

# MEASURES OF GLOBAL BANK COMPLEXITY

- Although the complexity of global banking institutions is generally thought to contribute to the risk of systemic disruptions, no single accepted metric for complexity exists.
- To address this gap, this study introduces two broad measures: *Organizational complexity* captures the number and geographic spread of an institution's affiliates, as well as the levels of ownership linking affiliates; *business complexity* captures the range of activities conducted within an institution's walls.
- Using these measures, the authors assess the complexity of a sample of 170 global banking organizations. They find that complexity cannot be equated with institution size; although affiliate counts *are* correlated with size, no close relationship exists with other complexity measures.
- In addition, the authors conclude that the institutions differ greatly in the number of their affiliates, the complexity of their ownership trees, and the degree of diversification in their business activities.

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## 1. INTRODUCTION

The increasing size and complexity of financial institutions has received renewed attention in recent years—prompted in part by the debate over the issue of too-big-to-fail entities. How the size of failing institutions might contribute to systemic disruption is well understood. Complexity, however, is a thornier, less easily defined concept, although it is a natural subject of policy concern given the systemic implications of resolving failing institutions. Resolvability requires successfully executing an orderly liquidation in the event of an organization's distress and default; in the case of complex institutions—many with global reach—such liquidations may be more difficult because a large number of legal entities or legal systems are involved.

Concerns over the potential systemic repercussions of disruptions to complex organizations have inspired a number of ideas for preemptive “fixes,” including capping of size, breakup and separation of the institution along business lines, organizational restructuring to limit the cross-border dimension of complexity (this last remedy captured in a proposed Federal Reserve rule to strengthen the oversight of U.S. operations of foreign banks),<sup>1</sup> and efforts to make organizations more robust, including the already-implemented enhanced capital and liquidity requirements for systemically important financial

<sup>1</sup> For details, see <http://www.federalreserve.gov/newsevents/press/bcreg/20121214a.htm>.

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institutions. Other approaches to resolution include the FDIC's Title II Orderly Liquidation Authority approach under the Dodd-Frank Act, whereby financial organizations operating in the United States would do so with a "single entry" strategy intended to reduce system spillovers from resolution as well as the fiscal consequences of such events.<sup>2</sup>

In the context of these initiatives, we note that there is no single accepted metric for complexity and that analysis of this issue across broad groups of financial firms is relatively scarce. It is well known that banks have developed broader networks of affiliated banking and nonbanking entities at home and abroad. Herring and Santomero (1990) were among the first to predict such an expansion of financial conglomerates, arguing that it would arise from synergies in the production of financial services and in the consumption of financial services.<sup>3</sup> Twenty years later, Herring and Carmassi (2010) documented how far this trend toward consolidation and conglomeration in financial services had progressed, observing that, by the middle of this century's first decade, large complex financial institutions had hundreds or thousands of subsidiaries.<sup>4</sup> At least half a dozen top U.S. bank holding companies (BHCs) had more than a thousand subsidiaries in 2012, in contrast to a single firm with such numbers in 1990, as shown in Chart 1 (Avraham, Selvaggi, and Vickery 2012). The organizational evolution of U.S. BHCs followed an intense process of industry consolidation and substantial acquisitions of nonbank subsidiaries (Cetorelli, McAndrews, and Traina 2014). On the international side, the extent of banking's globalization through the establishment of affiliates in other parts of the world has been documented in numerous studies, including a recent broad overview by Claessens and van Horen (2013). These studies have been revealing, but the complexity of these organizations has not been documented comprehensively.

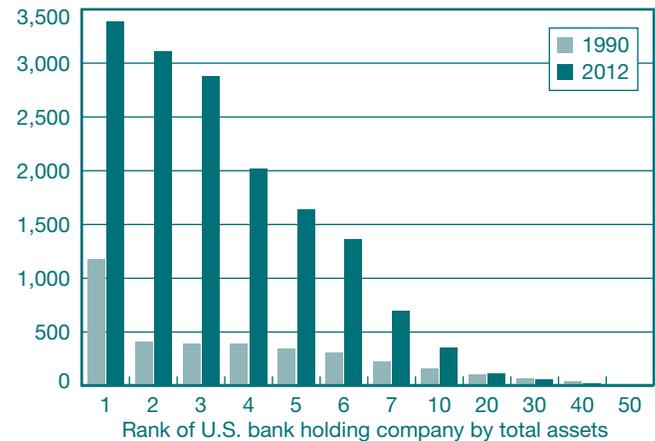
Despite the centrality of the bank complexity issue, no shared consensus has emerged just yet on what complexity might mean in the context of banking, or at least what might be the agreed-upon dimensions of our analysis of complexity. Concentrating on global banks adds many layers to considerations of complexity, so a focus on global banking organizations is bound to yield a more exhaustive take on the issue than an examination of purely domestic banking entities.

<sup>2</sup> See [http://www.fdic.gov/about/srac/2012/2012-12-10\\_title-ii\\_orderly-liquidation-authority.pdf](http://www.fdic.gov/about/srac/2012/2012-12-10_title-ii_orderly-liquidation-authority.pdf).

<sup>3</sup> Herring and Santomero (1990) were also prescient in anticipating some of the policy concerns that would arise from the growth of institutional size and complexity.

<sup>4</sup> Herring and Carmassi (2010) discuss some potential consequences, but primarily argue that complexity increases systemic risk, worsens information and incentive problems within organizations, and impedes timely regulatory intervention and disposition of financial firms.

CHART 1  
Number of Subsidiaries in U.S. Top Fifty Bank Holding Companies



Source: Avraham, Selvaggi, and Vickery (2012).

Accordingly, we turn our attention to financial institutions from around the world that have operations within the United States and financial institutions from the United States that have branches or subsidiaries abroad.

We adopt two broad measurement concepts. We introduce "organizational" complexity metrics to indicate the degree to which the organization is structured through separate affiliated entities. Organizational complexity also encompasses a related dimension specific to global entities—namely, geographic complexity, as captured by the span of the organization's affiliates across different regions or countries. In addition, we introduce "business" complexity, a concept referring to the type and variety of activities that may be conducted within the walls of a given institution. Organizational measures have a more direct fit with the main concerns typically associated with complexity, such as resolution, fragmentation, cross-border systemic risk, internal liquidity dynamics, managerial agency frictions, and "too big to fail." Business complexity concepts may speak more to the diversification and fragmentation of the type of production undertaken by organizations. Neither metric adequately captures the systemic nature of the distress resulting from potential failures; for this, the metric would need to incorporate insights on the criticality of the functions performed in the organization.

Since our focus is on global banking organizations, we pay careful attention to the fact that these are structured to encompass affiliates worldwide. The number of affiliates can be

relatively few or in the thousands. This pattern of complexity reflects the broader growth in global banking over recent decades, as international financial markets in general have grown more interconnected. Foreign banks now represent over a third of the banks in most countries, often accounting for more than half of banking assets (Claessens and van Horen 2013). In the case of the United States, these shares are slightly smaller but still quite significant. For instance, foreign banks account for about 25 percent of total banking assets, and five of the ten largest broker-dealers are foreign owned.

We selected our sample of global banking organizations by considering the universe of financial institutions with operations in the United States.<sup>5</sup> For non-U.S. entities, our sample includes small financial organizations and most of the financial organizations designated as G-SIFIs (global systemically important financial institutions).<sup>6</sup> These institutions support a broad range of real activities in the United States and around the world, including traditional lending, securities underwriting, loan syndicate participation, and funds collection for local or parent operations. We provide comparative analysis by also considering U.S. institutions with a global footprint. We measure complexity for each financial institution (U.S. or non-U.S.) by using detailed data on the counts of affiliates organized under common ownership and control, and we use this information to document a substantial heterogeneity across global institutions along all of the alternative dimensions of complexity. Finally, we show the relationship between different measures of complexity and the size of banking organizations.

The analysis yields a number of interesting observations. First, global banking organizations are highly diverse in terms of size and the correlated metric of absolute counts of affiliates around the world. These affiliates span multiple levels of ownership through an organizational tree. Second, within these organizations, the counts of nonfinancial affiliated entities are generally many times the counts of affiliated banks. Third, business-type complexity within these organizations—measured with Herfindahl index constructs—shows different tendencies according to the economic geography of the financial institutions' parent organizations, with large compositional distinctions across firms by parent nationality.

Details on the location of affiliates of each parent organization add another important dimension of complexity. We observe very large differences in the patterns of geographic complexity among institutions across countries and regions and even within country of origin. For example, global

<sup>5</sup> In particular, we consider which foreign banking organizations operate branches in the United States.

<sup>6</sup> The Financial Stability Board's November 2012 update of G-SIFIs is discussed at [http://www.financialstabilityboard.org/publications/r\\_121031ac.pdf](http://www.financialstabilityboard.org/publications/r_121031ac.pdf).

banking organizations with Japanese parentage are the least geographically diverse in terms of affiliate locations (that is, they are more likely to be located within Japan), while these same organizations tend to have lower overall numbers of affiliated entities. By contrast, financial organizations with parents in the euro area tend to be larger in number, have more affiliates on average, and are more differentiated in terms of the geographic diversity of affiliate locations. The U.K. financial organizations are fewer in number, but have large numbers of affiliates and high geographic diversity.

Finally, we consider whether organizations' complexity and size are comparable concepts that can be used interchangeably in discussions of size premia and too-big-to-fail debates. We find a strong correlation between the complexity of large financial organizations—as measured by affiliate counts—and the organizations' size. However, this tight link disappears with the other measures of complexity we have described.

## 2. THE SAMPLE OF GLOBAL BANKS AND AVAILABLE DATA FOR MEASURING COMPLEXITY

Perspectives on the complexity of an organization start with access to detailed data describing that organization's structure. All U.S. banks, as well as all branches and subsidiaries of foreign banks within the United States, file regulatory reports in the United States. These reports provide information on the structure of the organization that the reporting entities belong to, but primarily report data on the components within the United States. For a more complete picture of the entire parent or bank holding company, we supplement the information from regulatory reports with metrics of foreign bank organizational structure and size that are drawn from reporting available through the Bureau van Dijk's Bankscope database. We focus our attention on the subset of foreign-owned global institutions that are the ultimate parents of the U.S. branches of the foreign organizations.<sup>7</sup>

Since our focus is on global banks, we also look at those banks of U.S. parentage that have affiliates outside of the United States. This information on U.S. global banks is drawn

<sup>7</sup> Foreign banking organizations are present in the United States also through ownership of U.S.-chartered bank subsidiaries. We could include these entities in our analysis of global complexity. However, branches are a direct emanation of a foreign-located parent, while subsidiaries (and, if existing, their U.S. holding company parents) are locally capitalized and under direct control of the U.S. regulator. In that sense, the implications associated with complexity of the parent organizations are quite distinct. For our purposes, we choose to focus our attention on the organizations that operate in the United States through bank branches, recognizing that some of these organizations may also have other U.S. subsidiaries, which can be banks and/or nonbanks.

