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Global Financials and Payments

Data Analytics for FIs: The Journey from Insight to Value

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3. BCG's Gamma team comprises world-class data scientists and business consultants who specialize in advanced analytics

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Global Financials and Payments

Data Analytics for FIs: The Journey from Insight to Value

Financial institutions have yet to realize the full ROI potential of data analytics. But the opportunity remains, with potential for up to 5% in cost savings, new revenues, and most important, shift share toward those that execute best. It is now a race to extract value from the insights made.

In order to assess the current state of data analytics at Financial Institutions (FIs) and identify best practices they need to follow, The Boston Consulting Group and Morgan Stanley spoke with data analytics executives and experts. We found that while FIs are collecting very large amounts of data and building insights, most are early in the journey toward generating value from their data analytics. The strongest potential for FIs in the short-run lies in achieving benefits through internal value creation, while generating new revenue streams involves a longer, more challenging but potentially highly rewarding journey.

FIs on the path to value creation, but a lot of work still needs to be done: The Boston Consulting Group's primary research finds that most FIs have been building data analytics capabilities — we estimate more than $1bn has been invested by FIs thus far — and indeed many are deriving valuable insight from their initiatives. But most have yet to generate a return commensurate with investments in terms of cost savings, market share gains, or revenue uplift. In addition, FIs have impressive ambitions to create new revenue streams, but none – 0% in the surveyed group – claimed to have established credible and sizeable data-driven revenue sources.

The path to value creation leveraging insights is paved by ***engineering customer interactions*** and ***developing ecosystem partnerships*** to harness critical internal and external data sets to be able to make insights actionable. Additionally, we think it is equally important to engender a data-based decision-making culture and manage consumer privacy issues to make trust an asset and a competitive advantage.

The stakes are substantial; and analytics can be a key tool in the battle for market share: Financial institution operating margins have been static for the past 3-4 years, but we estimate that effective application of data analytics to internal processes could be a source of near-term value creation – i.e. more efficient customer acquisition and retention, operational improvements, and risk mitigation could alone drive as much as **$7bn in incremental US profit (or 5% EPS upside).** But perhaps the key driver to banks' ultimate pursuit of data analytics, and both a whip and carrot, is the notion that some FIs will be more effective in building customer relationships through superior data analytics, which could drive **substantial market share shift** between the leaders and the laggards. Furthermore, as a longer-term aspirational objective, we see the potential for FIs to draw from **new revenue pools** – **potentially pulling incremental revenue** from the pool of nearly a trillion in advertising and marketing dollars globally currently paid to agencies, tech companies, and others.

In this report we cover **Seven Things You Should Know About Data Analytics in the FI World,** as well as **Five Key Imperatives for FIs** to succeed in value creation efforts. In conjunction with this piece, we also present key investable ideas in a report titled ***Early Data Analytics Movers Stand Out,*** published today.

Executive Summary

A collaborative global report informed by learnings from key industry executives: This report was prepared jointly by Morgan Stanley Research and The Boston Consulting Group. In researching this report, BCG led interviews with 21 data and analytics executives and experts worldwide across banks, payments companies, merchants, data aggregators/service providers, FinTech firms, and within BCG. In addition, BCG conducted a quantitative survey of 52 US executives (including 14 of the top 30 US commercial banks) to understand the level of data collection, analysis and business implementation that exists in these organizations today.

Why FIs? Finding (More) Value in Consumer Transactions: Value creation from data analytics is a theme pervasive across several industries. But we focus the scope of this report on Financial Institutions, and the consumer banking and payments industries in particular, because our view is that these firms sit on a trove of purchase and banking transaction data that is still early in being utilized. To date, analytics haven't yet driven a meaningful performance divergence between banks, for example. Disruptors (e.g. online lenders), meanwhile, are touting data as a key competitive advantage that is enabling them to take share from the incumbents. We expect that as some FIs begin to figure out how to derive outperformance from analytics, others will more urgently pursue the opportunity as well, which will have ramifications for the entire set of ecosystem players.

In this report we cover three topics: 1) A State of the Union assessing data analytics and value creation at Financial Institution and Payment companies, as well as high level results of our survey; 2) Seven Things You Should Know About Data and Analytics in the FI World, where we distill the key findings of our analysis; and 3) Five Key Imperatives for FIs to Generate Value Data Analytics, where we explore key steps needed for firms to make the leap from discovering insights to monetizing them.

Value creation through data analytics is paramount to excelling in the digital world. But there are few industries that have tapped into more data and derived less upside from it than the Financial Institutions and Payments industries. And although years of accumulating data, experimenting with partnerships, and building internal buy-in and infrastructure have placed these firms closer than ever before to seeing real returns, there is still a gap between the insights they have started to derive from data, and creating value from those insights. Bridging that divide is key to differentiation and value creation. Our expectation is to see a near-term improvements in generating customer value and realization of internal operating improvements that drive margin expansion and share gains for some. In the long-term, best-in-class firms with the right level of focus to generate value externally will bring incremental revenue to the entire industry.

Near-term opportunity to deepen customer relationships and improve operational efficiency

BCG interviews with financial institution executives and industry experts and complementary survey work found that while FIs are investing in analytics to derive customer insights, collecting significant amounts of data and generating insights, success in translating data analytics into returns is relatively nascent. We estimate that those that do succeed could reap potential EPS upside of 5% from cost saves alone.

These internal returns are likely to be generated in part through deeper customer relationships reduced customer acquisition costs, lower churn, better fraud detection and risk mitigation, and more efficient operations. At the front end, these expenses are nontrivial. On a US banking profit base of $150bn, we estimate that banks in the US spent $12-13bn in 2015 on marketing and promotion expense (SNL Financial), with per person customer acquisition costs as high as $300 or more for basic credit products.

Further, we expect improved return on technology investment from effective data analytics. We estimate that most FI's spend 3-6% of total revenue on technology, or $20-40bn per year, and we estimate over $1bn has been invested in data analytics alone. Improving return on this significant investment, combined with better customer acquisition could help to change the trend of declining ROE for many FIs. We estimate median large cap bank ROE to increase from 9% in 2015 to 10% in 2018, primarily driven by efficiency improvements, loan growth, fee growth, and capital return.

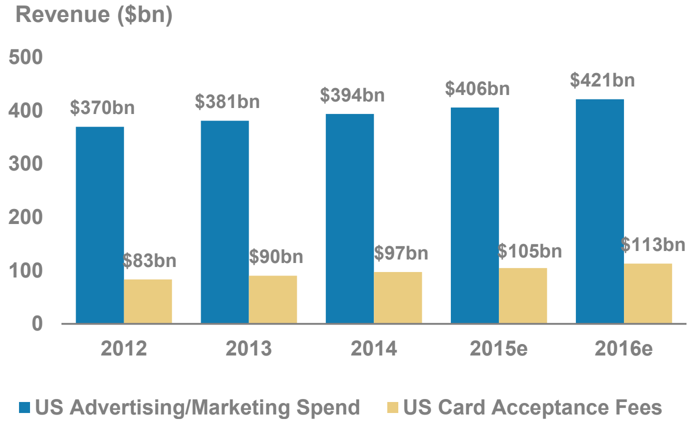
External revenue potential is further out, but could be sizeable

Long-term revenue generation opportunities shouldn't be ignored even if the hurdles are considerable. One of the biggest potential revenue opportunities is to take share from advertising/marketing budgets globally, as there is increasing demand for data driven targeted marketing programs that can drive higher ROI. The opportunity is significant – we expect Advertising/Marketing budgets across the US alone to total $421bn in 2016, and global advertising spend to be ~$450bn. Including other forms of marketing spend, this global figure approaches or exceeds $1tn. While not all of this revenue is addressable to FIs, we think the portion that FIs will target is in the $10s of billions, as they partner or utilize transaction data to "smarten" traditional marketing dollars, like Consumer Promotion (~$50bn in the US), Direct Marketing ($93bn in the US), internet advertising ($60bn in the US).

The card industry is one for which this opportunity is the greatest. While the card industry is attractive and growing, it is also highly competitive, and consequently, banks and payment companies are constantly seeking higher ROI opportunities. For example, for every 1% of the advertising/marketing budget that US FIs/payments companies can attract by leveraging their transaction data to create consumer targeting strategies for merchants, their fee-based card payment revenue pools can expand by 3-4% (banks and payments companies will generate nearly $113bn in interchange, acquiring, and network fees from merchants, according to BCG estimates).

Exhibit 1:

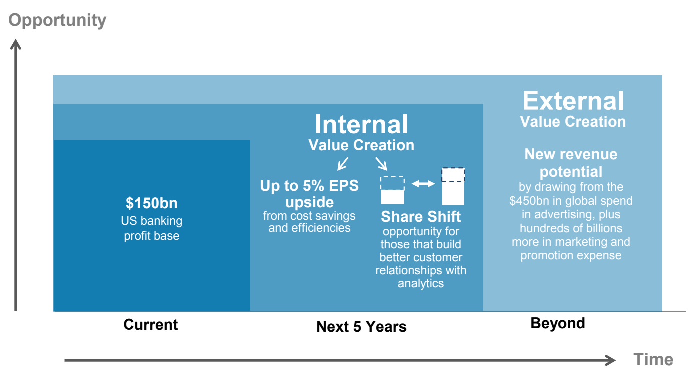
The revenue banks/payments companies earn on transactions is a fraction of the size of the Advertising/marketing revenue pool, indicative of available growth opportunity as data becomes a key component for attracting marketing dollars



Source: The Boston Consulting Group, Veronis Suhler Stevenson, Magna, RAB, OAAA, IAB, NAA, PIB, Morgan Stanley Research

Exhibit 2:

Internal value creation represents near-term EPS upside opportunity and, more importantly, could lead to market share shift. External monetization is a longer-term aspiration.



Source: The Boston Consulting Group, Morgan Stanley Research estimates

Seven Things You Should Know About Data Analytics in the FI World

1. Within four walls represents the best near-term opportunity to generate value
2. Complexity of large FIs offsets the advantages of scale; Enterprise-wide execution excellence is key
3. Transaction data is only one pillar; high value in adding additional internal and external data
4. Data access is becoming more restricted; firms can engineer interactions based on "fair value exchange" to generate unique new data for specific, actionable insights
5. For FIs, creating new external revenue streams from data is still only aspirational
6. External value creation requires partnerships to generate "actionable" insights
7. Some regions, e.g. EU, will be structurally disadvantaged due to tighter regulation

See detail in **Seven Things You Should Know About Data & Analytics in the FI World**

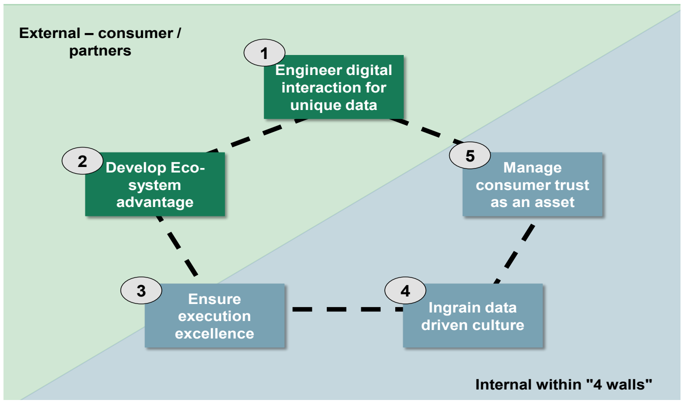
Five Key Imperatives for FIs to Monetize Data & Analytics

Our analysis uncovered best practices in the journey from data to insights to value and found that many FIs are missing essential capabilities are hindered by historical organizational and cultural factors. Most FIs are in the Developing and Adopting stages of skill and culture. And few, if any, could be categorized as Path Breaking. For most, the hardest part of the journey will involve more a cultural adoption than a technological transformation.

There are five best practices that when executed concurrently are likely to yield best returns internally, while improving opportunities for external value creation (**Exhibit 3**):

1. **Engineer customer interactions** to gather valuable data based on fair value exchange for customers
2. Develop a structured program to manage **ecosystem partnerships** whose objectives are to harness data critical to internal and external value creation
3. **Ensure execution excellence** by organizing data & analytics function as a **center of excellence** with explicit senior executive support and business buy-in/partnership
4. Ingrain data-based decision making and **"test & learn" culture**
5. Make trust an asset and proactively manage consumer privacy

Exhibit 3:
Five pillars of success



Source: The Boston Consulting Group

See detail in **What Comes Next? Five Key Imperatives for FIs**

State of the Union: Where FIs and Payments Companies Stand Today

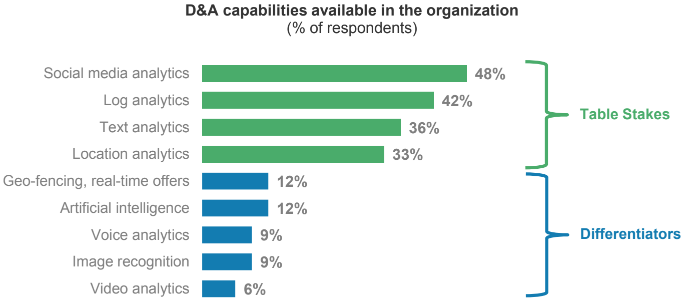
Following our qualitative conversations with global FIs, payments companies, merchants, and service providers, as well as our survey of 52 US executives (conducted by BCG; including from 14 of the top 30 US commercial banks), we provide an overview of the current state of value creation in the FI and Payments space.

