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Resource Commitment and Cost Behavior Under Different Strategies

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Resource Commitment and Cost Behavior under Different Strategies

by

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A THESIS

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Abstract

I analyze asymmetric cost behavior from the perspective of resource commitment made to support strategic positions. Previous studies of asymmetric cost behavior consider how managers’ expectations about future demand in relation to costs of adjusting resources affect cost stickiness. My studies focus on how managers’ resource commitments made for strategic reasons affect cost behavior, and how cost stickiness as evidence of commitment to strategy is associated with firm performance. My first study investigates how resource commitment or resource flexibility reflected in cost stickiness is related to firm performance under different generic strategies. I interpret higher cost stickiness as evidence of commitment to a differentiation strategy and find that intangible value (measured by Tobin’s Q) associated with differentiation increases with cost stickiness. I also find that the persistence of return on assets (ROA) increases with cost stickiness for differentiators.

My second study examines stickiness of SG&A costs as a consequence of resource commitments made to support a customer-focused strategy reflected in higher customer satisfaction. I find that customer satisfaction increases with both the intensity and stickiness of SG&A costs. I also document that the positive relation between intangible value and customer satisfaction increases with cost stickiness.

My third study focuses on the airline industry in order to gain further insights about the roles of strategy and operations in determining cost behavior. In the airline industry,
full service carriers (FSCs) employ clearly distinctive operating strategies from low cost carriers (LCCs). Resource complementarity is important to FSCs whose strategy depends on combinations of resources that enable high levels of service but resource flexibility is important to LCCs whose strategic goals are to minimize costs in both up and down markets. I use revenue passenger miles (RPMs) flown as the primary cost driver to separate the influence of volume changes from price changes on the empirical analysis. I find that operating costs, number of employees, and number of flights all exhibit stickiness for FSCs but not for LCCs.
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Chapter 1: Introduction

In this dissertation, I empirically investigate relations between firm strategy and cost behavior, especially with respect to asymmetry in cost behavior between periods when sales increase and periods when sales decrease. In three studies, I look at various types of strategic positions and their influence on cost behavior. First, I examine generic strategies including product differentiation and cost leadership. Second, I consider a resource-based strategy that emphasizes customer satisfaction. Third, I analyze cost behavior in an industry that has two distinct operational strategies that influence resource adjustments in response to changes in customer demand and sales.

Costs are sticky when they increase more when sales rise than they decrease when sales fall (Anderson, Banker, and Janakiraman, 2003). In my first study, I rely on the adjustment costs theory of sticky costs as opposed to alternative agency explanations (Banker & Byzalov, 2014). The adjustment costs theory of sticky costs indicates a systematic positive relationship between the magnitude of adjustment costs and the degree of cost stickiness. My first study investigates how resource commitment or flexibility that causes or reduces cost stickiness is in turn reflected in firm performance under different strategies. I find that the positive effect of differentiation on long-term value increases with commitment to strategy represented by cost stickiness.
In my second study, I adopt the resource-based view of strategy. Investments in key resources enable the development of firm-specific capabilities that enhance customer relationships. Because these resources are of greater value within the firm than outside the firm, the adjustment costs of disposing of and reacquiring these resources are high. I find that customer satisfaction, as a measure of the strength of customer relationships, is associated with cost stickiness. Moreover, the positive effect of customer satisfaction on long-term value increases with resource commitment represented by cost stickiness.

In my third study, I compare stickiness for companies that follow one of two distinctive strategic positions in the airline industry – full service carrier (FSC) versus low cost carrier (LCC). Here I am interested in the idea that FSCs need to build and maintain combinations of resource commitments to provide their distinctive services while LCCs care more about cost and resource flexibility. Using a cost driver based on quantities, revenue passenger miles, instead of revenues, I remove the influence of price changes on the observed stickiness (Cannon 2014). I find that costs and cost objects, including operating costs, the number of employees and the number of flights, are sticky for FSCs but not for LCCs.

Previous literature has documented that SG&A costs and other operating costs are sticky and has investigated various questions about the causes of cost stickiness. For instance, research indicates that stickiness increases with asset intensity and employee
intensity as variables representing frictions in adjusting resources (Anderson, Banker, and Janakiraman, 2003). It also indicates that stickiness increases with manager optimism based on the direction of the sales change in previous periods (Banker, Byzlov, Ciftci, & Mashruwala, 2014) – managers are typically more optimistic when a sales decline follows a sales increase than when sales decline in successive periods.

Research also indicates that cost stickiness increases with agency concerns such as poor governance or excess free cash flows (Chen, Lu, and Sougiannis, 2012) – indicating that managers’ personal motives, such as empire-building desires, may affect their resource adjustment decisions. A few studies have challenged the empirical work on cost stickiness – some suggest that the empirical model induces a bias because downward cost elasticity (the sensitivity of costs to sales) is mechanically greater than upward cost elasticity (Balakrishnan, Labro, Soderstrom, 2014). Others challenge the economic principles underlying cost stickiness (Anderson and Lanen, 2007). Banker and Byzalov (2014) make arguments to refute these challenges.

Building on the economic trade-off between adjustment costs and costs of carrying slack resources, research has demonstrated that stickiness increases as adjustment costs increase, especially costs of adjusting labor. Banker, Byzlov, and Chen (2012) find higher stickiness in countries where employees have greater protection under national labor laws. Other research indicates that cost stickiness increases with the criticality or centrality of the resources to the business operations (Balakrishnan and Gruca 2008),
indicating that companies are concerned about the opportunity costs of not having sufficient resources to meet a surge in demand.

In a study more closely related to my dissertation, Banker, Flasher, and Zhang (2014) discriminate between companies that follow a differentiation strategy and companies that follow a cost leadership study. They argue that adjustment costs are greater for differentiators because they make higher firm-specific investments in resources in order to distinguish themselves from competitors. Such investments cannot be recovered in secondary markets for those resources, making it costlier for firms to retrench when sales decline and then ramp up when sales increase. They document that cost stickiness is higher for differentiators.

While there is persuasive evidence documenting cost stickiness and the roles of adjustment costs, agency concerns, and criticality of resources in determining asymmetry in cost behavior, most research to date has used broad-based samples across industries and has not fully considered how resource commitments made to support specific strategic goals influence cost behavior. In addition, little research has investigated the consequences of cost stickiness or the role of resource commitments in supporting competitive advantages. My dissertation addresses the relation between cost behavior and strategic positioning of companies and investigates how resource commitment reflected in cost stickiness affects competitive advantage and economic sustainability of performance associated with strategic positioning.
Chapter 2: Commitment to Strategy and Cost Behavior

Abstract

Using SG&A to Sales, R&D to Sales, Sales to COGS, Sales to CAPEX, Sales to P&E, and Employee to Assets ratios, I document firms’ strategic positioning; differentiation or cost leadership. I find that firms follow differentiation strategy are more likely to keep slack resources in low demand period, which lead to higher cost stickiness. Differentiation strategy, aligned with resource commitment, enhance the firm future performance.

2.1 Introduction

The asymmetric cost behavior (ACB) model considers how costs change between periods based on managers’ decisions to add or remove resources when sales increase or decrease (Anderson, Banker, and Janakiraman 2003). Unlike traditional models of cost behavior that assume a production technology and consider how costs change with volume, the ACB model is based on the economic primitives (fundamental concepts) of adjustment costs and managers’ expectations of future resource needs (Banker and Byzalov 2014). Similar to the notion of transaction costs with respect to buying or selling investments, adjustment costs are the costs of adding or removing resources, such as the costs of hiring or terminating employees and opening or closing facilities. Adjustment costs themselves are not productive, but they may enable production or
enhance efficiency through the acquisition or removal of productive resources. When adjustment costs are trivial, resources may be added or subtracted in response to anticipated changes in demand. When adjustment costs are high, managers must decide whether to retain resources when demand and sales decline. If managers are optimistic that the decline in sales is temporary, they trade off the adjustment costs of removing and reacquiring resources with the carrying costs of retaining slack resources through the anticipated duration of the low demand period. This leads to asymmetry in cost behavior because some resources that must be added to support sales growth are not removed when sales decline.

Adjustment costs include out-of-pocket costs such as cost incurred to search for and hire new employees or severance costs when employees are terminated. They may also include firm-specific investments, such as employee training or relationship-building, that cannot be recovered when a resource is removed if such investments have enduring value. For example, a firm-specific investment in human capital that resides with an employee or group of employees is lost if the employee or employees leave the firm. Banker, Flasher and Zhang (2014) recognize that firms that follow a differentiation strategy are likely to make firm-specific investments in specialized resources that cannot be recovered if the resources are removed. Therefore, they predict and document that cost stickiness is higher for differentiators versus cost leaders.
To successfully distinguish their products or services from those offered by other firms, differentiators invest in specialized resources that provide creative designs, distinctive branding, unique product qualities, or exceptional service. Managers’ willingness to retain these resources in low demand periods is reflected in cost stickiness, meaning that the level of cost stickiness may serve as a measure of commitment to a differentiation strategy. In this paper, I first seek to replicate the finding that cost stickiness is higher for companies classified as differentiators (Banker, Flasher and Zhang, 2014) than for other firms. Then, using a firm-specific measure of cost stickiness (Weiss 2010), I test whether commitment to a differentiation strategy reflected in cost stickiness contributes to future firm performance, measured by Tobin’s Q, and to the sustainability of future performance, measured by the persistence of return on assets (ROA).

I discriminate between cost leadership and differentiation as two generic strategies (Porter, 1980, 1996) and use factor scores based on firm operating characteristics to measure a firm’s inclination to follow a cost leadership or differentiation strategy (Banker, Byzalov, Ciftci, and Mashruwala, 2014). I document that cost stickiness increases with the differentiation score and decreases with the cost leadership score, consistent with Banker, Flasher and Zhang (2014). I find that cost stickiness moderates the positive relation between differentiation and Tobin’s Q, but does not affect the relation between cost leadership and Tobin’s Q. I also find that cost stickiness aligned
with differentiation increases the persistence of ROA whereas there is no such relation for cost leadership. Thus, my findings support the interpretation of cost stickiness as evidence of commitment to a differentiation strategy.

This study contributes to the strategy literature by documenting the cost behavior consequences of strategic positioning. For firms that follow a differentiation strategy, strategic commitment leads to investments in specialized resources. This results in cost stickiness because the adjustments costs are higher than the anticipated benefits of reducing those resources temporarily. For firms that follow a cost leadership strategy, strategic emphasis on resource flexibility is reflected in low cost stickiness. This study also contributes to the literature on the determinants of asymmetric cost behavior. While previous literature shows that adjustment costs and managerial optimism are associated with cost stickiness, it does not fully consider the tension between resource commitment and resource flexibility that is an important strategic concern when managers make deliberate resource commitment decisions.

The remainder of this paper is organized as follows. In section 2.2, I develop my research hypotheses by reviewing literature on cost behavior and strategy. In section 2.3, I describe my research design. In section 4, I present the sample and variable definitions. I describe the results in section 5 and conclude in section 6.
2.2 Literature review and hypothesis development

To learn about contextual consequences of cost stickiness, I investigate the relationship between cost stickiness and strategic positioning. Cost stickiness reflects managers’ deliberate resource allocation decisions. Anderson, Banker, and Janakiraman (2003) explain the rationality of managers’ resource adjustment decisions. “When demand increases, managers increase committed resources to the extent necessary to accommodate additional sales. When volume falls, however, some committed resources will not be utilized unless managers make deliberate decisions to remove them. Stickiness of SG&A costs occurs if managers decide to retain unutilized resources rather than incur adjustment costs when volume declines” (p. 49). Banker, Byzalov, and Chen (2012) provide support for the influence of adjustment costs incurred when dismissing employees on cost asymmetry. They build on prior research that employment protection legislation (EPL) is associated with adjustment costs for labor. They find that the degree of cost stickiness is increasing in the strictness of EPL across countries. Their findings support the theory that sticky cost behavior is driven by managers’ deliberate resource commitment decisions in the presence of adjustment costs of labor.

Agency theory provides another perspective to explain asymmetric cost behavior. Chen, Lu, and Sougiannis (2012) assert that managers’ empire-building leads to cost stickiness because managers retain under-utilized resources. They show that strong
corporate governance mitigates cost asymmetry. Kama and Weiss (2013) predict that
the incentive to meet analyst earnings forecasts could mitigate cost stickiness.
Managers are inclined to cut slack resources in response to sales decreases when
earnings would otherwise fall below analyst forecasts, resulting in a lower degree of
cost stickiness than under normal circumstances. Kama and Weiss (2013) find evidence
consistent with their prediction.

The contrasting views between the adjustment cost and agency explanations for
cost asymmetry motivate me to investigate the economic consequences of cost
stickiness. How is cost stickiness associated with firm performance? Few studies
address this question directly. One exception is Anderson, Banker, Huang, &
Janakiriman (2007). They document that relatively high investment in SG&A when
sales decline, as compared with the industry average, signals higher future performance.
If retaining slack resources benefits firms in future revenue growth periods, I should
find that cost stickiness is associated with higher firm future performance. If cutting
slack resources mitigates agency costs and benefits firms through lower costs over time,
I should find that cost flexibility is associated with higher future performance. The
conflicting views in prior literature suggest that the consequences of cost stickiness are
contextual, or that the consequences of cost stickiness depend on other firm
characteristics. I investigate the consequences of cost stickiness by focusing on firms’
strategic positioning.
A recent stream of literature suggests that managers make resource allocation decisions that are aligned with their business strategies. For example, Balakrishnan and Gruca (2008) find that cost stickiness is greater for resources associated with core competencies, based on a sample of acute care hospitals. Porter (1980, 1991, 1996) delineates two competitive business strategies that individual firms may follow to compete within an industry: product differentiation and cost leadership. Porter (1980) posits that a firm may achieve competitive advantage either by creating unique products or services to differentiate from other firms or by improving production efficiency to provide the same products or services at lower cost. Hambrick (1983) states that the main advantage of the cost leadership strategy is efficiency, the degree to which inputs per unit of output are lower. A firm following a cost leadership strategy succeeds by utilizing minimum resources to achieve the desired sales. Such firms pay great attention to asset utilization and employee productivity. Their customers buy their products primarily because they are priced below their competitors’ equivalent products, an advantage achieved through minimizing costs and assets used per unit of output.

