ own consolidated financials (both balance-sheet and income-statement

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<sup>4</sup> Moreover, the years *after* the crisis belong to a different “regime” as far as business scope goes, due to the significant changes in regulation and the imposition of new forms of restrictions on bank activities. We consider the role of scale, scope, M&A in relation to the crisis in a follow-on paper.

<sup>5</sup> A clear indication of conditions already being ripe for industry transformation at the end of the 1980s is the perhaps less well-known Proxmire Financial Modernization Act of 1988, a piece of legislation that would have repealed Glass-Steagall 11 years earlier. The Act actually passed in the Senate with 94 votes to 2, but then died in the House (US Congress 1987–1988). Our evidence confirms that the experimentation of BHCs with different subsidiaries exploded in the 1990s, and the maximum number of NAICS owned by banks can be found *before* the Financial Modernization Act of 1999, which sanctioned the end of Glass-Steagall (see Appendix).

items), as contained in the FR Y-9C Reporting Form, *Consolidated Financial Statements for Holding Companies*. The matched sample consists of a panel of 3,206 unique BHCs for which we have financial data. This set of firms consistently accounts for the virtual totality of total BHC assets over the sample period.<sup>6</sup>

## II.2 Defining business scope, expansion, and exit

For each subsidiary of a BHC, the database reports its primary and, where applicable, secondary business activity<sup>7</sup>, both classified according to the finest (six-digit) North American Industry Classification System (NAICS) code. Since full six-digit codes are not available for all activities, we aggregated codes at the five-digit level and defined business *scope* as the number of different five-digit codes that were under a BHC's organizational umbrella. For example, a BHC that controls a commercial bank (NAICS 52211), a securities brokerage firm (NAICS 52312), and a life insurance carrier (NAICS 52411) would have a scope defined by these three business activities. By extension, we define the *expansion* (or *adoption*) of scope as the addition of one or more subsidiaries in a five-digit NAICS that was not part of the organization before. We identify an expansion of scope whether it originates from a subsidiary's primary or secondary activity.<sup>8</sup> Conversely, we define *exit* as the complete elimination of a previously held NAICS.

Financial data for individual subsidiaries is not available, so we cannot measure the *intensity* of engagement by a BHC in an activity, as captured by conventional metrics such as asset size or income.<sup>9</sup> However, in the spirit of Chandler (1990), our focus is on banks that add activities that are *new to the banks* themselves (i.e. an *extensive* margin of business-scope expansion), and our data are uniquely positioned to inform us about this.

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<sup>6</sup> A question might be raised about the extent to which the database captures *nonbank* entities (e.g. insurance companies, specialty lenders, or investment banks) that buy bank subsidiaries. However, by law any entity that acquires a bank charter has to turn itself into a bank holding company. Hence the database has full coverage on such instances.

<sup>7</sup> Approximately 3 per cent of all subsidiaries in the database ever report a secondary business activity, suggesting that for the vast majority of cases, the subsidiaries are narrow in scope. This also marks our database out from others where scope has been analyzed (e.g. Compustat), where NAICS information is collected at the level of the corporation, leading to not only vast understatement of the actual scope, but also to potential inconsistencies.

<sup>8</sup> Restricting the identification to consider only subsidiaries' primary business activity would be a more conservative approach, under the presumption that if a NAICS is observed as a secondary activity, it might not be considered economically important enough to qualify as an expansion of scope. At the same time, including secondary NAICS improves the overall information set on BHCs' activity. We have run the entire analysis excluding secondary NAICS' information, and the results were extremely robust throughout.

<sup>9</sup> However, for many activities it is actually not obvious that total asset size, or even total income, would reflect the intensity of engagement in an activity: Many activities may have a marginal asset footprint and yet be highly productive (e.g. asset management services, data management, financial technology); low income generation may reflect poor market conditions or ineffective engagement.



We have performed a number of quality checks and a detailed comparison with alternative metrics of scope used in the literature, which we report in section A1 of the attached Appendix.

### **II.3 Evolution of scope**

Figure 1 shows that most BHCs are “simple” organizations at entry, with most entities starting as commercial banks (NAICS 52211) or having subsidiaries in just one or two additional NAICS. This is a compelling feature of the population, since in most cases we see a process of business scope transformation driven by a relatively homogeneous base of similar firms—rather than by “legacy” firms that already had a more complex scope before becoming BHCs.

As noted previously, the process of expansion is broadly diffused—not just the practice of a select few. Figure 2 reports, in its upper part, the number of BHCs that pursued some degree of scope expansion in every year. We see a consistent number—about 200 institutions per year in the early 1990s—adding new NAICS, and then a ramping-up over time, reaching a peak of over 400 in the early 2000s. The trend then reverts—but, remarkably, there is still a relatively consistent cross-section of institutions entering new activities, even during the crisis. Overall, more than half of the observed population engages in at least some degree of scope expansion. We also see significant exits and refocusing, as indicated in the lower part of Figure 2 by the count of BHCs dropping at least one NAICS.

One might object that much of what we see as strategic may simply reflect the passive incorporation of businesses resulting from acquisition dynamics. But this is not borne out by the data. Only 10% of scope expansions were ever the result of M&A activity between BHCs. Table A4 in the Appendix provides the detail. Nevertheless, in the analysis of performance, we explicitly take into account the M&A dynamics within each BHC.

## **III. Methodology**

### **III.1 Basic relationship between scope and performance**

In order to establish common ground with the literature, we first take a basic cross-sectional approach, testing whether firms with a broader scope overall exhibit higher or lower

performance.<sup>10</sup> Hence, we start by estimating regressions based on the following model specification:

$$Performance_{i,t} = \alpha + \beta \cdot Scope_{i,t-1} + Controls_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

In terms of performance, as we explain in detail in the Appendix, we have used both Tobin’s Q and ROE, confirming, for publically listed firms, that both measures yield similar results. Yet as we have a large number of non-listed firms, we have run our analysis with ROE, to cover our full sample.<sup>11</sup> Starting with the regressors, as defined earlier, *Scope* is the count of five-digit NAICS present in the BHC’s organizational structure. We also include basic firm-specific controls that should have a direct and independent impact on the performance of a bank—and for which, at the same time, one could argue that the metric of scope could serve as a proxy. For example, scope *per se* may not have any particular impact on performance, but could simply be a reflection of the size of the bank, with larger banks exhibiting higher returns on average, possibly indicating market power, or easier access to cheaper funding (e.g., Lang and Stulz, 1994). Likewise, as noted earlier, regulation constrains scope expansion for banking firms with declining performance. Capital adequacy is one of the main factors capturing a bank’s quality standing. Hence we include the BHC’s capital-to-asset ratio as a basic control of overall firm quality.

We also wanted to test whether the benefits to scope expansion may be reaped in times of tight market conditions, or whether firms may be motivated by the pursuit of vertical integration (“VI”), and whether VI expansion is more beneficial (Williamson, 1989). We thus ran regressions including the TED spread and its interaction with scope and, drawing on the data of the Bureau of Economic Analysis’ Input-Output tables, we constructed a NAICS-specific metric of vertical integration relatedness. Details on the construction of these metrics are contained in section A2 of the Appendix.

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<sup>10</sup> Note, however, that there is one significant difference between our research design and that in the diversification literature: We do not compare the relative performance of broad vs narrow firms, but want to primarily focus on the impact of expansion of particular firms (BHC) in terms of a new area. For this reason, our basis of comparison is different: We consider how BHCs that expand compare with those that do not; or, alternatively, how different types and strategies of expansion compare. Thus, our emphasis is on the focal industry and the focal firm: BHCs. This means we should not (and do not) include the Tobin Q (or ROE) of the sectors into which BHCs expand. Our interest is in negative or positive synergies, and as such in how BHCs see their performance change as they expand or contract.

<sup>11</sup> The Appendix (section A2) provides a detailed discussion of why ROE in our sample does not suffer from the concerns often associated with accounting-based measures.

### III.2 Endogeneity and selection concerns

Earlier studies have typically found a negative empirical relationship between business scope diversification and performance in the cross section. However, many contributions—e.g., Chevalier (2000); Campa and Kedia (2002); Maksimovic and Phillips (2002); and Villalonga (2004a, 2004b)—have suggested that such findings may be the result of selection: Underperformers seek to diversify to ensure their survival, thus leading to a negative but non-causal link between diversification and performance. We believe this should be less applicable to the population under study, since BHCs are subject to intensive supervisory monitoring and regulation that might discourage expansion plans in the case of poor performance. In fact, bank regulation explicitly codified this during the period of our study: in 1991, the Federal Deposit Insurance Corporation Improvement Act (FDICIA), imposed restrictions on BHCs' expansion plans if they exhibited low or falling performance.

Nevertheless, we addressed this potential problem in different ways. First, we ran logit regressions of the likelihood of expanding scope as a function of firm characteristics that should reflect relative performance. This provides us with *prima facie* evidence on the selection issue, as endogeneity concerns would lead us to predict a systematic positive relationship between recent performance and the likelihood of expanding today. Second, we ran our (core) model specification adding BHC fixed effects, thus drawing inference from within-firm changes in scope over time and taking firms' underlying heterogeneity as given.

Besides the self-selection issue, though, another concern might be that both expansion decisions and performance are driven by common unobservable factors changing over time. For example, banks may consider expanding during the upswings of macroeconomic cycles, when their performance may also be relatively better. We acknowledge this issue by adding time fixed effects to the same model specification. Hence,

$$Performance_{i,t} = \alpha + \beta \cdot Scope_{i,t-1} + Controls_{i,t-1} + \gamma_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

Where  $\gamma_i$  and  $\delta_t$  are vectors of BHC and year-specific indicator variables.

### III.3 Dynamic analysis of entry and exit

We suspected, however, that looking at the “static” relationship between scope and performance—that is, comparing focused vs. broad scope firms—hides significant heterogeneity in strategies that firms may pursue. Consequently, we moved on to a dynamic analysis, where we analyzed the

specific impact of *expanding into new segments* (or exiting some segments altogether), thus allowing us to consider the impact of *different firm strategies*. First, we focused on entry (scope expansion), exit, and overall churn (i.e. the combination of entry and exit). Specifically, we asked whether firms that build broader scope and keep it (i.e., empire builders) are better or worse off than firms that enter new segments that they subsequently exit, consistent with the idea of strategic renewal (Capron, Mitchell, and Swaminathan, 2001). We also considered whether scope expansions that have happened incidentally—i.e. resulting from M&A between two high-holding BHCs—have different impacts from de novo or acquisitive expansions. To capture these dynamics, we adopt the following specification:

$$Performance_{i,t} = \alpha + \beta \cdot Cum\ Adoption_{i,t-j} + \gamma \cdot Cum\ Exit_{i,t-j} + \delta \cdot Churning_{i,t-j} + \theta \cdot Scope_{i,t-j-1} + Controls_{i,t-j-1} + \varepsilon_{i,t} \quad (3)$$

where *Cum Adoption* is the total number of new NAICS that a BHC has added in the recent past. In our baseline specification we summed over the previous three years and measured the impact on performance at time  $t$ . Conversely, the variable *Cum Exit* measures the total number of NAICS that the BHC completely dropped over the same three-year period, while *Churning* is the interaction between the first two variables, thus capturing the extent to which a BHC is *transforming* its business scope. Controls also included the level of *scope* before the three years of expansions captured by *Cum Adoption*. Moreover, we controlled for any M&A activity over the previous three years, as a way to condition on possible scope expansions that might be just the indirect consequence of such activity. In addition, we included the interaction of *Cum Adoption* with *Scope*, to allow for non-linear effects of expanding scope depending on the extent to which scope is broad to begin with.

#### III.4 Synergies from related activities

We next examined performance effects across activities that are more or less related, drawing on the literature on relatedness in diversification (Rumelt, 1974; Teece et al, 1994; Palich et al, 2000; Villalonga, 2004a), hypothesizing that expansion into related activities will be more beneficial than distant expansion.<sup>12</sup>

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<sup>12</sup> Note that by testing for the validity of these alternative theories we are also implicitly examining the depth of the basic story of agency-driven motives and imperium building: If diversification is not in the interests of shareholders, but managers pursue it for their own benefits, then it should be the case that any instance of diversification would do

We implemented this idea by refining specification (3), allowing for a separate effect of adoption activity as a whole and that of specific kinds of adoptions, using alternative metrics that should capture relatedness across activities. One traditional measure is the “distance” of a given NAICS code from core commercial banking (NAICS 52221): looking “upwards” from 52221 in the NAICS tree, activities that shared the same first four digits were assigned a distance of 1; those that shared only the first three digits were assigned 2, etc. The prediction would be that entering more distant activities should have a relatively worse impact on performance. A second, similar metric of distance differentiates between scope expansions within the financial industry proper (NAICS 52) and all others.