Basics are in place, but journey from insight to value is still nascent

Many large FIs and Payment companies have invested in several data analytics necessary to generate insights, including Social Media, Log (e.g., web, chat), Text, and Location Analytics (see **Exhibit 4**). While these analytical capabilities could add value, they will probably not be sufficient to generate a sustainable competitive edge. That FIs are early in the data analytics journey is illustrated by the fact that the most widely cited source of supplemental analytics — social media — was being used by slightly less than half of those surveyed, and fairly well established analytics like location and geo-fencing (real time offers specific to location) are still used by a minority of surveyed firms. While 12% of surveyed FIs stated are undertaking AI, we believe these efforts are relatively nascent.

Exhibit 4:

Most are focused on "table stakes" analytics with few using differentiated, mature analytics

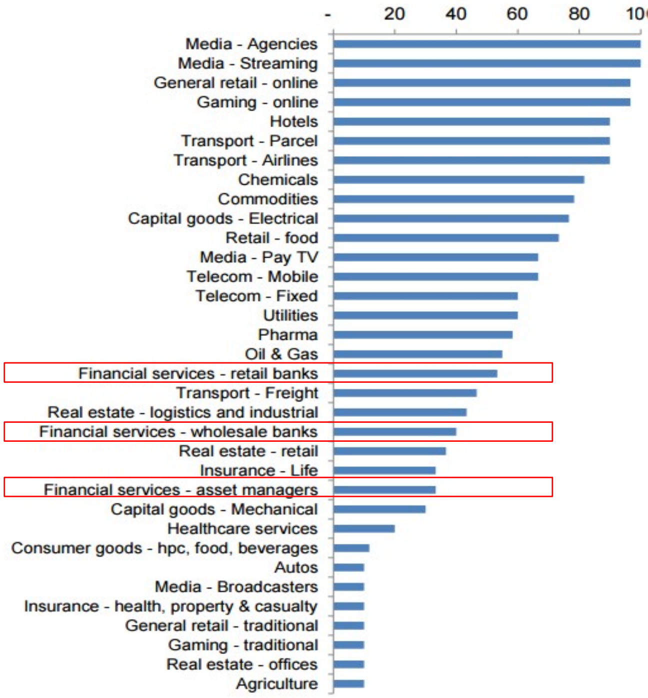


Source: The Boston Consulting Group, Morgan Stanley Research

The findings from the BCG survey work is **consistent with Morgan Stanley's assessment of the digitalization** of distinct segments of the financial services. In that report, we noted that banks already collect much of their customers' data in digital format, but that substantial gains remain to be made from digitalizing and automating data processing. For example, eradicating manual reconciliation and data entry to deliver straight through processing represents a multi-billion dollar cost opportunity for the industry, and seamless processing can also drive improved customer experience. Banks are also increasingly open to shared solutions, like the adoption of shared utilities to deliver Know Your Customer and Anti-Money Laundering. Also, development of distributed ledger solutions reduces manual reconciliation in areas such as post-trade settlement. We scored financial services in the lower half on a spectrum vs. other industries:

Exhibit 5:

The Morgan Stanley Digitalization Index ranks Financial Services towards the lower end



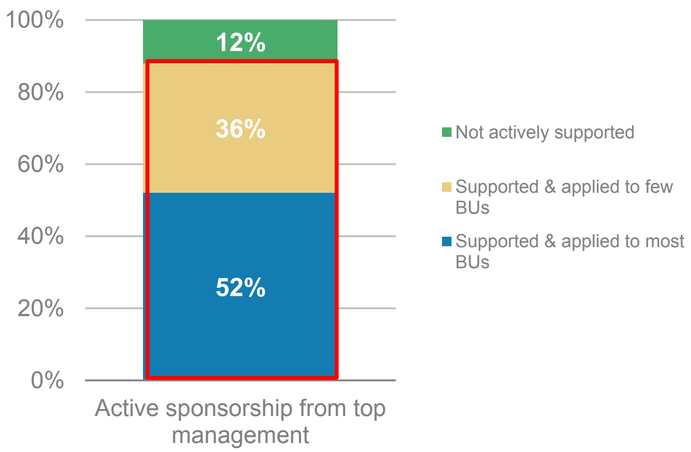
Source: Morgan Stanley Research

Management Sponsorship is Building, Though Not Yet Translating to Formal Governance

We find that most FIs have significant data and analytics initiatives underway with active sponsorship by senior management (see **Exhibit 6**), even if such efforts are only applied to a few business units. But despite high levels of active senior management sponsorship, few FIs formally govern data analytics actively through senior management (14%), well below those that treat data management as an ad-hoc effort (33%). As we explore later in this paper, firms that take a cohesive, firmwide approach to monetizing data are most likely to succeed.

Exhibit 6:

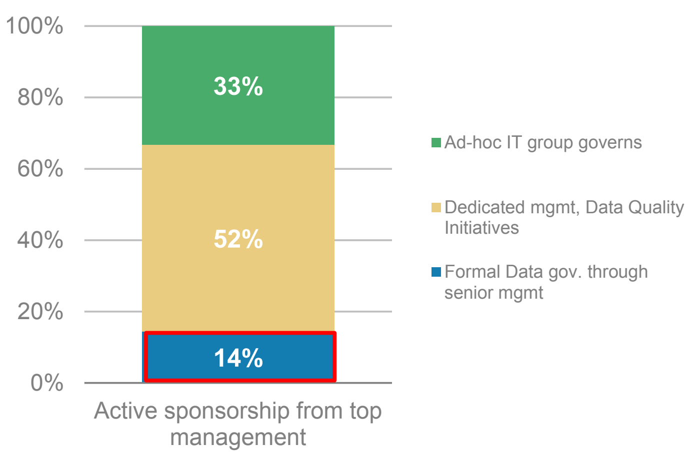
Most large FIs and Payments Cos. have some level of senior management sponsorship...



Source: The Boston Consulting Group, Morgan Stanley Research

Exhibit 7:

...although most do not have data governed formally through senior management



Source: The Boston Consulting Group, Morgan Stanley Research

Other Ecosystem Players Are Further in the Journey

Our conversations with non-FI ecosystem players suggest that they are ahead of FIs and in many cases represent attractive partners for FIs and Payments companies.

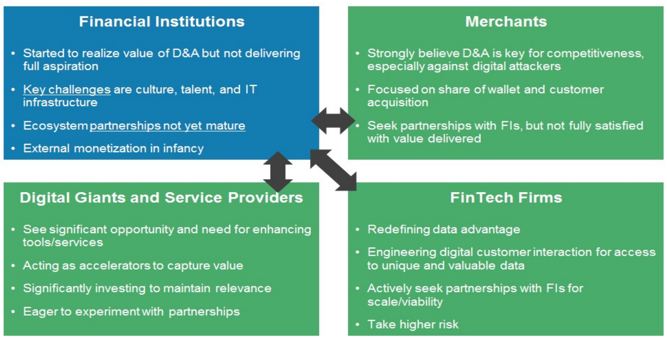
Merchants, the key "customer" in external value creation efforts, broadly believe that data analytics are key to remaining competitive in face of the threat from online competitors, and acquiring new customers efficiently and building share. Merchants are interested in establishing partnerships with FIs but have in general been dissatisfied with their experience to date.

Digital giants and service providers see meaningful opportunity to leverage their position as tech leaders and generate a win-win with other ecosystem players. These players currently have a wider view on consumers' digital life and use this advantage to create new revenue streams.

FinTech firms are redefining the data advantage, and in some cases their very existence is predicated on the ability to engineer interactions and acquire data, which enables them to better serve customers and operate with a competitive edge.

Exhibit 8:

Overview of D&A maturity among key ecosystem players



Source: The Boston Consulting Group, Morgan Stanley Research

Technology Expands the Realm of Possibility, but Raises the Bar for Firms to Keep Up

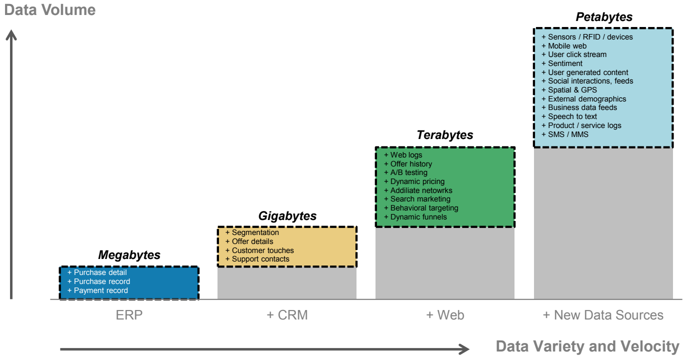
The proliferation of data coupled with advanced technology is fueling the ability to generate value.

More data available: Data volume, types, and quality are significantly growing, much of it generated by the internet and smart devices and increasingly by sensors. In the physical world, the Internet of Things is expanding the reach of data-gathering deeper into a consumer's life. In the digital realm, the growing use of APIs (Application Program Interface) is enabling interoperability, increased data sharing across devices, and the development of applications to more specific use cases. Moreover, in the EU, banks are being required to build APIs to enable permissioned access to account data by third parties under the PSD2.

At the same time, technological advancements have enabled data storage and processing to keep up with this proliferation (e.g. 10-15x data storage cost reduction has occurred in last 3 years and platforms allowing for parallel processing of structured/unstructured data on cost-effective servers are being built). The result has been increasing ability to analyze traditional structured data and unstructured data (e.g. social media, call records) in innovative ways.

Exhibit 9:

Data is increasing in volume, as well as in variety and velocity



Source: Teradata, The Boston Consulting Group, Morgan Stanley Research

More sophisticated ways to make use of the data: As the data proliferates, more insightful analytical models are being developed that can effectively use both structured and unstructured data and can derive insights from even weak signals. At the bleeding edge, deep learning methods can process tera and petabytes of data and ultimately provide the strongest level of predictive power.

Exhibit 10:

Proliferation of data coupled with tech advances has allowed for more insightful analytical models

Depth of Insight

	Business Intelligence	Traditional Analytics	Advanced Analytics
Level of Insights	• Identifies simple correlations • Aggregated results • Weak in prediction	• Identifies complex dependencies in data • Granular results • Good in prediction	• Identifies weaker dependencies in data • Highly granular results • Strong in prediction
Auditability / Explanatory Power	• High	• Mid - Low	• Low (black box)
Example Methods	• Linear regression • Geo-mapping • Basic reporting, e.g. frequency tables	• Regression trees • Classification analysis, e.g. Support vector machine • Model order reduction, e.g. Linear discriminant analysis	• Deep neural networks (deep learning)
Requirements	• Structured data • Low data volume	• Structured data • Medium data volume	• Structured, unstructured data • High data volume

Source: The Boston Consulting Group, Morgan Stanley Research

Potential end to Moore's Law could signal a slowing to this improvement: Separately, data collection and analytics strategies tend to hinge on the assumption that Moore's Law persists, driving down compute costs, and with it, continued declines in data storage costs (and increasing densities). However, as the Morgan Stanley semiconductor team has pointed out in a Global Insight piece exploring the topic, the pacing of Moore's Law may be permanently slowing. Valid questions may also emerge about strategy soundness of letting third party cloud hosting companies (like Amazon or Google) be the sources of continued cost reduction pushes.

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1. Within four walls represents the best near-term opportunity to generate value

Summary: For FIs, we estimate that improvements in customer acquisition costs, customer support, fraud detection, compliance monitoring, credit risk management, etc. have the most potential to generate near-term return, and can increase profits by as much as 5%. And being best in class represents an opportunity to try to win market share.

BCG's industry interviews indicate that most organizations see the business case for internal value creation as a viable near-term opportunity. For most companies, the **primary objective is to gain a competitive advantage** through more meaningful sales & marketing, improved customer service, higher operational efficiency, reduced risk & fraud. We've segmented the most common use cases into four broad categories, though these are not exhaustive.