Banker, Flasher, and Zhang (2014) find that firms pursuing differentiation strategies have a higher degree of cost stickiness relative to those pursuing cost leadership. To achieve strategic goals, differentiators invest more in resources (e.g. human capital and other resources that provide capabilities in product development, branding, and service to customers) specialized to their strategic needs. Such
investment creates intangible value that is realized through premium prices in high demand periods. It is costly for differentiators to cut back on these specialized resources when demand falls because they cannot recapture their investment by trading the resources in secondary markets. On the other hand, cost leaders focus on cost efficiency, pursuing a lean cost structure and low adjustment costs. I begin by replicating the test in Banker, Flasher and Zhang (2014) that cost stickiness is higher for companies that follow a differentiation strategy.

H1: Managers’ resource adjustment decisions lead to higher cost stickiness for companies pursuing a differentiation strategy than companies pursuing a cost leadership strategy.

The advantages achieved from strategic positioning can be sustained only if firms can build effective barriers to the imitation of practices that enable superior performance in the short run. In more recent work, Porter (2011) argues that technological innovations that permit the rapid diffusion of best practices make some operational improvements that enhance cost efficiency easily imitable. On the other hand, benefits derived from a differentiation strategy built on products or services that are perceived to be different from competitors, take longer to imitate and hence would likely lead to more sustainable economic performance. Advantages attained through a differentiation strategy are more likely to be sustainable because unique services or products valued by customers cannot be easily imitated by competitors. For example,
responses by competitors to pricing moves come almost immediately, while responses to brand premium and customer intimacy would take a much longer period. The longer it takes for a competitor to respond to a particular comparative advantage, the greater the opportunity for a firm to sustain its performance. Empirically, Banker, Mashruwala, and Tripathy (2014) document that firms pursuing a differentiation strategy are more likely to sustain performance over time than firms pursuing a cost leadership strategy.

I extend this research by considering whether evidence of managers’ commitment to a differentiation strategy based on their willingness to retain slack resources during a sales downturn has a positive moderating effect on the relation between a differentiation strategy and future firm performance. I interpret cost stickiness measured at the firm level (Weiss, 2010) as evidence of managers’ commitment to a differentiation strategy.

H2: Cost stickiness, as evidence of managers’ commitment to a differentiation strategy, has a positive moderating effect on the relation between a differentiation strategy and future firm performance measured by Tobin’s Q.

I also test whether cost stickiness, aligned with a differentiation strategy, increases the economic sustainability of earnings reflected in the persistence of earnings (Banker, Mashruwala, and Tripathy, 2014).

H3: Cost stickiness interacted with a differentiation strategy increases the persistence of earnings over time.
2.3 Research design

I investigate (1) the association between resource adjustment decisions and strategic positioning, and (2) how the alignment of resource adjustment decisions and strategic positioning influences firm performance. Empirically, I use a measure of cost stickiness (Weiss, 2010) to proxy for managers’ deliberate resource adjustment decisions. I use factor analysis applied to firm operating characteristics to capture strategic positioning (Banker, Mashruwala, and Tripathy, 2014). I use Tobin’s Q to measure firm’s expected performance (Coles, Lemmon, & Meschke, 2012).

I utilize six variables to construct a measure of strategic positioning (Balsam et al., 2011; Banker, Mashruwala, and Tripathy, 2014). I apply factor analysis to identify the common factors that explain the variation in these variables. The six variables are described below.

1. SG&A/Sales is the ratio of selling, general and administrative expenses to net sales. This variable captures a firm’s investment in activities required to differentiate its product or service offering from its competitors (Miller & Dess 1993). Firms pursuing a differentiation strategy invest in a variety of activities such as advertising, promotions, customer service, product distribution, and other related activities in order to differentiate themselves from competitors. A higher allocation of resources to SG&A indicates an effort to build and strengthen the firm’s brand and product image. Higher allocation to SG&A also reflects greater effort to achieve better coordination amongst
activities within the firm. As a result, higher SG&A indicates a greater likelihood that
firm is pursuing a differentiation strategy.\(^1\)

2. R&D/Sales is the ratio of research and development expenses to net sales. A key
to the success of firms pursuing differentiation is the ability to offer high quality and
innovative products and services. This variable captures a firm’s propensity to spend
on research and product design. Higher R&D expenditure is likely to indicate that a
firm is pursuing a differentiation strategy (Hambrick, 1983).

3. Sales/COGS is the ratio of net sales to cost of goods sold. A firm pursuing a
differentiation strategy wants to create a unique perception of its products and services,
superior to its competitors, enabling it to charge a price premium and earn greater
profitability (Porter, 1980). Therefore, a higher margin as measured by Sales/COGS
is likely to be associated with a differentiation strategy. Some researchers have used the
margin variable to measure cost efficiency (Hambrick, 1983), given that a firm pursuing
an efficiency strategy (cost leadership) will aim to minimize its cost of goods sold
relative to sales in order to improve gross margin. Hence, we use factor analysis to
examine whether this variable loads along factors for differentiation or cost leadership.

\(^1\) Some variables used in the factor analysis that determines the differentiation and cost leadership
scores are also used in the empirical analysis in other ways. In my tests of multi-collinearity among the
variables included in the regression models, I find no evidence that multi-collinearity is a concern in the
estimations.
4. Sales/CAPEX is the ratio of net sales to capital expenditures on property, plant, and equipment. Firms that follow a cost leadership strategy are more likely to focus on developing processes that maximize operational efficiency (Hambrick, 1983). Therefore, expenditures on capital assets relative to sales are lower for such firms.

5. Sales/PP&E is the ratio of sales revenue to property, plant and equipment. Firms that operate more efficiently achieve higher sales revenue for every dollar invested in property, plant, and equipment. A higher ratio indicates more efficient use of the firm’s assets.

6. EMPL/Assets is the ratio of the number of employees to assets. It is an alternative measure that has been used in the literature to capture the productive use of assets and is referred to as employee intensity. Higher employee intensity defined in this manner is associated with more efficient use of assets.

I obtain data for the strategy variables from Compustat for the sample period 1986-2015. I compute the mean value for the previous five years of data for each of the above six variables on a rolling basis in order to capture the long-term strategic orientation of firms. For example, the SG&A/Sales variable for firm i in year 1995 is the mean SG&A/Sales for firm i during the years 1990-1994. I conduct factor analysis implemented using these six variables as tabulated in 2-1. The variables load on two factors with Eigen values > 1. The SG&A/Sales, R&D/Sales, and Sales/COGS variables load together on one factor that is named “Differentiation”. The other three
variables, Sales/CAPEX, Sales/PP&E, and EMPL/Assets, load together on a second factor that is named “Cost Leadership”. I compute factor scores for each individual firm-year observation based on the factor loadings for each variable, and use the standardized factor scores as measures of strategy, Differentiation and Cost Leadership.

My first analysis relates stickiness of selling, general and administrative (SG&A) costs to differentiation and cost leadership. My empirical model follows Anderson, Banker, and Janakiraman (2003) and Banker, Flasher and Zhang (2014). In their analysis of cost behavior, Anderson, Banker, and Janakiraman (2003) related changes in SG&A costs to changes in sales between periods t-1 and t. To investigate asymmetry in SG&A cost behavior, they include a sales decrease indicator variable that takes a value of 1 if sales decreased during this time period. They expanded their basic model to include variables that may affect the degree of cost stickiness including asset intensity, labor intensity, economic growth (GDP), and successive decrease (takes a value of 1 if sales also decreases between t-2 and t-1). To test whether stickiness increases with strategic positioning, I include differentiation and cost leadership as additional variables in the expansion of the sales decrease term.

\[
\log(\frac{SG&A_{i,t}}{SG&A_{i,t-1}}) = \beta_0 + \beta_1 \times \text{Decrease} \times \log(\frac{Sales_{i,t}}{Sales_{i,t-1}}) \\
+ \beta_2 \times \text{Decrease} \times \log(\frac{Sales_{i,t}}{Sales_{i,t-1}}) \times \text{Differentiation} \\
+ \beta_3 \times \text{Decrease} \times \log(\frac{Sales_{i,t}}{Sales_{i,t-1}}) \times \text{CostLeader} \\
+ \beta_4 \times \text{Decrease} \times \log(\frac{Sales_{i,t}}{Sales_{i,t-1}}) \times \text{Asset Intensity}
\]
To measure firm-year specific cost stickiness, I adopt Weiss’ (2010) approach. I estimate cost stickiness as the difference between the rate of cost increase for recent quarters with increasing sales and the corresponding rate of cost decrease for recent quarters with decreasing sales.

\[
\text{Cost stickiness}_{i,t} = \log \left( \frac{\Delta \text{SG\&A}}{\Delta \text{SALE}} \right)_{i,T} - \log \left( \frac{\Delta \text{SG\&A}}{\Delta \text{SALE}} \right)_{i,T}, \tau, T \in (t, \ldots, t-3)
\]

where \( \tau \) is the most recent of the last four quarters with an increase in sales and \( T \) is the most recent of the last four quarters with a decrease in sales. Thus, cost stickiness is the difference in the SG\&A function slope between the two most recent quarters from quarter t-3 through quarter t, such that sales decreased in one quarter and increased in the other.

I use Tobin’s Q as a proxy for expected future firm performance. A firm’s Q value is the ratio of the market value of the firm to the current replacement cost of its assets. I approximate the Q value by adding the book value of debt to the market value of equity and dividing the sum by total assets.

In model 2, the dependent variable is firm performance (Tobin’s Q), the independent variables of interest are firm-year cost stickiness, strategic positioning...
based on the differentiation and cost leadership scores and the interactions between cost stickiness and the differentiation and cost leadership scores. The control variables include logarithm of total assets, financial leverage, R&D to sales, advertising to sales, and age (Coles, Lemmon, & Meschke, 2012).

In a separate analysis of the persistence of performance over time, I use return on assets (ROA) as the primary performance variable (model 3). The dependent variable is ROA in period t+1. The independent variables of interest are ROA in period t, firm-year cost stickiness, strategic positioning based on the differentiation and cost leadership scores, and interactions between ROA in period t, cost stickiness and the differentiation and cost leadership scores. The control variables include logarithm of total assets, financial leverage, book-to-market, and age. The empirical models are presented below.

\[ Q_{it} = \alpha_0 + \alpha_1 \text{Sticky}_{i,t-1} + \alpha_2 \text{Differentiation}_{i,t-1} + \alpha_3 \text{Sticky}_{i,t-1} \times \text{Differentiation}_{i,t-1} + \alpha_4 \text{CostLeadership}_{i,t-1} + \alpha_5 \text{Sticky}_{i,t-1} \times \text{CostLeadership}_{i,t-1} + \text{Controls} \times \text{Year}_t \times \text{Industry}_j + \omega_{it} \]

\[ \text{ROA}_{i,t+1} = \beta_0 + \beta_1 \text{ROA}_{i,t} + \beta_2 \text{ROA}_{i,t} \times \text{Sticky}_{i,t-1} + \beta_3 \text{ROA}_{i,t} \times \text{Differentiation}_{i,t-1} + \beta_4 \text{ROA}_{i,t} \times \text{CostLeadership}_{i,t-1} + \beta_5 \text{ROA}_{i,t} \times \text{Sticky}_{i,t-1} \times \text{Differentiation}_{i,t-1} \]
\[ + \beta_6 \ ROA_{i,t} \ * \ \text{Sticky}_{i,t-1} \ * \ Cost\text{Leadership}_{i,t-1} \]

\[ + \ \text{Controls} \ + \text{Year}_t \ + \text{Industry}_j \ + \ \omega_{i,t} \]

2.4 Sample, variable measurement, and descriptive statistics

I construct a time-series and cross-sectional dataset (panel data) using firm-year observations. The sample includes annual observations taken from 1986 to 2015 obtained from CompuStat. I delete firm-years missing sales or SG&A costs. The remaining sample size available in Compustat is 72,503 firm-year observations. The sample selection process is described in 2-2. After deleting for missing values of R&D, the sample includes 28,891 observations.

Panel A of table 2-3 provides descriptive statistics on SG&A/Sales, R&D/Sales, Sales/COGS, Sales/CAPEX, Sales/P&E, and EMPL/Assets. Panel B of table 2-3 provides Spearman correlations for SG&A/Sales, R&D/Sales, Sales/COGS, Sales/CAPEX, Sales/P&E, and EMPL/Assets. The majority of the correlations are significant. For each model that I estimate, I conduct multicollinearity diagnostic tests for the independent variables, including the interaction terms. I find that the variance inflation factor (VIF), is less than 10 for all of the variables, suggesting that multicollinearity is not a concern in the estimation of our models.
2.4 Results

Hypothesis 1 predicts that strategic positioning is associated with resource commitment. I estimate model (1) using two-way fixed effects regressions and I report clustered robust standard errors (Cameron 2005; Peterson 2009). Results are presented in Table 2-5. I find that the coefficient on the sales increase term is significantly positive ($\beta_1 = 0.57, t = 49.22$), indicating that SG&A costs increase about $0.57 for a $1.00 increase in sales. The base sales decrease term $\beta_2$ is negative but not significantly different from zero ($\beta_2 = -0.03, t = -1.49$), meaning that cost stickiness is captured by the interaction terms. The interaction term between sales decrease and differentiation is significantly negative ($\beta_3 = -0.007, t = -3.61$), consistent with the prediction that cost stickiness increases with differentiation. On the other hand, the interaction between sales decrease and cost leadership is significantly positive ($\beta_4 = 0.001, t = 3.06$), indicating that cost stickiness decreases with cost leadership. These results indicate that firms following a differentiation strategy are more likely to retain slack resources in a revenue-down period whereas firms following a cost leadership strategy are less likely to retain slack resources when revenue declines. I interpret the results as supporting the idea that strategic positioning is associated with resource commitment, and that cost stickiness may be interpreted as evidence of commitment to a differentiation strategy.
Hypothesis 2 predicts that the positive relation between expected future performance and differentiation documented in previous research is moderated by cost stickiness as an indicator of commitment to a differentiation strategy. Results are presented in table 2-6. The dependent variable is Tobin’s Q. The differentiation coefficient is significantly positive ($\alpha_2 = 0.0522$, $t = 17.55$). The cost leadership coefficient is significantly negative ($\alpha_3 = 0.0011$, $t = -8.11$). The coefficient on the interaction between cost stickiness and differentiation is significantly positive ($\alpha_2 = 0.0002$, $t = 2.12$), indicating that firm-specific cost stickiness (Weiss, 2010) does have a positive moderating effect on differentiation. The coefficient on the interaction between cost stickiness and cost leadership is not significantly different from zero, consistent with the notion that resource flexibility is important for cost leaders.