These approaches have two key shortcomings. First, as Bryce & Winter (2009) note, NAICS-distance is a problematic measure of true relatedness. There may very well be activities further “away” from NAICS 52211, and/or outside of NAICS 52, that are nevertheless closely related to financial intermediation (e.g., real estate, which is seen to offer direct synergies, but also other non-financial sectors that may be seen as natural hedges in credit intermediation, such as oil and gas extraction, construction, etc.). Second, and more important, these metrics are time-invariant, while combining certain activities may have a very different implication at different times. And so, to go back to the division between NAICS 52 and non-52, it may be that adding a securities broker or an insurance underwriter is beneficial early in the sample period, but less so later on, when there are no more externalities to be had as the market matures. Conversely, changes in financial intermediation might make functions such as warehousing and title insurance more attractive later on, as the underlying technologies develop and mature.

More broadly, we want to introduce a measure that captures the changing set of opportunities that drives all firms in the sector, and that may explain their quest for greater scale and scope (as Chandler, 1997, remarked for a different set of industries and time periods). We can only do this if we know what the average or *modal* firm looks like, and consider how far the diversification of a particular BHC is geared towards it. We operationalized these considerations with two alternative specifications. First, we classified individual NAICS on the basis of how many BHCs expanded in them over the previous year. This yielded a natural ranking, with “hot” NAICS at the top. The fact that many BHCs choose to enter the same activities at the same time may indicate bigger rewards.

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it. In other words, the agency argument cannot predict any heterogeneous effects on performance across alternative expansion paths.

A possible concern with ranking NAICS this way is that a very popular NAICS may *fall* in the ranking because it has attained saturation within the population. We therefore complement this flow metric with one that ranks NAICS based on how many BHCs *hold* them at any point in time, irrespective of when they added them. This classification of modality is just as dynamic, but captures more of the organizational structure that is currently most prevalent. Note that these metrics are fully derived from the data itself, thus leaving us agnostic about which specific combinations should better reflect the prevalent technology. In this sense, the approach is consistent with the basic *survivor principle* originally proposed in Alchian (1950), reiterated by Stigler (1968), and adapted to organizational studies by Teece et al (1994), Bryce and Winter (2009), and others.

To provide a visual intuition of the concept of NAICS modality, Figure 3 shows the corresponding time series for a representative subset of five-digit NAICS. For instance, NAICS 52599, Other Financial Vehicles, which includes closed-end investment funds, special purpose vehicles, mortgage real estate investment trusts (REITs), and real estate mortgage investment conduits (REMICs), was hardly present within the population in the early 1990s, but became overwhelmingly prevalent in later years. This seems to match the prior that this type of subsidiary became increasingly related to the mode of intermediation during the asset securitization boom. Conversely, NAICS 53111, which includes entities managing residential dwellings, was relatively very popular in the early 1990s—presumably, a time when balance sheet assets such as mortgages and their collateral defined the predominant scope of a commercial bank—but later declined into obscurity, probably mirroring the subsequent evolution toward the originate-and-distribute model of intermediation. And NAICS 52312, Securities Brokerage, and 52421, Insurance Brokerage, start at similar levels of popularity but diverge later. Table A6 in the Appendix presents the ranking of modality for the top 50 NAICS in the population.

### **III.5 Survival or conformity?**

Finding a positive association between these measures and performance from diversification, however, does not necessarily mean that firms that “go modal” are better at responding to economic needs. Rather, it may simply be the result of institutional and social pressures to conform. As economic sociologists have long argued, the consistency of business activities (the “iron cage” that makes businesses remarkably similar to each other) might be caused by social pressures that punish deviants while rewarding conformers (Meyer and Rowan, 1977; DiMaggio

and Powell, 1983; Zuckerman, 1999). Thus, banks might all change their scope not to take real opportunities, but to follow a trend. Their customers prefer them to look a certain way; potential employees are seeking the reassurance of a “familiar scope”; and capital providers like to fund what they know (Zuckerman, 1999).

How can we distinguish between these two alternative explanations? As described in the introduction, we compare BHCs that adopt the *same* NAICS at different points in time, and define a BHC as a “lead adopter” if it fell within the first quartile of all BHCs that ever expanded in the same NAICS.<sup>13</sup> If it is underlying technology change that drives possible benefits in transforming scope, “early” adopters should benefit more than latecomers, while the opposite prediction should hold under the alternative, sociological explanation.

## **IV. Results**

### **IV.1 Basic scope and performance relationship**

Table 1 shows the results of specification (1), displaying the relationship between the breadth of scope of a BHC and its performance. The comparison of results in columns 1 and 2 suggests that *Scope* may indeed capture the role of size, but also that once we control for *Size*, it exhibits a significant effect of its own, suggesting the existence of a negative relationship, consistent with the extant literature. The *Size* control enters with a positive and significant sign, also consistent with previous findings. In column 3 we report the result of the same regression, but including BHCs’ capital-to-asset ratio. That ratio displays a positive association with BHCs’ ROE, but the coefficient of *Scope* remains unchanged. This first set of results is consistent with the many contributions in the literature documenting a negative association between firm scope and performance.

The effect is economically significant. For example, the value of business scope in the first quartile of the population is 1, while it is 4 at the third quartile. Hence, an inter-quartile increase in scope would generate, according to the estimate in column 3, a decrease in ROE of about 0.36 percentage points. This figure corresponds to about 5% of the standard deviation of the ROE distribution. To put things in perspective, from the same regression, a hypothetical doubling of the asset size of a BHC would generate an impact on ROE equal to about 10% of its standard

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<sup>13</sup> It is perhaps worth repeating that this classification allows particular banks to be lead adopters in some NAICS, but mass adopters or laggards in others, thus yielding identification from the treatment effect of different types of adoption through the use of our fixed effects specification.

deviation. The analysis also shows that using market-based or accounting-based metrics of performance yields consistent results. Section A2 of the Appendix provides the rationale for this, and discusses the related empirical findings.

## **IV.2 Addressing endogeneity concerns**

As noted earlier, a recurrent counter-argument is that scope diversification *per se* does not impair performance; it is just that poorer performers are more likely to expand. In order to address this and similar issues of firm heterogeneity, we augmented the regression specification by including BHC (and time) fixed effects. Column 4 in Table 1 reports the results. The coefficient of scope remains negative and significant, and is in fact of marginally greater magnitude than the coefficient in the corresponding OLS regressions. Again, as anticipated, this is not surprising in the context of an industry subject to supervisory scrutiny, and where scope expansion is restricted by regulation in the event of poor performance.

As an additional step, we directly tested whether recent performance should affect the likelihood of engaging in scope expansion. The full results are reported in the Appendix, but the bottom line is that performance *per se* does not seem to be a systematic driver of subsequent scope expansion. We also considered another potential selection problem: perhaps expanding scope is beneficial, but the BHCs that expand are acquired before their higher ROE is realized, thus systematically selecting upon the positive instances in the scope/ROE relationship. In other words, scope expansion could signal quality, increasing the likelihood of being the target of an acquisition. To address this, we ran logit regressions to estimate the likelihood that BHCs that engage in scope expansion are more likely to be the targets of subsequent acquisitions. The analysis (not shown here) indicates that, if anything, adopting BHCs are slightly *less* likely to be acquired than non-adopters.

## **IV.3 Capital reallocation and vertical integration motives**

Having a broader business scope thus seem to have a strong negative relationship with performance, and it does not seem to be driven by selection issues. This empirical regularity then begs the question of why firms would systematically engage in scope expansion (Montgomery, 1994). We can test at least a couple of possible explanations, which have been presented in the literature and illustrated earlier. Table 2 augments specification (1) with the TED spread observed at a given point in time and its interaction with BHCs' scope. Following Matvos, Seru, and Silva (2016), we use the TED spread as indicator of tight capital markets. Broad scope may yield lower



performance results overall, but the implicit internal capital reallocation effect in bad times can help. The data supports this conjecture. Having broader scope in times of tighter capital markets is associated with a positive, countervailing effect on ROE, as indicated by the coefficient of the term of interaction. This is found both in the pure cross section (the OLS regression in column 1) and from within-firm variation (the FE regression in column 2).

The table also shows the differential impact on ROE from being engaged in activities that are more or less connected with one another within vertical chains of production. Columns 3 and 4 of Table 2 report the results. The variable *average VI* captures the extent to which the NAICS that constitute the scope of a BHC are more or less vertically integrated. Conditional on a given level of scope, a higher degree of vertical integration yields a negative impact on ROE in the cross section. The relationship, though, becomes positive and significant in the FE specification, consistent with the argument that unconditionally worse performers confine their expansion to NAICS that enable VI, and that once we take this selection issue into account, there can be a benefit to VI as a strategy. We also find that the interaction between scope and VI is negative: The broader the scope, the more VI becomes a *drag* on performance (consistent with Rawley and Simcoe, 2010), suggesting that overly broad *and* integrated firms can suffer as a result of excessive complexity.

#### **IV.4 Dynamics of entry and exit**

Table 3 reports the results of regressions based on specification (3). A few results are worthy of note. First, controlling for the extent of business scope, the act of expanding into new NAICS is associated, unconditionally, with a negative impact on performance. However, the impact seems to have a non-linear component, with further expansions gradually becoming associated with a positive impact. Engaging in M&A activity has a negative impact on performance. However, even after this is properly accounted for, the expansion in and of itself retains its negative coefficient. Exiting does not have a significant relationship with ROE, at least in the basic OLS regressions. This may indicate an underlying latent heterogeneity in the population—after all, a firm must expand its scope before one can observe instances of refocusing. Hence, the cross-sectional regressions in columns 3–5 compare BHCs exiting activities they have added, BHCs that expanded and then chose to stay, *and* BHCs that never expanded in the first place.

To better understand the *marginal effect* of expansion, it might be more helpful to regard it as a “treatment” and consider its impact, in the spirit of Schoar (2002). We can do this by shifting to

a fixed effects model, which looks at how dynamics of scope *transformation* affect firms, accounting for their heterogeneity. The results in column 6 show, as we would expect, a significant difference from those in columns 3–5. Moreover, exiting displays a positive and significant coefficient. This suggests that firms that engage more broadly in scope expansion, but also retrench when (presumably) its results are poor, on net display relatively better performance. At the same time, the results in column 6 indicate that overall churning of activities does not improve performance—if anything, it worsens it slightly.<sup>14</sup>

A possible issue is that the full population includes a relatively small but still potentially important subset of BHCs that begin the study period with an already-broad scope footprint (e.g. financial conglomerates such as insurance companies that at some point acquire a bank charter and therefore become BHCs). We cannot observe the dynamics that brought them to that point—and if they exit certain NAICS, we do not know how long they have been pursuing those activities. Our attempted workaround was to run a separate regression excluding BHCs that were already “complex” in scope (i.e. three or more separate NAICS) at the outset. The results are in column 7. Interestingly, all the action actually comes from churning, while exit *per se* is not significant. Moreover, with already-complex BHCs excluded, exiting is more likely to be from recently added activities. Hence, it is not pure refocusing that is associated with a positive impact on performance, but rather the combined act of entering and exiting.

Finally, it is worth noting that scope has a negative direct coefficient. However, scope (which is also the result of previous expansion into new areas, since BHCs started narrow) has a *positive* interaction term with adoption, suggesting that broader scope (which is linked to the previous experience in expanding) makes expansion into new areas more effective. This confirms Zollo and Singh (2004), who study the impact of experience and learning, albeit in the context of acquisitions in banking. Overall, these results thus indicate that different strategies combining scope expansion with activity exiting have a heterogeneous impact on performance—a finding consistent with theories of resource renewal.

