

Labor Turmoil and Service Quality:
Evidence from the U.S. Airline Industry, 1987-2008

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Abstract

Despite the existing literature on contentious forms of labor disputes, little is known about the relationship between less pronounced expressions of labor turmoil and product/service quality. To investigate how various forms of labor turmoil affect service quality, this thesis conducted an intra-industry event study to analyze unique carrier-craft-monthly data on the major U.S. domestic airlines between 1987 and 2008. This thesis contributes to the literature in two aspects. First, this thesis analyzed diverse forms of labor turmoil from both routine and disrupted industrial relations actions in the important areas of business strategy, employee representation, and collective bargaining. Second, exploiting detailed monthly measures of operational performance and passenger service, this thesis examined the relative contribution of each occupation's labor turmoil to service quality.

The empirical results strongly suggest that diverse forms of labor turmoil affect service quality in the airline industry. First, while strategic turmoil arising from the mergers and acquisitions generally had a significant effect on operational performance, representation and bargaining turmoil had significant effects on both operational performance and passenger service. Second, the significant effects on passenger service were obtained even after the correlations between operational performance and passenger service were accounted for. Third, representation turmoil from conflicts between employer and employees was more influential for affecting service quality than labor turmoil from conflicts among employees. Fourth, the legal framework governing the bargaining process under the RLA was also important for service quality. In particular,

the mediation/arbitration process is less visible than strikes, but its cumulative effects on flight cancellation from 1987-2008 were found to be well beyond the cumulative effects of strikes on flight cancellation.

Another unique finding is that the effect of labor turmoil on service quality has weakened in the post-9/11 period, particularly for representation and bargaining turmoil. Finally, this thesis shows how labor turmoil within particular occupations differentially affects service quality.

Taken together, this thesis suggests a need to broaden the conceptualization of labor dispute in the industrial relations literature and to expand what it considers to be the set of determinants of economic performance.

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Union Abbreviation

AFA	Association of Flight Attendants
AFA-CWA	Association of Flight Attendants-CWA
ALPA	Airline Pilots Association
AMFA	Aircraft Mechanics Fraternal Association
APA	Allied Pilots Association
APFA	Association of Professional Flight Attendants
ATE	Air Transport Employees
AWPA	America West Airlines Pilots
BRAC	Brotherhood of Railway and Airline Clerks
CPFA	Coalition of Professional Flight Attendants
CSEA	Civil Service Employees Association
CWA	Communications Workers of America
IAM	International Association of Machinists and Aerospace Workers
IBT	International Brotherhood of Teamsters
ICAP	Independent Association of Continental Pilots
IFFA	International Flight Attendants Association
PCCA	Professional Cabin Crew Association
PFAA	Professional Flight Attendants Association
ROPA	Ramp Operations & Provisioning Agents
SWAPA	Southwest airlines Pilots' Association
TWU	Transport Workers Union of America
UAW	United Automobile, Aerospace & Agricultural Implement Workers of America International Union
UFA	Union of Flight Attendants
UIU	United Independent Union
USAPA	US Airline Pilots Association
USWA	United Steelworkers of America

CHAPTER 1

INTRODUCTION

Empirical evidence on the union effects on productivity has shown that how unions and management interact at the workplace, rather than unions per se, affects product and service quality and broader measures of economic performance (Cutcher-Gershenfeld, 1991; Katz, Kochan, and Gobeille, 1983; Katz, Kochan, and Weber, 1985; Rubinstein, 2000). In particular, there is growing evidence that contentious forms of industrial conflicts (e.g., job actions and strikes) are costly to the firm through lowered product quality and increased production costs (Kleiner, Leonard, and Pilarski, 2002; Mas, 2008), and damaging to customers through product defects (Krueger and Mas, 2004) and lowered service quality (Gittell, von Nordenflycht, and Kochan, 2004; Lee and Rupp, 2007). Although the effects of contentious labor disputes on the quality of product/service are relatively well established, little is known about how less pronounced forms of industrial conflicts which develop from routine interactions between labor and management impact the quality of product/service and customer welfare. This is an important omission in the literature, because most labor-management interactions are relatively stable and routine in the contemporary U.S. workplace as opposed to the contentious kinds of labor disputes that are frequently studied.

The purpose of the thesis is to examine the relationship between diverse forms of labor turmoil and the quality of air travel service. Air travel service is a particularly important dimension of organizational performance to examine in conjunction with airline industrial relations in general and labor turmoil in specific for several reasons. First, air travel service is delivered to customers in a complex mix of intangibles that are difficult for airlines to standardize and monitor. Second, the service is delivered by the interdependent and often simultaneous job performance of employees from many different occupational groups (Gittell, 2001). Third, more than 60% of non-managerial employees in these occupational groups are represented by unions (Johnson, 2002), which are characterized as possessing distinctive skill sets to perform their own tasks in the service delivery process. Finally, the contemporary airline industrial relations are in a state of continuing bitterness and mistrust between labor and management (Gittell et al., 2004: pp.163). Under these circumstances, employees and their collective representation are likely to frequently experience labor turmoil that may affect service quality and customers' satisfaction.

This thesis employs an intra-industry event study of the U.S. domestic major airlines between 1987 and 2008. The U.S. airline industry over these two decades provides particularly excellent testing grounds for an event study with which to evaluate the effects of labor turmoil on service quality (for a detailed discussion of the airline labor market in the 1980s, see Cappelli, 1992; for the relationship between the pre-9/11 airline labor relations and service quality, see Gittell et al., 2004; and for the global airline labor relations, see Bamber, Gittell, Kochan, and von Nordenflycht, 2009). During

the period under investigation, the major U.S. airlines not only had to fiercely compete with low-cost carriers stemming from deregulation in 1978, but also experienced increasingly volatile travel demands (Bamber et al., 2009). The data under investigation reflects the residual effects from the later stage of the first massive wave of industrial consolidation through airline mergers for 1985-1987, and covers the second wave of the major airlines' bankruptcies and mergers in the 2000s, which in most part reflects the post-9/11 recovery process.

Simultaneously, airline industrial relations have deteriorated by most standards. This thesis focuses on the historical profiles of airline industrial relations from the later stage of the continuance of concession bargaining in 1983-1985 with a vast number of workplace disruptions to the post-9/11 development of airline industrial relations. As Gittell et al. (2004) observed, even before 9/11, airline industrial relations were becoming more adversarial. The major airlines and their unions experienced a contentious cycle of concession bargaining followed by union attempts to make up for these concessions. The emergency procedures set forth by the Railway Labor Act (RLA) to avoid work stoppages were frequently used, and visible job actions also increased. The adversarial patterns of airline labor relations were reinforced by the response of the major airlines to the economic consequences of 9/11 and still continue in the post-9/11 economic recovery period. However, there were substantial variations in such industrial relations events across carriers and across crafts within the same carrier (Gittell et al., 2004), a fact that the thesis will exploit to examine the relationship between labor turmoil and service quality.

This thesis contributes to the literature with two major innovations. First, instead of focusing on a strike or other highly contentious labor dispute in isolation, this thesis analyzes broad and diverse forms of labor turmoil that arise from both routine and disrupted industrial relations actions. The measures of labor turmoil used here are more detailed than have been in the literature, and include specific forms of labor turmoil in the important areas of business strategy, employee representation, and collective bargaining. Second, exploiting detailed monthly measures of operational performance and passenger complaints, this thesis examines whether labor turmoil in one occupation has impacts on the airlines' overall service quality, as well as on the particular dimensions of service quality for each occupation that it is expected to primarily serve. By doing so, it provides inferences about how labor turmoil affects service delivery process in the context of highly interdependent work environment among many different occupations.

All of the analyses are based on a unique data set, assembled from a variety of data sources, that provides information on labor turmoil at the occupation level within carriers. This occupation level of observations is both theoretically and empirically important in that it is the craft level within the carrier where labor and management exchange their strategic and tactical decisions that ultimately determine the patterns of industrial relations actions and outcomes. The occupations analyzed in this thesis are the big five crafts: pilots, flight attendants, mechanics, fleet service employees, and passenger service employees. The carriers analyzed are the ten major domestic airlines as of the year 2000, including seven legacy airlines and three most successful new entrants since deregulation.

Taken together, this thesis is the first to examine how different expressions of labor turmoil affect service quality within occupations within carriers. The empirical tests are particularly compellingly, because the detailed industry-specific measures of both service quality and labor turmoil control for important sources of unmeasured heterogeneity in the service delivery process, which would have been a problem in broader samples from diverse industries (Shaw and Ichniowski, 2009).

The results strongly show that diverse forms of labor turmoil affect service quality in the airline industry. The industrial relations literature needs to broaden its conceptualization of labor turmoil and expand what it considers to be the set of determinants of economic performance.

CHAPTER 2

LITERATURE REVIEW

2.1. Labor Turmoil Defined

Labor turmoil refers to a state of conflict and disturbance at the workplace caused by conflicts in interests and goals among actors within industrial relations. Thus, labor turmoil is used as a fairly comprehensive term to encompass industrial conflicts that have developed into *overt* forms of industrial conflicts, often called labor disputes (or labor strife) such as strikes or job actions, as well as an underlying set of *covert* forms of industrial conflicts that have the potential to grow into such overt forms.

Table 2.1 summarizes assumptions and representative studies of the leading empirical studies that have yielded insights into the relationship between labor turmoil and service quality.

2.2. Studies of Union-Related Events

2.2.1. Event Study Approach

The event study approach focuses on the occurrence and/or outcome of a union-driven event or an implementation of important labor policies *across* firms. Studies typically adopt event study method (Fama, 1969) to estimate the average effect of an event of interest across firms while treating other potential confounding factors as random error. Evidence from this approach is highly generalizable to a different research context, but with a loss of information on idiosyncratic labor relations which may have actually caused the occurrence or outcomes of the event of interest.

A majority of event studies has analyzed stock returns as organizational performance with various events, including announcement and completion of merger (Kim and Singal, 1993) and layoff (Farber and Hallock, 2009), union certification elections (Bronars and Deere, 1990; Ruback and Zimmerman, 1984) and decertification elections (Huth and McDonald, 1990), wage settlements through collective bargaining (Abowd, 1989), and concession bargaining (Becker, 1987), and strikes (Becker and Olson, 1986; DiNardo and Hallock, 2002; Neumann, 1980). These studies are based on a fairly strong assumption that the financial market is efficient so that all the information available in the market is immediately incorporated into stock prices (Campbell, Andrew, and MacKinlay, 1997). Evidence from these studies consistently suggests that such union-relevant events, on average, have a negative effect on stock returns. However, the consistent finding is at best suggestive to the relationship between such an event and the quality of product/service because the quality of product and service is a more direct outcome of the industrial relations than stock returns that are determined by many factors other than labor relations.

Two recent event studies provided direct evidence on the quality aspects of performance. In their recent event study on the pilots' concession bargaining in the post-9/11 period, Lee and Rupp (2007) found that pilots' wage cuts under bankruptcy protection were associated with the lowered performance of the flights' on-time arrival, but that this association did not last long.¹ In an analysis of the final offer arbitration cases between the New Jersey Police bargaining units and municipalities from 1978 to 1996, Mas (2006) found that bargaining units that were awarded higher wage increases experienced an increase in their policemen's performance as measured by per capita crime clearances. These two studies suggest that employees are likely to reduce their work efforts in response to such events which reduced their welfares.

2.2.2. Econometric Case Study Approach

The other event-oriented approach, often called the "econometric case study approach", focuses on the chain of contentious labor disputes *within* a firm or a plant over longer time spans. This approach analyzes rich micro-data about how certain types of labor turmoil originate from firm- or plant-specific labor relations and evolve over time, thereby providing direct implications to the relationship between labor turmoil and

¹ Lee and Rupp's (2007) event study analysis assumed that pilots did not expect the wage cut announced and implemented. To justify their assumption, they argued that a hike in the stock price came as a "surprise" to the stock market, therefore, it also came as a "surprise" to pilots (p. 755). But their justification ignored the fact that the parties already exchanged their proposal seven months before the agreement was ratified (i.e., US Airways proposed a 21% wage-cut and its pilot union (Airline Pilots Union Association (ALPA)) made a counter-proposal of a 17% wage-cut). It may be the case that the hike in the stock price would be more likely to represent a favorable response of the stock market to the size of wage-cut along with the elimination of the uncertainty regarding the size of the wage-cut.

organizational performance. Despite its rich analysis, its heavy reliance on a single case tends to limit generalizability of its finding to a broader context.

Not surprisingly, the strike has been the most frequently studied type of labor turmoil, perhaps because of its immediate effect on economic performance along with its high visibility and social significance. For example, Mas (2008) showed that the United Auto Workers' Caterpillar strike caused varying degrees of operational instability, which eventually resulted in frequent resales, worse appraisal reports, and lower list prices of the equipments produced during the strike. In their analysis of an aircraft assembly plant, Kleiner et al. (2002) found that a series of strikes and conflicts in whether to adopt total quality management practices increased production costs to secure product quality due to strict quality control of aircrafts by the Federal Aviation Administration (FAA). Finally, Krueger and Mas (2004) showed that a strike at the Bridgestone/Firestone's Decatur plant and the subsequently troubled work environment where strike participants co-worked with strike replacements led to customer casualties from product defects.

To summarize, studies from the econometric case studies provide deep-insights on the dynamics of labor-management relationship, but little research has been conducted on other expressions of labor turmoil other than strikes and related disputes with high visibility or social significance.

2.3. Studies on the Quality of Industrial Relations

While event-oriented studies focus on either occurrence/outcome of an event or a series of events within an establishment/firm, studies of the quality of labor relations focus on the level of industrial conflicts at the workplace or firm level as a determinant of organizational effectiveness. Central to this approach is a premise that the underlying quality of industrial relations, or “industrial relations climate”, often being characterized as “cooperative” or “adversarial”, affects the effectiveness of conflict management at the organization level and employees’ motivation and work efforts at the individual level, and these factors determine organizational effectiveness (Katz et al., 1983, 1985).²

A number of empirical studies suggest that firms or plants characterized by a cooperative labor-management relationship tend to have positive employee attitudes and behaviors, such as higher job satisfaction and organizational commitment, and lower absenteeism and turnover, and relative low grievance rates with high speeds of grievance resolution, and have higher levels of product/service quality, productivity, and profitability (Colvin, 2007; Cutcher-Gershenfeld, 1991; Katz et al, 1983, 1985; Kochan and Rubinstein, 2000; Norsworthy and Zabala, 1985). Of particular relevance to this thesis is Gittell et al.’s (2004) empirical evidence on the relationship between airline industrial relations climate and service quality. Analyzing the pre-9/11 airline industrial relations, they found that the quality aspects of industrial relations – as measured by culture and the frequency of mediation and arbitration – were more important

² In individual-level studies, the term “industrial relations climate” is often conceptualized as one reflecting individual’s subjective perception on the overall quality of labor-management relations (Deery, Erwin, and Iverson, 1999; Deery and Iverson, 2005). This concept has drawn attention for the possibility of dual commitment (i.e., employees’ organizational and union commitment) under a cooperative industrial relations climate (Angle and Perry, 1986; Sherer and Morishima, 1989).

determinants of service quality and productivity gains than the structural aspects of industrial relations such as unionization, shared governance, and wages.³

Although studies on the quality of industrial relations represent an important theoretical and empirical contribution to the literature, they are subject to several important limitations. First, there is no global consensus on how to appraise the quality of industrial relations. Common appraisals to measure the quality of industrial relations seem unsystematic and somewhat arbitrary in the selection of labor disputes. An integrative approach to appraise the quality of industrial relations is needed. Second, they are mostly cross-sectional. Although the quality of industrial relations is relatively stable over time, it is also situation- and time-bound. Thus, it is always desirable to consider the temporal fluctuations of the quality of industrial relations over the longer time span, not limited only to whether it occurred or not.

2.4. Summary

This chapter has reviewed the previous literature's empirical approaches to analyzing labor turmoil. Studies of union-related events from the event study and econometric case study approach and studies of the quality of industrial relations were the major groups of studies reviewed in this chapter. Although they differ in the assumption and treatment of labor turmoil in empirical analysis, they share some commonalities in that the occurrence

³ On the other hand, their measure of "workplace culture" seems problematic because they created the variable of "workplace culture" on the basis of their qualitative study, in which the relationship between a carrier culture and carrier performance was ascertained. In their specification, therefore, "workplace culture" would work in a manner of a self-fulfilling prophecy.

and outcomes of union-related events can be construed as behavioral outcomes determined by the quality of industrial relations.

This thesis attempts to address some limitations of these studies in empirical analysis. First, the most notable feature of the existing literature is that with few exceptions (Gittell et al., 2004; Lee and Rupp, 2007), most studies mainly center on product quality largely from the manufacturing sector, and relatively little of this identifies robust relationships with service quality. This thesis employs an intra-industry event study to examine the quality of air travel service in the U.S. domestic airline industry. Second, a more comprehensive approach to labor turmoil is taken to include less pronounced forms of labor turmoil from routine interactions between labor and management, in addition to contentious kinds of labor dispute in the industry. Third, by developing a historical profile of labor turmoil in the U.S. airline industry from 1987 to 2008, this thesis analyzes the effect of labor turmoil on service quality over a longer time span than is typically found in the industrial relations literature. Finally, the historical profile of labor turmoil was assembled at the occupation level, not at the carrier level, which minimizes discordance between the bargaining unit and the level of performance measures in the service delivery process.

CHAPTER 3

MODELING THE EFFECTS OF LABOR TURMOIL ON SERVICE QUALITY

3.1. A General Model of Service Quality

The theoretical underpinning guiding the previous research can be summarized in a general form:⁴

$$(1) \quad Q = f(L, K, v),$$

where Q is service quality, L is labor input, K is capital stock, and v is the idiosyncratic random element in service production.

It is assumed that labor input (L) is a product of the number of workers (N), the number of hours (H), and the intensity of effort of the workers (E). It is further assumed that these elements of labor are affected by labor turmoil, and then $NHE=L(T)$. Therefore, the final model is expressed as

$$(2) \quad Q = f(L(T), K, v),$$

where T is labor turmoil.

⁴ In essence, the model is identical with an enriched model of the standard production function (Kleiner et al., 2004), except that the current model does not impose an *a priori* functional form.

An overarching prediction the model postulates is that service quality is a function of labor input deteriorating in a number of aspects of the process and context, in which labor turmoil affects employee attitudes and behaviors, which as determinants of the level of labor input affect service quality.

The model proposes two causal relationships.⁵ The first predicts labor turmoil as a determinant of worker attitudes and behaviors. Labor turmoil can create uncertainty as to job security, wage and benefits, and other aspects of the employment relationship in the workplace. For example, mergers & acquisitions (M&As) can create uncertainty as to job security through job displacement or dismissal, the representation rights through the transfer of certification, and the potential reduction in wages and benefits through changes in established labor contracts. Similar uncertainties may arise when the organization is in financial distress or under bankruptcy protection.

Likewise, employees are likely to have low trust in their employer or be less committed toward the organization when they have seen their legally guaranteed rights interfered with by their employer, as in union certification election interferences by employer. When their employer does not negotiate in good faith and contract negotiation is in a stalemate, employees may well think that their employer treats them as a simple labor input. In the presence of labor turmoil, therefore, employees are more likely to

⁵ The third component is a recursive form with more complex causal relationships. The animosity and distrust accumulated from the past adversarial relationship contribute to a low-trust-high-conflict spiral that further undermines the capacity of the parties to pursue common goals (e.g., a joint program for service quality) and increases the likelihood that visible workplace disruption would occur and persist for a longer period of time. That is, the past patterns of distrustful interactions determine the future patterns of labor industrial interaction (Cutcher-Gershenfeld, 1991).

develop negative attitudes toward such events causing labor turmoil, and be dissatisfied with their job, and less committed toward organization.⁶

The second predicts the relationship between employee attitudes and behaviors and service quality, which has been well established in various disciplines (for a direct application to service quality, see Heskett, Sasser, and Schlesinger, 1997). Job dissatisfaction would likely lead employees to temporarily withdraw themselves from the job (i.e., absenteeism) or permanently to leave the carrier (i.e., turnover) (Deery, Erwin, and Iverson, 1999; Deery and Iverson, 2005; Harrison and Martocchio, 1998); or may actively engage in individual forms of voice, such as grievance filing (Katz et al., 1983, 1985; Colvin, 2007). In particular for the airline industry, absenteeism and turnover can be substantially damaging to carriers by affecting labor input for prescheduled operation plans. Carriers are likely to experience the interference in the proper functioning of the work groups, and suffer from direct loss of firm-specific training and the increased personnel costs of keeping staffing levels negotiated in labor contracts or for service and safety purposes (Gittell et al., 2004).

Even at full operation, wherein the number of employees and their working hours are in operation as scheduled, dissatisfied employees are less likely to be motivated to work hard and committed to the organization, thereby affecting service quality. They are

⁶ The quality of industrial relations can play as a moderator to the relationship between labor turmoil and employee attitude and behavior (e.g., Fuller and Hester, 1998). Employees in cooperative labor relations are likely to feel the uncertainty incurred by management's strategy implementation less than employees in adversarial labor relations. Cooperative labor relations could help to prevent employees from developing severe concerns through the better conflict resolution system or employee participation or labor-management programs (Kelley and Harrison, 1992). In contrast, employees in adversarial labor relations would perceive such events as threats to the employment relations and, therefore, form negative attitude toward the events.

predicted to reduce their work efforts to satisfy the minimum requirement of job-related tasks and activities necessary for delivering and maintaining service quality (Heskett et al., 1997; Schneider and Bowen, 1985, 1995). Also dissatisfied employees are less likely to work collaboratively, or fail to perform proper communications with coworkers (Ostroff, 1992), thereby interfering with the normal functioning of a work group to provide services to customers.

When job dissatisfaction is wide spread in workgroups, employees may develop group norms to control the daily routine service delivery process, or may organize collective actions to defeat the common roots of dissatisfaction when certain conditions are met (Kelly, 1998).⁷ It seems obvious that such collective actions reduce service quality. When workplace disruption occurs, where employees refuse to perform their jobs and engage in various job actions to fail the normal functioning of service delivery process, simply there is no labor input available for airlines to meet scheduled operations and various demands from passengers. Therefore, it would likely reduce service quality and customer satisfaction.

In addition, the current thesis empirically examines three important issues that are not explicitly addressed in the model. First, there has been little attempt to quantify the economic manifestations of less visible and more routine types of labor turmoil. While causing an immediate workplace disruption, contentious labor disputes rarely occur in the contemporary workplace and their effects might be temporary (Krueger and Mas, 2004;

⁷ Kelly (1998) argued that job dissatisfaction is not sufficient for collective action. It is possible only when employees attribute management to injustice (i.e., management is responsible for the roots causing their job dissatisfaction) and they share a sense of collective identity in the workplace.

Kleiner et al. 2004). In contrast, more routine types of labor turmoil (e.g., mandatory mediation under the Railway Labor Act) may be less visible but persist over a long period. Therefore, it may be the case that compared to the effects of such contentious kinds of labor disputes, the cumulative effects of more routine types of labor turmoil on service quality can be substantial.

The second issue is to examine whether labor turmoil has differential effects on operational performance – as a set of objective measures – and passengers’ behavioral response to service they experienced – as a set of subjective measures. While carriers may be alerted for operational performance in the presence of labor turmoil, it may not be for direct contact with passengers, which is difficult to monitor and standardize.

Finally, the model implicitly assumes that employees are homogeneous in terms of their ability to affect service quality. While innocuous when the focus is on a core group of employees in an empirical context, this assumption may not be valid for other research contexts such as the airline industry, where several distinctive groups of employees are characterized as having different abilities to affect service quality. This will be discussed in Chapter 7.

