

CHAPTER 1

Financial Institutions as Information Processors

FINANCIAL INSTITUTIONS' RAISON D'ÊTRE

Economic literature includes a rich debate on why firms exist as they do—the main question being why firm boundaries are defined in the ways that we observe. Certain types of activities that could remain in-house are routinely outsourced, while many activities with the potential to be outsourced remain internal to the firm. Mergers, acquisitions, and divestitures do exhibit certain patterns with respect to how firms believe their own boundaries ought to be defined, but these patterns are by no means exhaustive nor are their outcomes obviously probative. Some corporate restructurings are metamorphic and highlight the question of what makes a financial institution a financial institution. For example, in 1987 Greyhound Corp., a bus line company since 1929, spun off its bus line operating units so that it could “focus on its core business of financial services.” To even think about which firms should be defined as belonging to the financial

2 ► FINANCIAL INSTITUTION ADVANTAGE

services sector we need to have some practical mechanism or criteria for inclusion. Theoretically we could simply enumerate a comprehensive list of financial services and products, and include firms that engage in this set of activities. With a boundary so constructed, we would have an identified set of institutions to analyze. But does that boundary really exist or is it helpful even as an abstraction? Retail sales finance is one of the largest and most obvious types of boundary blurring, often occurring at the direct expense of banks and retail credit suppliers. Captive finance subsidiaries for manufacturing firms are also common and the obvious complementarity between manufacturing goods and financing their sale seems to suggest that the latter function can be effectively internalized. But while the economic incentive to encroach on the boundaries of financial services seems to be predominantly one way—that is, we have not heard of things like mortgage institutions directly engaging in home construction—no hard and fast rule seems to apply.

There are well-known cases of captive finance companies whose financial services activities grew beyond financing the parent's manufactured products—in one case so much so that the entity became a systemically significant financial institution in its own right with only remnant relationships between their financing activities and the financing of the parent's products. Are there economic principles that would allow us to explain why, and the extent to which (for example) auto sales and lease financing are or are not more thoroughly internalized within auto manufacturers? While to economists the answer is surely yes (what area of human endeavor do economists feel cannot be explained by economics?), it seems clear that management teams at financial institutions themselves do not recognize or embrace such principles. For if they believed they understood the principles that define why the financial institution exists, they would surely leverage those same principles to establish firms that function better overall.

Rather than try to tackle this broader problem head on, in this book we simply focus on the kinds of firms that dominate the financial services industry landscape: banks and insurance companies. We leave it to the reader to consider whether or not the observations made also apply to any specific firm or subset of firms with financial sector exposure or activities. A number of factors characterize the financial services

industry in a way that might help us better understand why financial institutions exist in the way they do, and how they can improve their economic strength and competitive positions.

Low Barriers to Entry

Over the bulk of the financial industry's long history, practical barriers to entry in banking and insurance were quite high. In the modern era this was primarily due to regulatory and licensing requirements, but also due to consumer preferences for brand stability and stature. Over the past 100 years or so great banking and insurance industry firms were founded on brand strength, and their ability to attract depositors and policy holders was their primary determinant of growth. However, those barriers began to erode during the twentieth century as cultural changes and an increasing dependence on technology changed both the supply and demand sides of financial services markets. Changing regulatory requirements produced periods that alternated between stimulating and dampening bank and insurance company formation as well as merger activity, which is beyond the scope of this book to either document or survey. What is important is that evidence can be presented to support the claim of low barriers to entry.

Interestingly, the aggregate data does not show an upward trend in the number of operating financial institutions. For banks, the total number of operating institutions in the United States hovered around 14,000 for the nearly 20 years between the early 1960s and the early 1980s. Then, after the savings and loan crisis began to unfold, the total number of banks began to drop—a trend that continues to this day, with the number of banks dropping by more than 50 percent from its 1980s total to fewer than 6,000 in 2013 (see Figure 1.1). However, looking only at the total number of institutions does not tell the whole story. In particular, the stability of the total number of institutions during that 20-year period between the 1960s and the 1980s reflected an offset between periods of great consolidation through mergers and acquisitions that reduced the total and periods of rapid entry of new institutions—particularly savings and loans associations, prior to the S&L crisis. Overall, entry into the banking sector has remained brisk and steady, despite the stable, then declining, count totals. Hubert

4 ► FINANCIAL INSTITUTION ADVANTAGE

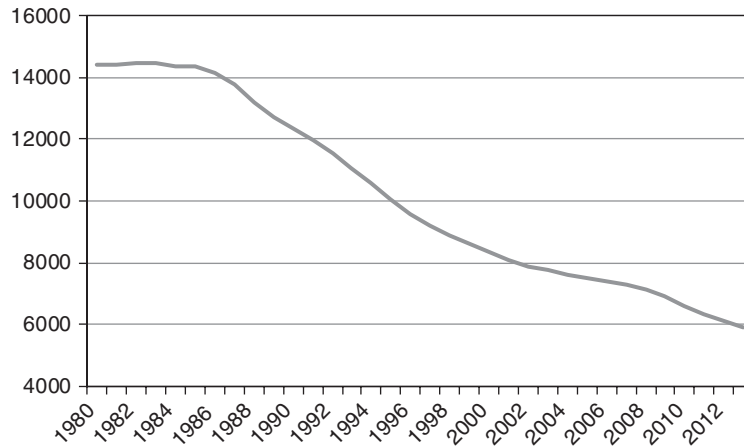


Figure 1.1 Total Commercial Banks in the United States

Source: Federal Reserve Economic Data (FRED); Federal Reserve Bank of St. Louis.