#### **IV.5 Synergies from related activities**

The focus on changes in scope and heterogeneous strategies finally brings us to our test of the synergistic motive. We began with the two NAICS-distance metrics of relatedness described

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<sup>14</sup> Interestingly, expanding scope when credit conditions are tight is *negatively* correlated with performance in the cross section, although significance disappears when we introduce FEs (results not reported here).

earlier, spiritually akin to those used in the literature. Table 4, column 1 shows the results of a regression based on the same specification as in Table 3, where, however, we included a term (*adoption type*) that captures the average distance from NAICS 52211 of adoptions over the previous three years. The estimated coefficient of the baseline cumulative adoption regressor remains negative and significant, while the distance-related term is not significant. We then used the alternative metric that simply separates expansion in NAICS 52 sectors from any other. Column 2 shows the results. In this case the baseline effect of expansion remains negative and significant, while the term capturing expansions in NAICS 52 sectors is positive and significant—a first indication that expansions in possibly more closely related activities should be associated with relatively better performance outcomes.

We then introduced metrics to reflect activities becoming more or less related over time, depending on industry-wide evolution. We started using the metric of “hot” activities described in section 3.4. The results, in column 3, show that hot expansions do seem to have a more positive effect on performance. Columns 4 and 5, meanwhile, display the results for the stock-based “modal” metrics. The results are consistent with previous ones, and they are significant whether we use a coarse binary metric or the more accurate, continuous measure. Expanding into modal activities is associated with better performance.<sup>15</sup>

We can gauge the economic magnitude of expanding into modal NAICS. We ran the exercise focusing on one activity, and reporting the hypothetical impact of its addition to the organizational structure of a BHC for different degrees of modality of this activity. Take, for instance, NAICS 52421, Insurance Agencies and Brokerage. Over the sample period, it had a minimum level of modality of 12.2%, and a maximum of 37.5%, with fluctuations over time. If a BHC were to expand into this activity at the nadir of its modality, it would yield a net *ROE* impact of approximately -0.15% ( $-0.39 + 0.02 \times 12.2$ ). Expanding instead when the NAICS had its maximum modality would generate a net *ROE* boost of around +0.36%; hence the differential is approximately +0.51%.

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<sup>15</sup> Including both the term for NAICS 52 sector (static measure) and our dynamic measures of modality shows that modality is more important: The static coefficient that was significant at the 1% level, when tested separately, becomes significant at the 10% level when tested jointly, and its point estimate is reduced by 39%. The point estimate of the dynamic measure remains significant at the 1% level, when jointly considered, and its point estimate decreases by 12% when compared to its separate test. This suggests that the dynamic measure is a more reliable indicator, which also has greater economic impact when considered jointly with the static measure.

Next, we wanted to consider together the role of vertical integration and the importance of expanding toward the modal BHC structure, to make sure that they captured independent strategies of scope expansion. To that end, column 5 includes the average VI metric. It also considers the interaction of VI with the modality metric. This allows us to assess the extent to which a firm enters into a *commonly held* VI sector in our BHC population.<sup>16</sup> We find, first that VI is negative, and second, the *interaction* between modal and VI is significant and positive: If firms move to a VI segment that is becoming modal, VI can add value.<sup>17</sup>

#### **IV.6 Endogeneity in hot/modal scope expansion**

We addressed earlier the issue of endogeneity and selection that recurs frequently in this literature—namely, that worse performers are more likely to select themselves into expanding scope, which could explain the negative association with performance. But if we accept this, it seems difficult to see how such selection problems could be consistent with the *positive* relationship between hot/modal expansion types and performance.

Nevertheless, one may wonder whether BHCs that have been doing better and/or foresee better future prospects, would *systematically* expand in exactly those NAICS that are hot or modal in the population. Again, if better firms were to expand to begin with, then we should also find a positive association *on average*, which we do not. Endogeneity concerns are assuaged by the fact that identification in the regression results in Table 4 comes from within-firm variation, but, mostly because we focus on the *type* of expansion. We also ran logit regressions of the likelihood of expanding in a hot or modal NAICS as a function of BHC characteristics capturing past performance, and we did not find any systematic empirical relationship in the data, as noted in Table A8 in the Appendix. One might possibly make the argument that high-performing firms (or firms which know that their future ROE will be higher) expand in a given *new* NAICS, making that NAICS become hot or modal. This does not appear plausible, as our focus is on *new* expansions, which mean that firms would need to not only have a systematic preference in expanding into *particular types* of sectors, but ones they also did not have in their portfolio prior

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<sup>16</sup> Some vertically related sectors become *more* modal over time, and others less. This reflects BHCs choosing *which* of their related sectors to hold. NAICS 541 (Professional, Scientific, and Technical Services), which includes NAICS 54199 (mostly, specialized B2B service providers) and NAICS 54119 (Legal Services) gains popularity, while NAICS 561 (Administrative and Support Services) loses popularity over our sample period, even though both maintain similar vertical linkages.

<sup>17</sup> The inclusion of TED as a control variable does not change our base results, nor does it reduce the impact of modality, being early, or engaging in VI as a type of expansion.

to expanding every time they found themselves endowed with knowledge of future superior ROE.<sup>18</sup>

#### IV.7 Survival or conformity?

Finally, we attempted to distinguish between the economic view of relatedness and the sociologically inspired concept of isomorphism. The results in column 1 of Table 5 summarize the findings, indicating that lead adopters achieve a better performance. The estimated effect is economically strong: The estimated net impact on a lead adopter's ROE would be equal to about +0.62%. Adding the same activity in any of the following three quartiles, meanwhile, would yield an estimated net impact of -0.20%. Results are robust to using different definition of lead adopters. We ran separate regressions, with the definition altered to encompass the first 5%, 10%, etc., up to 40%, in addition to the baseline 25%. The rest of the table shows the results, and indicates that whatever specification we use, being a lead adopter is associated with better performance at the 1% level. More to the point, the lower the cutoff point (i.e., the earlier the adoption), the greater the benefit in terms of performance, suggesting that the very first adopters benefit the most: The estimated ROE impact on a very early entrant (first 5%) would be +2.11%, compared to the estimated effects mentioned above, of about +0.643% for a BHC in the first quartile and -0.20% for a later adopter.<sup>19</sup>

Finally, we provide a comparative analysis of leader/laggard and modal expansion analysis, so as to consider their interaction. We split the sample and ran separate regressions for (a) all "lead" adoptions (which is what we report in Table 6, Column 1); (b) lead adoptions that *are* modal at the time of their adoption; (c) lead adoptions that are *not* modal at the time of their adoption but *ultimately become* modal; and (d) lead adoptions in segments that never become modal. Comparing the coefficients, we see that our baseline is 0.817 ( $p < 0.01$ ), whereas (b), as expected, is higher at 0.951 ( $p < 0.01$ )—as this also includes the benefit of being modal. More importantly, the coefficient value in (c) is also higher than (a) at 0.849 ( $p < 0.01$ ), suggesting that

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<sup>18</sup> Furthermore, note that both the hot and modal metrics are count-based, so that each BHC that expands counts equally, making it unlikely that any particular BHC's success can meaningfully influence a NAICS "hotness" or modality. Moreover, the modal metric is a stock measure driven not only by the *focal* BHC, but by *the average* BHC in the past few years, which cannot plausibly be connected to their performance status or expectations.

<sup>19</sup> We also analyzed "laggards" (bottom quartile adopters) separately to see whether they would be more harshly "penalized" for adopting late (something which, again, would be inconsistent with the basic isomorphism hypothesis, but consistent with a "peer pressure" and vicarious learning hypothesis). We found that being a laggard does indeed have a net negative impact on performance (-.28, significant at the 5% level). (Full results for the laggard group are available on request.)

*future* modal segments yield more benefit, whereas leading in segments that will never catch on does *not* help ROE, with the coefficient 0.291 being not significant.

A fuller exploration of leader/laggard dynamics goes beyond the scope of this paper, but our results offer some basis for educated conjecture. Our evidence is consistent with the hypothesis that lead adopters are intrinsically better at identifying the opportunities offered by changes in intermediation. Alternatively, early expansion might offer preemptive “first mover” type benefits—although this is made less likely by the fact that we are not looking at entry into new markets, but rather expansion of existing firms into existing markets in the quest for synergies. Moreover, we measure ROE, and as such do not look at whether, e.g., laggards overpay for their acquisitions in popular areas. If popularity is associated with increased cost for expansion, then the negative impact of late adoption would be even higher. Furthermore, it may be that there is heterogeneity in *why* firms expand: Lead adopters might go after the opportunities, as they obtain higher ROE. As the sector sees the benefit of these moves, other firms, perhaps less well poised to benefit from scope expansion, also expand, but fail to benefit, as we can see from the decisively negative impact of being a laggard.

These results, taken together, also suggest that there could be a subtler but important set of social pressures that shapes scope expansion mechanisms, with a predictable sequence of first functional, then dysfunctional expansion. This hypothesis, consistent with our data but not tested through it, is corroborated by anecdotal evidence from the financial crisis (see Tett, 2009), and will be the object of future research.

## **V. Conclusions**

We aimed to illuminate the dynamics of business scope transformation, drawing on the unique opportunities offered by our comprehensive data on BHCs. We focused on a period of increasingly permissive policy, regulatory change, and significant technological change that transformed both the process of financial intermediation and the boundaries of the majority of firms, and not just highly visible leaders, well before the formal repeal of the Glass-Steagall Act through Graham-Leach-Bliley in 1999. We show that M&A at BHC level does not drive our results, suggesting that this expansion is the result of a desire to broaden the boundaries of the banking firm. Our analysis addresses the puzzle of why this sector-wide transformation happened, even though expansion

does not yield positive results—given that, in our sample, it is not the poor performers who diversify and expand into new segments.

Our results suggest that broader scope is beneficial during periods of turbulence (Matvos et al, 2016), although *expanding* into new areas when credit conditions are tight is not. We also find that vertical integration is (weakly) positively associated with ROE in some specifications, but that *expansion* into new vertically related segments is *negatively* related to ROE, which confirms the conjecture that it is more beneficial to dis-integrate in mature markets, as transaction costs diminish and capable suppliers emerge (Jacobides and Winter, 2005). We also illustrate the role of churning and portfolio renewal, whose beneficial impact is demonstrated for the first time, to our knowledge, in such a systematic fashion (see Capron & Mitchell, 2013): We show that imperium builders suffer, while those experimenting with both entry *and* exit benefit. We show that churn appears to be a firm-level attribute—which is why it is important in our panel, while fixed-effects regressions are not. We also find evidence for learning through the positive correlation between scope (and as such experience with expanding) and the ability to benefit from scope expansion.

More important, we provide fresh insights on the nature of synergistic benefits, which cannot be explained away by considering the variation in capital market conditions (Matvos et al, 2016; Kuppaswamy and Villalonga, 2015) or any control variables, even with the most comprehensive FE specifications. Confirming and qualifying existing theory, we find that relatedness matters for the success of scope expansion, and find strong support for our hypothesis that the evolution of the modal bank, reflecting the changing technology of intermediation, affects success in expansion. BHCs that move into modal or “hot” segments tend to benefit. This is a significant advance over the prevailing mode of analysis of scope expansion, and draws on our dynamic analysis of a shifting set of “coherent” segments (see Teece et al, 1994). Our findings show that this dynamic feature matters, and we further advance research by finding that this is not due to banks benefitting from becoming more isomorphic over time, but rather to trailblazers who shape the frontiers of the sector and benefit. This finding leaves an interesting question for future research in terms of the underlying causes of the qualitative differences between early and late innovators (or non-expanders). While our findings allow some conjectures on this, it merits dedicated follow-on research.

Our results are a significant departure from the received wisdom that scope expansion and diversification are detrimental because of managerial agency, and also move beyond the

(debatable) merits of VI and the (more robust) benefits of scope in dealing with capital market volatility. The role of *specific strategies*, in terms of corporate renewal, and the (early) identification of where the sector “mode” is heading, provide a fresh agenda for strategy as well as policy. In terms of the policy, which is currently debated, our findings suggest that it is hard to justify a blanket negative bias against broadening bank boundaries. The robust regularities we have brought to light suggest that policy, as well as our understanding of scope expansion and diversifications’ merit, may require a better understanding of the role of the shifting sectoral context and of firms’ strategies.



