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How Do Customers Respond to Increased Service Quality Competition?

Ryan W. Buell, Dennis Campbell, Frances X. Frei
Harvard Business School, Harvard University, Boston, Massachusetts 02163
{rbuell@hbs.edu, dcampbell@hbs.edu, ffrei@hbs.edu}

When does increased service quality competition lead to customer defection? And, which customers are most likely to defect? Our empirical analysis of 82,235 customers exploits the varying competitive dynamics in 644 geographically isolated markets in which a nationwide retail bank conducted business over a five-year period. We find that customers defect at a higher rate from the incumbent following increased service quality (price) competition only when the incumbent offers high (low) quality service relative to existing competitors in a local market. We provide evidence that these results are due to a sorting effect, whereby firms trade off service quality and price, and, in turn, the incumbent attracts service (price) sensitive customers in markets where it has supplied relatively high (low) levels of service quality in the past. Furthermore, we show that it is the high quality incumbent's most profitable customers who are the most attracted by superior quality alternatives. Our results appear to have long-run implications whereby sustaining a high level of service quality is associated with the incumbent attracting and retaining more profitable customers over time.

Keywords: empirical service operations; service quality competition; customer defection; firm performance; customer compatibility
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1. Introduction

Service quality is clearly an important element of competition in a variety of markets, ranging from traditional service and retail industries to, increasingly, even the manufacturing sector. Correspondingly, it has been the subject of a substantial body of analytical research (Cachon and Harker 2002, Cohen and Whang 1997, Dana 2001, Ernst and Powell 1995, Gans 2002, Hall and Porteus 2000, Karmarkar and Pitbladdo 1997, Li and Lee 1994, Li 1992, Nerlove and Arrow 1962, Tsay and Agarwal 2000) and an emerging body of empirical research (Allon et al. 2011, Buzzell and Gale 1987, Guajardo and Cohen 2015, Guajardo et al. 2015, Jacobson and Aaker 1987, Phillips et al. 1983). These studies have primarily focused on the relationship between competition and the supply of service quality within firms, finding evidence that increased competition generally leads to increased service quality levels (Mazzeo 2003, Olivares and Cachon 2009). A cornerstone of the economic models underlying much of this research is that a firm's market share and performance are influenced by the level of service quality that it and its competitors decide to provide. Yet, surprisingly little attention has been paid to the question of how customers actually respond to increased competition among firms offering differing levels of service quality. We address this question using a unique data set that allows us to empirically measure the relationship between increased service quality competition and an incumbent firm's customer defection rates.

At a surface level, the answer to this question would appear obvious. Superior quality facilitates customer acquisition (Dana 2001, Ernst and Powell 1995, Nerlove and Arrow 1962) and retention (Cachon and Harker 2002, Cohen and Whang 1997, Gans 2002, Hall and Porteus 2000, Karmarkar and Pitbladdo 1997, Li and Lee 1994, Li 1992, Tsay and Agarwal 2000), so firms with relatively high service quality entering a market should benefit at the expense of lower quality incumbents. However, there are several complicating factors that leave this an open empirical question.

First, per the theories and findings of the current operations management literature, incumbent firms may respond to increased quality competition in a particular market by raising their own quality levels in that market. Average quality levels may rise under such a "race to the top" scenario even as relative quality differentials among firms are reduced, leading to minimal customer switching. Alternatively, many of the capabilities and costs required to improve service quality may reside primarily at the firm level and may not be so easily modified in response to competition at the local market level (Berger et al. 2007, Cachon and Olivares 2010, Erel 2009, Gibbons

and Henderson 2012). Under this view, service quality differentials at the *firm level* matter and can have potentially important effects on customer switching in response to competition among different firms in a local market. Because existing studies speak more to the effects of competition on average service quality levels supplied in a market, empirical evidence is lacking on the potential performance effects of relative service quality differentials between different firms competing in a given market.

Second, firms compete on price in addition to nonprice attributes like service quality. Under vertical (quality) differentiation theory, customers differ in their marginal willingness to pay for quality and will defect from an incumbent only if a competitor's price/quality bundle will improve their utility (Gabszewicz and Thisse 1979, Shaked and Sutton 1982, Sutton 1986, Tirole 1990). Under these models, customers will sort among existing firms in the market according to their price and service quality preferences. As a result of such customer sorting, the effects of increased competition on an incumbent's customer retention rates may be highly heterogeneous and dependent on its relative service quality and price performance vis-à-vis both existing firms in the market and any potential new entrants.

Third, although vertical differentiation models raise the possibility of heterogeneity in the effects of service quality competition across markets, they ignore important features that may influence customer behavior in important and systematic ways. Notably, existing theory tends to assume that customers possess perfect information (Tirole 1990). Although pricing information is often available in advance of firm selection, customers may not possess the same knowledge about a firm's service quality (Fitzsimmons and Fitzsimmons 2006). Service has been characterized as an experience good, the quality of which is revealed to the customer through her experiences with the firm over time (Israel 2005). Consequently, the effect of increased service quality competition on incumbent customer retention rates may depend crucially on the length of time customers in a local market have had to learn about its provision of service quality.

Finally, in models documenting customer switching behavior, customers are assumed to vary in service sensitivity and either generate homogeneous profitability for the firm or profitability that is uncorrelated with their preferences for quality (Cohen and Whang 1997, Dewan and Mendelson 1990, Karmarkar and Pitbladdo 1997, Mandelbaum and Shimkin 2000, Tsay and Agarwal 2000). It is unclear, however, how realistic these assumptions are in practice. If the most profitable customers are enmeshed in more complex relationships with the firm, switching costs may reduce their probability of defection when an attractive opportunity presents itself (Klemperer 1995). Alternatively, highly profitable customers may have a higher willingness to pay for service quality as posited by the priority pricing literature (Afèche and Mendelson 2004, Lederer and Li 1997, Mendelson and Whang 1990). Furthermore, to the extent that high profitability customers have more at stake in the relationship, and more interactions with the firm than their low profitability counterparts, they may be more acutely aware of any potential deficiencies in its provision of service quality (Israel 2005). These arguments raise the possibility of customer-level—rather than just market-level—heterogeneity in the effects of service quality competition on customer defection, and they point to the importance of understanding the economics of the customer relationships most influenced by increased service quality competition.

Studying the effects of service quality competition on customer defection is complicated by the challenge of first observing customer-level outcomes and then linking those outcomes to market entry by firms with differential service quality levels. We overcome these challenges using data on thousands of customers interacting with one of the largest nationwide retail banks in the United States across hundreds of its geographically isolated markets over a five-year period. We exploit regulatory data on bank entry and external ratings of bank service quality to capture variations in each market's competitive dynamics.

Using this unique data set, we document four main empirical findings, which contribute to the operations management and economics literatures on service quality competition. First, in contrast with existing research that tends to focus on average service quality levels supplied in a market as an outcome of general competition, we document the first empirical evidence on the performance effects of increased competition among firms offering differential levels of service quality. Our results show that such competition can have sizable effects on incumbent customer defection and that these effects can vary in systematic ways across local markets. When the incumbent had an existing high quality service position in a market, we find that customer defection increased by 9.6% over baseline rates in the year following entry or expansion by a superior service quality competitor. Similarly, when the incumbent had a low quality service position, defection increased 7.8% over baseline rates in the year following entry or expansion by an inferior service quality (low price) competitor. In contrast with the assumptions underlying traditional vertical differentiation models, and consistent with theories of service as an experience good, our results suggest that these effects strengthen considerably with the length of time the incumbent has

occupied a relatively high service quality position in a market. These results are robust to a variety of customer- and market-level controls and to specifications that account for unobserved heterogeneity across markets.

Second, we provide direct empirical evidence that customer sorting within each local market is a mechanism that underpins these results. In markets where the incumbent occupied a high relative service quality position, its customers exhibited heightened sensitivity to service quality: expressing lower levels of satisfaction with comparable transactions, reporting service problems more frequently, and showing a lower level of overall satisfaction with the bank. This pattern persisted after controlling for differences in objective service quality between markets, and our analysis of industry-wide data suggests that the pattern generalizes beyond the focal firm.

Third, in contrast with existing theoretical models, we demonstrate a positive correlation between a customer's service sensitivity and her profitability to the firm. Highly profitable customers (with the longest tenure, broadest relationships, and highest balances) were more likely to defect from the incumbent when a provider offering superior service quality entered or expanded in their market. In our sample, defection probabilities among customers in these groups increased by 14%–28% over baseline rates following an increase in service quality competition.

Finally, we document potential long-run effects of service quality competition in the form of a positive relationship between the relative level of service quality sustained by a firm in a given market and the profitability of customers it attracts and retains over time. In a matched-sample analysis accounting for observable market-level differences, the focal incumbent served customers with balances that were 9.71% higher on average in markets where it sustained a high service quality position relative to its competitors over the long run.

2. Theory and Hypothesis Development

2.1. Market-Level Differences in Service Quality Sensitivity

A customer's choice of service provider depends on the relationship between her willingness to pay for service quality improvements and the increase in variable costs, and in turn, prices, associated with the provision of those improvements (Sutton 1986, Tirole 1990). Intuitively, theory suggests that as customers acquire information about the service quality and price of competing providers in their market (e.g., through word of mouth, increased advertising in the local market, etc.), they are able to gauge which provider offers the best fit with their own preferences over service quality and price.

In practice, however, this sorting is likely to be imperfect, both because service quality is difficult for consumers to evaluate with precision (Darby and Karni 1973, Nelson 1970) and because of the limitations of human information processing in complex environments (Simon 1955, 1956). Moreover, prospective customers are unlikely to evaluate each local-market competitor's *absolute* level of quality. Rather, consumer evaluations of quality usually take place in a comparison context (Maynes 1976). Specifically, the quality of an offering is evaluated as high or low depending on its relative superiority among options that are viewed as substitutes by the consumer (Zeithaml 1988). Since geographic proximity is an important criterion for customers in selecting a service provider like a bank (Stafford 1996), it is likely that relative levels of service performance exhibited by firms competing within the customer's market will serve as the points of comparison in their evoked set.

Service-sensitive customers, who possess a higher willingness to pay for service quality, may gravitate over time to the companies that occupy a high relative service quality/price position within their market. Likewise, *price-sensitive* customers, who possess a lower willingness to pay for service quality, may gravitate over time to the companies that occupy a low relative service quality/price position within their market.