TABLE 1

## Foreign Banking Organizations with U.S. Branches, by Highholder Region As of Fourth-Quarter 2012

Highholder Region	Highholder Data				U.S. Branch Data	
	Number of Highholders	Highholder Total Assets (Billions of Dollars)	Number of G-SIFIs	G-SIFI Asset Share (Percent)	Number of U.S. Branches	Branch Total Assets (Billions of Dollars)
Euro area	29	21,379	8	64	46	596
United Kingdom	4	6,855	3	78	11	143
Japan	8	6,163	3	78	18	440
China	6	9,312	1	20	11	53
Switzerland	2	2,621	2	100	8	134
Canada	7	3,375	0	0	20	396
Other Americas	19	1,477	0	0	22	47
Other Asia	37	4,114	0	0	59	61
Other	23	5,644	1	16	27	217
All foreign	135	60,940	18	48	222	2,089
United States	35	12,568	8	81	—	—

Sources: Federal Financial Institutions Examination Council (FFIEC), Report of Assets and Liabilities of U.S. Branches and Agencies of Foreign Banks, 002 regulatory filing; Bureau van Dijk, Bankscope database.

Notes: Highholder region information for the U.S. branches of foreign banking organizations filing with the FFIEC was matched from Bankscope's Ownership Module. We initially matched 140 highholders—that is, ultimate owners—in Bankscope. Of the 140, 3 were dropped because we could not find an ownership tree; 2 were dropped because they did not meet our criteria for complexity (that is, they did not have an ownership share exceeding 50 percent in their affiliates). “Other Asia” comprises Hong Kong, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, South Korea, Taiwan, and Thailand. “Other Americas” comprises Argentina, Bermuda, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guam, Panama, Puerto Rico, Uruguay, and Venezuela. “Other” comprises Australia, Bahrain, Egypt, Israel, Jordan, Kuwait, Nigeria, Norway, Saudi Arabia, Sweden, Turkey, and the United Arab Emirates. G-SIFI asset share is defined as the percentage of the region's total assets that are associated with a global systemically important financial institution.

from regulatory reporting in the United States and serves as a reference point for comparisons with the complexity of foreign financial organizations operating in the United States. For all global banks, we provide metrics of organizational structure as well as various descriptive statistics obtained using these metrics. Our analysis primarily examines data on organizational structure in place at the end of 2012.

### 2.1 Foreign Organizations with U.S. Branches

As part of our criteria for defining a sample of global banks, we begin with information pertaining to the 222 branches of foreign banking organizations that filed regulatory reports

in the United States at the end of 2012.<sup>8</sup> As shown in Table 1, overall these branches belong to a total of 135 foreign banking organizations (FBOs). Asia as a whole (Japan, China, and “other Asia”) accounts for the largest number of parent organizations from a single region, but euro-area organizations dominate from the perspective of total assets. The total worldwide assets of these euro-area FBOs exceed \$21 trillion.

A number of the foreign banking organizations in the United States have G-SIFI status—a sign of their significant global footprint. In terms of geographical distribution, most G-SIFIs are originally from Europe. While European FBOs are the largest worldwide, their U.S.-specific presence, measured by the asset size of their bank branches, is not dissimilar to that of FBOs originating in other regions. Branches

<sup>8</sup> In the fourth quarter of 2012, 230 U.S. branches of foreign banks filed regulatory reports. Of these, we were able to match only 222 to complete highholder data from Bankscope.

themselves follow heterogeneous business models (this information is not reported in the table). For example, many smaller branches often lend to nonresident borrowers and support trade finance. Most of the larger branches instead conduct trade finance and also provide short- and long-term lending to support customers from their home country as well as U.S. business clients. Many of the foreign organizations use their branches to help manage the liquidity of the larger entity. Finally, the largest FBOs have many activities that extend beyond lending, including sales and trading, corporate finance, and asset management. Some of these activities are conducted outside the branches and through affiliated U.S. subsidiaries.

The final row of Table 1 provides some comparable statistics on U.S. global financial institutions that engage in banking activity. A total of 35 U.S. financial institutions have branches or subsidiaries outside of the United States and are considered global banks by these criteria. Eight of these institutions are classified as G-SIFIs, representing 81 percent of the \$12.6 trillion in total assets across all U.S. global banking organizations.

## 2.2 Parents and Their Affiliates

Measurement of the complexity of global banking organizations requires multiple steps. Typically, the immediate owner of the U.S. branch is a commercial bank, but that entity can have a different ultimate owner. Indeed, there can be many intermediate ownership links, with ownership shares that vary all along the levels of ownership in an organizational tree. Determining the ultimate owner, or “highholder,” of an organization requires climbing up the ladder of an organization’s ownership.

A number of issues concerning ownership of the organization must be resolved before we can generate useful metrics of complexity. First, within financial firms, legal and regulatory distinctions are made between related institutions, those with majority ownership, and those that are controlled. For our purposes, we seek to capture a level of ownership that is sufficient to constitute affiliation from an economic perspective—that is, where control can be presumed. Second, we confront the question of how to deal with multiple levels of ownership trees under an ultimate parent, since most parents own entities that have stakes in other entities. Third, we recognize the difficulty in constructing metrics that aggregate over affiliates of different sizes and types. While some methods of aggregation best demonstrate the dimensionality of the organization, and perhaps are most useful for indicating potential frictions in a firm-resolution scenario, other methods might be more useful for systemic risk discussions. The latter point raises the issue of whether ideal complexity constructs would show which entities serve some

“critical function” from the vantage point of the organization’s production function, in the sense of having the potential to significantly disrupt some part of the organization’s business in the event of their absence.<sup>9</sup> Moreover, while recognizing these important conceptual issues, we confront the practical issue of whether all this relevant information is available. Below we outline the approach followed based on these considerations and data availability, addressing only some of these issues.

Our parent concept is the ultimate parent organization that presides over the U.S. branch, its commercial bank owner, and the structures above these entities. The full vertical ownership and vertical affiliate structure are available in regulatory reports filed in the United States for the banks and bank holding companies with a U.S. parent. We use these data to measure the complexity of U.S. organizations, as also examined in Avraham, Selvaggi, and Vickery (2012). However, the ownership structure reported above the particular banking entity in the United States generally does not capture the full structure for the whole foreign parent organization, particularly for larger and more complex organizations.

For foreign parents, we follow Herring and Carmassi (2010) and use Bankscope’s Ownership Module to extract relevant organizational structure.<sup>10</sup> For each organization, the data sources contain information on affiliate names, percentage of ownership by the immediate parent or a related control categorization, geographic location, and type. Information on the size or balance sheet data of affiliates is less consistently available. The data are available in levels of direct ownership from the parent—meaning, for example, that a level 1 affiliate is directly owned by the ultimate parent entity. Level 2 entities are owned by level 1 entities, and so on down through level 10 of an ownership tree. Each affiliated entity is tied to its direct parent with information provided on the quantitative level or a percentage grouping of ownership, as well as with information on the entity type, industry, and size.<sup>11</sup> The structural

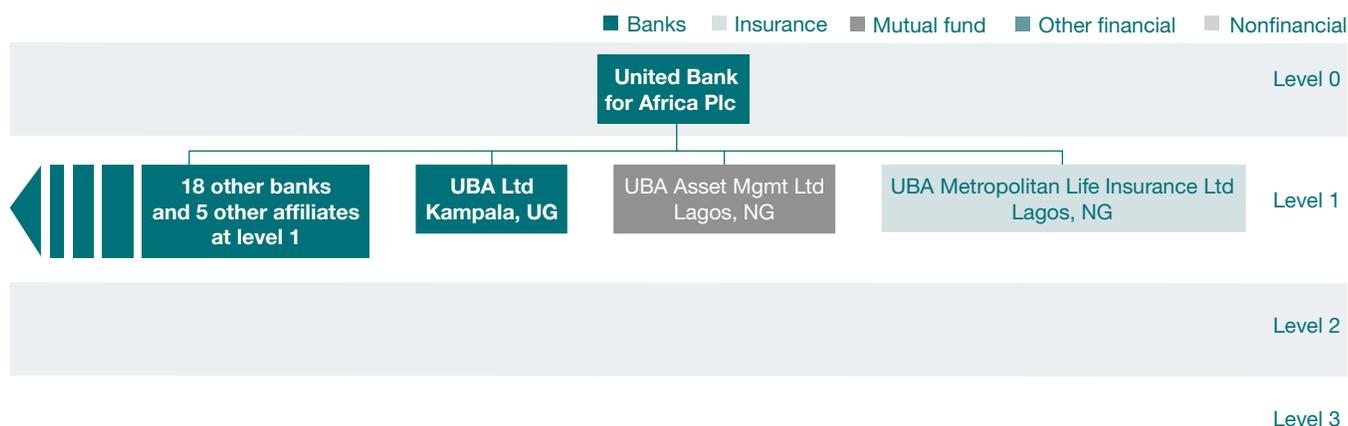
<sup>9</sup> For a discussion of critical functions, see Annex 3 of the Financial Stability Board’s work on recovery and resolution, available at [https://www.financialstabilityboard.org/publications/r\\_121102.pdf](https://www.financialstabilityboard.org/publications/r_121102.pdf). In practice, such determinations are made at the level of specific products and services.

<sup>10</sup> In terms of procedure, we begin with the regulatory reports filed in the United States. These provide information on “entity” names and identification codes that are then hand-matched with names of organizations reported in Bankscope. We then cull information on the organizational structure of the foreign parent. We were able to match approximately 97 percent of all reporting U.S. branches of foreign banking organizations to a foreign parent, which represented 98 percent of all FBO branch assets in the United States in the fourth quarter of 2012. The missing entities are typically smaller branches that have been in the overall sample for shorter periods of time; they are less likely to be in organizations with multiple branches in the United States.