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**Table 1: Return on equity and scope**

	(1)	(2)	(3)	(4)
	ROE	ROE	ROE	ROE
Scope	0.0785*** (0.0184)	-0.0576* (0.0305)	-0.113*** (0.0384)	-0.178*** (0.0543)
Log Assets		0.684*** (0.120)	0.763*** (0.136)	-0.0478 (0.428)
Capital Ratio			-0.425*** (0.0457)	-0.413*** (0.0535)
Constant	12.85*** (0.120)	4.350*** (1.493)	7.501*** (1.810)	18.53*** (5.447)
Bank fixed effects	No	No	No	Yes
Year fixed effects	No	No	No	Yes
Observations	21031	21031	16742	16742
Adjusted R <sup>2</sup>	0.003	0.008	0.037	0.026

The dependent variable is the BHC's return on equity. The variable Scope is defined as the count of unique 5-digit NAICS identified by either the primary or secondary business activity reported by a BHC's subsidiaries. Log Assets is the natural logarithm of the total asset size of the consolidated BHC, while Capital Ratio is the ratio between regulatory capital and total asset. The regression frequency is annual, with the right hand side variables measured at year t-1. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Column 4 includes both BHC and year indicator variables. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table 2: Return on equity and scope.  
Capital market tightness and vertical integration**

	(1) TED	(2) TED	(3) VI	(4) VI
Scope	-0.217*** (0.0742)	-0.245*** (0.0667)	-0.0530 (0.0488)	-0.0629 (0.0683)
TED Spread (Avg.)	-0.353 (0.435)			
Scope X TED Spread	0.201** (0.0883)	0.138** (0.0701)		
Average VI			-0.0712* (0.0367)	0.0573 (0.0350)
Scope X Average VI			-0.0200* (0.0115)	-0.0284** (0.0114)
Log Assets	0.777*** (0.137)	0.00311 (0.430)	0.921*** (0.142)	0.0553 (0.431)
Capital Ratio	-0.425*** (0.0458)	-0.411*** (0.0534)	-0.425*** (0.0459)	-0.412*** (0.0536)
Constant	7.512*** (1.816)	17.83*** (5.478)	5.866*** (1.901)	17.04*** (5.506)
Bank fixed effects	No	Yes	No	Yes
Year fixed effects	No	Yes	No	Yes
Observations	16742	16742	16742	16742
Adjusted R <sup>2</sup>	0.038	0.027	0.044	0.027

The dependent variable is the BHC's return on equity. The variable Scope is defined as the count of unique 5-digit NAICS identified by either the primary or secondary business activity reported by a BHC's subsidiaries. The variable TED Spread (Avg.) is the three-year moving average of the daily TED spread. The variable Average VI is the amount of normalized inputs (from the BEA's Inputs/Outputs table) that each of a BHC's NAICS provides to the BHC's other NAICS, averaged over all NAICS-pairs within the BHC. Log Assets is the natural logarithm of the total asset size of the consolidated BHC, while Capital Ratio is the ratio between regulatory capital and total asset. The regression frequency is annual, with the right hand side variables measured at year t-1. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Columns 2 and 4 includes both BHC and year indicator variables. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table 3: Return on equity and unconditional adoption**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROE	ROE	ROE	ROE	ROE	ROE	Only simple
Cumulative Adoption	-0.123** (0.0580)	-0.112* (0.0589)	-0.111* (0.0612)	-0.176** (0.0731)	-0.271*** (0.0869)	-0.132* (0.0715)	-0.209* (0.126)
All Exit			-0.00369 (0.104)	-0.136 (0.123)	-0.00468 (0.137)	0.193* (0.104)	0.0793 (0.162)
Cum. Adoption X Exit				0.0189** (0.00912)	-0.0218 (0.0152)	-0.0198** (0.00970)	0.113** (0.0509)
Cum. Adoption X Scope					0.0169*** (0.00603)	0.00877* (0.00452)	0.00158 (0.0320)
Cumulative M&A		-0.147 (0.139)	-0.147 (0.139)	-0.128 (0.138)	-0.135 (0.134)	-0.336*** (0.101)	-0.644*** (0.226)
Scope (lagged)	-0.0960*** (0.0315)	-0.0948*** (0.0323)	-0.0941** (0.0397)	-0.103** (0.0413)	-0.183*** (0.0593)	-0.218*** (0.0619)	-0.151 (0.114)
Log Assets	0.910*** (0.146)	0.941*** (0.156)	0.940*** (0.157)	0.996*** (0.163)	1.094*** (0.174)	-1.205** (0.593)	-0.730 (0.738)
Capital Ratio	-0.365*** (0.0658)	-0.365*** (0.0657)	-0.365*** (0.0657)	-0.367*** (0.0659)	-0.367*** (0.0661)	-0.435*** (0.0735)	-0.458*** (0.0774)
Constant	4.962** (2.160)	4.556** (2.277)	4.568** (2.286)	3.942* (2.337)	2.875 (2.441)	34.11*** (7.854)	27.64*** (9.534)
Bank fixed effects	No	No	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	No	Yes	Yes
Observations	10226	10226	10226	10226	10226	10226	8005
Adjusted R <sup>2</sup>	0.042	0.042	0.042	0.043	0.044	0.032	0.034

The dependent variable is a BHC's return on equity. An adoption is defined as the appearance of a new 5-digit NAICS within a BHC's organizational structure. Cumulative Adoption is the count of a BHC's adoptions over a consecutive three-year period. All Exit is the count of unique 5-digit NAICS that are observed leaving a BHC over a consecutive three-year period. Scope is defined as the count of unique 5-digit NAICS reported by a BHC's subsidiaries. Cumulative M&A is the number of subsidiaries acquired by a BHC from other BHCs. Log Assets is the natural logarithm of the total asset size of the consolidated BHC, while Capital Ratio is the ratio between regulatory capital and total asset. The regression frequency is annual. Cumulative Adoption, Exit and Cumulative M&A are calculated over t-1 and t-3, and Scope at t-4. Column 7 reports the results of a regression that excludes BHCs with a scope at entry in the database equal to or greater than 3. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Column 6 and 7 include both BHC and year indicator variables. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table 4: Return on equity and adoption for different adoption types**

	(1)	(2)	(3)	(4)	(5)
	Distance	Financial	Hot	Modal	Modal with VI
Cumulative Adoption	-0.119 (0.0911)	-0.325*** (0.121)	-0.350*** (0.0919)	-0.386*** (0.117)	-0.193 (0.165)
Adoption Type	-0.0152 (0.0576)	0.298** (0.141)	0.134*** (0.0372)	0.0215*** (0.00781)	0.0162** (0.00812)
Cumulative VI					-0.0277*** (0.0106)
Modal X VI					0.000240* (0.000143)
All Exit	0.194* (0.104)	0.183* (0.105)	0.201* (0.104)	0.198* (0.104)	0.216** (0.104)
Cum. Adoption X Exit	-0.0200** (0.00976)	-0.0187** (0.00906)	-0.0196** (0.00974)	-0.0199** (0.00975)	-0.0224** (0.0103)
Cum. Adoption X Scope	0.00852* (0.00471)	0.0120** (0.00477)	0.0137*** (0.00421)	0.0146*** (0.00438)	0.0128*** (0.00493)
Cumulative M&A	-0.337*** (0.101)	-0.333*** (0.0993)	-0.345*** (0.101)	-0.331*** (0.0998)	-0.358*** (0.100)
Scope (lagged)	-0.217*** (0.0628)	-0.228*** (0.0613)	-0.241*** (0.0620)	-0.242*** (0.0612)	-0.228*** (0.0620)
Log Assets	-1.207** (0.595)	-1.222** (0.590)	-1.232** (0.591)	-1.186** (0.591)	-1.173** (0.592)
Capital Ratio	-0.435*** (0.0735)	-0.437*** (0.0733)	-0.441*** (0.0736)	-0.436*** (0.0736)	-0.439*** (0.0740)
Constant	34.15*** (7.885)	34.40*** (7.822)	34.62*** (7.826)	33.94*** (7.834)	33.81*** (7.852)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	10226	10226	10226	10226	10226
Adjusted R <sup>2</sup>	0.032	0.033	0.035	0.034	0.035

The dependent variable is a BHC's return on equity. Adoption Type is a sub-specification of the cumulative adoptions count based on the type specified in each column header. Distance defines the adoption type as the average distance (one, two, three or four digits) from NAICS 52211 of the NAICS adopted by the BHC. Financial is the subset of the cumulative adoption count of adoptions in NAICS 52. Hot defines the adoption type as the percentage of BHCs over the previous year that adopted the NAICS. Modal defines the adoption type as the sum of shares of BHCs that hold the NAICS a BHC adopts. Cumulative VI is the sum of the amount of normalized inputs (from the BEA Input/Output table) the adopted NAICS contributes to each of the BHC's NAICS, summed over each adoption in the past three years. The regression frequency is annual. Cumulative Adoption, All Exit, Adoption Type, Cumulative VI Added and Cumulative M&A are calculated over t-1 and t-3, and Scope at t-4. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.



**Table 5: Return on equity and adoption for lead adoption type**

	(1)	(2)	(3)	(4)	(5)
	Lead	5%	10%	30%	40%
Cumulative Adoption	-0.204*** (0.0739)	-0.127* (0.0712)	-0.149** (0.0726)	-0.206*** (0.0749)	-0.204*** (0.0778)
Adoption Type	0.817*** (0.245)	2.237*** (0.836)	0.890** (0.427)	0.641*** (0.231)	0.416** (0.174)
All Exit	0.171 (0.104)	0.173* (0.103)	0.184* (0.104)	0.170 (0.105)	0.180* (0.104)
Cum. Adoption X Exit	-0.0149 (0.00971)	-0.0138 (0.00955)	-0.0167* (0.00979)	-0.0147 (0.0100)	-0.0162* (0.00961)
Cum. Adoption X Scope	0.00785* (0.00430)	0.00538 (0.00450)	0.00760* (0.00454)	0.00808* (0.00440)	0.00863** (0.00436)
Cumulative M&A	-0.362*** (0.0964)	-0.346*** (0.102)	-0.356*** (0.0984)	-0.362*** (0.0978)	-0.344*** (0.0982)
Scope (lagged)	-0.200*** (0.0600)	-0.183*** (0.0618)	-0.200*** (0.0619)	-0.201*** (0.0606)	-0.206*** (0.0604)
Log Assets	-1.219** (0.589)	-1.208** (0.592)	-1.187** (0.592)	-1.200** (0.589)	-1.205** (0.589)
Capital Ratio	-0.441*** (0.0732)	-0.437*** (0.0730)	-0.436*** (0.0733)	-0.439*** (0.0730)	-0.439*** (0.0733)
Constant	34.30*** (7.801)	34.11*** (7.842)	33.87*** (7.848)	34.03*** (7.808)	34.11*** (7.806)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	10226	10226	10226	10226	10226
Adjusted R <sup>2</sup>	0.035	0.034	0.033	0.034	0.033

The dependent variable is a BHC's return on equity. Adoption Type is a sub-specification of the cumulative adoptions count and for each regression is a variant of the Lead adoption type. The main Lead adoption type (column 1) is defined as the subset of adoptions where the BHC was among the first 25% of BHCs to ever hold that NAICS. Columns 2 through 5 contain the same regression, except with the 25% cutoff changed to the indicated values. The regression frequency is annual. Cumulative Adoption, Adoption Type, Exit and Cumulative M&A are calculated over t-1 and t-3, and Scope at t-4. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table 6: Return and adoption for lead adoption, by modality**

	(1)	(2)	(3)	(4)
	Lead	Lead (modal)	Lead (future modal)	Lead (not modal)
Cumulative Adoption	-0.204*** (0.0739)	-0.199*** (0.0746)	-0.157** (0.0728)	-0.137* (0.0712)
Adoption Type	0.817*** (0.245)	0.951*** (0.293)	0.849** (0.387)	0.291 (0.355)
All Exit	0.171 (0.104)	0.179* (0.104)	0.186* (0.104)	0.190* (0.104)
Cum. Adoption X Exit	-0.0149 (0.00971)	-0.0157 (0.00983)	-0.0165* (0.00989)	-0.0193** (0.00970)
Cum. Adoption X Scope	0.00785* (0.00430)	0.00869** (0.00433)	0.00798* (0.00444)	0.00847* (0.00451)
Cumulative M&A	-0.362*** (0.0964)	-0.353*** (0.0954)	-0.345*** (0.0983)	-0.340*** (0.102)
Scope (lagged)	-0.200*** (0.0600)	-0.205*** (0.0603)	-0.206*** (0.0609)	-0.216*** (0.0625)
Log Assets	-1.219** (0.589)	-1.188** (0.588)	-1.189** (0.592)	-1.215** (0.593)
Capital Ratio	-0.441*** (0.0732)	-0.440*** (0.0730)	-0.437*** (0.0734)	-0.436*** (0.0735)
Constant	34.30*** (7.801)	33.91*** (7.781)	33.89*** (7.842)	34.24*** (7.862)
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	10226	10226	10226	10226
Adjusted R <sup>2</sup>	0.035	0.035	0.033	0.032