3.2. Empirical Framework

This section presents an empirical framework that focuses on the strategic and functional level of labor-management interactions as sources of labor turmoil. Consistent with Kochan, Katz, and McKersie’s (1986) three-tier institutional framework, the empirical

framework presumes that a series of specific conflicts of interest between actors within industrial relations emerge, evolve, and are resolved at the strategic, functional, and workplace level of the firm's industrial relations system. Specifically, *strategic* turmoil refers to labor turmoil which results from disagreements over management's choices on various management strategies. In this thesis, M&A and bankruptcy in the airline industry are analyzed as sources of strategic turmoil. *Functional* turmoil refers to labor turmoil resulting from the labor-management interactions encompassing the functional areas of employee representation (i.e., representation turmoil) and collective bargaining (i.e., bargaining turmoil).⁸

Given that the chief goal of the RLA is to “avoid any interruption to commerce or to the operation of any carrier engaged therein (Section 151a)” in the U.S. airline industry, it is essential to understand how the RLA conditions ways that strategic, representation, and bargaining turmoil occur and evolve over time.⁹ In particular, it is important to consider employee representation and collective bargaining in the context of the rights and protections that the RLA provides to both carriers and airline workers. The

⁸ Though not the focus of the current thesis, another type of labor turmoil, i.e. workplace turmoil, should be noted. Workplace turmoil refers to labor turmoil resulting from administration of collective bargaining agreement, work organization, and forms of labor-management cooperation on production (Kochan et al., 1986, p. 15-18). Under the RLA, grievances, or “minor disputes”, arising from disagreements over whether or not someone's rights as specified in the existing collective bargaining agreement have been violated must be handled through grievance arbitration that involves a hearing before a third-party neutral (i.e., arbitrator) over a dispute. If not resolved, grievances cannot be used to trigger self-help actions. In this thesis, workplace turmoil is not included because historical profiles of grievance at the craft level over the years 1987-2008 are not available and are extremely difficult to collect.

⁹ Established as the legal authority of the RLA in 1934, the National Mediation Board (NMB) administers a variety of specified procedures to be followed when a labor dispute is found. As for the grievance arbitration the role of the NMB is minimal in that the NMB furnishes panels of prospective arbitrators for the parties' selection.

following sub-section discusses the sources of labor turmoil one by one, whenever necessary, along with the relevant features of the RLA.

3.2.1. Strategic Turmoil

Under the RLA management's strategy formulation is not a mandatory bargaining subject, but management's implementation of a formulated strategy may be subject to the RLA if the strategy implementation causes changes in the areas of employee representation and established collective bargaining agreements. Hence management's strategic choice is carrier-wide in its application but its application may evolve differently by the union status of each craft.

Although these strategies are assumed to reduce service quality through employees' negative attitudes and behaviors toward these strategies, they may improve service quality through rationalization of carrier's operations. For instance, the merging carrier typically adjusts its capital to optimize operational capacity through elimination of duplicative hubs and routes and integration of computer systems and similar airline fleets (GAO, 2008). Likewise, carriers with financial distress or under bankruptcy protection often rescale their operations and eliminate non-profitable routes and outsource in-house services (Borenstein and Rose, 1995). Therefore, it is likely that optimal uses of carriers' resources may moderate or offset any deterioration in service quality associated with labor inputs.

Merger & Acquisition (M&A)

When the M&A is imminent, employees in both the merging and the merger target carriers may well have elevated concerns of job security and other possible disadvantages in pay and seniority, which would eventually influence employee receptivity and reaction to the proposed M&A. Experience from past airline mergers in the 1980s and until recently suggests that the employees were vulnerable to the M&As, particularly when they were displaced or dismissed due to the merger. Although the Airline Deregulation Act in 1978 had the labor protective provisions which guaranteed priority in hiring and some allowances in case of displacement and dismissal, the Department of Transportation (DOT) encouraged employees to obtain these labor protective provisions through collective bargaining. For this reason, unions fight to keep as many employees rights as possible in terms of the pay, seniority, work rules, and job security.¹⁰ Thus, the airlines in the merger process are likely to experience intense labor-management conflicts over representation rights and over the negotiation of contracts during the early stage of the M&A.

When a series of merger talks, including the government's approval, and financial integration are in place, employees' concerns over possible disadvantages induced by the M&A would become salient. These concerns are likely to carry over into the post-merger workforce integration process through changes in employee representation either by the

¹⁰ The labor protective provision in the Consolidated Appropriations Act of 2008, signed by President George Bush in December 27, 2007, applies to the integration of employees of any future airline mergers or acquisitions.

transfer or extinction of certification, as well as through changes in established labor contract, including changes in the seniority formula.

Specifically, the M&A can create many different combinations of changes in employee representation, which have different implications to employees from both the merging and merging target carriers (see Appendix A for the NMB's single carrier determination rules and Appendix B for the past M&As and changes in employee representation from 1987 to 2008). Even in cases where employees lose their representation due to the M&A, there is an increasing likelihood that the combined carrier would go through a highly contested process of new certification election or raid election in near future (Kochan, 2008).

Perhaps the most challenging part during both the transition period and the post-merger negotiation period is an integration of seniority lists of employees from two different entities.¹¹ This is not only because each carrier has developed a unique human resource management system through a long history of collective bargaining but also because seniority is almost the sole factor in determining employees' salaries and benefits, and job security (keeping their job and priority in hiring when laid off during a downturn), and for pilots and flight attendants, types of aircraft they can fly, and flight schedules. For this reason, seniority integration is often carried out through a binding

¹¹ A recent America West Airlines-US Airways merger in 2005 showcased how the integration of seniority list is important to the employees. The Airline Pilots Association (ALPA), which represented pilots at both carriers, went through a smooth transition period. But pilots who were dissatisfied with pilots' seniority integration after the merger formed an independent union, the US Airline Pilots Association (USAPA), and won its certification against the ALPA in March 2009.

arbitration after the completion of the merger or prolonged until new contract talks kick off while keeping seniority the same as prior to the merger.

For empirical purposes, the M&A process is measured by two discrete events. Financial integration is measured by the event window from the date of official announcement to the completion date of ownership transfer. To measure post-merger workforce integration, a generic interval from 1 year to 3 years after the completion of financial integration is adopted.¹² The generic interval allows us to capture any residual resentment over the M&A, including disputes over integrated seniority lists and legal challenges that claim violations of fair representation of union. Also differences in workplace culture, such as job routines, ways to resolve conflict, job autonomy and discretion may also delay the workforce integration between the employees at the merging carrier and the merger target carrier. These factors can create the conditions that lead to lowered service quality during the post-M&A period.

Finally, it is possible that employees at the merger target carrier and the merging carrier would anticipate an imminent M&A before these carriers officially announce the M&A plan. Thus, employee anticipation of the proposed M&A may affect service quality even prior to the official announcement. Since there is no precise information on when a rumor of a potential M&A begins to float around, again a generic interval from one

¹² An alternative way to operationalize the post-merger workforce integration is to use the date of the first post-merger labor contract settled after the merger as a completion date of the post-merger workforce integration. However, seniority list integration is typically negotiated separately from contract negotiation and often separately maintained for a long time. Also it is extremely difficult to collect relevant information completely. For these reasons, this thesis adopts the generic interval approach to the post-merger workforce integration process here.

month to three months prior to the month the M&A is officially announced is adopted to examine if the anticipation of the M&A is associated with lowered service quality.

Bankruptcy Protection

Bankruptcy protection is a *strategic* option to the near-bankrupt carrier in a sense that the carrier with an obligation to bargain with unions can take advantage of several provisions of the U.S. Bankruptcy Code in its restructuring of labor costs *without* the union's agreement under the bankruptcy protection.¹³

Here a typical collective bargaining scenario under bankruptcy protection is illustrated. Once a carrier with financial distress files for bankruptcy protection, it must try to negotiate a short-term relief plan with its unions to alleviate its immediate financial burdens and maintains its operations under the protection. If the carrier fails to reach an agreement with its unions, it can seek court approval to impose an interim agreement under Section 1113(e) of the U.S. Bankruptcy Code. If approved, the unilateral imposition of interim relief comes with a time-limit.

¹³ The 1984 amendment added several procedures to which the bankruptcy court must adhere in order to impose interim changes and reject collective bargaining agreements. For an imposition of interim changes, the Amendment required the bankruptcy court to order interim changes only after notice and an opportunity for a hearing, and only if the interim changes are essential to the continuation of the debtor's business or necessary to avoid irreparable damage. For a rejection of a collective bargaining agreement, Section 1113(c) states that "the court shall approve an application for rejection of a collective bargaining agreement only if the court finds that (1) the trustee has, prior to the hearing, made a proposal that fulfills the requirements of Subsection (b)(1); (2) the authorized representative of the employees has refused to accept such proposal without good cause; and (3) the balance of the equities clearly favors rejection of such agreement." Subsection 1113(b)(1) requires that a debtor "(A) make a proposal to the authorized representative of the employees covered by such agreement based on the most complete and reliable information available at the time of such proposal, which provides for those necessary modifications in the employees benefits and protections that are necessary to permit the reorganization of the debtor and assures that all creditors, the debtor, and all of the affected parties are treated *fairly* and *equitably*; and (B) provide . . . the representative of the employees with such relevant information as is necessary to evaluate the proposal."

After the negotiation over an interim agreement closes, the carrier tries to negotiate a permanent restructuring plan to ensure that the financial plans necessary for exiting from bankruptcy are in place. Again, if the carrier fails to reach a permanent agreement with its unions, it can seek a court approval to vacate existing collective bargaining agreements and develop its own terms of wage and employment consistent with its restructuring plans under Section 1113(c) of the U.S. Bankruptcy Code. It may also seek the termination of its defined pension and benefit plans under Section 1114(g) of the U.S. Bankruptcy Code.

For empirical analysis, the bankruptcy process is measured by one event window from the date of the bankruptcy protection filed to the exit date of the bankruptcy protection. Employees who face an imminent bankruptcy filing or are under bankruptcy protection are likely to have elevated concerns about losses of pay and benefits through concessionary bargaining, and most importantly, job security due to mass layoffs and outsourcing, and therefore form negative attitudinal and behavioral responses to the bankruptcy protection.

Finally, it is likely that employees may anticipate their firm's imminent bankruptcy filing when their firm had gone through financial distress for the past years or when management threatens to file bankruptcy protection for concession demands. Since there is no precise information on employee's anticipation or the timing of the threat, generic intervals from one month to three months before the month the bankrupt carrier actually filed are imposed to examine if the pre-bankruptcy protection period is associated with lowered service quality.

3.2.2. Representation Turmoil

The RLA, unlike the National Labor Relations Act (NLRA), narrowly defines the bargaining unit in terms of crafts (i.e., pilots, flight attendants, maintenance, and so on) and uses a carrier-wide definition of bargaining unit in terms of geographical location. In a typical representation election, therefore, eligible voters are employees who perform a set of similar tasks in certain job categories and are geographically dispersed across a carrier's operation. As for a required showing of interest, a minimum 35 percent of showing interest from eligible voters is required for a *certification* election; and a minimum 50 percent of showing interest for a *raid* election.¹⁴ When the majority (i.e., 50% plus one) of eligible workers votes to be represented, the carrier is legally obliged to bargain in "good faith" with the certified representative; otherwise the petition for certification is dismissed (or an incumbent union loses its certification in the raid election).

There are many potential reasons why labor turmoil can be severe throughout the entire representation election process. It is well accepted that managers in the U.S. are exceptionally hostile toward unions (Jacoby, 1991; Kleiner, 2001). In the presence of a union organizing drive, the U.S. managers generally adopt various anti-union tactics

¹⁴ In addition to the two types of elections, in rare cases, a union can be recognized by the carrier without the certification election. However, the NMB does not allow a petition for decertification only. Employees who do not want to be represented by their union can decertify their union if they can first meet the requirement of the 50 percent of showing of interest and more than a half of eligible voters do not vote at all.

(legal or illegal) to defeat union organizing drives or to decertify existing unions (Brofenbrenner, 1994; Weiler, 1983). When either party alleges *election interference*, the NMB investigates the allegation(s) and, depending on the severity of interference, may rule to invalidate the election outcome and order a re-election with some remedies.

In my empirical analysis, representation turmoil is measured by two event windows: (1) from the date of election petition filed to the date of the NMB determination; and (2) to the date the initial collective bargaining agreement is signed.

First, consider the date of election petition filed to the date of the NMB determination. Because the NMB determines an appropriate bargaining unit and total number eligible voters after a petition for union election is filed, a “card drive” for the petition necessarily embodies uncertainty regarding (1) whether employees who signed the union card belong to the job classifications the union targets to organize, and (2) whether they worked before the cut-off date. The uncertainty dissipates with the NMB’s determination of either dismissal or election authorization, but often can result in an objection to the determination. Union petitioners typically file an objection to the eligibility decision when their petition is dismissed due to an insufficient showing of interest. In contrast, when an election is ordered, the carrier often files an objection to the bargaining unit and eligibility decision. The carrier’s objection can delay the election schedule because this objection entails another investigation by the NMB that is often not resolved before the scheduled ballot mailing date.

Next, consider the date of the NMB determination to the first contract settled.¹⁵ Even when a union wins the election, the representation turmoil may continue until the settlement of the first contract. This would be particularly severe when many significant violations have occurred during a course of the election or when the carrier refuses to negotiate or does not negotiate the first contract in good faith or when a newly certified union stretches its demands too far. If this were the case, conflicts over the first contract are likely to reduce service quality (Ash and Seago, 2004).

In addition to the two event windows, this thesis further explores a potential interplay between the type of election petition and the NMB's determination of the petition in affecting service quality. It is likely that employers have strong incentives against union-organizing drives to a nonunionized craft in the carrier, but less incentive to already unionized crafts. This is because a unionization of nonunion craft would restrict the carrier's discretions in employment-related decisions with substantial economic consequences through changes in wage and benefits and other terms of the employment relationship. Furthermore, the type of election manifests whose interests are in conflicts over employee representation. A certification election represents the conflicts between the carrier and employees, whereas a raid election represents the conflicts among different employee groups. Finally, the NMB's determination clears the uncertainty as to

¹⁵ This thesis considers only the first contract negotiation of a certification election. This is because in contrast to a typical certification election process that ends with an agreement of the first contract, a raid election has two broad combinations of collective bargaining after the election ends. When an incumbent union wins the election, schedules for collective bargaining remain the same as before the petition was filed. When a raider wins the election, the schedules would depend on a timing of the petition filed. For example, when the established contract is not amendable, then the raider administers it. When amendable, the raider will take over bargaining at the stage the incumbent union left.

an appropriate bargaining unit and eligibility of employees. The NMB's determination on whether a petition is dismissed or ordered for election may lead a different phase of representation turmoil. Are employees frustrated by not having any chance of voting for a union? Or, does an upcoming election gear up representation turmoil more intensely? This thesis will present rich analysis of the effects of representation turmoil on service quality.

3.2.3. Bargaining Turmoil

The other key piece of the RLA is that bargaining disputes arising from disagreements over proposed changes in collective agreements must be handled through mediation in the context of a judicially enforced *status quo*. If not resolved, the parties cannot engage in self-help actions (a strike for a union and a lockout or imposition of its own contract terms for the carrier), once the NMB permits them to do so after the mandatory steps are exhausted. When the parties fail to reach an agreement through the mediated negotiation and either party rejects the proffer of arbitration, the NMB releases the parties from the mediation, which immediately sets off a thirty-day cooling-off period. If the parties fail to reach an agreement at the end of the first cooling-off period, the NMB either permits the parties to engage in a lawful *self-help* or refers the case to the President of the United States who can establish a Presidential Emergency Board (PEB) composed of three neutral experts. If the NMB releases the parties for self-help actions, a carrier can impose new contract terms unilaterally while employees can go on a strike. If the NMB refers the

case to a PEB, a second thirty-day cooling-off period is set off. The PEB develops a recommended settlement. With an issuance of the PEB recommendations at the end of the second cooling-off period the third cooling-off period is automatically started. If the parties neither accept the recommendations nor reach a new contract on their own, the parties are free to engage in self-help actions at the end of the third cooling-off period.

As the RLA specifies, the mandatory bargaining procedures are separately measured in four event windows with qualitative discontinuity in empirical analysis: (1) direct bargaining; (2) mediation (and arbitration); (3) cooling-off period; and (4) self-help actions that comprises of strike and no strike. To my knowledge, this study is the first to investigate whether or not each bargaining step required by the RLA affects service quality and, if so, how the effects differ. Indeed, this investigation is important because such restrictions on strikes or lockouts may result in unintended lengthy bargaining sequences. In other words, the negotiating parties can delay their efforts to urgently negotiate their differences to the self-help stage, while leaving passengers vulnerable to the ill effects of the bargaining turmoil for an extended period of time.

As the negotiating parties head towards later stages of the bargaining procedures, they would identify some critical differences in the negotiated terms that were difficult to resolve and become engaged in more intense negotiation than they had in the previous steps. The tension would continue to mount as the parties face imminent release from mediated negotiation and prepare for legal self-help actions in the cooling-off period(s) and the period pending in the PEB. Eventually the tension would reach its peak when

legal self-help actions are actualized, that is, strike on the union side and unilateral imposition of the carrier's terms on the carrier side.

Therefore, the negative effect of the bargaining process on service quality is hypothesized to increase as the negotiating parties move towards latter stages of the bargaining process. Specifically, it is likely that direct negotiation would have no effect on service quality whereas mediation and arbitration would have a negative effect on service quality. However, the effect of the cooling-off period on service quality is not clear. It begs an empirical test of whether the cooling-off period achieves the goals that the RLA intends to achieve. Finally, it is likely that strike would have negative effect on service quality while self-help actions without a strike would have no effect on service quality.

3.3. Summary

This chapter first discussed the theoretical model of labor turmoil effects on service quality, followed by detailed discussions of the M&A and bankruptcy as strategic turmoil, and of employee representation and collective bargaining as functional turmoil in the context of the legal frame of the RLA.

The model produced an overarching hypothesis that labor turmoil would reduce service quality. One key assumption behind the empirical framework is that employees who are experiencing labor turmoil will be dissatisfied with the job and the organization, and reduce their labor input through reduced work efforts or organizational withdrawal

behavior or collective actions. Although it would be ideal to measure various forms of individual attitudes and behaviors in aggregate at the craft level, this is extremely difficult to achieve. For this reason, this thesis tests the direct effect of labor turmoil on service quality without testing the theoretically proposed mediating process in empirical analysis. The next chapter describes the data.

CHAPTER 4

DATA AND STYLYZED FACTS OF THE U.S. AIRLINE INDUSTRY, 1987-2008

4.1. Data Sources

The data cover the ten U.S. passenger airlines classified as major carriers (revenues greater than \$1 billion) in 2000 and span the period from October 1987 (the first month detailed measures of service quality became available) to December 2008. The airlines included are Alaska Airlines, American Airlines, America West Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, Southwest Airlines, Trans World Airlines (TWA), United Airlines, and US Airways.

To characterize the unique data analyzed here, it is useful to compare it with Gittell et al.'s (2004) data which was used to analyze service quality in the pre-9/11 period. First, the observation unit is carrier-craft-monthly, while theirs is carrier-quarterly. Second, the sample period is extended to cover the post-9/11 period – the period characterized as being one of the most tumultuous times in the labor relations history of the industry. Third, the extension resulted in the exclusion of TWA and American West Airlines, which were merged into American Airlines in April, 2001 and US Airways in September 2005, respectively. The merged carriers were dropped out of

the final dataset on the basis of the listing status on the *Air Travel Consumer Report* (ATCR), in which all the service measures were integrated from January 2001 for TWA and from January 2006 for America West. On the other hand, although Delta Air Lines and Northwest airlines merged in 2008, they operate under separate certificates as of June 2009. Thus, they were kept in the final dataset. Therefore, the data set yields 12,150 carrier-craft-month (or 2,430 carrier-month) observations, including 855 (171) for TWA, 1,095 (219) for America West Airlines, and 1,275 (255) for the remaining each eight carriers.

4.1.1. Service Quality

The measures of service quality were assembled from two sources. First, monthly arrival delay and flight cancellation measures were computed from the DOT's on-time performance data, which provides detailed information of each flight in the computerized reservation systems as to origin and destination, the scheduled/actual departure and arrival time, flight delays in minutes, cancellation and divert, and so on. Second, monthly records on various dimensions of service quality were obtained from the *Air Travel Consumer Report* (ATCR) assembled by the DOT.¹⁶ The ATCR contains monthly mishandled baggage, quarterly voluntary/involuntary denied boarding, and the monthly total number of passenger complaints and passenger complaints on various dimensions of

¹⁶ The monthly records from January 1998 to December 2006 were collected from the Department of Transportation (<http://airconsumer.ost.dot.gov/reports/index.htm>) and those from October 1987 to December 1997 were collected from the ATCR.

air travel service (e.g., flight problems, oversales, reservation/ticketing/ boarding, fares, refunds, baggage, customer service, advertising, etc.). Finally, the airline quality ratings (AQR) that were developed by Bowen and Headley (1991) were used as a measure of each airline's overall service quality.¹⁷

These measures of service quality are consistent with a notion of quality being the “reliability of the travel experience” (Gittell et al., 2004: pp.167) or quality being the “[operational] conformance to specifications and meeting [passengers’] expectations” (Reeves and Bednar, 1994: pp.421-423, Bracket is mine). Although these measures do not capture price components (e.g., passengers’ perceptual evaluation of service quality relative to actual price they pay), they do reflect not only the objective and operational components (e.g., on-time arrival, flight cancellation, and mishandled baggage) important to passengers when judging the quality of airline services, but also the behavioral responses of passengers to airline service they experience during air travel (e.g., passenger complaints on various dimensions of airline service). Throughout this thesis, Arrival Delay, Flight Cancellation, Mishandled Baggage as a group will be referred to *operational performance*; and the Total Number of Passenger Complaints and passenger complaints on the four dimensions (i.e., Flight Problem, Reservation/Ticketing/Boarding, Baggage, and Customer Service) as a group will be referred to *passenger service*. Each

¹⁷ According to Bowen and Headley (1991), the AQR is an objective method of comparing airline quality on combined multiple performance criteria. The sub-components that were evaluated to form an AQR score by carrier and month has changed over time. Fourteen components of service quality that were evaluated for the period 1991-1997 were reduced to only four after 1997 (i.e, on-time arrival, mishandled baggage, involuntary denied boarding, and the number of passenger complaints) (Bowen and Headley, 1998). To measure the AQR consistently over time, I rescaled the AQR scores for the period 1987-1997 using the four categories. The formula used to rescale is $(8.63 \times \text{On-time Arrival} - 8.03 \times \text{Mishandled Baggage} - 7.92 \times \text{Involuntary Denied Boarding} - 7.17 \times \text{Rate of Total Complaints}) / (8.63 + 8.03 + 7.92 + 7.17)$.

measure of service quality will be analyzed in a separate regression. The definition and data sources of each measure of service quality are summarized in Table 4.1.¹⁸

4.1.2. Labor Turmoil

To characterize the carrier-craft-month time series of labor turmoil as identified in the previous chapter, historical profiles of labor turmoil were drawn from a variety of published sources.

First, as for strategic turmoil, information on airline M&As and bankruptcies were obtained through an extensive archival search using *LexisNexis* for news reports or the National Mediation Board's *Determinations of the National Mediation Board* when the M&As included single carrier determinations by the NMB.

Second, the primary source for representation elections is the NMB's *Determinations of the National Mediation Board*. Specifically, the volumes contain information on the date of election petition filed, the type of election, whether and when a petition is dismissed or an election was authorized, when votes were counted, and the election outcome.

Finally, as for bargaining turmoil, the steps of labor contract negotiations (i.e., direct bargaining, mediation, and release) for the five crafts were obtained from the

¹⁸ One drawback for the measure for arrival delay (or on-time arrival) is that the definition of being on time is based on the scheduled time in the computerized reservation systems, which may be vulnerable to carriers' manipulation. For example, carriers can set each flight's scheduled time in the computerized reservation systems with a substantial buffer. Therefore, the actual flight delays might have been worse than what they looked like in 2008.

NMB's archives of *Weekly Activity Report* (available only after February 20, 1998 in the NMB website <http://www.nmb.gov/activ-rpts/odarch.html>) and from the Bureau of Labor Statistics' *Current Wage Developments* and *Monthly Labor Review* for the years of 1984-1995, and the Bureau of National Affairs' *Collective Bargaining Negotiations and Contracts* for the years of 2000-2008. Other relevant information, whenever necessary, was further collected through company and union documents (e.g., news releases from airlines and unions and collective bargaining agreements) or through an extensive archival search using *LexisNexis* for news reports. Among these sources, the Bureau of National Affairs' *Labor Relations Week* from 1996 to 2008, and *Aviation Daily* from 1989 to 2008 were particularly useful.

Because there was no single complete source of labor turmoil to cover the whole period, the priority was first placed to the direct sources; and when no direct source was available, the priority was placed to the secondary sources. The definition and data sources of labor turmoil are also summarized in Table 4.1.