Overall, resource commitment represented by cost stickiness, aligned with a differentiation strategy, is positively associated with expected future performance.

Hypothesis 3 predicts that resource commitment, aligned with a differentiation strategy, leads to greater sustainability of firm performance. Table 2-6 presents results of my analysis of the persistence of ROA. The dependent variable is ROA in period $t+1$, the independent variables include ROA in period $t$, cost stickiness, differentiation, cost leadership and their interactions. The coefficient on the interaction term between ROA in period $t$, differentiation, and cost stickiness is significantly positive ($\beta_5 = 0.0102$, $t = 2.66$), indicating that cost stickiness aligned with differentiation increases
the persistence of ROA. However, if the firm pursues cost leadership, retaining unused resources does not increase the sustainability of firm performance measured by the persistence of ROA.

2.5 Conclusion

Strategic positioning determines the capabilities that companies develop for achieving competitive advantage. The accounting literature considers how deliberate resource allocations decisions affect cost behavior. My study merges these two fields by investigating how strategic positioning leads to deliberate resource allocation decisions and influences cost behavior. I interpret cost stickiness associated with differentiation as a measure of commitment to a differentiation strategy. This provides a different perspective from the adjustment costs and optimism described in previous accounting literature.

By interacting cost stickiness and strategic positioning, I document that the level of commitment to a differentiation strategy reflected in cost stickiness positively affects firm performance. For cost leadership, on the other hand, resource flexibility is important so there is a trade-off between cost stickiness as a measure of commitment to strategy and the absence of cost stickiness as an indicator of resource flexibility. I find that cost stickiness does not have a moderating effect on the relation between cost leadership and firm performance.
A limitation of my study is the use of ex post performance information to determine dimensions of strategic positioning. Future research may use alternative means of determining strategic positioning such as textual analysis of the management discussion and analysis of annual reports. In the next part of my dissertation, I use an alternative means of identifying strategic positioning based on an index of customer satisfaction.
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Governance, and the Asymmetrical Behavior of Selling, General, and

endogeneity in corporate finance: The link between managerial ownership and


### Table 2-1: Variable definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales REV</td>
<td>Revenues, total operating revenues in the corresponding period.</td>
</tr>
<tr>
<td>SG&amp;A</td>
<td>Selling, General and Administrative expense</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and development expenses</td>
</tr>
<tr>
<td>COGS</td>
<td>Cost of goods sold</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital expenditures on property, plant and equipment</td>
</tr>
<tr>
<td>P&amp;E</td>
<td>Net book value of plant and equipment</td>
</tr>
<tr>
<td>EMPL</td>
<td>Number of total employees</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>(Market value of equity plus book value of debt) divided by total assets</td>
</tr>
</tbody>
</table>

### Table 2-2: Sample selection procedure

<table>
<thead>
<tr>
<th>Category</th>
<th>CompuStat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original (1986-2015)</td>
<td>132,649</td>
</tr>
<tr>
<td>Missing Sales or SG&amp;A</td>
<td>60,146</td>
</tr>
<tr>
<td>Available</td>
<td>72,503</td>
</tr>
<tr>
<td>Missing R&amp;D</td>
<td>43,612</td>
</tr>
<tr>
<td>Final sample</td>
<td>28,891</td>
</tr>
</tbody>
</table>

* I delete observations if the Sales or SG&A are missing or are less than 0.
### Table 2-3: Sample information

#### Panel A: Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>25th Percentile</th>
<th>Median</th>
<th>75th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG&amp;A/Sales</td>
<td>0.2907</td>
<td>1.3916</td>
<td>0.1308</td>
<td>0.2335</td>
<td>0.3716</td>
</tr>
<tr>
<td>R&amp;D/Sales</td>
<td>0.0693</td>
<td>0.4083</td>
<td>0.0029</td>
<td>0.0269</td>
<td>0.09625</td>
</tr>
<tr>
<td>Sales/COGS</td>
<td>2.3677</td>
<td>18.960</td>
<td>1.3179</td>
<td>1.5868</td>
<td>2.1655</td>
</tr>
<tr>
<td>Sales/CAPEX</td>
<td>89.51</td>
<td>1094.01</td>
<td>11.5892</td>
<td>26.2174</td>
<td>57.0782</td>
</tr>
<tr>
<td>Sales/P&amp;E</td>
<td>11.93</td>
<td>109.26</td>
<td>2.28</td>
<td>4.893</td>
<td>9.8697</td>
</tr>
<tr>
<td>EMPL/Asset</td>
<td>0.011</td>
<td>0.040</td>
<td>0.0023</td>
<td>0.0061</td>
<td>0.01262</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>2.0489</td>
<td>47.97</td>
<td>0.6467</td>
<td>1.0112</td>
<td>1.6639</td>
</tr>
</tbody>
</table>

#### Panel B: Spearman Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
<th>V7</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>SG&amp;A/Sales</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>R&amp;D/Sales</td>
<td>0.670*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3</td>
<td>Sales/COGS</td>
<td>0.160*</td>
<td>0.167*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4</td>
<td>Sales/CAPEX</td>
<td>-0.033</td>
<td>-0.070</td>
<td>-0.018</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5</td>
<td>Sales/P&amp;E</td>
<td>0.005</td>
<td>-0.013</td>
<td>-0.002</td>
<td>0.775*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>V6</td>
<td>EMPL/Asset</td>
<td>-0.123</td>
<td>-0.207</td>
<td>-0.050</td>
<td>-0.025*</td>
<td>-0.034*</td>
<td>1</td>
</tr>
<tr>
<td>V7</td>
<td>Tobin’s Q</td>
<td>0.170*</td>
<td>0.163*</td>
<td>0.059*</td>
<td>-0.023*</td>
<td>-0.045*</td>
<td>-0.030</td>
</tr>
</tbody>
</table>

Note: Panel A describes the distribution of SG&A/Sales, R&D/Sales, Sales/COGS, Sales/CAPEX, Sales/P&E, EMPL/Asset, and Tobin’s Q. See table 2-1 for variable definitions. Panel B presents the Spearman correlation matrix. * denotes significance at the 1% level.
### Table 2-4: Factor analysis (Sample period: 1986-2015)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Differentiation</th>
<th>Cost Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG&amp;A/Sales</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>R&amp;D/Sales</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Sales/COGS</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Sales/CAPEX</td>
<td></td>
<td>0.81</td>
</tr>
<tr>
<td>Sales/P&amp;E</td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td>EMPL/Assets</td>
<td></td>
<td>0.72</td>
</tr>
</tbody>
</table>

Model fit Statistics

<table>
<thead>
<tr>
<th>Bartlett test</th>
<th>57,331</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The variables load on two factors with Eigen values >1. The SG&A/Sales, R&D/Sales, and Sales/COGS variables load together on one factor which I named as “differentiation”. The other three variables, Sales/CAPEX, Sales/P&E, and EMPL/Assets load together on a second factor which I named as “Cost Leadership”. I use the Bartlett test to identify the model fit.
Table 2-5: Cost asymmetry for differentiation and cost leadership

<table>
<thead>
<tr>
<th>Term</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(SG&amp;A&lt;sub&gt;i,t&lt;/sub&gt; / SG&amp;A&lt;sub&gt;i,t−1&lt;/sub&gt;)</td>
<td>0.57***</td>
<td>(49.22)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)</td>
<td>-0.03</td>
<td>(-1.49)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*Differentiation</td>
<td>-0.007***</td>
<td>-3.61</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*CostLeader</td>
<td>0.001***</td>
<td>(3.06)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*Asset Intensity</td>
<td>-0.010***</td>
<td>(-3.02)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*Employee Intensity</td>
<td>-0.027</td>
<td>(-1.00)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*GDP</td>
<td>-0.002**</td>
<td>(-2.11)</td>
</tr>
<tr>
<td>Decrease*log(Sales&lt;sub&gt;i,t&lt;/sub&gt; / Sales&lt;sub&gt;i,t−1&lt;/sub&gt;)*Successive decrease</td>
<td>0.07**</td>
<td>(2.57)</td>
</tr>
</tbody>
</table>

Year Dummy: Yes
Industry effect: Yes
N: 27,797
R-square: 0.49

Note: this table presents the association between strategic positioning and cost stickiness.
*, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
Table 2-6: Strategic positioning and firm performance

<table>
<thead>
<tr>
<th>Tobin Q</th>
<th>Predicted sign</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stickiness</td>
<td>?</td>
<td>-0.0001 (-2.32)</td>
</tr>
<tr>
<td>Differentiation</td>
<td>+</td>
<td>0.0522*** (17.75)</td>
</tr>
<tr>
<td>Cost leadership</td>
<td>+</td>
<td>-0.0011*** (-8.11)</td>
</tr>
<tr>
<td>Stickiness*Differentiation</td>
<td>+</td>
<td>0.0002** (2.12)</td>
</tr>
<tr>
<td>Stickiness*Cost Leadership</td>
<td>?</td>
<td>-0.0000 (-0.59)</td>
</tr>
<tr>
<td>Ln(Assets)</td>
<td></td>
<td>0.0610 (1.21)</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.0300*** (-8.10)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D/Sales</td>
<td>0.0100*** (5.36)</td>
<td></td>
</tr>
<tr>
<td>Advertising/Sales</td>
<td>0.008*** (3.68)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.001 (-0.93)</td>
<td></td>
</tr>
<tr>
<td>Year effects</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Industry effects</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>28,891</td>
<td></td>
</tr>
<tr>
<td>R-square</td>
<td>0.0473</td>
<td></td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating the association between cost stickiness, strategic positioning and firm future performance.

*, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
### Table 2-7; ROA persistence and stickiness, strategy positioning

<table>
<thead>
<tr>
<th>ROA_{t+1}</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA_{t}</td>
<td>0.5782*** (4.78)</td>
</tr>
<tr>
<td>ROA_{t}*Stickiness</td>
<td>-0.0104** (-2.27)</td>
</tr>
<tr>
<td>ROA_{t}<em>Stickiness</em>Differentiation</td>
<td>0.0102*** (2.66)</td>
</tr>
<tr>
<td>ROA_{t}<em>Stickiness</em>CostLeadership</td>
<td>0.0002 (0.85)</td>
</tr>
<tr>
<td>Ln(Assets)</td>
<td>0.0430 (1.02)</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.0081*** (-3.94)</td>
</tr>
<tr>
<td>Book to Market</td>
<td>0.0006*** (2.68)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0008 (1.78)</td>
</tr>
<tr>
<td>Year effects</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry effects</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>27,869</td>
</tr>
<tr>
<td>Adj R-Squared</td>
<td>0.6602</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating the association between ROA persistence and stickiness, strategic positioning and their interaction. *, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
**Chapter 3 - Customer Satisfaction, Cost Behavior and Firm Performance**

**Abstract**

I use customer satisfaction as a proxy for customer relationship resources and stickiness of selling, general and administrative (SG&A) costs as an indicator of commitment to a resource-based customer strategy. Consistent with this interpretation, I document that customer satisfaction increases with cost stickiness. I follow previous literature that relates Tobin’s Q, as a measure of expected future performance, to customer satisfaction and find that the positive relation between Tobin’s Q and customer satisfaction increases with the degree of cost stickiness. I also test whether persistence of ROA increases with customer satisfaction and whether this relationship increases with the degree of cost stickiness and find that it does.
3.1 Introduction

The resource-based view (RBV) provides a pivotal framework to explain the basis of a firm’s competitive advantage and performance (Barney et al., 2011; Slotegraaf and Dickson, 2004; Vorhies and Morgan, 2005). In the past decade, more than 200 published conceptual and empirical marketing articles draw on RBV. These studies focus on market-based resources, such as building brands and customer relationships. Research increasingly focuses on intangible, complementary resources because these resources impact a firm’s sustainable competitive advantage (SCA) and performance more than tangible resources (Srivastava et al. 1998). As much as 70% of a firm’s market value comes from its intangible resources (Caprano and Srivastava 1997), and firm performance is increasingly tied to intangible resources, such as customer relationships and brand equity (Lusch and Harvey 1994). Extant research suggests that the greatest benefits accrue when externally-focused, market-based resources, such as resources that enhance customer relationships, are complemented by internal resources (Dutta et al. 1999; Moorman and Slotegraaf 1999). I investigate how customer satisfaction is associated with managers’ commitment to a resource-based strategy reflected in selling, general and administrative (SG&A) cost behavior.

I use customer satisfaction as a proxy for customer relationship resources and SG&A cost stickiness to measure managerial resource commitment to a customer-focused strategy. Costs are sticky if they go down less with a decrease in sales than
they go up for an equivalent increase in sales. Cost stickiness is the degree to which downward cost elasticity is lower than upward cost elasticity with respect to changes in sales. In the cost stickiness literature, the asymmetric cost behavior (ACB) model is used to investigate how costs change between periods based on managers’ decisions to add or remove resources (Anderson, Banker, and Janakiraman 2003). Unlike traditional models of cost behavior that assume a production technology and consider how costs change with volume, the ACB model is based on the economic primitives of adjustment costs and managers’ expectations of future resource needs. Adjustment costs include firm-specific investments that cannot be recovered when a resource is removed if those investments have enduring value. For example, a firm-specific investment in human capital that resides with an employee or group of employees is lost if the employee or some of the employees leave the firm.