The dependent variable is a BHC's return on equity. Adoption Type is a sub-specification of the cumulative adoptions count and for each regression is a subset of the Lead adoption type. The Lead adoption type is the subset of adoptions where the BHC was among the first 25% of BHCs to ever hold that NAICS. In Column 1 the adoption type is the Lead adoption type. Column 2 defines the adoption type as the subset of Lead adoptions that are made on NAICS that are binary-modal (among the top ten most-held NAICS by BHCs as of the previous quarter) as of the time of the Lead adoption. Column 3 defines the adoption type as the subset of Lead adoptions that are not binary-modal at the time of adoption, but that become binary-modal for at least one future quarter. Column 4 defines the adoption type as the subset of Lead adoptions that are not binary-modal at the time of adoption and do not for any future quarter ever become binary-modal. The regression frequency is annual. Cumulative Adoption, Adoption Type, Exit and Cumulative M&A are calculated over t-1 and t-3, and Scope at t-4. The sample consists of all FR Y-9C-filing BHCs between 1992 and 2006. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Figure 1: BHC scope upon entry**

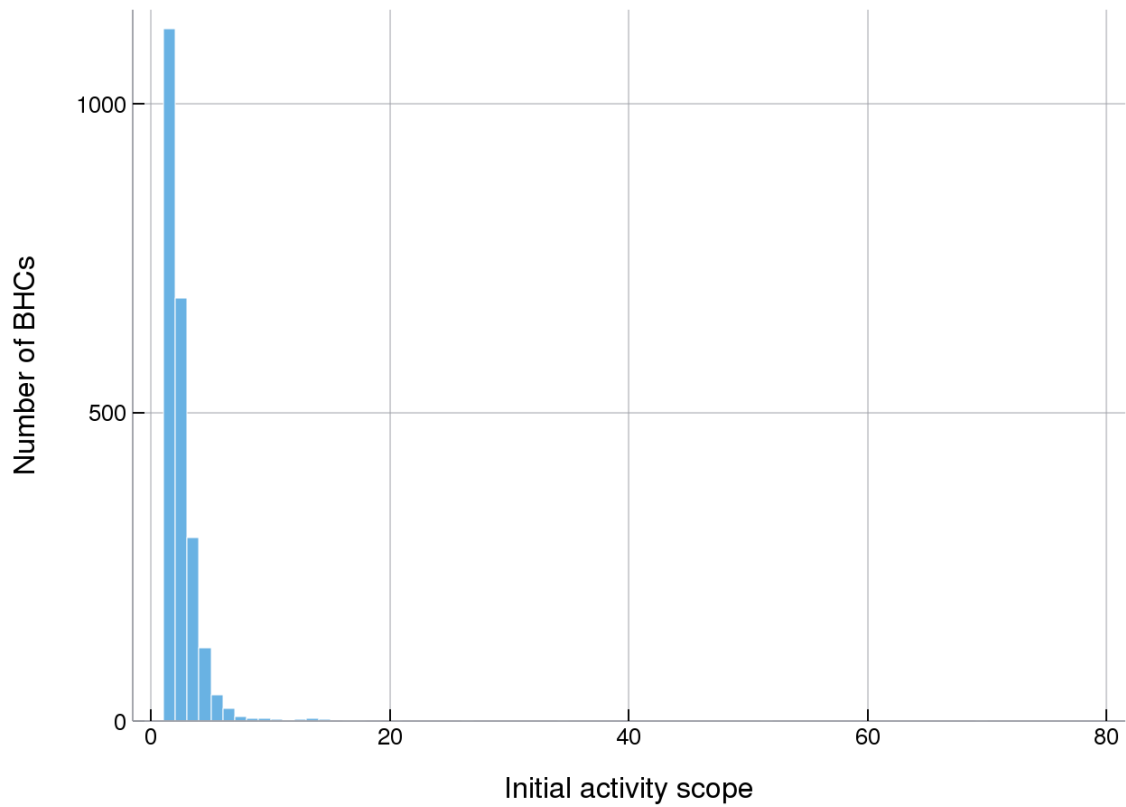


Figure 1 shows a histogram of initial activity scope for all BHCs that file the Y-9C and become BHCs during the sample period (1992-2006). Initial activity scope is the number of unique five-digit NAICS that a BHC holds during its first year as a top-tier BHC, based off the reported primary or secondary NAICS of its controlled subsidiaries. The data underlying the activity scope measure is from the Cetorelli and Stern (2015) database of organizational structure.

**Figure 2: Annual number of BHCs with adoptions or exits**

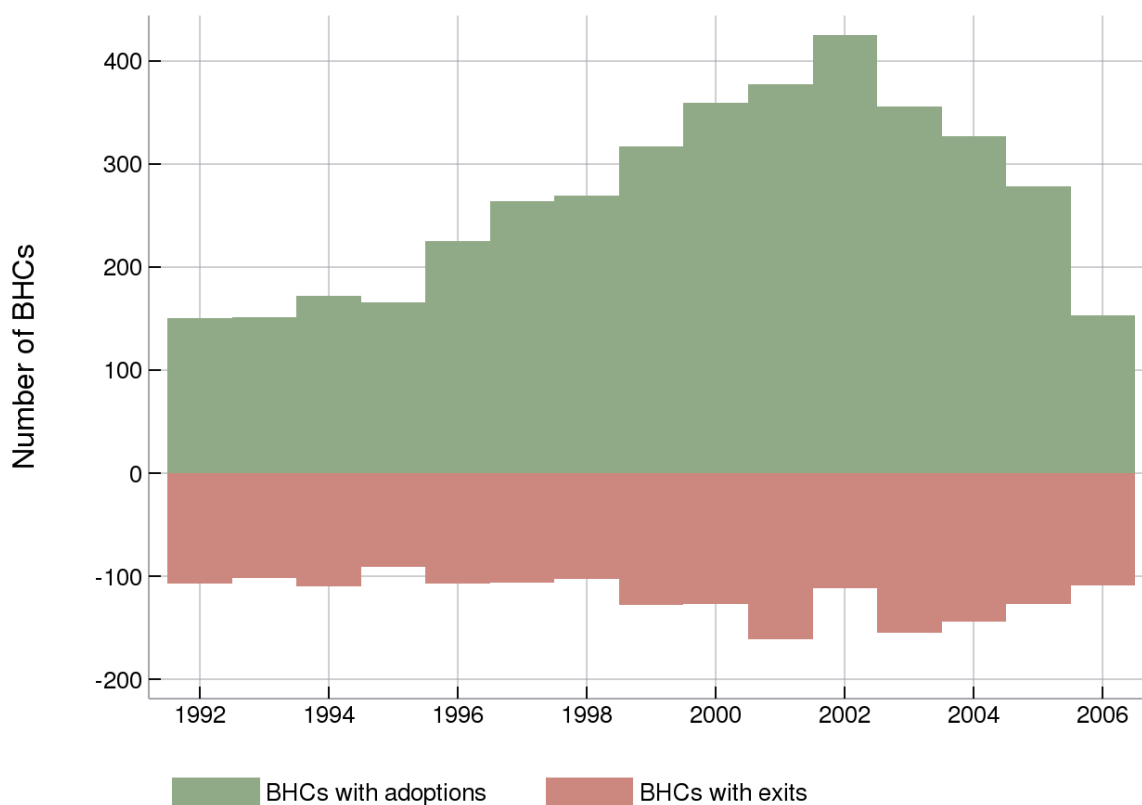


Figure 2 shows, among Y-9C-filing BHCs, how many BHCs make at least one adoption and/or at least one exit during each year over the sample period (1992-2006). An adoption occurs for a given year when a BHC controls a subsidiary with a five-digit primary or secondary NAICS code that prior to that year the BHC had never held within its organization. An exit occurs for a given year when it is the final year that a BHC holds a five-digit NAICS that it has held in prior years. The data underlying the adoption and exit statistics is from the Cetorelli and Stern (2015) database of organizational structure.

**Figure 3: Annual popularity of select NAICS**

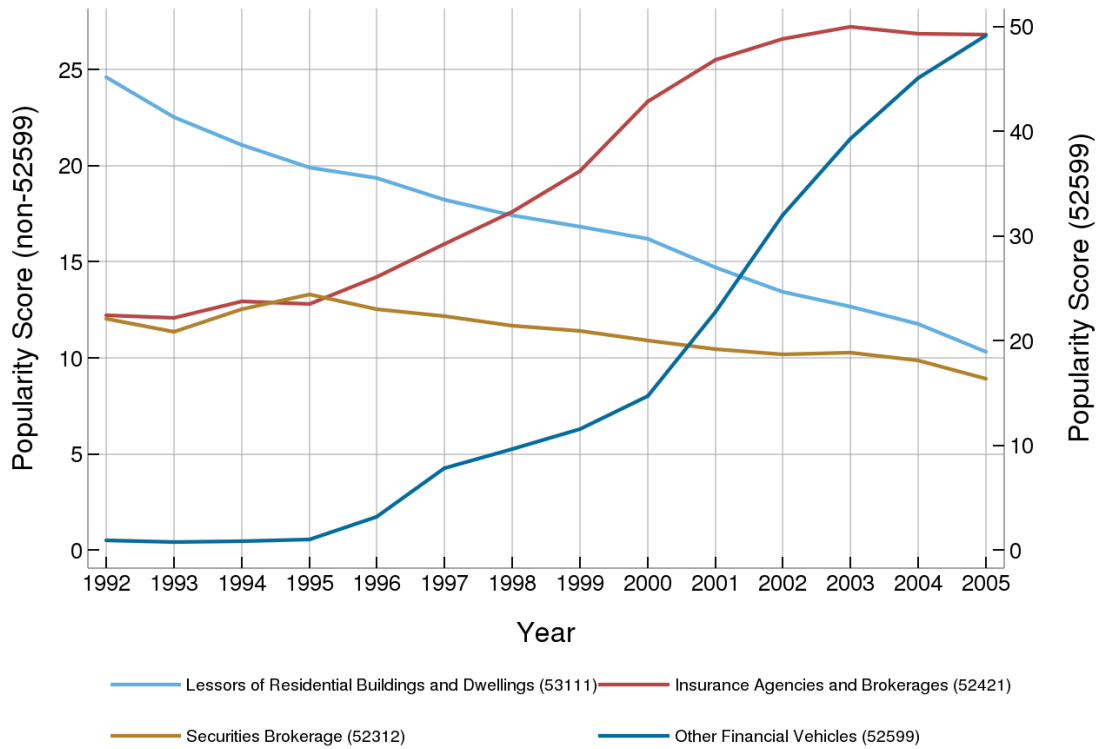


Figure 3 shows the popularity score of four different five-digit NAICS among Y-9C-filing BHCs for each year over the sample period (1992-2006). The right y-axis corresponds to the popularity score of NAICS 52599 (“Other Financial Vehicles”), while the left y-axis corresponds to the other three NAICS. The popularity score for a NAICS-year equals the number of BHCs that hold that NAICS during any quarter of the year divided by the total number of BHCs in the population (multiplied by 100). A BHC is considered to hold a NAICS if it controls at least one subsidiary whose reported primary or secondary activity is that NAICS. The underlying data is from the Cetorelli and Stern (2015) database of organizational structure.

**Appendix for**  
**Transformation of Corporate Scope in US Banks:  
Patterns and Performance Implications**

**Nicola Cetorelli**, Federal Reserve Bank of New York  
**Michael G. Jacobides**, London Business School  
**Sam Stern**, University of Michigan

*This appendix contains auxiliary material to the main analysis in the manuscript. The first section provides an in-depth discussion on the quality of the database, while the second presents more details on select items of both the methodology and the results of the analysis.*

**A1. Quality checks on the database**

*Is the data representative of the industry?* The database is highly representative of the transformation in the US banking industry as a whole. However, while we focus on BHCs, it is certainly the case that commercial banks can operate as standalone organizations. Likewise, thrift (savings and loans) institutions can also engage in banking activities, but are not captured in our analysis. Hence, we might miss some transformation dynamics in the banking industry by focusing on BHCs. However, this is likely not the case, for two reasons. First, the extent to which an entity with a commercial bank or thrift charter could expand its business scope is constrained by regulation, with the holding company being exactly the legal vehicle reserved for this. Second, as Table A1 shows, BHCs have in fact been the largest component of the depository lending industry, accounting for a dominant share of total banking assets over time.