4.1.3. Control Variables

Load factor, the miles flown per each departure, and the monthly total number of passengers were included as control variables. First, load factor was included to control the degree to which an airline utilizes individual airplanes. It was computed by dividing revenue passenger miles (RPMs) by available seat miles (ASMs). While ASMs indicate a distance that an airline's available passenger seats actually flown in miles, RPMs indicate

a distance that the airline's actually sold passenger seats flown in miles. For example, if an aircraft with 100 available passenger seats had 70 passengers and flown a distance of 100 miles, then RPMs are 7,000 and ASMs are 10,000). Therefore, load factor indicates a proportion of an airplane's seats that are sold and actually filled at departure. Second, the miles flown per each departure was included to capture an airline's route structure, i.e., a short route carrier or long distance carrier. It was computed by averaging the distance in miles that all the flights fly in a given month and year. The two measures were taken from the Department of Transportation's Form 41 available at the DOT's Research and Innovative Technology Administration (RITA) website (<http://www.transtats.bts.gov/>). Finally, the monthly total number of passengers, obtained from the *Air Travel Consumer Report* (ATCR), was used to control the size of an airline. The definition and data sources of control variables are summarized in Table 4.1.

4.2. Descriptive Statistics

Table 4.2 presents descriptive statistics of each variable by carrier as well as in aggregate. Table 4.3 also presents zero-order correlations of variables under analysis.

4.2.1. Service Quality

Figure 4.1 plots the trend of selected monthly measures of service quality from October 1987 to December 2008. Overall, though cyclical, the measures of service quality

substantially varied across carriers for a given month and show large fluctuations within carriers over time. Some additional important patterns are evident. First, although reaching its peak in 2000, Arrival Delay showed several similar peaks over time (Figure 4.1.1). This suggests that Arrival Delay is not only a recent problem. Second, except a peak at 9/11, Flight Cancellation was particularly high in the late 1990s (Figure 4.1.2). Third, the rate of Mishandled Baggage (Figure 4.1.3) and the rate of the Total Number of Passenger Complaints (Figure 4.1.4) were particularly high in the late 1980s and early 1990s and the late 1990s, while remaining relatively stable for the rest of the time period. Fourth, the AQR generally showed a similar pattern with Mishandled Baggage but in an opposite direction due to the computation formula. Finally, these selected measures improved immediately following the 9/11 terrorist attacks but this improvement lasted only for a short period of time. It suggests that some structural factors, such as the infrastructure of the U.S. airline industry and the competition with flight schedules, account for some variations in service quality,¹⁹ but the persistence of substantial variance within and between carriers even during this period suggests that such structural factors are only one part of the story.

One may be concerned about the credibility of the measures of service quality under analysis, particularly about the extent to which Arrival Delay due to factors beyond carrier's control are incorporated in the measure of Arrival Delay and about the extent to which operational measures of service quality and passenger complaints differ. Appendix

¹⁹ In their recent historical overview of the airline industry, Borenstein and Nancy (2007) listed numerous causes of flight delays but focused on the structural factors such as airport congestion, weather condition, and a carrier's incentive to make some delays inevitable (pp. 22-26).

C presents the zero-order correlations of selected measures of service quality with specific reasons for arrival delays, under the carrier's responsibility (i.e., carrier delays), due to weather conditions (i.e., weather delay), or security concerns (i.e., security delay). Note that because the DOT made these specific categories of Arrival Delay publicly available after June 2003, the correlations of carrier delay, weather delay, and security delay with other measures of service quality reflect the relationship during the period from June 2003 to December 2008.

First, the extent to which exogenous factors beyond carriers' control affect Arrival Delay was examined. The correlation of Arrival Delay with carrier delay, weather delay, and security delay was 0.82, 0.48, and 0.47, respectively. The correlation of carrier delay with weather delay and security delay was 0.33 and 0.26, respectively. All of the correlations were statistically significant at the 0.001 level, except the correlation between weather delay and security delay ($r=-0.06$). A similar pattern was found in the relationship between Flight Cancellation and the types of arrival delay. These correlations suggest that such exogenous factors as weather and security concerns which are beyond the carrier's control are present in the measure of Arrival Delay but limited in magnitude. This is because the inclusion of year-by-month fixed effects and firm fixed effects as control variables would account for the constant effects of weather conditions, thereby randomness in weather conditions only remains in empirical analysis.²⁰

²⁰ To account for the seasonal components of arrival delay, the yearly and monthly dummies were regressed on each measure of delay. They explained about 42% and 38% of variances in arrival delay and carrier delay, respectively, but 16% of variances in weather delay for the period from June 2003 to December 2008.

Next, the extent to which operational performance and various dimensions of passenger complaints differ is examined. Arrival Delay and Flight Cancellation were correlated with both Mishandled Baggage and all the measures of service quality based on passenger complaints (significant at the 0.001 level). While carrier delay was always correlated with all the measures based on passenger complaints (significant at the 0.001 level), weather delay had lower correlations with these measures (significant only with passenger complaints on flight problems and customer service). A similar pattern was found in the correlations of Mishandled Baggage with carrier delay and weather delay. Also Mishandled Baggage was correlated with all the measures based on passenger complaints (significant at the 0.001 level). Interestingly, security delay was not significantly correlated with Mishandled Baggage and even negatively significantly correlated with all the measures based on passenger complaints.

Finally, the extent to which the same dimension of service quality that operational performance and passenger service were designed to measure is examined with the pair of Arrival Delay and passenger complaints on Flight Problems and the pair of Mishandled Baggage and passenger complaints on Baggage. Arrival Delay had the highest correlation of 0.23 with passenger complaints on Flight Problems and Mishandled Baggage had the highest correlation of 0.40 with passenger complaints on Baggage. Together, the correlations among the dimensions of service quality which are statistically significant but modest in magnitude suggest that the measures of operational performance and passenger complaints share some commonality but are distinctive enough to measure different dimensions of service quality.

4.2.2. Strategic Turmoil

To better understand the occurrences and persistence of labor turmoil in the U.S. airline industry, it is useful to look at how the industry-specific economic conditions have changed over time and how carriers have responded to such changes. Figure 4.2 shows the median quarterly net income of the sample carriers (in bars), as well as detailed historical profiles of the M&As and bankruptcies.

Figure 4.2 suggests two important patterns pertinent to strategic turmoil. First, the profits and losses of the industry show an oscillating pattern over time (Bamber et al., 2009). Second, the two waves of industry consolidations during 1985-1987 and 2005-2008 occurred during economic downturns. This is presumably due to financial pressure, but it is also the case that the Department of Justice is less concerned with anti-competitive mergers.

4.2.3. Representation Turmoil

Table 4.4 presents a brief summary of petitions for representation election by the type of election for 1987-2008 (for a historical profile of each petition by occupation, see Appendix D). During this period, 75 petitions were filed for representation elections: 49 petitions (65%) were filed for a certification election and 26 petitions (35%) for a raid election. Overall, 23 petitions were dismissed or withdrawn prior to an election. Unions

won 36 percent of the non-raid elections and all of the raid election. Finally, there were five re-elections ordered by the NMB as remedies for election interferences.²¹

4.2.4. Bargaining Turmoil

Figure 4.3 shows the number of occurrences of direct bargaining and mediation/arbitration for 1987-2008. It should be emphasized that bargaining turmoil follows a highly cyclical pattern but in a lagged fashion. For example, mediation/arbitration frequently occurred during the 1990-1993 recession, but was less likely between 1994 and 1997. It began to increase for 1998-2000, a bargaining round of recovery for lost earnings in the previous recession. Bargaining turmoil for 1998-2000 was particularly severe because the carriers generally delayed negotiating wage increases despite the carriers' financial success (e.g., the total quarterly net income of the ten carriers from the U.S. domestic market accrued to \$7.2 billion for 1993-1997). A short peak of the number of mediation/arbitration was mainly due to collective bargaining under bankruptcy.

Table 4.5 presents a brief summary of the historical occurrences of cooling-off periods and strikes by carrier and occupation under the RLA. First, while the pilots, flight attendants, and mechanics were involved in the most of cooling-off periods, the fleet service employees and passenger service employees were involved in only three cooling-

²¹ There were also many court decisions mainly resulted from carriers' objection to the NMB's determination on conferring certification to a union (e.g., *America West Airlines, INC. v. National Mediation Bd.*, 119 F.3d 772,775 (9th Cir.1997)).

off periods. This is partly because these two occupations have been relatively recently organized. Second, there was substantial variation across the carriers: six out of ten carriers were involved in the cooling-off periods and three carriers were involved in strikes. Third, the number of strikes in the sample period is greatly reduced compared to that in the middle of 1980s.²² This is perhaps because the carriers and unions learned that strikes became more costly in terms of both financial losses and the risk of job losses (Bamber et al., 2009). Also note that the duration of strikes varied from 24 minutes to 416 days. Finally, consider the category of “Released-But-No-Strike.” This indicates a situation in which the NMB permitted the parties to pursue self-help actions, but the union did not engage in a traditional strike.

²² For example, the industry had eight strikes during 1983-1986. The strikes are: three strikes at Continental Airlines by the mechanics (IAM: August 13, 1983 – April 17, 1985), the pilots (ALPA: October 1, 1983 – September 15, 1985), and the flight attendants (UFA: October 1, 1983 – April 17, 1985); one-day strike by the mechanics at Ozark Airlines (IAM: February 7, 1985); the mechanics strike at Pan American Airlines (TWU: February 28, 1985 – March 27, 1985); the mechanics strike at Alaska Airlines (IAM: March 4, 1985 – June 3, 1985), the pilots strike at United Airlines (ALPA May 17, 1985 – June 14, 1985); and the flight attendants strike at Trans World Airlines (IFFA: March 7, 1986 – May 18, 1986).

CHAPTER 5

ESTIMATING THE EFFECTS OF LABOR TURMOIL ON SERVICE QUALITY, 1987-2008

5. 1. Empirical Model

A baseline empirical specification uses the carrier-craft-monthly observations as the unit of analysis of the form:

$$(3) \quad Q_{it} = \beta^S S_{ijt} + \beta^R R_{ijt} + \beta^B B_{ijt} + \beta^X X_{it} + \beta^q q_{it} + \alpha_i + \gamma_j + \eta_t + e_{ijt},$$

where Q_{it} is the monthly quality measures in carrier i at time t , S_{ijt} , R_{ijt} , and B_{ijt} are the set of broad (or detailed) categories of strategic turmoil (S), representation turmoil (R), and bargaining turmoil (B) in carrier i and craft j at time t , respectively, X_{it} are control variables at the carrier level, q_{it} is a set of operational performance of carrier i at time t , α_i is a carrier fixed effect, γ_j is a craft fixed effect, η_t is a set of year-by-month fixed effects, and a dummy variable indicating the post-9/11 period to capture new air travel policies and other systematic changes imposed after the 9/11. The carrier and craft fixed effects capture carrier- and craft-specific fixed effects, which would remove any remaining biases due to omitted but time-invariant carrier and craft characteristics; and the year-by-month fixed effects capture industry-wide shocks common to the airlines, such as decline

in demand, or a change in fuel prices. Finally, standard errors were clustered by carrier to deal with concerns about serial correlation within the carrier.

The fixed effects regressions use variations within the airline-craft pairs and estimate the average effects of different expressions of labor turmoil arising from the five occupations on service quality.

Note that service quality is measured at the carrier level but labor turmoil is measured at the craft level. The same value of each measure of service quality in a given year and month was assigned to the five occupations within the carrier. Also note that Arrival Delay and Flight Cancellation were controlled in the regression with Mishandled Baggage as the dependent variable, and the three measures of operational performance were controlled in the regression with each dimension of passenger service as a dependent variable. Therefore, if labor turmoil is found to have a significant effect on Mishandled Baggage or passenger service, then it indicates that labor turmoil significantly affects these dimensions of service quality that operational performance does not capture.

Finally, the measures of service quality (except the AQR) were transformed in logarithms for empirical analysis because they were positively skewed. Therefore, coefficients on labor turmoil indicate a log points change in service quality to a change in labor turmoil. While a higher score of these measures indicates deterioration in service quality, a higher score of the AQR indicates an improvement in service quality.

5.2. The Effects of Broad Categories of Labor Turmoil on Service Quality, 1987-2008

Table 5.1 displays the regression coefficients and R square statistics for the fixed effect models. Before the results are discussed in detail, some robustness checks of the measures of service quality are examined. The patterns in the relationship between operational performance and passenger service strongly suggest that they are both interrelated and convergent. For example, Arrival Delay significantly increased Mishandled Baggage ($p < 0.05$) and the Total Number of Passenger Complaints ($p < 0.10$) and passenger complaints on Flight Problems ($p < 0.10$). Flight Cancellation significantly reduced all the measures of passenger service. Mishandled Baggage marginally increased the Total Number of Passenger Complaints ($p < 0.10$) but significantly increased passenger complaints on baggage ($p < 0.05$).

In Table 5.1, first consider the results for strategic turmoil. The M&A process is generally associated with reduced service quality. In particular, airlines involved in the M&A process had a higher rate of Arrival Delay by 6.5 log points ($p < 0.10$) and Mishandled Baggage by 9.2 log points ($p < 0.05$). When an airline is in bankruptcy, surprisingly, the coefficients are mostly in the direction of suggesting that service quality improves, but none of the coefficients are statistically significant.

Representation turmoil had a significantly higher rate of passenger complaints over various dimensions of passenger service, but not on any of the operational performance measures. Although representation turmoil increased Flight Cancellation by

8.5 log points, it was not estimated precisely. It significantly increased the Total Number of Passenger Complaints by 12.4 log points ($p<0.05$), and passenger complaints on Flight Problems and Customer Service by 8.4 and 3.9 log points ($p<0.01$), respectively, and passenger complaints on Reservation/Ticketing/Boarding and Baggage by 2.4 and 5.8 log points ($p<0.10$), respectively. Representation turmoil reduced the AQR by 9.3 points but it was not significant.

In contrast, bargaining turmoil reduced Flight Cancellation by 4.6 log points ($p<0.10$), but was estimated imprecisely on other measures of service quality.

There was no significant effect for any of broad categories of labor turmoil on the AQR. Only the bankruptcy process was positively associated with the AQR. Because labor turmoil consists of different procedures that may differ in the direction of their effects, the coefficients in Table 5.1 may represent mixed effects of these different procedures on service quality. This will be addressed in Section 5.3.

As for the control variables, load factors increased Arrival Delay, but reduced Flight Cancellation and Mishandled Baggage, all of which were significant at the 0.05 level. For example, a one percent increase in airplane utilization resulted in a 0.8 log points increase in Arrival Delay, but resulted in a 2.6 and 0.7 log points reduction in Flight Cancellation and Mishandled Baggage, respectively. Average miles flown per departure significantly reduced passenger service only. The number of monthly passengers increased Arrival Delay only ($p<0.01$). Since the last two control variables were log-transformed, their coefficients indicate elasticity suggesting that, for example, a

10 percent increase in the average number of monthly passengers (in thousands) resulted in a 1.98 percent increase in Arrival Delay.

Finally, the presence of a union was significantly associated with only passenger complaints on Reservation/Ticketing/Boarding ($p < 0.10$).

5.3. The Effects of Detailed Categories of Labor Turmoil on Service Quality, 1987-2008

Table 5.1 used broad categories of labor turmoil. Table 5.2 presents the results using detailed categories of labor turmoil. First, the results show that the significant effects of broad category of the M&A in Table 5.1 were driven by the post-merger workforce integration process which was measured by a 2-year interval after the completion of financial integration. The post-merger workforce integration process significantly increased Arrival Delay by 8.5 log points ($p < 0.05$) and Mishandled Baggage by 13 log points ($p < 0.01$). While not significant, an interesting pattern emerged on passenger service: the financial integration process was positively associated with passenger service but the workforce integration was negatively associated with passenger service. The results of bankruptcy protection remained consistent with the results in Table 5.1.

Table 5.2 also shows that the significant effects of representation turmoil in its entire process were mostly driven by the event window from the date of election petition filed to the date of the NMB determination. During this period, passenger complaints significantly increased from 3.4 to 14 log points. In contrast, none was significant for the

event window from the NMB determination to the first contract. Its coefficients were consistently higher than those on the event window from the date of election petition filed to the date of the NMB determination but the standard errors were even higher.

Now turn to the specific bargaining procedures under the RLA. As expected, the mediation/arbitration significantly reduced service quality, but direct negotiation did not. Specifically, the carrier-craft pairs in the mediation/arbitration had a higher rate of Flight Cancellation by 6.6 log points ($p < 0.01$). Also the pairs had a higher rate of total number of passenger complaints by 7.5 log points ($p < 0.10$) and passenger complaints on Flight Problems by 5.8 log points ($p < 0.05$), Baggage by 3.6 log points ($p < 0.10$), and Customer Service by 3.2 log points log points ($p < 0.01$), respectively. When the pairs were in the cooling-off period, most of significant effects appeared in the mediation/arbitration were literally cooled off.

Some important results emerged from the impasse process. Strike significantly increased Arrival Delay by 12.2 log points ($p < 0.05$). Strike also increased Flight Cancellation by 37.8 log points, but it was not significant. In contrast, the carrier-craft pair which was allowed to seek self-help actions but did not engage in strike had a significantly lower Flight Cancellation by 36.1 ($p < 0.05$). Interestingly, strike reduced Mishandled Baggage by 13.2 log points ($p < 0.05$) and passenger complaints on Reservation/Ticketing/Boarding by 4.6 log points ($p < 0.05$), whereas the released-but-no-strike increased Mishandled Baggage by 13.2 log points ($p < 0.05$) and passenger complaints on Reservation/Ticketing/Boarding and 1.9 log points ($p < 0.05$)

5.4. Extensions of the Baseline Specification

5.4.1. The Effects of the Post-Merger Workforce Integration and Bankruptcy on Service Quality by Union Status

Before additional analyses from the extended specifications are discussed, Table 5.3 presents the estimates of broad and detailed categories of the M&A process with several different year intervals for the post-merger workforce integration on service quality. Coefficients on other variables shown in Table 5.1 and 5.2 remained vertically identical with these different definitions of the post-merger workforce integration. Table 5.3 shows that the 2-year interval for the post-merger workforce integration process had the significant effects on Arrival Delay ($p < 0.05$) and Mishandled Baggage ($p < 0.01$), which were constant across the different intervals. In contrast, the effects on passenger service were marginally significant when the 1-year interval was used and became insignificant when the other year intervals were used.

Now turn to the empirical results on whether strategic turmoil, the post-merger workforce integration process and bankruptcy process in particular, have differential impacts union status on service quality. Note that two new interaction terms were introduced in addition to the variables in Table 5.2.

Table 5.4 presents selected coefficients on the relevant variables and R -squared statistic for convenience. The newly introduced interaction terms provide no strong evidence of differential impacts by union status on service quality. There was a

significant effect on passenger complaints on Reservation/Ticketing/Boarding only for the interaction term of post-merger integration process by union status ($p < 0.10$). None of the interaction terms was significant for the interaction term of bankruptcy process by union status. Finally, a series of F -test of the hypothesis that the two interactions terms are jointly zero is strongly rejected by the data, except for Mishandled Baggage.

5.4.2. The Effects of Employees' Anticipatory Response to the M&A and Bankruptcy on Service Quality

It is possible that employees' anticipation of an imminent M&A or bankruptcy filing prior to management's official announcement may affect service quality. If this is the case, the leads of these variables should be significant. To examine the anticipatory effects, a subset of leads of the strategic turmoil variables (i.e., indicator variables for 1, 2, and 3 months prior to the official announcement of the M&A and bankruptcy filing) were added to the specifications in Table 5.2 in alternate fashion.

Table 5.5 presents only the estimates on the leads of broad category of strategic turmoil and R -squared statistic for convenience. Note that a ΔR^2 indicates a change in R^2 explained by each subset of lead variables on the basis of the R^2 of the models in Table 5.2. First, the inclusion of a set of one-month lead variables was jointly significant, but there was a significant effect only for one-month lead variable of the M&A process on arrival delay. The inclusion of a set of one- and two-month lead variables was jointly significant, but there was no consistent pattern for individual coefficients on these lead

variables. Similar results were found for the inclusion of a set of one-, two-, and three-month lead variables of broad category of each strategic turmoil.

In short, the individual coefficients on the leads were close to zero, showing little evidence of anticipatory response to the management's strategic choices. Although a series of *F*-test of the hypothesis that the leads are jointly zero is strongly rejected by the data, the pattern of the results provides no robust evidence that the anticipatory responses from employees are strong enough to systematically affect service quality.

5.4.3. The Effects of the Representation Turmoil on Service Quality by Election Type and Election Authorization

To explore whether the type of representation election and the NMB's determination affect service quality, the window from the date of election petition filed to the date of the NMB determination was further divided by the type of election (i.e., certification election *vs.* raid election) and the type of determination (i.e., petition with dismissal *vs.* petition with election ordered). Table 5.6 presents only the estimates on these variables for brevity.

Two clear patterns emerged from Table 5.6. First, petitions seeking certification elections significantly increased Flight Cancellation. Specifically, petitions with certification elections authorized increased Flight Cancellation by 9.3 log points ($p < 0.05$) and petitions with certification elections dismissed increased Flight Cancellation by 34.8 log points ($p < 0.01$). Second, regardless of the type of election, dismissed petitions due to

either insufficient showing of interest (ISI) or withdrawal during investigation (WDI) significantly increased passenger complaints over various dimensions of passenger service. Notably, dismissed petitions seeking for raid election increased the Total Number of Passenger Complaints by 21.1 log points ($p < 0.05$) and those seeking for certification election increased the Total Number of Passenger Complaints by 32.2 log points ($p < 0.001$).

5.4.4. The Effects of Concession Bargaining on Service Quality

Though not of analytical focus, it is interesting to examine how concessionary contracts affect service quality. Here a concessionary contract is defined as one including a wage cut in the contract. For a comparison purpose, three groups, i.e., unions-in-concession, nonunion, and unions-not-in-concession as a reference group, were created. This is mainly because it is extremely difficult to observe a timing of changes in employees' wage in the nonunion occupation, in addition to the absence of reliable data sources. Therefore, the nonunion group is a mix of concession and non-concession, so that in this three group comparison, coefficients on nonunion will indicate the mean difference weighted by nonunion-in-concessions and nonunion-not-in-concessions, relative to the unions-not-in-concession group.

Table 5.7 provides no strong evidence of differential impacts for concessionary contract on service quality by union status. Nonunion occupations had a higher rate of passenger complaints on Reservation/Ticketing/Boarding and Baggage, and the AQR,

relative to union-not-in-concession ($p < 0.10$). The pattern of results suggests that unions in a more favorable work conditions perform best, followed by nonunion occupations, while unions in a poor situation perform worst. Most of coefficients on the unions-in-concession group were estimated highest but their standard errors were highest too.

5.5. Discussions

This chapter has analyzed the carrier-craft-level data to estimate the effects of labor turmoil on service quality of the U.S. domestic airline industry for 1987-2008. Three major findings emerged from the empirical results in this chapter. As for strategic turmoil, the empirical results suggest that the M&A process had some significant effects on operational performance but not on passenger service. Specifically, it significantly increased Arrival Delay and Mishandled Baggage, which was driven by the post-merger workforce integration process. It suggests that integrating employees from two different legal entities is a key obstacle for carriers to improve operational performance. Therefore, the combined carriers should give proper attentions to having the employees from two different entities harmonized. However, the finding that the M&A has no significant effect on passenger service remains puzzling.

Second, the bankruptcy process had no significant effect on any measures of service quality under analysis. This may result from several factors. First, the bankruptcy process is composed of different stages which may have different effects on service quality. Second, the bankrupt carrier's efforts to rationalize its operations may offset the

negative effects associated with labor turmoil under bankruptcy. Third, though not commensurate, most concessions due to bankruptcies have been accompanied by some balancing rewards such as a distribution of profit-sharing plans, and unsecured creditor bankruptcy claims, which may encourage employees to work hard in order to share in the company's future profits. This may also help moderate the negative effects associated with labor turmoil under bankruptcy.

The M&A process and bankruptcy process together, although employees were hypothesized to have unitary interests in the outcomes resulting from the M&A process and bankruptcy process, they in fact may have divergent interests based on expected outcomes from these events. For example, employees from the merger target carrier with poor financial performance may evaluate continuing employment opportunities over some disadvantages of wage and benefit cuts. Similarly, employees in different occupations within the carrier may have different interests in the expected outcomes from such events. If this were the case, the current results may simply average out the different effects from employees' divergent interests to the same event.

Third, the present empirical framework is unable to detect any richer interplay between strategic turmoil and union status, nor any anticipatory responses from employees on service quality.²³

As for representation turmoil, the empirical results suggest that while the presence of a union per se does not matter to service quality, the process of determining unionization does matter. Specifically, representation turmoil significantly reduces the

²³ While not shown in the thesis, the bankruptcy process was also interacted by the bargaining process. There was no significant effect for the interaction term on service quality.

quality of passenger service. The effects of the first contract after certification on passenger complaints were found positive but not estimated precisely. Further analyses suggest that election petitions that were dismissed and not authorized for election were the main source of the negative effects of representation turmoil. While raid elections did not significantly affect operational performance, certification elections did significantly affect Flight Cancellation.