<sup>11</sup> Not all fields of data are equally well populated. We include the foreign parent itself as an affiliate in the organizational structure and assign it to level 0. Suppose a bank headquartered in Germany had one affiliate in France. This organization is intuitively more complex than a bank headquartered in France

EXHIBIT 1

Sample Organizational Structure of a Simple Foreign Banking Organization



Source: Bureau van Dijk, Bankscope database.

Notes: Highholder structure information is drawn from Bankscope’s Ownership Module from 2012:Q4. Highholder and affiliates shown are selected to illustrate a foreign banking organization with subsidiaries only at the first level. “Other financial” includes the following Bankscope entity types: financial company, private equity firm, venture capital firm, and hedge fund. “Nonfinancial” includes the following Bankscope entity types: industrial company, foundation/research institute, and self-owned firm.

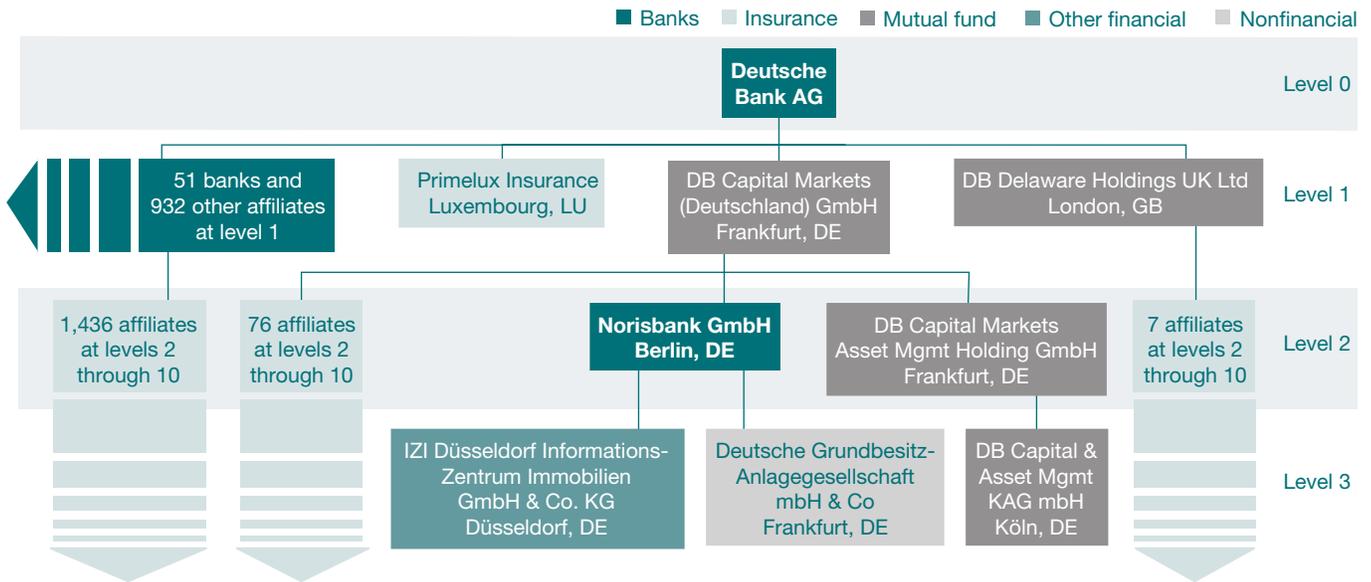
information available from Bankscope is typically the most recently reported. For the details reported below, we use information contained in Bankscope as of the end of 2012. We follow Herring and Carmassi (2010) and sort these affiliates into broad buckets: banks, insurance companies, mutual and pension funds, other financial subsidiaries, and nonfinancial subsidiaries. Bankscope defines “other financial” as consisting of four Bankscope categories: “financial companies,” “private equity” firms, “venture capital” firms, and “hedge funds,” with “financial company” not separately defined. We restrict our analysis to include only those entities in which a parent has 50 percent or more ownership. Thus, to be included in our affiliate counts, an ultimate parent organization has an affiliate below it (at level 1) if the ownership threshold is at least 50 percent, and if the level 1 organization has an ownership stake of at least 50 percent in the level 2 organization, and so on all the way to level 10, which is the furthest distance from the ultimate parent that we found recorded within Bankscope. Given these conditions, all statistics provided present a conservative view of the ownership and complexity of the organizations. We have performed the analysis using ownership shares of both 25 percent and 50 percent and have generated quite similar results for both cutoff levels.

*Footnote 11 (continued)*  
with one affiliate in France. Adding the foreign parent as an affiliate noticeably alters the complexity measures only in cases where the parent has few affiliates.

To understand these structures, consider Exhibits 1 and 2, which show the types of organizational trees that emerge from the data. The entity depicted in Exhibit 1 has a relatively simple organizational structure. In this case, United Bank for Africa Plc is a parent organization with only level 1 affiliates in the hierarchy, and most of the affiliates are classified as commercial banks. This structure contrasts sharply with that provided in Exhibit 2, which shows a small part of the organization under parent Deutsche Bank AG. This organization is highly complex, encompassing a broad range of affiliates of different types cascading down the various levels of the tree. For example, the highholder has numerous direct ownership positions shown in level 1, spread across types of entities as the color coding indicates. These level 1 affiliates have their own ownership positions in entities captured as level 2 affiliates, also across a range of bank and nonbank types.

Some caveats apply to the results. All affiliate counts should be considered illustrative as opposed to definitive, because our approach has potential shortcomings. First, we match a U.S. branch to its ultimate highholder and then match that highholder to a Bankscope entity, thus introducing a risk of mismatch. Second, we examine the most recent organizational tree under a highholder as reported in the Bankscope Ownership Module, but we do not view the longer history of organizational trees. While we expect considerable inertia in the organizational structure and counts, structures potentially

Sample Organizational Structure of a Complex Foreign Banking Organization



Source: Bureau van Dijk, Bankscope database.

Notes: Highholder structure information is drawn from Bankscope’s Ownership Module from 2012:Q4. Highholder and affiliates shown are selected to illustrate a multilevel foreign banking organization. “Other financial” comprises the following Bankscope entity types: financial company, private equity firm, venture capital firm, and hedge fund. “Nonfinancial” comprises the following Bankscope entity types: industrial company, foundation/research institute, and self-owned firm.

could change dramatically over time. Third, we make specific assumptions about the ownership share that warrants inclusion in our counts. Since lower ownership shares could also be associated with valid affiliates, our counts likely understate the total number of affiliates under control of an ultimate parent.

### 3. EVIDENCE ON COMPLEXITY

#### 3.1 Measures of Complexity

We construct a number of complexity metrics, each with a different value depending on the economic issues to be addressed, including activities during the life of the organization or during periods of extreme stress and resolution. While finer measures could potentially be constructed using more detailed supervisory or regulatory data, the measures we

present have the advantage of being available for a wide cross section of entities and therefore are useful for cross-country and broad conceptual discussions. For example, we can consider the complexity of a firm’s organizational structure, which maps into the issues normally raised when the terminology of complexity is used in policy circles. For instance, a firm organized with multiple separate legal entities is likely to pose greater challenges for those executing an orderly liquidation, thus potentially increasing the risk of systemic repercussions. Likewise, we can consider the fragmentation of business activities across different entity types, which is relevant for policy in that it may increase the challenges in conducting effective monitoring and regulation if, for instance, the separate subsidiaries are under the oversight of separate regulatory agencies.<sup>12</sup> For global firms,

<sup>12</sup> U.S. bank holding companies are a good example of this. These organizations as a whole are subject to the supervision of the Federal Reserve, but the activities of certain subsidiaries are under the direct regulation of other agencies (for example, the SEC for broker-dealers and funds, and state and federal insurance bodies for insurance subsidiaries). This issue is amplified for global organizations with subsidiaries located in foreign countries that are subject to local regulatory jurisdictions.

TABLE 2

## Complexity Metrics

Type	Name	Construction	Comments
Organizational	<i>Count</i>	Number of 50+% owned affiliates under a parent organization	The affiliate count includes the parent itself as an affiliate.
Organizational	<i>CountNBtoB</i>	Number of 50+% owned nonbank affiliates/number of 50+% owned bank affiliates	
Business	<i>Business complexity</i>	$\frac{T}{T-1} \left( 1 - \sum_{i=1}^T \left( \frac{\text{count}^i}{\text{totalcount}^i} \right)^2 \right)$ where $T$ is the number of types	The normalized Herfindahl index is based on affiliate types given in Bankscope, grouped into 1) banks, 2) insurance companies, 3) mutual and pension funds, 4) other financial subsidiaries, and 5) nonfinancial subsidiaries. Output values range from 0 to 1, where 0 is lowest complexity and 1 is highest complexity.
Geographic	<i>Geographic complexity</i>	$\frac{R}{R-1} \left( 1 - \sum_{r=1}^R \left( \frac{\text{count}^r}{\text{totalcount}^r} \right)^2 \right)$ where $R$ is the number of regions	The normalized Herfindahl index is based on affiliate regions given in Bankscope, grouped into 1) euro area, 2) United Kingdom, 3) Japan, 4) South Korea, 5) China, 6) Canada, 7) United States, 8) Taiwan, 9) Middle East, 10) other Americas, 11) other Europe, 12) other Asia, 13) other. Output values range from 0 to 1, where 0 is lowest complexity and 1 is highest complexity.

an organizational footprint that spans multiple countries also adds to the challenges of oversight and resolution.

Table 2 provides the set of measures—organizational, business, and geographic—that we construct for each of the global financial firms. The standard measure of organizational complexity, *count*, is the total number of affiliates—including the ultimate parent—that satisfy the percent ownership criteria we apply in constructing the metric. This measure is especially relevant for thinking about organizational fragmentation and resolution planning. A second organizational measure, *countNBtoB*, is computed as the ratio of counts of nonbank affiliates to bank affiliates. This indicator is more relevant for potential discussions about the relationship between bank and nonbank affiliates and for discussions about the pattern of liquidity flows between the commercial banks and the rest of the organizational structure.<sup>13</sup> The two other metrics, introduced to capture business and geographic complexity, are constructed as Herfindahl concentration indexes. The *business complexity* measure gauges the diversity of the affiliates in terms of the types of business they conduct, with types divided into five buckets; the *geographic complexity* measure assesses the diversity of the affiliates in terms of geographic location, with locations divided into thirteen regions.

<sup>13</sup> See Cetorelli and Goldberg (2013).