Janicki and Edward Prescott observed that, “Despite the large number of banks that have exited the industry over the last 45 years, there has been a consistent flow of new bank entries,” and calculated the average annual entry rate at about 1.5 percent of operating banks. The authors further observe that, “It is striking that despite the huge number of bank exits starting in the 1980s, entry remained strong throughout the entire period. Interestingly, it is virtually uncorrelated with exit. For example, the correlation between exit and entry for the 1985–2005 period is only -0.07 .”¹

Technical Core Products and Services Offered (Financial Intermediation and Disintermediation and Risk Pooling)

Janicki and Prescott also observe how market share can shift dramatically. They note that of the top ten banks in 1960 (by asset size), only three are still in the top ten.

Part of this is due to M&A (mergers and acquisitions) activity. But part of it reflects the fact that the product and service sets, based on intermediation and disintermediation and risk pooling, are technical in nature, and as trends in the underlying technologies change, firms have a great opportunity to innovate effectively and gain market share,

or fail to innovate effectively and lose market share. What Figure 1.1 does show clearly is that while barriers to entry may be low, barriers to exit are even lower. Failure to stay abreast of technological innovations, as well as the adoption of so-called innovations that misrepresent true risk-adjusted returns, has been causing the number of operating banks to shrink by about 280 per year since 1984. Some of the innovations that led to distorted risk assessments include mortgage-backed securities and complex, illiquid types of derivatives (there are others). But while distorted risk assessments have historically been blamed on personal mismanagement and a culture of greed, these explanations offer little in the way of economic underpinnings and cannot explain the disappearance of nearly 8,600 banks over a 30-year period. The main culprit is that decision makers within these firms have been provided with poor information, insufficient information, and, in many cases, misinformation, and the main cause for this is that these firms were manifestly poor at information management and creation. While the S&L crisis triggered the largest number of bank closures, the bursting of the tech and housing bubbles, and the ensuing liquidity crisis of 2008, also forced many institutions to close. And in far more cases, institutions that did not fail saw their profitability greatly reduced by inefficiencies, losses, and fines—most of which could have been avoided with the appropriate amount of investment in system architecture and process redesign. Recent examples of significant regulatory fines related to information processing failures include:

- \$25 billion: Wells Fargo, JPMorgan Chase, Citigroup, Bank of America, Ally Financial (2012)
- \$13 billion: JPMorgan Chase (2013)
- \$9.3 billion: Bank of America, Wells Fargo, JPMorgan Chase, and 10 others (2013)
- \$8.5 billion: Bank of America (June 2011)
- \$2.6 billion: Credit Suisse (May 2014)
- \$1.9 billion: HSBC (2012)
- \$1.5 billion: UBS (2012)

Taken together, these historical facts show how even very large financial institutions can suffer or even cease to exist if they fail to

6 ► FINANCIAL INSTITUTION ADVANTAGE

embrace technological innovation, or embrace it without a commensurate investment in the information management capability required to effectively evaluate risk. Thus, the stylized facts that should concern current financial institutions are:

- Firms entering the market, particularly those entering with some technological advantage, are a threat.
- Excessive risk taking based on impaired risk assessments (often the result of technological innovation without the supporting information flow) is a threat.
- The likelihood that any firm succumbing to these threats will be expelled from the market is high.

Poor information management itself has causes. In some cases, the underlying causes may have included a regulatory (and rating agency) arbitrage in which financial institutions were incented to do the minimum while benefiting from things like deposit insurance (an explicit stamp of approval from regulatory authorities) and high public ratings from rating agencies, or even the implicit stamp of approval that comes purely from compliance and the absence of regulatory censure. But more importantly and more generally, low industry standards for excellence in information processing have meant the absence of competitive pressures to innovate and excel. This environment, which has persisted for decades, is now coming to an end.

CULTURAL ISSUES

While identifying more effective management of information assets as a key strategic objective for the firm is a good first step, implementing an effective strategic management process is not without challenges within a modern financial institution. Among those are serious cultural and organizational challenges that can work against the development and deployment of an integrated approach to information management. One such challenge is so pervasive and so constraining that it deserves special consideration. Within the broader fabric of corporate culture, there lies a deep cultural rift—a rift that may be more or less pronounced depending on the business mix and particular firm characteristics, but that is almost always material. It is the rift between IT

(alternately management information systems, or MIS) and non-IT. This rift has developed over decades, with rapid technological change and exponentially increasing business dependencies on technology as the driving forces. Importantly, the initials IT stand for information technology—something that should be a core competency for a financial institution. But far from being core from an integrated strategic management perspective, business managers and their IT counterparts are often separated culturally to such an extent that they are speaking different languages, both euphemistically and literally. Business executives frequently view their IT organizations with distrust. Common complaints are that their process requirements are opaque, that they do not understand the organization's business objectives, or, worst of all, that they are not motivated by incentives that are aligned with the business strategy.² On the other side, IT personnel often hold a dim view of the non-IT businessperson's understanding of technology generally, and IT technology in particular. The IT presumption that the business side doesn't understand its own problem, doesn't understand what the solution should be, or simply can't express itself intelligibly, can easily lead to ill-formed plans and projects whose poor outcomes further the distrust, in addition to sapping the resources of the firm. Importantly, the rift reflects the fact that information processing is not viewed as a true core competency within most financial institutions, and that consequently IT is seen as a supporting, or enabling, function—critical yes, but no more so than operating an effective health benefits program (or company cafeteria, for that matter).