The results may result from several factors. First, carriers are more likely to have been incentives against organizing drives for nonunion crafts than against organizing drives in the already unionized craft. A newly certified union will generate substantial, negative economic consequences in labor costs and restrictions in managerial discretion. Second, the raid election is likely to have a higher union demand from employees, and therefore, anti-union campaigns are not economically justifiable (Freeman and Kleiner, 1990). Therefore, carriers are less likely to use anti-union campaigns. Indeed, Table 4.4 shows that re-election orders by the NMB as a remedy to severe election interferences were found only in the certification election petitions. Third, conflicts over employee representation among employees may not be as contentious as those between employees and employer.

On the other hand, there was no significant effect for the first contract negotiation on service quality. This finding suggests that there were substantial variations in the first contract negotiation process with varying durations to reach the first contract.

As for bargaining turmoil, the legal framework governing collective bargaining of the airline industry does matter to service quality. Most notably, the mediation mandated

by the RLA, which is relatively routine and less pronounced kind of labor turmoil, was significantly important to both operational performance and passenger service. Cooling-off periods significantly increased Arrival Delay and passenger complaints on Reservation/Ticketing/Boarding. As expected, strikes had the biggest effect on Flight Cancellation, but its effect was not significant. Compared to the effects of the mediation/arbitration, those for strikes were somewhat limited in scope.

To further illustrate what these estimates imply to the welfares of carriers and passengers, Table 5.8 presents a simple comparison of the effects of the mediation/arbitration and strikes on Flight Cancellation. Flight Cancellation was chosen because it is most costly to the carriers as well as passengers. The results were quite impressive in two respects. First, the cumulative effect of the mediation/arbitration on Flight Cancellation is much larger than that of strike on Flight Cancellation. Although the mediation/arbitration is less visible to the public, its cumulative effects are not negligible. Second, given the fact that strike had relatively short durations and was measured monthly, the effect of strike is indeed impressive. As shown in Table 4.5, strike rarely occurred with varying durations from 24 minutes for the pilots' strike against American Airlines to 416 days for the mechanics' strike against Northwest Airlines which ended up with the union's big loss.²⁴

²⁴ In particular, If the mechanics' strike against Northwest Airlines was coded only on the first month the strike occurred, then the effect of strike on Flight Cancellation would have gone up to 178 log points (approximately 8 percent). Then, the cumulative number of passengers who missed their flight due to strike would have been 2,313,906.

CHAPTER 6

THE PRE- AND POST-9/11 COMPARISON OF THE EFFECTS OF LABOR TURMOIL

6.1. Background Discussion

Chapter 5 examined how labor turmoil affected service quality of the U.S. domestic airline industry from 1987 to 2008, leaving aside the issue of whether and how the U.S. major carriers' response to the economic consequence of the September 11, 2001 terrorist attacks affected the relationship between labor turmoil and service quality. Given the carriers' impetus to reduce labor costs and the public concerns about the continuing deterioration in air travel service quality, this natural experiment provides a testing ground of compatibility between reduction in labor costs and improvement in service quality. This chapter examines this issue.

Various customer groups and popular media have raised serious concerns about the decline in service quality of the U.S. airline industry. For example, during 1999-2000 the U.S. Senate introduced three legislations to enforce the governmental oversights of

service delivery and consumer protection requirements.²⁵ To avoid governmental interventions, fifteen carriers voluntarily pledged to implement the “Airline Customer Service Commitment” in 1999. According to Department of Transportation (2006), however, as of 2006 only 5 of the 14 airlines continued to implement their voluntary provisions; and the others either discontinued them after the September 11 terrorist attacks, or combined them with operations or financial performance reviews. Not surprisingly, the industry’s failure to self-regulate service quality caused continuing demands for governmental intervention.²⁶

While having faced continuing demands for high quality air travel service, the major airlines have also sought drastic measures to restructure their labor costs in response to the sharp drop in air travel demands after 9/11. For example, the major carriers’ financial losses after 9/11 were unprecedented such that the nine carriers in the sample (TWA excluded) lost \$2.8 billion in the last quarter of 2001, about \$9 billion in 2002, and about \$52 billion in total through the last quarter of 2008. As Bamber et al.,

²⁵Years 1999 and 2000 are a good reference point in highlighting the relationship between labor turmoil and service quality. For example, the years represent another fierce bargaining round for retroactive “catch-up” wage increase (Bamber et al., 2009). Despite of record profitability continued from the end of 1993 (e.g., the net income of the ten carriers only from the U.S. domestic market accrued to \$7.2 billion for 1993-1997), the major carriers delayed negotiating wage increases. Unions which made concessionary agreement during the recession period 1991-1993 reopened their concessionary agreement in the middle of 1990s and some of them continued to negotiate even continued after 9/11. For example, mechanics at United Air Lines reached a new labor contract with a 15 percent wage increase in March 2002 after the cooling-off period in December 2001. United Airlines demanded a concession in July 9, 2002 and filed the bankruptcy protection in December 9.

²⁶ A similar bill, called “Airline Customer Service Improvement Act,” was reintroduced in the U.S. Senate in February 2007. Independent of the attempts at the federal regulation, New York state first introduced a bill of rights, which took effect January 1, 2008, and requires that “whenever airline passengers in New York State are delayed for more than three hours on the aircraft prior to takeoff, the carrier must ensure that passengers are provided, as needed, with: (1) electric generation service and temporary power for fresh air and lights; (2) waste removal service in order to service the holding tanks for on-board restrooms; and (3) adequate food, drinking water and other refreshments.”

(2009) noted, the tremendous financial losses drove the major airlines to be more committed to cost reduction than labor relationship-improving strategies through wage and benefit cuts, work rule changes and mass layoffs, or through bankruptcy.

Although the major airlines' preoccupation with labor cost reduction in the post-9/11 period were reminiscent of those in the early 1980s and early 1990s, there are some qualitative differences between the pre- and post-9/11 period. According to Hirsch (2001), low-cost competition with low-cost entrants since deregulation created financial pressure more on financially-unhealthy carriers, causing substantial variances in wages between carriers. Although there were still some variations in ways for the major carriers to achieve labor cost cuts, their responses to the economic aftermath after 9/11 were more uniform. For example, immediately after 9/11 five major airlines, i.e., American Airlines, Delta Airlines, Northwest Airlines, United Airlines, and US Airways, invoked the *force majeure* ("superior force") clauses in their labor contracts to avoid employee termination costs associated with the layoffs (Gittell et al., 2004). The four major airlines except American Airlines opted to file for the bankruptcy protection to further cut labor costs under the U.S. Bankruptcy Law. In particular, the termination of defined pensions became common and resulted in many lawsuits from various stakeholders, including retirees, the Pension Benefit Guarantee Corporation (PBGC), and current employees.²⁷

²⁷ The Pension Benefit Guarantee Corporation (PBGC), a U.S. government corporation, took over the defined benefit pension plans of pilots at US Airways, United Airlines, and Delta Air lines. A direct consequence of the takeover is that pilots would suffer from a large loss of their pensions. As of 2008, for example, senior pilots at United Air Lines receive the maximum PBGC annual payout of \$51,750 (\$4,312.50 per month) at the retirement of age 65 and \$33,637.56 (\$2,803.13 per month) at the retirement of age 60, the current age limit for U.S. commercial airline pilots. If their benefit pension plans continued, they would receive annual pensions well in excess of \$100,000. One particular issue for the pilots of United Airlines in the legal battle was to determine the date of takeover because the PBGC can refuse to fully

American Airlines and Continental Airlines could avoid bankruptcy by achieving concessions from their unions. As a result, according to Bamber et al. (2009: p.64), labor unit costs for the legacy carriers dropped from \$0.039 to \$0.032 per seat mile between 2000 and 2006, while labor unit costs for the new-entrants airlines slightly increased from \$0.024 to \$0.026 per seat mile.²⁸

Perhaps the contents of concessionary bargaining may best capture a key difference in the major carriers' endeavor to cut labor costs between the pre- and post-9/11 periods. The concessionary bargaining in the early 1980s contained a *quid pro quo* agreement between labor and management that exchanged moderation in labor costs for improvements in job security (Cappelli, 1982). In contrast, the contemporary concessionary bargaining does not guarantee job security, but does include provisions that allow greater job flexibility for the carrier (e.g., outsourcing), and therefore, imperil job security (Caison, 2007).

6.2. Empirical Strategy

To test whether the relationship between labor turmoil and service quality differs before and after 9/11, the specifications which produced Table 5.1 and 5.2 were run with the two separate samples divided by the 9/11 terrorist attacks (the month September 2001 was dropped in the subsample analyses). While each regression result is of interest by itself,

guarantee the benefits created or amended to increase within five years before its termination date. The assumption of a plan by the PBGC eliminated all the improvements in the contract in 2000.

²⁸ For their computation, American, continental, Delta, Northwest, United, US Airways were categorized as the legacy carrier, and Southwest Airlines was categorized in the new-entrants carrier.

my emphasis is on testing whether the estimated coefficients are the same in the two periods.

To test whether the intercepts and slopes between these two periods differ, a dummy variable approach was adopted. This dummy variable approach is more useful than Chow test. While they produce identical F -statistics, the dummy variable approach can be used to test whether some of the parameters are the same in two periods without loss of degrees of freedom and with only one regression (Gujarati, 1970).

Specifically, a dummy variable to represent the post-9/11 period was created. Then, all the variables included in Table 5.1 and Table 5.2 were interacted by the dummy variable. Finally, all the variables, the dummy variable, and all the interaction terms were entered in one regression. The coefficients on the main effects are the same as those from a separate regression for the pre-9/11 period. Likewise, the coefficients on the multiplicative terms are the same as those from a separate regression for the post-9/11 regression. The equality of slopes was tested by using the t -value of each interaction term; and the equality of intercepts was tested using the t -value of the dummy variable.

The regression results shown in Table 6.1 and Table 6.2 are from each separate regression for simplicity.

6.3. Pre- & Post-9/11 Comparisons of the Effects of Broad Categories of Labor Turmoil on Service Quality

Table 6.1 presents the estimated effects of broad categories of labor turmoil on service quality, along with tests of equality of coefficients between the pre- and post-9/11 periods (shown in superscript on the columns of the post-9/11 period).

First, the positive effect of the M&A on Arrival Delay ($p < 0.01$) in the pre-9/11 period became negative and insignificant. Also, its positive effect on Flight Cancellation in the pre-9/11 period became negative and significant in the post-9/11 period ($p < 0.10$). The test of equality of coefficients suggests that the changes in the coefficients of the M&A on Arrival Delay and Flight Cancellation were significant at the 0.10 level. Though still positive, the significant effect of the M&A on Mishandled Baggage ($p < 0.05$) in the pre-9/11 period became insignificant in the post-9/11 period. On the other hand, the effects of the M&A on passenger service were close to zero, except for passenger complaints on Reservation/Ticketing/Boarding in the post-9/11 period ($p < 0.10$).

The bankruptcy process showed a contrasting pattern with the M&A process. As for operational performance, it reduced Flight Cancellation ($p < 0.10$) only in the post-9/11 period. Its effects became significant across all the measures of passenger service in the post-9/11 period, which were negative but generally insignificant in the pre-9/11 period. For example, it reduced the Total Number of Passenger Complaints by 11.7 log points ($p < 0.01$) and passenger complaints on Reservation/Ticketing/Boarding by 4.3 log points ($p < 0.01$). However, the test of equality of coefficients suggests that none of these changes was significant.

Both representation and bargaining turmoil showed the same pattern with passenger service. The significantly positive effects on passenger service in the pre-9/11

period became insignificant in the post-9/11 period. As for operational performance, the effects of representation turmoil on Mishandled Baggage became significant ($p < 0.10$) in the post-9/11 period, which was unexpected but not significantly different from its effect in the pre-9/11 period. The effect of bargaining turmoil on Flight Cancellation, which was significant in the pre-9/11 period, also became insignificant in the post-9/11 period. The test of equality of coefficients suggests that there were significant changes for representation turmoil on the number of total passenger complaints ($p < 0.01$), and passenger complaints on Flight Problems ($p < 0.001$), Baggage ($p < 0.05$), and Customer Service ($p < 0.05$). The test also suggests that there were significant change for bargaining turmoil on Arrival Delay and the AQR at the 0.10 level.

The union presence showed no particular pattern in both periods. As for the control variables, the same level of the load factor caused a higher level of Arrival Delay in the post-9/11 period than in the pre-9/11 period, whereas it caused a lower level of Flight Cancellation and Mishandled Baggage in the post-9/11 period. In contrast, the same level of the load factor generally increased passenger complaints in the post-9/11 period. The test of equality of coefficients suggests that there were significant changes for load factors on Arrival Delay ($p < 0.05$) and passenger complaints on Baggage ($p < 0.05$). The mileage flown per departure showed no particular pattern, but the significant changes were found on Arrival Delay ($p < 0.05$), Mishandled Baggage ($p < 0.10$) and passenger complaints on Baggage ($p < 0.10$). Finally, the same monthly number of passengers consistently resulted in higher operational performance, lower passenger complaints, and

higher AQR. The significant changes between the two periods were found only on passenger complaints on Baggage ($p < 0.01$) and the AQR ($p < 0.05$).

In short, the pattern of results in Table 6.1 strongly indicates that the negative effects of labor turmoil on service quality appearing in the pre-9/11 period reduced to zero in the post-9/11 period. In particular, some of the results as to passenger service were interesting. The negative but insignificant effects of the bankruptcy process on passenger service in the pre-9/11 period became significant in the post-9/11 period. In contrast, the significant and positive effect of the representation and bargaining turmoil in the pre-9/11 period became close to zero. This pattern was most salient for representation turmoil.

6.4. Pre- & Post-9/11 Comparisons of the Effects of Detailed Categories of Labor Turmoil on Service Quality

Table 6.2 repeats the pre- and post-9/11 comparisons of the effects of labor turmoil using detailed categories of labor turmoil. First, consistent with the results in from Table 6.1, the financial and workforce integration process generally had the significant effects on operational performance, but not on passenger service. Specifically, the positive effects of financial integration in the pre-9/11 period became negative for Arrival Delay ($p < 0.05$) and Flight Cancellation ($p < 0.10$) in the post-9/11 period. The test of equality of the two coefficients indicates that there was a significant difference only for Arrival Delay ($p < 0.05$). Similarly, the positive and significant effects of the post-merger workforce

integration process in the pre-9/11 period became insignificant on Arrival Delay and Mishandled Baggage in the post-9/11 period. Its positive effect became significantly negative on Flight Cancellation ($p < 0.10$), and the difference between both periods was significant ($p < 0.10$).

The extended specifications did not affect statistical inference on the effect of the bankruptcy on service quality, again showing that none of its coefficients significantly differed between the pre- and post-9/11 periods.

As for representation turmoil, there were the significant effects for the event window from the date of election petition filed to the date of the NMB determination only on passenger service in the pre-9/11 period, but its effects generally became insignificant in the post-9/11 period, except passenger complaints on Flight Problems ($p < 0.05$). The test of equality of coefficients suggests that there were the significant differences in most of its coefficients between the pre- and post-9/11 periods. The similar results were found for the event window from the NMB determination to the first contract settled, showing the significant differences between the pre- and post-9/11 periods on Arrival Delay ($p < 0.10$), the Total Number of Passenger Complaints ($p < 0.10$), and Flight Problems ($p < 0.05$).

Although the similar pattern appears in the specific bargaining procedures under the RLA, Table 6.2 reveals some notable differences among the bargaining procedures. First, direct bargaining was generally insignificant in both periods, except on Arrival Delay ($p < 0.05$). Second, the mediation/arbitration was significant on Flight Cancellation ($p < 0.10$) only in the pre-9/11 period, but not significant on Arrival Delay and Mishandled

Baggage between the pre- and post-9/11 periods. However, it was significant at various levels of significance on passenger service in both time periods, except on passenger complaints on Reservation/Ticketing/Boarding, but with slightly smaller magnitude in the post-9/11 period. The test of equality of coefficients indicates no significant difference between the pre- and post-9/11 periods. Third, cooling-off periods period generally reduced operational performance, particularly with a higher Arrival Delay by 10.5 log points ($p < 0.05$) in the post-9/11 period. As for passenger service, cooling-periods increased passenger complaints on Baggage by 6.3 log points ($p < 0.01$) in the post-9/11 period. The test of equality of coefficients indicates the only significant difference in passenger complaints on Flight Problems between both periods.

Fourth, strikes increased Flight Cancellation by 177.3 log points (approximately 488 percent) ($p < 0.01$) in the pre-9/11 period but increased it only 8.8 log points (approximately 9.2 percent) in the post-9/11 period. Although the estimated effects of strike on other measures of service quality in the post-9/11 period were smaller than those in the pre-9/11 period, they significantly increased the Total Number of Passenger Complaints and passenger complaints on Flight Problems, Reservation/Ticketing/Boarding, and Customer Service, all of which were significant at the 0.05 level. The test of equality of coefficients suggests that the effects of strike on Flight Cancellation between the pre- and post-9/11 periods were significantly different ($p < 0.01$). Strike reduced the AQR by 78.1 points ($p < 0.10$) in the pre-9/11 period, but increased the AQR by 10.5 points. And the difference between the pre- and post-9/11 periods was significant at the 0.10 level. Finally, the released-but-no-strike as another

impasse process unexpectedly reduced Flight Cancellation by 26.3 log points ($p < 0.05$), and had no significant effect on other measures of service quality.

Any detailed discussion of the intercept has been reserved until now. The intercepts of the separate regressions for the post-9/11 period were consistently higher than those of the separate regressions for the pre-9/11 period. But the intercepts between both periods were not significantly different from each other, except the intercepts of Mishandled Baggage ($p < 0.001$) and the intercepts of Flight Problems and the AQR ($p < 0.10$).

6.5. Discussions

This chapter has analyzed whether there was a significant change in the effects of labor turmoil between the pre- and post-9/11 periods. The empirical results in this chapter raise two important issues. First, did the post-9/11 airline labor relations go through a more fundamental change compared to the pre-9/11 airline labor relations, in ways that employees and their representation lost their influence over the service delivery process? Second, if so, is the change sustainable over the long term?

Overall, the empirical results showed two important patterns in the relationship of labor turmoil with service quality between the pre- and post-9/11 periods. First, labor turmoil had significant effects on various measures of service quality in the pre-9/11 period, but its effects became insignificant or even significantly negative in the post-9/11 period. Second, a series of tests of equality of coefficients suggests that the weakened

effects of labor turmoil between the two periods on service quality were not as significant as they appeared, although some important variations in representation and bargaining turmoil were found.

Because there are few empirical studies to directly compare the present empirical results, here are some speculations about how 9/11 affected the contemporary airline labor relations. As for strategic turmoil, the empirical findings suggest that the major carriers in the post-9/11 period successfully increased operational performance, but not passenger service. The steep drop for air travel demand may have prompted the major carriers, the merging carriers and the bankrupt carriers in particular, to operate more efficiently. As shown in Figure 4.2, the post-9/11 M&As included several bankrupt carriers at the time of the M&As. These carriers must have become keener particularly on the rate of Flight Cancellation, along with their efforts to rescale established pre-9/11 route structures in ways that increased profitable routes while eliminating unprofitable routes. The configuration of flight schedules and routes structure must have created slacks in the capacity of the U.S. airports, which further helped these carriers to improve operational performance in the post-9/11 period. Furthermore, it is likely that passengers adjusted well to the new security environment in the post-9/11 period. They may arrive at the airport earlier and pack their baggage as specified by carriers, reducing flights' departure delays and thereby arrival delays, and mishandled baggage.

These factors all together may moderate the negative effects of strategic turmoil. If the increase in operational performance was mainly due to the weakened influence of employees over service delivery process, similar findings must have appeared in

passenger service. Carriers may find passenger service difficult to monitor and standardize, relative to operational performance, so that carriers may not dominate the employees' power over the service delivery process. In addition, it is likely that carriers' efficient operation may not necessarily bring a better service quality to passengers. In this regard, the findings as to load factors seem suggestive in that more efficient utilization of airplanes to increase profits highly correlated with more passenger complaints perhaps due to arrival delay.

The results also suggest that the bankrupt carriers may face high internal demands for efficient operation, regardless of the pre-9/11 and post-9/11 periods. Particularly in the post-9/11 period, carriers that avoided bankruptcy filing also performed drastic restructuring similar those of the bankrupt carrier, which may produce no qualitative difference between the bankrupt carrier and carriers. In short, the findings as to strategic turmoil are likely to reflect some mixed effects from various factors.

Second, the empirical findings suggest some significant changes in the effects of representation and bargaining turmoil on service quality between the pre- and post-9/11 period. Did the findings reflect a somewhat weakened influence of employees over the service delivery process?

To some extent, yes. First of all, employees may well think the carrier's restructuring efforts to cut labor costs inevitable, though not desirable, to survive the new shrinking market. Employees were more obliged to conform to the airlines' policies in the pre- 9/11 period than those in the pre-9/11 period.

At the same time, unions were vulnerable to the management's demands for concessions in wages and work rules. Given the clear restrictions that employees were less inclined to attribute the post-9/11 financial distress to management, unions might find it difficult to organize resistance against the carrier's new policies. Therefore, employees and their representation may lose some of their influence over the service delivery process in the post-9/11 period.

However, the weakened influence of employees over the service delivery process does not mean that there is a sharp discontinuity in airline industrial relations after 9/11. In fact, employees and their representation had gradually experienced some important disadvantageous changes even before 9/11. First, there was an increasing use of strike replacements (Budd, 2010). For example, strike replacements were the main reason for the defeat of the flight attendants' strike against TWA in 1985. In response, the AFA at Alaska Airlines in 1993 adopted a strategy, called CHAOS (Create Havoc Around Our System) campaign, while working under a new term imposed by the carrier for about ten months. This was mainly to avoid the strikers' job losses.

Equally important, carriers also had gradually outsourced a variety of services but with a drastic increase in the post-9/11 period. According to a data set from the MIT airline data project (<http://web.mit.edu/airlinedata/www/default.html>), the outsourced services of the nine major carriers (TWA excluded) in the sample of airlines on flight equipment maintenance in 1995, 2000, and 2005 totaled more than \$1.3 billion, \$2.7 billion, and \$3.5 billion, respectively. The corresponding proportion of flight equipment maintenance expenditures allocated to outsourced services increased from 22% in 1995

to 30% in 2000 and to 43% in 2005. The mechanics' bargaining turmoil at Northwest Airlines in 2001 and 2005 may best capture how outsourcing can affect the evolution of bargaining turmoil. At the end of the cooling-off period in March, 2001 Northwest Airlines asked the NMB to report the case to the PEB in order to avoid the strike. In contrast, at the end of the cooling-off period July, 2005 the carrier asked the NMB to release from the NMB mainly because the carrier was ready for outsourcing of flight equipment maintenance. Eventually, the strike by the mechanics against Northwest Airlines lasted for 416 days but ended up with a big loss to the union.

Although there is no reliable source for outsourcing of the fleet service and passenger service jobs, it would be reasonable to assume that carriers should have outsourced these jobs in the post-9/11 period, especially to the jobs held within small airports. As a consequence, it is likely that outsourcing must have weakened the link of labor turmoil with service quality.

In these circumstances, as Hebdon (2005) argued, where employees and their unions are difficult to organize visible collective actions, they may substitute a variety of forms of covert actions for salient collective actions.²⁹ For example, the legal restriction on self-help actions under the RLA may lead the employees to file grievances more actively even when otherwise the similar conflicts would have resulted in collective actions. One implication of a possibility of substitutability among labor turmoil to the

²⁹ Another contingency to promote the substitutability is that under bankruptcy unions do not have a legal right to strike the bankrupt carrier against its unilateral imposition of its terms after its contract is vacated. The initial decision by the bankruptcy court permitted that unions have a legal right to strike their employer (In re Northwest Airlines Corp., 346 B.R. 333, 344 (Bankr. S.D.N.Y.2006)), which was reversed in the higher court (Northwest Airlines Corp. v. Association of Flight Attendants-CWA, 483 F.3d 160 (2d. Cir. 2007)).

empirical results in this chapter is that there may be actually an increase in unmeasured expressions of labor turmoil other than representation and bargaining turmoil. This may be the case that while labor turmoil is similarly present in the workplace, a portion of unobservable forms of labor turmoil increases, which may result in a downward bias in the true effect of labor turmoil in the post-9/11 period.