To the extent that a different combination of firms competes in each market, each exhibiting persistent, firm-level differences in service quality (Berger et al. 2007, Cachon and Olivares 2010, Erel 2009, Gibbons and Henderson 2012), the relative service/price position of a particular firm may vary meaningfully from one market to the next. By virtue of its competitive context, therefore, a multimarket firm may hold a relatively high service quality/price position in one market and a relatively low service quality/price position in another. Consequently, these well-understood patterns of customer sorting may lead a multimarket firm to acquire and retain customers who prioritize price and service quality quite differently from market to market.

What is particularly interesting and counterintuitive about this process is that one might typically expect that higher relative service performance in a market will result in higher customer satisfaction. On the contrary, since customer sorting is based on relative performance, multimarket firms may systematically attract customers with higher quality expectations in markets where its quality outshines that of its competitors. Those service-sensitive customers may, in turn, be less satisfied with the firm's offering than customers attracted in markets where the firm holds a

low relative service quality position. Consistently, we hypothesize the following:

Hypothesis 1 (H1). *The service quality sensitivity of customers attracted and retained by a firm in a particular market is positively associated with its relative service quality position in that market.*

Since service offerings tend to possess experience qualities, which can only be evaluated through purchase and consumption (Israel 2005, Nelson 1970), customers are likely to become increasingly attuned to a firm's quality through their transaction experiences. Similarly, to the extent that the prices realized by an individual depend on her usage characteristics (e.g., interest rates and fees may vary by customer), customers may develop a more nuanced understanding of their providers' prices over time (Iyengar et al. 2007).

Dissatisfied customers, who are over- or underserved, may choose to seek service from a competing provider, a phenomenon that has been extensively modeled in the operations management literature. Customers defect in response to service quality deficiencies, either experienced (Gans 2002, Hall and Porteus 2000) or anticipated (Cohen and Whang 1997, Tsay and Agarwal 2000). Theory suggests that when customers are underserved, which is most typically modeled as when inventory is unavailable or subject to a lengthy delivery delay (Cachon and Harker 2002, Li 1992, Li and Lee 1994), or when customers encounter an unacceptably long queue (Dewan and Mendelson 1990, Mendelson 1985, Stidham 1992, Van Mieghem 2000), they are likely to defect in favor of superior service. These service-sensitive customers may trade up to another firm in their market that offers higher service quality, albeit at higher prices.

Although the process of customers sorting among providers in a market is continuous, it can be readily identified and acutely meaningful for incumbents in the context of competitive entry or expansion. When a firm enters a new market or expands in an existing one, it acquires customers from a variety of sources, including some who have defected from incumbent competitors (Caves 1998). Owing to the dynamics described above, the switching behavior of an incumbent's customers in response to increased competition among firms offering differing levels of service quality depends on the distribution of its customers' marginal willingness to pay for service quality.

Traditional vertical differentiation models, in which customers leverage perfect information and exhibit rational choice behavior, predict that entry by a competitor offering superior or inferior service quality that is adjacent to an incumbent will result in incumbent customer defection (Tirole 1990). Under these assumptions, a firm's customers' marginal willingness to pay for service quality is likely to be distributed in a market such that some customers are *underserved* by the operation, while others are *overserved*. Therefore, defection to an adjacent entrant offering superior or inferior quality service will symmetrically result in a utility improvement for some fraction of the incumbent's customers.

However, to the extent that customers sort among firms in a market based on each firm's relative service quality (and price) positioning as described above, firms that deliver relatively high quality service may disproportionately attract customers who are more service sensitive and who, in turn, will seek opportunities to defect to higher quality competitors. Consistently, because of the dynamics noted above, patterns of customer defection are likely to be influenced by the firm's relative service quality positioning in each market. Thus, we hypothesize the following:

Hypothesis 2A (H2A). *When a firm holds a high service quality position relative to competitors in its local market (compared to when it holds a low relative service quality position), its customers are more likely to defect following the entry or expansion of competitors offering superior service quality (for correspondingly higher prices).*

Hypothesis 2B (H2B). *When a firm holds a low service quality position relative to competitors in its local market (compared to when it holds a high relative service quality position), its customers are more likely to defect following the entry or expansion of competitors offering inferior service quality (for correspondingly lower prices).*

The implications of the market-level asymmetries discussed above could be significant. In particular, they would suggest that investments in higher service quality may not yield uniform returns across markets and may in some cases be counterproductive, depending on the incumbent's service quality position relative to its local market competitors.

2.2. Customer-Level Differences in Service Quality Sensitivity

Customer defection has a multiperiod effect on firm performance, which has been extensively modeled in the operations management literature (Caine and Plaut 1976, Hill 1976, Schwartz 1966). However, the magnitude of this effect depends heavily on the foregone profitability that would have been generated by each individual defector. Indeed, a rich stream of the extant literature explores strategies for initiating, managing, and terminating relationships in competitive settings with customers who vary in profitability (Musalem and Joshi 2009, Shin and Sudhir 2010, Shin et al. 2012, Villanueva et al. 2007). We contribute to this line of inquiry by exploring several factors that correlate with customer profitability that may also

affect customer responses to service quality competition. We discuss three such factors below: switching costs, customer learning, and the direct link between service sensitivity and customer profitability.

2.2.1. Switching Costs. In general, the investments a customer makes in a service provider that engender switching costs tend to be positively associated with that customer's profitability. Over time, as the length of a customer's relationship with a firm increases, psychological switching costs intensify as the customer develops a pattern of repeat purchase through habit or loyalty (Klemperer 1987). Customers with lengthy relationships with the firm tend also to be older, wealthier, and have more invested with the bank. Furthermore, as the number of service offerings utilized by the customer increases, setup and learning costs intensify (Burnham et al. 2003). As such, each new service offering at play in the relationship simultaneously increases switching costs for the customer and revenue for the firm. Therefore, the dynamics of switching costs would suggest that high profitability customers would be *less likely* to defect following the entry or expansion of competitors offering superior service quality.

2.2.2. Customer Learning. Over time, customers become acutely aware of the strengths and deficiencies of the companies that serve them. The theoretical literature on customer switching behavior models customer learning in two ways: customer defection as an immediate response to a service failure (Hall and Porteus 2000) and updating one's perspective based on a history of service experiences (including failures and successes; Gans 2002). Assuming service failures are low probability events (and especially low probability events among high quality service firms), customers with higher tenure are more likely to have experienced them than customers with lower tenure. Similarly, customers who have more multifaceted relationships with the firm, and, as a consequence, transact more frequently with it, are more likely to have experienced deficient service. Limited support for this perspective exists in the empirical literature. Buell et al. (2010) found that customer defection probabilities increased in the total number of transactions conducted by a customer, controlling for the customer's tenure, balances, and counts of the types of service offerings utilized. High tenure customers and customers with more touch points with the firm will have had more opportunities to learn about the level of service offered by the firm and may, as a result, be better positioned to evaluate whether an entrant's value proposition is more attractive. Hence, the effects of customer learning should cause high profitability customers to be *more likely* to defect following the entry or expansion of competitors offering superior service quality.

2.2.3. Direct Link Between Service Sensitivity and Customer Profitability. Finally, there are several reasons to believe that high profitability customers are inherently more attracted by superior service quality competition. First, customers who believe they are highly profitable to the firm may wish to be treated accordingly. If so, they may be particularly sensitive to service deficiencies. Second, in absolute terms, high value customers have more at stake in the service relationship. Accordingly, they may be more selective about the quality of service offered by their provider and more willing to pay for it. Consistently, several queuing models feature priority pricing schemes in which customers are able to pay a higher price for expedited service (Mendelson and Whang 1990, Van Mieghem 2000). Third, to the extent that highly profitable customers are wealthier, they may also be less price sensitive. Richer consumers are often assumed to prefer higher quality products (Sutton 1986), and a deli's most price-sensitive customers have been shown to be the least averse to waiting in a queue (Lu et al. 2013). For these reasons, the service sensitivity effect should make high profitability customers *more likely* to defect in the wake of increased service quality competition.

To the extent that highly profitable customers face higher switching costs, we would predict they would be less likely to defect in general, as hypothesized above. However, the effects of customer learning and the direct link between service sensitivity and customer profitability may cause highly profitable customers to defect more than less profitable customers following the entry of superior service quality competitors. Because of these countervailing effects, we present the following hypothesis in null form:

Hypothesis 3 (H3). *There is no relationship between a customer's profitability to the service quality positioned firm and the probability that he or she will defect following the entry or expansion of a local market competitor offering superior service quality.*

3. Research Setting and Data

3.1. Research Setting

We conduct our study in the U.S. domestic retail banking industry, which is an ideal setting for studying how customers respond to service competition. First, although the offerings of retail banks tend to be functionally comparable (for example, most banks offer checking accounts, savings accounts, loans, etc.), the industry consists of thousands of local, regional, and national competitors, which vary in price and service quality. Second, despite the fact that pricing and service design decisions in banking tend to be made centrally (Berger et al. 2007, Erel 2009, Gibbons and

Henderson 2012), the relative price/quality position of each firm varies across markets as a function of the prices and quality levels offered by the competitors it faces in each local market. In our analysis, we leverage this variation to tease apart the differential effects of service quality on customer defection between markets and customers. Third, retail banking is a useful laboratory for empirical work, because of the quantity of data that are captured by the banks themselves, the government, and third-party institutions. These data quantify customer behavior, firm performance, intramarket competition, and institution-level price and service quality. Finally, retail bank customers are a diverse group, with varying needs, preferences, and experiences. This diversity is common to a wide variety of consumer service settings, which broadens the relevance of our analysis and creates a rich environment in which to analyze the impact of operational decisions and competitive circumstances on customer behavior.

The primary market- and customer-level performance data for this study are provided by a bank that is one of the largest diversified financial service firms in the country, serving millions of customers across hundreds of markets in more than 20 states. Importantly for the purposes of our paper, over the time period of our analysis, this bank offered customers a roughly median level of service quality and price relative to the full set of competitors it faced across all markets. In the analyses we describe throughout the remainder of this paper, we refer to this bank as the *incumbent bank*.

3.2. Data Collection

We utilize market-level service competition and demographic data, institution and market-level service quality data, institution-level pricing data, and account-level retention and customer attribute data to conduct our primary analyses. This section outlines the nature and sources of these data.

3.2.1. Market Definition. The incumbent bank competed without interruption in 644 markets from 2002 to 2006. Its strategy group delineated each market as a block of adjoining zip codes within which customers tended to transact during the period of analysis. This treatment is consistent with a rich industrial organization literature on retail banking as well as the treatment used by policy makers examining banking competition (Jackson 1992, Kwast et al. 1997, Shaffer 2002, Whitehead 1980). We note that each market is geographically isolated, as in Olivares and Cachon (2009), which facilitates our empirical approach. These markets are located in more than 20 states, and the median market contained seven zip codes. We restrict our analyses to the customers and institutions engaging in these markets.