The Senior Leadership Component

Senior leadership positions such as chief financial officer or chief credit officer are typically viewed not only as great executives but also as repositories of subject matter expertise and corporate history. The people who hold such positions are expected to understand the entire fabric of their respective organizations thoroughly and often are expected to have personal experience at multiple levels of job seniority. Chief credit officers will invariably have had deep experience in underwriting and workouts over a range of products and markets. Chief financial officers will usually have had deep hands-on experience in preparing

8 ► FINANCIAL INSTITUTION ADVANTAGE

and analyzing financial statements, and frequently in auditing financial accounts from different parts of the company. Unfortunately, this deep experience in their respective disciplines is a double-edged sword. As the needs within risk and finance become increasingly dependent on analytics and information processing, these leaders may not have the experience or vision to help shape the data and analytic infrastructure of the firm to enable competitive capabilities to be developed in these key areas.

Contrast this with the chief information officer, chief technology officer, or whatever the C-level executive responsible for IT is called. These leaders *are* responsible for establishing a forward-looking competitive infrastructure design and overall vision for the firm, and because their peer-level leaders may not have comparable technical depth, that responsibility may be very highly concentrated. As individuals, they have frequently distinguished themselves in general manager roles or within a specific discipline *other than IT*. But even for those with relatively deep or long-tenured association with IT, how many in the financial services industry actually rose up from within the IT culture? How many have ever personally designed a software application and seen it through each phase of the development process? How many have personally developed a major data processing system? How many have written a single line of production code? Certainly, outside the financial services industry—and not just in the technology space—the answer to all these questions would be: the majority. However, the honest answer within the financial services industry has to be: very few. This shows both the general lack of interest senior managers have in actively managing their companies as *information processing companies*, and the reason that financial institutions are so challenged by the basic needs and competitive demands that they currently face in this area.

For corporate leaders not directly responsible for IT, the acceleration of technological change within their respective disciplines has been more recent but the vintage effect of the experience base is no less pronounced. For example, 10 years ago almost all chief compliance officers were attorneys and most reported to the general counsel. As compliance risks and regulatory attention evolved toward more systemic information-based areas such as anti-money laundering (AML),

FINANCIAL INSTITUTIONS AS INFORMATION PROCESSORS ◀ 9

customer identification programs (CIP), reporting covered under the Bank Secrecy Act of 1970 (BSA), and other types of fraud detection, more technical, risk-related training has become increasingly important. Within the AML space (now a front-burner issue, especially for larger institutions), detection solutions are increasingly based on sophisticated statistical modeling and voluminous data processing. Top-vendor AML systems deploy sophisticated models that require not only expert management and independent validation, but also rich and timely data flows that can test the capability of the institution's overall data infrastructure. Even CIP, formerly a rule-based exercise with a tendency toward weak performance measurement, continues to evolve in this direction. The Patriot Act clarification on CIP includes this statement:

The Agencies wish to emphasize that a bank's CIP must include risk-based procedures for verifying the identity of each customer to the extent reasonable and practicable. It is critical that each bank develop procedures to account for all relevant risks including those presented by the types of accounts maintained by the bank, the various methods of opening accounts provided, the type of identifying information available, and the bank's size, location, and type of business or customer base. Thus, specific minimum requirements in the rule, such as the four basic types of information to be obtained from each customer, should be supplemented by risk-based verification procedures, where appropriate, to ensure that the bank has a reasonable belief that it knows each customer's identity.³

To summarize, regulators now expect financial institutions to bear the full weight of modern data management and creative, advanced analytics in addressing issues for which compliance had traditionally been a matter of minimally following highly prescriptive rule sets. Given the emphasis on risk-based techniques requiring advanced, industrial strength data processing support, chief risk officers and chief compliance officers will be challenged to lead these efforts without a technical risk-analytics and IT-oriented experience base.

10 ► FINANCIAL INSTITUTION ADVANTAGE

Outsourcing and the Culture of Failure

Unfortunately for many firms, the problem of an inadequate experience base is self-reinforcing. How many stories have we heard about giant IT projects that were catastrophic failures? Without adequately experienced leaders in place (who could potentially prevent some of these disasters), it can be extremely difficult to get accurate assessments of why the projects failed or what could have been done better. The experience deficit has also created an information asymmetry in which business decision makers, often not completely clear about what their current and future needs are and scarred by past IT project failures, are squared off against software vendors who are often very well informed about the firm's knowledge, current capabilities, and history, and can tailor their sales pitches accordingly. Ironically, many large-scale IT failures occurred because the projects weren't nearly large enough—that is, as big as they may have been, they weren't part of a holistic redesign of the overall information processing infrastructure of the firm. At the same time, many IT-related outsourcing relationships have helped financial institutions improve performance and efficiency, creating a tremendously appealing perception that more outsourcing is better, and that financial institutions need to get out of the information processing business. But as we will discuss in more detail below, institutions need to consider carefully what aspects of their information-process complex are truly core to their identities and competitive positions in the marketplace, and invest in and further develop these internal capabilities instead of outsourcing them.