Banker, Flasher and Zhang (2014) observe that firms that follow a differentiation strategy are likely to make firm-specific investments in specialized resources that cannot be recovered if the resources are removed. This increases cost stickiness because managers are reluctant to release such resources when sales decline if they are optimistic that demand will be restored in the near future. In this paper, I adopt a resource-based approach to asymmetric cost behavior that considers how strategic commitment to resource-based capabilities is reflected in cost stickiness. A resource-based advantage comes from a set of resource capabilities that add value to products or
services and cannot be easily imitated by competitors. Inimitability implies that such capabilities are developed over time through costly and risky firm-specific investments. To build and sustain a resource-based advantage, managers must be willing to keep the resource commitments through low demand periods when the additional costs reduce profitability. Thus, I assume that commitment to a resource-based strategy increases cost stickiness because companies build capabilities to increase profitability in high demand periods but they must retain resources in low demand periods when there is pressure to reduce costs due to lower profitability.

I use high levels of customer satisfaction as a proxy for customer relationship resources and interpret the degree of cost stickiness in SG&A costs as an indicator of the firm’s commitment to a customer-centered resource-based strategy. Consistent with this interpretation, I find that customer satisfaction increases with the intensity of SG&A costs to sales and with the degree of cost stickiness. I test whether resource commitment as reflected in cost stickiness enhances the positive relationship between Tobin’s Q (as a measure of expected future performance) and current customer satisfaction documented in previous literature. The results indicate that Q is positively related to customer satisfaction, consistent with prior research, and that Q increases with the interaction between cost stickiness and customer satisfaction. I also test whether the persistence of return on assets (ROA) increases with customer satisfaction.
and with the interaction between cost stickiness and customer satisfaction and find that it does.

This study contributes to the resource-based-view literature by empirically documenting an association between asymmetry in cost behavior and customer satisfaction, and by demonstrating that the intangible value of customer relationships is enhanced by resource allocation decisions that reflect greater commitment to a resource-based strategy. The study also contributes to the cost stickiness literature by documenting that a customer-focused strategy is an important determinant of managerial resource commitment decisions.

The remainder of this paper is organized as follows. In section 2, I review relevant literature and develop my hypotheses. In section 3, I present my research design. In section 4, I describe the sample and variable definitions. I discuss the results of estimating the empirical models in section 5 and conclude in section 6.
3.2 Background and hypotheses

3.2.1 Customer relationships and resource commitments

According to resource-based theory (RBT), resources that are valuable, rare, inimitable and non-substitutable (Barney, 1991) make it possible for businesses to develop and maintain competitive advantages (Armstrong & Shimizu, 2007; Castanias & Helfat 1991; Lockett & Thompson 2001). Managers’ deliberate resource allocation decisions create and maintain firm-specific resources, such as market-based relationships. Because relational assets are based on factors such as trust and reputation (Barney 2014), organizations have the potential to develop intimate relations with customers. These relationships may then become difficult for rivals to replicate and have the potential to turn into a unique and valuable competitive advantage for a firm.

To build these intimate relationships with customers, organizations invest considerable time, energy and money to create deep and insightful customer knowledge (Fahey, 1999). Srivastava, Shervani and Fahney (1998) propose a framework illustrating how such market-based assets (customer knowledge and intimacy), nurtured through investments in customer relationship management processes, can be leveraged to drive marketplace performance and shareholder value. These relationships form the basis of value delivered to customers via product attributes, experiential benefits, attitudes and reputation (Anderson, Fornell, and Lehmann, 1994). This value then
leads to network effects that can be leveraged to drive marketplace performance (Anderson and Fornell, 2000). Network effects include higher prices, greater market shares, more responsive advertising and promotions, greater buyer loyalty, deflection of competitor initiatives, earlier market penetration, and product line extensions. Customer retention is a barrier to entry and in turn reduces risk, thereby increasing shareholder value (Srivastava, Fashey, & Christensen, 2001). Unlike physical resources, the intangible nature of customer relationships make it possible to produce and support multiple revenue streams without erosion (Romer 1986). But, unlike research and development (R&D), whose benefits are protected by patents, customer relationships can be lost or their competitive advantage can be lost with the mobility of employees (Jovanovic & Nyarko 1995).

Investments in resources that are used in the customer service process are largely included in SG&A costs and reflected in the intensity of SG&A spending. Ray, Barney and Muhanna (2004) explore the intermediate effect of resources and capabilities on the effectiveness of the customer service process. Technologies, such as networks with agents, computer-telephony integration, and scanning technologies were used to support the customer service business process. Ray, Muhana, & Barney (2005) also investigate the differential effects of various IT resources and capabilities on customer service. Srivastava (2014) finds that SG&A expenses increased significantly, and their matching with current revenues declined significantly over the
40 years from 1970 to 2009. He argues that money spent on development of intangibles included in SG&A expenses cause these effects. Williamson (1975) and Stein (1997) argue that firms have limited resources and that a firm’s resource allocation requires tradeoffs between current and future benefits. Enache and Srivastava (2016) divide SG&A spending into two parts, one part produces a current benefit while the other produces a future benefit. They call it “maintenance SG&A and investment SG&A”. Fisher (1930) refers to this division as consumption and investing, March (1991) calls it exploitation and exploration, and Mizik and Jacobson (2003) call it value appropriation and value creation.

Nohria and Gulati (1996) argue that managers will make discretionary resource allocation decisions in response to environmental opportunities and threats. Similarly, Lee & Grewal (2004) argue that firms with slack resources may display greater abilities to absorb and use new information, which makes it easier for firms to absorb and assimilate new technologies. In addition, managerial resource commitment is important to create or maintain brand value. Investments in marketing and R&D are necessary to retain customers. Advertising can communicate the product’s availability and inform customers about the product characteristics. Research and development and market research could lead to a high quality product that continues to meet customers’ needs. (Herremans, Ryans, & Aggarwal 2016). Besides advertising, SG&A can also reflect investments in market strategy, market
research, customer and social relationships, and human capital (Enache & Srivastava 2016).

Banker, Flasher, and Zhang (2014) argue that firm’s resource allocation decisions are associated with the firm’s strategic positioning. They predict and find that cost stickiness is higher for differentiators than for other firms because differentiators make higher investment in firm-specific resources such as human capital. Anderson and Yu (2017) find that, compared to low cost airlines, full service airlines do not cut flights and terminate employees even when revenue decreases. Such temporary cost savings may harm their long-term customer relationships. To build and sustain customer relationships, a company must be committed to supporting the customer relation resources in both up and down periods. High levels of customer intimacy may enable higher profits in high demand periods but it takes time and sustained effort to develop the resources that provide high levels of customer satisfaction. Based on these arguments, I make first hypothesis:

**H1: Customer relationship value represented by customer satisfaction increases with resource commitment reflected in SG&A cost stickiness.**

3.2.2 Complementarity

Anderson, Fornell, and Mazvanchery (2004) develop a theoretical framework that specifies how customer satisfaction affects future customer behavior and in turn, the level, timing, and risk of future cash flow. Other empirical research confirms that
there is a positive relationship between firms’ customer satisfaction and future financial performance (Ittner & Larcker 1998). Banker and Mashruwala (2007) find that customer satisfaction and employee satisfaction are positively associated with future performance and that competition moderates these relationships.

At the operational level, a set of resources, not equally available to all firms, and their combination into competences and capabilities, are a precondition for sustained superior returns. Teece, Pisano, and Shuen (1997) propose the dynamic capabilities framework to explain how combinations of competences and resources can be developed, protected, and deployed. Similar to capabilities, dynamic capabilities are resources that can be used to modify other resources and create value. The competitive advantage of firms is seen as resting on difficult-to-trade knowledge assets and complementary assets. With respect to customer satisfaction, companies acquire and develop combinations of resources that enable them to anticipate customer needs, communicate with customers, and service customers effectively. Day (2011, p. 187) proposes that adaptive marketing capabilities allow firms to anticipate “trends and events before they are fully apparent and then adapt effectively.” According to Peteraf and Barney (2003), dynamic capabilities are a type of resource that improves the productivity of the firm’s other resources. Adegbesan (2009) argues that firms achieve competitive advantage when they acquire target resources that are complementary to their existing resources.
Srivastava, Fahey and Christensen (2001) argue that resources are transformed through managerial guidance into something that is valuable to customers. They suggest that RBV research needs to identify precisely how customer value, in the form of specific attributes, benefits, attitudes and network effects is generated and sustained. For example, marketing research can investigate how particular market-based assets and capabilities contribute to generating and sustaining specific forms of customer value. I interpret customer relations as a set of market-based resources and resource commitment as evidence of a managerial capability.

A resource-based advantage is not necessarily separable from a group of employees and assets. For instance, an employee group may develop a resource-based advantage by cultivating customer relationships. Removing people from the group may have more than a proportionate detrimental effect on this resource-based advantage because of complementarity of resources (Milgrom and Roberts, 1995). These insights motivate me to empirically investigate how relationship resources embodied in customer satisfaction, aligned with managers’ deliberate resource allocation decisions, are associated with expected future performance.

**H2**: Expected firm performance (Tobin’s Q) is positively related to customer relationship value represented by customer satisfaction and this positive effect is strengthened by resource commitment indicated by SG&A cost stickiness.
Advantages attained through customer relationships are likely to be sustainable because unique services or products valued by customers cannot be easily imitated by competitors. Competitors can respond to price moves almost immediately but it will take them much longer to replicate a firm’s brand premium or build strong customer relationships. The longer it takes for a competitor to respond to a particular competitive advantage, the greater the opportunity for a firm to achieve sustainable economic performance.

Firms with high customer satisfaction rely on intimate relationships with customers. Overtime, these relationships build the “reputation” of the firm. A good reputation translates into better performance and creates a valuable resource that is difficult to imitate, thus providing the firm with a durable advantage (Cart and Ruefli, 2006). Companies that excel in developing close relationships with customers build long-term customer loyalty. This in turn enables such companies to achieve sustainable financial performance (Heskett and Schlesinger, 1994).

Chandler (1962) argues that a firm’s strategy, its structure, and its managerial process have to “fit” with one another. Milgrom and Roberts (1995) consider shifts from mass production to flexible manufacturing as responses to customer’ requirements. To explain the fit and synergy effects more clearly, Milgrom and Roberts (1995) build a model based on complementarity and super modularity. Both their case study and model demonstrate that two or more elements of business strategy and managerial
process, if aligned with each other, provide additional benefits for the business. This leads to my third hypothesis: sustainable performance advantage occurs when resource commitment supports customer relationships.

**H3:** Customer relationship value represented by customer satisfaction, aligned with managerial resource commitment indicated by SG&A cost stickiness, enhance the economic sustainability of firm performance.

### 3.3 Research Design

I investigate (1) the association between resource allocation decisions and relationship resources and (2) the performance effects of aligning resource allocation decisions with relationship resources. Empirically, I use cost stickiness to proxy for managers’ deliberate resource allocation decisions consistent with the firm’s strategic commitment (Banker, Flasher, and Zhang 2014). Following prior literature on asymmetric cost behavior, I use cost stickiness as a direct measure of resource commitment (Weiss 2010). I estimate cost stickiness as the difference between the rate of cost increase for recent quarters with increasing sales and the corresponding rate of cost decrease for recent quarters with decreasing sales.

$$\text{Cost stickiness}_{i,t} = \log \left( \frac{\Delta \text{SG&A}}{\Delta \text{SALES}} \right)_{i,t} - \log \left( \frac{\Delta \text{SG&A}}{\Delta \text{SALES}} \right)_{i,T} \quad \tau, T \in (t, \ldots, t - 3)$$

where \( \tau \) is the most recent of the last four quarters with an increase in sales and \( T \) is the most recent of the last four quarters with a decrease in sales. \( \Delta \text{SALES}_{i,t} = \)
SALES_{i,t} - SALES_{i,t-1}; \: \Delta \text{SG&A}_{i,t} = \text{SG&A}_{i,t} - \text{SG&A}_{i,t-1}.

In this manner, cost stickiness is defined as the difference in the SG&A function slope between the two most recent quarters from quarter t-3 through quarter t, such that sales decrease in one quarter and increase in the other. If managers commit to a resource-based strategy to attain higher customer satisfaction, they must acquire sufficient resources to accommodate growth in sales. Because those resources are more valuable within the firm than in external markets, SG&A costs would increase more when activities rise than they would decrease when activities fall by an equivalent amount. Thus the proposed measure has a positive value – high commitment leads to stickier cost behavior. That is, a positive value indicates that managers are less inclined to respond to sales drops by reducing SG&A than they are to increase SG&A when sales rise.

Following prior cost behavior literature, cost stickiness is determined with respect to a change in sales revenue as an imperfect proxy for the actual underlying activities because changes in activities are not observable. Employing sales as a fundamental stochastic variable is in line with Banker and Chen (2006). They use sales as a stochastic variable for predicting future earnings.

I use customer satisfaction to proxy for relationship resources (Kozlenkova, Samaha, and Palmatier, 2014; Anderson, Fornell, & Mazvancheryl, 2004). For customer satisfaction, I use annual values of the American Customer Satisfaction Index (ACSI) from 1994 to 2015 provided by the National Quality Research Center at the
University of Michigan. The ACSI methodology provides a uniform, independent, customer-based, firm-level satisfaction measure for nearly 200 companies in 40 industries in the US economy. It covers around 40% of gross domestic product of the United States. The raw data for the ACSI are collected from random telephone surveys of customers (at least 200 customers for every firm) who have recently consumed a specific brand of a firm’s product or service. Respondents are asked questions on 15 measurement variables, which are compiled as 6 latent variables or constructs by applying structural equation modeling (SEM). One of these latent variables is customer satisfaction, ranging from 0 to 100.