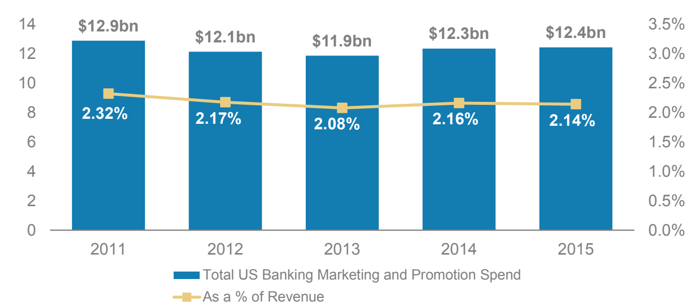
Product, sales and marketing: The most frequently cited internal use case for data is sales & marketing. Specifically, effective use of data can help with targeted customer acquisition through use of targeted offers (as opposed to broad-based general offers) that increase conversion rates and improve ROI on marketing dollars, while maintaining profitability on existing loyal customer base. In addition, data analytics can drive better product development and pricing.

Banks spent an average 2.1% of total 2015 revenue on Marketing and Promotion expenditure, according to data from SNL Financial, and several percentage points more when including branch costs. Customer acquisition cost skyrockets with marketplace lenders, where there are no bank branches to help support customer acquisition. At On Deck Capital, for example, customer acquisition costs were 5.7% of origination volume in the first nine months of 2014, equivalent to 45% of revenue. Even Lending Club, which touts the efficiency of its customer acquisition, has had Sales and Marketing expense equivalent to 40% of revenue over the past three years. Quantifying the potential improvement to customer acquisition is difficult, but On Deck recently called out its "data-driven" decision making as a key to improved acquisition costs in its Q3 2016 earnings call.

Exhibit 11:

Banks in the US spend ~2.1% of revenue on Marketing & Promotion

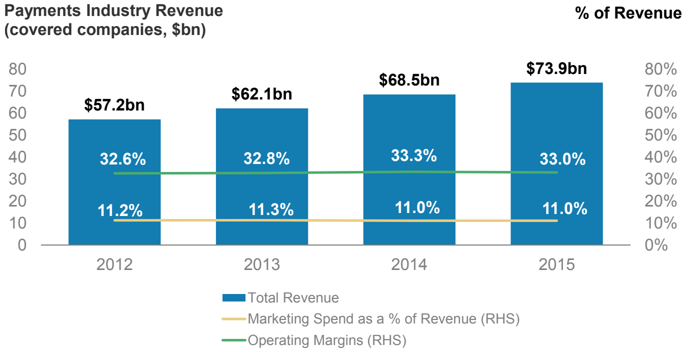
Total Marketing & Promotion Spend ($bn)



Source: SNL Financial, Morgan Stanley Research

Exhibit 12:

And within US Payments, marketing spend as a % of Revenue is even higher, and has seen little leverage over recent years



Source: Company Data, Morgan Stanley Research

Another example is **Price optimization.** Companies make myriad pricing decisions each year with the objective of maximizing profits, but many of these fail to deliver. Unlocking the value of data and acting on it can significantly improve the potential to make better pricing decisions that can help save lost or at-risk revenue. E.g. Merchant acquirers like VNTV and FDC have noted use of analytics-based pricing to reduce merchant churn.

Other use cases for sales and marketing that we found within our surveyed universe include contextual offers (e.g. geo-location based real time offers), customer lifetime value maximization, improved advocacy marketing, and cross-sell optimizations, which are primarily aimed at driving higher topline growth.

Operations: Some companies have put data analytics to use for driving operational efficiency by helping address issues around customer service (e.g. optimization of cross-channel customer journeys, in particular for on self-service channels) or resource optimization (e.g. demand prediction for optimized ATM replenishment), or streamlining collections on loans (e.g. early prediction of collection risk and optimization of outreach effort).

Risk & Fraud management is a critical use case for several financial and payments companies. Banks and fintech companies use data learnings for effectively underwriting credit risk, while payments processing companies have long used transaction data to assess fraud risk through use of predictive analytics on a wide range of factors such as past purchasing behavior, purchase location, IP address detection, etc. The use of sophisticated predictive analytics has helped the payment networks consistently minimize fraud while limiting user authentication requirements, thereby reducing friction in the consumer experience.

Compliance is a key source of opportunity for the financial services industry given complex regulatory burden. Companies have found data analytics to be effective in managing the burden and cost of compliance and compliance monitoring.

Applying analytics to these spend categories could drive as much as 5% earnings upside: Between the several sources of spend we've identified as ripe for improvement, we think it could be reasonable for a bank to shave 200 or 300 basis points off total operating expenditure by leveraging analytics throughout the firm. We expect realization for this higher amount of savings is likely to be relegated to the most complex of firms, while midcap banks are less likely to benefit. We also note that there is a likely some degree of incremental technology spend before banks realize the value of their analytics, and this will most likely be a function of how much the bank has invested so far, vs. how far along the bank is in addressing some of the key imperatives we've laid out in this report. All in we see a wide plausible range of outcomes, with on the one hand banks spending more to chase the opportunity but doing so without traction (potentially dilutive) to those that have already made most of the required investment and are nearing meaningful upside (~5% earnings upside).

Exhibit 13:

We see the potential for up to 5% in earnings upside as Analytics are applied to major cost categories

Plenty of use cases available for FIs and Payment companies to enhance sales & operations

Sales & Marketing	• Targeted customer acquisition • Next best offer / cross-sell optimization • Contextual offers (real-time, geo-based) • Pricing, e.g. lending, deposit, fee & commission • Marketing mix optimization • Customer lifetime value optimization
Operations	• Cross-channel customer journey optimization • Complaint reduction • Churn prediction / reduction • Demand prediction / resourcing optimization • Optimized ATM replenishment
Risk & Fraud	• Credit risk management • Portfolio stress testing • Fraud detection
Compliance	• Stress testing • Compliance monitoring

Reduction to Noninterest Expense from Sales, Marketing, Compliance, and other Compensation Savings

Incremental Tech Spend (assumes current spend is 4.5% of revenue)		1.0%	1.5%	2.0%	2.5%	3.0%
	1%	1.5%	2.3%	3.1%	4.0%	4.8%
	5%	1.1%	1.9%	2.7%	3.5%	4.3%
	10%	0.5%	1.4%	2.2%	3.0%	3.8%
	15%	0.0%	0.8%	1.6%	2.4%	3.2%
	20%	-0.5%	0.3%	1.1%	1.9%	2.7%

Potential net income upside

Source: The Boston Consulting Group, Morgan Stanley Research estimates

Beyond the hard dollar savings, we think market share shift potential is the bigger carrot/stick: As FIs face increasing threats from disruptive innovators and from each other, we think those that are able to effectively use data for improving internal decision making as well as driving better consumer engagement will be better positioned to not only preserve, but potentially accumulate market share from others. One of the most relevant avenues is through customer loyalty. Acquiring customers can be expensive but FIs often lose them frequently when competitors offer lower priced products. Making broad-based pricing cuts is often not a solution given profit ramification across the portfolio. Data can be an effective tool to understand the customer's motivations and help improve retention by either offering targeted pricing changes or value added services which customer may value more than a few dollars of savings.

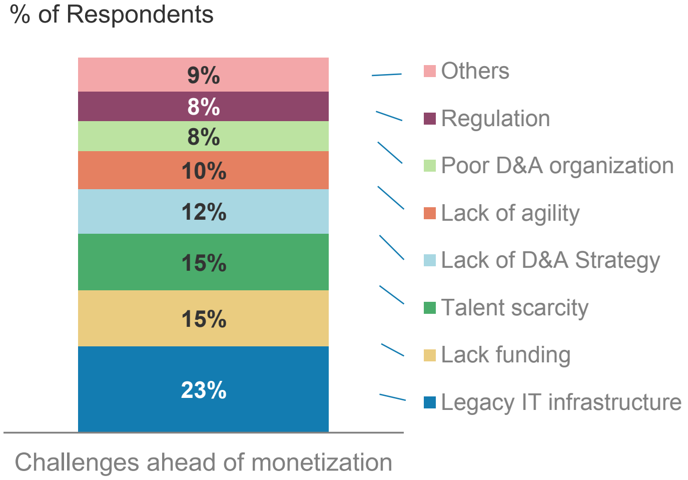
2. Complexity of large FIs offsets the advantages of scale; Enterprise-wide execution excellence is key

Summary: There are challenges that all firms will face in creating value from data. Large-scale banks have clear advantages such as having access to larger data sets that allow for deriving more granular insights with more robust sampling, or having more comprehensive and established data collection capabilities. However, scale also brings implementation challenges including more complex data, linking data silos that are run independently by different business units to form a 360-degree customer view, building an enterprise-wide agile test & learn culture, or scaling-up successful ideas rapidly due to higher organizational and product complexity.

A key finding from our senior leadership survey is that while scale does provide banks with some advantages, such as resources to build a team and a larger base of customers resulting in increased sampling accuracy and higher adoption rates, these are largely offset by several challenges to executing on data insights at a large institution. First, large institutions often struggle with attendant internal complexity, which can lead to greater difficulty of securing management buy-in, a more fragmented approach to managing D&A initiatives, and overall lack of coordination due in part to the silo'd nature of many large firms (see **Exhibit 14**, **Exhibit 15**, **Exhibit 16** ,and **Exhibit 17** below).

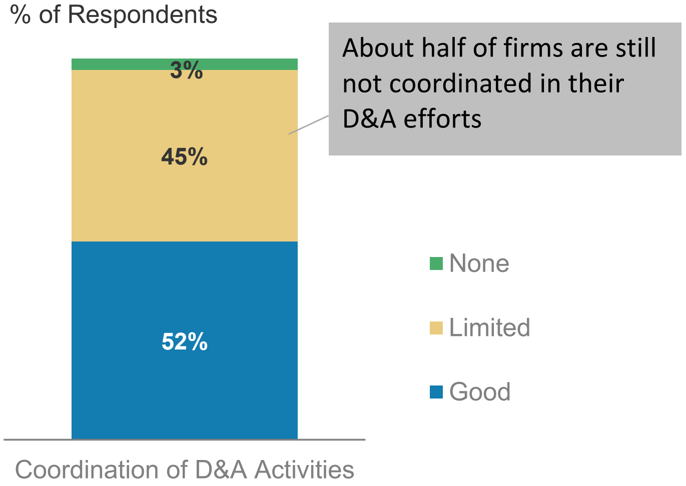
In addition to complexity, banks are often hampered by cultural barriers. For example, FIs have been slow to adopt an agile "test and learn" culture (something many FinTech firms have mastered). Large FIs also noted difficulty in fully incorporating data analytics insights in front line sales and service processes.

Exhibit 14:
Legacy IT, lack of D&A funding, and talent scarcity are key challenges



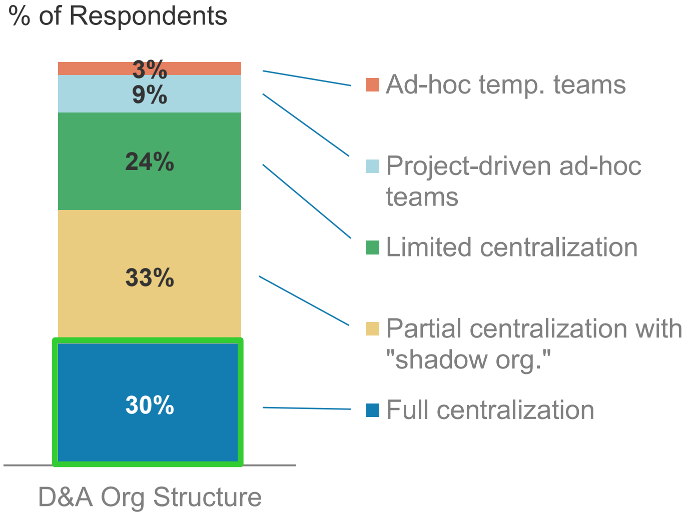
Source: The Boston Consulting Group, Morgan Stanley Research

Exhibit 16:
There is an overall lack of coordination of D&A efforts at about half of surveyed firms



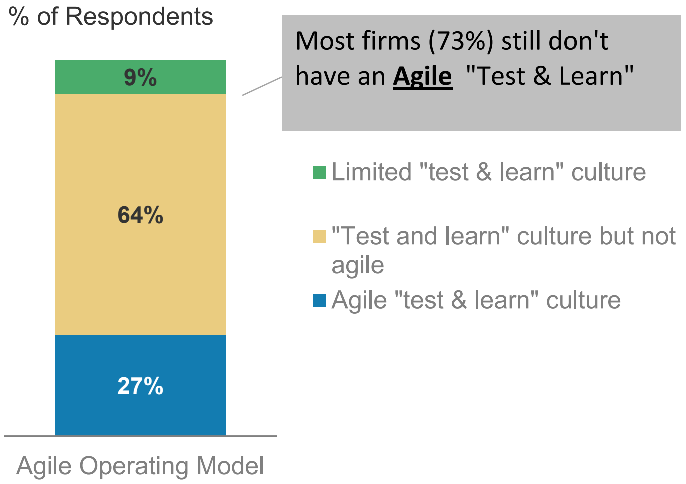
Source: The Boston Consulting Group, Morgan Stanley Research

Exhibit 15:
D&A activities are still mostly decentralized



Source: The Boston Consulting Group, Morgan Stanley Research

Exhibit 17:
FIs are still developing an agile test & learn environment



Source: The Boston Consulting Group, Morgan Stanley Research

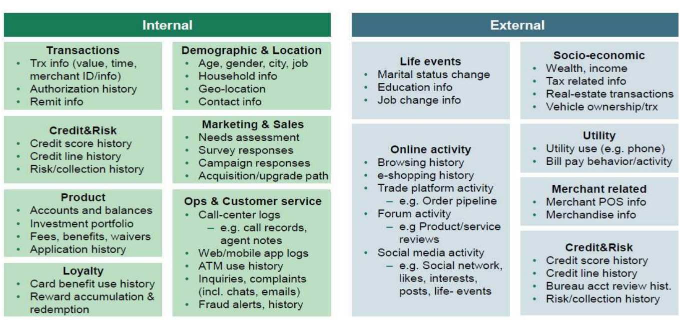
3. Transaction data is only one pillar; high value in adding additional internal and external data

Summary: FIs need more precise, timely, geo-specific, actionable insights to generate greater value from data, leading to optimized customer journeys, including contextual offers (e.g., location or life event based). For this, beyond transaction information, accurate internal (credit & risk, product, loyalty, demographic, location, and customer service) and external (life events, online activity, socio-economic statistics, merchant, and incremental credit & risk) data needs to be appropriately assimilated.