### 3.2 Organizational Complexity of Non-U.S. Global Banks

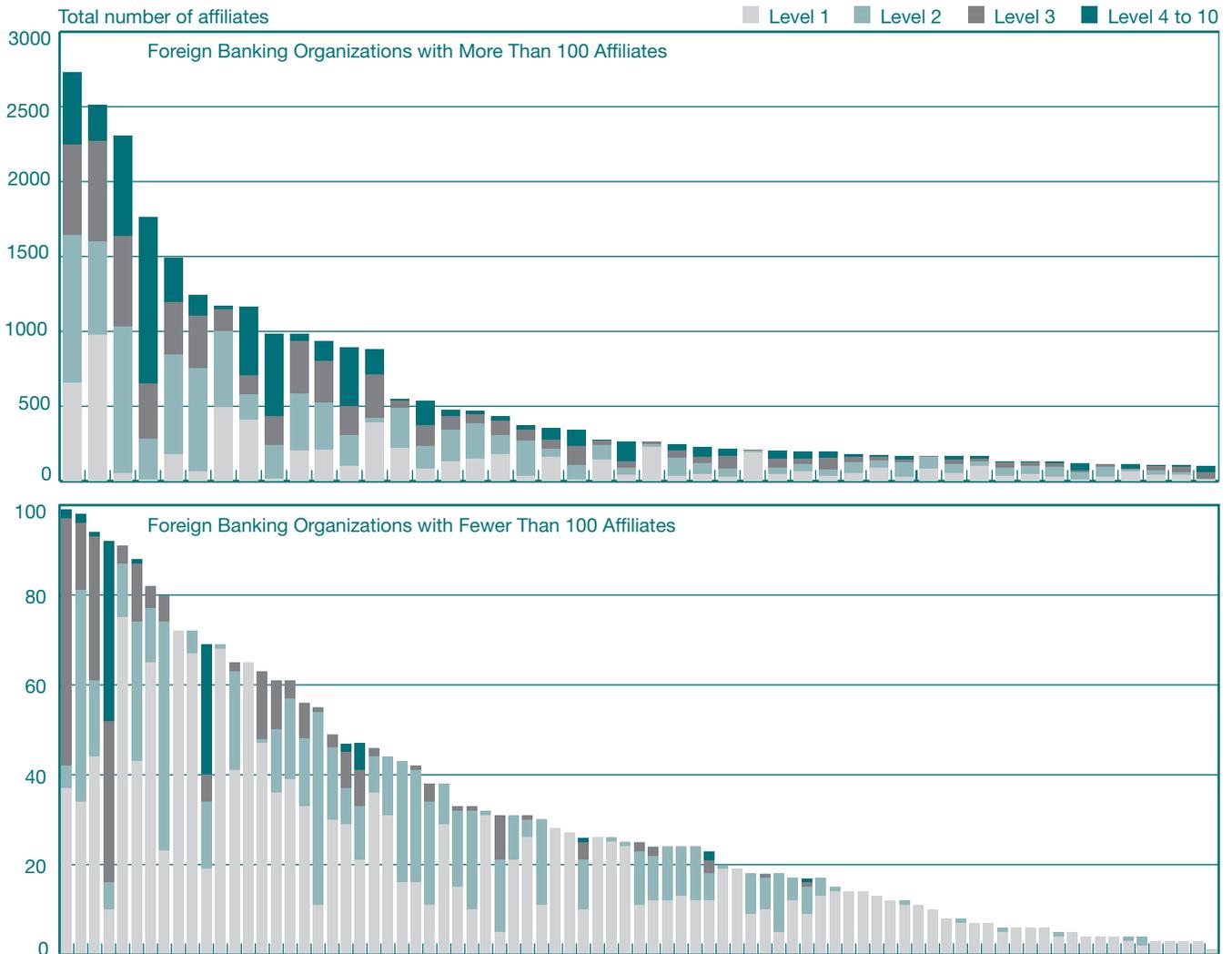
We begin by describing the findings for those organizations owned by parents outside the United States. The statistics for these institutions are constructed using the Bankscope database, as noted earlier. We later turn to the statistics that are computed for U.S. financial institutions and that are based on the U.S. regulatory reporting by those entities.

Consider first the patterns in our broadest metric of organizational complexity, which is the total count of affiliates under a highholder with U.S. branches and where at least 50 percent ownership of an affiliate is required at each level of the organization. Chart 2 provides total counts for highholders. Those organizations with more than 100 affiliates are shown in the top panel, and those organizations with fewer than 100 affiliates are presented in the bottom panel. Each vertical bar represents a separate highholder.<sup>14</sup> Among these highholders, twenty-four have more than 250 affiliates and fifteen have more than 500 affiliates; the highholder with the highest count has 2,729 affiliates (top panel). Most of the foreign organizations have fewer than 100 affiliates (bottom panel).

<sup>14</sup> We do not focus on the specific factors driving the establishment of a given legal entity. In some cases, tax or regulatory arbitrage may be factors explaining the existence of a subsidiary, more so than actual business activities. However, such entities still contribute to more difficult monitoring and regulation, more complex resolution, and perhaps a denser network of interconnections within the organization.

CHART 2

Foreign Banking Organizations: Number of Affiliates, by Level



Source: Bureau van Dijk, Bankscope database.

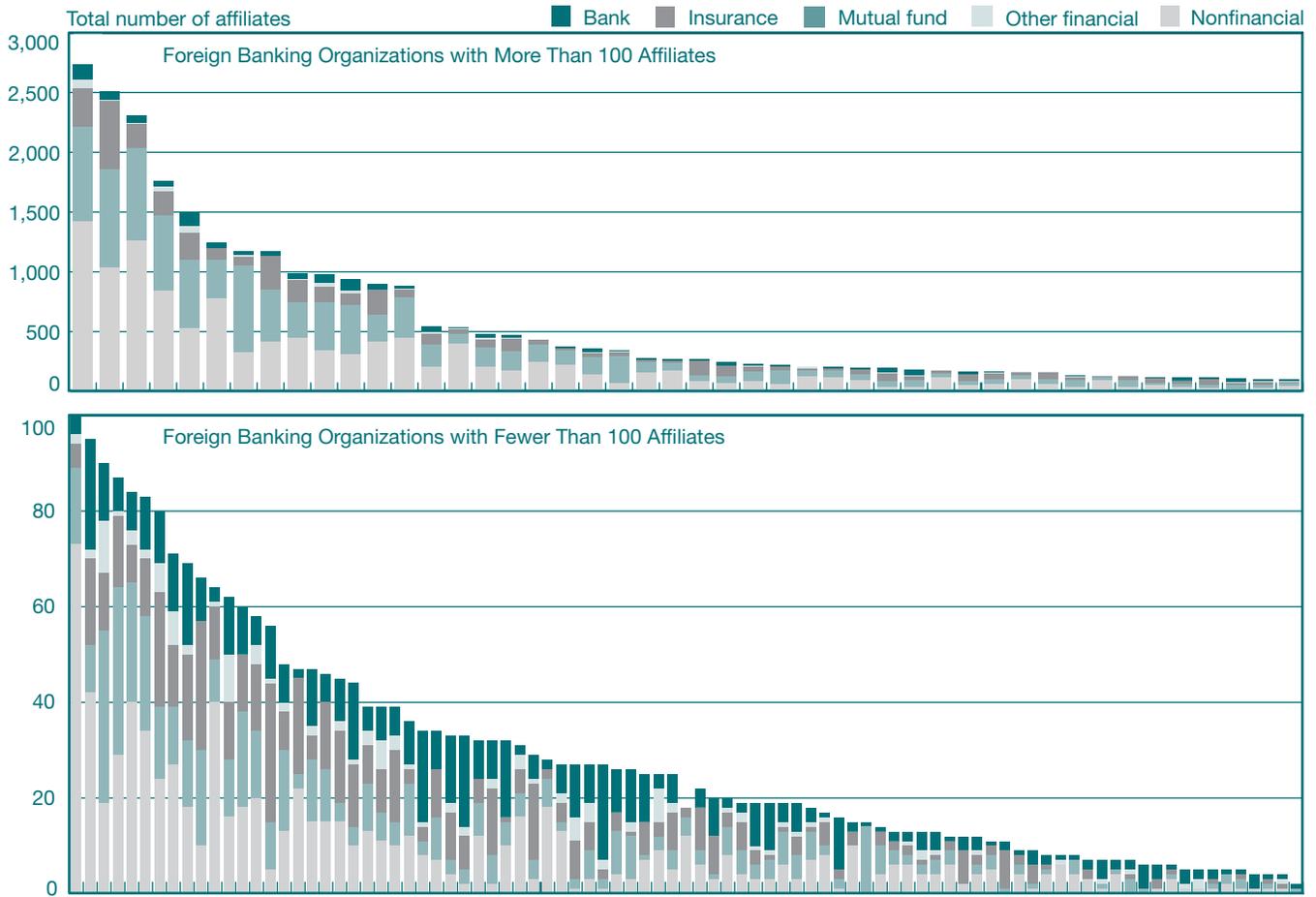
Notes: Each bar in the chart panels represents a separate foreign banking organization. Highholder structure information is drawn from Bankscope's Ownership Module. Level 1 is the first level down from the highholder. An affiliate is considered to be owned by the highholder if a series of 50-plus percent ownership links exists between it and the highholder. Highholders in the figures are sorted by number of affiliates. Data shown do not include level 0, which contains one affiliate that represents the highholder itself. Data capture organizational structures as of end-2012.

The color segments within each vertical bar of Chart 2 show how many affiliates are captured at each level of the organizational tree, from level 1 through level 10. We provide buckets of levels to keep this information visually accessible, showing counts for affiliates at level 1, level 2, level 3, and levels 4 and beyond. It is noteworthy that Herring and Carmassi (2010) use the pattern and counts of only level 1 affiliates to capture complexity.

Our decomposition shows that studies limiting the analysis to level 1 affiliates, while informative, will not present the full richness and diversity of affiliate structures. Level 1 affiliates dominate the structures for entities with fewer than 100 affiliates, but even these lower-complexity organizations appear quite different when levels 2 through 4 are added to the metrics of organizational structure. The role of the multiple levels of

CHART 3

Foreign Banking Organizations: Breakdown of Affiliates by Type



Source: Bureau van Dijk, Bankscope database.