Alternatively, the main results in fact may be a purely statistical artifact. The data under analysis covers the period from October 2001 through December 2008 for the post-9/11 period. This period includes only the very early stage of another bargaining round of recovery for lost earnings for the first time after 9/11. Given that bargaining turmoil follows an economic cycle in a lagged fashion and that the magnitude of concessions made after 9/11 was huge, the inclusion of the whole bargaining round after 9/11 in the post-9/11 period may produce different results from those presented in this chapter.

In short, there are many potential factors that led the link of labor turmoil to service quality to be weakened in the post-9/11 period. At the surface level, carriers and passengers became better off compared to in the pre-9/11 period, while employees and their representation became worse off. However, it is likely that the impetus to cut labor costs may create a vicious circle of the low service quality - higher operating costs/fewer passengers - more labor cuts. Also employees and their representation will focus on recovering their lost earnings in the upcoming bargaining round, which may repeat the proliferation of labor turmoil across the airline industry as in the late 1980s and 1990s. For this reason, the impetus to cut labor costs and to improve service quality may be compatible in the short term but not be sustainable in the long term.

CHAPTER 7

THE RELATIVE EFFECTS OF EACH OCCUPATION'S LABOR TURMOIL ON SERVICE QUALITY

7.1. Introduction

The previous two chapters analyzed the carrier-craft-monthly panel data to estimate the average effects of labor turmoil from five crafts on service quality. The theoretical model discussed in Chapter 3 does not explicitly state whether employees are homogenous or heterogeneous in their ability to affect service quality in the service delivery process, and if they are heterogeneous, how distinctive groups of employees affect service quality through the performance of cross-functional tasks . The airline industry provides a testing ground for how different work groups affect service quality in the task-interdependent service delivery process.

The main purpose of this chapter is two-fold: to determine a relative contribution of each of the five crafts to service quality; and to analyze an issue of whether labor turmoil in one occupation affects other measures of service quality which the other occupations are primarily designed to serve. The issues are empirically appealing in that each occupation determines the quality of service quality while affecting the other occupations' task performances.

Consider an extended form of Equation 2 to include craft-specific labor turmoil:

$$(4) \quad Q = f(L^j(T), K, v),$$

where Q is service quality, L^j is labor input by pilots, flight attendants, mechanics, fleet service employees, and passenger service employees, respectively, T is labor turmoil, K is capital stock, and v is the idiosyncratic random element in service production.

Equation 4 allows one to identify the unique effects of a set of labor turmoil of one craft individually and jointly, conditional on the presence of labor turmoil in the other four crafts. Statistically, we can analyze whether, for example, flight attendants' bargaining turmoil affects passenger complaints on baggage, which fleet service employees are designated to primarily serve; or alternatively, passenger complaints on reservation, ticketing, and boarding, which passenger service employees are designated to primarily serve.

It would be useful to summarize how air travel service is actually delivered to passengers. Gittell (2001: pp.470) briefly illustrated how a flight departure as a core operation of airlines is dependent upon task performance by many different occupations. First, twelve occupations are involved in the flight departure. Each of twelve distinctive workgroups, i.e., gate agents, ticketing agents, ramp agents, baggage handlers, cabin cleaners, caterers, fuelers, freight agents, operations agents, pilots, flight attendants, and mechanics, performs a set of their own tasks. Second, the task sets are repeated for every flight departure between the arrival and departure of the plane at an airport. Third, these tasks are often carried out in parallel while employees are continuously updating how the other related tasks are performed.

The five occupations under analysis are the largest occupations within the carrier, which possess a wide variety of distinctive skill sets to make their unique contributions to service quality and perform their tasks in the occupation-specific work context.³⁰ The pilots operate the aircraft in regularly scheduled service, while working in a team in the cockpit and frequently communicating with the flight attendants. But they are secluded from the passenger for safety concerns. The pilots are the most important in that no airline can fly aircraft without a pilot. Any disruption by the pilots will have an immediate impact on the airline.

The flight attendants are not highly skilled in a sense that they are not required to have a license to perform their tasks. Due to legal requirements associated with safety of flight, the carrier must make sure that a minimum number of flight attendants are present for a flight. Their main tasks are to keep direct contact with customers while serving various demands from the passengers, as well as ensuring safety issues of the flight. They work collaboratively and often communicate with the pilots.

On the other hand, the mechanics must possess a legally imposed minimum level of skills to diagnose, adjust, repair, maintain, or overhaul flight equipments. They also determine compliance with safety standards as to flight equipments. They are secluded from passengers and employees in other occupations mainly because they are working at the maintenance centers.

³⁰ This section is drawn from job description, work activity, and work context from the O*Net (<http://online.onetcenter.org/>). In a similar account for the between-occupation comparisons, Cappelli (1985) argued how a wide variety of distinctive skills, earnings, and employment alternatives led these occupations to respond to concession demands in 1980s.

In contrast, the fleet service employees and passenger service employees perform relatively unskilled labor, such as moving freight and baggage for the fleet service employees and computer skills to make and confirm reservations and sell tickets to passengers for the passenger service employees. However, the passenger service employees work directly with and often negotiate and resolve conflicts with passengers.

Given the lack of existing studies, this thesis explores whether labor turmoil affects the work interdependence during service delivery process, although no specific hypothesis will be made. The quality of air travel service is based on cross-functional task interdependence, in which the between-occupation configuration of task performances are important, as well as the within-occupation coordination by employees in the same occupations. Therefore, labor turmoil in one occupation is expected to affect service quality through disruption in the between-occupation configuration of task performances and through disruption in within-occupation coordination of task performances.

7.2. Empirical Model

An empirical version of Equation 4 is based on the carrier-monthly panel data regressions of the form:

$$(5) \quad Q_{it} = \beta^S S_{it} + \beta^{Z_j} Z_{it}^j + \beta^X X_{it} + \beta^q q_{it} + \alpha_i + \eta_t + e_{ijt},$$

where Q_{it} is the monthly quality measures in carrier i at time t , S_{it} is the set of strategic turmoil in carrier i at time t , Z_{it}^j is the set of the union status, and broad (or detailed)

categories of representation turmoil (R) and bargaining turmoil (B) by craft j in carrier i at time t , X_{it} is other exogenous variables at the carrier level, q_{it} is a set of operational performance of carrier i at time t , α_i is a carrier fixed effect, η_t is a set of year-by-month fixed effects. Standard errors were clustered by carrier to deal with concerns about serial correlation within the carrier.

Note that because strategic turmoil is common to all the occupations within the airlines, it appears as a carrier-general level variable only once. Therefore, Equation 5 identifies a unique contribution of occupation-specific representation and bargaining turmoil to service quality by each occupation, conditional on labor turmoil in the other crafts within the same carrier. Finally, the 12,150 airlines-crafts monthly observations analyzed in the previous chapters reduce to the 2,430 airlines-monthly observations.

7.3. The Effects of Broad Categories of Labor Turmoil on Service Quality by Occupation, 1987-2008

Table 7.1 presents the results of broad categories of labor turmoil by craft on service quality. First, the results for strategic turmoil were generally consistent with the findings in the previous chapter. For example, the M&A process had the significant effects on Arrival Delay ($p < 0.10$) and Mishandled Baggage ($p < 0.05$). The bankruptcy process had the significant but negative effect on passenger complaints on Reservation/Ticketing/Boarding ($p < 0.10$).

Second, the pilots' union presence and broad categories of representation and bargaining turmoil are examined. In general, the presence of union improved service quality, whereas the process of obtaining union status reduced service quality. For example, the union presence reduced Mishandled Baggage ($p < 0.10$) and passenger complaints on Reservation/Ticketing/Boarding ($p < 0.10$) and Baggage ($p < 0.05$), and the AQR ($p < 0.01$). In contrast, representation turmoil reduced operational performance and passenger service, but its effects were not statistically significant. The pilots' broad category of bargaining turmoil also generally increased service quality, but unexpectedly, it reduced Mishandled Baggage ($p < 0.10$).

Third, the flight attendants' union presence, and representation and bargaining turmoil are examined. In contrast to pilots' union presence, the flight attendants' union presence significantly reduced all the measures of service quality, except the AQR. For example, the union presence increased Flight Cancellation by 98.6 log points ($p < 0.001$) and passenger complaints on Flight Problems by 36.8 log points ($p < 0.05$) and Customer Service by 7.9 log points ($p < 0.10$). The representation turmoil had the significant effects on all the measures of passenger service and the AQR by 61.1 points ($p < 0.01$), while showing no significant effect on operational performance. The flight attendants' bargaining turmoil shows the same pattern as the pilots' bargaining turmoil: the flight attendants' bargaining turmoil increased passenger complaints, but its effects were not estimated precisely; and unexpectedly, it significantly reduced Mishandled Baggage ($p < 0.01$).

Fourth, the mechanics' union presence, and representation and bargaining turmoil are examined. The mechanics' union presence significantly reduced Flight Cancellation by 84.3 log points ($p < 0.001$) but increased Mishandled Baggage by 18.3 log points ($p < 0.10$). The representation turmoil had the significant effects only on passenger service. For example, it increased the Total Number of Passenger Complaints ($p < 0.10$) and passenger complaints on Flight Problems ($p < 0.10$) and Customer Service ($p < 0.05$). The mechanics' bargaining turmoil had no consistent pattern of results, but showing an unexpected results on passenger complaints on Baggage ($p < 0.10$).

Fifth, the fleet service employees' union presence, and representation and bargaining turmoil are examined. The fleet service employees' union presence generally reduced passenger service, but its effects were not statistically significant. An interesting pattern emerges from the broad categories of representation and bargaining turmoil. For example, the representation turmoil reduced Mishandled Baggage ($p < 0.10$) and increased the AQR ($p < 0.10$), whereas the bargaining turmoil increased Mishandled Baggage ($p < 0.10$) and reduced the AQR ($p < 0.05$). Similar pattern with no statistical significance was found in passenger service.

Finally, though not statistically significant, the passenger service employees' union presence, and representation and bargaining turmoil showed a consistent pattern: they generally increased operational performance but reduced passenger service.

7.4. The Effects of Detailed Categories of Labor Turmoil on Service Quality by Occupation, 1987-2008

Table 7.2 presents the effects of labor turmoil on service quality using detailed categories of labor turmoil by craft. First, as for the detailed categories of strategic turmoil, the financial integration showed no significant effect on any measures of service quality, and the post-merger workforce integration process increased only Mishandled Baggage by 14 log points ($p < 0.01$). Bankruptcy process generally improved service quality, but its effects were not significant.

Second, the pilots' union presence, and detailed categories of representation and bargaining turmoil are examined. The results show that the effects of the union presence became more significant than those in Table 7.1 and its effects were found for all the measures of service quality, except Arrival Delay. In particular, the union presence reduced Flight Cancellation by 31.6 log points ($p < 0.05$) and increased the AQR by 1.81 points ($p < 0.001$). The window from the date of election petition filed to the NMB determination increased Mishandled Baggage ($p < 0.05$). Unexpectedly, the first contract negotiation process reduced passenger complaints on Baggage ($p < 0.01$) and improved the AQR by 76.8 points ($p < 0.01$). As for the specific procedures of collective bargaining, the mediation/arbitration reduced service quality, but its effects were not statistically significant. As expected, the pilots' strikes increased Flight Cancellation by 163 log points ($p < 0.10$) and reduced the AQR by 89.6 points ($p < 0.10$), and significantly increased all the measures of passenger complaints, except on Baggage.

Consistent with the results in Table 7.1, the flight attendants' union presence reduced service quality across all the measures of service quality, except Mishandled

Baggage. In particular, it increased Flight Cancellation by 117 log points ($p < 0.001$) and the AQR by 0.85 points ($p < 0.10$). The window from the date of election petition filed to the NMB determination increased the Total Number of Passenger Complaints ($p < 0.10$) and passenger complaints on Reservation/Ticketing/Boarding ($p < 0.10$) and Customer Service ($p < 0.05$). And the first contract negotiation reduced both operational performance (except Mishandled Baggage) and passenger service. For example, the first contract negotiation increased Arrival Delay by 31 log points ($p < 0.01$), Flight Cancellation by 33.4 log points ($p < 0.01$), and increased passenger complaints on Flight Problems by 42.7 log points ($p < 0.001$) and Customer Service by 17.7 log points ($p < 0.001$), and reduced the AQR by 1 points ($p < 0.001$)

As for the specific bargaining procedures, the mediation/arbitration reduced service quality, but its effect was statistically significant only on passenger complaints on Flight Problems ($p < 0.10$). Unexpectedly, the mediation/arbitration reduced Mishandled Baggage ($p < 0.01$). The flight attendants' strike significantly increased Arrival Delay by 21 log points ($p < 0.10$) and Flight Cancellation by 169 log points ($p < 0.001$), and passenger complaints on Reservation/Ticketing/Boarding by 8.8 log points. It is interesting to note that the flight attendants' strike significantly reduced passenger complaints on Flight Problems ($p < 0.10$), Baggage ($p < 0.10$), and Customer Service ($p < 0.10$). Finally, the flight attendant's released-but-no-strike increased Mishandled Baggage by 16.7 log points ($p < 0.05$).

Next, the mechanics' union, and detailed categories of representation and bargaining turmoil are examined. The union presence significantly reduced Flight

Cancellation by 83 log points ($p < 0.001$) but reduced the AQR by 0.43 points ($p < 0.10$). The event window from the date of election petition filed to the NMB determination increased passenger complaints on Flight Problem ($p < 0.10$) and Customer Service ($p < 0.10$). The first contract negotiation unexpectedly reduced Flight Cancellation ($p < 0.05$). As for the specific bargaining procedures, the mechanic's direct bargaining was significantly associated with reduced passenger complaints. There was no significant effect for the mediation/arbitration on service quality. The mechanics' strikes increased Arrival Delay ($p < 0.10$), but reduced passenger complaints on Flight Problem ($p < 0.10$) and Baggage ($p < 0.05$), which was found in the flight attendants' strike. The mechanics' strikes increased Flight Cancellation by 15.3 log points, but its effect was not statistically significant. Also the unexpected result was found for the mechanics' strikes on Mishandled Baggage ($p < 0.05$).

The fleet service employees' union presence, and representation and bargaining turmoil are considered. The union presence was significantly associated only with passenger complaints on Baggage ($p < 0.10$). As expected, the mediation/arbitration reduced the quality of baggage-related service: it significantly increased Mishandled Baggage ($p < 0.001$), but did not passenger complaints on Baggage. However, there are two unexpected results. First, the event window from the date of election petition filed to the NMB determination significantly reduced Mishandled Baggage ($p < 0.05$). Second, the first contract negotiation increased the AQR by 0.53 points ($p < 0.05$).

Finally, the passenger service employees' union, and representation and bargaining turmoil are considered. In general, these variables consistently reduced

passenger service, but showed no consistent pattern for operational performance. In particular, the mediation/arbitration increased passenger complaints on Flight Problems ($p < 0.10$), Reservation/Ticketing/Boarding ($p < 0.10$), and Customer Service ($p < 0.05$). Also the cooling-off periods increased the Total Number of Passenger Complaints by 31.3 log points ($p < 0.05$). However, two unexpected findings were apparent for the mediation/arbitration on Mishandled Baggage ($p < 0.01$) and for the cooling-off periods on Flight Cancellation ($p < 0.001$).

7.5. Discussions

This chapter has analyzed how labor turmoil arising from each occupation within the carrier affects service quality. It was argued that each occupation contributes to service quality through their own distinctive skill sets in the occupation-specific work context, but also through interdependent task performance by different occupations.

Although there was no clear pattern of results by craft, the analyses provided several interesting findings. First, while the average effect of the union status of the five occupations was close to zero in the previous chapters, the empirical results in this chapter show that the presence of a union was generally associated with higher service quality, except the strongly negative effects of the flight attendants' union presence.

Second, the results also suggest that not surprisingly, the pilots and flight attendants were the most influential occupations within the carrier. In particular, the flight

attendants' representation turmoil was noteworthy in that it had the most significant effects on all the measures of service quality, except on Mishandled Baggage.

Third, the results also show that each occupation differs by the effects of detailed categories of bargaining turmoil on service quality. While the broad category of bargaining turmoil by each occupation was insignificant, the detailed categories of bargaining turmoil show interesting results. The effects of the strikes by the pilots and flight attendants were significant but those by the mechanics were not. The coefficients on the pilots' strikes were based on the two strikes at American Airlines for 24 minutes and at Northwest Airlines for 15 days. The coefficient on the flight attendants' strike reflects the effect by the flight attendants' strike at American Airlines which lasted for five days. The mechanics' strikes represent two strikes by the mechanics at US Airways for five days and at Northwest Airlines. As discussed in Chapter 6, if the mechanics' strike at Northwest Airlines was coded only for the first month, the coefficients on the mechanics' strikes would have been statistically significant with similar magnitude of those by the flight attendants. Interestingly, there were significant effects for the mediation/arbitration of the passenger service employees on passenger service, but not for the mediation/arbitration of the other occupations. Finally, it should be emphasized that because of the low incidence of such procedures (see Table 4.5), coefficients on the later stages of bargaining turmoil, i.e., the mediation/arbitration, cooling-off periods, strikes, and released-but-no-strike, are occupation-specific.

This chapter by nature is exploratory in that this is the first study to isolate each occupation's contribution to service quality in the airline industry. Instead of taking a

theoretical guide, this chapter focuses on some specific relations. The empirical findings in this chapter are consistent with the nature of air travel service, which is delivered by each occupation's unique skill sets in the occupation-specific work context as well as in the cross-functional task interdependence. The results need to be interpreted cautiously. The detailed categories of labor turmoil by occupation lead the coefficients to become more sample-specific.

CHAPTER 8

CONCLUSION

8.1. A Summary of Findings

This thesis presents an analysis of how labor turmoil affected service quality in the U.S. airline industry between 1987 and 2008. It also brings in a critical issue of whether the relationship between labor turmoil and service quality has changed after the 9/11 terrorist attacks. Finally, it performs an exploratory analysis of how labor turmoil affects service quality by craft in the context of task interdependence in the service delivery process.

While previous research has exclusively analyzed the impact of an event with high visibility and social significance, the thesis integrates various sources of labor turmoil into the empirical framework that focuses on more routine type of interactions between labor and management from direct bargaining and mediation, as well as non-routine type of interactions, including the M&As and bankruptcies and the emergency procedures under the RLA.

The thesis begins with an examination of the average effects of labor turmoil arising from the five crafts on service quality. Overall, the empirical results suggest that the different expressions of labor turmoil have differential effects on service quality. First, while strategic turmoil generally has a significant effect on operational

performance, representation and bargaining turmoil have the significant effects on both operational performance and passenger service. Second, the significant effects on passenger service are obtained even after the correlations between operational performance and passenger service are accounted for. This suggests that representation and bargaining turmoil have unique effects on passenger related service. Third, although the U.S. airline industry is often counted as a saturated union sector, the dynamics over employee representation is still in place. Conflicts between employer and employees are more influential for affecting service quality than those among employees. Also, dismissed petitions are more influential to service quality than those authorized for elections.

Finally, each step of the bargaining process specified in the RLA is also important to service quality. In particular, the mediation/arbitration process is less visible than strikes but its cumulative effects on Flight Cancellation for 1987-2008 are found well beyond the cumulative effects of strikes on Flight Cancellation. The empirical results suggest that it is important to reach agreements in a more timely fashion for the welfare of carrier and employees, as well as for the passengers' welfare.

A unique finding of this thesis is that the effect of labor turmoil on service quality has weakened in the post-9/11 period, particularly for representation and bargaining turmoil. Given that bargaining turmoil follows economic cycle in a lagged fashion, the significant but weakened effects of labor turmoil found in the post-9/11 period may reflect the early periods after 9/11 when most of bargaining turmoil intensely occurred. If the post-9/11 period were extended to include another bargaining round of recovery for

lost earnings after 9/11, the effects might look differently from now with a high likelihood that passengers will suffer from lower service quality than the present findings suggest. However, it is not clear whether employees and their representation will have the same level of influence over the service delivery process as they had in the pre-9/11 period.

Another unique part of this study is evidence about how each craft's labor turmoil contributes to service quality. Given task interdependence of the service delivery process and the distinctive nature of skills sets by occupation, it is expected that different groups of employees make differential contributions to service quality. The pilots and flight attendants are the two groups that make most contributions to service quality. Interestingly, the empirical results suggest that the flight attendants are at least as influential as the pilots over the service delivery process. The mechanics are also important but their scope of influence is limited. Similar results are found for the fleet service employees. Mainly because of their nature of work which requiring direct contacts with passengers, the passenger service employees are found to have higher contributions to passenger service than the mechanics and fleet service employees. In short, different occupations experience different forms of labor turmoil and affect the service delivery process differently.

8.2. Limitations and Suggestions for Future Research

Labor turmoil is not a random occurrence; rather it results from the strategic decisions of management and unions. Although substantial efforts were made at the data collection stage, various sources still remain and can affect the validity of the findings of the current thesis.

Most importantly, it might be the case that poor airline industrial relations may make it difficult to statistically identify the effect of individual turmoil events on changes in service quality. If airline labor relations were better in general, a turmoil event should have been more discrete and then provided a better “experiment” to analyze.

Second, the fixed-effects model this thesis takes as the main analytical tool can effectively eliminate time-invariant carrier- and craft-specific properties, but it can produce biased estimates in the presence of time-varying and unmeasured variable(s) when it correlates with the occurrence and evolution of labor turmoil and service quality. A potential candidate for the time-varying and unmeasured variable(s) is some important properties of top management team, such as labor relations strategy (Kochan et al., 1986). As evidenced by the important figures from the U.S. airline industry, including Frank Lorenzo, the former CEO of Continental Airlines and Eastern Airlines, and Carl Icahn, the former CEO of Trans World Airlines, such properties are likely to affect the patterns of industrial relations actions with its craft unions and affect service quality and broader measures of firm performance at the same time. To the extent to which the time-varying unmeasured variable(s) would affect, the results presented in this thesis would be biased. Therefore, the results should be interpreted carefully.

Third, unmeasured strategic/tactical variants may create omitted variable bias in the empirical results. Indeed, it is extremely difficult to measure all the possible forms of labor turmoil because it is multi-faceted in terms of a variety of its *expressions and durations*. This difficulty becomes even more complex when one further considers some combinations of different expressions of labor turmoil over time. In particular, this thesis has mostly focused on collective bargaining between unions and airlines (i.e., “institutional bargaining”), leaving “employee bargaining” including the grievance filings and other informal negotiations at the workplace unmeasured (Budd, 2010). Although this thesis incorporates many different expressions of labor turmoil, other possible expressions of labor turmoil are not still measured.

An immediate consequence from omitted variables is that the estimated effects of labor turmoil can be either underestimated or overestimated. The estimated effects are underestimated when the unmeasured substitutes are prevailing while collective expressions of labor turmoil are absent. In an alternative scenario, in which both the unmeasured substitutes and collective expressions of labor turmoil are present at the same time, the effects of unmeasured labor turmoil will be tapped on the coefficients of the measured labor turmoil such that converges to the true effects which this thesis intends to capture by the term “labor turmoil. Together with the monthly measurement of labor turmoil, the present estimated effects are likely to be lower bound.

In short, non-random samples, omitted variables, and (possibly) measurement error are all potential sources of bias that might affect both the internal and external validity of the results presented here. In particular, because of the complex nature of labor

turmoil, and because it is not viable to obtain comprehensive data as to top management's important properties and grievance filings at the craft level over more than two decades, this thesis leaves them as the important limitations. Instead, cautions for careful interpretation are warranted.

Future research is expected to address these limitations. One way to overcome these limitations is to perform detailed qualitative studies as a way of complementing statistical evidence of the relationship between labor turmoil and service quality. For example, a qualitative analysis on the M&A process including the post-merger workforce integration and the bankruptcy process would further identify discrete stages within detailed categories of strategic turmoil which the event windows adopted in this thesis did not capture.

In this line of suggestion, another interesting venue to extend this thesis is to conduct a historical study of employee representation election in the U.S. airline industry. This thesis sacrifices detailed information on employee representation election under the RLA for statistical analysis focusing on the ten major carriers. It is viable to perform more detailed statistical analysis by including more carriers with a longer time span. This extension may include important topics, such as how the determination over an appropriate bargaining unit has changed over time by innovations in aviation technology and changes in the major occupations' skill sets; and how these factors have formed and dissolved union rivalry through its blurring effects on occupational boundaries.