I use Tobin’s Q to measure expected firm performance (Anderson, Fornell, & Mazvancheryl, 2004). Tobin’s Q is well established as a performance measure. It assumes that the securities market efficiently evaluates the firm’s expected future revenue stream in determining the firm’s value.

3.3.1 Resource commitment and customer satisfaction

To test my first hypothesis, I regress customer satisfaction in period t+1 on cost stickiness in period t and customer satisfaction in period t while controlling for other economic factors that affect customer satisfaction.2 As the ACSI ranges from 0 to 100,

2 I include customer satisfaction in period t as a dependent variable instead of using a changes specification to relax the restriction in a changes specification that sets the coefficient on customer satisfaction in period t to equal one.
I use a Tobit model rather than an ordinary least squares model to accommodate the limits on the range of the dependent variable. The empirical model is described below.

\[ AC_{t+1} = \beta_0 + \beta_1 \text{Cost stickiness}_t + \beta_2 \text{ACSI}_t + \beta_3 \text{SGA-to-Sales}_t \]
\[ + \beta_4 \text{Ln Asset}_t + \beta_5 \text{Sales growth}_t + \beta_6 \text{ROA}_t + \beta_7 \text{Ad-to-Sales}_t \]
\[ + \beta_8 \text{R&D-to-Sales}_t + \text{Year}_t + \text{Industry}_j + \omega_{i,t} \]

3.3.2 Relationship resources and resource allocation decisions

To test the alignment effect between resource allocation decisions and relationship resources, I investigate the association between Tobin’s Q in period t, firm stickiness (Sticky) in period t-1, and customer satisfaction (ACSI) in period t-1. The control variables include the logarithm of total assets, book-to-market and leverage in t-1 (Coles, Lemmon, & Meschke, 2012). See equation 2 below for my empirical model.

\[ Q_{i,t} = \alpha_1 + \alpha_2 \text{Sticky}_{i,t-1} + \alpha_3 \text{ACSI}_{i,t-1} + \alpha_4 \text{Sticky}_{i,t-1} * \text{ACSI}_{i,t-1} \]
\[ + \alpha_5 \log(\text{Assets}_{i,t-1}) + \alpha_6 \log(\text{Sales}_{i,t-1}) + \alpha_7 \text{leverage}_{i,t-1} \]
\[ + \alpha_8 \text{R&D}_{i,t-1} + \alpha_9 \text{Advertising}_{i,t-1} + \text{Year}_t + \text{Industry}_j + \omega_{i,t} \]

To test my third hypothesis about the influence of alignment of resource commitments and relationship resources on the sustainability of performance, I estimate a model that relates ROA to lagged ROA, cost stickiness and the interaction between cost stickiness and the ACSI. This model is similar to the model estimated by
Banker, Mashruwala, and Tripathy (2014). See equation 3 below for my empirical model.

\[
ROA_{i,t+1} = \alpha_0 + \alpha_1 \text{ROA}_{i,t} + \alpha_2 \text{Sticky}_{i,t-1} + \alpha_3 \text{ACSI}_{i,t-1} \\
+ \alpha_4 \text{Sticky}_{i,t-1} \times \text{ACSI}_{i,t-1} + \alpha_5 \log(\text{Assets}_{i,t-1}) \\
+ \alpha_6 \log(\text{Sales}_{i,t-1}) + \alpha_7 \text{leverage}_{i,t-1} + R&D_{i,t-1} \\
+ \alpha_9 \text{Advertising}_{i,t-1} + Year_t + Industry_j + \omega_{i,t}
\]

3.4 Sample, variable measurement, and descriptive statistics

I use Tobin’s Q because it is well-grounded in economic theory (Coles et. al, 2012). A firm’s Q value is the ratio of its market value to the current replacement cost of its assets. I approximate Q by adding the book value of debt to the market value of equity and dividing the sum by total assets. I use cost stickiness to capture managers’ deliberate resource allocation decisions, consistent with the firm’s commitment to a resource-based strategy (Banker et al, 2014). I use the American Customer Satisfaction Index (ACSI) to measure the strength of customer relationships. An individual firm’s ACSI represents its served customers’ overall evaluation of their total purchase and consumption experiences. It provides a comprehensive picture of customer satisfaction for each of seven major economic sectors.

I construct a pooled dataset (panel data) using firm-year observations. My sample includes annual observations taken from 1994 to 2015 from CompuStat. I delete firm-years with missing sales or SG&A costs. The sample available from ACSI is 5,632
firm-year observations. When I merged the two datasets, I removed 660 observations for international firms and 1,298 observations for private firms. I obtained a sample consisting of 2,602 firm-year observations. I have a final sample of 1,182 because of missing data for advertising expense and research and development expense. The sample selection procedure is described in 3-2.

Panel A of table 3-3 provides descriptive statistics for SG&A, revenues, assets, employees, ACSI, asset intensity, and employee intensity. On average, sales, SG&A, and assets are $31,850, $5,966, $70,649 million, respectively. On average, total employees are 103,000, ACSI is 77, asset intensity is 2.26, and employee intensity is 0.005.

Panel B of table 3-3 provides Spearman correlations for sales, SG&A, revenues, Assets, Employees, ACSI, Assets Intensity and Employee Intensity. The majority of the correlations are significant. For all the models that I estimate, I conduct multicollinearity diagnostic tests for the independent variables in the models, including the interaction terms. I find that the variance inflation factor (VIF), is less than 10 for all variables. This indicates that multicollinearity is not a problem in my models.
3.5 Results

3.5.1 Customer satisfaction and cost stickiness

Hypothesis 1 predicts that customer satisfaction is associated with cost stickiness. Table 3-4 presents the results of estimating model (1) that relates ACSI in t+1 to cost stickiness and other variables. The first column reports the results without controlling for Advertising to Sales and R&D to Sales. The coefficient on cost stickiness of 0.0034 is significantly positive at the 1 percent level. The coefficient on ACSI in period t of 0.8973 is significantly different from zero at the 1 percent level. The coefficient on SGA-to-Sales of 0.0540 is also significantly positive at the 1 percent level.

The second column reports the results after controlling for advertising and R&D. The coefficient on cost stickiness is 0.0032 and is significantly positive at the one percent level. The coefficient on customer satisfaction, is 0.9214 and is significantly positive at the 1 percent level. The coefficient on SGA-to-Sales is 0.049 and is significant at the 5 percent level. The coefficient on Advertising to Sales is 0.032 and is significant at the 5 percent level.

Results of both estimations indicate that customer satisfaction increases with managers’ resource commitment as reflected in SG&A cost stickiness and with the intensity of SG&A to sales. The coefficients on customer ACSI, that are both close to
one indicates that customer satisfaction is persistent, consistent with a resource-based advantage derived from customer relationships.

**3.5.2 Relationship resources and resource allocation decisions**

Hypothesis 2 predicts that the extent to which firm relationship resources are aligned with resource allocation and retention decisions is positively associated with firm future performance. I use ACSI to proxy for the firm relationship resources. I use cost stickiness to measure managerial resource allocation and retention decisions that support a resource-based strategy. Table 3-5 presents the results of estimating the model in equation (2). The dependent variable is expected future performance measured by Tobin’s Q, the primary independent variables are customer satisfaction, cost stickiness and their interaction. The customer satisfaction coefficient is 0.0542 and is statistically significant at the 1% level, consistent with previous research that finds that future performance increases with customer satisfaction (Ittner and Larcker, 1998). The coefficient on the interaction between customer satisfaction (ACSI) and cost stickiness is 0.0048 and is statistically significant at the 1% level, supporting the hypothesis that higher future performance is likely to occur when relationship resources align with managers’ resource allocation and retention decisions.

Hypothesis 3 predicts that alignment of a firm’s relationship resources and resource allocation and retention decisions leads to more sustainable performance. Table 3-6 presents results of estimating the model in equation (3). The dependent variable is
ROA in period $t+1$ ($t+2$ and $t+3$ in alternative estimations), the independent variables include ROA in period $t$, cost stickiness, ACSI customer satisfaction, and their interactions. The results indicate that customer satisfaction increases the persistence of ROA (the coefficient is 0.143 and is significant at the 1 percent level) and that cost stickiness has a positive moderating effect on the influence of customer satisfaction on the persistence of ROA. The coefficient on the three-way interaction between cost stickiness, ACSI and ROA is 0.001 and statistically significant at the 1% level. The results indicate that customer satisfaction, aligned with resource commitment represented by SG&A cost stickiness, increases the sustainability of firm economic performance.

3.6 Conclusion

Resource-based theory considers how investments in resources that are not easily imitated provide a competitive advantage. The accounting literature considers how deliberate resource allocations decisions affect cost behavior. This study merges these two fields by investigating how development of a resource-based advantage leads to deliberate resource allocation and retention decisions that influence cost behavior. In this study, I interpret SG&A cost stickiness as evidence of commitment to a resource-based strategy to cultivate and sustain customer relationships. By interacting cost stickiness and customer satisfaction, I find that the positive association between
customer satisfaction and firm economic performance enhances as managers commit
to a resource based strategy.


Banker, R. D., Mashruwala, R., & Tripathy, A. (2014). Does a differentiation strategy lead to more sustainable financial performance than a cost leadership strategy? Management Decision, 52(5), 872-896.


### Table 3-1: Variable definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>Total operating revenues in the corresponding period.</td>
</tr>
<tr>
<td>SG&amp;A</td>
<td>Selling, General and Administrative expense</td>
</tr>
<tr>
<td>SGA-to-Sales</td>
<td>The ratio of SG&amp;A to sales</td>
</tr>
<tr>
<td>Ln assets</td>
<td>Log of total assets</td>
</tr>
<tr>
<td>ROA</td>
<td>The ratio of Return on total assets</td>
</tr>
<tr>
<td>Growth</td>
<td>Sales growth</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost-to-sales in the most recent sales increasing period minus that</td>
</tr>
<tr>
<td>stickiness</td>
<td>in the most recent sales decreasing period</td>
</tr>
<tr>
<td>ACSI</td>
<td>American Customer Satisfaction Index</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>The ratio of a firm’s market value to the current replacement cost of its assets.</td>
</tr>
<tr>
<td>Leverage</td>
<td>The ratio of long-term debt to total assets</td>
</tr>
<tr>
<td>Ad-to-Sales</td>
<td>The ratio of advertise expense to sales</td>
</tr>
<tr>
<td>R&amp;D-to-Sales</td>
<td>The ratio of Research development to sales</td>
</tr>
<tr>
<td>BTM</td>
<td>The ratio of Book to Market value</td>
</tr>
</tbody>
</table>

### Table 3-2: Sample selection procedure

<table>
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<tr>
<th>Category</th>
<th>Deleted</th>
<th>Cumulative Observations</th>
</tr>
</thead>
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<tr>
<td>Original ACSI (1994-2015)</td>
<td></td>
<td>5,632</td>
</tr>
<tr>
<td>International</td>
<td>660</td>
<td>4,972</td>
</tr>
<tr>
<td>Private company</td>
<td>1,298</td>
<td>3,674</td>
</tr>
<tr>
<td>No stickiness measure</td>
<td>1,072</td>
<td>2,602</td>
</tr>
<tr>
<td>Missing Ad &amp; Rd</td>
<td>1,420</td>
<td>1,182</td>
</tr>
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</table>
Table 3-3: Description of sample observations

Panel A: Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>25%</th>
<th>Median</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales($mil)</td>
<td>31,850</td>
<td>54,050</td>
<td>4,120</td>
<td>12,278</td>
<td>35,284</td>
</tr>
<tr>
<td>SG&amp;A($mil)</td>
<td>5,966</td>
<td>8,827</td>
<td>848</td>
<td>2,451</td>
<td>7,509</td>
</tr>
<tr>
<td>SGA-to-Sales</td>
<td>.237</td>
<td>.108</td>
<td>.167</td>
<td>.230</td>
<td>.291</td>
</tr>
<tr>
<td>Ln assets</td>
<td>9.293</td>
<td>1.832</td>
<td>8.248</td>
<td>9.305</td>
<td>10.301</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>1.084</td>
<td>0.233</td>
<td>1.003</td>
<td>1.056</td>
<td>1.119</td>
</tr>
<tr>
<td>ROA</td>
<td>.384</td>
<td>1.587</td>
<td>.112</td>
<td>.248</td>
<td>.473</td>
</tr>
<tr>
<td>Cost stickiness</td>
<td>-1.420</td>
<td>47.70</td>
<td>-.603</td>
<td>-.062</td>
<td>.170</td>
</tr>
<tr>
<td>ACSI</td>
<td>77</td>
<td>7</td>
<td>73</td>
<td>77</td>
<td>82</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>1.734</td>
<td>1.633</td>
<td>.834</td>
<td>1.288</td>
<td>2.130</td>
</tr>
<tr>
<td>Leverage</td>
<td>.384</td>
<td>1.587</td>
<td>.112</td>
<td>.248</td>
<td>.473</td>
</tr>
<tr>
<td>Ad-to-Sales</td>
<td>.053</td>
<td>.063</td>
<td>.014</td>
<td>.031</td>
<td>.067</td>
</tr>
<tr>
<td>Rd-to-Sales</td>
<td>.017</td>
<td>.029</td>
<td>0</td>
<td>.002</td>
<td>.023</td>
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<tr>
<td>BTM</td>
<td>1.554</td>
<td>4.596</td>
<td>.395</td>
<td>.718</td>
<td>1.335</td>
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Panel B: Spearman Correlation matrix