A financial institution has an intimate knowledge of its customers in the form of personal and transaction data, and this is highly distinguished from the vast array of data available to others. But that said, FIs are able to derive far greater insight by combining this basic transaction-level data with the array of other data points available. We highlight some of the more frequently cited data points FIs leverage:

Exhibit 18:

FIs need to merge transaction data into the vast array of other data points to derive greater insights



Source: The Boston Consulting Group

We highlight some successful examples of use-cases that leverage the spectrum of available data and analytics tools to generate upside:

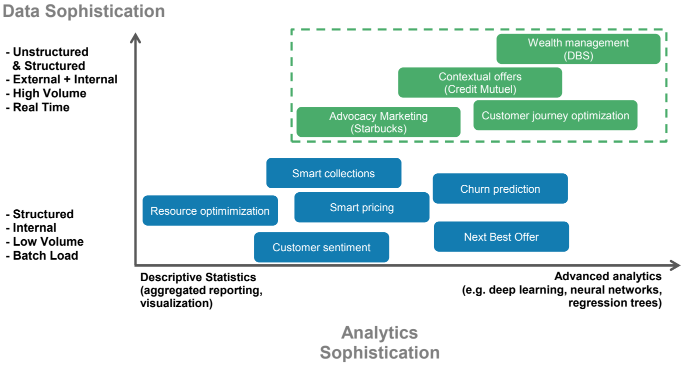
1. **Fivory (Credit Mutuel) – Contextual Offers:** Credit Mutuel partnered with merchants to leverage customer data on location, demographics, transaction history, and purchase history in order to predict time, amount, and category of the customer's next purchase. The app then sends highly contextual offers in real-time to the customers based on their geo-location. Key to the success of the predictive model is the partnership Fivory has with merchants, in which merchants provide anonymized consumer behavior to supplement the bank's own data.

2. **DBS (Singapore) – Cognitive computing in wealth management:** DBS partnered with IBM to use cognitive, deep learnings for automated data analysis in its wealth management business. In doing so, DBS was able to use client and market data (i.e. both structured and unstructured data) to provide best-in-class insights and advisory services, improving wealth-manager efficiency and output.

3. **Customer Journey Optimization (multiple firms):** FIs can leverage real-time internal data from multiple sources, like customer banking history, online/mobile channel interactions, chat logs, call voice records, agent notes from prior interactions, and the profile of a specific agent to optimize cross-channel customer journeys and predict a client interaction pattern. For example, an FI could identify gaps in its self-service channel offering that results in agent handled calls, predict the reason for the call and analyze customer sentiment with voice analytics to 1) better match that customer with the right agent (e.g. more experienced agent for high value customer in distress), 2) provide that agent with relevant information to facilitate the call quickly and painlessly (e.g. pre-populating agent screen with info related to predicted call reason), and ultimately 3) pre-empting a potential follow-up call by predicting the reason for agent to react to.

4. **Advocacy Marketing (e.g. retailers):** Advanced retailers combine customer and third party data to run 1) link analysis, i.e. which customers are most connected, 2) transactional analysis, and 3) demographic analysis in order to target customers with high influence and reach, and it focuses special deals and new product access on these key brand advocates. While we have not seen examples of FIs running similar brand advocate analyses, the strategy should apply in the FI/Payments space as well.

Exhibit 19:
Sample of recent firm initiatives that have made use of a spectrum of available data and analytics tools



Source: The Boston Consulting Group, Morgan Stanley Research

4. Data access is becoming more restricted; firms can engineer interactions based on "fair value exchange" to generate unique new data for specific, actionable insights

Summary: While organizations are expanding data collection abilities, gaining access to externally sourced data is becoming more difficult, in particular due to increasing sensitivity on consumer privacy. The traditional path to increasing data collection, partnerships, is being hampered by uncertain process implementation, increased regulatory barriers, and competitive uncertainties of data sharing. A new path, however, is available. Firms can engineer customer interactions that provide a benefit to customer in exchange for the data they share, generating a win-win.

Despite the proliferation of customer data, most FIs remain limited in the amount of data they can gather on specific transactions, and very few have access to the "whole picture" of a transaction (see **Exhibit 23**). Moreover, consumers, regulators, and ecosystem partners are becoming increasingly sensitive to what data is freely shared. The General Data Protection Regulation in the EU, adopted April 2016, serves as a perfect example, with consumers given greater rights over having their data "forgotten" or otherwise restricted from use without explicit consent. Moreover, more firms are increasingly competing to gain access to the same pieces of customer data (e.g. social media players, search engines, merchants, FIs are all trying to get geo-location of customers).

Successful value creation will depend in large part on a firm's ability to engineer new customer interactions that provide "fair value exchange" of data sharing. Examples include Google Maps, which provides map service for location data and Target's CartWheel app which provides discounts for real-time aisle-location/product interaction data — to name one key feature.

This fair value exchange can be replicated by FIs as exemplified by two key examples. **Kabbage** is an online lender focused on Small Business loans, and it redesigned a digital loan application experience for simplicity, speed and convenience with a seamless customer digital experience ensuring fair value exchange to gain access to further data. In addition to using available third party data like customer reviews and assessing credit worthiness from eBay, Kabbage has its customers volunteer bank account and sales history, and in return the customer is rewarded with faster, more favorable credit decisions. Kabbage has seen meaningful traction and has moved beyond lending on its own balance sheet to now partnering with banks like Santander (offers UK SMEs same day funding) and ING and Scotiabank (fully automated, on-boarding, underwriting, servicing and monitoring along customer life cycle).

Another example is the **Sesame Credit** product at Ant Financial, which provides credit scoring service in a largely unbanked market, using data from Alibaba's trade platform like trade volume and customers reviews to complement limited credit history data. Customers voluntarily provide banking data, payments data (e.g. utility bills), digital behavior (websites visited), eCommerce history, personal information, and social media data. Data is run through advanced machine learning platform to produce a credit score for individuals and SMBs. And in return for providing this data, customers increase their chance to access funding. Ant Financials success so far is clear, with over $4.5bn in funding to date.

Some other examples we have observed:

	Company	Interaction	Data Accessed	How Monetized
Within FI	Commonwealth Bank of Australia	Real Estate App with Augmented Reality	Home price/date/value/history, iPhone camera, customer location, financial health, behavior	Sell more mortgages via early customer engagement
	"Hao Che" by Ping An	Used car trading platform	Vehicle info, buyer/seller demographics, individual financial history on Ping An	Offer insurance policies tailored to customers
	Ant Financial	eCommerce payments platform	Product info and attributes; Buyer/seller location, ratings, transaction history; FI government and PBOC records	Offer credit with better assessment of SMB creditworthiness
Beyond FI	Facebook Messenger	Social media	Messages, in app purchases, pictures, audio	B2C services like direct messaging with a bank
	LinkedIn	Professional networking	Professional background	For use over Cortana assistant
	"Health Hob" by Keas	Employee health management	Medical records, insurance claims, diet, exercise, biometrics, users data	Predict and prevent high healthcare costs, encourage employees to compete on diet/exercise

5. For FIs, creating new external revenue streams from data is still only aspirational

Summary: Use of data analytics-driven services to generate external, new revenue streams is fairly rare at FIs. In most instances, value has been derived through improved customer service, which in turn typically translates to increased retention or ability to cross-sell a broader suite of core services.

External value creation involves sharing of consumer data with third parties to generate unique value for consumers and in turn additional revenue streams. It can range from simple sale of raw data to merchants or other third parties, or delivering specific, actionable insights. The latter is more valuable and hence has greater value generation potential, but is much more challenging.

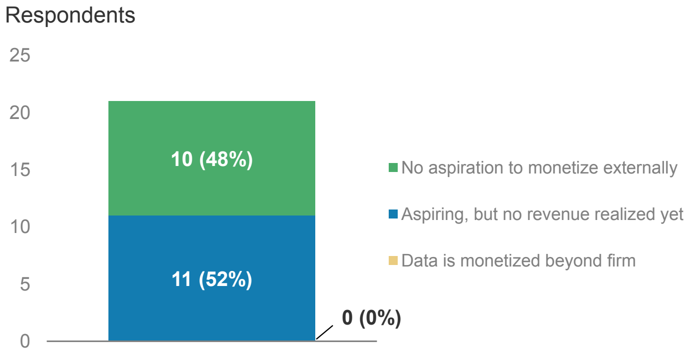
Half of our surveyed FIs have no aspirations to build an external data analytics business. The remaining half, while aspiring towards new revenue streams, have not realized much by way of external data revenues today (see **Exhibit 20**).

FIs have tended to focus their external efforts on supporting merchants by helping them identify consumer spending patterns, predict future purchases, design the right loyalty programs, and provide competitive benchmarking. But in most cases, the return has been in kind, that is, benefiting FIs by helping retain these merchants as clients as opposed to earning new revenue streams. In most instances, these services have been appreciated by smaller clients, that have limited data and tools internally to run these types of analyses on their own.

Evidence of external value creation has thus far been limited. One example is third party aggregators, such as Cardlytics, that use FI data to identify customers that can benefit from merchant offers, thereby unlocking value for both. Similarly, the payments networks have partnered with merchants to link them to best customers for targeted campaigns.

Exhibit 20:

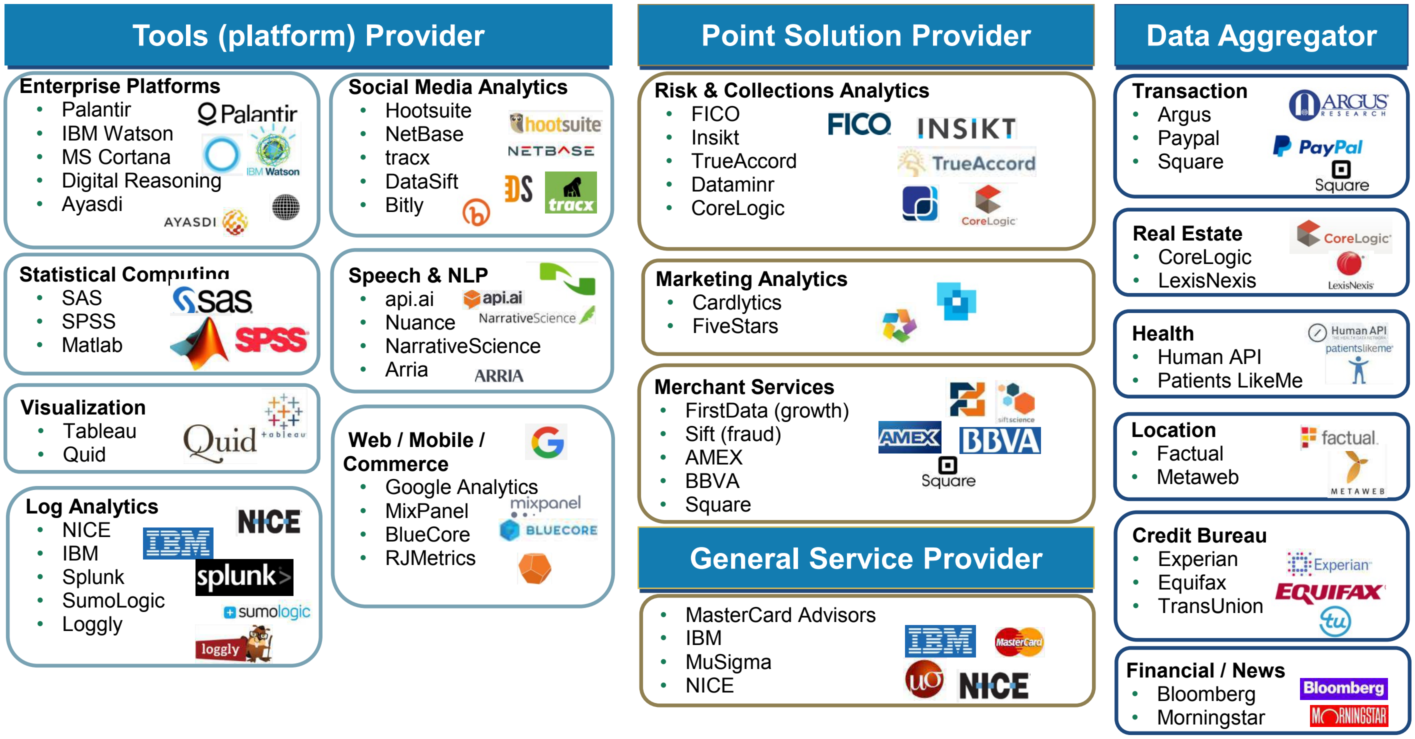
No surveyed FIs are currently monetizing outside their own four walls