Outsourcing issues aside, all IT infrastructure projects expose the firm to some risk. In the absence of a clearly communicated overall vision, the risks associated with piecemeal infrastructure projects are elevated for a number of reasons. In the first place, even well-meaning and experienced project managers are at an informational disadvantage. They are solving *a* problem—or a narrow set of problems—without knowing whether the design choice will be complementary to other software and system projects also underway. The only way to insure strong complementarity of such projects is to have a clearly articulated vision for the overall system and to evaluate each project for consistency with that vision. For many large

institutions, particularly those who have grown by acquisition, the underlying system is effectively a hodgepodge, and there may be no clearly articulated vision. Under these conditions, the chance that any one project will make the problem worse is high. This can lead decision makers to embrace min-max strategies⁴ with respect to high-visibility infrastructure projects—often strategies that can be supported with information from industry experts, including consultants and the software vendors themselves, who certainly do not have a long-term vision for the firm's competitive position as a goal. In many cases, both the requirements for a given infrastructure build and the design choices made in order to meet those requirements are partly or wholly outsourced to vendors, consultants, or both. From asset/liability management systems, to Basel II/III systems, to AML systems, to model governance systems, to general purpose database and data processing systems, key expertise and decision making are routinely outsourced. Recognizing this, the sales presentations from the major software firms increasingly involve selling the vendor-as-expert, not just the product. Consulting firms, too, have increasingly oriented their marketing strategies toward this approach under the (frequently correct) assumption that the audience is operating on the short end of an information asymmetry, understanding primarily that it has a *problem* and needs a *solution*. Vendors' increasing focus on integrated solutions reflects their perception that institutions are now aware that they have bigger problems and are increasingly willing to outsource the vision for how the firm manages its analytic assets in the broadest sense.

The outsourcing approach can be expedient, particularly when an institution does not have the immediately required technical knowledge. And since design choices require both technical/product knowledge and a deep understanding of the particular institutional needs and constraints (and history), adding internal expertise through hiring may not be a quick solution either, since new hires may know less than consultants about the internal workings of a given firm. But such knowledge and expertise gaps may be symptoms of a deeper underlying problem and, particularly when regulatory expectations are involved, the persistence of the expertise gaps that led to the outsourcing can come back to haunt the firm. One illustrative example is that of AML. At many banks, sophisticated vendor-provided

12 ► FINANCIAL INSTITUTION ADVANTAGE

transaction-monitoring software is used for AML alert processes. In fact, the sophistication of these systems has been increasing rapidly over the past several years, to the delight of institutions that see these systems as solving a real problem caused by increasing expectations of regulators. But both the understanding of how these systems work and the back-testing and tuning of the many settings required to operationalize them have, in many cases, been outsourced to the vendors who supply the product. Predictably, regulators who applaud the installation of such capable technology have been highly critical of the banks' actual deployment of it. Generally, negative feedback from the regulators about the implementation of these systems has included the following complaints:

- The company is not using the full functionality of the system.
- The system is not adequately customized to align with the company's risk profile.
- The program does not capture all of the company's products and services.
- The scenarios or rules used do not adequately cover the company's risks.
- There are no statistically valid processes in place to evaluate the automated transaction monitoring system.
- There are insufficient MIS and metrics to manage and optimize the system.

More recently, the Fed has issued explicit statements that it considers such systems to be models and that therefore the requirements of SR 11-7⁵ apply—requirements that few compliance teams or model validation teams are fully prepared to meet. Clearly, the regulatory community is quite sensitive to the fact that outsourced solutions without close internal expertise and oversight may be ineffective in achieving their goals, and in the AML area this sensitivity is backed up by firsthand experience obtained in the course of examinations. But AML is just one example. And regulators' concerns aside, the firms themselves should be very sensitive to these same issues. For any large information processing project for which a significant amount of planning, design specification, vendor selection, implementation, tuning or

validation is outsourced, the ability of the firm to maximize the value of the resulting system will be compromised. If we adhere to the view that a firm's competitive advantage will derive largely from the relative effectiveness of the management of the broad range of information assets, then the outsourcing of the vision itself to a software vendor who is marketing that same vision to other institutions amounts to nothing less than a decision to make the firm less competitive.

It is not obvious how an institution should approach narrowing or eliminating the IT rift, but one thing is clear: It needs to be recognized by the senior leaders of the firm as a challenge to be overcome, and this is unlikely to occur unless corporate leaders themselves are more IT savvy than they have been historically. A more deliberate and holistic approach to information processing means not only structuring physical data processing and analytic capabilities (as discussed below), it also means creating an organizational structure to match that modernized business model (also discussed below). This means that the overall strategic direction must be identified, that the underlying physical infrastructure must be aligned with that vision, and that a plan to match personnel with that model must be developed and communicated throughout the organization. One of the principle consumers of that communication has to be the firm's human resources department, which may itself be required to take transformative steps in order to implement that strategy. The existence of dedicated IT HR departments that only hire into IT roles serves to propagate and reinforce the rift. (Interestingly, poll data from users of internal service providers within U.S. corporations found satisfaction rates for IT (MIS) and HR at 28 and 24 percent respectively⁶—dead last among internal providers.) If the HR function does not clearly understand the need for more strategically deployed skill sets across functions and across the revamped information processing complex, it will be impossible to implement such a strategy. This means more subject matter experts need to be embedded directly into the HR organization.