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>8</th>
<th>9</th>
<th>10</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SGA-to-Sale</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Ln Asset</td>
<td>-.16</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Sales growth</td>
<td>-.07</td>
<td>-.03</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4 ROA</td>
<td>-.01</td>
<td>-.11</td>
<td>.32</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Cost stickiness</td>
<td>-.04</td>
<td>-.03</td>
<td>-.03</td>
<td>.01</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 ACSI</td>
<td>-.05</td>
<td>.01</td>
<td>.01</td>
<td>.07</td>
<td>.06</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7 Tobin’s Q</td>
<td>.21*</td>
<td>-.23</td>
<td>.22</td>
<td>.63</td>
<td>-.09</td>
<td>.06*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8 Leverage</td>
<td>-.07</td>
<td>-.08</td>
<td>-.10</td>
<td>.06</td>
<td>.01</td>
<td>.13</td>
<td>.10*</td>
<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>9 Ad-to-Sale</td>
<td>.16</td>
<td>-.56</td>
<td>-.05</td>
<td>.16</td>
<td>.03</td>
<td>.21*</td>
<td>.32*</td>
<td>.17</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Rd-to-Sale</td>
<td>.20</td>
<td>.27</td>
<td>.00</td>
<td>.01</td>
<td>.02</td>
<td>.02</td>
<td>.07*</td>
<td>-.16</td>
<td>-.10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11 BTM</td>
<td>-.17</td>
<td>.24</td>
<td>-.19</td>
<td>-.51</td>
<td>.02</td>
<td>-.03</td>
<td>-.52</td>
<td>.01</td>
<td>-.18</td>
<td>.01</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: This table presents the descriptive statistics for firms with ACSI index. Panel A describes the distribution of SGA-to-Sale, Ln Assets, Sales growth, ROA, Cost stickiness, ACSI, Q, Leverage, Ad-to-Sale, Rd-to-Sale, BTM. See table 3-1 for variable definitions. Panel B presents the Spearman correlation matrix. * denotes significance at the 1% level.
Table 3-4: Customer satisfaction and cost stickiness

<table>
<thead>
<tr>
<th></th>
<th>Tobit</th>
<th>Tobit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( ACSI_{t+1} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost stickiness</strong></td>
<td>0.0034***</td>
<td>0.0032***</td>
</tr>
<tr>
<td></td>
<td>(3.81)</td>
<td>(3.15)</td>
</tr>
<tr>
<td><strong>ACSI(_t)</strong></td>
<td>0.8973***</td>
<td>0.9214***</td>
</tr>
<tr>
<td></td>
<td>(12.4)</td>
<td>(11.5)</td>
</tr>
<tr>
<td>( SGA-\text{to-Sales} )</td>
<td>0.0540***</td>
<td>0.0490**</td>
</tr>
<tr>
<td></td>
<td>(2.84)</td>
<td>(2.13)</td>
</tr>
<tr>
<td><strong>Ln Asset</strong></td>
<td>0.2014</td>
<td>0.1754</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(0.47)</td>
</tr>
<tr>
<td><strong>Sales growth</strong></td>
<td>0.1513</td>
<td>0.1678</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.24)</td>
</tr>
<tr>
<td><strong>ROA</strong></td>
<td>1.6214</td>
<td>1.5621</td>
</tr>
<tr>
<td></td>
<td>(1.05)</td>
<td>(0.91)</td>
</tr>
<tr>
<td><strong>Ad-to-Sales</strong></td>
<td></td>
<td>0.0320**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.04)</td>
</tr>
<tr>
<td><strong>R&amp;D-to-Sales</strong></td>
<td></td>
<td>0.0260</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.17)</td>
</tr>
<tr>
<td><strong>Year effects</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Industry effects</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>( N )</td>
<td>2602</td>
<td>1182</td>
</tr>
<tr>
<td><strong>R-square</strong></td>
<td>0.47</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating a model relating customer satisfaction (ACSI) to cost stickiness. See table 3-1 for definitions of the variables. The t-statistics are based on firm-clustered standard errors (Petersen 2009).

*, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
Table 3-5: Cost asymmetry, customer satisfaction and firm performance

<table>
<thead>
<tr>
<th>Tobin’s Q</th>
<th>Predicted sign</th>
<th>FE</th>
<th>FE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost stickiness</td>
<td>?</td>
<td>-0.01201***</td>
<td>-0.0132***</td>
</tr>
<tr>
<td>ACSI</td>
<td>+</td>
<td>0.0621***</td>
<td>0.0542***</td>
</tr>
<tr>
<td>ACSI*Cost stickiness</td>
<td>+</td>
<td>0.0053***</td>
<td>0.0048***</td>
</tr>
<tr>
<td>Asset</td>
<td>?</td>
<td>-0.2142</td>
<td>-0.1923</td>
</tr>
<tr>
<td>Leverage</td>
<td>?</td>
<td>-0.1347**</td>
<td>-0.1452**</td>
</tr>
<tr>
<td>Ad-to-Sales</td>
<td>+</td>
<td>0.7325</td>
<td>(0.89)</td>
</tr>
<tr>
<td>R&amp;D-to-Sales</td>
<td>+</td>
<td>1.7810</td>
<td>(1.34)</td>
</tr>
</tbody>
</table>

Year effects: Yes, Yes
Industry effects: Yes, Yes

N: 2602, 1182
R-square: 0.2403, 0.2612

Note: This table presents the results of estimating a model relating Tobin’s Q to cost stickiness and customer satisfaction using a fixed effects (FE) specification.

*, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
### Table 3-6: ROA persistence and stickiness, customer satisfaction

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>$ROA_{it+1}$</th>
<th>$ROA_{it+2}$</th>
<th>$ROA_{it+3}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ROA_i$</td>
<td>.476***</td>
<td>.397***</td>
<td>.273***</td>
</tr>
<tr>
<td></td>
<td>(12.81)</td>
<td>(8.67)</td>
<td>(5.23)</td>
</tr>
<tr>
<td>$ROA_i*Cost stickiness_i$</td>
<td>-.059***</td>
<td>-.113***</td>
<td>-.97***</td>
</tr>
<tr>
<td></td>
<td>(-3.49)</td>
<td>(-4.43)</td>
<td>(-2.99)</td>
</tr>
<tr>
<td>$ROA_i*ACSI_i$</td>
<td>.143***</td>
<td>.104***</td>
<td>.087***</td>
</tr>
<tr>
<td></td>
<td>(7.45)</td>
<td>(5.11)</td>
<td>(3.17)</td>
</tr>
<tr>
<td>$ROA_i<em>ACSI_i</em>$</td>
<td>.001***</td>
<td>.002***</td>
<td>.001***</td>
</tr>
<tr>
<td>$Cost stickiness_i$</td>
<td>(3.01)</td>
<td>(4.13)</td>
<td>(2.97)</td>
</tr>
<tr>
<td>$LnAsset_i$</td>
<td>.002</td>
<td>.003</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(1.37)</td>
<td>(.96)</td>
</tr>
<tr>
<td>$BTM_i$</td>
<td>-.014***</td>
<td>-.013***</td>
<td>-.016***</td>
</tr>
<tr>
<td></td>
<td>(-7.23)</td>
<td>(-5.65)</td>
<td>(-5.21)</td>
</tr>
<tr>
<td>$Leverage_i$</td>
<td>.004***</td>
<td>0.003</td>
<td>.005*</td>
</tr>
<tr>
<td></td>
<td>(2.91)</td>
<td>(0.66)</td>
<td>(1.79)</td>
</tr>
<tr>
<td>Year effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>2602</td>
<td>2382</td>
<td>2116</td>
</tr>
<tr>
<td>Adj R-Squared</td>
<td>0.3209</td>
<td>0.2803</td>
<td>0.1895</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating models relating ROA persistence to cost stickiness and customer satisfaction. *, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
Chapter 4 - Cost Behavior and Operating Strategy in the Airline Industry

Abstract

I use data from 2003 to 2015 for the US airline industry to investigate how asymmetry in airline firms’ cost behavior is associated with operating strategies of full service carriers (FSCs) and low cost carriers (LCCs). My research extends previous research on cost stickiness and competitive strategy by using a non-monetary activity driver (revenue passenger miles flown) as opposed to a dollar-value activity driver. This enables me to discriminate between price effects and volume effects when analyzing cost stickiness. Using revenue passenger miles as an activity-based cost driver for non-fuel operating costs, I document that cost behavior of full service carriers (FSCs), which operate hub-and-spoke systems, is sticky but cost behavior of low cost carriers (LCCs), which operate point-to-point systems, is not sticky. In separate analyses, I also test for stickiness of non-monetary measures of resources utilized instead of dollar-value operating costs. I find that both the number of employees and the number of flights are sticky with respect to RPMs for FSCs but are not sticky for LCCs. My study illustrates how asymmetry in cost behavior may affect variability in earnings for FSCs versus LCCs.
4.1 Introduction

Anderson, Banker, and Janakiraman (2003) document cost stickiness as an asymmetric response of costs to increases and decreases in activities. For example, selling, general & administrative (SG&A) costs increase relatively more when sales rise than they decrease when sales fall. ABJ and Anderson, Asdemir, and Tripathy (2012) focus on economic determinants of sticky costs. They assume managers make optimal resource commitment decisions. For instance, when sales decline, managers may decide to retain some employees who are not needed to support a lower level of sales rather than dismiss those employees. This phenomenon is explained by adjustment costs associated with hiring and firing employees and managers’ expectations for future sales (Banker, Byzalov, and Chen, 2012; Banker and Byzalov, 2014). Managers prefer to retain employees when adjustment costs are high and they are optimistic about future sales trends.

sub-categories, such as cost of goods sold and SG&A costs. Thus, prior findings imply that cost behavior and cost stickiness depend on industry and firm characteristics.

The airline industry provides a clean separation between full-service carriers (FSCs) that use a hub-and-spoke system and low-cost carriers (LCCs) that follow a point-to-point strategy.\(^3\) A hub-and-spoke network includes a series of nodes (hubs), connected by arcs (spokes) to provide viable transportation alternatives between two nodes (Taylor et. al. 1995). A point-to-point strategy connects cities in pairs. Availability of Form 41 data from the Bureau of Transportation Statistics (BTS) of the U.S. Department of Transportation (DOT) enables analysis of both costs and resources in relation to dollar-value and units of volume measures of activity.

In the airline industry, FSCs provide distinctive classes of services and facilitate a wide spectrum of individual travel needs through hub-and-spoke systems that use a variety of aircraft types. Because this operating strategy requires inter-connected resources and FSCs are heavily unionized (see Banker, Byzalov, and Chen, 2012), adjustment costs for releasing and adding resources are high. On the other hand, LCCs provide a limited selection of services through point-to-point systems on heavily traveled routes and are subject to less-restrictive labor agreements. Thus, LCCs can take out pieces (flights) and shut down portions of the business without disrupting the rest

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\(^3\) Some airlines classified as FSCs also control airlines classified as LCCs. These are typically separate operating units and are included separately in the DOT data.
of the business. Therefore, I conjecture that the cost structure of LCCs is less sticky than that of FSCs.

Previous literature on sticky costs has primarily analyzed changes in SG&A and other operating costs in relation to changes in the dollar value of revenue recognized. Theoretically, “the behavior of SG&A cost can be meaningfully studied in relation to revenue activity because sale volume drives many of the components of SG&A” (Cooper and Kaplan, 1991, p341). Empirically, ABJ “use sales revenue as an imperfect proxy for sales volume because sales volume is not directly observable.” (Anderson and Lanen, 2007). Cost stickiness observed in relation to sales may be biased due to price reductions (Cannon, 2014). Thus, it is meaningful to investigate stickiness with respect to non-monetary units of revenue volume as opposed to dollar values of revenue.

When there is a shift in demand, airline companies adjust fares so that revenue reflects a new mix of price and volume of sales (Cannon, 2014). Price adjustments in relation to input costs are likely to differ between FSCs that differentiate across fare classes and routes and LCCs that have simpler pricing heuristics. Therefore, I estimate the sticky costs model with revenue passenger miles (RPMs) as the revenue cost driver as opposed to the dollar value of sales revenue.

I find evidence that non-fuel operating costs are sticky for both FSCs and LCCs when I estimate the ABJ model with dollar value revenues as the cost driver. However,
when I estimate the model with RPMs as the cost driver, I find stickiness for FSCs but not for LCCs. This indicates that LCCs adjust the cost of resources utilized symmetrically with respect to increases in volume as measured by RPMs for periods when volume increases and periods when volume decreases. Because input prices may also change with shifts in product demand, another concern is that cost changes may not reflect changes in resource utilization. Therefore, I estimate the model with direct measures of resource utilization, including the number of employees and the number of flights, instead of non-fuel operating costs. I find that the number of employees and the number of flights are both sticky with respect to RPMs for FSCs but that neither is sticky with respect to RPMs for LCCs.

My paper contributes to the strategic cost management literature by empirically documenting an association between asymmetry in cost behavior and competitive strategy in the airline industry. This association is most apparent when non-monetary units of volume are used as the cost driver, suggesting an important role for price in this context. LCCs are often referred to as low-fare airlines reflecting their ability to pass cost savings on to customers. The findings suggest that an important strategic advantage of LCCs is their ability to manage resource utilization symmetrically when volume of sales increases and decreases. Such symmetry reduces earnings volatility.

The remainder of this paper is organized as follows. In section 2, I develop research hypotheses on sticky cost behavior by reviewing literature on cost behavior
and on competitive strategy in the airline industry. In section 3, I describe my research design. In section 4, I present information about the sample and variable definitions. In section 5, I provide details about the results of my analysis, and in section 6, I make concluding comments.

4.2 Literature review and hypothesis development

In this section, I first discuss literature on cost stickiness, which focuses on resource adjustment decisions. Then, I discuss literature on operational strategy as it relates to low cost carriers and full service carriers in the airline industry. Finally, I synthesize the above literatures and propose hypotheses.

4.2.1 Resource adjustment decisions

ABJ (p. 49) explain sticky costs as follows, “When demand increases, managers increase committed resources to the extent necessary to accommodate additional sales. When volume falls, however, some committed resources will not be utilized unless managers make the deliberate decision to remove them. Because demand is stochastic, managers must evaluate the likelihood that a drop in demand is temporary when deciding whether to adjust committed resources downward. Stickiness of SG&A costs occurs if managers decide to retain unutilized resources rather than incur adjustment costs when volume declines.” Anderson, Asdemir, and Tripathy (2012, p. 2) state, “Managers must intervene to adjust the resources that support an activity when
the activity demand increases or decreases. Asymmetric cost responsiveness or ‘cost stickiness’ happens when managers decide to retain resource slack [that is] created by a drop in activity demand.”