Source: The Boston Consulting Group, Morgan Stanley Research

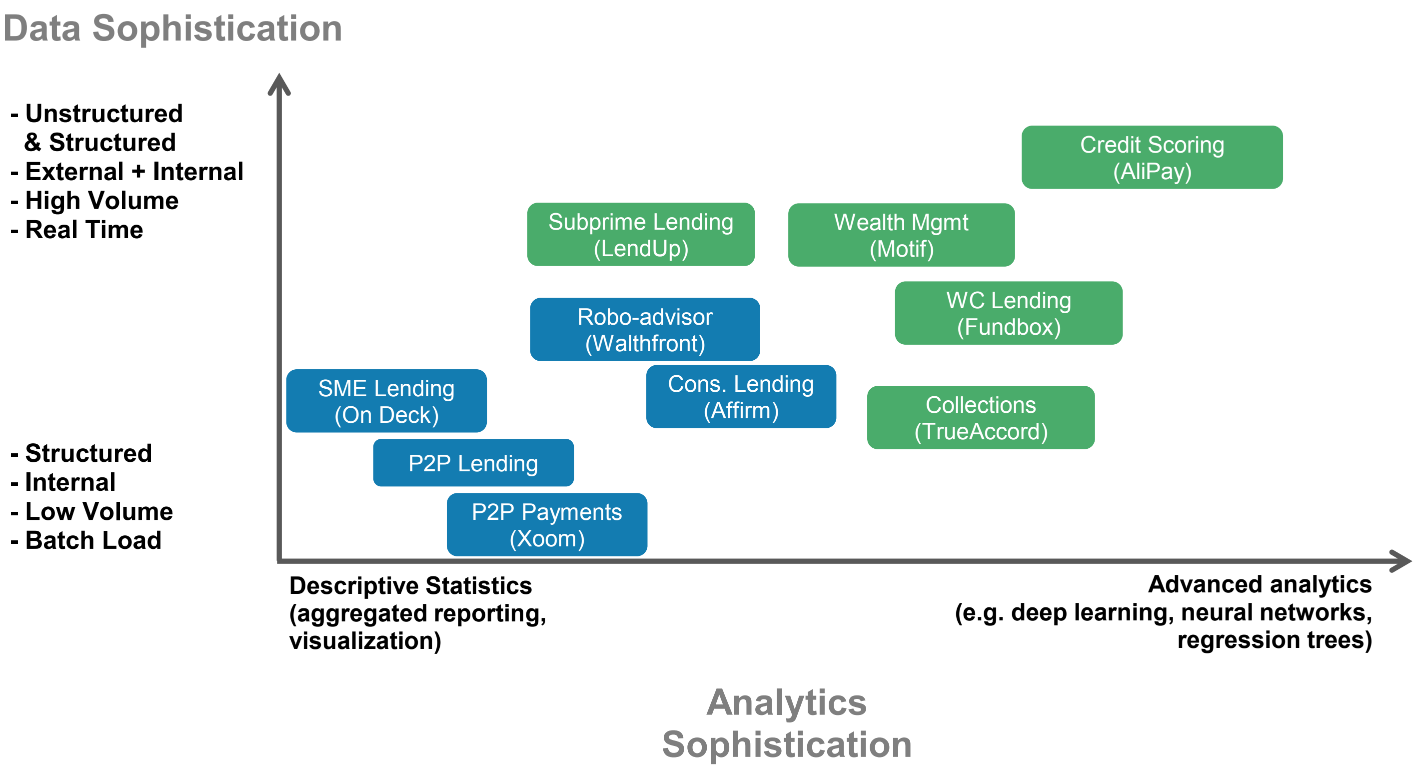
While some FIs have tried offering point solutions primarily in the area of fraud and know-your-customer, FI-developed point solutions are unlikely to be successful for 2 key reasons: 1) Lack of relevant sales experience outside of core 2) Competition from 3rd party technology suppliers/FinTechs is stiff (see **Exhibit 21**). We think that the investments required in developing the solution and establishing a specialized sales force is too high and probability of return too low to be an attractive option for FIs.

Exhibit 21:
A sampling of third party data analytics companies



Source: The Boston Consulting Group, Morgan Stanley Research

Exhibit 22:
Several prominent FinTech firms have successfully made use of cutting edge data and analytics models



Source: The Boston Consulting Group, Morgan Stanley Research

6. External value creation requires partnerships to generate "actionable" insights

Summary: Where FIs and payments companies struggle most as they seek to generate value externally is having sufficient data breadth, depth, and precision to generate actionable insights for merchants. These insights need to be customer specific in term of type, time, and location. Breadth, depth, and precision will likely be achievable only through partnerships. There are only a few examples of successful closed loop structures.

Merchants find value in data analytics if it 1) helps increase their share of wallet, and/or 2) helps them identify new prospects. Both goals require a large sample of data at a customer or category level to identify and target specific customers. FIs and payments companies struggle to offer the combination of data **breadth, depth, and precision** to generate actionable insights. Hence their challenge is to supplement their data.

FIs require sufficient breadth/depth of data to be "actionable" for merchants

	Required Breadth	Required Depth
Increase Share of Wallet	Large pool of overlapping customers	Customer level wallet data to link to merchants' product-level data to make compelling offers
Identify Prospects	Large pool of prospects within merchant's current or desired footprint	Potential size of wallet of customer, plus contact information

Transaction data is fragmented; limited insight by individual firms

Today, FIs and payments companies struggle to provide this combination of breadth and depth for a few reasons:

- FIs may lack scale to provide insights on large customer pools. E.g. the largest bank has ~10-20% market share of credit and debit cards combined, with the average bank having much lower share.
- Payment networks (V and MA) may have larger market share (25-50%) but lack customer specific information. e.g. V/MA don't have a customer's personal information like name or contact info etc.
- SKU/Product level data is typically not available to FIs or payments companies. While card issuers have depth of data on the consumer, their access to transaction info is typically limited to merchant name and transaction size with no visibility into SKU data.
- Privacy/Regulatory concerns could limit customer level data sharing.

No single entity in a payments transaction – from merchant to issuer – has access to full depth of the data, which necessitates either fair value data exchanges and/or partnerships (including private label card programs). Issuers have unique cardholder data, which puts them at an advantageous position to partner. Card networks have the breadth of transaction data and could independently derive geographic specific or merchant-level insights (rather than product level), but likely require a partnership with issuers to generate powerful, actionable insights.

Exhibit 23:

Overview of which stakeholders have access to which transaction data

	What They See	What's Missing	Breadth of data accessed
Merchants	• Card number • **SKU level data**	• Cardholder personal info • Transaction data not always linkable to customer	• Largest retailers have up to 10-15% market share
Issuers	• Card number • Cardholder name • **Cardholder personal info**	• SKU level data	• Largest issuers have up to 10-20% market share
Networks	• Card number • Cardholder name	• Cardholder personal info • SKU level data • Data at card level, not customer level	• Major networks have **25-50% market share**
Acquirers	• Card number • Cardholder name • Merchant info	• Cardholder personal info • SKU level data • Data at card level, not customer level	• Largest acquirers have up to 15-20% market share

Source: The Boston Consulting Group, Morgan Stanley Research

Ecosystem partnerships are an important enabler to overcoming these hurdles: Given the state of fragmented data sources, we believe that it will ultimately take collaborations across multiple ecosystem players to create value in any meaningful way. Below we highlight examples of partnering to achieve actionable insights.

1. **Co-branded card partnerships:** Under a co-brand partnership, the issuer has access to consumer's wallet spend inside and outside the merchant partner and hence is able to provide its merchant partner with share-of-wallet information.
2. **Third party marketing firms:** Card-linked offer engines such as Cardlytics merge insights at the customer level from FIs and merchants, while keeping the raw data at the source. This

enables FIs to send targeted offers on behalf of merchants, though we note the insights are more often on a merchant level rather than a product level, and is therefore more effective only to certain merchant types that sell limited product SKUs (e.g. fast-food, coffee chain).

3. **Direct partnerships:** FIs and payments companies can establish partnerships directly with merchants. Visa, for example, developed a program with Gap in which consumers (that opted in) would receive Gap offers/coupons on the mobile device if they used their card at a nearby merchant.

Exhibit 24:

We review a range of partnership structures

	Partnerships			Individual firm
	Co-branded cards	**Via data aggregators**	**Directly btw FI/merchant**	**Closed loop**
Players	• Merchants • Issuers	• Merchants • Bank • Data aggregators, e.g. Credit Bureau	• Merchants • FIs	• Integrated players – Payments – Merchants
Examples	• Citi/AAdvantage • Synchrony/Gap	• Cardlytics • Argus • Experian	• Visa/Gap • Visa/Uber	• Amazon Payments • Ant Financial [3] • Tesco (UK)
Resulting data	• Customer level[1] • SoW[2] • Contact details	• PII bank level • Contact details • Marketing data[5]	• PII bank level[6] • Contact details • Marketing data[5]	• Customer level[1] • Product level[4] • Near real time
Require-ments	• Scale: Large enough overlapping primary customer pool	• Scale: Enough FI partners to have large enough customer set • Trust: Raw data stays at FIs/merchants	• Scale: Enough FI partners to have large enough customer set	• Use trust as an asset and fair value exchange to access customer data, e.g. No sales of data to 3rd party

More suitable for merchants with fewer categories (e.g. Starbucks, McDonnalds vs. Walmart, Home Depot)

Source: The Boston Consulting Group

7. Some regions, e.g. EU, will be structurally disadvantaged due to tighter regulation

Summary: More restrictive data regulations, particularly in Europe, will likely mean that FIs operating in those areas will be at a long-term disadvantage unless they can generate fair value exchange.

Overview of Regulatory Considerations

On the use of data, we see several changes in the regulatory environment to consider. We see **increasing data nationalization**, with rising restrictions on moving data outside of source country. We see **tightening rules for online marketplace lending**, with potential extension of scope of fair lending regulation from FIs to online marketplace lenders, and where customers gain ability to correct data used in credit decisions. We see **smarter data disclosure** (i.e. open banking) in which regulations like PSD2 facilitate Fintechs to access customer data at FIs and at government agencies. And we see **enhanced data privacy** as explicit customer consent required to access/use personal data or company has legitimate interests (e.g. Under GDPR), and where customers gain right to be forgotten.

1. Increasing Data Nationalization: In the US, data can be freely transferred in and out of the country, but the EU is more strict about data transfer and the General Data Protection Regulation ("GDPR", adopted April 2016 for implementation by May 2018) limits data transfer only to countries that are willing to warrant "adequate level of privacy protection." Note the EU does not consider the US to be adequate in privacy protection, though there is a EU-US "privacy shield" that enables US firms to access EU data. Rules about data privacy are even more restrictive in developing countries where data is nationalized, restricting data from being moved abroad (e.g. China) or requiring on-soil data centers (e.g. Turkey). **Key implications** for FIs are a partial loss of scale advantage for banks with global D&A infrastructure, and for FinTech firms a hurdle to scaling globally (e.g. PayPal was denied a banking license in Turkey).

2. Increased access to customer personal data at FIs and governments: EU regulation now requires FIs provide direct access to relevant customer data through an API (see **Exhibit 25** for more on the differences between EU and US data privary regulation), provided the customer consents, and the UK hints it may mandate something similar unless the industry does so on its own. In the US there is no current requirement, though Treasury recommends implementing an API with the IRS to automatically share personal data. The **key implication** for FIs is higher spend to implement some of these requirements, as well as a loss of advantage vs. FinTech firms, and key implications for FinTech firms is potential benefit from better access to relevant customer data.