3.2.2. Competitive Composition. Within each market, we identified which institutions were competing against the incumbent bank by using the Federal Deposit Insurance Corporation (FDIC) Summary of Deposits database. On an annual basis, the FDIC captures branch-level deposit balance data for every active commercial and savings bank, listing these data along with an institution identifier, branch street address, and zip code. We augmented these data with specific branch opening dates for de novo entry and closing dates, as well as historical institution ownership data, provided by the incumbent bank's strategy group, to pinpoint the months within which entry, exit, and changes of branch ownership occurred. On a monthly basis from 2002 to 2006, these data enabled us to identify which institutions were competing in each market, how many branches each institution had, and when competitive expansion, entry, or exit events occurred.

3.2.3. Service Quality. Consistent with the notion that service quality is an antecedent to service satisfaction (de Ruyter et al. 1997), we relied on the 2006–2009 J.D. Power and Associates Retail Banking Satisfaction Studies[SM] to assess the relative service quality performance of different banking institutions for our analysis. The studies captured responses from 12,904, 20,898, 19,602, and 28,570 households regarding their experiences with their primary banking providers during the fourth quarters of 2005–2008, respectively. Over the four-year period, the annual study captured user-based perceptions of service quality from customers of 59 banks on five dimensions of service: convenience, account initiation and product offerings, fees, account statements, and transactions. We have chosen to rely on the J.D. Power and Associates data for this analysis because, relative to data from the American Customer Satisfaction Index (ACSI) and Consumer Reports, the J.D. Power response categories are more granular, the ratings cover a broader range of institutions, and the studies rely on a greater number of customer observations, all of which increase the power of our analysis. From 2004 to 2006, for example, the ACSI conducted an annual study of the nation's four largest banks. In 2006, Consumer Reports published a similar study that covered 19 institutions.

In creating the service quality metric we used for our analysis, we omitted the rating for fees to capture a pure service quality score that did not conflate price and service quality. The annual mean of the remaining four dimensions for each institution was taken to create an annual service quality score, s_{jt}, and the mean of the annual service quality scores from each of the four years was taken to produce a relative measure of institution-level service quality, s_j. This aggregated score constitutes a user-based

Table 1 Comparison of Different Types of Institutions (2004)

	(1) Incumbent	(2) Superior service entrants	(3) Inferior service entrants	(4) Unrated (local) entrants
Average number of states	—	4.10	4.07	1.05
Average number of zip codes	—	191.64	238.62	4.05
Average number of branches	—	231.62	301.38	4.75
Average number of branches/zip	1.41	1.21	1.26	1.17
Average number of markets	651.00	69.04	70.54	2.05
Average number of branches/market	4.35	3.35	4.27	2.32
Average deposits/branch (000) ($)	87,246	82,112	63,396	56,680
Average branch share upon entry (%)	11.21	6.46	7.22	3.42

Note. To protect the identity of the incumbent bank, we have excluded summary statistics for number of states, number of zip codes, and number of branches.

measure of quality, which has been defined in the literature as the capacity to satisfy customer wants (Edwards 1968, Garvin 1984, Gilmore 1974). Similar user-based perceptual metrics have been used to measure service quality in numerous empirical studies (Anderson et al. 1997, Fornell et al. 1996, Oliva and Sterman 2001). Throughout our analyses, we used this metric to identify the sets of competitors that, on average, offered higher and lower levels of service quality than the incumbent bank (Table 1).

One potential limitation of our analysis is that the data used to construct this metric (collected in 2005–2008) do not temporally align with the 2004 customer defection data we study. The first year J.D. Power and Associates conducted its survey was 2005, so collecting equally detailed service quality data from an earlier period is not possible. Furthermore, data retention policies at the focal incumbent preclude us from collecting pre–financial crisis defection data from 2005 or later. However, we note that the relative quality rankings produced by these data were consistent with managerial perceptions of relative performance throughout the period, and, as we describe in the online appendix (available as supplemental material at http://dx.doi.org/10.1287/msom.2016.0589), relative quality differentials across firms exhibited strong persistence in our data from year to year and, where overlapping, were consistent with data from the ACSI. Furthermore, in a supplemental analysis provided in the online appendix, we demonstrate the stability of these institution-level relative performance differences across markets, which is consistent with prior literature (Cachon and Olivares 2010, Gibbons and Henderson 2012, Roth and Jackson 1995). In 100% of the cases for which significant pairwise differences in service quality offered by various institutions in a state were identified at the $p < 0.10$ level, the relative performance of the firms in question was consistent with the relative performance ordering defined by the institution-level metric we use in our analysis.

3.2.4. Price. Price data were collected from the FDIC Quarterly Call Reports database, which captures balance sheet entries including RCON6636, "interest-bearing deposits in domestic offices," as well as income statement items such as RIAD4080, "service charges on deposit accounts in domestic offices." We calculated a fee income per deposit dollar metric, p_{jt}, by dividing each institution's annual service charges on deposit accounts in domestic offices by their corresponding interest-bearing deposits in domestic offices. We use fee income per deposit dollar as our primary measure of price throughout our analysis, owing to the salience of fees in customer evaluations of bank pricing, though we note our results are substantively similar if net interest margin is used as our price metric. Both price measures are commonly used in the industrial organization and finance literatures pertaining to retail banks (Claessens et al. 2001, Stiroh 2004).

3.2.5. Customer-Level Performance. We created a two-year panel of 100,000 randomly selected customers who were active with the bank as of December 31, 2003. To facilitate linking customers to specific markets, we removed customers from our sample that had home addresses that were outside the 644 markets of interest. In this study, we analyze the behavior of the remaining 82,235 customers. We chose to analyze customer behavior during 2004 because it was a relatively stable period of moderate growth in the industry, predating the financial crisis. During this time period, for example, average total balances at the focal bank grew by 9.18%, which was comparable with the average balance growth for all banking institutions insured by the Federal Deposit Insurance Corporation (7.51%).

For each customer, we tracked end-of-year balances in various types of accounts (checking accounts, loan accounts, and investment accounts), depth of cross-sell (counts of various types of products, including checking, loan, and investment accounts as well as ATM and debit cards), breadth of cross-sell (number of product classes), and customer demographic information (customer tenure and customer age). To the extent that a firm's market position is correlated

Table 2 Summary Statistics for Customer Panel (2003–2004)

	2003 (pre-entry year)		2004 (entry year)	
	Mean	SD	Mean	SD
Customer demographics				
Customer tenure (years)	10.93	11.11	11.33	11.16
Customer age (years)	44.05	19.01	44.43	19.08
Balance information				
Checking balance ($)	9,823	58,701	12,051	138,596
Loan balance ($)	3,028	16,988	3,488	18,249
Other balance ($)	1,294	12,117	875	11,689
Depth of cross-sell				
Total product count	2.92	2.22	3.00	2.17
Count of checking products	1.29	1.08	1.38	2.17
Count of loan products	0.37	0.64	0.42	0.67
Count of investment products	0.08	0.51	0.06	0.42
Count of ATM cards	0.13	0.40	0.09	0.31
Count of debit cards	0.72	0.82	0.66	0.67
Breadth of cross-sell				
Number of product classes	2.13	1.28	2.26	1.31
Has checking account (%)	79.5	40.4	81.7	38.7
Has non-home equity loan (%)	26.3	44.0	29.7	45.7
Has home equity loan (%)	6.3	24.2	6.6	24.8
Has other account (%)	4.9	21.6	3.6	18.7
Has ATM card (%)	11.6	32.0	8.5	27.9
Has debit card (%)	53.2	49.9	56.6	49.6
Uses online services (%)	31.6	46.5	39.0	48.8
Customers retained at end of year	82,235		72,321	

with the characteristics of customers it attracts and customer-level differences are important drivers of experiences and behaviors, failure to control for such factors could lead to biased estimators. As such, the variables summarized in Table 2 serve as important control variables in all of our customer-level analyses.

Notably, 12.06% of customers in the panel who were active at the end of 2003 had defected (closed all of their accounts with the bank) by the end of 2004. Because of this defection trend and the continuous nature of our panel, average customer age and tenure years do not increment precisely in our sample from one year to the next. Moreover, since it is the tendency in retail banking for customers who are retained to have higher balances and be cross-sold into more products than customers who opt to defect, selection effects inflate the changes in customer performance reflected in Table 2, relative to the average performance changes across all customers.

3.2.6. Market-Level Differences. To control for factors that could be correlated with both the propensity for customer defection and the attractiveness of a market to entrants, we incorporate market-level demographic data from Esri, a geographic information services company, into many of our analyses. Managers at the incumbent bank identified demographic criteria that are used by banking institutions to make market entry decisions. These annual, market-level data, which are summarized in Table 3, include population, median household income, median age, population growth, per-capita income, median home value, household growth, average household size, gender distribution, incumbent branch growth, and the branch share of nonincumbent competitors in the market preceding the event window.

4. Primary Analysis and Results

4.1. Do Firms Trade Off Price and Service Quality?

We test the assumption that firms trade off price and service quality, an important building block of our theory of the effects of service competition outlined in Section 2, by measuring how annual fee income per deposit dollar, p_{jt}, varied with a firm's service ratings, s_{jt}, from 2005 to 2007. Although J.D. Power and Associates collected service data over the 2005–2008 period, we have chosen this particular event window to predate the financial crisis. However, we note that all results reported are substantively similar if we analyze the entire 2005–2008 period and that the results are robust to a fixed effect specification, which accounts for unobserved time-invariant differences among firms. From 2005 to 2007, J.D. Power and Associates rated the service quality of 42 institutions, but three were classified as savings banks by the

Table 3 Market Summary Statistics (2004)

	(1)	(2)	(3)
	All markets	High service quality position markets	Low service quality position markets
Population (2000)	136,244	148,015	127,075
Current year population	145,792	156,373	137,550
Median household income ($)	51,116	51,843	50,550
Household income percentile	61.66	62.17	61.26
Median age	36.13	36.16	36.10
Population growth percentile	54.20	51.38	56.41
Per-capita income ($)	26,613	27,894	25,614
Median home value ($)	209,249	235,136	188,304
Household growth	1.71	1.35	1.99
Average household size	2.69	2.66	2.71
Percentage males (%)	50.1	50.1	50.0
Competitor branch share (%)	86.0	88.5	84.0
Average fee change from prior year (%)	−1.3	−2.1	−0.7
Lagged average fee change (%)	4.3	2.1	6.0
Number of markets	644	282	362

Notes. High service quality position markets are markets in which the incumbent bank branches occupied an above-median service quality position throughout 2002 and 2003 relative to area competitors, as described in 4.3.1. Low service quality position markets are those in which the incumbent did not occupy an above-median service quality position for the duration of that period.