*Properly capturing changes in business scope.* While we believe that our database presents the most detailed and extensive analysis of banking scope (and, arguably, the most detailed database of scope transformation of any major industry), there is a risk of both Type I and Type II errors in our measure of changes in scope. First, there may be subsidiary additions that have little to do with actual economic activity, driven perhaps by tax or regulatory arbitrage (although creating a tax shield or circumventing regulatory restrictions could still be considered synergistic strategies). Second, one could argue that scope expansion could still take place within the boundaries of a commercial bank entity, even without a subsidiary addition. For instance, a commercial bank could obviously engage in mortgage lending without necessarily adding a specialist mortgage lender to its structure, so that the addition of such a lender may signal the “start” of a new activity that actually began earlier.

To check on the first type of concerns, we ran regressions with both interest income ratio (revenues from interest-earning assets over total revenues) and noninterest income ratio (revenues from fee-based activities over total revenues) as dependent variables, and our metrics of scope expansion as regressors. If the addition of subsidiaries in new NAICS were merely an artifact of the tax and regulatory landscape, or any other arbitrage opportunity, we should not find any systematic association with income generation. The results, reported in Table A2, show exactly the opposite: Scope expansion is consistently associated with a subsequent increase in income, especially in the noninterest component -- as one would expect, since most newly adopted activities are likely to generate fee-based rather than interest-based revenues. Interestingly, expansion of scope is also associated with an increase in income *expenses*, another indication that adding subsidiaries in new activities has direct economic consequences.

The second concern is also unlikely to apply in our setting. While it is certainly the case that certain activities, as in the case of specialty lending, could be pursued by a commercial bank entity, it is also true that significant restrictions are in place on the type of economic activities that can be conducted within its strict legal boundaries. Indeed, the BHC is exactly the legal vehicle that US law has designed for a bank to pursue broader activities. Having said that, in specific circumstances we could accurately map NAICS types to corresponding items on BHCs' balance sheets (e.g. credit-card lending; rental and leasing). If those specific activities were already significantly pursued within the boundaries of an existing commercial bank subsidiary (and therefore showing up in the consolidated balance sheet of the commercial bank top holder), adding a specialist should not be associated with meaningful expansions in those activities; it would only be formalizing that activity, and just tracking the organization in a different way. Yet we found that this was not the case. Our analysis confirms that adding subsidiaries in either credit-card lending or rental and leasing for the first time led to a significant rise in the respective balance-sheet line items. Table A3 reports the results of the corresponding regressions.

We also looked into other potential data issues. For instance, we considered the possibility of false attribution of business scope and business expansion in the database: A particular concern is the possibility that a BHC might look like it had added subsidiaries in a given NAICS, when such data might simply reflect the investments of private equity entities under its control, or the investments of its controlled asset management entities. If such instances were prevalent, we would be hard pressed to consider them as reflecting a BHC's

own business scope. However, we show that this is a non-issue: Private equity and asset management entities account for virtually no instances of scope expansion in the population.

Further, we considered the fact that NAICS industry classifications are revised over time, a potential challenge in maintaining a consistent panel database. However, this is not an issue in our case, since the industry codes assigned to subsidiaries and reported to the regulatory authorities are either confirmed or updated in the event of changes in the classification system, and then the information is rendered backward-compatible in the database according to the most recent classification.

***Transformation of scope not driven by Glass-Steagall repeal.*** We also track the evolution of the NAICS “envelope” for the BHC population as a whole, i.e., the *aggregate* number of NAICS in our database at any point in time. As Figure A1 shows, there was a significant upward trend throughout the early part of the 1990s, with a peak in 1997, well before the formal repeal of Glass-Steagall in 1999. This suggests that the sector had been experimenting with broadening its scope well before the landmark legislation since regarded as transformative for the industry (Barth, Brumbaugh, and Wilcox, 2000).

***Comparison with alternative metrics of business scope.*** Knowledge of the business activity of controlled subsidiaries thus appears to be a direct and precise way to infer the business scope of an organization. The use of industry classification codes for this purpose is also far more accurate than popular alternatives—such as Compustat segments, which offer only a coarse classification. Moreover, and perhaps most important, Compustat segments are self-reported, leading to possible reporting biases and a lack of homogeneity in classification across firms (Villalonga, 2004a). Also, Compustat segment information is only available for listed companies by definition, whereas our database encompasses the entire population of BHCs. As we argued earlier, much scope transformation takes place beyond listed BHCs: As Table A4 shows, almost half (45%) of all instances of scope expansion occur among private BHCs.

The BHC database resembles census-based sources, such as the Longitudinal Business Database (Jarmin and Miranda, 2002), with detailed information on firms, subsidiaries, and business activity. However, in census records (as used by other detailed examinations, including Schoar, 2002 and Villalonga, 2004a), ownership is defined either by a majority equity stake, or, in the case of minority positions, by the firms’ own declaration that they control the subsidiary (Nguyen, 1998). That raises the possibility of arbitrary classifications,



as well as a lack of homogeneous standards. In our database, control is strictly defined according to a set of regulatory guidelines—conditions that guarantee objectivity and higher standards of homogeneity across firms and through time. Given that our interest is in *synergies* and the overall impact from diversification, the focus on high-holder overall performance (as opposed to productivity, as in Schoar, 2002) is appropriate, and the fact that we have a set of sectoral comparisons further justifies the use of ROE, since firms are broadly comparable in our setting.

The data is also better suited to our purposes than income data, which has been used extensively in studies of corporate diversification in banking (see, e.g. the comprehensive literature review in Stiroh, 2015). Arguably, non-traditional banking activities are sources of fee-based, non-interest income, and so a higher reliance on such income can meaningfully be associated with greater business diversification. However, income data remains too coarse, and does not lend itself well to a precise mapping with specific business activities. Second, a hypothetical increase in non-interest income may simply reflect a *scaling up* of extant non-traditional activities, rather than an expansion into new ones. Of course, such an increase would still capture a change in business *emphasis* and overall diversification, but it could not be characterized as an instance of scope expansion in the Chandlerian sense described in section I.2 of the manuscript. Finally, a focus on income cannot capture synergies across different business activities: A new activity may not necessarily generate an income contribution, and may even make a loss, but it may nevertheless have a positive impact on the profitability of other, already existing operations. For example, entering the underwriting business may not necessarily be profitable *per se*, but it may reduce information frictions on corporates, thus possibly boosting *interest* revenues. Hence, as a result of this scope expansion the overall income composition of the organization may remain stable, or even tilt back, suggesting reduced diversification.

***Scope expansion driven by M&As.*** As discussed in the manuscript, we explicitly consider the possibility that what we are characterizing as the result of active scope transformation strategies may simply reflect the “passive” incorporation of businesses resulting from the acquisition of another BHC, but not necessarily the active intention to engage in those businesses. This concern is not borne out by the data. Table A5 reports the total count of scope expansion instances recorded in the study, broken down by whether they occurred as a result of two BHCs consolidating or not. As the table shows, only 10% of such events were ever the result of M&A activity between BHCs. As we also mention explicitly in the

manuscript, we nevertheless explicitly take into account in the regression analysis the M&A dynamics within each BHC.

## A2. Methodology and analysis

***Index of NAICS modality.*** In order to capture the industry “modal” BHC, we identified the count of individual BHCs that at any point in time either *add* subsidiaries for the first time in a given five-digit NAICS (the flow measure of “hot” NAICS) or the count on the basis of subsidiaries *held* in a given five-digit NAICS, irrespective of when that NAICS was entered for the first time (the stock metric of “modal” NAICS). To give a sense of the broad span of NAICS held by BHCs and their changing modality, Table A6 reports the list of the 50 most widely held five-digit NAICS for three representative years, sorted on the 2005 ranking. For each NAICS/year, the table reports count of BHCs, the equivalent share of total BHCs in the population (the actual modality metric), and the total number of subsidiaries held (the BHC count and total number of subsidiaries are reported for reference). The first line reports the figures for commercial bank subsidiaries, NAICS 52211. By dint of the legal definition of a BHC, the entire population necessarily holds at least one such subsidiary.<sup>20</sup> The other NAICS display a significant heterogeneity in both the cross section and the time series.

***Construction of the vertical integration metric.*** We constructed a metric of how vertically related a BHC’s scope expansions are by drawing on Input-Output Accounts Data (IO table) from the Bureau of Economic Analysis (BEA). These tables provide information on how industries in the US economy interact with each other. For a given three-digit NAICS industry  $i$ , the BEA constructs the input component of the IO table by calculating the annual US economy-wide dollar value of inputs provided by each three-digit NAICS industry (including industry  $i$  itself) for the production of output by industry  $i$ . If industry  $i$  takes a large proportion of its inputs from industry  $j$ , then we can reason that industry  $j$  is upstream in the production chain of industry  $i$ , and that the two industries are vertically related.

We can therefore use the input table to calculate how intensely a BHC’s expansion into a new NAICS contributes to the vertical integration of the BHC’s own “production process.” This is done as follows. Let  $n$  be the five-digit NAICS adopted by the BHC at time  $t$ . From the input table at time  $t-1$  we sum across the inputs that  $n$  gives to each of the NAICS the BHC already holds. A high value of the sum indicates that the addition of  $n$  significantly

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<sup>20</sup> And for the same reason, of course, there is never an instance of scope expansion *into* NAICS 52211.

increases the upstream vertical integration of industries in which the BHC is active. The sum is dynamic in that as a BHC expands its scope, its opportunities for vertical integration also increase: in a BHC with a large scope, there are more NAICS with which the new NAICS  $n$  can be vertically related. We then normalize the inputs sum by dividing from it the total amount of inputs (across all industries, regardless of whether they are held by the BHC) used by the NAICS the BHC already held prior to its expansion. The resulting metric, which we call *average VI*, thus captures the extent to which a given scope expansion increases the proportion of upstream production that is housed within the BHC.

***Comparison between market-based and accounting-based metrics of performance.*** As explained in the manuscript, our main metric of performance is the BHC return on equity (ROE). In keeping with much of the extant literature, we have also performed analysis using firms' Tobin's Q. The basic rationale for a market-based performance metric such as Tobin's Q is that balance-sheet return would not fully reflect the possible differences in risk taking associated with different business scope profiles (Lang and Stulz, 1994, p. 1249). If higher performance is associated with higher risk-taking, then an accounting-based performance measure may embed a positive relationship with business scope simply because it does not adjust for different levels of risk.<sup>21</sup>

However, for this particular study we want to analyze the entire population of BHCs, not just listed companies, since significant scope transformation occurs across the entire population (see Table A4). Moreover, our analysis progressively shifts toward dynamics within a firm, and so we wish to observe the entire dynamics of *any* firm: those that never go public; those that do, but observing any scope change in the preceding years; and those that are already public but choose to delist during the sample period.

There are good reasons why concerns over the use of accounting metrics are less acute for this particular study. First, net returns reported in BHCs' income statements include a component of "provisioning" for expected losses, which will be naturally correlated with the level of risk each firm is taking, thus automatically reducing reported returns as risk increases. Moreover, as an industry subject to supervisory monitoring, banking should be less

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<sup>21</sup> Another reason to privilege market-based metrics is that empirical exercises normally use samples of firms from broad cross-sections of different industries, where accounting practices could be very different, thus raising concerns about comparability and possibly leading to biases in the analysis. This is obviously not an issue here, since accounting rules are fully homogeneous in this population.

exposed to systematic *discretion* in reporting standards across firms.<sup>22</sup> To that end, we run the analysis to include *all* BHCs for which financial data is available, and use *ROE* as the default metric of performance.