Finally, although the thesis is primarily interested in the main effects of labor turmoil on service quality, there are many important contextual factors. While it might be

important to examine some important contextual factors to moderate the effects of labor turmoil on organizational effectiveness, an inquiry for this is left for future work.

8.3. Conclusion

This thesis and its findings demonstrate a need to broaden the conceptualization of labor dispute in the industrial relations literature for future theoretical work and expand what it considers to be the set of determinants of economic performance for future empirical work. While the previous literature has focused on contentious kinds of labor disputes with high visibility and social significance, this thesis focuses on diverse forms of labor turmoil, including more routine and less pronounced types of labor turmoil as well as contentious types of labor disputes, as determinants of service quality. In a direct comparison of the effects of mediation/arbitration on flight cancellation with the effects of strikes, for example, this thesis strongly shows that although the effects of strikes are much larger than those of mediation/arbitration in a cross-section comparison, the cumulated effects of mediation/arbitration are larger.

The results of this thesis also have important practical implications. From a managerial perspective, this thesis shows that labor turmoil in one occupation affected service quality, crossing over the occupation's formal occupation boundary and disrupting the normal cross-functioning of task performance with the other occupations in the service delivery process. Thus, the current craft-centered institutional framework

within the carrier should be replaced by a “more coordinated enterprise-wide approach” (Bamber et al., 2009: p.182).

From a public policy perspective, this thesis reinforces the importance of the longstanding U.S. policy objective of providing institutional mechanisms for managing labor-management conflicts in ways that reduce disruptions to consumers and the economy. This thesis shows that diverse forms of labor turmoil affect airline service quality, and thus, public policies continue to be needed to help manage the conflicts that give rise to this turmoil. And the results reinforce the need to continuously improve these public policies, such as finding new ways to shorten the duration of mediated negotiation and avoid the emergency procedures under the RLA.

In these ways, this thesis contributes to the longstanding industrial relations tradition of not only increasing our understanding of the employment relationship, but also of helping it work better.

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Appendix A The National Mediation Board's Single Carrier Determination Rules

In addition to the typical representation election, mergers and acquisitions activity (M&As) also creates an employee representation issue. The NMB initiates an investigation of representation issues with a request by either the carriers or unions that are involved in a merger. To determine the representation case, the NMB investigates if indeed the two systems were combined within a single carrier and when this had actually occurred. The decision is based on two tests: (1) whether or not the two systems are held out to the public as a single carrier, and (2) whether or not the carriers have combined their operations from a managerial and labor relations perspective. The second test is determined by the following factors, whether labor relations and personnel functions are handled by one carrier, whether there are a common management, common corporate officers and interlocking Boards of Directors, whether there is a combined workforce, and whether separate identities are maintained for corporate and other purposes. (TWA/Ozark, 14 NMB No. 63: pp.236).

As a general rule, the NMB considers the 'comparability' between unions of the merging carriers. When two unions are comparable in terms of the number of employees, the NMB orders a standard ballot election without showing of interest. When not comparable, the NMB orders the "transfer of certification" of the dominant union to the combined system. In contrast, the dominated union loses its certification but is allowed to file a representation application with a minimum 35% showing of interest from

employees of the combined system.³¹ The comparability rule also applies to a case where employees are represented by a union at one carrier but not at the other carrier. When the number of employees at both carriers is comparable, the NMB orders a standard ballot election, through which the employees determine whether or not to have their bargaining agent of the combined system. When the number of employees the union represents is larger than the number of employees who are not represented by union, the certification of the union extends to the combined system; otherwise the certification of the union extinguishes. Therefore, it is possible for employees involved in the merger to lose their collective bargaining agent either through the standard ballot election or by the comparability rule.

³¹ The NMB also sets the time limit for petition for an election, which varies from within 30 days from the date of the determination to 60 days. When the dominated union does not file the petition, then no petition for the craft is allowed for one year (i.e., one-year bar rule applies).

Appendix B The M&As and Employee Representation, 1987-2008

	Merger Announcement	DOT/DOJ (since 1989) Approval	Completion of Financial Integration	NMB Determination as Single Carrier	Occupation	Union at the merger carrier	Union at the merged carrier	Transfer of Certification/ Election
Northwest-Republic	19860123	19860731	19860812	19860812	Pilots FA Mechanics Passenger Fleet	ALPA IBT IAM BRAC BRAC	ALPA AFA IBT vs. AFA ALEA ALEA	IBT vs. AFA BRAC-ALEA-IAM; BRAC vs. IAM (RUN-OFF); IAM BRAC-ALEA-IAM; BRAC vs. IAM (RUN-OFF); IAM
TWA-Ozark	19860228	19860912	19860912	19861026	Pilots FA Mechanics Passenger Fleet	ALPA IFFA IAM IAM IAM	AFA AMFA	IFFA vs. PCCA
Delta-Western	19860910	19861211	19861217	19870401	Pilots FA Mechanics Passenger Fleet	ALPA	ALPA AFA IBT ATE ATE	
American-Air Cal	19861118	19870330	19870430	19870701	Pilots FA Mechanics Passenger Fleet	APA APFA TWU	ALPA APFA TWU TWU	American Airlines voluntarily recognized TWU
Alaska-Jet America	19860807	19860910	19860930	19871001	Pilots FA Mechanics Passenger Fleet	ALPA AFA IAM IAM IAM		
Alaska-Horizon	19861120	19861223	19861229		Pilots FA Mechanics Passenger Fleet	ALPA AFA IAM IAM IAM		
USAir-PSA	19861209	19870304	19870529	19880409	Pilots FA Mechanics Passenger Fleet	ALPA AFA IAM IBT	ALPA AFA IAM	USAir challenged IBT's Certification; Certified through Election

Continental- People Express (Approval to Texas Air)	19860915	19861024	19870201		Pilots FA Mechanics Passenger Fleet	IAM		
USAir-Piedmont	19870128	19871030	19871105	19890805	Pilots FA Mechanics Passenger Fleet	ALPA AFA IAM	ALPA AFA IAM	
USAir-Shuttle	19911219	199201 ¹	19920412	19920810	Pilots FA Mechanics Passenger Fleet	ALPA AFA IAM	ALPA TWU AMFA IAM IAM	USWA vs. IAM (Dismissed) CSEA (Dismissed)
American-Reno	199811 ¹	19981119	19990222	19990831	Pilots FA Mechanics Passenger Fleet	APA APFA TWU	ALPA	Transfer of certification (19990831)
American-TWA	20010110	20010316	20010409	20011201	Pilots FA Mechanics Passenger Fleet	APA APFA TWU	ALPA IAM IAM IAM	Transfer of certification (20020305) Transfer of certification (20020419) Transfer of certification (20020327)
US Airways- America West	20050519	20050623	20050927	20060130	Pilots FA Mechanics Passenger Fleet	ALPA AFA IBT IBT TWU	ALPA AFA-CWA IAM AFA-CWA IAM	Transfer of certification (20060811) Transfer of certification (20060420) to ACSEA Transfer of certification (200600511)
Delta-Northwest ¹	20080414	20081029	20081029	20090107	Pilots FA Mechanics Passenger Fleet	ALPA	ALPA AFA AMFA IAM IAM	Transfer of certification (20090107) Revocation of certification (20090226)

Note: ¹ No reliable source for the date; ²The IBT and AFA-CWA, which represented passenger service employees at US Airways and America West Airlines, respectively, reached an agreement to form the Airline Customer Service Employee Association (ACSES), a joint association to represent passenger service employees of the combined system; ³ as of June 2009, the Delta-Northwest merger invoked the representation issues at two classes.

Appendix C Zero-Order Correlations of Selected Measures of Service Quality, 1987 – 2008

	1	2	3	4	5	6	7	8	9	10	11
1. Arrival delay (%)											
2. Flight Cancellation (%)	0.264***										
3. Delay due to Carriers (%)	0.811***	0.417***									
4. Delay due to Weather Condition (%)	0.470***	0.264***	0.334***								
5. Delay due to Security Concerns (%)	0.211*	-0.014	0.259***	-0.064							
6. Mishandled Baggage	0.447***	0.153***	0.453***	0.233***	0.022						
7. Complaints - All	0.197***	0.198***	0.336***	0.105*	-0.137**	0.331***					
8. Complaints - Flight problems	0.232***	0.201***	0.415***	0.160***	-0.041	0.315***	0.960***				
9. Complaints - Ticket/Boarding	0.149***	0.206***	0.181***	0.043	-0.159***	0.255***	0.782***	0.673***			
10. Complaints - Baggage	0.173***	0.113***	0.227***	0.067	-0.137***	0.401***	0.880***	0.784***	0.700***		
11. Complaints - Passenger Service	0.189***	0.282***	0.252***	0.084*	-0.016	0.151***	0.814***	0.752***	0.641***	0.634***	
12. Airline Quality Rating (AQR)	-0.323***	-0.131***	-0.454*	-0.201***	-0.018	-0.765***	-0.720***	-0.683***	-0.548***	-0.721***	-0.469***

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; all the service quality measures of the ten U.S. major domestic carriers are measured monthly from October 1987 to December 2008 ($n=2,430$ carrier-months), except delay due to carrier and weather condition, and security concerns that are from June 2003 to December 2008 ($n=567$ carrier-months); and the ten U.S. major domestic carriers include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (merged into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (merged into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the shares of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; the number of the total passenger complaints and complaints on the four dimensions is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, involuntary denied boarding (excluded in the paper), and passenger complaints.

Appendix D Union Representation Elections at Major Carriers and Major Classes from 1987-2008¹

Carriers	Pilots	Flight Attendants	Mechanics	Fleet Service	Passenger Services
Alaska	ALPA	AFA	IAM AMFA (19971205-19980401)	IAM	IAM
America West	No Union ALPA (19890112-19890322) AWPA (19901120-19910225) ALPA (19930802-19931026)	No Union AFA (19880909-19900112; 19940920): Rerun election	No Union IAM (19930312-19930713) IBT (19940727-19950127) IBT (19951205-19960419)	No Union TWU (19890126-19890228) TWU (19940414-19941227) TWU (19960126-19960429) TWU (19970609-19971008) TWU (19981014-19990413)	No Union TWU (20010122-20010320) IBT (20020821-20021112) IBT (20040617-20040818)
American	APA ALPA (19990618-19990830)	APFA	TWU AMFA (20040312-20040921)	TWU	CWA (19981008-19990811)
Continental	No Union ALPA (19880314-19900817) ALPA/ICAP (19920123-19930712)	UFA → IAM TWU (19880318-19900817)	No Union IAM (19880310-19900817) AMFA (19930506-19940503) AMFA (19950909-19960301) IBT (19970509-19970728) TWU (20060801-20061013)	No Union IAM (19880310-19900817) IAM (19960708-19970402) IAM (19990308-19990608) IAM (20010703-20010817) TWU (20030604-20031030) TWU (20050427-20050729) TWU (20060801-20061013)	No Union
Delta	ALPA	No Union AFA (20010829-20020204) AFA-CWA (20080221-20080529)	No Union	No Union ATE (19870401-19870924) TWU (19970916-19971209) TWU (19991209-20000306) TWU (20000314-20001003) UIU (2001 - 20010625) ²	No Union ATE (19870401-19870924)
Northwest	ALPA	IBT UFA (19911125-19920313) PFAA (20030310-20030620) AFA-CWA (20060407-20060707)	IAM AMFA (19881229-19890209) AMFA (19910205-19911206) AMFA (19940628-19941017) AMFA (19980722-19990601)	BRAC → IAM	IAM
Southwest	SWAPA	TWU	IBT AMFA (20021106-20030127)	ROPA → TWU IBT (19880224-19880504) IBT (19921112-19930216)	IAM ROPA (19920730-19921222) CARE/ROPA (19930816- 19940610)

TWA	ALPA	IFFA PCCA (19870730-19871110) AFA (19870826-19871026) IAM (19961112-19970306) CPFA (20000314-20000613)	IAM AMFA (19861110-19870618)	IAM	IAM ³ (19860523-198607)
United	ALPA	AFA	IAM AMFA (19940609-19950811) AMFA (20010330-20010809) AMFA (20030306-20030715) IBT (20071204-20080401)	IAM AMFA (20040824-20041008)	IAM (19901025-19910226) IAM (19980401-19980721)*
US Airways	ALPA USAPA (20071113-20080418)	AFA	IAM	No union IBT (19880407-19881223) US Airways (19890202-19890805) IBT (19890805-19900817) IAM (19920402-19920810) IBT/USWA/IAM (19940128-19940722) IBT/USWA/IAM (19940128-19940517; 19940722) Run-off election	IBT CSEA (1992 -19920616) ² USWA (19940318-19940822) CWA (19960425-19970619; 19970929 (Re-run election); 19971001 (Court ordered re-run election); 19990824)

Note: ¹ For the abbreviations, please see Abbreviation; the union representing each craft as of October 1987 is in bold; ² the petition date is not available; ³ IAM was certified in July 1986, but TWA refused to negotiate until the court ordered TWA to negotiate in July 1988.

Sources: Determinations of the National Mediation Board (1968-2008) .

Figure 4.1 Trends of Selected Measures of Service Quality, 1987-2008
Figure 4.1.1 Delay in Flight Arrival (%)

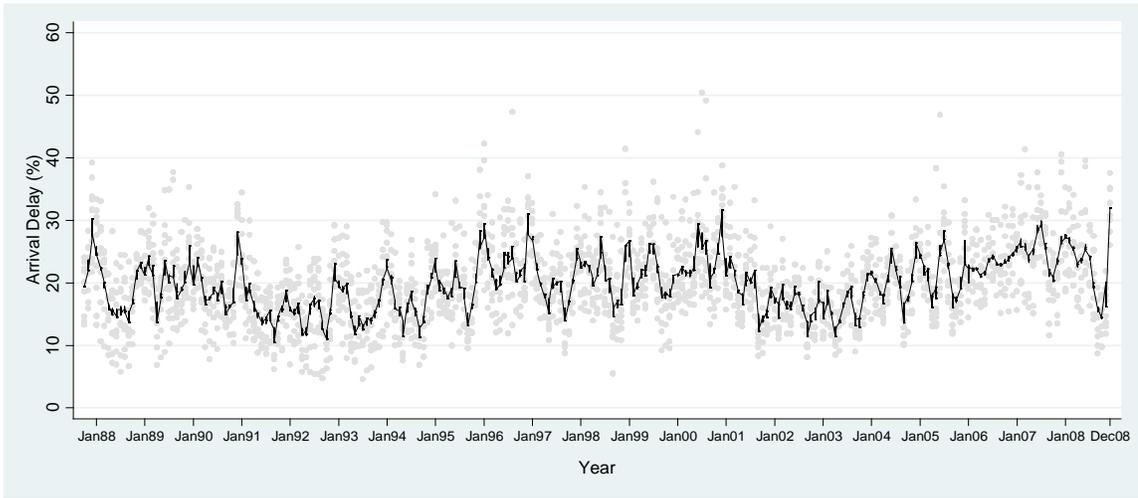


Figure 4.1.2 Flight Cancellation (%)

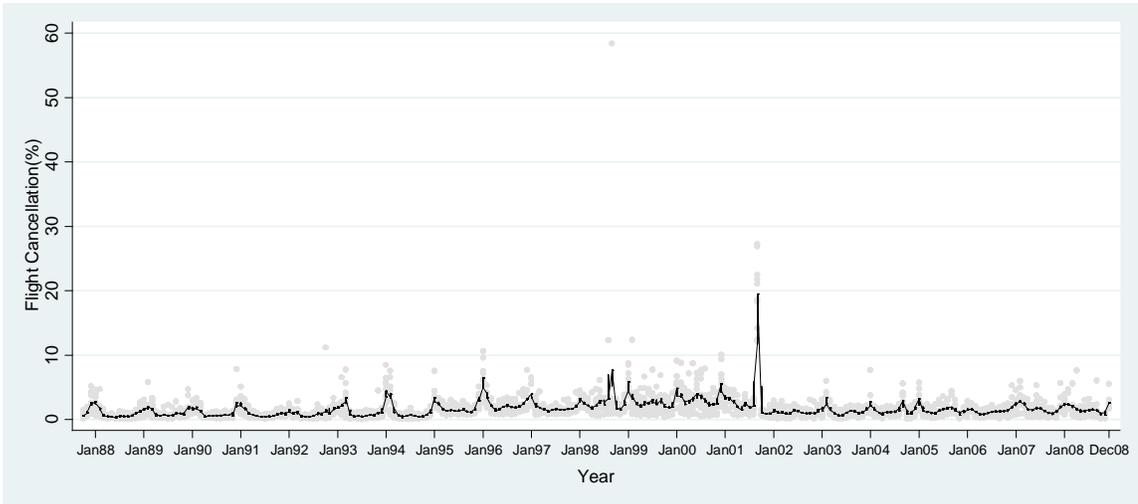


Figure 4.1.3 Mishandled Baggage per 1,000 passengers

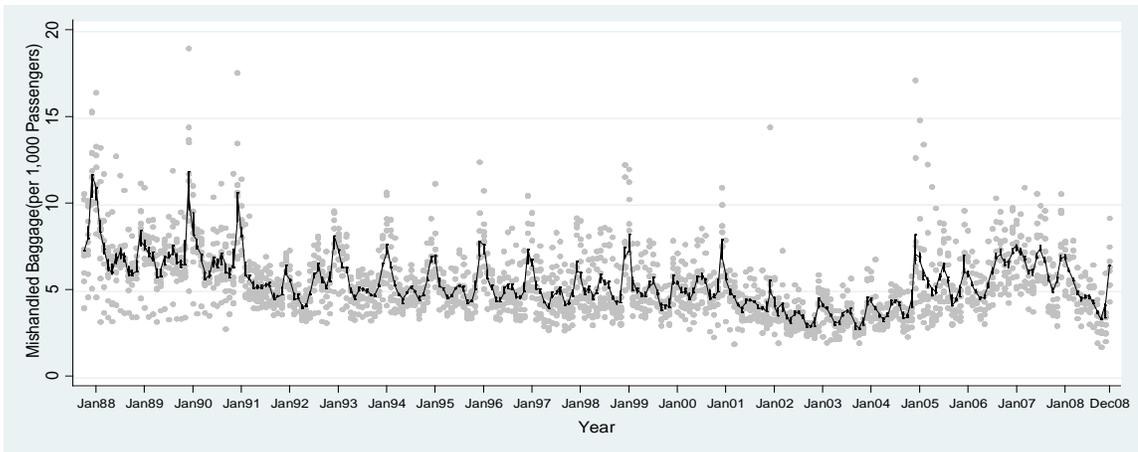


Figure 4.1.4 Passenger Complaints per 100,000 passengers

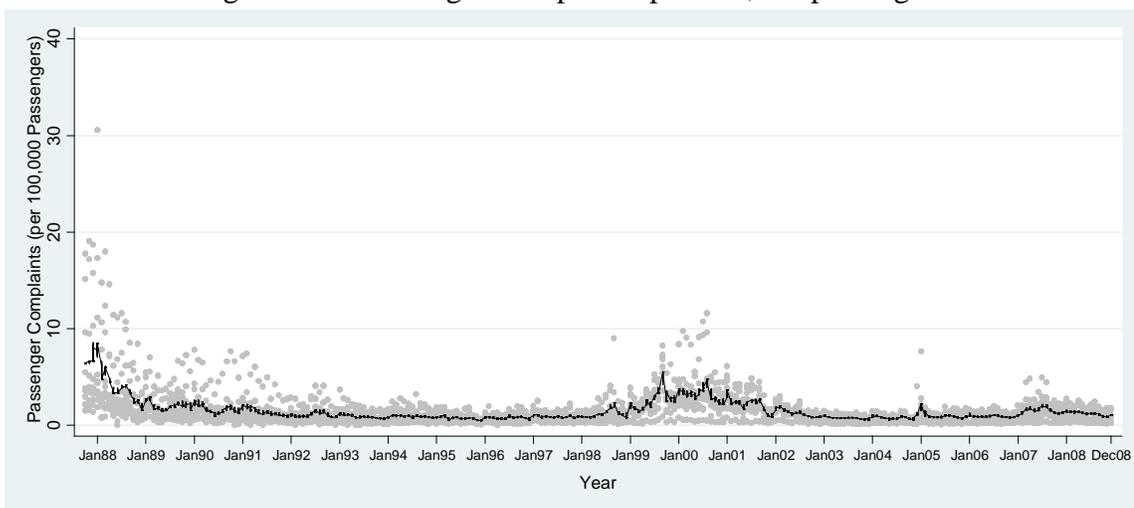
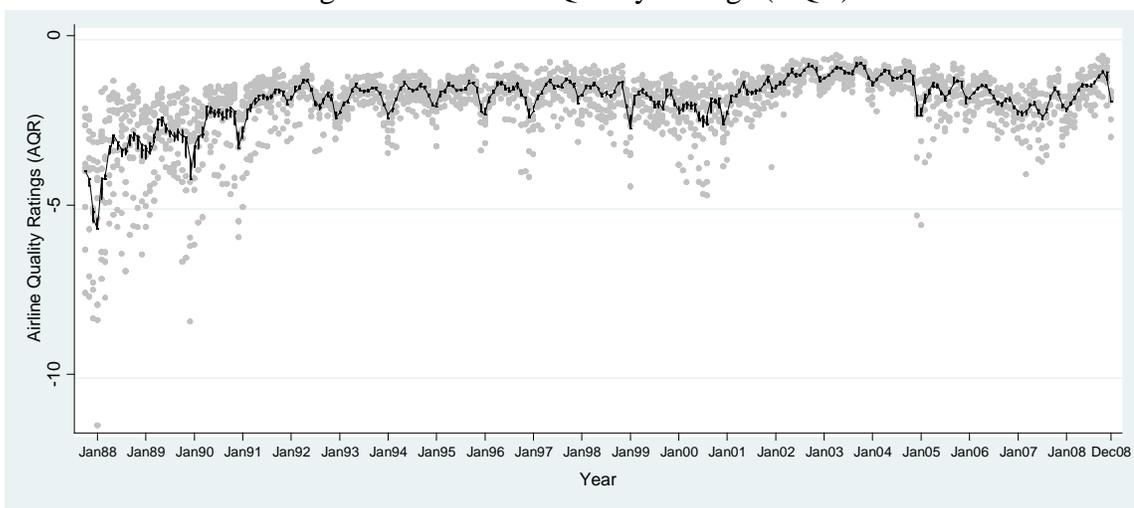
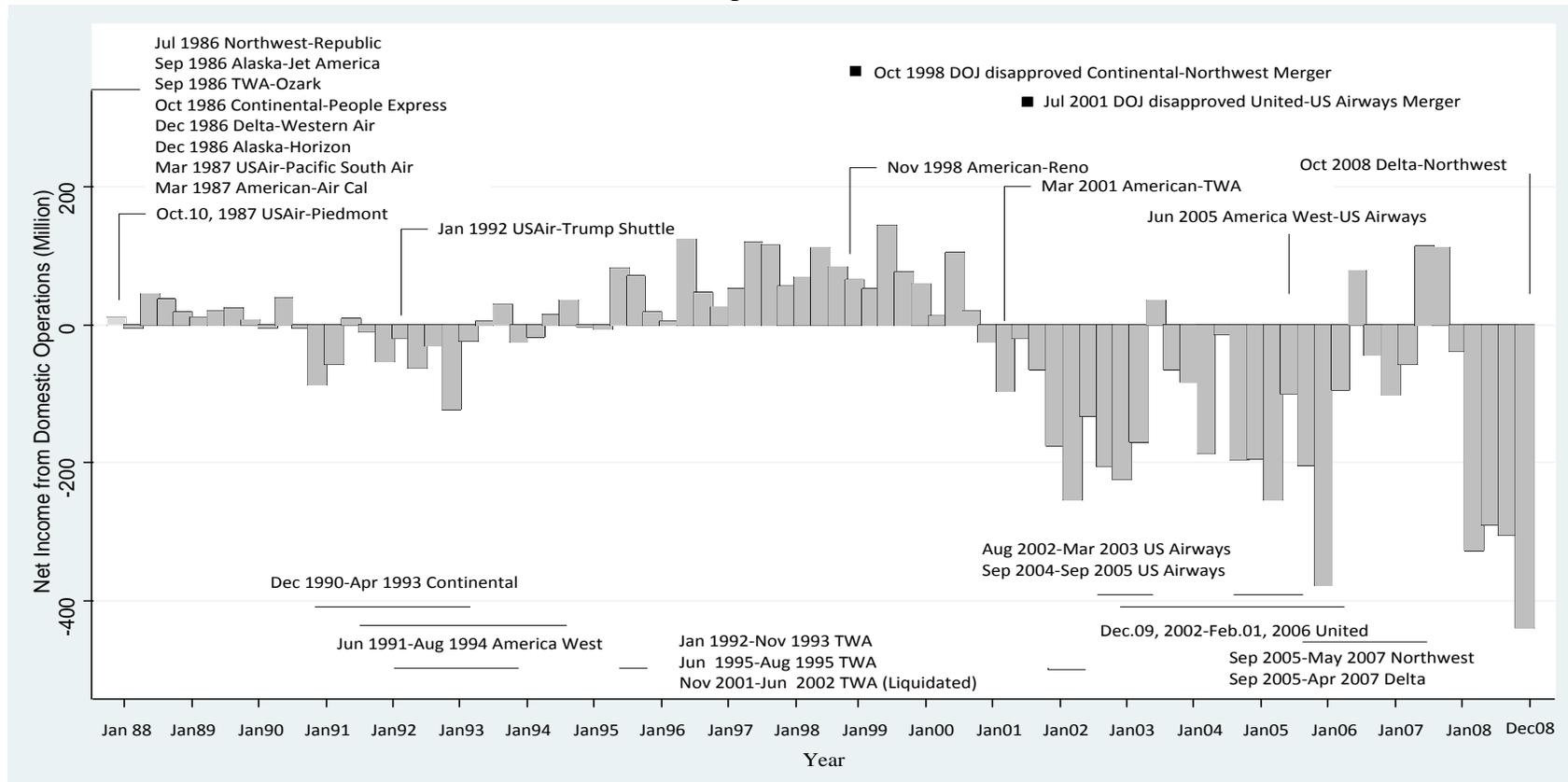