3. Consumer gains rights over data capture and usage: In the EU, GDPR regulation to be implemented in 2018 focuses in part on data privacy and both raises the bar for access/use of personal information, and also gives consumers the "right to be forgotten" and review/modify customer data used in credit decisions. In the US regulation varies by state, but implicit consent is usually enough to record/use personal data, though opt-out rules and pre-collection notice is required. Customers must also have the right to review/modify data used in credit decisions. In developing markets the trend is also towards increasing consumer protection. For example, China passed a "Consumer Right Protection Law" in 2014 that requires explicit consent for capture of personal data, and gives customers the right to modify stored personal information. The key implications of intensifying consumer protection is that using data is currently easiest in

Asia and most challenging in Europe, with the US falling in between. And rising costs to serve EU customers could pressure some firms to exit the business if transformation costs become prohibitive.

Regulatory implications for FIs:

1. Value creation potential depends on regulators' flexibility in letting data move freely and it varies by geography
2. Governments will become a provider of data, reducing some of FI's competitive data advantage over FinTech and other providers
3. As consumers gain greater control over their data (e.g. data used only for purpose it is collected for), generating fair value exchange becomes paramount

Regulatory implications for FinTech firms:

1. Regulatory arbitrage is declining for FinTechs in lending
2. Yet FinTechs will benefit from increased access to customer data but only if they convince the customer that there is fair value exchange

Exhibit 25:

Key reasons the EU is a more challenging environment for data monetization than the US

	Key EU regulations with no counter-parts in US	Implications for FIs
Third party access to PII	PSD2 warrants FinTechs direct access to customer data at FIs upon customer consent	Increased competition
Explicit consent	GDPR requires either individuals' explicit consent or "legitimate interest" from data controllers to collect PII	Harder data collection, emphasis on benefits for customers
Cross border data transfer	GDPR allows cross borders data transfer only if receiver country warrants "adequate level of privacy protection"[2]	Restrictions on data off shoring
Right to be forgotten	GDPR grants individuals the right to require a controller to delete data files relating to them • If there are no legitimate grounds for retaining it	Potential loss of stored customer data
Breach notifications	GDPR requires firms to notify users and authorities about serious data breaches as soon as possible	Higher risk of customer churn if security breach
Data protection officer	GDPR requires data processors / controllers[1] to designate a data protection officer to ensure compliance	Additional investment More complex org.

Under GDPR non-compliant companies can be penalized up to 4% of their revenues

1. Specifics criteria have to be met to qualify (e.g. company requires regular and systematic monitoring of data subjects on a large scale) 2. Based on EU assessment of the country domestic law or as a result of the international commitments it has entered into

Source: The Boston Consulting Group

What Comes Next? Five Key Imperatives for FIs

1. **Engineer customer interactions** to gather valuable data based on fair value exchange for customers
2. Develop a structured program to manage **ecosystem partnerships** whose objectives are to harness data critical to internal and external value creation
3. **Ensure execution excellence** by organizing data & analytics function as a **center of excellence** with explicit senior executive support and business buy-in/partnership
4. Ingrain data-based decision making and **"test & learn" culture**
5. Make trust an asset and proactively manage consumer privacy

1. Engineer customer interactions to gather valuable data based on fair value exchange for customers

While FIs have extensive internal data, often lacking is unique data that sets the FI apart or helps unlock a specific, actionable insights critical to maximize the value of data analytics both internally and make their value prop stand out externally. These unique data elements can be about specific individual preferences which are revealed (vs. inferred), or real-time geo-location etc. To gain access to these unique data sets, FIs need to engineer digital customer interactions by ensuring fair value data exchange for consumer adoption.

Seeking similar pieces of data, digital giants, fintechs and advanced merchants are continuously raising the bar for FIs. Examples include Google Maps, which provides map service and value-adding location information for real time location data and Target's CartWheel app which provides discounts for real-time aisle-location/product interaction data — to name one key feature. FIs play critical roles in numerous consumers' life events (e.g., buying a home) and could add more value (e.g., by simplifying the experience and reducing stress/uncertainty) if they had more data. By either building on their mobile banking app or by building use-case specific apps, they can engineer improved customer journeys and data sharing. For example, CBA's Property Guide app combines real estate data with customer provided data that enables CBA to deliver insights on affordability of housing and offer more relevant mortgage options.

2. Develop a structured program to manage ecosystem partnerships whose objectives are to harness data critical to internal and external value creation

A structured ecosystem partnership program solves the problem of insufficient data breadth and depth that has historically hampered FIs' external monetization potential. FIs have made inroads in the co-branded card arena but are still in the early days of building wider partnerships. By partnering with leading merchants or across FIs, they can deliver incremental value to their customers beyond traditional reward programs. Card-linked offer program are a step in that direction but more can be done. For example, FIs can leverage their mobile banking or wallet app to deliver geo-location based offers from these merchants based on their combined data analytics. Another opportunity is developing API-based partnerships to share data with 3rd party providers to customers (e.g., accountants) and/or deliver relevant functionality to a 3rd party app (e.g., wallet to a m-commerce app).

3. Ensure execution excellence by organizing data & analytics function as a center of excellence with explicit senior executive support and business buy-in/partnership

Critical to the success of data analytics at FIs is a cohesive, consistent, enterprise-wide strategy and operating model which lends itself to supporting all business units and functional areas (e.g., risk, operations). Best practice is to have an enterprise-level Center of Excellence, championed by senior management, with explicit liaisons in internal business and operations partners. The CoE's role is multi-faceted, ranging from, at a high level, contributing to ingraining a data-driven, test and learn culture (discussed next) to teaming with partners to identify problems and opportunities and formulate solutions and hypothesis regarding actionable insights, respectively. It comprises multi-functional teams of data engineers, data scientists, business intelligence analysts, and project managers.

4. Ingrain data-based decision-making and "test & learn" culture

The digital world is fast-paced, and the winners are excelling in data analytics. Underlying their success is a data analytics-driven culture as exemplified by the rise of online market places like Amazon. Enterprise-wide, these organizations empower their employees with analytical tools and a highly effective internal data sharing infrastructure. Starting with senior management it pushes for a fact-based, data-driven decision making culture that allows for calculated risk-taking and experimentation.

In face of this new competitive driver, senior executives at FIs must embrace and propagate a data-based decision making culture, and adopt an enterprise-wide "test and learn" approach. That this transformation is feasible is shown by numerous FIs.

5. Make trust an asset and proactively manage consumer privacy

Paramount to data analytics excellence is earning and maintaining consumer trust. BCG estimates that two-thirds of the total value potential of big data stands to be lost if stakeholders fail to establish a trusted flow of personal data. Those organizations that make trust an asset and proactively manage consumer privacy will see trust as a competitive advantage.

FIs, given the particular sensitive nature of financial information and compliance requirements, face a relatively high bar. They must not only fulfill regulatory requirements but also proactively respond to upcoming regulation (e.g., GDPR in the EU) as well as set their own internal policy. Gaining the trust advantage requires executive leadership and a shifting of responsibility for privacy-related issues from legal to the C-suite. FIs that can transparently steward consumer information, restricting its use to understood and agreed-upon applications that can be customized by the customers, and generate fair value exchange will have the ability to access more data than competitors that fail to do this well. They will create better products and services and generate more value for consumers, leading to meaningful shifts in market shares and faster growth.

Assessment tools for FIs and Payments companies on best practices

In order to enable FIs to gauge where they are in the journey towards data analytics best practices, BCG has mapped out three phases (**Exhibit 26**). Most FIs are in the Adopting or Developing phase with a few reaching the Path Breaking phase. Most are in the process of defining their strategy and operating model (**Exhibit 27** outlines action items).

Exhibit 26:

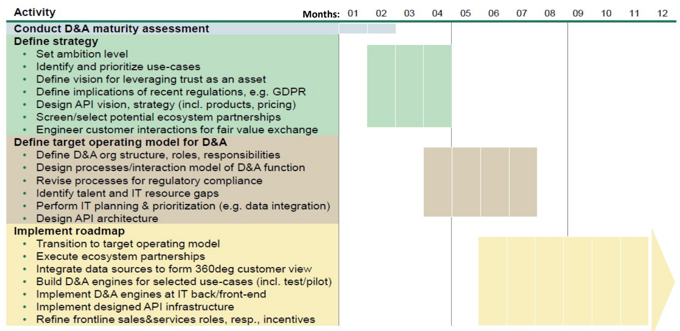
Our assessment framework for FIs pursuing data analytics value creation

	Adopting	Developing	Path breaking
Strategy & operating model	• Developing BU level strategies	BU level D&A strategies, centrally funded on project basis	Comprehensive firm-wide D&A strategy, with initiatives optimized across BUs
	• Lack a dedicated D&A team	Dedicated D&A teams but not centralized; duplications occur	Firm-wide agile D&A CoE, with explicit liasons in business
	• Limited ecosystem partnerships	Partnerships being explored	Established D&A partnerships, with seat at the table through venture funding
Culture	• D&A not considered strategic across org	Leadership supports D&A	Senior leadership actively champions data-driven decision making
	• Limited experimentation	Test&learn culture present but not agile	An agile test&learn culture wildly present
Adoption	• D&A use-cases are focused on marketing & sales	More extensive use within org. in operations, risk& fraud, etc	Aspiring to provide D&A services to its customers as retention tool or for revenue
Data management	• Internal, structured data is used with focus on trx data	Internal data used, experiments with unstructured data	Uses unstructured/structured, internal/external data from various sources
	• Data breaks across silos	Data silos are linked	Data is governed, optimized, quality-controlled and linked across silos
Tools	• Advanced stat. models are used in select use-cases	Advanced statistical models used extensively	Cutting-edge analytical tools (e.g. Voice analytics, real-time offers, geo-fencing, AI)
	• Legacy infrastructure with speed, scalability restrictions	Mostly structured data platforms, with limited scalability	Scalable, cost efficient, distributed processing platforms at scale with fast unstructured data processing capability

Source: The Boston Consulting Group

Exhibit 27:

We highlight key steps for FIs

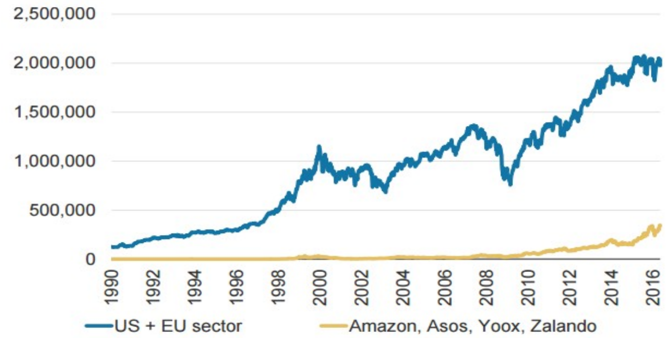


Source: The Boston Consulting Group

Appendix A: Digitalization and Implications for Data Monetization

Effective use of data analytics to digitalize business can create significant shareholder value for the disruptors, which have the largest scale, but also for the enablers. Legacy companies which embrace digitalization or focus on improving the operational model, rather than being in denial, can survive and thrive. However, regulation can be a headwind to digitalization, such as in gaming. Methodology: we show the historical development total market cap of legacy companies vs. the digital disruptors and how much of the sector market cap the disruptors represent vs. the legacy companies.

Exhibit 28:
Disruptors in general retail have also created a significant amount of shareholder value



Source: Datastream, Morgan Stanley Equity Research

Sectors which have fully embraced the digital revolution and most aggressively implemented data analytics capabilities include Media, Retail, Hotels and Gaming (see our Digitalization Index in **Exhibit 5**). Disruptors in these sectors have created a significant amount of shareholder value, now representing 35-70% of their respective sector market capitalization.

In Retail, pure online plays such as Amazon, Alibaba, Asos, YooxNAP, Zalando have gained material share in their respective subsegments and currently represent about 35% of the global market cap capitalization of the sector. Still, legacy players as a group has significantly outperformed the S&P 500 since early 2000 driven by the increase in number of stores but also by embracing online as a response to pressure from disruption. Meanwhile, certain segments such as food retail remain largely unaffected by digital disruption as online challengers have yet to achieve scale benefits.

A significant portion of the outperformance of legacy companies may be survivor bias. That survivor bias by retailers is likely enhanced by those that have best embraced digitalization processes.

In Hotels and Gaming, disruption has been driven by digitalizing the booking process creating two large champions - Priceline and Expedia - but certain private companies have also gained share in apartment letting. Disruptors (Priceline and Expedia) now represent 50% of the total market capitalization, similar share as during the Internet boom. Still, legacy hotel groups have performed in line with S&P 500 driven by operational efficiencies as a response to digital disruption.