We report results of the cross-sectional analysis using BHCs' Tobin's Q as dependent variable in specification (1) in the manuscript. We compare that to the results obtained using ROE instead, both for the subset of listed companies (for a direct comparison), and then on the whole population of listed and private BHCs, as done in the manuscript. For the reasons set out above, we do not expect ROE to give a biased assessment of the true impact of changes in business scope. The empirical analysis confirms this. Table A7 shows regressions based on specification model (1), using Tobin's Q and ROE as alternative dependent variables, and because we used a market-based metric, the database is restricted to the set of listed BHCs. The results in the first two columns show a consistent relationship between scope and performance. In column 3 we present the results of a separate regressions, using BHCs' Z-Score, calculated as the sum of ROA and the capital ratio (equity over assets) divided by the standard deviation of ROA across the previous four years, as a dependent variable strictly capturing risk. We did this to verify the extent to which *ROE* reflects possible risk considerations embedded in broader scope. The results are consistent throughout. Broader scope has a negative association with performance and, yes, broader scope is associated with more risk, but that is reflected *both* in the Tobin's Q *and* the *ROE*.

***Endogeneity concerns.*** As discussed in the manuscript, the negative relationship between scope and performance may in fact be the result of selection, with poorly performing BHCs more likely to expand into new activities. In order to address this issue formally, we ran logit regressions of the likelihood of expanding scope as a function of firm characteristics that should reflect relative performance. In the regressions, the dependent variable is switched on if a BHC expands scope at time  $t$ , and the regressors capture firm performance observed at time  $t-1$ . Table A8, column 1, reports the findings. In this table, each cell in a column shows the results of a separate logit regression, with the main covariate of interest listed in each row. We used a number of alternative measures that should correlate with inferior performance, especially in relation to traditional banking business. We used ROE itself, and then Tobin's Q for the subset of listed BHCs. We then used the capital-to-asset ratio and a measure of net

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<sup>22</sup> In fact, one could argue that for this particular industry there may be a possible *upward* bias in the use of market-based metrics: If scope expansion leads to circumstances where a BHC is "too complex to let fail," markets may incorporate a valuation premium associated to this potential regulatory subsidy.

loan charge-offs. We also used metrics of asset growth, a ratio of the assets of the commercial bank subsidiaries to the total assets of the BHCs and total BHC asset itself. The estimated coefficients are odd ratios, so they indicate significant relationships if they deviate significantly from a value of 1. None of these metrics seem to be fundamental drivers of scope expansions. The only variables that appear to have a strong association with the likelihood of expansion are, not surprisingly, asset size and the bank-to-total-asset ratio. Larger banks seem to be more likely to expand, and those that do so increasingly depart from core commercial banking activities.

Overall, and as expected, there is no indication of a systematic relationship between previous performance and likelihood to expand in the BHC population.

We also addressed the *opposite* selection concern that might be raised in relation to our results on the impact of related scope expansions (hot and modal). There one could argue that perhaps *better* performing BHCs somehow systematically would select into expansions that are closer to the modal firm. We thus ran logit regressions of engaging in a hot or modal expansion as a result of recent performance characteristics. The results are reported in columns 2 and 3 of Table A8. Again, we do not see any relationship in the data corroborating the selection concern. If anything, the evidence seems to go the other way, at least for hot expansions, and only according to the estimated coefficient on the capital ratio. We ran an equivalent logit regression also on lead-type expansions (results in column 4), there as well not finding any evidence that better performing firms should be more likely to go first in new activities.

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**Table A1: Aggregate assets (\$ billion) of banking entities for select years**

	1992		1996		2000		2004		2006	
	Assets	Percent	Assets	Percent	Assets	Percent	Assets	Percent	Assets	Percent
<b>BHCs</b>	3,021	71%	4,176	76%	6,419	81%	9,734	83%	12,077	85%
<b>Thrifts</b>	1,030	24%	1,029	19%	1,217	15%	1,687	14%	1,764	12%
<b>Standalone CBs</b>	226	5%	259	5%	292	4%	252	2%	325	2%

Table A1 shows the total aggregate assets (in billions of dollars) of three types of banking industry entities at the end of select years within the 1992–2006 sample period. The entities included are bank holding companies (“BHCs”), thrifts, and commercial banks that are not controlled by a holding company (“Standalone CBs”). Data on BHC assets is from the *Consolidated Financial Statements for Holding Companies* (FR Y-9C). Data on thrift assets is from the Federal Deposit Insurance Corporation (FDIC), while data on Standalone CB assets is from the Reports of Condition and Income (Call Reports).

**Table A2: Return on equity decomposition and adoption**

	(1)	(2)	(3)	(4)	(5)	(6)
	Int. Inc.	Nonint. Rev.	Nonint. Exp.	Int. Inc.	Nonint. Rev.	Nonint. Exp.
Cumulative Adoption	0.676*** (0.186)	1.987*** (0.251)	2.887*** (0.318)	0.233* (0.130)	0.551*** (0.116)	0.978*** (0.167)
All Exit	0.0824 (0.311)	-1.316*** (0.422)	-1.145** (0.475)	-0.0845 (0.192)	-0.593** (0.256)	-0.838*** (0.325)
Cum. Adoption X Exit	-0.000284 (0.0254)	0.105** (0.0458)	0.124** (0.0501)	-0.0104 (0.0169)	0.0404* (0.0236)	0.0426* (0.0253)
Scope (lagged)	-0.276* (0.143)	1.416*** (0.207)	1.501*** (0.232)	-0.376*** (0.114)	0.262** (0.111)	0.177 (0.149)
Cum. Adoption X Scope	-0.0102 (0.0221)	-0.102*** (0.0207)	-0.136*** (0.0248)	0.00347 (0.00764)	-0.0190** (0.00905)	-0.0300*** (0.0109)
Cumulative M&A	0.244 (0.374)	-2.111*** (0.525)	-1.862*** (0.591)	-0.541*** (0.206)	-0.384** (0.157)	-0.255 (0.216)
Log Assets	-1.353*** (0.385)	0.390 (0.506)	-3.235*** (0.635)	-6.390*** (0.940)	-4.611*** (0.974)	-12.57*** (1.345)
Capital Ratio	-3.474*** (0.140)	-0.689*** (0.227)	-3.351*** (0.255)	-2.414*** (0.164)	-0.929*** (0.166)	-2.647*** (0.254)
Constant	96.04*** (5.203)	10.39 (7.313)	107.2*** (8.953)	155.8*** (12.97)	80.41*** (13.33)	226.8*** (18.72)
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Observations	10226	10226	10226	10226	10226	10226
Adjusted R <sup>2</sup>	0.317	0.205	0.230	0.848	0.851	0.841

Table A2 reports regression results from specification (3). The sample consists of all FR Y-9C-filing BHCs, both listed and non-listed ones, between 1992 and 2006. The dependent variable is some component of net income, indicated by the column title, divided by equity. Int. Inc. is net interest income over equity, Nonint. Rev. is noninterest revenue over equity, and Nonint. Exp. is total noninterest expenses over equity. An adoption is defined as the appearance of a new 5-digit NAICS within a BHC's organizational structure. Cumulative Adoption is the count of a BHC's adoptions over a consecutive three-year period. All Exit is the count of unique 5-digit NAICS that are observed leaving a BHC over a consecutive three-year period. Cum. Adoption x Exit is the product of the previous two variables. Scope is defined as the count of unique 5-digit NAICS reported by a BHC's subsidiaries. Cum. Adoption x Scope is the product of a BHC Scope at time t-4 and the cumulative adoption count over t-1 and t-3. Cumulative M&A is the number of subsidiaries acquired by a BHC from other BHCs. Log Assets is the natural log of the total asset size of the consolidated BHC, while Capital Ratio is the ratio between regulatory capital and total asset. The regression frequency is annual. Cumulative Adoption, Exit and Cumulative M&A are calculated over t-1 and t-3, and Scope at t-4. Columns 4 through 6 include both BHC and year indicator variables. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.



**Table A3: Credit card and leasing activities**

	(1) CC	(2) CC	(3) Leasing	(4) Leasing
Credit Card Sub	8.822*** (2.936)	1.405 (1.484)		
Rental and Leasing Sub			4.860** (2.220)	0.799** (0.380)
Constant	0.715*** (0.0561)	1.572*** (0.103)	0.675*** (0.0491)	0.308*** (0.0812)
Bank fixed effects	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes
Observations	20380	20380	20373	20373
Adjusted R <sup>2</sup>	0.085	0.061	0.023	0.011

Table A3 reports the results of regressions of a LHS variable corresponding to an activity's importance on a BHC's balance sheet on a RHS variable corresponding to whether the BHC holds a NAICS with that activity. A BHC is defined to hold a NAICS if the NAICS is either the primary or secondary business activity reported by at least one of a BHC's subsidiaries. In Columns 1 and 2, the LHS variable is the proportion of a BHC's loans in credit card lending and the RHS variable is an indicator for whether the BHC holds a subsidiary with NAICS 52221 (Credit Card Issuing). In Columns 3 and 4, the LHS variable is the proportion of a BHC's loans in rental and leasing loans and the RHS variable is an indicator for whether the BHC holds a subsidiary with three-digit NAICS 532 (Rental and Leasing Services). The regression frequency is annual, with the LHS variables measured at year t and the RHS indicator variables at year t-1. Balance sheet items are taken from the fourth quarter of the year. Columns 2 and 4 include both BHC and year indicator variables. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table A4: Number of adoptions by public vs. private BHCs**

<b>Type of Adoption</b>	<b>Count</b>	<b>Percent</b>
Private BHC Adoption	2,627	45.22
Public BHC Adoption	3,183	54.78
<b>Total</b>	<b>5,810</b>	<b>100</b>

Table A4 shows the breakdown of adoptions between those made by publically listed BHCs and those made by private BHCs within the 1992–2006 sample period. All adoptions made by BHCs that file the FR Y-9C are included. An adoption is defined to occur for a given quarter when a BHC controls a subsidiary with a reported primary or secondary five-digit NAICS that prior to that quarter the BHC had never held within its organization. The underlying source for adoptions is the database of Cetorelli and Stern (2015). Data on whether a BHC is publically listed during each quarter is from the Center for Research in Security Prices (CRSP) US Stock Databases.

**Table A5: Number of adoptions through M&A vs. non-M&A**

<b>Type of Adoption</b>	<b>Count</b>	<b>Percent</b>
M&A Adoption	566	9.74
Non-M&A Adoption	5,244	90.26
<b>Total</b>	<b>5,810</b>	<b>100</b>

Table A5 shows the breakdown of adoptions between those that are the result of a merger and acquisition (M&A) and those that are not the result of M&A within the 1992–2006 sample period. The adoptions of all BHCs that file the FR Y-9C are included. An adoption is defined to occur for a given quarter when a BHC controls a subsidiary with a reported primary or secondary five-digit NAICS that prior to that quarter the BHC had never held within its organization. An adoption is defined to be the result of M&A when the subsidiary with the new NAICS is acquired either as a result of the BHC merging with another BHC or of the BHC acquiring the subsidiary from another BHC. The underlying source is the database of Cetorelli and Stern (2015).