ABJ find that stickiness reverses in subsequent periods and stickiness declines with the aggregation of periods. They also find that the degree of stickiness increases with both asset intensity (the ratio of total assets to sales) and employee intensity (the ratio of the number of employees to sales). They observe that adjustment costs are likely to be higher when SG&A activities rely more on assets owned and people employed by a company than materials and services purchased by the company. Disposing of long-term assets is costly because the company must pay selling costs and lose firm-specific investments (installation and customization costs). Restructuring charges recognized when a firm downsizes typically involve large write-downs of fixed assets (Stickney and Brown, 1999). Similarly, adjustment costs are likely to be higher for firms that have more employees to support a given volume of sales. Dismissing employees is costly because employers must pay severance costs and hiring employees is costly because firms must pay search and training costs. In addition, companies experience productivity losses because morale declines when employees are laid off, and they may experience greater turnover because employee loyalty is eroded.

Banker, Byzalov, and Chen (2012) provide support for the influence of adjustment costs of dismissing employees on cost asymmetry. They build on prior research that
employment protection legislation (EPL) is associated with adjustment costs for labor. They find that the degree of cost stickiness is increasing in the strictness of EPL across countries. Their findings support the theory that sticky cost behavior is driven by managers’ deliberate resource commitment decisions in the presence of adjustment costs of labor. While they assume that the adjustment cost of labor is fixed at the country level because it depends on the EPL, I note that the adjustment costs of labor may vary at the firm level with, for example, the level of unionization.

Agency theory provides another perspective to explain asymmetric cost behavior. Dierynck, Landsman, and Renders (2012) argue that managerial incentives to meet or beat the zero earnings benchmark leads to asymmetric cost behavior. As a result, self-interested managers deliberately increase labor costs to a smaller extent for sales increases but decrease labor costs to a larger extent for sales decreases when earnings are low or negative. Likewise, Kama, and Weiss (2013) predict that the incentive to meet analyst earnings forecasts could mitigate the cost stickiness. Managers are inclined to cut slack resources in response to sales decreases when earnings would otherwise fall below analyst forecasts, resulting in a lower degree of cost stickiness than under normal circumstances. In contrast to this earnings management behavior, Chen, Lu, and Sougiannis (2012) find that managerial empire-building leads to cost stickiness because managers retain under-utilized resources. They show that strong corporate governance mitigates such asymmetry.
In this paper, I rely on the economic theory of sticky costs as opposed to alternative agency explanations (Banker & Byzalov, 2014). The economic theory of sticky costs implies a systematic positive relationship between the magnitude of adjustment costs and the degree of cost stickiness. Adjustment costs include both out-of-pocket costs and other costs such as loss of morale when firms downsize. They may also include disruption costs if removing a resource disrupts other business activities.

4.2.2 Operational strategy in the airline industry

After deregulation in 1978, the airline industry evolved into two groups of carriers: LCCs with point-to-point systems and FSCs with hub-and-spoke systems. The US Department of Transportation defines LCCs as scheduled carriers that focus on the presence of a single passenger cabin class, ‘no frill’ service, and standardized aircraft utilization (Zhang, Derudder, and Witlox, 2013). The business model of LCCs is simple. By reducing labor costs and improving capacity utilization, LCCs compete with FSCs by offering low fares on highly travelled routes with direct point-to-point systems.

LCCs have lower labor costs and higher labor cost flexibility. According to International Civil Aviation Organization (ICAO) fiscal 2001 data, at Delta Air Lines the average pay per employee was $54,761; at Frontier Airlines the average pay per employee was $30,384 (Morrell, 2005). LCCs have lower fixed salary and higher variable pay related to labor hours than FSCs. This salary arrangement not only improves productivity on a cost basis, but also reduces adjustment costs for labor.
FSCs invest in hub-and-spoke (HS) network structures because HS network structures allow airlines to exploit productive efficiencies from economies of traffic density (Nero, 1999). FSCs run a complex business model by providing a series of services. For instance, they develop sophisticated yield management techniques to manage multiple aircraft types. In addition, they offer in-flight entertainment, VIP waiting lounges, and other ‘frill’ services (Hazledine, 2011). However, as a result of their full-service business model and HS network, FSCs have difficulty reducing the number of flights when capacity utilization is low.

LCCs deploy a different operating strategy by using point-to-point (PP) network structures offering more direct flights (Gillen, Morrison, & Stewart, 2004). The PP organization has unique productivity advantages, such as low transportation costs and short travel time because of the absence of a transfer system (Taneja, 2004) and a low number of aircraft types. In contrast to FSCs, the modularity of the LCCs’ business model enables them to adjust the number of flights according to demand.

I synthesize asymmetric cost behavior theory with operational strategy to conjecture that the cost structure of FSCs is stickier than that of LCCs. This leads to the following hypothesis.

_**H1: Non-fuel operating expenses are stickier with respect to revenue changes for FSCs than LCCs.**_
Cannon (2014) evaluates asymmetric cost behavior in the airline industry. He demonstrates that the observed cost stickiness when sales revenue is used as a cost driver may be biased by price changes. If a company increases its prices when demand increases, the revenue change is greater than the volume change. Conversely, if a company lowers its prices when demand falls, the revenue change is less than the volume change. If input prices do not change equivalently with output prices, the observed cost behavior is distorted. Cannon (2014) finds that sticky costs may arise because airline managers lower selling prices to utilize existing capacity when demand falls, but add capacity (rather than raise selling prices) when demand grows.

Prior research suggests that RPMs, available seat miles (ASMs), load factor, and total passengers could be effective cost drivers associated with input resources, such as fuel consumed, transportation labor hours, service labor hours, aircraft maintenance and repair, selling expense, depreciation and amortization (Banker & Johnston, 1993, Cannon, 2014). 4

To discriminate between cost stickiness that is determined by price changes and cost stickiness associated with volume changes, I use revenue passenger miles (RPMs) instead of dollar-value sales revenue as a cost driver.

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4 I will develop the potential use of other cost drivers in future research.
H2: *Non-fuel operating expenses are stickier with respect to revenue-passenger miles (RPMs)* for FSCs than LCCs.

Another concern is that changes in input prices may influence cost stickiness. Therefore, I also substitute quantity-based input measures for dollar-value based input measures in my analysis.

H3: *The number of employees is stickier with respect to RPMs for FSCs than LCCs.*

H4: *The number of flights is stickier with respect to RPMs for FSCs than LCCs.*

4.3 Research Design

ABJ developed an empirical model to capture asymmetry in the cost response of selling, general and administrative (SG&A) expense to increases versus decreases of sales activity. I adopt and adjust their model as follows to test my four hypotheses.

\[
\log(OPR_{i,t} / OPR_{i,t-1}) = \alpha + \beta_1 \log(sales_{i,t}/sales_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(sale_{i,t}/sale_{i,t-1}) + \omega_{i,t} \quad (1)
\]

\[
\log(OPR_{i,t} / OPR_{i,t-1}) = \alpha + \beta_1 \log(RPM_{i,t}/RPM_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(RPM_{i,t}/RPM_{i,t-1}) + \omega_{i,t} \quad (2)
\]

\[
\log(employee_{i,t} / employee_{i,t-1}) = \alpha + \beta_1 \log(RPM_{i,t}/RPM_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(RPM_{i,t}/RPM_{i,t-1}) + \omega_{i,t} \quad (3)
\]

\[
\log(flights_{i,t} / flights_{i,t-1}) = \alpha + \beta_1 \log(RPM_{i,t}/RPM_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(RPM_{i,t}/RPM_{i,t-1}) + \omega_{i,t} \quad (4)
\]
where $OPR_{i,t}$ is the operating expense for firm ‘i’ in period ‘t’, $sales_{i,t}$ is sales revenue for firm ‘i’ in period ‘t’, $RPM_{i,t}$ is the revenue passengers miles for firm ‘i’ in period ‘t’, ‘decrease_dummy’ equals ‘1’ if $sales$ or $RPM$ decreases from period ‘t’ to ‘t-1’, "employee_{i,t}" is the number of employee for firm ‘i’ in period ‘t’, $flights_{i,t}$ is the number of flights for firm ‘i’ in period ‘t’. I run the above regression for FSCs and LCCs individually. $Sales$ are total operating revenues in the corresponding period. $Operating Expenses$ exclude special items, restructuring charges, and impairments.

### 4.4 Sample, variable measurement, and descriptive statistics

I construct a pooled dataset (panel data setting) using firm-quarter observations. The sample includes quarterly observations taken from fourteen airlines across 13 years (from 2003 to 2015). The initial sample size is 728 firm-quarter observations. I extract our activity-based cost driver RPM and the number of flights from data available at the Department of Transportation (DOT) website. I extract sales, fuel costs, operating expense and number of employees from 10-K filings. After merging the two datasets, I get a final sample consisting of 445 firm-quarter observations. I follow the DOT definition to classify FSCs and LCCs. The sample process is described in table 4-2.

Panel A of table 4-3 provides descriptive statistics on sales revenues, operating expenses, RPM, ASM, flights and employees for FSCs and LCCs. Not surprisingly, the FSCs are larger on average that the LCCs. On average, the sales and operating
expense of FSCs are $3,978 and $3,874 million, which are significantly greater than those of LCCs, $618 and $604 million. Similarly, on average, RPM and ASM of FSCs are 21,002 and 26,604 million, which are significantly greater than those of LCCs, 4,701 and 5,409 million. Moreover, on average, the numbers of flights and employees of FSCs are 128,000 and 49,000, which are significantly greater those of LCCs, 87,000 and 11,000. These latter statistics reflect the differences in the length of flights and services provided by FSCs versus LCCs.

Panel B of table 4-3 provides Spearman correlations for sales, operating expenses, RPM, ASM, flights and employees. The majority of the correlations are significant. For all the models that I estimate, I conduct multicollinearity diagnostic tests for all the independent variables in the models, including the interaction terms, with continuous variables demeaned for comparability (Belsley, Kuh, and Welsch 1980; Greene 2003). I find that the variance inflation factor (VIF), is less than 10 for all the variables, indicating that multicollinearity is not a concern in the estimation of our models.

4.5 Results

4.5.1 Operating strategy and asymmetry in operating costs

Hypothesis 1 predicts that operating expenses for LCCs are less sticky than those for FSCs. For each subsample, I follow the ABJ log specification to regress the changes of operating expenses, excluding fuel costs, on changes in sales revenue. In
the airline industry, fuel costs are a significant portion of operating costs and volatility in fuel prices affects operating costs across periods. In addition, firms hedge the volatility in fuel prices using financial derivatives. Therefore, I exclude fuel costs to remove noise in operating costs. I estimate the models with firm and time fixed effects and retrieve clustered robust standard errors (Cameron, 2005; Cameron & Trivedi 2009, Peterson 2009).

Table 4-4 presents results for non-fuel operating costs in relation to dollar-value revenues and RPMs. In table 4-4, the first column reports the results for FSCs. In panel A, I find that $\beta_1$ is significantly positive ($\beta_1 = 0.64, t = 11.27, p<0.01$). In addition, I find that $\beta_2$ is significantly negative ($\beta_2 = -0.19, t = -2.34, p<0.01$). The second column reports the results for LCCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.55, t = 13.67, p<0.01$). In addition, I find that $\beta_2$ is significant negative ($\beta_2 = -0.16, t = -2.08, p<0.01$). I interpret the coefficients to indicate that a 1% increase in sales revenue is accompanied by a 0.64% increase in non-fuel operating costs for FSCs and a 0.55% increase in non-fuel operating costs for LCCs. The degree of stickiness is associated with the magnitude of the negative value of $\beta_2$. Summing the estimated coefficients $\beta_1$ and $\beta_2$, I infer that a 1% decrease in sales is accompanied by a 0.45% reduction in non-fuel operating costs for FSCs and a 0.39% reduction in operating costs for LCCs. Thus, I find similar evidence of stickiness across the two strategy types when stickiness is defined by asymmetry in non-fuel operating costs in relation to changes in sales revenue.
4.5.2 RPMs as cost driver

Hypothesis 2 predicts that non-fuel operating expenses are stickier for FSCs than LCCs when RPMs are used as a non-monetary activity-based cost driver. In other words, the analysis in panel B of table 4-4 is based on the volume of passenger traffic as opposed to the fares paid by air travellers. The first column reports the results for FSCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.69$, $t = 11.46$, $p<0.01$). In addition, I find that $\beta_2$ is significantly negative ($\beta_2 = -0.27$, $t = -2.57$, $p<0.01$). The second column reports the results for LCCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.39$, $t = 9.71$, $p<0.01$) but I find that $\beta_2$ is not significantly different from zero ($\beta_2 = -0.08$, $t = -0.67$). Thus, I find that non-fuel operating expenses are sticky with respect to RPMs for FSCs but not for LCCs. This suggests that the stickiness I observed with respect to sales revenue is driven by fare changes for LCCs and not by changes in costs for the unit volume of activity.

4.5.3 Number of employees as resource utilized

Hypothesis 3 predicts that there is greater stickiness in the number of employees with respect to changes in RPMs for FSCs versus LCCs. In table 4-5, I present the estimations for the number of employees. The first column reports the results for FSCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.99$, $t = 12.04$, $P<0.01$). In addition, I find that $\beta_2$ is significantly negative ($\beta_2 = -0.94$, $t = -11.80$, $P<0.01$). The
second column reports the results for LCCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.13$, $t = 3.22$, $p<0.01$) but I find that $\beta_2$ is not significantly different from zero ($\beta_2 = 0.012$, $t = 0.17$).

I observe that the number of employees changes proportionately with an increase in RPMs for FSCs but does not decline appreciably when RPMs fall (high stickiness). On the other hand, I observe that a 1% increase in RPMs leads to a 0.05% increase in the number of employees for LCCs and a 1% decrease in RPMs leads to a similar decrease in the number of employees. I note that LCCs make employment agreements that include more variable components, apparently enabling them to flex their labor inputs symmetrically when activity rises and falls.