FDIC and, as such, were not required to submit call report data. Prior to the period of analysis, another bank was acquired by a larger competitor, and its pricing data were aggregated with the larger competitor for reporting purposes. We estimate the following between-effects linear model on data from the remaining 38 institutions. The between-effects estimator characterizes the cross-sectional information in the data, reflected in the changes between institutions over time:

$$p_{jt} = f(\alpha_0 + \alpha_1 s_{jt} + \epsilon_{jt}). \quad (1)$$

The α_1 coefficient reflects the degree to which service quality is associated with price in these markets. If $\alpha_1 > 0$, then firms that charged customers a higher price tended also to offer higher quality service. Importantly, this specification is not intended to test causality, but merely correlation between a firm's service quality and the prices it charges to customers for use of its services. To deepen our understanding of the pricing dynamics in retail banking, we also conduct supplementary analyses, examining relative price positioning as a function of the total number of branches the institution had, the sum of all deposits it held, and whether or not the institution was a nationwide bank.

In Table 4, we multiply the dependent variable by $1,000 to facilitate coefficient interpretation, such that coefficients represent the marginal effect on a firm's fee income per thousand deposit dollars. Column (1) shows that among service-rated firms, those with higher service ratings charged higher prices (coefficient = 5.61, $p < 0.05$, two-tailed), and column (2) shows that the relationship strengthens after controlling for the institution's total number of branches and total deposits (coefficient = 6.18, $p < 0.05$, two-tailed). Moreover, in column (3), our analysis reveals that nationwide retail banks, those for which a service rating was available, charged higher service fees than regional and local competitors (coefficient = 8.58, $p < 0.01$, two-tailed). In column (4), we find that this difference remains robust after controlling for a firm's total number of branches and deposits (coefficient = 5.16, $p < 0.01$, two-tailed). Taken together, these results suggest that, on average, nationwide banks charged higher fees than local and regional competitors and that, among nationwide competitors, those offering high quality service charged the highest fees, which is consistent with the extant theory underlying our hypotheses. We note that among nationwide banks, those offering higher service quality also earned a higher net interest margin during the period of analysis (coefficient = 0.004, $p < 0.05$, two-tailed) and that net interest margin and fees were positively correlated, suggesting they are complements ($\rho = 0.346$).

4.2. Aggregate Effects of Service Competition on Customer Defection

We test the aggregate effects of service quality competition by modeling individual customer defection behavior in 2004 as a function of the number and relative service nature of competitive events that took place within the customer's market in that year. There is a long-standing tradition in the economics and marketing literatures of analyzing substitution patterns

Table 4 Firms Trade Off Price and Service (2005–2007)

	(1)	(2)	(3)	(4)
Dependent variable	Fee income per 1,000 dep. dol.	Fee income per 1,000 dep. dol.	Fee income per 1,000 dep. dol.	Fee income per 1,000 dep. dol.
Service rating	5.6117**	6.1779**		
	[2.4377]	[2.4167]		
Total deposits (in thousands)		−0.0000		−0.0000***
		[0.0000]		[0.0000]
Branch count		0.0070*		0.0114***
		[0.0038]		[0.0016]
Nationwide retail bank			8.5773***	5.1623***
			[1.0258]	[1.3544]
Constant	−5.3230	−8.7865	5.2145***	5.1722***
	[7.3483]	[7.5712]	[0.0502]	[0.0504]
Sample selection	Rated institutions (2005–2007)	Rated institutions (2005–2007)	Rated institutions (2005–2007)	Rated institutions (2005–2007)
Observations	78	78	22,686	22,686
Between R-squared	0.128	0.207	0.009	0.015
Institutions	38	38	8,068	8,068

Notes. Brackets contain standard errors. Dep. dol., Deposit dollars.
*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-tailed tests).

using a simulated methods of moments approach with market-level and aggregated consumer-level data (Berry et al. 1995) or a combination of market-level data and "microlevel" customer data (Berry et al. 2004). This technique has also been used in the operations management literature in the calibration of structural models that estimate full demand systems (Chen and Farias 2012). Our work differs from these streams of research in that we are not estimating a full demand system, but rather exploring the impact of competitive changes on the behavior of customers from an existing incumbent. Moreover, we directly observe pricing and individual-level customer behavior, which facilitates our reduced-form approach. We modeled customer defection during 2004 as a binary dependent variable, $DEFECT_{imt}$. In our analysis, a customer has defected if he or she has closed all accounts with the bank by the end of the year. This measure of customer defection has been used in prior empirical studies conducted in retail banking (Buell et al. 2010).

Throughout 2004, we counted the number of competitive entry or expansion events (net of exit events) that took place in each market, categorizing events by the competitor's service position relative to the incumbent bank. Let s_a represent the incumbent's average service quality level, and let s_c represent the average service quality level of a rated competitor. Entry events pertaining to competitors for which $s_a < s_c$ were defined as superior service quality entry events, and entry events pertaining to competitors for which $s_c < s_a$ were defined as inferior service quality entry events. In all cases, the service quality rating of the focal incumbent was distinct from those of its competitors, such that $s_c \neq s_a$. Although we rely on nominal comparisons of the service quality rating for our primary analysis, we note that our results are substantively similar when competitors are instead characterized by whether there are statistically significant respondent-level differences in service quality with the focal incumbent. Entry events pertaining to institutions for which no service quality rating is available were defined as local entry events.

As detailed in Table 1, superior and inferior service institutions tend to be nationwide competitors, operating in a comparable number of states, zip codes, and markets, with similar branch share and density. Notably, superior service branches tend to have roughly 30% more deposits on hand than inferior service branches. Local (unrated) institutions, by contrast, typically operate in a single state, with far fewer branches—and lower density, share, and balances than superior and inferior service institutions. This distinction arose from the sampling scheme used by J.D. Power and Associates in conducting the Retail Banking Satisfaction Studies. Because customers were randomly selected and asked to provide feedback on the service of their primary banking institution, larger institutions, which had more customers, were more likely to be represented in the sample. Institutions for which an insufficient number of responses were collected to draw statistically significant inferences were not reported in the annual study, leading to the systematic exclusion of local and regional competitors. Within a market, if the number of (superior/inferior/local) entry or expansion events exceeded the number of (superior/inferior/local) exit events in the year, then, using a binary independent variable, we classified the market as increasing

in superior service (SS_{mt})/inferior service (IS_{mt})/local (L_{mt}) competition. We note that all primary results are substantively similar if an alternate set of binary variables is used that indicates whether any entry occurred in each category during the event period.

To separate the effects of customers departing from the incumbent bank as a result of entrant-driven changes in a market's service quality landscape from those of customers departing in response to intra-market pricing dynamics, we directly control for the annual price changes in each market. For each year, we calculate the mean price in each market charged by firms that did not enter or exit the market, p_{mt}. We calculate annual market-level percentage changes in this variable, $\Delta p_{mt} = (p_{mt} - p_{m,t-1})/p_{m,t-1}$, which we use as a control variable. We also institute a lagged price change control, $\Delta p_{m,t-1} = (p_{m,t-1} - p_{m,t-2})/p_{m,t-2}$, intended to capture the effects of price changes instituted in anticipation of competitive entry (Goolsbee and Syverson 2008).

As described in the previous section, we also control for a vector of market-level control variables, X_{mt}, as well as a vector of customer-level control variables, Z_{it}. We test the aggregate effects of service quality competition by using a logistic regression to estimate the following cross-sectional model on our random sample of 82,235 customers as of the end of 2004:

$$\begin{aligned}&\Pr(DEFECT_{imt} = 1)\\ &\quad = f(\beta_0 + \beta_1 SS_{mt} + \beta_2 IS_{mt} + \beta_3 L_{mt} + \beta_4 \Delta p_{mt}\\ &\qquad + \beta_5 \Delta p_{m,t-1} + \beta_6 X_{mt} + \beta_7 Z_{it} + \epsilon_{imt}),\end{aligned} \quad (2)$$

where β_1 and β_2 capture the average effect of entry or expansion of superior and inferior service competitors on incumbent customer defection, respectively.

Table 5, column (1), demonstrates that on a nationwide basis, relative to when no change occurred in the customer's market, entry or expansion by competitors offering superior service quality had an insignificant effect on customer defection (coefficient = 0.0112, $p = 0.751$, two-tailed). Similarly, relative to when no change occurred in the customer's market, entry or expansion by competitors offering inferior service quality had an insignificant effect on customer defection (coefficient = 0.035, $p = 0.240$, two-tailed). We next turn to examining whether the absence of a significant average effect is due to heterogeneity in the effects of service quality competition across markets and customers.

4.3. Customer Sorting and Market-Level Heterogeneity (H1–2B)

Although we detect no average effect of superior or inferior service quality entry or expansion on customer defection, we hypothesize that there may be differential effects between markets that emanate from differences in the incumbent's service quality position relative to the competitors it faces locally. In particular, customers attracted and retained by the incumbent in markets where it has occupied a relatively high service quality position may exhibit heightened sensitivity to service quality (H1). In turn, customers in these markets may be more likely to defect following the entry or expansion of competitors offering superior service quality (H2A). In contrast, customers attracted and retained by the incumbent in markets where it has occupied a relatively low service quality position may exhibit less sensitivity to service quality and, in turn, be more likely to defect from the incumbent following the entry or expansion of competitors offering inferior quality service for lower prices (H2B).

4.3.1. Customer Sorting (H1). We test H1 by modeling several dimensions of service quality sensitivity as a function of the incumbent's relative service quality position within the customer's market. We operationalize the incumbent's perceived relative service quality position in particular markets in the following way. Let $\bar{s}_m$ represent the median service level for all rated branches competing in a given market during a particular month. We define the incumbent, a, to hold a *high service quality position* in any month where $s_a \geq \bar{s}_m$. As a measure of the degree to which the incumbent has established a high perceived relative service quality position among customers in market m, let T_{mt} represent the number of months that the incumbent has held a high objective service quality position in the market during the preceding two years. For our base specification, we define an incumbent branch to be operating in a high service position in a market when the incumbent has occupied an above-median service position over the past two years, $T_{mt} = 24$. However, we will test (and our results will be robust to) other definitions as well.