Figure 4.1.5 Airline Quality Ratings (AQR)



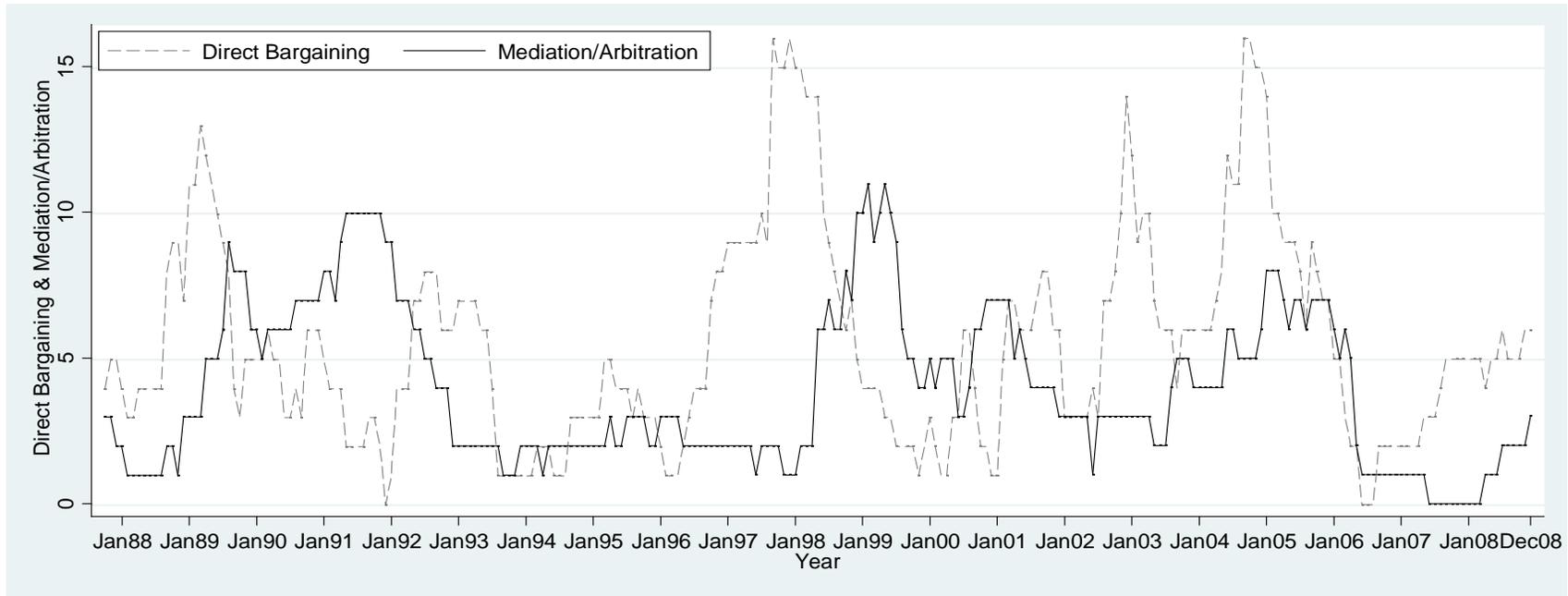
Note: Arrival delay and flight cancellation were computed by the author using the Department of Transportation (DOT)'s on-time performance data, and mishandled baggage claims per 1,000 passengers and passenger complaints per 100,000 passengers were obtained from the *Air Travel Consumer Report* (ATCR) assembled by the DOT; and the AQR is the weighted scores of arrival delay, mishandled baggage, involuntary denied boarding, and passenger complaints; the observations include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways.

Figure 4.2 Median Quarterly Net Incomes of the Sample Carriers, and Historical Profiles of Mergers & Acquisitions, and Bankruptcies, 1987-2008



Notes: The median quarterly net income is shown in the bar; the authorization date of the Mergers and Acquisitions (M&As) are shown in the upper part; and the durations of each filing of bankruptcy protection are shown in the bottom part; the observations include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways.

Figure 4.3 Frequency of Direct Bargaining and Mediation/Arbitration, 1987-2008



Notes: The observations include the ten major U.S. domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways.

Table 2.1 A Summary of Literature Review on Labor Turmoil

	Quality of Industrial Relations	Event Study	Econometric Case Study
Approach to Labor Turmoil	<ul style="list-style-type: none"> • Frequentist-oriented • Overall level of industrial conflicts at the establishment or firm level 	<ul style="list-style-type: none"> • Occurrence/Outcome-oriented • An event <i>across</i> firms 	<ul style="list-style-type: none"> • Process-oriented • A series of events <i>within</i> a plant or firm
Key Assumption	<ul style="list-style-type: none"> • Although unobservable, the underlying quality of industrial relations is reflected in overall level of industrial conflicts. • The underlying quality of industrial relations is relatively stable over time. 	<ul style="list-style-type: none"> • <i>Ex post</i> outcome should be the same across firms when an event of interest is accounted for. 	
Types of labor turmoil			
<i>Strategic level</i>	<ul style="list-style-type: none"> • Business strategy 	<ul style="list-style-type: none"> • Announcement/completion of merger (Han and Singal, 1993), layoff (Farber and Hallock, 2008), filing of the bankruptcy protection (Lee and Rupp, 2007) 	<ul style="list-style-type: none"> • Corporate and union leadership interactions (Kleiner et al., 2001)
<i>Functional level</i>			
• Representation		<ul style="list-style-type: none"> • Union certification elections (Ruback and Zimmerman, 1984, Bronars and Deere, 1990), decertification elections (Huth and McDonald, 1990) 	
• Contract bargaining	<ul style="list-style-type: none"> • Mediation and arbitration (Gittel et al., 2004), and contract demands and negotiation duration (Katz, et al., 1983) 	<ul style="list-style-type: none"> • Wage settlements (Abowd, 1990), arbitration decisions (Mas, 2007), concession bargaining (Becker, 1987, Lee and Rupp, 2007), and strike (Neumann, 1980, Becker and Olson, 1986, DiNardo and Hallock, 2000) 	<ul style="list-style-type: none"> • Strike and strike replacement (Krueger and Mas, 2004), strikes and work-to-rule (Kleiner et al., 2001), strike (Mas, 2007)
<i>Workplace level</i>			
• Contract administration (Conflict management)	<ul style="list-style-type: none"> • Grievance and disciplinary actions (Colvin, 2007, Katz, et al., 1983, 1985), absenteeism, and the attitudinal climate of industrial relations (Katz, et al., 1983) 		

Table 4.1 Definition and Source of Variables

Variables	Definition and Source
Service Quality	
Arrival delay (%)	A flight is counted as “delayed” if it operated (i.e., arrived at gate) more than 15 minutes after the scheduled time shown in the carriers’ Computerized Reservation Systems (CRS). <i>Source:</i> The DOT’s on-time performance data
Flight Cancellation (%)	A flight is counted as “cancelled” if the flight was scheduled in the carriers’ CRS, but it was cancelled. <i>Source:</i> The DOT’s on-time performance data
Mishandled Baggage	The total number of reports (per 1,000 passengers) each carrier received from passengers concerning lost, damaged, delayed or pilfered baggage. <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Total Number of Passenger Complaints	The total number of passenger complaints per 100,000 passengers each carrier received from passengers concerning several service dimensions. When the total number of passenger complaints each carrier received given a month is less than five, it is not reported. Therefore, we coded the missing in the total number of passenger complaints as zero, thereby some observations have entries on the total number of passenger complaints with zero on the specific dimensions of service quality. <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Flight Problems	Cancellations, delays, or any other deviations from schedule, whether planned or unplanned. <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Reservations/Ticketing/Boarding	Airline or travel agent mistakes made in reservations and ticketing; problems in making reservations and obtaining tickets due to busy telephone lines or waiting in line, or delays in mailing tickets; problems boarding the aircraft (except, oversales). <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Baggage	Claims for lost, damaged or delayed baggage, charges for excess baggage, carry-on problems, and difficulties with airline claims procedures. <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Customer Service	Rude or unhelpful employees, inadequate meals or cabin service, treatment of delayed passengers. <i>Source:</i> The DOT’s <i>Air Travel Consumer Report</i>
Airline Quality Rating (AQR) ¹	The weighted average of on-time arrival, <i>mishandled baggage</i> , <i>involuntarily denied boarding</i> and <i>the rate of passenger complaints</i> . The formula used to rescale is $(8.63 \times \text{on-time arrival} - 8.03 \times \text{mishandled baggage} - 7.92 \times \text{involuntary denied boarding} - 7.17 \times \text{the rate of total complaints}) / (8.63 + 8.03 + 7.92 + 7.17)$. <i>Source:</i> see Bowen and Headley (1998)
Labor Turmoil	
Union	Equals 1 if a carrier/craft pair has collective bargaining agreement; equals 0 otherwise (including a case that union is certified but still in the 1 st contract negotiation). <i>Source:</i> The NMB’s <i>Determinations of the National Mediation Board</i>
M&A	
Financial Integration	Equals 1 if carrier/craft pair has a value of 1 in the two specific procedures below; equals 0 otherwise. <i>Source:</i> Various SOURCES.
Post-merger Workforce Integration	Equals 1 if a carrier/craft pair is involved in the M&A process from the date of official announcement of the M&A proposal to the date of ownership transfer completed (Unauthorized M&A proposals, the merger proposals by Continental Airlines-Northwest Airlines in 1998 and by United Air Lines-US Airways in 2000, were included); equals 0 otherwise. <i>Source:</i> The Bureau of National Affairs’ <i>Labor Relations Week</i> (1996-2008), <i>Aviation Daily</i> (1989-2008), and other various sources.
Bankruptcy filing	Equals 1 if carrier/craft pair is from the date of bankruptcy filing to the date of bankruptcy exit; equals 0 otherwise. <i>Source:</i> The Bureau of National Affairs’ <i>Labor Relations Week</i> (1996-2008), <i>Aviation Daily</i> (1989-2008), and other various sources.

Representation Turmoil Equals 1 if carrier/craft pair at least has a value of 1 in the two specific temporal developments below; equals 0 otherwise.

Petition to Determination Equals 1 if carrier/craft pair is involved in a petition for representation election or a representation election, but does not receive the NMB's final determination on the petition or the election; equals 0 otherwise. *Source:* The NMB's *Determinations of the National Mediation Board* and various

Determination to the 1st Contract Equals 1 if carrier/craft pair is involved in the initial contract negotiation after a union wins certification from the NMB; equals 0 otherwise. *Source:* The Bureau of Labor Statistics' *Current Wage Developments* and *Monthly labor Review* (1984-1995), the Bureau of National Affairs' *Collective Bargaining Negotiations and Contracts* (2000-2008) and *Labor Relations Week* (1996-2008), and *Aviation Daily* (1989-2008).

Bargaining Turmoil

Direct Negotiation Equals 1 if carrier/union pair has a contract of which amendable date has passed but not in other process mandated by the RLA; equals 0 otherwise. *Source:* the Bureau of National Affairs' *Labor Relations Week* (1996-2008), *Aviation Daily* (1989-2008), and other various sources.

Mediation/arbitration Equals 1 if carrier/union pair is in mediated negotiation or arbitration; equals 0 otherwise. *Source:* The NMB's *Weekly Activity Report* and the Bureau of National Affairs' *Labor Relations Week* (1996-2008), *Aviation Daily* (1989-2008), and other various sources.

Cooling-Off Period Equals 1 if carrier/union pair is in cooling-off or pending on the President Emergency Board; equals 0 otherwise. *Source:* The NMB's *Weekly Activity Report*, the Bureau of National Affairs' *Labor Relations Week* (1996-2008), *Aviation Daily* (1989-2008), and other various sources.

Strike Equals 1 if carrier/union pair is involved in strike; equals 0 otherwise. *Source:* The NMB's documents, the Bureau of National Affairs' *Labor Relations Week* (1996-2008), *Aviation Daily* (1989-2008), and other various sources.

Released-but-No-Strike Equals 1 if carrier/union pair is released from the NMB but not involved in strike; equals 0 otherwise. *Source:* The NMB's *Weekly Activity Report*, the Bureau of National Affairs' *Labor Relations Week* (1996-2008), *Aviation Daily* (1989-2008), and other various sources.

Bargaining Outcomes

Union-in-Concession Equals 1 if union has its contract with a wage-cut; equals 0 otherwise. *Source:* the Bureau of Labor Statistics' *Current Wage Developments* and *Monthly labor Review* (1984-1995), the Bureau of National Affairs' *Collective Bargaining Negotiations and Contracts* (2000-2008) and *Labor Relations Week* (1996-2008), and *Aviation Daily* (1989-2008).

Nonunion Equals 1 if union is not organized at craft; equals 0 otherwise.

Union-not-in-Concession Equals 1 if union has its contract with no wage-cut; equals 0 otherwise. *Source:* the Bureau of Labor Statistics' *Current Wage Developments* and *Monthly labor Review* (1984-1995), the Bureau of National Affairs' *Collective Bargaining Negotiations and Contracts* (2000-2008) and *Labor Relations Week* (1996-2008), and *Aviation Daily* (1989-2008).

Control Variables

Load Factors Revenue passenger miles (RPMs) divided by aircraft seat flown one mile (ASMs). *Source:* The DOT's Form 41.

Average miles flown for departure The average non-stop distance flown per departure. *Source:* The DOT's Form 41.

Number of passengers per departure Monthly number of passengers. *Source:* The DOT's Form 41.

Note: ¹ Involuntarily Denied Boarding (per 10,000 passengers), or oversales, indicates the quarterly number of passengers per 10,000 passengers who hold confirmed reservations and are denied boarding ("bumped") from a flight because it is oversold (*Source:* The DOT's *Air Travel Consumer Report*).

Table 4.2 Descriptive Statistics, 1987 – 2008

	All (N=2,430/ 12,150)	Alaska (n=255/ 1275)	America West (n=219/ 1095)	American (n=255/ 1275)	Continental (n=255/ 1275)	Delta (n=255/ 1275)	Northwest (n=255/ 1275)	Southwest (n=255/ 1275)	TWA (n=171 /855)	US Airways (n=255/ 1275)	United (n=255/ 1275)
<i>Service Quality</i>											
Arrival delay	19.81 (6.22)	21.41 (7.09)	19.37 (7.26)	19.94 (5.74)	20.17 (5.03)	20.68 (5.28)	18.74 (6.30)	16.36 (5.52)	19.76 (6.13)	19.88 (5.66)	21.69 (6.41)
Flight cancellation	1.70 (2.18)	1.87 (1.84)	1.48 (1.42)	1.95 (2.10)	1.36 (1.70)	1.55 (1.61)	2.01 (3.97)	0.91 (0.90)	1.84 (1.91)	2.02 (2.29)	2.08 (2.22)
Mishandled baggage	5.42 (1.99)	5.38 (2.00)	5.10 (2.13)	5.51 (1.60)	4.92 (1.61)	5.58 (1.80)	5.47 (1.84)	4.23 (0.98)	6.70 (2.49)	5.80 (2.43)	5.91 (1.93)
Total Number of Passenger complaints	1.55 (1.86)	0.80 (0.67)	2.02 (1.80)	1.47 (0.96)	2.15 (3.27)	1.06 (0.67)	1.76 (2.45)	0.38 (0.36)	3.25 (2.42)	1.50 (1.14)	1.71 (1.35)
Passenger complaints on Flight problems	0.51 (0.89)	0.20 (0.33)	0.72 (0.97)	0.48 (0.44)	0.70 (1.46)	0.30 (0.28)	0.72 (1.46)	0.08 (0.13)	1.01 (0.94)	0.52 (0.57)	0.57 (0.74)
Passenger complaints on Reservation/Ticketing/ Boarding	0.16 (0.15)	0.06 (0.10)	0.20 (0.16)	0.15 (0.08)	0.21 (0.22)	0.14 (0.09)	0.17 (0.13)	0.04 (0.05)	0.32 (0.22)	0.17 (0.11)	0.17 (0.09)
Passenger complaints on Baggage	0.25 (0.34)	0.12 (0.17)	0.30 (0.28)	0.25 (0.17)	0.34 (0.54)	0.18 (0.16)	0.23 (0.32)	0.08 (0.11)	0.58 (0.56)	0.23 (0.35)	0.27 (0.22)
Passenger complaints on Customer service	0.24 (0.28)	0.12 (0.19)	0.32 (0.38)	0.24 (0.21)	0.33 (0.38)	0.16 (0.13)	0.25 (0.27)	0.07 (0.06)	0.48 (0.36)	0.22 (0.19)	0.29 (0.27)
Airline Quality Rating	-1.88 (0.97)	-1.71 (0.60)	-2.22 (1.34)	-1.63 (0.50)	-1.89 (1.27)	-1.72 (0.55)	-1.83 (1.08)	-1.55 (0.51)	-2.82 (1.39)	-1.91 (0.94)	-1.84 (0.70)
Union	0.74 (0.44)	1.00 (0.00)	0.33 (0.47)	0.80 (0.40)	0.42 (0.49)	0.20 (0.40)	1.00 (0.00)	1.00 (0.00)	0.95 (0.22)	0.80 (0.40)	0.89 (0.31)
<i>Merger & Acquisition</i>											
Announcement to Ownership Transfer	0.12 (0.32)	0.09 (0.29)	0.04 (0.19)	0.21 (0.41)	0.04 (0.19)	0.09 (0.29)	0.12 (0.32)	0.00 (0.00)	0.14 (0.35)	0.39 (0.49)	0.06 (0.24)
2-year period after Ownership transfer	0.04 (0.19)	0.00 (0.00)	0.02 (0.15)	0.03 (0.17)	0.04 (0.19)	0.03 (0.16)	0.07 (0.25)	0.00 (0.00)	0.02 (0.15)	0.11 (0.31)	0.06 (0.24)
Bankruptcy filing	0.09 (0.28)	0.09 (0.29)	0.02 (0.13)	0.20 (0.40)	0.00 (0.00)	0.07 (0.26)	0.05 (0.23)	0.00 (0.00)	0.12 (0.33)	0.30 (0.46)	0.00 (0.00)
<i>Representation Turmoil</i>											
Petition to Determination	0.08 (0.27)	0.00 (0.06)	0.18 (0.43)	0.00 (0.19)	0.11 (0.39)	0.08 (0.14)	0.08 (0.18)	0.00 (0.15)	0.19 (0.34)	0.08 (0.33)	0.15 (0.20)
Determination to the 1st contract	0.05 (0.22)	0.00 (0.06)	0.13 (0.33)	0.02 (0.14)	0.15 (0.36)	0.02 (0.14)	0.03 (0.18)	0.02 (0.15)	0.02 (0.15)	0.06 (0.25)	0.03 (0.18)

<i>Bargaining Turmoil</i>	0.21 (0.41)	0.33 (0.47)	0.12 (0.33)	0.16 (0.37)	0.14 (0.35)	0.05 (0.21)	0.33 (0.47)	0.17 (0.37)	0.33 (0.47)	0.24 (0.43)	0.23 (0.42)
Direct Negotiation	0.12 (0.32)	0.14 (0.35)	0.14 (0.35)	0.10 (0.30)	0.09 (0.29)	0.02 (0.15)	0.17 (0.37)	0.15 (0.35)	0.16 (0.37)	0.17 (0.38)	0.06 (0.24)
Mediation/arbitration	0.09 (0.28)	0.19 (0.39)	0.06 (0.24)	0.08 (0.28)	0.05 (0.22)	0.01 (0.12)	0.12 (0.32)	0.03 (0.16)	0.15 (0.36)	0.08 (0.28)	0.10 (0.30)
Cooling-Off Period	0.00 (0.06)	0.00 (0.06)	0.00 (0.00)	0.00 (0.07)	0.00 (0.00)	0.00 (0.03)	0.01 (0.09)	0.00 (0.00)	0.00 (0.00)	0.00 (0.07)	0.01 (0.07)
Strike	0.00 (0.02)	0.00 (0.00)	0.00 (0.00)	0.00 (0.04)	0.00 (0.00)	0.00 (0.00)	0.01 (0.12)	0.00 (0.00)	0.00 (0.00)	0.00 (0.03)	0.00 (0.00)
Released-but-No-Strike	0.00 (0.05)	0.01 (0.09)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<i>Control Variables</i>											
Load Factors	0.69 (0.09)	0.65 (0.09)	0.68 (0.08)	0.69 (0.08)	0.70 (0.09)	0.69 (0.09)	0.71 (0.09)	0.66 (0.06)	0.64 (0.07)	0.68 (0.09)	0.72 (0.08)
Average miles flown for departure	773.73 (185.03)	741.91 (108.66)	769.29 (158.18)	979.66 (96.39)	941.65 (151.00)	748.92 (102.29)	736.21 (46.80)	484.92 (90.15)	765.56 (66.93)	613.52 (109.89)	952.37 (103.08)
Number of passengers per departure (000s)	4,222 (2,316)	964 (390)	1,459 (256)	6,974 (1,028)	3,402 (479)	7,064 (1,298)	4,115 (729)	4,912 (2,286)	1,934 (305)	4,346 (864)	5,908 (1,025)

Note: Definition and source of the variables are shown in Table 4.1; N =Carrier-Monthly observations/Carrier-Craft-Monthly observations; Standard deviations are in parenthesis; service quality and control variables are measured at the carrier level, and labor turmoil is measured at the craft level; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the shares of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, involuntary denied boarding, and passenger complaints.