**4.5.4 Number of flights as resource utilized**

Hypothesis 4 predicts that there is greater stickiness in the number of flights with respect to RPMs for FSCs versus LCCs. In 4-6, I report the results of estimating the model that relates changes in the number of flights to changes in RPMs. The first column reports the results for FSCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 1.01$, $t = 12.09$, $p<0.01$). In addition, I find that $\beta_2$ is significantly negative ($\beta_2 = -0.57$, $t = -3.73$, $p<0.01$). The second column reports the results for LCCs. I find that $\beta_1$ is significantly positive ($\beta_1 = 0.47$, $t = 10.41$, $p<0.01$) but I find that $\beta_2$ is not significantly different from zero ($\beta_2 = 0.039$, $t = 0.64$, $P>0.1$).
These results suggest that FSCs expand the number of flights in order to accommodate additional demand for travel more than they contract the number of flights when demand for travel falls. LCCs, on the other hand, increase the number of flights to satisfy higher demand and decrease the number of flights to satisfy lower demand symmetrically. My findings are consistent with the hypothesis that FSCs cannot adjust the number of flights as easily given the interconnectedness of the hub-and-spoke operating system versus the LCCs who use a more modular point-to-point system.

4.6 Conclusion

This research extends recent research that relates competitive strategy to asymmetry in cost behavior (Banker, Flasher and Zhang, 2014) by investigating differences in asymmetry of cost behavior across FSCs and LCCs in the airline industry. An important advantage of this industry-specific research is the use of non-dollar-value measures of activity and resources. I document stickiness in both operating costs and resources utilized for FSCs but not for LCCs.

Asymmetry in cost behavior or sticky costs (differences between the downward and upward elasticity of costs with respect to changes in the volume of activity) is a different concept from operating leverage (elasticity of costs in relation to revenues) because it considers how cost changes (or changes in resources used) differ for activity increases versus activity decreases. Higher asymmetry in cost behavior leads to
greater volatility in earnings, potentially increasing risk and cost of capital. Studying asymmetry in cost behavior for FSCs in relation to LCCs helps to contribute information about a dimension of cost leadership that has not been studied extensively – the ability to flexibly adjust resource commitments to accommodate changes in demand.

An important element of operations is the ability to adjust resource commitments with changes in demand. My findings suggest that the interconnectedness of resource commitments for FSCs that use a hub-and-spoke system restricts their ability to adjust resource commitments whereas the modularity of the point-to-point system for LCCs enables them to adjust resource commitments quickly and retain cost advantages in both up and down markets.

Previous research on asymmetric cost behavior has primarily investigated cost stickiness or anti-stickiness using large data sets comprised of firms from many industries. Focusing on a specific industry enables richer analysis of cost behavior through understanding of cost drivers. The distinction between interconnected resources and modular resources may have applications in other industries, such as trucking and logistics or telecommunication.
Bibliography


Cameron, A. C., & Trivedi, P. K. (2009). *Microeconometrics using stata* Stata Press College Station, TX.


Table 4-1: Variable definitions

Operational Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM</td>
<td>Revenue passenger-miles, the number of revenue-paying passengers multiplied by the number of miles flown (provided by the Department of Transportation Statistics or DOT).</td>
</tr>
<tr>
<td>Flights</td>
<td>Number of flights made in a quarter (provided by DOT)</td>
</tr>
<tr>
<td>Employee</td>
<td>Number of employees reported for the quarter (Compustat)</td>
</tr>
</tbody>
</table>

Financial Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>REV</td>
<td>Revenues, total operating revenues in the corresponding period.</td>
</tr>
<tr>
<td>OPR</td>
<td>Operating Expenses, excludes special items, restructuring charges, impairments.</td>
</tr>
</tbody>
</table>

Table 4-2: Sample selection (2003 to 2015)

<table>
<thead>
<tr>
<th></th>
<th>Revenue and RPMs</th>
<th>Employees</th>
<th>Flights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm-quarters</td>
<td>728</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lags</td>
<td>-56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merger quarters*</td>
<td>-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total available</td>
<td>659</td>
<td>659</td>
<td>659</td>
</tr>
<tr>
<td>Missing data</td>
<td>-224</td>
<td>-156</td>
<td>-55</td>
</tr>
<tr>
<td>Final sample</td>
<td>445</td>
<td>503</td>
<td>614</td>
</tr>
</tbody>
</table>

*I manually delete observations because of mergers between US Air and American West in Q3 2007, Delta and Northwest in Q1 2010, United and Continental in Q1 2012.
Table 4-3: Descriptive statistics


<table>
<thead>
<tr>
<th></th>
<th>FSCs</th>
<th></th>
<th>LCCs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Expenses ($mil)</td>
<td>3,874</td>
<td>2,257</td>
<td>604</td>
<td>765</td>
</tr>
<tr>
<td>Sales Revenue ($mil)</td>
<td>3,978</td>
<td>2,313</td>
<td>618</td>
<td>810</td>
</tr>
<tr>
<td>RPM (mil)</td>
<td>21,002</td>
<td>12,000</td>
<td>4,751</td>
<td>5,177</td>
</tr>
<tr>
<td>Flights (000)</td>
<td>128</td>
<td>57</td>
<td>87</td>
<td>85</td>
</tr>
<tr>
<td>Employees (000)</td>
<td>49</td>
<td>26</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Panel B: Spearman Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(OPR_{i,t} / OPR_{i,t-1})</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(Sales_{i,t} / Sales_{i,t-1})</td>
<td>0.29</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(RPM_{i,t} / RPM_{i,t-1})</td>
<td>0.39</td>
<td>0.38</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(Flights_{i,t} / Flights_{i,t-1})</td>
<td>0.09</td>
<td>0.22</td>
<td>0.95</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>log(Employee_{i,t} / Employee_{i,t-1})</td>
<td>0.16</td>
<td>0.30</td>
<td>0.18</td>
<td>0.22</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Panel A presents the descriptive statistics for the FSC and LCC subsamples. Panel B presents the Spearman correlation matrix. All correlations are significant at the 1% level.
Table 4-4: Cost asymmetry for FSCs and LCCs subsamples

<table>
<thead>
<tr>
<th>Panel A: Revenue activity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FSCs</td>
<td>LCCs</td>
</tr>
<tr>
<td>Operating expense</td>
<td>Coefficient</td>
<td>t-statistic</td>
</tr>
<tr>
<td>(excluding fuel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue (log mil)</td>
<td>.064***</td>
<td>11.27</td>
</tr>
<tr>
<td>Decrease*Revenue</td>
<td>-0.19**</td>
<td>-2.34</td>
</tr>
<tr>
<td>N</td>
<td>236</td>
<td>209</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.74</td>
<td>0.69</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: RPM activity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FSCs</td>
<td>LCCs</td>
</tr>
<tr>
<td>Operating expense</td>
<td>Coefficient</td>
<td>t-stat</td>
</tr>
<tr>
<td>(excluding fuel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPM</td>
<td>.69***</td>
<td>11.46</td>
</tr>
<tr>
<td>Decrease*RPM</td>
<td>-0.27**</td>
<td>-2.57</td>
</tr>
<tr>
<td>N</td>
<td>236</td>
<td>209</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.61</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating operating expense asymmetry for the FSC and LCC subsamples. See table 4-1 for the definitions of the variables. The sample is partitioned into FSC and LCC subsamples based on Department of Transportation (DOT) definition. The fuel cost and operating expense data are extracted from Compustat and 10-K filings. The t-statistics are based on firm-clustered standard errors (Petersen 2009).

*, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
Table 4-5: Asymmetry of number of employees for FSC and LCC subsamples

\[
\log(\text{employee}_{i,t} / \text{employee}_{i,t-1}) = \alpha + \beta_1 \log (\text{RPM}_{i,t}/\text{RPM}_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(\text{RPM}_{i,t}/\text{RPM}_{i,t-1})
\]

<table>
<thead>
<tr>
<th>Employees</th>
<th>FSCs</th>
<th>LCCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
</tr>
<tr>
<td>RPM</td>
<td>0.99***</td>
<td>12.04</td>
</tr>
<tr>
<td>Decrease*RPM</td>
<td>-0.94***</td>
<td>-11.8</td>
</tr>
<tr>
<td>N</td>
<td>203</td>
<td>300</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.83</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating changes in the number of employees with respect to RPMs for the FSC and LCC subsamples. See table 4-1 for the definitions of the variables. The sample is partitioned into FSC and LCC subsamples based on Department of Transportation (DOT) definition. *, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.

Table 4-6: Asymmetry of number of flights for FSC and LCC subsamples

\[
\log(\text{flights}_{i,t} / \text{flights}_{i,t-1}) = \alpha + \beta_1 \log (\text{RPM}_{i,t}/\text{RPM}_{i,t-1}) \\
+ \beta_2 \text{decrease\_dummy} \log(\text{RPM}_{i,t}/\text{RPM}_{i,t-1})
\]

<table>
<thead>
<tr>
<th>Flights</th>
<th>FSCs</th>
<th>LCCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
</tr>
<tr>
<td>RPM</td>
<td>1.01</td>
<td>12.09***</td>
</tr>
<tr>
<td>Decrease*RPM</td>
<td>-0.57</td>
<td>-3.73***</td>
</tr>
<tr>
<td>N</td>
<td>233</td>
<td>381</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.77</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Note: This table presents the results of estimating changes in flights with respect to RPMs for FSCs and LCCs subsamples. See table 4-1 for the definitions of the variables. The sample is partitioned into FSC and LCC subsamples based on Department of Transportation (DOT) definition. *, **, and *** denote significance at 0.1, 0.05, and 0.01 using two-tailed tests, respectively.
Chapter 5 – Summary and Conclusion

The literature on asymmetric cost behavior addresses the question how managers adjust resources when sales decline. By relaxing assumptions that costs are either fixed or variable or that costs change proportionally and symmetrically with changes in volume, the asymmetric cost behavior model opens up the opportunity to analyze managers’ resource adjustment decisions. By comparing the change in costs when sales increase with the change in costs when sales decline, research provides insights about factors that influence managers’ decisions to retain or release resources in low demand periods.

Previous research has adopted two perspectives on managers’ deliberate decision-making when sales fall – (1) the adjustment costs perspective, where managers trade off the adjustment costs associated with removing and reacquiring resources with the carrying costs of retaining slack resources through the anticipated duration of a downturn, and (2) the opportunistic perspective, where managers decisions to remove resources are influenced by their self-interest.

My innovation and contribution to the literature is to use strategic positioning as a means for involving a decision context that enables consideration of factors influencing managers’ resource adjustment decisions. I believe that this enriches the study of
asymmetric cost behavior. In particular, it highlights the tension between resource commitment and resource flexibility.

Each of my three studies demonstrates that resources commitments made to execute and support specific strategic positions are important determinants of sticky costs, and two of my studies bring out the fact that efficiency-driven strategies require resource flexibility. In the first study, I find that differentiators, who employ specialized resources to achieve their strategic goals, have stickier costs than cost leaders who need resource flexibility to achieve cost advantages in both up and down markets. In the second study, I document that companies that seek to achieve a resource-based advantage by building customer relationships that endure through up and down markets have higher cost stickiness than other firms. In the third study, I show that airline companies that follow a full-service strategy and invest in hub-and-spoke networks have restricted resource flexibility that affects the volatility of earnings. I also provide evidence that an important element of strategy for low-cost carriers is their ability to adjust resource commitments quickly with changes in demand.

I believe that each of the three studies makes incremental contributions to both the accounting literature that seeks to understand drivers of cost behavior and to the strategy literature that investigates the implications of strategic choices for firm performance. The concept of commitment to strategy that affects inter-temporal cost behavior and the volatility of earnings over time has not been explored in the strategy literature.
In this regard, my first study investigates how alignment of strategic positioning and resource commitment reflected in cost stickiness affects firm performance. I find that the positive effect of differentiation on long-term value increases with commitment to strategy represented by cost stickiness. In my second study, I adopt the resource-based view of strategy. Investments in customer relationships enable the development of firm-specific capabilities. Because these resources are of greater value within the firm than outside the firm, the adjustment costs of disposing of and reacquiring these resources are high. I find that customer satisfaction, an output measure of customer relationship value, is associated with cost stickiness. Moreover, I find that the positive effect of customer satisfaction on long-term value increases with resource commitment represented by cost stickiness.

In my third study, I compare stickiness for companies that follow one of two distinctive operational strategies in the airline industry. Full service carriers (FSC) adopt hub-and-spoke strategies and low cost carriers (LCC) adopt point-to-point strategies. Here I am interested in the idea that FSCs need to build and maintain combinations of resource commitments to provide their connected services while LCCs care more about efficiency and resource flexibility. Using a cost driver based on quantities, revenue passenger miles, instead of revenues, I remove the influence of price changes on the observed stickiness. I find that costs and cost objects, including
operating costs, the number of employees and the number of flights, are sticky for FSCs but not for LCCs.

My analysis may have important implications for managers that seek to achieve strategic goals but wish to control the effects of strategy on cost behavior and earnings volatility. They may increase cost flexibility by making contracting decisions that reduce adjustment costs. For example, managers may hire more temporary employees and pay them hourly. Another implication is that, rather than invest in new capacity and operate new routes, managers may choose to outsource additional capacity. For instance, Air Canada and United Airlines make a code sharing agreement. Air Canada doesn’t operate between Houston to Miami, but it can acquire certain numbers of seats from United Airlines and those seats are also marketed and sold as Air Canada seats.

An important aspect of my dissertation research is that managers consciously make strategic choices that increase cost stickiness because such choices enhance long-term performance. This tension between strategic choices that lead to cost stickiness and increase earnings volatility versus strategic choices that increase resource flexibility and reduce cost stickiness has not been explicitly considered in the strategy literature and is a useful avenue for future research.