IT LITERACY AND THE SPREADSHEET DELUGE

Interestingly, the cultural IT rift that is often systemic within an institution is preserved across a wide array of different business

14 ► FINANCIAL INSTITUTION ADVANTAGE

processes and sub-entities, even though the constituents have widely varying interests, objectives, and technical expertise. For example, line personnel and process managers may view IT through the lens of laptops, email, portable devices, and the like. Traders may see IT through the lens of complex trading system implementations and sophisticated asset valuation models. Finance teams may rely heavily on stable and long-standing ledger systems and view IT purely as a so-called keep-the-lights-on function. Process owners looking for application development often see the IT team as the project management wildcard, unable to be controlled through the tools the process owners typically use to manage every other aspect of a given project. However, throughout the financial services industry the main boundary that divides the realm of the IT constituents from the non-IT constituents is the Excel spreadsheet. More broadly, using the current lexicon, the latter is the realm of the end-user tool (EUT). EUTs are defined in just that way—they are not controlled by or interfered with by IT. The end user may create, populate, alter, rename, copy, share, and email the EUT at will. Importantly, because spreadsheets and supported processes live outside the sphere of formal IT control, the control practices and capabilities used within IT organizations to control production-level systems and processes are usually unavailable to help with EUT control. These include robust documentation requirements, including signed-off specification documents, restricted access and version control, user acceptance testing (UAT), and back-up and business continuity requirements.

In many institutions, the cost of controllership for spreadsheet-based processes has historically been close to zero. Spreadsheets could be developed without any of the onerous involvement of IT, and with virtually no requirements for documentation, independent validation, access and version control, or other operational risk mitigants. In this zero-cost environment, the use of spreadsheets exploded. On the positive side, the dominance of spreadsheet-based analytics has led to a highly agile environment in which business functions can quickly meet their own analytic needs using spreadsheets (often needs that are rapidly changing), at low cost. However, the unfortunate effect of this freedom is that key processes that any institution would want to have some level of controllership over are too frequently

managed largely or entirely through EUTs. In such cases data storage, data processing, modeling, and reporting may all be performed through EUTs. When inefficient tools are used for data storage and data processing, the institution loses information creation capacity and can lose information outright or create misinformation. When spreadsheets are used as data repositories the situation is somewhat worse. If a spreadsheet is storing unique data and information, that data or information will be available to only those few users who have access to and full understanding of the spreadsheet. Thus, the data or information embedded in the spreadsheet has been housed in an institutional dead end. If the spreadsheet is storing redundant data or information, then it is simply creating an unnecessary controllership cost and operational risk. This is typically the case, since data within a financial institution rarely originates from an EUT. In considering the efficiency of its information processing complex, an institution can consider this simple rule of thumb: *End-user tools should be handling end uses only*. They belong in what we will refer to as the analytic layer.

Demands on financial institutions for better information processing controls are changing the landscape for EUT use. This has largely been spurred by regulators, who have been put in the position of examining risk and financial reporting processes managed largely through webs of nested spreadsheets. Their demands for transparency, documentation, and effective control often prove difficult to meet. Physical control of a known and fixed set of EUTs, and especially spreadsheets, is becoming somewhat easier as vendor-provided spreadsheet-control systems are becoming more capable and more user-friendly. Such systems provide audit trails covering file use, access, change control monitoring, and other diagnostics. But the actual cost of controlling spreadsheet-based processes is often inflated because of the cost of reducing the process to a known and fixed set of EUTs and of documenting the design and purpose of each such process. Just tracing through the path of the data is challenging when the process is composed of complex systems of nested and linked spreadsheets, augmented by myriad cuttings and pastings of data from one to another. With such processes being difficult to even diagram, and the boundaries of the process difficult to establish, adding control capabilities to a subset of key EUTs may provide very little controllership to the process overall.

16 ► FINANCIAL INSTITUTION ADVANTAGE

From the perspective of knowledge and experience, a *crowding-out effect* is clearly evident across the financial services industry: The higher the demand for spreadsheet-expert analysts, the narrower the flow of training and expertise in alternate technologies. Part of this has been the result of the successful strategy of Microsoft to promote spreadsheet use for a wider and wider array of uses, which comes at the expense of a more segmented approach to data management and analysis. In the 1980s as the PC boom began in earnest, sophisticated yet user-friendly database tools also took off, spearheaded by products like FoxPro and Ashton-Tate's dBase. These tools integrated a basic SQL (Structured Query Language) type of functionality with FORTRAN-based programming languages and could be managed by business experts looking to solve applied business problems as opposed to computer scientists. Microsoft sought to redirect attention away from these do-it-yourself applications, releasing its middle-ground Access product and acquiring (and then discontinuing) the feature-rich FoxPro. These market tactics altered the flow of experience accumulation and helped to create the IT rift. Short-term trade-offs became the rule for business executives who were faced with accomplishing tasks under time pressure and who had no direct personal stake in the institution's overall information processing architecture, creating stronger and stronger incentives to extend the breadth and depth of spreadsheet use and to continue to accumulate spreadsheet-analytic skills in their respective teams.