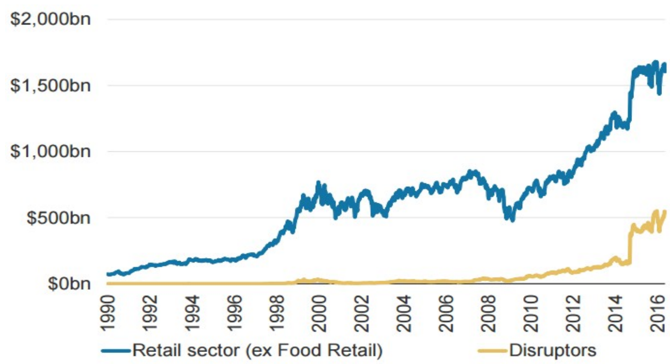
Regulation can act as a headwind to digitalization as seen in Gaming where disruptors only represent a mere 20% of the sector market capitalization as certain key markets remain regulated. Legacy Gaming has performed in line with S&P 500 but with a higher degree of volatility.

Media is likely the sector that experienced the highest degree of pressure from digital disruptors (Alphabet, Facebook, Netflix) that now represent around 70% of total market capitalization. This excludes the music industry which has largely gone through a similar trend. Legacy Media has struggled to respond to the digital trend and has as a group underperformed the S&P 500. Large media agencies are, in our view, an exception as they have maintained high margins and benefitted from consolidation.

Retail

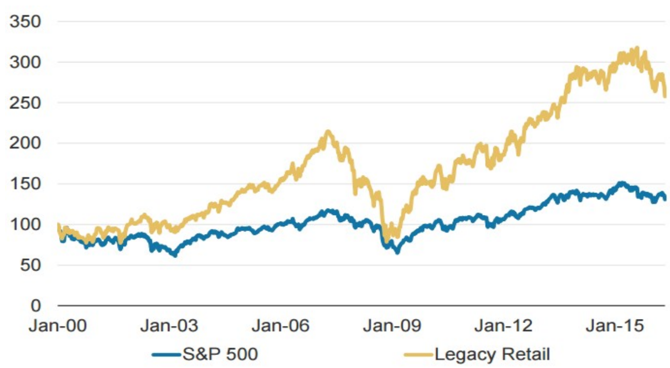
General Retail has gone through a long and arguably more gradual period of digitalization. Conceptually, general retail has been very fragmented with varying incumbents depending on region and segment. Digitalization has predominately been driven by the majors being Amazon in the western world and Alibaba in China. The digitalization of the purchase process and economies of scale has created two large global champions, which now represent 25% of the global sector market cap.

Exhibit 29:
Disruptors have struggled to get into the food retail sector



Source: Datastream, Morgan Stanley Equity Research
Note: Global Retail excluding Food Retail

Exhibit 30:
Legacy retail outperformed the S&P 500



Source: Datastream, Morgan Stanley Equity Research
Note: Legacy Retail contains major global retail franchises including: Inditex, H&M, Macy's, Kohl, Penney, Nordstrom, Stories, Ross Stories, TJX, L Brands, Urban Outfitters, Tiffany & Co, American Eagle Outfitters, Abercrombie & Fitch, ABF, M&S, Next, Kingfisher, Home Retail Group

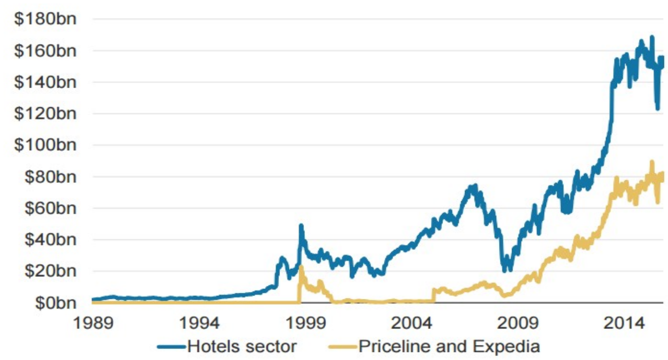
That said, disruptors have struggled to gain traction in food retail which has remained largely (un)disrupted. Looking at retail excluding food retail, the share of disruptors reaches 35%. There are some digital companies specialized in food delivery and retail but these have not reached the scale and traction compared to digital disruptors in other sectors. This suggests there is still significant room for further digitalization in Retail.

While being under pressure from disruptors it is interesting to note that legacy retail companies have actually outperformed the S&P 500 with a wide margin despite the emergence of Amazon. Part of this outperformance is due to players embracing digitalization (such as Inditex) and converting more to online. But the build out of footprint into new geographies coupled has also contributed to shareholder returns.

Hotels

The digitalization of the Hotels sector and primarily the booking process has generated significant value with emergence of disruptors such as Priceline and Expedia. This exercise does not include major private disruptors that have gained share in private apartments lettings and could possibly add to share attributed disruptors if included (see Exhibit 31).

Exhibit 31:
Hotels sector global market cap - Priceline Booking.com and Expedia make up ~50%



Source: Datastream, Morgan Stanley Research
Note: Hotels sector comprise Accor, IHG, Marriott, Hilton, Starwood. Disruptors: Priceline and Expedia

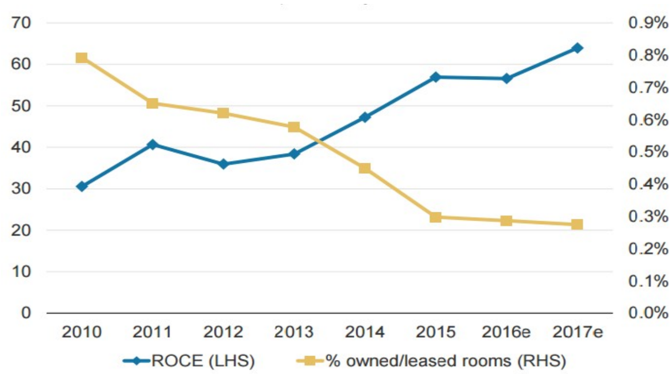
Exhibit 32:
Hotel Groups performing in line vs S&P 500 since early 2000

Source: Datastream, Morgan Stanley Equity Research
Note: Hotels composite includes Accor, IHG, Marriott and Starwood

Similar to now, the share of disruptors reached 50% at the peak of the Internet boom. This emphasises the correct vision of disruptors but years too early in terms of timing while the stock market got overly excited in valuing these companies.

Interestingly, the large hotel chains have performed well while being exposed to disruption - market returns have been in line with the S&P 500 since the early 2000s. As a result from the inherent pressure from digital disruptors, large hotel groups were forced to increase operational efficiencies. Legacy hotel groups such as Accor/IHG/Marriott optimized the capital base leading to improved profitability. For example, the reduction of their asset base has led to a near doubling of IHG's return on capital employed (see Exhibit 33 below). Also, in response to the traction of Priceline and Expedia, large hotel groups such as Starwood and Hilton now try to (re)capture the best clients by providing loyalty schemes and perks.

Exhibit 33:
ROCE of IHG doubled in the past 10 years

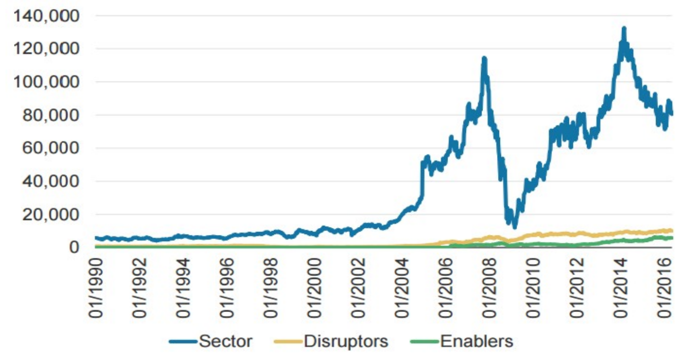


Source: Company data, Morgan Stanley Equity Research

Gaming

Gaming is an interesting sector as it has inherent characteristics that are fundamentally well suited for digitalization. High data dependance coupled with low requirement for physical interaction promotes a significant drive for increased digital content. That said, gaming remains only partly digitalized – due to government regulation. Disruptors and enablers create shareholders value but less in comparison to the hotels, media or retail sector.

Exhibit 34:
Gaming sector highlighting disruptors and enablers

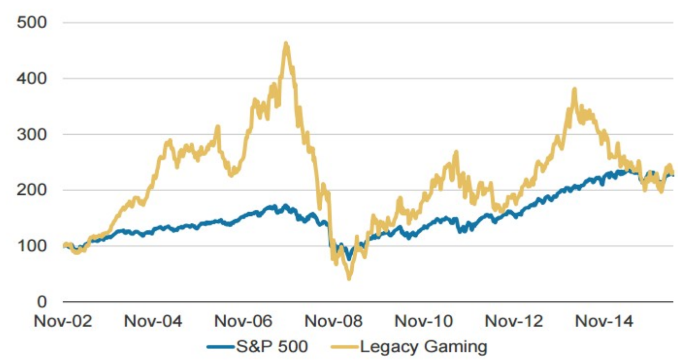


Source: Datastream, Morgan Stanley Equity Research

Note: legacy: William Hill, Ladbrokes, MGM Resorts, Boyd Gaming, Las Vegas Sands, Wynn Resorts; disruptors: Unibet, Betsson, PPB Group, 888; Enablers: Playtech, Net Entertainment

The share of sector market value attributed to disruptors and enablers has gradually increased in the last decade and is currently around 20%. Shareholder returns has remained robust in recent years driven by continuing conversion to online benefitting disruptors but also multiple expansion. However, the share attributed disruptors and enablers reached a peak of around 50% in 2009 as the US Casino model experienced balance sheet pressure during the financial crises while disruptors continued to take share.

Exhibit 35:
Selection of legacy gaming/gambling companies vs S&P 500



Source: Datastream, Morgan Stanley Equity Research

Note: legacy gaming includes William Hill, Ladbrokes, MGM Resorts, Boyd Gaming, Las Vegas Sands and Wynn Resorts

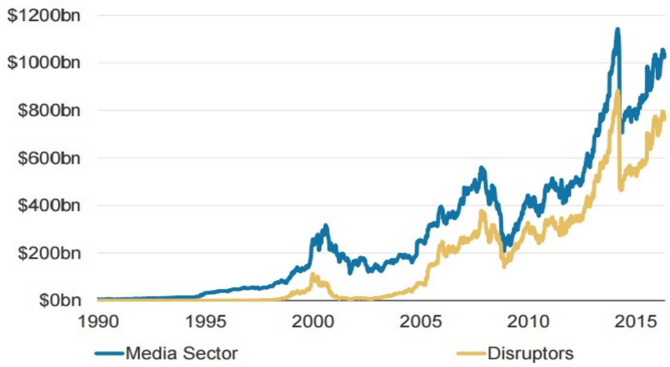
Since early 2000, legacy gaming has performed in line with the S&P 500 but volatility has been significant. Regulation has acted as protection for the legacy casino model in the US and online gaming has predominately reached traction in Europe.

Media

The global media sector was also one of the first sectors to digitalize. There was a false start during the Internet boom, mostly driven by Yahoo rather than today's winner, but the vision was correct. The share of sector market cap attributed to disruptors have been above 50% for over a decade emphasising the solid leadership in the sector and robustness in business models of companies such as Google and Facebook and also Netflix recently.

Exhibit 36:

Disruptors in Media such as Google, Facebook and Netflix have generated significant amount of shareholders' value in the past 15 years



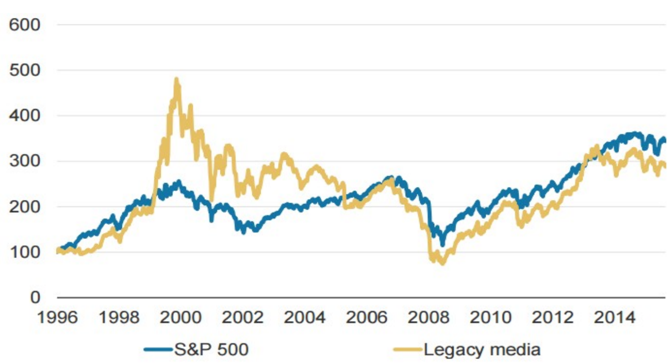
Source: Datastream, Morgan Stanley Equity Research

Note: All sectors include AOL,, Publicis, WPP, Omnicom, Interpublic, Havas, CBS, Time Warner Cable, 21st Century Fox, Sky, ITV, TF1, RTL, Prosieben. Disruptors: Alphabet, Facebook, Netflix and Yahoo

In the previous two decades, disruptors have gained significant share at the expense of legacy media players. As a result, legacy media have underperformed vs the S&P 500. It is worth noting that the music industry is largely excluded from this analysis. The legacy music industry has experienced major disruption starting around two decades ago with large implications and where currently music streaming services are gaining traction in distribution.