In Table 6, column (1), we model the queue time satisfaction reported by 23,928 randomly selected customers who engaged in face-to-face service with the focal incumbent during January 2004 as a function of the incumbent's service position in the customer's market. Customers in this sample were randomly selected from among all customers who came into the bank for a face-to-face transaction and were called by a polling agency on the following day and asked a series of questions about their experiences. Customers were asked to estimate how long they waited for service and were asked how satisfied they were with their wait, how satisfied they were with their visit, whether they had experienced a recent problem or annoyance with their service, and about their overall level of satisfaction with the bank.

As one might expect, column (1) shows that relative to not waiting for service (the omitted category),

Table 5 Customer Defection Following Competitive Entry

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Defection	Defection	Defection	Defection	Account closures
Superior service competitor entry	0.0112	−0.1266*	0.1094**	−0.0598	−3.4975
	[0.0353]	[0.0672]	[0.0486]	[0.0477]	[2.7078]
Inferior service competitor entry	0.0353	0.1550***	0.0302	0.0896**	1.9662
	[0.0301]	[0.0497]	[0.0379]	[0.0417]	[1.5607]
Local competitor entry	0.0117	0.1186**	−0.0579	0.0927**	1.4838
	[0.0291]	[0.0524]	[0.0410]	[0.0380]	[1.2526]
Number of months with a high service position		0.0069***			0.0189
		[0.0024]			[0.0185]
Superior service entry × Number of months		0.0087**			0.2762**
		[0.0035]			[0.1399]
Inferior service entry × Number of months		−0.0072***			−0.2325***
		[0.0025]			[0.0827]
Local service entry × Number of months		−0.0071***			−0.0821
		[0.0027]			[0.0590]
Constant	−78.3286	−41.2858	75.7879	−84.0835	−100.1876
	[99.9919]	[98.5877]	[150.1256]	[131.7256]	[15.0762]
Level of analysis	Customer level	Customer level	Customer level	Customer level	Market-level panel
Sample selection	All customers	All customers	High service position markets	Low service position markets	All markets
Regression model	Logistic	Logistic	Logistic	Logistic	Fixed effects OLS
F test (*Sup. entry* + 24(*Number above* × *Sup. entry*) > 0	$F = 4.74$; $p < 0.05$				
P(*Defection of focal customers* | *No entry*) (%)			12.02	11.42	
P(*Defection of focal customers* | *Entry*) (%)			13.17	12.31	
Observations	82,235	82,235	34,964	47,271	16,100

Notes. Brackets contain robust standard errors, clustered by market. Coefficients for mean service fee change in the market, lagged mean service fee change, and competitor branch share were not significant and have been hidden to conserve space. Additional market-level controls include population, median household income, median age, population growth, per-capita income, median home value, household growth, average household size, gender distribution, and incumbent branch growth. Customer-level controls include customer tenure (in years); prior year checking, loan, and investment account balances; and counts of checking accounts, loan accounts, investment accounts, credit cards, debit cards, and deposit certificates. Variables in column (5) are aggregated, as described in Equation (4). Additional market-month level controls in column (5) include aggregated counts of the number of new and existing customers.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-tailed tests).

customers who waited less than five minutes were less satisfied with their queuing time (coefficient = −0.456, $p < 0.01$, two-tailed). Customers who waited five or more minutes were even less satisfied with the length of their wait (coefficient = −1.699, $p < 0.01$, two-tailed). Controlling for high service quality position in column (2) shows that there is a main effect of service position, with customers transacting in markets where the incumbent has a high relative service quality position being less satisfied with the length of their wait on average (coefficient = −0.043, $p < 0.01$, two-tailed). Moreover, and consistent with our hypotheses about customer sorting, the interaction model in column (3) reveals that the effect of queue time on queue time satisfaction depends on the firm's relative service quality position. Customers in markets where the focal incumbent has a high relative service quality position, and who we argue are in turn more service quality sensitive, are disproportionately affected by waits that are five or more minutes in duration (coefficient = −0.804, $p < 0.05$). A postestimation test combining the coefficients for high relative service quality position and the interaction term confirms that customers in high service quality positioned markets who wait more than five minutes for service are less satisfied with the length of their wait than customers who experience waits of the same duration in low service quality positioned markets ($F(1,643) = 9.17$, $p < 0.01$). This result suggests that the incumbent's customers are disproportionately service sensitive in markets where it maintains a relatively high service quality position, which supports H1.

As further evidence, in columns (4)—(6), we model the perceptions and behaviors of 23,451 randomly selected customers during the same time period as a function of the incumbent's relative service position and branch-level labor utilization (labor hours utilized/labor hours available), a proxy for objective service quality differences. After controlling for labor utilization, customers in markets where the firm held a high quality service position still exhibited greater service sensitivity, reporting lower service satisfaction with their visit to the bank (coefficient = −0.064,

Table 6 Customer Service Sensitivity and Objective Service Quality Differences Based on Incumbent Service Position

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	Satisfaction with queue time	Satisfaction with queue time	Satisfaction with queue time	Visit satisfaction	Annoyances	Overall satisfaction	Service quality rating	Labor utilization	Total labor hours	Transaction time (seconds)
High service position market		−0.0430*** [0.0141]	−0.0099 [0.0120]	−0.0637** [0.0318]	0.0881*** [0.0282]	−0.0611** [0.0284]	−0.1196** [0.0571]	0.0025* [0.0015]	−8.1780 [7.6342]	1.3302* [0.7343]
Wait time <5 minutes	−0.4555*** [0.0111]	−0.4549*** [0.0111]	−0.4543*** [0.0135]							
Wait time ≥5 minutes	−1.6988*** [0.0154]	−1.6969*** [0.0154]	−1.6659*** [0.0191]							
High service position × <5 minutes			−0.0030 [0.0234]							
High service position × ≥5 minutes			−0.0804** [0.0317]							
Branch-level labor utilization				−4.3321*** [0.3532]	1.8004*** [0.3170]	−1.7567*** [0.3282]				
Number of transactions demanded									0.0665*** [0.0009]	
Constant	4.8579*** [0.0141]	4.8733*** [0.0145]	4.8611*** [0.0145]		−0.6088*** [0.0718]		7.7045*** [0.2257]	−1.6505*** [6.4155]	18,303.3600 [29,752.5700]	95.3307*** [11.6114]
Level of analysis	Customer level	Customer level	Customer level	Customer level	Customer level	Customer level	Customer level	Branch level	Branch level	Customer level
Sample selection	Focal incumbent	Focal incumbent	Focal incumbent	Focal incumbent	Focal incumbent	Focal incumbent	All rated firms	Focal incumbent	Focal incumbent	Focal incumbent
Regression model	OLS	OLS	OLS	Ordered logistic	Logistic	Ordered logistic	OLS	OLS	OLS	OLS
Customer-level control variables	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Market-level control variables	No	No	No	No	No	No	No	Yes	Yes	No
Predicted dependent variable in high service mkts.	N/A	N/A	N/A	4.41/5.00	36.84%	4.14/5.00	7.53/10.00	16.68%	943.36	62.18
Predicted dependent variable in low service mkts.	N/A	N/A	N/A	4.44/5.00	34.82%	4.16/5.00	7.65/10.00	16.43%	952.04	60.85
R-squared (pseudo-*R*-squared)	0.37	0.37	0.37	0.01	0.01	0.01	0.11	0.36	0.82	0.22
Observations	23,882	23,882	23,882	23,451	23,409	23,451	20,890	2,811	2,811	21,161

Notes. Brackets contain robust standard errors clustered at the market level, except those in columns (8) and (9), which contain robust standard errors. Column (7) includes institution and city/state fixed effects. Additional controls for transaction type were used for columns (4) and (5). Forty-two customers did not respond to the question about annoyances and recent service problems. Additional customer-level controls include a direct deposit indicator; counts of loan, investment, and deposit accounts; and balances in loan, investment, and deposit accounts. Additional market-level controls include population, median household income, median age, population growth, per-capita income, median home value, household growth, average household size, and gender distribution.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-tailed tests).

$p < 0.05$, two-tailed; column (4)), an increased likelihood of experiencing a recent problem or annoyance with their service (coefficient = 0.88, $p < 0.01$, two-tailed; column (5)), and a lower overall level of satisfaction with the bank (coefficient = −0.061, $p < 0.05$, two-tailed; column (6)) than customers transacting in low service quality positioned markets, where $T_{mt} < 24$. These results offer further support for H1.

To explore whether these patterns exist among customers transacting with other banks, in column (7) we compare the service quality ratings of 20,890 randomly selected customers surveyed for the J.D. Power and Associates Retail Banking Satisfaction Study during late 2006. These customers transacted with 78 different banking institutions in 6,098 U.S. cities. Customer ratings were aggregated to produce a mean service quality rating for each institution, which in turn was used to categorize the institution's service position relative to the median in each market. For this analysis, markets were defined as a city/state combination. Respondents' ratings were modeled as a function of the firm's relative service position in each respondent's market as well as institution- and market-level fixed effects. The results demonstrate a general tendency for customers to perceive firms to have below average service quality in markets where they have a relatively high service quality position (coefficient = −0.120, $p < 0.05$, two-tailed). On average, customers rated service in these markets to be 1.6% below average for the institution, which is consistent with both the results above and H1.

A complimentary explanation for this pattern of effects is service complacency: the idea that firms that offer a high level of quality relative to local alternatives may lack incentives to maintain high objective quality levels themselves. For example, Mazzeo (2003) observed that the prevalence and duration of flight delays are increased on routes where only one airline provides direct service. Among airlines, the presence of additional competition is correlated with better on-time performance. Likewise, to the extent that banks with a high relative service quality position in a local market face limited service quality competition, they may, in turn, provide objectively poorer service. Although our interviews with banking executives emphasized the standardized nature of service quality in this industry, local managers retain some discretion, particularly with regard to staffing levels. In column (8), we model branch-level labor utilization as a function of the incumbent's relative service quality position in each market and market-level controls. Labor utilization is marginally higher (1.5%) in markets where the incumbent maintains a high service quality position (coefficient = 0.003, $p < 0.10$, two-tailed), suggesting that tellers are busier and service quality may, in turn, be objectively poorer in markets where the incumbent faces limited superior service quality competition. However, in columns (9) and (10), we decompose labor utilization, noting that while controlling for the number of transactions demanded, scheduled labor hours are not significantly lower in high service positioned markets (coefficient = −8.178, $p = 0.28$, two-tailed); customers in high service positioned markets consume marginally more time per transaction (coefficient = 1.330, $p < 0.10$, two-tailed). This pattern suggests that objective service quality deficiencies in markets where the firm holds a high relative service quality position are driven by its failure to account for customer sorting and the service-sensitive customer's tendency to consume more time per transaction. These results offer converging evidence in support of H1.