Notes: Each bar in the chart panels represents a separate foreign banking organization. “Other financial” includes the following Bankscope entity types: financial company, private equity firm, venture capital firm, and hedge fund. “Nonfinancial” includes the following Bankscope entity types: industrial company, foundation/research institute, and self-owned firm. Data capture organizational structures as of end-2012.

ownership is especially important in the organizations depicted in the top panel. The level 1 affiliates would capture only a small fraction of affiliates for many of these large players. While most of the counts of affiliate ownership are within three levels from the top of the organization, a sizable share of affiliates are further from the ultimate parent, at levels 4 through 10. Level 1 affiliates are the largest group of affiliates across these global banking organizations. There are more than 7,000 level 1 affiliates, 9,000 level 2 affiliates, and more than 6,000 level 3 affiliates, so the total number of affiliates down to and including level 10 is well in excess of 29,000 for the 100-plus foreign parents.

These non-U.S. global bank affiliates can also be sorted by types of activities. As previously noted, affiliates owned are classified as belonging to one of five types of primary activity: bank, insurance, mutual fund, other financial, and nonfinancial. Chart 3 recasts the organizations shown in Chart 2 using delineation by types of activity rather than level in the reporting structure. The counts of nonfinancial affiliates are generally many times the counts of banks. Insurance companies are least pervasive at each level, followed by banks and then mutual funds.

The second organizational complexity metric captures the extent to which the structure of the organization goes

beyond banks. The median ratio of nonbank affiliate counts to bank affiliates across the smaller (fewer than 100 affiliates) organizations is 3.5, while the median ratio across the more complex (more than 100 affiliates) organizations is 19. If these ratios are taken as a metric of activity levels (as opposed to just fragmentation for other reasons), we would conclude that nonbank activity rises as organizations become more complex.

Business and geographic complexity metrics for the foreign organizations also provide interesting insights. To make this comparison most informative, we break down the parentage of the foreign organizations by country or region.<sup>15</sup> As reported in Table 1, Asia as a whole accounts for the largest number of foreign banking organizations with U.S. branches. The euro area ranks second in terms of counts.<sup>16</sup> However, euro area banks are significantly larger in terms of overall asset size. The average number of affiliates per parent also differs substantially across regions (Chart 4, bottom panel). Highholders in the United Kingdom have the largest number of affiliates by far, with euro-area highholders coming in second. Next, we supplement this information with descriptive statistics on the business complexity and geographic complexity of the organizations by parentage (that is, by the country or region of the ultimate owner).

The measure of business complexity is constructed as a Herfindahl-type index. The index is 0 for organizations with low complexity—which in practice means that the organization is exclusively composed of commercial banks—and 1 for organizations with the highest business complexity. In the latter case, the affiliate counts would be equal across the five categories of types: banks, insurance companies, mutual and pension funds, other financial subsidiaries, and nonfinancial subsidiaries. Chart 5 presents the business complexity measure in two ways: by composition into types (bottom panel) and by Herfindahl readings (top panel), shown as box-and-whiskers plots. The whiskers show the full range of Herfindahl readings constructed across the organizations from each country or region. The box shows the median degree of diversity and the lower and upper quartiles of diversity across all institutions from that country or region.

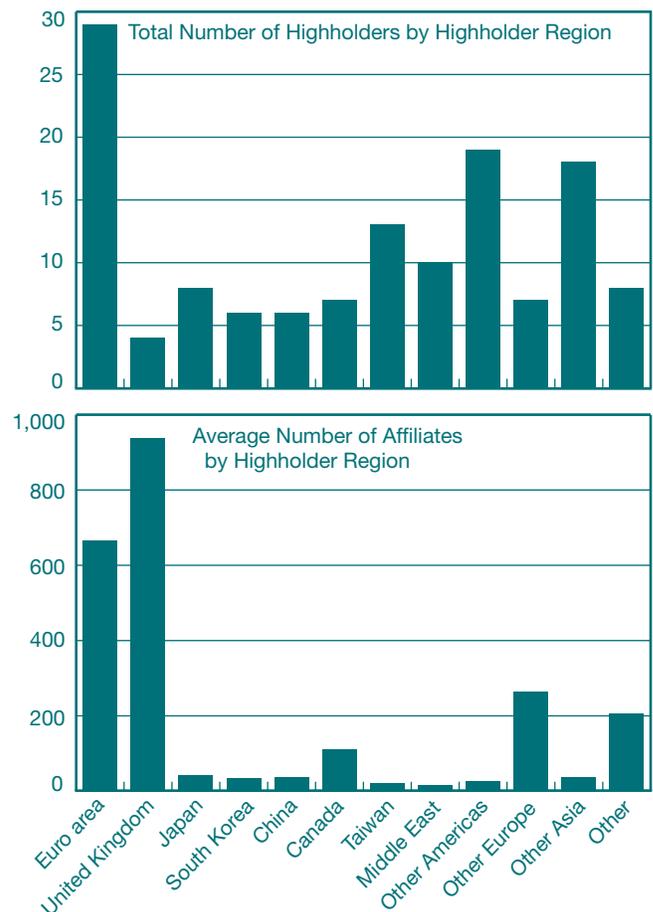
The box portions in the top panel differ in length, indicating that the scope of differences from the mean by parent geography is limited for the U.K., South Korean, and Canadian parents, but broader for parents from Taiwan, the Middle East, other Asia, and the euro area. The range of differences is particularly high for parents from other Asia. The type breakdowns in the lower panel show that South Korean organizations have

<sup>15</sup> We use the International Monetary Fund's 2012 definitions to define the euro area and the Middle East. We then categorize the remaining countries using the geoscheme created by the United Nations Statistics Division, with African and Oceanian countries making up the "other" countries category.

<sup>16</sup> The list of countries in each region is reported in the footnote of Chart 4.

CHART 4

### Foreign Banking Organizations: Number of Highholders and Affiliates, by Region

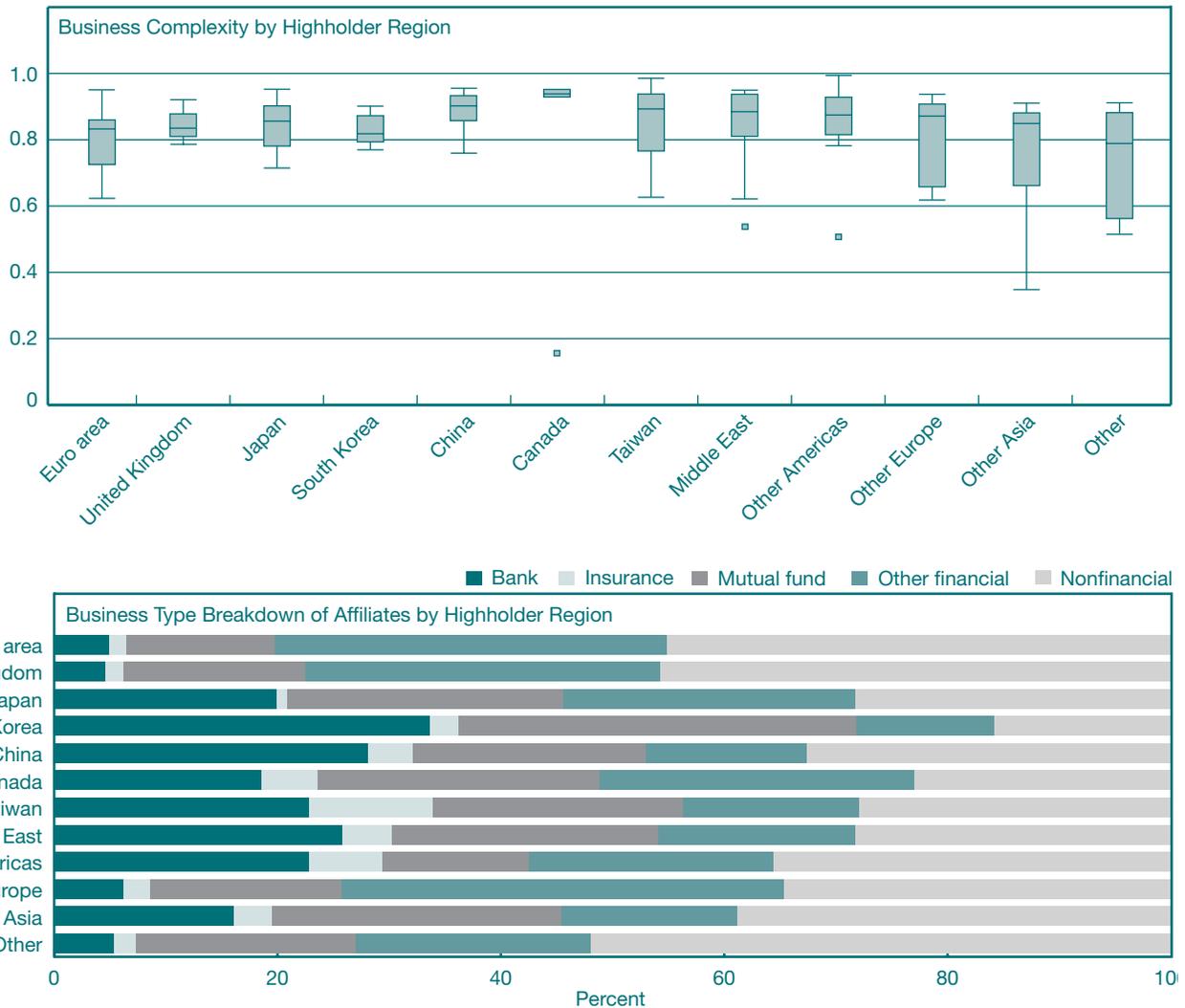


Source: Bureau van Dijk, Bankscope database.

Notes: "Middle East" comprises Bahrain, Egypt, Jordan, Kuwait, Saudi Arabia, Turkey, and the United Arab Emirates. "Other Americas" comprises Argentina, Bermuda, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guam, Panama, Puerto Rico, Uruguay, and Venezuela. "Other Europe" comprises Norway, Sweden, and Switzerland. "Other Asia" comprises Hong Kong, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, and Thailand. Data capture organizational structures as of end-2012.

the heaviest relative concentration of banks, followed by Chinese organizations. South Korean organizations also have the heaviest concentration of mutual fund affiliates. European organizations, whether from the euro area, the United Kingdom, or the rest of Europe, have the heaviest concentration of affiliates categorized as "other financial firms." The affiliates of Taiwanese parents are the most evenly distributed across types.