**Table A6: Modality of NAICS for select years**

NAICS	1995			2000			2005		
	BHC Count	BHC Share (%)	Sub Count	BHC Count	BHC Share (%)	Sub Count	BHC Count	BHC Share (%)	Sub Count
52211 Commercial Banking	1272	100.00	3418	1705	100.00	3348	2215	100.00	3428
52599 Other Financial Vehicles	13	1.02	16	251	14.72	512	1088	49.12	2680
52421 Insurance Agencies and Brokerages	163	12.81	284	398	23.34	896	594	26.82	1134
55111 Management of Companies and Enterprises	292	22.96	1420	431	25.28	2111	497	22.44	2158
52229 Other Nondepository Credit Intermediation	219	17.22	602	291	17.07	893	333	15.03	1236
54199 All Other Professional, Scientific, and Technical Services	118	9.28	309	209	12.26	493	277	12.51	814
53111 Lessors of Residential Buildings and Dwellings	253	19.89	957	276	16.19	1327	229	10.34	1447
52393 Investment Advice	105	8.25	312	169	9.91	695	211	9.53	847
52222 Sales Financing	169	13.29	797	226	13.26	1193	203	9.16	1315
52312 Securities Brokerage	169	13.29	272	186	10.91	321	198	8.94	326
52399 All Other Financial Investment Activities	120	9.43	520	148	8.68	685	171	7.72	813
51821 Data Processing, Hosting, and Related Services	153	12.03	278	175	10.26	358	146	6.59	299
62422 Community Housing Services	101	7.94	531	124	7.27	2779	142	6.41	5138
52239 Other Activities Related to Credit Intermediation	126	9.91	1358	111	6.51	308	105	4.74	209
53119 Lessors of Other Real Estate Property	16	1.26	18	107	6.28	207	101	4.56	176
52411 Direct Life, Health, and Medical Insurance Carriers	119	9.36	259	115	6.74	347	99	4.47	296
54119 Other Legal Services	13	1.02	21	57	3.34	82	94	4.24	137
52391 Miscellaneous Intermediation	57	4.48	170	71	4.16	434	81	3.66	662
52413 Reinsurance Carriers	33	2.59	43	57	3.34	65	64	2.89	87
53139 Other Activities Related to Real Estate	8	0.63	8	16	0.94	20	61	2.75	111
54161 Management Consulting Services	43	3.38	111	53	3.11	134	60	2.71	127
52311 Investment Banking and Securities Dealing	7	0.55	7	51	2.99	169	55	2.48	151
53112 Lessors of Nonresidential Buildings (except Miniwarehouses)	61	4.80	186	44	2.58	113	54	2.44	131
52392 Portfolio Management	11	0.86	21	21	1.23	67	48	2.17	180
52231 Mortgage and Nonmortgage Loan Brokers	27	2.12	76	29	1.70	39	48	2.17	108
52412 Direct Insurance (except Life, Health, and Medical) Carriers	6	0.47	6	12	0.70	14	44	1.99	62
52429 Other Insurance Related Activities	2	0.16	2	11	0.65	13	38	1.72	49
52212 Savings Institutions	88	6.92	102	73	4.28	77	34	1.53	40
53132 Offices of Real Estate Appraisers	19	1.49	19	27	1.58	29	32	1.44	37
52313 Commodity Contracts Dealing	40	3.14	96	33	1.94	362	26	1.17	176
52591 Open-End Investment Funds	4	0.31	4	15	0.88	30	25	1.13	164
52232 Financial Transactions Processing, Reserve, and Clearinghouse Activities	38	2.99	202	32	1.88	243	23	1.04	192
53131 Real Estate Property Managers	4	0.31	4	6	0.35	9	22	0.99	38
53121 Offices of Real Estate Agents and Brokers	50	3.93	424	36	2.11	86	22	0.99	44
52590 Other Investment Pools and Funds	14	1.10	65	21	1.23	187	22	0.99	81
52221 Credit Card Issuing	27	2.12	54	37	2.17	78	20	0.90	53
52220 Nondepository Credit Intermediation	25	1.97	348	28	1.64	342	18	0.81	94
56199 All Other Support Services	38	2.99	73	25	1.47	49	17	0.77	26
23721 Land Subdivision	42	3.30	100	28	1.64	152	15	0.68	149
52390 Other Financial Investment Activities	4	0.31	7	7	0.41	18	15	0.68	52
56144 Collection Agencies	10	0.79	14	8	0.47	9	14	0.63	16
54121 Accounting, Tax Preparation, Bookkeeping, and Payroll Services	7	0.55	9	7	0.41	11	13	0.59	18
53242 Office Machinery and Equipment Rental and Leasing				3	0.18	4	13	0.59	16
81321 Grantmaking and Giving Services	8	0.63	8	9	0.53	14	13	0.59	16
52314 Commodity Contracts Brokerage	16	1.26	24	12	0.70	28	12	0.54	20
48121 Nonscheduled Air Transportation	3	0.24	3	6	0.35	5	12	0.54	11
53249 Other Commercial and Industrial Machinery and Equipment Rental and Leasing	5	0.39	5	8	0.47	11	11	0.50	14
54151 Computer Systems Design and Related Services	10	0.79	27	12	0.70	37	10	0.45	40
53241 Construction, Transportation, Mining, and Forestry Machinery and Equipment	4	0.31	5	5	0.29	8	9	0.41	14
53130 Activities Related to Real Estate	13	1.02	61	14	0.82	71	9	0.41	27

Table A6 shows the relative modality scores (BHC Share) for the top 50 five-digit NAICS sorted in descending order based on the 2005 count. The modality score for a NAICS-year equals the number of BHCs that hold that NAICS during any quarter of the year divided by the total number of existing BHCs (multiplied by 100). A BHC is defined to hold a NAICS if the NAICS is either the primary or secondary business activity reported by at least one of a BHC's subsidiaries. BHC Count is the number of BHCs that exist during the year and Sub Count is the number of subsidiaries with the NAICS. The underlying source is the database of Cetorelli and Stern (2015).

**Table A7: Return on equity and scope, listed BHCs**

	(1)	(2)	(3)	(4)	(5)
	Tobin's Q	Tobin's Q	Tobin's Q	Log Z-score	ROE, public only
Scope	0.113*** (0.0338)	-0.206*** (0.0431)	-0.217*** (0.0507)	-0.0140*** (0.00527)	-0.157*** (0.0366)
Log Assets		1.944*** (0.234)	2.387*** (0.279)	0.0646** (0.0298)	1.673*** (0.204)
Capital Ratio			0.423*** (0.151)	0.0679*** (0.0120)	-0.210** (0.0892)
Constant	108.2*** (0.266)	82.62*** (3.043)	73.93*** (4.146)	2.755*** (0.433)	-7.722** (3.107)
Observations	6123	6123	4656	4592	4656
Adjusted R <sup>2</sup>	0.014	0.068	0.103	0.028	0.087

Table A7 reports regression results from specification (1). The sample consists of all listed FR Y-9C-filing BHCs between 1992 and 2006. In the first three columns the dependent variable is the BHC's Tobin's Q, calculated as the BHC's market value (approximated by the sum of the market value of equity plus the book value of debt) over the BHC's book value (total assets), multiplied by 100. In the fourth column the dependent variable is the log of the BHC's Z-score, calculated as the sum of ROA and the capital ratio (equity over assets) divided by the standard deviation of ROA across the previous four years. In the final column the dependent variable is the BHC's return on equity. The variable Scope is defined as the count of unique 5-digit NAICS identified by either the primary or secondary business activity reported by a BHC's subsidiaries. Log Asset is the natural logarithm of the total asset size of the consolidated BHC, while Capital Ratio is the ratio between regulatory capital and total asset. The regression frequency is annual, with the right hand side variables measured at year t-1. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Table A8: Logits of any adoptions and adoption types (odds ratios)**

	(1)	(2)	(3)	(4)
	Any Adp.	Hot (Binary)	Modal (Binary)	Lead
ROE	1.014*** (0.00324)	0.992 (0.00583)	0.995 (0.00651)	1.007 (0.0103)
Tobin's Q	1.012** (0.00508)	0.992 (0.00747)	1.021*** (0.00784)	0.993 (0.00902)
Capital Ratio	0.925*** (0.0104)	0.906*** (0.0158)	0.964* (0.0184)	0.778*** (0.0295)
Log Net Charge-Offs	0.928 (0.0436)	0.945 (0.0659)	1.010 (0.0821)	1.074 (0.116)
4-Quarter Asset Growth	1.013*** (0.00145)	1.000 (0.00238)	1.003 (0.00251)	1.000 (0.00295)
Bank to Total Assets Ratio	0.678*** (0.0670)	0.815 (0.126)	0.735* (0.126)	0.941 (0.196)
Log Assets	1.615* (0.026)	0.702*** (0.0147)	0.600*** (0.0135)	1.147*** (0.0309)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	17783	3484	3484	3333

Table A8 reports results of logit regression estimating the likelihood of NAICS adoptions. An adoption is defined as the appearance of a new 5-digit NAICS within a BHC's organizational structure. Each row corresponds to a distinct regression with that row's name as the RHS variable (as well as Log Assets, unreported, as a control). The LHS variable for Column 1 is an indicator for whether the BHC makes at least one adoption during the year. For Columns 2 through 4, BHCs are only included in the regression if they made at least one adoption during the year. The LHS of Column 2 is whether the BHC made a binary-hot adoption, defined as an adoption of a NAICS that was among the top three most adopted NAICS over the past year. The LHS of Column 3 is whether the BHC made a binary-modal adoption, defined as an adoption of a NAICS that was among the top ten most held NAICS as of the last quarter. The LHS of Column 4 is whether the BHC made a lead adoption, defined as an adoption where the BHC was among the first 25% of BHCs to ever hold that NAICS. ROE is the BHC's return on equity. Tobin's Q equals the BHC's market value (approximated by the sum of the market value of equity plus the book value of debt) over the BHC's book value (total assets), multiplied by 100. Log Net Charge Offs equals the log of the amount of net charge offs (the dollar difference between gross charge-offs and any recoveries on loans previously charged-off) divided by the total dollar amount of loans held. Capital Ratio is the ratio of regulatory capital and total BHC assets. 4-quarter Asset Growth is the average growth in total assets, calculated over the previous 4 quarters. Log Assets is the natural logarithm of a BHC's total assets. The regression frequency is annual, with the right hand side variables measured at year t-1. All regressions include year indicator variables. The coefficient estimates are expressed as odds ratios. Standard errors are in parentheses and are clustered at the BHC level. \*\*\* indicates statistical significance at the 1% level, \*\* at 5% and \* at 10%.

**Figure A1: Annual number of new NAICS held by BHCs**

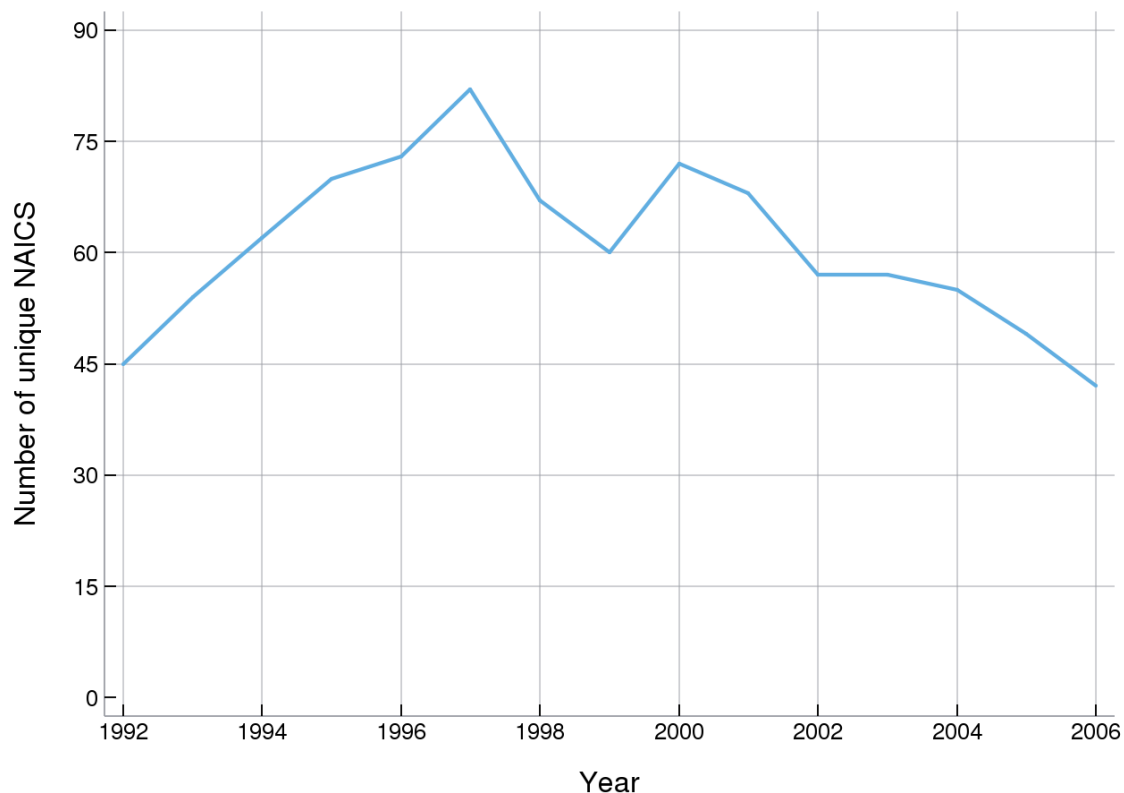


Figure A1 shows the number of unique five-digit NAICS held within the population of Y-9C-filing BHCs for each year over the sample period (1992-2006). Only those five-digit NAICS that were not held by a Y-9C-filing BHC before the first quarter of 1992 are included. A five-digit NAICS is considered to be held within the population if for at least one BHC, that five-digit NAICS is the reported primary or secondary activity of at least one of its controlled subsidiaries. The underlying data is from the Cetorelli and Stern (2015) database of organizational structure.