4.3.2. Market-Level Heterogeneity (H2A–2B). In the previous section, we found that customers transacting with the incumbent in markets where it occupies a relatively high service quality position exhibit a heightened level of sensitivity to service quality. We next turn to whether these differences in service quality sensitivity translate to differential effects of service quality competition on customer defection, as we hypothesize in H2A and H2B. Building on model (2), one of our tests of H2A and H2B uses a logistic regression to estimate the following cross-sectional model:

$$\Pr(DEFECT_{imt} = 1) = f\begin{pmatrix} \gamma_0 + \gamma_1 SS_{mt} + \gamma_2 IS_{mt} + \gamma_3 L_{mt} \\ \quad + \gamma_4 T_{mt} + \gamma_5 SS_{mt} \times T_{mt} \\ + \gamma_6 IS_{mt} \times T_{mt} + \gamma_7 L_{mt} \times T_{mt} + \gamma_9 \Delta p_{mt} \\ \quad + \gamma_{10} \Delta p_{m,t-1} + \gamma_{11} X_{mt} + \gamma_{12} Z_{it} + \epsilon_{imt} \end{pmatrix}. \quad (3)$$

By design, this interaction model explicitly tests whether customer sorting is a continuous process, the effects of which intensify over time. If $\gamma_5 > 0$, then, as we predict in H2A, the longer an incumbent occupies a high service quality position, the more likely it is that its customers will defect following the entry or expansion of competitors offering superior service quality. If $\gamma_6 < 0$, then, as we predict in H2B, the longer an incumbent occupies a low service quality position in the market, the more likely it is that its customers will defect following the entry or expansion of competitors offering inferior service quality.

In Table 5, column (2), the negative coefficient on the main effect of superior service entry suggests that when the incumbent has a low service quality position, retention is *marginally higher* for its customers when superior service quality competitors enter or expand in its market (coefficient = −0.127, $p < 0.10$, two-tailed). This counterintuitive result is expected in the context of extant industrial organization research in banking. Entry by superior banks (which charge higher rates and fees on average)

results in a significant rise in market prices, due to small (local and regional) banks adjusting their prices upward. On the other hand, large competitors, such as the focal incumbent we analyze, lack the flexibility to adjust price in this manner, and as a consequence, their pricing appears relatively more attractive in the context of smaller providers with higher prices (Hannan and Prager 2004, Park and Pennacchi 2009). A separate analysis presented in the online appendix provides evidence consistent with these dynamics. In our sample, average market prices rise significantly from the pre- to postevent periods in markets where entry or expansion by a superior service provider occurs, making the incumbent bank more attractive to price-sensitive customers. However, as can be seen in Table 5, column (2), the coefficient on the interaction of superior service quality entry and the number of months in the preceding two years the incumbent has occupied a high quality service position (coefficient = 0.009, $p < 0.05$, two-tailed) suggests that maintaining a high quality service position attenuates this negative effect. If the bank has held a high relative service quality position in the local market, the customers it has attracted are less price sensitive, caring more about service quality performance. Indeed, if the focal incumbent has held a high relative service quality position for a sufficiently long period of time, we would expect its quality-sensitive customers to be more likely to defect in the wake of superior quality entry. Given that our competitive composition data for each market began in January 2002 and the event window for competitive entry began in January 2004, in our data, $\max(T_{mt} = 24)$. As such, to test this idea, we reestimated the model using ordinary least squares (OLS) regression and conducted a postestimation linear test of the hypothesis that when an incumbent has maintained a high quality service position over the past 24 months, its customers will defect in the wake of entry or expansion by a superior service competitor ($F = 4.74$, $p < 0.05$). These results are consistent with H2A.

Column (2) further shows that the coefficient on the interaction of inferior service quality entry and the number of months in the preceding two years the incumbent has occupied a high quality service position is negative and significant (coefficient = −0.007, $p < 0.01$, two-tailed), suggesting that holding a low service quality position for a longer period of time is associated with increased customer defection probabilities following the entry or expansion of inferior service quality firms. Moreover, after controlling for the incumbent's prior service position, the main effect of inferior service quality entry is positive and significant (coefficient = 0.155, $p < 0.01$, two-tailed), suggesting that when the incumbent has held a low quality service position for the prior two years (equivalently, when $T_{mt} = 0$), its customers are more likely to defect following the entry or expansion of competitors offering inferior service quality. These results are consistent with H2B.

A related approach for testing H2A is to use logistic regression to estimate model (2) on the subset of our random sample of customers who lived and transacted in markets where T_{mt} was sufficiently high to allow for the accumulation of service-sensitive customers by the incumbent. We estimate model (2) on the subset of customers for which $T_{mt} = 24$. If $\beta_1 > 0$, then when the incumbent has occupied a high service quality position over the prior two years, its customers are more likely to defect following the entry or expansion of competitors offering superior service, which is consistent with H2A. Using similar logic, we test H2B by estimating model (2) on the subset of customers for which $T_{mt} < 24$. If $\beta_2 > 0$, then when the incumbent has not occupied a high service quality position relative to competitors in its market for a sufficient period of time, its customers are more likely to defect following the entry or expansion of competitors offering inferior service quality, which is consistent with H2B.

In column (3), the main effect of superior service entry is significant and positive (coefficient = 0.109, $p < 0.05$, two-tailed), suggesting that in markets where the incumbent maintained a high quality service position for the preceding two years, its customers were more likely to defect following the entry or expansion of superior service competitors. Defection probabilities increased for the incumbent in these markets from 12.02% when no entry or expansion occurred to 13.17% following entry or expansion by a superior service competitor. In contrast, these same customers were no more likely to defect following the entry or expansion of inferior service quality competitors (coefficient = 0.030, $p = 0.43$, two-tailed) or local service quality competitors (coefficient = −0.058, $p = 0.158$, two-tailed). These findings offer further support for H2A.

In column (4), the main effect of the entry or expansion of inferior service quality competitors (coefficient = 0.090, $p < 0.05$, two-tailed) is significant and positive, offering further support for H2B. In these markets, where the incumbent held a low service quality position relative to competitors in its local market, average defection probabilities increased from 11.42% when no entry or expansion occurred to 12.31% following the entry or expansion of competitors offering inferior service. Although superior service quality entrants had no effect on defection in these markets (coefficient = −0.060, $p = 0.21$, two-tailed), we note that entry and expansion by local and regional competitors increased incumbent customer defection in these markets as well (coefficient = 0.093, $p < 0.05$,

two-tailed), a result that is consistent with our earlier findings that such competitors offer lower prices, and our account that the incumbent's customers are price sensitive in markets where it maintains a low service quality position.

We note that our primary results presented above are robust with respect to alternative construct definitions and model specifications. For example, the results are substantively similar if high (low) service positioned markets are defined on the basis of whether the incumbent held (did not hold) a high service position in the market for an above-median number of months (20) in the pre-entry observation period. The results are similarly robust if defection is modeled to include customers who significantly draw down their balances (95%) without closing their accounts with the bank. We further find that the primary results are robust when we control for prior year customer satisfaction and intended loyalty in the market, as well as competitive entry events and the presence of incumbent branches in the customer's zip code. Moreover, although adjacent entry (offering immediately superior or inferior service quality than the focal incumbent in the market) had an insignificant incremental effect on defection, we note that our primary results are substantively similar if we only focus on entrants for which there are statistically significant differences in relative performance from the focal incumbent. A detailed description of each supplementary analysis we performed, along with the corresponding results tables, are presented in the online appendix.

4.3.3. Addressing the Potential Endogeneity of Competitive Entry. Our account is that competitive entry by firms offering varying service quality levels caused the defection patterns observed in this paper. However, an alternative explanation is that the propensity of customers to defect may have precipitated these competitive entry events. In particular, competitors may have specifically chosen to enter markets where the incumbent's customers were dissatisfied and more likely to defect. If that were the case, then the entry regressors would be correlated with the error term in model (3), leading to biased estimators. Though our findings are robust to controls for the lagged market-level satisfaction and intended loyalty of the focal incumbent's customers, we also directly test this possibility by separately modeling superior service quality entry, inferior service quality entry, and local entry as functions of the prior year intended loyalty of 27,279 customers who were randomly selected to complete a survey in these markets during the pre-entry year, aggregated to the market level, as well as market- and customer-level control variables. In all models, we failed to reject the null hypothesis that competitive entry decisions are not a function of intended customer loyalty ($p > 0.22$; two-tailed). Replacing intended loyalty with overall satisfaction with the bank yielded similarly insignificant results ($p > 0.41$; two-tailed).

Furthermore, to rule out unmeasured explanatory variables that may affect entry decisions and the behavior of customers in the markets being analyzed, and to test the robustness of these effects over a longer period of time, we used a panel data approach with fixed effects to model the total number of closed accounts in each of the incumbent's markets from January 2004 through December 2006, as a function of the entry of superior quality, inferior quality, or local competitors. The first 11 months of 2004 are dropped due to missing lagged variables, leaving 25 months of observations. Let $CLOSURES_{mt}$ represent the number of customer account closures experienced by the incumbent bank in market m during month t. We use the following fixed effects linear specification, where the coefficients of interest are δ_5 and δ_6, the interactions of $T_{m,t-k}$, and the rated entry variables:

$$CLOSURES_{mt} = f\left(\begin{array}{l} \delta_0 + \delta_1 \sum_{k=0}^{11} SS_{m,t-k} + \delta_2 \sum_{k=0}^{11} IS_{m,t-k} + \delta_3 \sum_{k=0}^{11} L_{m,t-k} \\ \quad + \delta_4 \sum_{k=0}^{11} T_{m,t-k} + \delta_5 \sum_{k=0}^{11} SS_{m,t-k} \times T_{m,t-k} \\ \quad + \delta_6 \sum_{k=0}^{11} IS_{m,t-k} \times T_{m,t-k} + \delta_7 \sum_{k=0}^{11} L_{m,t-k} \times T_{m,t-k} \\ \quad + \delta_8 \Delta p_{m,t} + \delta_9 \Delta p_{m,t-12} \\ \quad + \delta_{10} X_{m,t} + \alpha_m + \beta_t + \epsilon_{mt} \end{array}\right). \tag{4}$$

In Table 5, column (5), we observe that $\delta_5 > 0$ (coefficient = 0.276, $p < 0.05$, two-tailed), suggesting that the longer a firm has occupied a high service quality position relative to competitors in its local market, the more likely it is that its customers will close accounts following the entry or expansion of competitors offering superior service quality. This result is consistent with H2A. Though we do not observe in this analysis that $\delta_2 > 0$ (coefficient = 1.97, $p = 0.21$, two-tailed), we do observe that $\delta_6 < 0$ (coefficient = −0.23, $p < 0.01$, two-tailed), which indicates that the longer a firm has occupied a high service quality position, relative to its competitors in its local market, the less likely it is that its customers will close their accounts following the entry or expansion of competitors offering inferior service quality. Equivalently, this result suggests that the longer a

firm has occupied a low service quality position, the more likely it is that its customers will close their accounts following the entry or expansion of competitors offering inferior service quality, which is consistent with H2B.