CHART 5  
Foreign Banking Organizations: Business Complexity of Affiliates



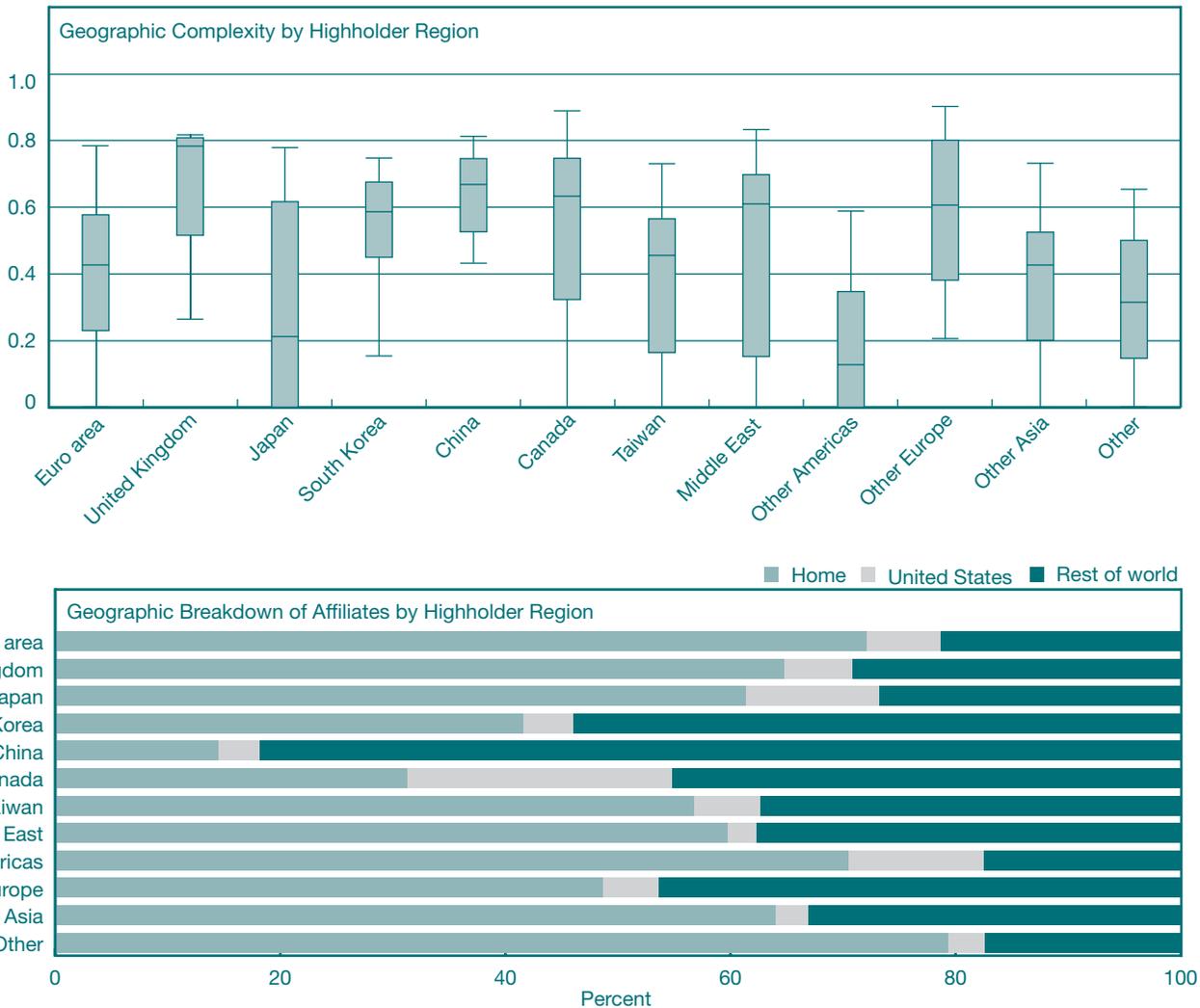
Source: Bureau van Dijk, Bankscope database.

Notes: The top panel summarizes business complexity, which is described in Table 2. The top whisker identifies a region's maximum business complexity, the top line of the box is the 75th percentile, the line inside the box is median complexity, the bottom line of the box is the 25th percentile, and the bottom whisker identifies the minimum business complexity (excluding outliers). Outliers are identified by points using the conventional formula  $1.5 \times$  interquartile range. For both panels, "Middle East" comprises Bahrain, Egypt, Jordan, Kuwait, Saudi Arabia, Turkey, and the United Arab Emirates. "Other Americas" comprises Argentina, Bermuda, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guam, Panama, Puerto Rico, Uruguay, and Venezuela. "Other Europe" comprises Norway, Sweden, and Switzerland. "Other Asia" comprises Hong Kong, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, and Thailand. Business type breakdown is consistent with reporting conventions in Bankscope's ownership module. Data capture organizational structures as of end-2012.

The geographic complexity measure incorporates information on the geographic location of each parent organization's affiliates. For this construction, affiliate locations are broken down into thirteen groups: euro area, United Kingdom, Japan, South Korea, China, Canada, United States, Taiwan, Middle

East, other Americas, other Europe, other Asia, and "other" (Chart 6). The panels of the chart are constructed similarly to those already discussed for the business complexity measures. Very large differences exist across banks by country or region, and within country of origin, in the patterns of geographic

CHART 6  
Foreign Banking Organizations: Geographic Complexity of Affiliates



Source: Bureau van Dijk, Bankscope database.

Notes: The top panel summarizes geographic complexity, which is described in Table 2. The top whisker identifies a region's maximum geographic complexity, the top line of the box is the 75th percentile, the line inside the box is median complexity, the bottom line of the box is the 25th percentile, and the bottom whisker identifies the minimum geographic complexity (excluding outliers). Outliers are identified by points using the conventional formula  $1.5 \times$  interquartile range. For both panels, "Middle East" comprises Bahrain, Egypt, Jordan, Kuwait, Saudi Arabia, Turkey, and the United Arab Emirates. "Other Americas" comprises Argentina, Bermuda, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guam, Panama, Puerto Rico, Uruguay, and Venezuela. "Other Europe" comprises Norway, Sweden, and Switzerland. "Other Asia" comprises Hong Kong, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, and Thailand. Data capture organizational structures as of end-2012.

diversity of their affiliates. The banks with Japanese parentage are in organizations that are among the least geographically diverse in terms of the average affiliate structure and that also have lower overall numbers of affiliates. The euro area organizations are large in number and large in their average number

of affiliates. The U.K. organizations are fewer in number, but they also have large numbers of affiliates.

The lower panel of Chart 6 provides an additional perspective on geographic diversity by distinguishing affiliates that are located in the home country/region from those in

TABLE 3  
Pearson and Spearman Correlations  
of Complexity Measures

	Pearson Correlations			
	Ln Count	Count-NBtoB	Business Complexity	Geographic Complexity
Ln count	1			
CountNBtoB	0.67*	1		
Business complexity	0.03	-0.33*	1	
Geographic complexity	0.31*	-0.14	0.29*	1

	Spearman Rank Correlations			
	Ln Count	Count-NBtoB	Business Complexity	Geographic Complexity
Ln count	1			
CountNBtoB	0.68*	1		
Business complexity	-0.02	-0.24*	1	
Geographic complexity	0.32*	-0.07	0.28*	1

Source: Bureau van Dijk, Bankscope database.

Note: Complexity measures are constructed using end-2012 data from Bankscope's Ownership Module.

\*Significant at the 5 percent level.

the United States and from those in the rest of the world. It is interesting that most countries/regions have more than half of their affiliates in their home market. Having a U.S. presence in total affiliates is strongest for organizations from Canada, Japan, and other Americas (which includes Mexico). Organizations from other countries might have branches and a small number of affiliates in the United States, but about 95 percent of their legal entities are typically located elsewhere.

Overall, these metrics of complexity address different dimensions of the business make-up and geographical reach of global organizations with branches in the United States. Note that the metrics are not always significantly or positively correlated with each other. As reported in Table 3, counts are positively correlated with the ratios of nonbank to bank affiliates. The correlation between affiliate counts and the measures of geographic complexity is statistically significant. Business complexity and geographic complexity are positively correlated, but both are negatively correlated with the non-bank-to-bank-count ratios.

### 3.3 Organizational Complexity of U.S. Global Banks

U.S. banks and their organizations can also be highly complex, as evidenced by U.S. legislative actions addressing recovery and resolution planning in the aftermath of the Great Recession. To illustrate this complexity and provide an appropriate comparison with foreign organizations in the United States, we start with the top-fifty U.S. bank holding companies in 2013—similar in size to the larger FBOs—and limit our discussion to U.S.-owned organizations with global banking activities. To meet the global banking criterion, an organization must have some branch or subsidiary outside of the United States and must file a report indicating exposure to foreign countries.<sup>17</sup> In this way, we can compare U.S. organizations that have global banks with foreign organizations that have global banks.<sup>18</sup> As reported in Table 1, these criteria generate a sample of thirty-five organizations with U.S. owners.

For information related to organizational complexity, we start with a database that collects FR Y-10 reports, the “Report of Changes in Organizational Structure” filed by each institution.<sup>19</sup> The “structure data” use Regulation Y definitions of control and include affiliates that are controlled and regulated by the bank holding company. The database contains information on the geography of each affiliate, as well as information on the type of affiliate as captured by the U.S. NAICS (North American Industry Classification System) codes. We can clearly differentiate between banks (NAICS 5221), insurance companies, nonfinancial firms, and other financial firms. We do not have a readily available mapping that cleanly separates the mutual funds from other financial firms, a division that would allow for a direct correspondence with the categories drawn from the Bankscope data for foreign organizations. We use the most current structure as of the fourth quarter of 2012.