These days an experienced spreadsheet expert can be deployed and redeployed cross-functionally with a very low ramp-up cost. Alternatively, any consideration of a non-spreadsheet-based solution to a process that is currently spreadsheet-based means the involvement of IT personnel, who will not likely be viewed as subject matter experts or as expeditors. As a result, the manager can economize on difficult-to-manage IT resources, bulk up on subject matter expertise, and retain control of his time line by keeping the analytic and reporting functions of his group spreadsheet-based. This trend has further insulated business analytics teams from IT personnel and policies, and further isolated the IT teams from a wide array of business-critical processes. And because of this isolation effect, IT personnel who could potentially engineer more efficient alternatives to the spreadsheet deluge, or at least help to manage the risks and complexities that

stem from the overuse of spreadsheets, are not even fully aware of the problem or which processes are being impacted. Without the perspective of more technology savvy personnel who also understand the business processes, out-of-control spreadsheet processes can appear insoluble.

Consider the following example: a project to consolidate various data sources relevant for risk modeling within a large financial institution—a project designed partly to streamline reporting capabilities, but primarily to streamline and improve controllership for analytics teams building statistical models within divisional business units (an important SR11-7 component). The largest business unit team, a thirty-some person team that included multiple PhDs and other modeling experts, was decidedly unenthusiastic after sitting through the initial training demo. “But how do we actually get the data out?” the team members asked. “Through SQL queries,” the project managers answered. “The data is organized to make the queries really intuitive and straightforward.” The analytics team was shown a simple, user-friendly query window and given a demonstration of the power and performance of the system. “But no one on our team knows SQL,” the group complained. Undaunted by this surprising revelation from such a technical group, the project managers countered, “That’s okay, you can link to the tables using Microsoft Access; use that interface and you’ll see hardly any decrease in performance.” “But no one on our team knows Access either,” the team members said, “we only use Excel.”

By contrast, consider the working operating model at Loan Pricing Corporation, a small bank services company that operated independently during the 1990s and was later acquired. This company was effectively providing outsourcing of portfolio analytics and statistical modeling for commercial banks, with the benefit of having access to data from multiple banks (confidentially supplied) to support those work streams. One of the things that made this small company exceptional was that the entire bank database (a simple but large relational database implemented in Sybase) was made available to every employee involved in analytic work, and each one of these employees was required to be fully self-sufficient with respect to the access and use of that data. SQL was the lingua franca at the firm,

18 ► FINANCIAL INSTITUTION ADVANTAGE

with the effect that data-supported processes were extremely direct and highly efficient, and a wide variety of operational risks were effectively mitigated. On the other hand, the operational risk associated with incorrect query writing was proportionally elevated. However, the culture of the firm was dramatically and positively shaped by the requirement that analysts know SQL and access data directly from the central database. First, the level of SQL expertise—and the consequent understanding of the data itself—was driven to high levels, as each employee's neighbor on the right and the left was highly capable and the competitive pressure to be expert in query writing was therefore palpable. Second, due to the direct pulling of data by the analysts themselves, the level of scrutiny and of data profiling was raised far beyond what typically exists in banks, with the result that data cleansing became an indirect ancillary service supplied to client banks. This superior outsourcing of data cleansing enhanced the credibility of the models being produced, and the quality of other analytic services was also enhanced in the eyes of the clients. Last, the importance placed on skill with SQL and data processing had a powerful democratizing effect on the culture of the company, eliminating the IT rift and providing a separate mechanism to support a meritocracy in work assignments and promotions. While the company changed hands more than once and its performance was buffeted by a variety of broader trends, many alumni from this firm went on to positions in the financial services industry through which they influenced and advanced the information processing capabilities of their subsequent employers.

As regulatory requirements for information processing control have increased, spearheaded in part by the Federal Reserve Bank's CCAR process,⁷ the need for financial institutions to better understand and control their EUT use has increased. For most institutions, just knowing what EUTs it has, what they are used for, and where they are located is a major challenge. Several software vendors now offer tools capable of searching through corporate networks to identify and count EUTs, and in some cases to provide varying levels of analysis of the EUTs identified. Anecdotal accounts hold that even medium-sized banks have tens of millions of EUTs extant on their corporate networks. Presumably millions more exist on local drives, inaccessible to network-crawling tools. One vendor recounted an

experience with a global bank based in Europe that (due to system constraints) was only able to perform a network scan on its home country corporate network, where it discovered 31 million EUTs—of which more than half had not been accessed in more than a year. Clearly, the accumulation of such large numbers of spreadsheets creates multiple forms of cost for the institution. These costs include:

- Loss of information, as the origins of the data become murky and the results can no longer be relied upon or attested to.
- Replication, as the loss of knowledge about the nature and purpose of a given spreadsheet creates the need to recreate something identical (or nearly identical).
- Operational risk, as the certainty that a given spreadsheet is fit for its intended purpose will degrade over time and the potential for the spreadsheet to become corrupted or simply outdated will grow over time.
- Physical resource drag, as the memory consumption alone from tens of millions of spreadsheets, many of which no longer have any useful purpose, reduces the capacity and can impair the performance of existing hardware.
- Compliance costs, as internal or external demands for documentation, or for minimal forms of controllership, become increasingly difficult and costly to comply with.