Exhibit 37:

Legacy media companies have underperformed the S&P 500



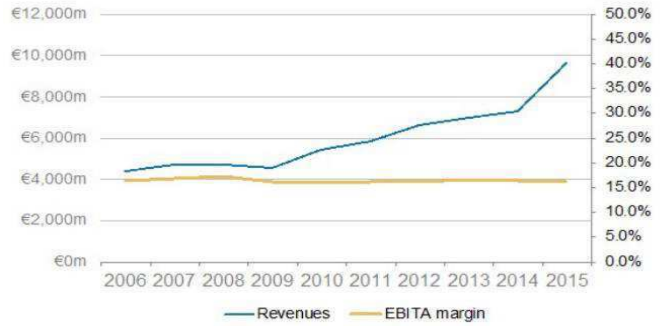
Source: Datastream, Morgan Stanley Equity Research

Note: Legacy media includes WPP, Omnicom, Interpublic, Havas, CBS, Sky, ITV, TF1, RTL, Prosieben

Similar to Hotels sector, some media companies have focused on improving the operational model in response to the pressure from disruptors. The media agencies have digitalized their business model, helping their clients using digital media platforms in an improved way and thus have maintained their margins while growing in size through consolidation such as Publicis below:

Exhibit 38:

Publicis doubling revenues with stable margins



Source: Company Data, Morgan Stanley Research

Exhibit 39:

...and 52% of revenues from digital

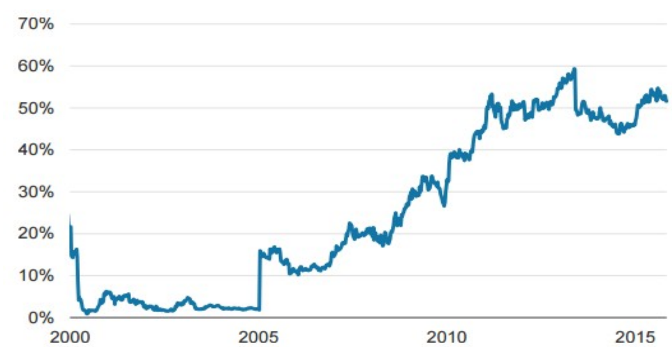
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Revenues - €m	4,386	4,671	4,704	4,524	5,418	5,816	6,610	6,953	7,255	9,601
Organic growth	5.6%	3.0%	3.8%	-6.6%	8.3%	5.7%	2.9%	2.6%	2.0%	1.5%
Digital as % of revenues	7%	15%	19%	22%	28%	31%	33%	38%	42%	52%
Digital organic growth			29%	7%	23%	14%	7%	14%	7%	5%
EBITA margin	16.3%	16.7%	17.1%	16.1%	16.0%	16.0%	16.1%	16.5%	16.4%	16.0%

Source: Company Data, Morgan Stanley Research

Disruptors share of total sector market capitalization

Exhibit 40:

Hotels - disruptors (Priceline and Expedia) represent 50% sector market cap

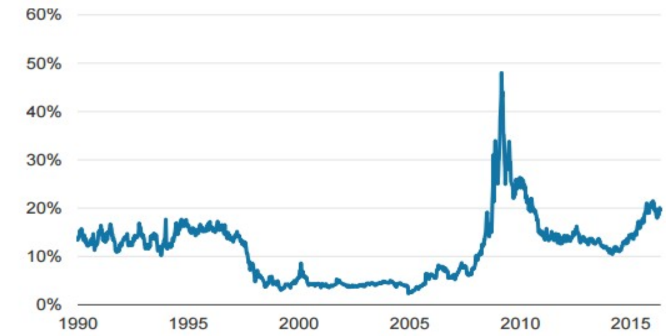


Source: Datastream, Morgan Stanley Equity Research

Exhibit 41:
Media- disruptors represent 75% of the media sector

Source: Datastream, Morgan Stanley Equity Research

Exhibit 42:
Gaming - disruptors and enablers represent 20% of the global sector

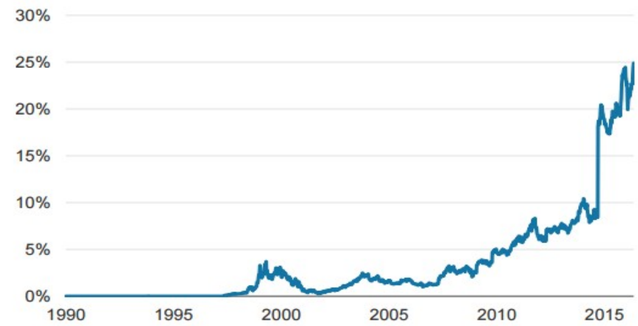


Source: Datastream, Morgan Stanley Equity Research

Exhibit 43:
General Retail - disruptors represent close to 35% of the global market cap

Source: Datastream, Morgan Stanley Equity Research

Exhibit 44:
...but only 25% if we include global food retail that is less digitalized



Source: Datastream, Morgan Stanley Equity Research

Appendix B: Survey Methodology

A comprehensive industry study on the state of data monetization, trends, challenges and next frontiers based on 3 inputs:

1. **Extensive interviews by BCG with thought leaders at global firms known for their excellence in data & analytics**
   - FIs: Issuers, acquirers, networks
   - FinTechs: Market place lenders, payments players
   - Merchants: Luxury and mass market retailers
   - D&A service providers: Digital giants, analytics service providers

2. **Augmented with a data & analytics maturity assessment survey**
   - 52 responses from senior leaders at US Retail banks, FinTechs, D&A service providers
   - Input from 14 of top-30 US Commercial banks

3. **Reflecting inputs from global BCG leaders in data & analytics**
   - 18 Global BCG topic expert interviews (including in Consumer Privacy, FinTechs, Big Data)
   - BCG business partners, e.g. MuSigma
   - BCG GAMMA team

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Global Stock Ratings Distribution

(as of September 30, 2016)
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	COVERAGE UNIVERSE		INVESTMENT BANKING CLIENTS (IBC)			OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC)	
STOCK RATING CATEGORY	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MISC
Overweight/Buy	**1144**	**35%**	**261**	**40%**	**23%**	**566**	**36%**
Equal-weight/Hold	**1429**	**43%**	**303**	**46%**	**21%**	**713**	**45%**
Not-Rated/Hold	**73**	**2%**	**8**	**1%**	**11%**	**10**	**1%**
Underweight/Sell	**655**	**20%**	**84**	**13%**	**13%**	**287**	**18%**
TOTAL	**3,301**		**656**			**1576**	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment

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Overweight (O or Over) - The stock's total return is expected to exceed the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.
Equal-weight (E or Equal) - The stock's total return is expected to be in line with the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.
Not-Rated (NR) - Currently the analyst does not have adequate conviction about the stock's total return relative to the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
Underweight (U or Under) - The stock's total return is expected to be below the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
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Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.
In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.
Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.
Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

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INDUSTRY COVERAGE: Payments and Processing

COMPANY (TICKER)	RATING (AS OF)	PRICE* (10/21/2016)
Danyal Hussain, CFA		
Automatic Data Processing Inc (ADP.O)	E (12/05/2013)	$86.72
Fleetcor Technologies Inc (FLT.N)	O (10/16/2014)	$173.70
MoneyGram International Inc (MGI.O)	E (06/18/2013)	$6.50
Paychex Inc (PAYX.O)	U (12/05/2013)	$56.00
TriNet Group Inc (TNET.N)	E (08/04/2016)	$19.34
Western Union Co (WU.N)	U (02/02/2015)	$20.00
WEX Inc (WEX.N)	E (07/09/2014)	$106.20
James E Faucette		
First Data Corp. (FDC.N)	O (03/28/2016)	$13.90
LendingClub Corp (LC.N)	E (05/31/2016)	$4.85
MasterCard Inc (MA.N)	O (03/28/2016)	$102.85
PayPal Holdings, Inc. (PYPL.O)	E (03/28/2016)	$44.15
Square Inc (SQ.N)	E (03/28/2016)	$11.32
VeriFone Systems Inc. (PAY.N)	E (06/10/2014)	$15.80
Visa Inc. (V.N)	O (03/28/2016)	$82.35
Vasundhara Govil		
Evertec Inc (EVTC.N)	E (08/08/2013)	$15.60
Global Payments Inc (GPN.N)	E (10/03/2014)	$72.88
Green Dot Corp (GDOT.N)	E (02/18/2014)	$22.81
On Deck Capital Inc (ONDK.N)	E (05/05/2016)	$4.56
Total System Services Inc. (TSS.N)	E (06/18/2013)	$47.71
Vantiv Inc (VNTV.N)	O (07/09/2014)	$57.35

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Banking - Large Cap Banks

COMPANY (TICKER)	RATING (AS OF)	PRICE* (10/21/2016)
Betsy L. Graseck, CFA		
American Express Company (AXP.N)	E (01/25/2016)	$67.36
Bank of America (BAC.N)	O (04/23/2013)	$16.67
Bank of New York Mellon Corp (BK.N)	E (10/21/2016)	$43.05
BATS Global Markets (BATS.Z)	E (05/10/2016)	$29.53
BB&T Corporation (BBT.N)	E (01/28/2014)	$38.80
Capital One Financial Corporation (COF.N)	O (07/30/2015)	$74.89
Citigroup Inc. (C.N)	E (10/26/2015)	$49.57
Discover Financial Services (DFS.N)	O (01/28/2014)	$55.35
Goldman Sachs Group Inc (GS.N)	O (10/26/2015)	$174.67
J.P.Morgan Chase & Co. (JPM.N)	O (12/11/2006)	$68.49
Northern Trust Corp. (NTRS.O)	U (11/28/2011)	$70.98
PNC Financial Services (PNC.N)	E (07/25/2013)	$92.92
Regions Financial Corp (RF.N)	E (02/11/2016)	$10.64
State Street Corporation (STT.N)	U (11/28/2011)	$70.88
SunTrust (STI.N)	E (12/04/2013)	$45.66
Synchrony Financial (SYF.N)	O (09/09/2014)	$28.23
U.S. Bancorp (USB.N)	E (12/19/2012)	$43.85
Wells Fargo & Co. (WFC.N)	O (09/20/2016)	$45.09

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INDUSTRY COVERAGE: Midcap Banks

COMPANY (TICKER)	RATING (AS OF)	PRICE* (10/21/2016)
Ken A Zerbe, CFA		
Associated Banc-Corp (ASB.N)	E (02/05/2013)	$19.50
Bank of Hawaii Corp. (BOH.N)	U (09/14/2010)	$74.02
BankUnited Inc (BKU.N)	O (03/27/2014)	$29.59
BOK Financial Corp (BOKF.O)	E (06/20/2011)	$70.55
Citizens Financial Group, Inc (CFG.N)	O (11/03/2014)	$25.97
Comerica Inc (CMA.N)	E (08/10/2011)	$51.46
Commerce Bancshares (CBSH.O)	U (09/20/2016)	$49.54
Cullen/Frost Bankers (CFR.N)	E (12/23/2014)	$74.88
East West Bancorp, Inc. (EWBC.O)	E (08/07/2012)	$39.79
Fifth Third Bancorp (FITB.O)	E (07/05/2016)	$21.21
First Horizon National (FHN.N)	E (06/06/2013)	$15.22
First Republic Bank (FRC.N)	O (03/22/2012)	$75.94
Huntington Bancshares (HBAN.O)	E (12/10/2015)	$10.06
KeyCorp (KEY.N)	O (07/05/2016)	$13.04
M&T Bank Corp. (MTB.N)	E (04/04/2011)	$118.91
New York Community Bancorp, Inc (NYCB.N)	O (02/05/2013)	$13.99
People's United Financial, Inc. (PBCT.O)	U (04/04/2016)	$16.09
Popular, Inc. (BPOP.O)	E (06/30/2015)	$38.47
Prosperity Bancshares Inc (PB.N)	E (09/01/2010)	$56.44
Signature Bank (SBNY.O)	O (06/06/2013)	$116.76
SVB Financial Group (SIVB.O)	O (11/11/2015)	$125.05
Synovus Financial Corp. (SNV.N)	U (02/11/2016)	$32.94
TCF Financial Corp. (TCB.N)	E (01/31/2012)	$14.45
Valley National Bancorp (VLY.N)	E (08/07/2012)	$9.75
Webster Financial Corp (WBS.N)	U (06/18/2015)	$39.02
Zions Bancorp (ZION.O)	O (05/26/2009)	$32.34

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INDUSTRY COVERAGE: Technology - Hardware

COMPANY (TICKER)	RATING (AS OF)	PRICE* (10/24/2016)
Andrew Humphrey		
Gemalto N.V. (GTO.AS)	E (07/08/2014)	€55.74
Ingenico S.A. (INGC.PA)	U (04/22/2016)	€76.80
Logitech (LOGN.S)	E (08/10/2016)	SFr 21.30
Technicolor SA (TCH.PA)	O (06/01/2016)	€5.26
TomTom NV (TOM2.AS)	O (05/21/2015)	€7.77
Francois A Meunier		
Telit Communications PLC (TELT.L)	O (08/06/2014)	261p

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