The counts of subsidiaries under the parent organization exceed 3,000 for three of the organizations, total more than 1,000 for another three, and are below 100 for many of the other U.S. banking organizations (Chart 7, top panel). The U.S. organizations are similar to their foreign global counterparts in that banking entities represent only a small share

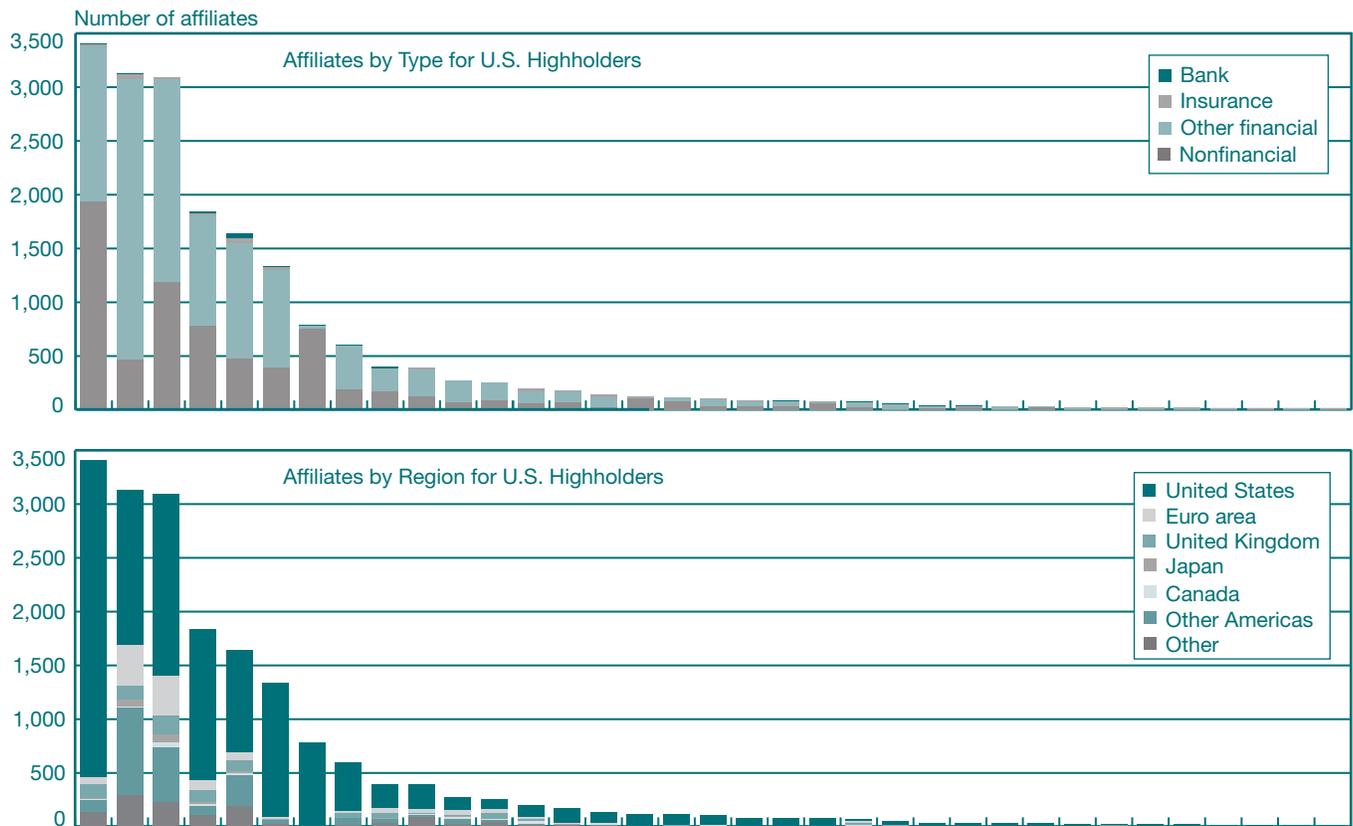
<sup>17</sup> Instructions for the preparation of the FFIEC 009 Country Exposure Report are provided at [http://www.ffiec.gov/PDF/FFIEC\\_forms/FFIEC009\\_201103\\_i.pdf](http://www.ffiec.gov/PDF/FFIEC_forms/FFIEC009_201103_i.pdf).

<sup>18</sup> Because our analysis is ultimately motivated by the potential implications for the United States of the existence of complex global banking organizations, it makes sense to identify U.S. global organizations by looking at entities that have either branches or subsidiaries abroad. This is not inconsistent with our approach to analyzing foreign global families, identified as those having only branch operations in the United States (see footnote 7).

<sup>19</sup> See [http://www.federalreserve.gov/reportforms/forms/FR\\_Y-1020121201\\_i.pdf](http://www.federalreserve.gov/reportforms/forms/FR_Y-1020121201_i.pdf).

CHART 7

U.S. Global Banks: Breakdown of Affiliates by Type and Regional Composition



Source: Board of Governors of the Federal Reserve System, FR Y-10 and FR Y-6 reporting forms.

Notes: Each bar in the chart panels represents a separate U.S. global bank. Highholder structure information is provided by the Federal Reserve Bank of New York's Statistics Function, sourced from the Federal Reserve Board's reporting forms. Data capture organizational structures as of end-2012. We first define the euro area and Middle East using the IMF's 2012 definitions. We then categorize the remaining countries using the U.N. Statistics Geoscheme. "Other Americas" comprises the following countries: Argentina, Aruba, the Bahamas, Barbados, Bermuda, Brazil, the British Virgin Islands, the Cayman Islands, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, the Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad and Tobago, the Turks and Caicos Islands, Uruguay, and Venezuela. "Other" includes the following regions: the Middle East (Bahrain, Egypt, Lebanon, Oman, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates), other Europe (Channel Islands, Croatia, Czech Republic, Denmark, Gibraltar, Hungary, Iceland, Liechtenstein, Monaco, Norway, Poland, Russia, Sweden, Switzerland, Ukraine, and Yugoslavia), and other Asia (Bangladesh, Brunei, Hong Kong, India, Indonesia, Kazakhstan, Malaysia, Pakistan, the Philippines, Singapore, Thailand, and Vietnam). "Other" also includes the following countries: Australia, Botswana, Cameroon, Côte d'Ivoire, the Democratic Republic of the Congo, Gabon, Israel, Kenya, Mauritania, Mauritius, Morocco, Namibia, New Zealand, Nigeria, Senegal, Somalia, South Africa, Swaziland, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe, and the Virgin Islands.

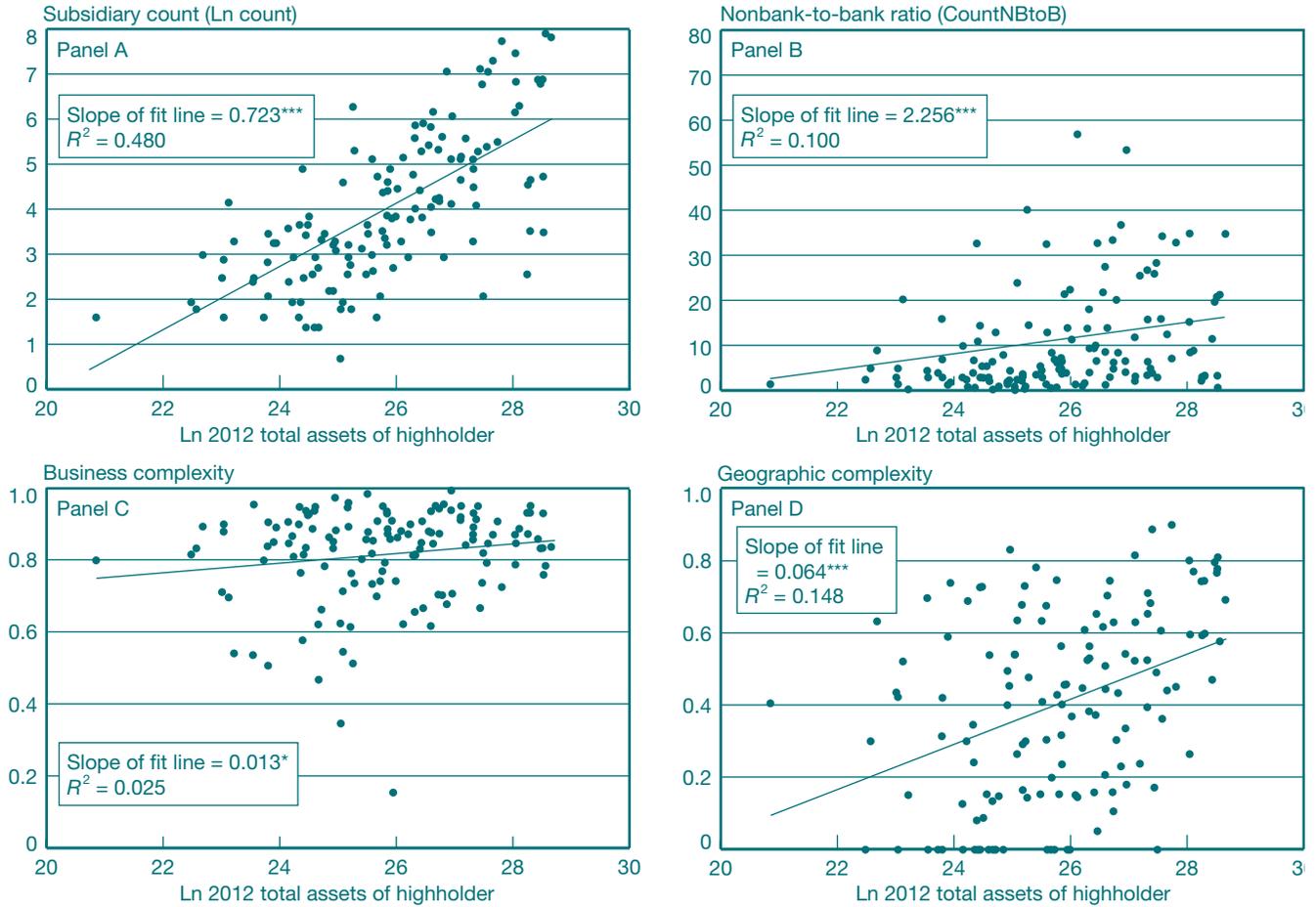
of the subsidiaries. Other financial entities and nonfinancial entities account for the vast majority of affiliates. As for the geographic location of the affiliates (Chart 7, bottom panel), U.S. global organizations exhibit considerable variation in the extent of home bias in their affiliates' locations. The mean share of affiliates within the United States is 83.2 percent, while the non-U.S. affiliates are concentrated in the euro area, the United Kingdom, and other Americas.

#### 4. IS ORGANIZATIONAL SIZE ANALOGOUS TO COMPLEXITY?

Discussions of complexity often treat fragmentation of the organization—and the number of affiliates—as a concept analogous to the size of the organization. In this section, we consider the relationship between our alternative complexity metrics and the size of the highholder organization as

CHART 8

Foreign Banking Organizations: Relationship between Size and Complexity



Sources: Bureau van Dijk, Bankscope database; Board of Governors of the Federal Reserve System, FR Y-7Q reporting form.

Notes: Complexity measures are constructed using end-2012 data from Bankscope's Ownership Module. "Total assets" data are drawn from Bankscope and the Federal Reserve Board's FR Y-7Q reporting form.