Spreadsheet control, and more broadly EUT control, is one of the current hot topics in financial institution risk management circles, and regulators are now demanding that institutions have comprehensive EUT control capabilities in place in order to clear other regulatory hurdles such as SOX (the 2002 Sarbanes-Oxley Act) and CCAR exams.

OTHER CHALLENGES TO ESTABLISHING AN IT-SAVVY CULTURE

Beyond the challenges imposed by the IT rift and the technical knowledge gap typical within management and HR functions, understanding and managing large financial institutions as a unique class of firms has additional cultural complexities. These stem from the fact that financial

20 ► FINANCIAL INSTITUTION ADVANTAGE

institutions are typically composed of multiple, highly heterogeneous product and service lines, with a strong correlation between firm size and the heterogeneity of these activities. This gives rise to a tendency toward localized solutions, and frustrates the centralization of data and information processing that would give rise to economies of scale and enable the establishment of an integrated and consistent vision for information processing.

Frequently, constituents engaged in certain sets of activities will try to segregate themselves from the firm's efforts to develop an integrated and efficient information management framework (and culture). These may be the within-firm leaders in information processing, in which case the talent and experience of the individuals involved and the capabilities of the system architecture should be tapped by HQ leaders to help shape the corporate vision. Other groups may be Luddites culturally, unwilling to accept that their business practices could be improved through better information management and use, with antiquated practices that can create a drag on local and firm-wide competitiveness as well as creating unnecessary operational risk.

In large institutions, the best run *data* processing business units are typically in the retail banking, transaction services, and consumer credit spaces. All of these are very high data volume businesses with industry-level transactions numbering in the hundreds of billions per year and continuing to grow rapidly. But even in areas like transaction banking, where financial institutions are doing the best job relative to other internal departments, they are in fact only tenuously in possession of a technological advantage at the industry level and are quite vulnerable to threats from more capable firms outside of or on the fringe of the financial services sector. Illustrating that vulnerability (and as mentioned in the introduction), the *Wall Street Journal* reported in April of 2014 that Wal-Mart:

aims to take a bite out of the roughly \$900 billion in so-called person-to-person payments made each year in the U.S., in the form of cash or checks ... The new service brings Wal-Mart even deeper into the of providing traditional banking services even though the company isn't technically a bank.⁸

For true strength in information processing within the financial services sector, consumer credit product providers tend to be among the best. These businesses, which include consumer credit card, mortgage, personal loan, and other small ticket financings, combine proficiency in high transaction volume data processing with cutting-edge model-based *information* processing technologies. Extending and monitoring credit for what can easily number in the tens of millions of accounts at a large institution requires superior data management and information processing on a number of fronts. On the analytics side, most of the heavy lifting in consumer credit businesses is performed by sophisticated credit scoring models, as well as marketing, line-limit adjustment, and fraud detection models for which what is defined as state of the art changes almost quarterly. While historically these businesses outsourced credit scoring to the primary credit bureaus, competitive pressures have driven them toward more sophisticated proprietary models that use bureau scores as one type of input. Importantly, these proprietary systems need to maintain the nearly instantaneous response time that the bureaus provide or customer acquisition rates can suffer. However, in spite of the expertise and physical information processing capabilities contained within these businesses, they are all too often closely held within the business lines themselves and not integrated into the overall information processing design of the institution. In most cases, this is simply because the institution isn't taking an integrated, cross-product approach to system design. In part, this may stem from managers' beliefs that only the consumer credit and consumer insurance businesses are high data-volume businesses and that it does not make sense to combine these with relatively low data-volume commercial business lines. But as we will discuss further in Chapter 2, the volumes of data that can, and ultimately must be, brought to bear to create competitive commercial financial institutions are (and will be) so high that such a distinction no longer makes sense as a system design principle.

Even within the so-called consumer side of the house, integration often takes a back seat to the product view of organizational segmentation. For example, it is typical for banks with multiple credit card programs, sales finance programs, and personal loan, auto loan, and mortgage loans, to store and model the key information related to

22 ► FINANCIAL INSTITUTION ADVANTAGE

these exposures at the *account* level, rather than at the *customer* level. This is ironic given that the most powerful and widely used inputs into these models are other models—namely the consumer bureau credit scores—that are developed and applied at the *customer* level. The irony is exacerbated by the fact that the identifiers for these bureau scores are social security numbers, individual taxpayer IDs, or both, which is precisely the information needed to integrate the consumer data at the customer level. And while the types of consumer data that can be collected and used for modeling are governed by a host of regulations,⁹ certainly the amount of information that could be generated or collected to improve the assessment of creditworthiness and the effectiveness of marketing efforts is not anywhere near the maximum. Now, powerful regulatory pressures are forcing firms to adopt more customer-centric information processing capabilities. New and higher standards for the production of suspicious activity reports (SARs) required under the Bank Secrecy Act are effectively requiring banks to apply new SARs-alert algorithms at the customer level, and this is causing many firms to radically remediate or replace their account-based data models.