4.4. Customer-Level Heterogeneity (H3)

As our test of H3, we further extend model (3) to account for how a customer's reaction to service competition may depend on the profitability he or she generates for the firm. As motivated in the hypothesis development section, we use three customer characteristics that are so closely tied to profitability in retail banking that they are used for customer segmentation purposes: customer tenure, number of product classes, and checking account balances.

Along each dimension, we sort customers into deciles within their markets. We chose this strategy to account for the fact that customers in different markets may have different baseline levels for each dimension, owing to characteristics of the markets themselves. For example, it is likely that, on average, markets the incumbent entered in the year 2000 would have customers with lower tenure than markets it entered 10 years earlier. Assigning customers to deciles across markets, or analyzing customers in absolute terms without standardizing the profitability they generate relative to others in the markets in which they transact, would fail to account for these differences.

For each profitability dimension, we selected a decile cutoff above which customers are considered high profitability. With regard to customer tenure, we define customers in the third decile and above to be high tenure ($C_{imt} = 1$). At a minimum, these customers have transacted with the bank for more than one year, a significant retention milestone in retail banking. We characterize customers with an above-median number of product classes in their market to have a high number of product classes ($R_{imt} = 1$). With regard to checking account balances, we define customers in the third decile and above as being high balance customers ($B_{imt} = 1$). At a minimum, these customers have positive, nonzero balances, which is of particular relevance to the bank. Our tests of H3 use logistic regression to estimate the following cross-sectional model on the subset of 34,964 customers who transacted in markets where the firm sustained a high relative service position prior to the event window ($T_{mt} = 24$):

$$\Pr(DEFECT_{imt} = 1) = f\begin{pmatrix} \zeta_0 + \zeta_1 SS_{mt} + \zeta_2 IS_{mt} + \zeta_3 L_{mt} + \zeta_4 HP_{imt} \\ \quad + \zeta_5 HP_{imt} \times SS_{mt} + \zeta_6 \Delta p_{mt} + \zeta_7 \Delta p_{m,t-1} \\ \quad + \zeta_8 X_{mt} + \zeta_9 Z_{it} + \epsilon_{imt} \end{pmatrix}, \quad (5)$$

where HP_{imt} represents a proxy for high profitability on the three dimensions of interest described above. When $HP_{imt} = C_{imt}$ or $HP_{imt} = R_{imt}$, if $\zeta_5 > 0$, then attraction to service competition is greater for high tenure or high product class customers, respectively. Since such customers have the opportunity to experience more transactions with the firm (either over a lengthier period of time or through a more multifaceted relationship with the firm), such findings would be consistent with the theory that customer learning attenuates the effects of switching costs in the face of increased service competition. Alternatively, if $\zeta_5 < 0$ when $HP_{imt} = C_{imt}$ or $HP_{imt} = R_{imt}$, then high tenure and high product class customers are less likely to defect following the entry or expansion of superior service competitors. Such a finding would suggest that switching costs dominate customer learning, inhibiting customers from seizing superior service experiences when they become available. Furthermore, if $\zeta_5 > 0$ when $HP_{imt} = B_{imt}$, then high balance customers are more attracted by superior service entrants, whereas if $\zeta_5 < 0$ when $HP_{imt} = B_{imt}$, then high balance customers are less attracted by them.

In Table 7, column (1), we demonstrate that although high tenure customers are significantly less likely to defect than low tenure customers (coefficient $= -0.523$, $p < 0.01$, two-tailed), the coefficient on the interaction term of superior service entry and high tenure suggests that this effect is marginally attenuated when superior quality competitors enter or expand in the market (coefficient $= 0.158$, $p < 0.10$, two-tailed). Indeed, for high tenure customers, the annual defection probability increases from 10.18% (with no entry) to 11.62% (following an increase in service competition). Consistently, in column (2), we show that in service positioned markets, when a customer possesses products in an above-median number of classes, they are considerably less likely to defect in general (coefficient $= -0.463$, $p < 0.01$, two-tailed), but they are disproportionately attracted by superior service competitors (coefficient $= 0.205$, $p < 0.05$, two-tailed). The annual defection probability for high product class customers increased from 6.50% (with no entry) to 8.34% (following an increase in service competition).

Although high tenure and high product class customers have generally low defection probabilities, they are disproportionately attracted to competitors offering superior service quality. These results are consistent with the account that experiences with the firm, increased through relationship duration (tenure) or relationship intensity (product breadth), engender switching costs that, on average, inhibit customer defection. However, having a high number of experiences with the firm makes these same customers more

Table 7 Customer-Level Heterogeneity in High Service Position Markets

	(1)	(2)	(3)
Dependent variable	Defection	Defection	Defection
High tenure customer (more than 1 year)	−0.5230*** [0.0436]		
Superior service entry × *High tenure*	0.1581* [0.0943]		
High product customer (above median)		−0.4629*** [0.0636]	
Superior service entry × *High product*		0.2051** [0.1016]	
High balance customer (positive balances)			−1.0940*** [0.0515]
Superior service entry × *High balance*			0.1779** [0.0878]
Constant	78.3152 [154.4906]	85.0662 [152.6555]	35.6284 [150.3961]
P(*Defection of focal customers* | *No entry*) (%)	10.18	6.50	7.66
P(*Defection of focal customers* | *Entry*) (%)	11.62	8.34	9.03
Observations	34,964	34,964	34,964

Notes. The table shows the logistic regression model. Brackets contain robust standard errors, clustered by market. To conserve space, coefficients for superior, inferior, and local competitor entry; mean service fee change in the market; lagged mean service fee change; and incumbent competitor share are not displayed. None of these coefficients are statistically significant, except lagged mean fee change, which is significant at the 10% level. Additional market-level controls include population, median household income, median age, population growth, per-capita income, median home value, household growth, average household size, gender distribution, and incumbent branch growth. Customer-level controls include customer tenure (in years); prior year checking, loan, and investment account balances; and counts of checking accounts, loan accounts, investment accounts, credit cards, debit cards, and deposit certificates.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-tailed tests).

attuned to its service deficiencies, heightening defection when opportunities to receive better service avail themselves.

In column (3), we show that high balance customers exhibit a pattern of relationships that is similar to those of the other high value customers described above. Customers with high balances are less likely to defect from the bank (coefficient = −1.09, $p < 0.01$, two-tailed), but this effect is attenuated in the wake of increased service competition (coefficient = 0.178, $p < 0.05$, two-tailed). Annual defection probabilities of high balance customers rose from 7.66% when no entry occurred to 9.03% following an increase in superior service quality competition.

The predicted annual defection probabilities for each tenure, product class, and balance decile are depicted graphically in Figure 1. The direction and significance of these relationships reveal a striking link between the profitability of service-sensitive customers and their probability of defection following the entry of a superior service provider. Hence, we reject H3 in favor of a directional alternative. Although high profitability customers are less likely to defect from the high service positioned incumbent in general, they are more likely to defect from the incumbent following the entry or expansion of competitors offering superior service quality.

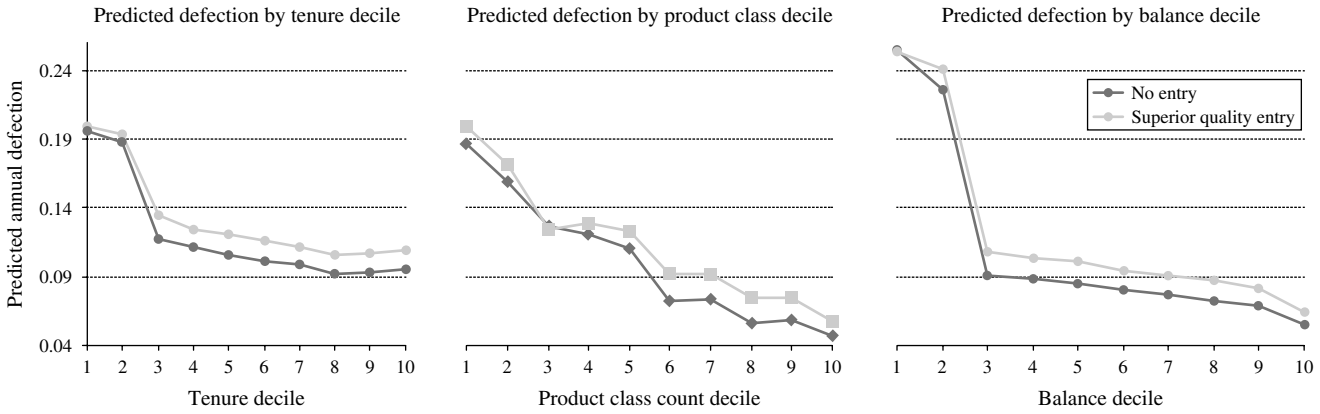
5. Long-Run Effects of Service Positioning

Our primary results to this point have been derived by estimating models of customer defection as a function of a single year of competitive entry or expansion. As such, they can be characterized as the short-run effects of service quality competition on customer sorting. The results suggest that firms that hold a high relative service quality position in a local market attract customers who are disproportionately service sensitive, and that these service-sensitive customers are more likely to defect following the entry of competitors offering better service for higher prices. Moreover, the results suggest that it is the high quality firm's most profitable customers who are more likely to defect when superior quality entrants expand in their local market. Given the direction of these short-run customer sorting effects, it stands to reason that if a firm can sustain a high relative service quality position within a local market, it should be able to attract and retain more profitable customers and achieve superior performance outcomes in the long run.