- \* Significant at the 10 percent level.
- \*\* Significant at the 5 percent level.
- \*\*\* Significant at the 1 percent level.

reflected in asset valuation. Overall, we find that the straight measures of affiliate counts are positively correlated with size of the highholder organization, such that the larger organizations have more affiliates. However, other measures of complexity that use information on type, organizational structure, and regional placement of affiliates are not as tightly correlated with the size of the overall institutions.

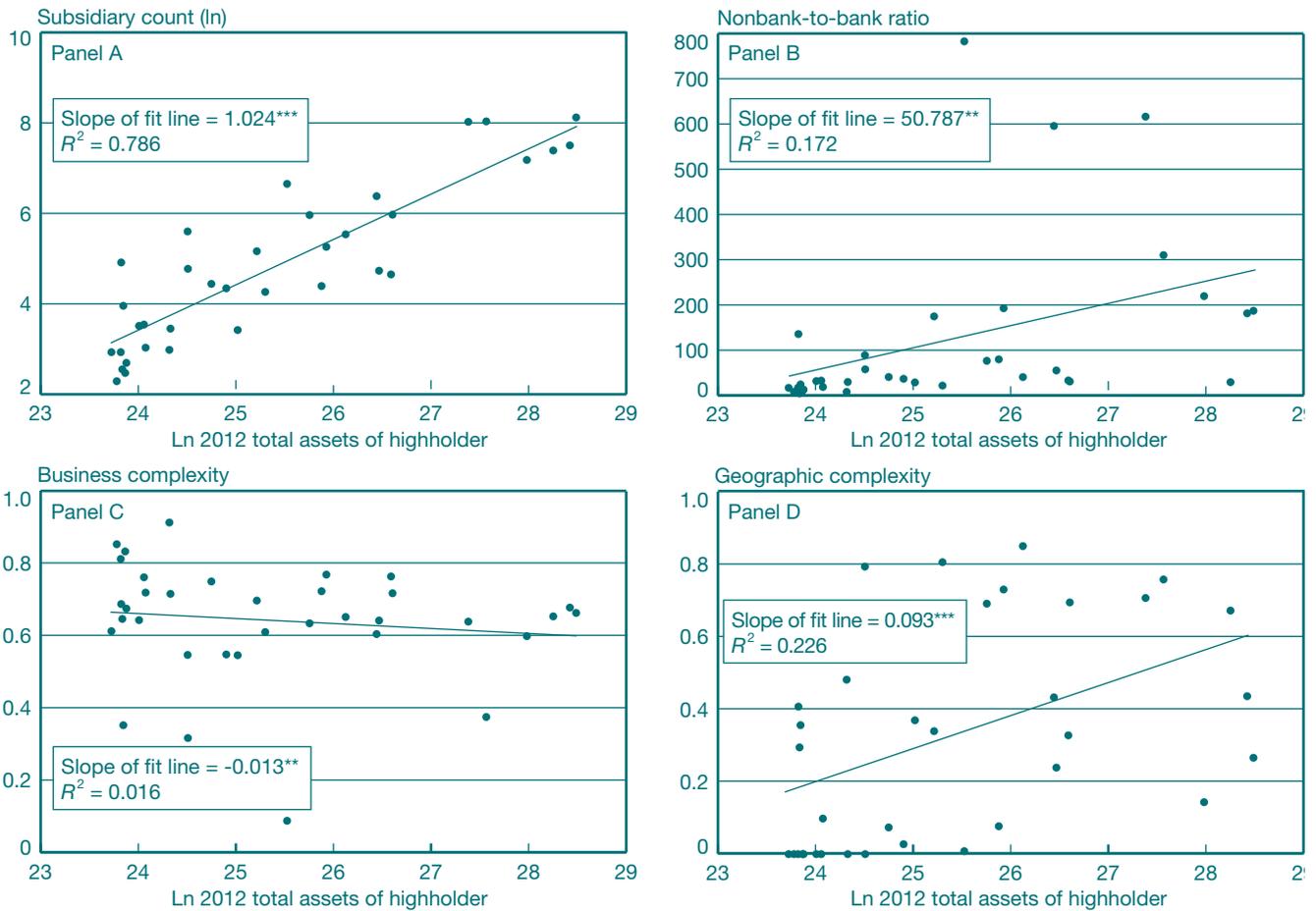
### 4.1 Complexity and Size for Foreign Global Organizations

Chart 8 provides plots and regression fits between measures of complexity and size. Panel A shows the relationship between the (logarithm of) counts of affiliates and the (logarithm of) asset size of the foreign global organizations.<sup>20</sup> The slope of the

<sup>20</sup> The size of the parent organization (in terms of assets) is, however, strongly correlated with the size of its branches within the United States.

CHART 9

U.S. Global Banks: Relationship between Size and Complexity



Source: Board of Governors of the Federal Reserve System, FR Y-10 and FR Y-9C reporting forms.

Notes: Complexity measures are constructed using end-2012 data from the FR Y-10 reporting form. “Total assets” data are drawn from the FR Y-9C reporting form.

\* Significant at the 10 percent level.

\*\* Significant at the 5 percent level.

\*\*\* Significant at the 1 percent level.

regression line is significant, and about half the cross-sectional variation in *counts* is explained by size. An organization that is twice as large as another is likely to have 70 percent more affiliates. If resolution of failing institutions is a concern, this relationship shows that the larger—and often more systemically important—institutions may have more complex and numerous affiliate structures, suggesting that resolution costs increase with size.

Consider next the concepts that might be relevant for understanding the business models of the global banking

organizations. The ratio of nonbank affiliate counts to bank affiliate counts is positively correlated with size (Panel B), but size explains less than 10 percent of cross-sectional variation. Additionally, the relationship between size and the diversity of affiliate types is close to zero as organizational size increases (Panel C), making size a poor predictor of affiliate-type diversity.

Similar observations pertain to the metrics of affiliates’ geographic complexity (Panel D). Recall that we presented evidence of significant home bias in the affiliate locations

for these organizations. Some organizations, regardless of size, have all of their legal entities in their home markets. Other organizations, regardless of size, are broadly diversified geographically. Overall, the relationship between size and diversity by region is highly diffuse, even if positively sloped.

## 4.2 Complexity and Size of U.S. Global Financial Institutions

For U.S. global financial institutions, the tight relationship between size and complexity is a feature only of the *count* metric, which is the number of affiliated entities under the parent organization. As shown in Panel A of Chart 9, the (log) count of affiliates rises one-for-one with the (log) size of the overall organization, a tighter and more linear fit than that observed for organizations with foreign parents.<sup>21</sup>

For all other measures, the correlations with size—even when statistically significant—are decidedly weaker. The ratio of nonbank to bank counts, shown in Panel B, shows a weak relationship to organizational size in U.S. global organizations, as it did for the foreign organizations, with a regression fit of only 17 percent. There is little relationship between size and the diversity of affiliate types (here consisting of four types, instead of the five types identified for the measures relating to the non-U.S. entities), which have a slope of essentially zero and explain only 2 percent of the cross-sectional variation in these values (Panel C). The relationship between geographic diversity and size is positive but also weak (Panel D). Smaller U.S. entities in our sample are more likely to have affiliates located exclusively in the United States. Otherwise, geographic dispersion is not related to the size of the organization.

## 5. CONCLUSION

Our examination of the complexity of global banking organizations—both foreign institutions that have operations in the United States and U.S. institutions that have branches or subsidiaries abroad—has produced a number of significant findings. Above all, we have documented that there is more to complexity than just organizational size. Global entities

<sup>21</sup> This finding is consistent with the evidence in Avraham, Selvaggi, and Vickery (2012), which showed that organizational size was the only significant determinant of this count measure of complexity, and that no role was played by an industry concentration index, geographical concentration indexes, or shares of domestic commercial bank assets.

can differ tremendously in their organizational complexity, business complexity, and global footprint.

It is not clear what might be driving the buildup in bank complexity. Complexity may result in part from firms growing larger as they attempt to achieve economies of scale and scope. Managerial motives (empire building, entrenchment) or rent seeking (monopoly power, acquisition of too-big-to-fail status) may also be contributing factors. Geographic diversification and the development of complex affiliate structures might reflect taxation regimes and efforts to avoid business transparency and achieve less restrictive regulation across markets (Baxter and Sommer 2005).<sup>22</sup> Moreover, some of the growth in complexity may be an endogenous response to an evolving intermediation technology that favors the growth of organizations incorporating, under common ownership and control, the many financial entities (specialty lenders, asset managers, finance companies, brokers and dealers, and others) that have increasingly become essential to the financial intermediation process (see, for example, Poszar, Adrian, Ashcraft, and Boesky [2010], Cetorelli, Mandel, and Mollineaux [2012], and Cetorelli and Peristiani [2012]).

Whatever the main causes of complexity may be, our analysis of global banking organizations—which are arguably the most complex among banking institutions in general—reveals a substantial degree of diversity in the forms that complexity takes. Banking organizations may display relatively few entities that are in their immediate control but, under that first layer of organizational complexity, many more affiliates may be connected indirectly to the same common highholder through multiple rounds of ownership. Alternatively, banking organizations may display a relatively narrow business scope, but still operate through a large number of entities broadly located across the globe. Or it could be that the organizations display a relatively narrow geographic focus but engage in a wide variety of business activities.

There is substantial room for further research to clarify the positive and negative consequences of business, organizational, and geographic complexity for individual financial organizations and the financial systems they inhabit. For instance, a bank that is part of a complex organization, spanning multiple sectors and countries, may benefit from larger and more diversified internal capital markets. Likewise, it may

<sup>22</sup> Desai, Foley, and Hines (2006) examine U.S. multinational firms and show that they establish operations in tax haven countries as part of their international tax-avoidance strategies. Rose and Spiegel (2007) argue that, while activities in offshore financial centers are likely to encourage bad behavior in some countries, they may also have positive effects, such as providing competition for the domestic banking sector.

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gain access to external markets and benefit from the credit standing of the broader organization. In addition, there may be benefits from business synergies such as product complementarities, information flows, and cost savings on common resources. If these working hypotheses are correct, the mode of operation of a bank may differ in accordance with the complexity of its family.

Complexity may alter balance sheet management strategies, affecting decisions about funding models, liquidity policies,

and investment and lending strategies. Hence, organizational complexity may have broad economic implications not just during episodes of financial distress but also in normal times. These observations suggest the importance of achieving a fuller understanding of the drivers and forms of complexity—and of using this knowledge to assess the positive and negative externalities that complexity generates.

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