By contrast, large commercial operations and certain capital market activities retain some of the most antiquated thinking about data, information processing, and analytics. The most obvious evidence of this is the continued heavy use of agency ratings as summary statistics for credit assessment and pricing. It should not be controversial at this point to assert that deal making and the pricing of corporate credit based on the deliberately slow-moving and opaquely generated agency ratings—whose track record is fraught with errors and omissions—does not constitute maximally informed decision making. Of course, another potentially limiting aspect of this practice is the narrowness of the universe covered by the major agencies. Very often, such limitations are overcome (when driven by necessity) by extending the rated universe with so-called internal ratings, EDFs (expected default frequencies), or other substitutes without adjusting the process to account for the different types of information content contained in each. Shockingly, at many institutions there is little recognition of the fact that these different types of indicators do in fact have widely varying information content and quality, even though

they are key inputs into pricing and structuring decisions, and often drive risk limits and approval authority. The connection between the quality of credit information and competitive advantage is immediate and direct, especially since institutions' practices in this area differ widely and produce widely varying outcomes—a fact that we can easily prove.

In 2009, the Financial Services Authority (FSA) repeated an exercise it had conducted in 2007 to assess the variability across institutions in assigning probabilities of default (PDs)¹⁰—the quantitative analogue to credit ratings. It surveyed firm-level PDs from 13 separate financial institutions. Specifically, the FSA requested firms' PDs for 50 sovereign obligors, 100 banks, and 200 corporations as of June 30, 2009. Table 1.1 reproduces Table 1 from the FSA report, showing the variance in measured PD for co-rated obligors and broken out by obligor category. Focusing on the line for corporations, one can see that while one firm saw the average default risk for 13 well-known obligors at 3.2 percent, another saw it at 18.8 percent. The rest of the table, as well as the other statistics presented in this and the prior FSA study, confirm the wide variability of PD estimates across financial institutions. The implications of this for the pricing of debt, credit default swaps, and other derivatives, as well as for the approach to marketing products and services for corporate clients are obvious. With such widely varying underlying views, these markets are clearly highly inefficient with huge profit and loss potential hanging in the balance. We may as well close the thought by tying it back to our central theme: While all of these institutions may have the PDs wrong, one of them has them the least wrong and can out-price and out-trade its peers; this firm is gaining this advantage through superior data and information processing.

As we will argue next: As a definition and general principle, unless data has accuracy characteristics that are known probabilistically, it does not even meet the criteria to be considered information. Therefore, similar measures whose probabilistic characteristics differ cannot be used interchangeably or in combination unless the characteristics of the combined or substituted information are carefully preserved. In other words, while agency ratings, EDFs, and other indicative data may all have valuable information content themselves, they may lose that

Table 1.1 FSA Co-Rated PD Variance

	PD Statistics for Sovereign, Bank, and Corporate Portfolios (co-rated sample)					
	1	2	3	4	5	6
	PD (%)					
	Respondents in Co-Rated Sample	Number of Obligors	Average Portfolio Mean	Lowest Portfolio Mean	Highest Portfolio Mean	Range
Sovereigns	10	17	1.9%	0.6%	3.1%	2.5%
Banks	13	34	5.4%	3.0%	8.6%	5.6%
Corporations	7	13	9.1%	3.2%	18.8%	15.7%

Source: Financial Services Authority, *Report to the G-20 Finance Ministers and Central Bank Governors (2009)*, P3.

content if they are used as loose substitutes or combined willy-nilly. The question commercial lending and investing institutions should be asking if they are serious about gaining some competitive advantage in the credit space is: How much actual information can I put into my credit measures (e.g., PDs) to deliver to decision makers and at what cost?

In certain cases, business participants may eschew the value of data and the necessity of being informed by claiming to be only price takers. As such, their need for collecting and processing data, other than for the most basic reporting requirements, or for higher level analytics, or statistical modeling, is minimal to nonexistent. As we discuss further in Chapter 3, the identification of activities that can be characterized as price taking is in fact evidence of a lack of competitiveness, which is likely the result of the firm's failure to develop an integrated and efficient information management framework and culture.

NOTES

1. Hubert P. Janicki and Edward S. Prescott, "Changes in the Size Distribution of U.S. Banks: 1960–2005," *Federal Reserve Bank of Richmond Economic Quarterly* 92, no. 4 (Fall 2006): 305.
2. Richard Hays provides an excellent, if somewhat dated, description of these dynamics; see Richard D. Hays, *Internal Service Excellence: A Manager's Guide to Building World-Class Internal Service Unit Performance* (Sarasota, FL: Summit Executive Press, 1996).
3. Board of Governors of the Federal Reserve System, "FAQs: Final CIP Rule" (2005), www.federalreserve.gov/boarddocs/SRLETTERS/2005/SR0509a1.pdf.
4. Min-max strategies are intended to minimize the maximum regret, or alternatively, to narrow the range of outcomes that could be called a failure.
5. SR 11-7, the Fed's guidance on model risk management, will be discussed further in Chapter 4.
6. Hays, *Internal Service Excellence*, 19.
7. The Fed's CCAR (Comprehensive Capital Analysis and Review) assessment will be discussed further in Chapter 3.
8. Paul Ziobro and Robin Sidel, "Wal-Mart Undercuts Rivals with New U.S. Money Transfer Service," *Wall Street Journal*, April 17, 2014.
9. An example of one regulation governing the use of consumer data is Regulation B of the Federal Reserve Board's Equal Credit Opportunity Act of 1974.
10. Financial Services Authority, "Report to the G-20 Finance Ministers and Central Bank Governors" (2009).