One market-level measure of retail bank performance is average deposit balance per customer, a metric that ties directly to marketwide revenue potential. The incumbent bank provided us with the aggregated monthly balances for all of its active customer accounts in each of its markets from 2004 to 2006. In this section, we compare the average deposit balance per customer transacting in markets where the firm sustained a high service quality position relative to its competitors with the average deposit balance per customer transacting in a matched sample of markets where it did not sustain such a position. In so doing, we test the proposition that sustaining a high service quality position in a market leads to superior performance outcomes.

For each of the 644 markets represented in our sample, we counted the total number of months the incumbent held an above-median (high) service quality position relative to its competitors for the five-year period from 2002 through 2006. Markets in which the incumbent maintained a high service quality position for an abovemedian number of months (more than 54) were designated treatment markets. Our set of control markets consists of the remaining markets, where the incumbent failed to sustain a high service quality position for an above-median number of months.

Figure 1 Predicted Defection in Service Positioned Markets by Customer Type



We pair treatment and control markets using nearest-neighbor propensity score matching (without replacement) on market-level characteristics that covary with the balance levels held by customers in each market. Markets are matched on market-level characteristics from 2004 (see Table 3 for a complete list).

Our goal in conducting the propensity score matching is to pair treatment and control markets that are similar on as many observable dimensions as possible, excluding the relative service quality position of the incumbent. To improve the balance of our matched treatment and control markets, we trim the 15% of treatment observations for which the available control markets offer the poorest support, leaving us with 544 paired markets. This strategy significantly improves balance across the covariates (unmatched R-squared = 0.102, $p < 0.01$; matched R-squared = 0.017, $p = 0.998$).

Notably, we exclude the competitor branch share variable from the matching procedure described above, because it is highly correlated with the incumbent's service position. Because the incumbent bank faces a higher number of rated institutions offering inferior service, markets in which the incumbent has a high service quality position tend to have higher levels of competitor branch share. Although we control for competitor branch share in our earlier analyses, including it in the matching procedure would necessitate trimming a significant number of control markets to achieve reasonable balance, thereby diminishing the power of our analysis. Instead, we directly control for competitor branch share after matching.

We test the proposition that the incumbent exhibits superior performance in markets where it sustains a high quality service position by using a random effects generalized least squares (GLS) panel regression to estimate the following model on the average balances of customers transacting in treatment and control markets from 2004 to 2006 (standard errors are clustered by market):

$$AB_{mt} = f(\eta_0 + \eta_1 TR_m + \eta_2 BS_{mt} + \epsilon_{mt}), \qquad (6)$$

where AB_{mt} and BS_{mt} represent the average deposit balance per customer and the branch share of competitors, respectively, in market m during month t, and TR_m is an indicator variable used to distinguish treatment markets. If $\eta_1 > 0$, then maintaining a high quality service position relative to market competitors leads to higher average balances.

In Table 8, column (1), we show that over the period of analysis, average balances of customers were 9.71% higher in markets where the firm sustained an above-median service position, which is a marginally significant difference (coefficient = 0.766, $p = 0.083$, two-tailed). In column (2) we control for competitor branch share as detailed in model (6), which strengthens the effect (coefficient = 0.927, $p < 0.05$, two-tailed). In column (3), we further refine our model by controlling for average service fees in the market (coefficient = 0.970, $p < 0.05$, two-tailed). These results suggest that sustaining a high quality service position relative to competitors in one's local market may lead to superior performance outcomes.

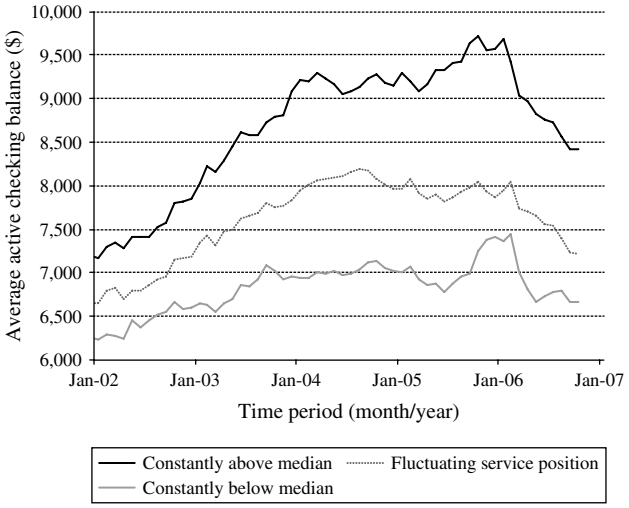
In columns (4)—(6), we replicate the analysis for the entire 2002–2006 time period using a continuous measure of service quality position, the count of the number of months the incumbent held an above-median service quality position. In this analysis, we are able to leverage market- and time-based fixed effects, which account for unobserved factors that are market invariant across time and time invariant across markets. The results provide converging evidence. In the fully specified model, each additional month with a high quality service position is associated with a \$20.59 increase in average balances (coefficient = 0.021, $p < 0.01$, two-tailed). Figure 2, which presents average monthly deposit balances for customers in markets where the incumbent sustained

Table 8 Service Position and Account Quality (Customer Balances, in Thousands)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Average active balance	Average active balance	Average active balance	Average active balance	Average active balance	Average active balance
High service position market (treatment)	0.7659* [0.4414]	0.9266** [0.4347]	0.9697** [0.4331]			
Count of months with above-median position				0.0195** [0.0078]	0.0196** [0.0078]	0.0206*** [0.0079]
Competitor branch share		−4.3439*** [1.5245]	−4.4554*** [1.5369]		0.1452 [1.5232]	0.9576 [1.5292]
Mean service fee in market			−41.7975 [37.2092]			−176.8542*** [48.3144]
Constant	7.8904*** [0.2090]	11.6215*** [1.3539]	12.0687*** [1.4681]	6.8539*** [0.0866]	6.7290*** [1.2922]	7.5814*** [1.3331]
Market fixed effects	No	No	No	Yes	Yes	Yes
Period (month) fixed effects	No	No	No	Yes	Yes	Yes
Years	2004–2006	2004–2006	2004–2006	2002–2006	2002–2006	2002–2006
Observations	19,584	19,584	19,584	32,096	32,096	32,096
Markets	544	544	544	544	544	544

Note. Brackets contain robust standard errors.
*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-tailed tests).

Figure 2 Comparison of Market Performance by Relative Service Position



an above-median service quality position, a fluctuating service quality position (sometimes above and sometimes below), or a below-median service quality position, offers converging evidence. Although these unadjusted means do not account for the underlying differences among markets, the pattern of results is visually consistent with the results of the econometric analyses, which do.

6. Discussion and Conclusions

One of the key dimensions upon which a firm competes is the quality of service it chooses to deliver to its customers. In this paper, we explore the links between a firm's service quality and the defection of its customers in the wake of increased service quality competition. Aspects of these relationships have been modeled in the operations management literature, but empirical evidence regarding the conditions under which customers defect in response to service competition is lacking.

Although our analysis does not reveal a significant average effect of increased service quality competition on customer defection, we show that competing firms trade off price and service quality, and when the incumbent has sustained a high relative service quality position in the market prior to the entry event, its customers are disproportionately service sensitive and systematically attracted to competitors offering superior service quality. Conversely, when the firm fails to maintain a high service quality position within the market, its customers are more likely to defect in the wake of entry or expansion by inferior service quality (low price) competitors. We provide evidence that these results are driven by a sorting effect, whereby customers endeavor to select the firms within their local markets that best fit their preferences for price and service quality. In turn, when a competing firm enters a market offering a service/price bundle that better meets the needs of particular customers, those customers are more likely to defect. Moreover, though the incumbent's most profitable customers—those with the longest tenure, most product classes, and highest balances—are less likely to defect in general, we demonstrate that in markets where the incumbent holds a high relative service quality position, its most profitable customers are disproportionately attracted by the entry or expansion of superior service quality competitors. Consistently, controlling for market-level demographic differences, we show that over the long term, the incumbent retains customers with significantly higher balances

in markets where it sustains a high relative service quality position over time.

These findings have important implications for operations management research and practice. First, our results highlight that there may be substantive differences among a firm's customers that can systematically influence their evaluations of the service it delivers. Since a firm's relative service quality position may vary across markets, the customer sorting dynamics at play within each market may lead it to attract customers whose service quality sensitivity differs meaningfully from one market to the next. When a firm has a high relative service quality position within a market, it may attract customers who, relative to customers it serves elsewhere, have higher service standards, and in turn will be harder to please. A manager observing performance in such a market may falsely interpret low satisfaction scores as a sign of poor quality, which may instead be a sign of elevated customer expectations. Our results suggest that companies should take into consideration the service sensitivity of the customers attracted by a particular location when evaluating its performance. More broadly, they may also suggest that the issue of customer compatibility with the operating system should be elevated to a strategic level when companies are deciding which markets to enter and how to serve them. Fundamentally, the pattern of results we observe highlights a trade-off for service organizations between standardization and customization. Standardization across markets lowers costs (Anderson et al. 1997), reduces complexity (Erel 2009, Hannan and Prager 2004), and ensures consistency for multimarket customers (Campbell et al. 2009). However, to the extent that customers attracted by the firm in different markets may have different service requirements, it may be worth considering the offsetting benefits of customization.

Second, our results suggest that firms that make the strategic decision not to compete on service quality may not need to be concerned about the entry or expansion of competitors offering superior service quality. In contrast with prior theory that posits that any adjacent entrant will increase defection, our results highlight an asymmetry, wherein price-sensitive customers are disproportionately attracted to competitors offering poorer service quality for lower prices. In fact, depending on the pricing dynamics in the industry and market, increased service quality competition may counterintuitively make the low price positioned incumbent relatively *more* attractive to price-sensitive customers, thereby reducing defection.

Third, our results highlight the risks of complacency for service positioned firms. Our analysis suggests that the entry or expansion of competitors offering superior service quality can have sizable short-term implications—increasing defection in our analysis by an average of 9.6% in a single year over baseline defection rates. We further show that these short-term effects have important long-term performance consequences, resulting in substantial differences in account profitability between markets in which the firm maintains a high or low service position. Firms differentiating themselves on the basis of service quality must remain vigilant about the relative level of service quality they provide to defend against an erosion of the profitability of accounts they attract and retain.

Finally, the positive association we demonstrate between service sensitivity and customer value suggests that models assuming the two are independent will underestimate the importance of service quality and prescribe suboptimally low service levels. Initiatives to optimize a firm's service level must weigh the long-term costs of losing a firm's most valuable customers against the costs of perpetuating a level of relative service quality that is sufficient to retain them.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/msom.2016.0589.

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