Table 4.3 Zero-Order Correlations of Variables, 1987 – 2008

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1. Arrival delay																										
2. Flight cancellation	0.264																									
3. Mishandled baggage	0.447	0.153																								
4. Total Number of Passenger complaints	0.197	0.198	0.331																							
5. Flight problems	0.232	0.201	0.315	0.959																						
6. Reservation/Ticketing/ Boarding	0.149	0.206	0.255	0.782	0.673																					
7. Baggage	0.173	0.113	0.401	0.880	0.784	0.7000																				
8. Customer service	0.190	0.282	0.151	0.814	0.752	0.641	0.636																			
9. Airline Quality Rating	-0.323	-0.131	-0.765	-0.720	-0.683	-0.548	-0.721	-0.469																		
10. Union	0.002	0.055	-0.049	-0.040	-0.021	-0.087	-0.050	-0.004	0.094																	
11. Merger & Acquisition	0.075	0.108	0.175	0.218	0.228	0.169	0.179	0.184	-0.198	0.053																
12. Financial Integration	0.062	0.159	-0.030	0.089	0.104	0.087	0.059	0.154	0.004	0.038	0.544															
13. Post-merger workforce integration	0.037	0.023	0.215	0.198	0.203	0.141	0.174	0.116	-0.233	0.037	0.832	0.031														
14. Bankruptcy	-0.079	-0.053	-0.006	-0.029	-0.062	-0.003	0.027	-0.059	0.031	-0.087	-0.032	0.010	-0.038													
15. Representation Turmoil	-0.005	-0.011	0.051	0.137	0.108	0.142	0.133	0.096	-0.141	-0.309	-0.013	-0.010	-0.010	0.021												
16. Petition to Determination	-0.038	-0.020	0.034	0.094	0.077	0.080	0.087	0.050	-0.105	-0.222	-0.001	-0.014	0.007	0.045	0.771											
17. Determination to the 1st contract	0.040	0.009	0.032	0.101	0.077	0.127	0.102	0.091	-0.091	-0.212	-0.018	0.000	-0.022	-0.022	0.615	-0.016										
18. Bargaining Turmoil	0.003	0.056	-0.003	0.018	0.028	-0.007	0.004	0.019	0.008	0.298	0.053	0.066	0.022	0.089	-0.084	-0.034	-0.091									
19. Direct Negotiation	-0.021	0.003	-0.019	-0.046	-0.032	-0.050	-0.047	-0.040	0.038	0.217	0.043	0.024	0.040	0.136	-0.076	-0.044	-0.066	0.726								
20. Mediation/Arbitration	0.033	0.065	0.019	0.071	0.068	0.038	0.055	0.068	-0.030	0.179	0.028	0.076	-0.018	-0.037	-0.034	0.001	-0.056	0.604	-0.063							
21. Cooling-off period	0.004	0.018	0.001	0.026	0.033	0.012	0.011	0.031	-0.008	0.032	0.014	0.005	0.011	-0.016	-0.016	-0.012	-0.010	0.107	-0.020	0.087						
22. Strike	0.012	0.066	-0.010	-0.003	-0.001	0.010	-0.009	-0.003	0.013	0.025	0.003	0.012	-0.006	0.096	-0.012	-0.010	-0.008	0.083	-0.015	-0.005	0.109					
23. Released but No Strike	-0.018	-0.012	0.001	-0.018	-0.016	-0.032	-0.021	-0.024	0.004	0.018	-0.011	-0.006	-0.009	-0.009	-0.009	-0.007	-0.006	0.060	-0.011	0.100	0.101	-0.001				
24. Load Factors	0.258	-0.054	-0.225	-0.113	-0.113	-0.010	-0.107	0.005	0.281	0.078	-0.039	0.101	-0.113	0.069	-0.085	-0.075	-0.038	-0.013	0.017	-0.039	-0.017	0.040	0.027			
25. Average miles flown for departure	0.265	0.087	0.033	0.206	0.154	0.240	0.227	0.009	-0.020	0.041	0.037	0.026	0.040	-0.022	-0.014	-0.016	0.006	-0.004	0.011	-0.004	0.001	-0.024	0.467			
26. Number of passengers per departure	0.070	-0.002	-0.048	-0.122	-0.089	-0.079	-0.114	-0.060	0.236	-0.087	0.016	0.049	-0.015	-0.093	-0.121	-0.069	-0.103	-0.080	-0.047	-0.067	0.008	0.004	-0.047	0.340	0.201	

Note: $|r| \geq 0.016$ significant at the 0.10 level; $|r| \geq 0.018$ significant at the 0.05 level; $|r| \geq 0.024$ significant at the 0.01 level; $|r| \geq 0.031$ significant at the 0.001 level; all the service quality measures of the ten U.S. major domestic carriers are monthly from October 1987 to December 2008, except delay due to carrier and weather that are from June 2003 to December 2008; and the ten U.S. major domestic carriers include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the shares of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, involuntary denied boarding, and passenger complaints.

Table 4.4 Election Petitions and Representation Elections, 1987-2008

	All	Type of Election	
		Certification	Raid
<i>Number of Petitions</i>	75	49 (100%)	26 (100%)
<i>Petition Outcome</i>			
Dismissal due to insufficient showing of interest or withdrawal during investigation	23	12 (24%)	11 (42%)
Authorized for Election	52	37 (76%)	15 (58%)
Union Won	27[3]	12[3] (25%)	n/a
Incumbent Union Won	6	n/a	6 (23%)
Raid Union Won	9	n/a	9 (35%)
Union Lost	25[2]	25[2] (51%)	n/a

Note: Number in brackets is the number of re-elections.

Table 4.5 Emergency Procedures under the Railway Labor Act (RLA), 1987-2008

Carriers	Pilots	Flight Attendants	Mechanics	Fleet Service Employees	Passenger Service Employees
<i>Cooling-Off Periods</i>					
Alaska		AFA (May20,1993-Jun19,1993)	IAM(Nov05,1992-Dec04, 1992) ¹	IAM(Nov05,1992-Dec04, 1992) ¹	IAM(Apr13,1995-May13,1995) ¹
American	APA(Jan15,1997-Feb14,1997) *PEB(Feb15,1997-Mar19,1997)	APFA(Sep29,1993-Oct30,1993) APFA(Jun01,2001-Jul01,2001)			
Delta	ALPA(Mar30,2001-Apr29,2001)				
Northwest	ALPA(Jul28,1998-Aug28,1998)	IBT(Jan28,1988-Feb26,1988)	AMFA(Feb09,2001-Mar12,2001) *PEB(Mar12,2001-May10,2001) AMFA(Jul20,2005-Aug19,2005)		
US Airways		AFA(Feb23,2000-Mar25,2000)	IAM(Aug24,1992-Sep24,1992) IAM(Aug26,1999-Sep26,1999)		
United			IAM(Nov13,1991-Dec12,1991) IAM(Nov23,2001-Dec20,2001) *PEB(Dec20,2001-Jan19,2001)	IAM(Nov13,1991-Dec12,1991)	
<i>Strike</i>					
American	24 minutes APA(Feb15,1997-Feb15,1997) ²	5 days APFA(Nov18,1993-Nov22,1993)			
Northwest	15days ALPA(19980829-19980912)		416days AMFA(Aug20,2005-Oct09,2006)		
US Airways			5days IAM(Oct05,1992-Oct09,1992)		
<i>Released but No Strike</i>					
Alaska		AFA (Jun19,1993-Mar14,1994) ³			

Note: ¹ A tentative agreement reached four days after the cooling-off period kicked off; ² the strike by the pilots against American Airlines was banned right after the NMB reported the case to the PEB; ³ Alaska Airlines imposed its terms on June 19, 1993 and the flight attendants' vote for a tentative agreement was held from Jan13, 1994 to Mar14, 1994.

Table 5.1 The Effects of Broad Categories of Labor Turmoil on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Post 9/11	-0.174 (0.150)	1.329** (0.339)	-0.005 (0.133)	-0.944*** (0.167)	-0.924*** (0.144)	-0.211** (0.059)	-0.498** (0.109)	-0.134 (0.084)	1.847* (0.757)
Union	0.023 (0.020)	-0.038 (0.050)	0.000 (0.021)	-0.005 (0.022)	0.010 (0.017)	-0.011+ (0.005)	-0.012 (0.012)	0.000 (0.006)	0.110 (0.080)
M&A	0.065+ (0.029)	0.061 (0.068)	0.092* (0.039)	0.011 (0.068)	0.030 (0.066)	0.002 (0.018)	-0.005 (0.031)	0.018 (0.030)	-0.218 (0.190)
Bankruptcy	-0.014 (0.053)	-0.016 (0.142)	0.012 (0.041)	-0.001 (0.036)	-0.017 (0.033)	-0.005 (0.008)	0.021 (0.016)	-0.017 (0.018)	0.070 (0.135)
Representation Turmoil	0.013 (0.036)	0.085 (0.054)	-0.026 (0.022)	0.124* (0.043)	0.084** (0.024)	0.024+ (0.011)	0.058+ (0.026)	0.039** (0.011)	-0.093 (0.116)
Bargaining Turmoil	0.006 (0.017)	0.046+ (0.024)	-0.006 (0.018)	0.014 (0.020)	0.021 (0.014)	0.002 (0.007)	0.004 (0.008)	0.012 (0.009)	-0.028 (0.054)
Arrival Delay			0.138* (0.049)	0.129+ (0.068)	0.155+ (0.074)	0.004 (0.012)	0.008 (0.027)	0.028 (0.032)	
Flight Cancellation			0.052 (0.032)	0.104** (0.026)	0.103*** (0.020)	0.019+ (0.008)	0.032* (0.011)	0.036* (0.012)	
Mishandled Baggage				0.167+ (0.088)	0.090 (0.049)	0.042 (0.024)	0.132* (0.046)	0.036 (0.027)	
Load factors	0.008* (0.003)	-0.026* (0.011)	-0.007* (0.003)	0.000 (0.006)	-0.003 (0.005)	0.002 (0.002)	0.000 (0.004)	-0.002 (0.002)	0.004 (0.016)
ln(Average Miles flown per Departure)	0.022 (0.050)	0.012 (0.084)	-0.011 (0.034)	0.065+ (0.035)	0.077* (0.028)	0.021+ (0.009)	0.024 (0.021)	0.034** (0.010)	0.016 (0.152)
ln(# of monthly passengers (000s))	0.198** (0.045)	0.136 (0.219)	0.158 (0.118)	-0.068 (0.117)	0.078 (0.078)	0.008 (0.032)	0.005 (0.071)	0.006 (0.039)	-0.294 (0.300)
Constant	-0.786 (0.602)	-1.907 (3.175)	-0.560 (1.684)	1.449 (1.728)	-0.957 (1.097)	-0.115 (0.465)	0.182 (1.039)	-0.038 (0.571)	0.531 (4.327)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.619	0.684	0.708	0.764	0.704	0.520	0.625	0.685	0.633
N	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding.

Table 5.2 The Effects of Detailed Categories of Labor Turmoil on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Post 9/11	-0.169 (0.148)	1.313** (0.340)	0.008 (0.133)	-0.941*** (0.168)	-0.919*** (0.147)	-0.210** (0.059)	-0.497** (0.109)	-0.130 (0.083)	1.838* (0.758)
Union	0.028 (0.023)	-0.041 (0.050)	0.000 (0.021)	-0.007 (0.021)	0.009 (0.018)	-0.010+ (0.005)	-0.014 (0.011)	-0.001 (0.006)	0.111 (0.079)
M&A									
Financial Integration	0.007 (0.057)	0.124 (0.082)	-0.021 (0.038)	0.079 (0.072)	0.087 (0.068)	0.010 (0.021)	0.041 (0.028)	0.054 (0.040)	-0.092 (0.148)
Workforce Integration	0.085* (0.032)	0.026 (0.109)	0.130** (0.040)	-0.028 (0.077)	-0.005 (0.068)	-0.005 (0.023)	-0.031 (0.045)	-0.001 (0.030)	-0.248 (0.222)
Bankruptcy	-0.008 (0.052)	-0.016 (0.144)	0.012 (0.045)	0.014 (0.036)	-0.008 (0.033)	-0.003 (0.008)	0.028+ (0.015)	-0.013 (0.018)	0.051 (0.148)
Representation Turmoil									
Petition to Determination	-0.023 (0.031)	0.092 (0.055)	-0.003 (0.009)	0.109* (0.046)	0.074* (0.028)	0.018 (0.011)	0.050+ (0.023)	0.034** (0.007)	-0.116 (0.064)
Determination to the 1 st Contract Settled	0.073 (0.047)	0.062 (0.043)	-0.056 (0.048)	0.127 (0.087)	0.089 (0.052)	0.029 (0.022)	0.060 (0.060)	0.042 (0.023)	-0.043 (0.269)
Bargaining Turmoil									
Direct Negotiation	-0.008 (0.020)	0.025 (0.044)	-0.003 (0.025)	-0.039 (0.022)	-0.014 (0.011)	-0.010 (0.007)	-0.022+ (0.011)	-0.005 (0.007)	0.035 (0.061)
Mediation/Arbitration	0.029 (0.016)	0.066** (0.016)	-0.005 (0.014)	0.075+ (0.034)	0.058** (0.024)	0.015 (0.009)	0.036+ (0.019)	0.032** (0.009)	-0.108 (0.064)
Cooling-Off Period	0.065 (0.041)	-0.010 (0.126)	0.001 (0.026)	0.078 (0.049)	0.080 (0.046)	0.019 (0.011)	0.019 (0.021)	0.028 (0.024)	-0.192 (0.118)
Strike	0.122* (0.053)	0.378 (0.245)	-0.132* (0.050)	0.001 (0.055)	0.016 (0.049)	0.046** (0.012)	-0.025 (0.026)	0.026 (0.020)	0.080 (0.138)
Released-but-No-Strike	-0.044 (0.056)	-0.361* (0.122)	0.135* (0.060)	-0.005 (0.047)	0.035 (0.044)	-0.019* (0.008)	-0.008 (0.030)	-0.023 (0.021)	-0.171 (0.157)
Arrival Delay			0.136* (0.048)	0.127+ (0.065)	0.154+ (0.074)	0.003 (0.011)	0.008 (0.025)	0.027 (0.032)	
Flight Cancellation			0.054 (0.031)	0.102** (0.024)	0.102*** (0.019)	0.018* (0.008)	0.031* (0.010)	0.035* (0.011)	
Mishandled Baggage				0.177+ (0.087)	0.098+ (0.049)	0.045+ (0.024)	0.138* (0.047)	0.041 (0.027)	
Load factors	0.008* (0.003)	-0.026* (0.011)	-0.007* (0.003)	0.000 (0.006)	-0.003 (0.005)	0.002 (0.002)	0.000 (0.003)	-0.002 (0.002)	0.004 (0.016)
ln(Average Miles flown per Departure)	0.020 (0.047)	0.017 (0.084)	-0.014 (0.034)	0.070+ (0.032)	0.081* (0.027)	0.022* (0.008)	0.027 (0.021)	0.036** (0.008)	0.014 (0.152)
ln(# of monthly passengers (000s))	0.197** (0.044)	0.135 (0.213)	0.156 (0.116)	-0.070 (0.113)	0.076 (0.075)	0.007 (0.031)	0.003 (0.068)	0.005 (0.037)	-0.291 (0.301)
Constant	-0.770 (0.608)	-1.898 (3.089)	-0.544 (1.646)	1.470 (1.659)	-0.952 (1.048)	-0.106 (0.451)	0.200 (0.997)	-0.036 (0.544)	0.517 (4.335)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.621	0.685	0.712	0.767	0.707	0.523	0.631	0.689	0.634
N	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding.

Table 5.3 The Effects of the M&A Process with a 1-, 2-, and 3-Year Interval for Workforce Integration on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
<i>M&A Process: Ownership Integration + 1-year Workforce Integration</i>									
M&A	0.040 (0.039)	0.078 (0.045)	0.052 (0.031)	-0.039 (0.054)	-0.027 (0.054)	-0.009 (0.014)	-0.021 (0.023)	0.002 (0.027)	0.072 (0.143)
R-squared	0.617	0.684	0.704	0.764	0.704	0.520	0.625	0.684	0.630
Financial integration	0.005 (0.056)	0.123 (0.084)	-0.024 (0.038)	0.086 (0.071)	0.093 (0.067)	0.012 (0.021)	0.044 (0.028)	0.056 (0.040)	-0.107 (0.151)
Workforce integration	0.060 (0.044)	0.026 (0.106)	0.097* (0.034)	-0.147+ (0.069)	-0.130+ (0.066)	-0.029 (0.019)	-0.079+ (0.039)	-0.043 (0.031)	0.218 (0.249)
R-squared	0.617	0.684	0.704	0.764	0.704	0.520	0.625	0.684	0.630
<i>M&A Process: Ownership Integration + 2-year Workforce Integration</i>									
M&A	0.065+ (0.029)	0.061 (0.068)	0.092* (0.039)	0.011 (0.068)	0.030 (0.066)	0.002 (0.018)	-0.005 (0.031)	0.018 (0.030)	-0.218 (0.190)
R-squared	0.619	0.684	0.708	0.764	0.704	0.520	0.625	0.685	0.633
Financial integration	0.007 (0.057)	0.124 (0.082)	-0.021 (0.038)	0.079 (0.072)	0.087 (0.068)	0.010 (0.021)	0.041 (0.028)	0.054 (0.040)	-0.092 (0.148)
Workforce integration	0.085* (0.032)	0.026 (0.109)	0.130** (0.040)	-0.028 (0.077)	-0.005 (0.068)	-0.005 (0.023)	-0.031 (0.045)	-0.001 (0.030)	-0.248 (0.222)
R-squared	0.621	0.685	0.712	0.767	0.707	0.523	0.631	0.689	0.634
<i>M&A Process: Ownership Integration + 3-year Workforce Integration</i>									
M&A	0.018 (0.027)	0.038 (0.079)	0.100* (0.040)	-0.022 (0.069)	-0.001 (0.063)	-0.004 (0.018)	-0.038 (0.031)	0.017 (0.027)	-0.086 (0.196)
R-squared	0.616	0.684	0.710	0.764	0.703	0.520	0.628	0.685	0.630
Financial integration	0.008 (0.056)	0.124 (0.081)	-0.018 (0.040)	0.078 (0.074)	0.087 (0.069)	0.010 (0.021)	0.040 (0.031)	0.054 (0.040)	-0.097 (0.148)
Workforce integration	0.017 (0.032)	0.007 (0.125)	0.134** (0.038)	-0.064 (0.076)	-0.038 (0.061)	-0.011 (0.022)	-0.068 (0.039)	0.001 (0.026)	-0.076 (0.211)
R-squared	0.618	0.685	0.714	0.768	0.708	0.523	0.637	0.689	0.631

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding .

Table 5.4 The Effects of the Post-Merger Workforce Integration and Bankruptcy on Service Quality by Union Status, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
R^2	0.621	0.685	0.712	0.767	0.707	0.523	0.631	0.689	0.634
Union	0.022 (0.019)	-0.025 (0.050)	-0.001 (0.016)	-0.022 (0.023)	-0.005 (0.021)	-0.015* (0.005)	-0.024+ (0.011)	-0.006 (0.008)	0.171+ (0.087)
Financial Integration	0.007 (0.057)	0.125 (0.079)	-0.021 (0.038)	0.081 (0.072)	0.089 (0.068)	0.011 (0.021)	0.041 (0.029)	0.055 (0.040)	-0.097 (0.150)
Workforce Integration	0.078 (0.055)	-0.044 (0.267)	0.115* (0.035)	-0.150 (0.108)	-0.111 (0.094)	-0.043 (0.035)	-0.095 (0.069)	-0.037 (0.043)	0.108 (0.339)
Workforce Integration × Union	0.009 (0.045)	0.086 (0.227)	0.020 (0.046)	0.152 (0.085)	0.133 (0.095)	0.048+ (0.021)	0.081 (0.050)	0.046 (0.036)	-0.449 (0.319)
Bankruptcy Protection	-0.039 (0.082)	0.156 (0.163)	0.020 (0.078)	0.019 (0.066)	-0.011 (0.056)	0.003 (0.009)	0.008 (0.028)	-0.015 (0.035)	0.154 (0.306)
Bankruptcy Protection × Union	0.052 (0.093)	-0.290 (0.171)	-0.015 (0.111)	-0.012 (0.078)	0.003 (0.053)	-0.010 (0.015)	0.032 (0.040)	0.003 (0.031)	-0.163 (0.390)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ΔR^2	0.000	0.002	0.000	0.001	0.002	0.002	0.002	0.001	0.003
F-Value	5.658**	33.814***	1.503	35.428***	38.727***	29.108***	38.386***	14.819***	47.430***

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; The same variables in Table 5.2 were included but not shown in this table; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding.

Table 5.5 The Effects of Employees' Anticipatory Response to the M&A and Bankruptcy on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
R^2	0.621	0.685	0.712	0.767	0.707	0.523	0.631	0.689	0.634
<i>One-Month Lead</i>									
M&A _{t+1}	0.069* (0.028)	0.037 (0.064)	0.046 (0.050)	-0.027 (0.055)	-0.024 (0.053)	0.007 (0.013)	0.011 (0.030)	-0.022 (0.027)	-0.030 (0.164)
Bankruptcy _{t+1}	-0.065 (0.058)	0.113 (0.163)	-0.042 (0.037)	0.030 (0.044)	0.016 (0.033)	-0.008 (0.018)	0.005 (0.017)	-0.011 (0.019)	0.075 (0.115)
ΔR^2	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F-Value	11.379***	2.822+	6.152**	1.601	1.419	0.900	0.679	4.061*	0.794
<i>Two-Month Lead</i>									
M&A _{t+1}	0.023 (0.034)	0.122 (0.133)	0.042 (0.035)	0.036 (0.081)	0.053 (0.076)	0.022 (0.018)	0.045 (0.043)	0.015 (0.035)	-0.156 (0.133)
M&A _{t+2}	0.049 (0.048)	-0.091 (0.116)	0.004 (0.046)	-0.067 (0.047)	-0.082+ (0.041)	-0.016 (0.012)	-0.036+ (0.018)	-0.040+ (0.020)	0.134 (0.081)
Bankruptcy _{t+1}	0.000 (0.036)	0.113 (0.074)	-0.058+ (0.031)	-0.036 (0.027)	-0.021 (0.019)	-0.037 (0.020)	-0.005 (0.023)	-0.021 (0.024)	0.125 (0.087)
Bankruptcy _{t+2}	-0.067 (0.059)	-0.001 (0.184)	0.016 (0.030)	0.067 (0.059)	0.037 (0.046)	0.030 (0.019)	0.010 (0.023)	0.010 (0.027)	-0.050 (0.105)
ΔR^2	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
F-Value	9.197***	2.343+	3.252*	4.740**	6.613***	4.224**	2.868	6.199***	1.861
<i>Three-Month Lead</i>									
M&A _{t+1}	0.022 (0.034)	0.121 (0.133)	0.042 (0.035)	0.038 (0.081)	0.055 (0.076)	0.023 (0.018)	0.045 (0.043)	0.015 (0.035)	-0.158 (0.133)
M&A _{t+2}	0.021 (0.036)	-0.147+ (0.078)	-0.001 (0.025)	0.004 (0.070)	0.014 (0.049)	-0.002 (0.024)	-0.029 (0.032)	-0.044 (0.034)	0.065 (0.053)
M&A _{t+3}	0.029 (0.031)	0.060 (0.112)	0.006 (0.037)	-0.074 (0.072)	-0.100 (0.056)	-0.015 (0.018)	-0.007 (0.028)	0.004 (0.030)	0.071 (0.076)
Bankruptcy _{t+1}	-0.003 (0.036)	0.120 (0.069)	-0.055 (0.030)	-0.033 (0.026)	-0.018 (0.018)	-0.037 (0.020)	-0.004 (0.023)	-0.020 (0.023)	0.118 (0.083)
Bankruptcy _{t+2}	-0.018 (0.048)	-0.108 (0.106)	-0.027 (0.025)	0.021 (0.046)	-0.007 (0.036)	0.023 (0.017)	-0.001 (0.013)	-0.005 (0.021)	0.069 (0.063)
Bankruptcy _{t+3}	-0.050 (0.027)	0.110 (0.176)	0.044 (0.034)	0.046* (0.020)	0.044* (0.017)	0.006 (0.010)	0.012 (0.018)	0.016 (0.021)	-0.123 (0.081)
ΔR^2	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.001	0.000
F-Value	7.252***	2.615*	2.997**	5.552***	10.219***	3.541**	2.090+	4.503***	2.031+

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; The same variables in Table 5.2 were included but not shown in this table; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding.

Table 5.6 The Effects of the Representation Turmoil on Service Quality by Election Type and Election Authorization, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Raid Election Authorized	-0.088** (0.025)	-0.054 (0.056)	-0.015 (0.036)	0.020 (0.043)	0.013 (0.028)	0.002 (0.011)	-0.014 (0.021)	0.029* (0.009)	0.058 (0.080)
Raid Election Dismissed	-0.133 (0.076)	0.071 (0.182)	0.019 (0.023)	0.211* (0.082)	0.162** (0.047)	0.051* (0.016)	0.126** (0.037)	0.061* (0.019)	-0.330* (0.124)
Cert. Election Authorized	0.057 (0.036)	0.093* (0.038)	-0.012 (0.020)	0.006 (0.023)	0.003 (0.013)	-0.012 (0.008)	-0.009 (0.011)	0.000 (0.006)	-0.053+ (0.026)
Cert. Election Dismissed	0.030 (0.057)	0.348** (0.073)	-0.027 (0.031)	0.322*** (0.041)	0.212*** (0.029)	0.062** (0.015)	0.165*** (0.028)	0.087*** (0.013)	-0.220 (0.198)
Determination to the 1 st Contract Signed	0.082 (0.048)	0.069 (0.041)	-0.058 (0.048)	0.125 (0.089)	0.086 (0.053)	0.028 (0.022)	0.058 (0.061)	0.040 (0.023)	-0.036 (0.271)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.623	0.686	0.712	0.771	0.710	0.526	0.637	0.690	0.635
N	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; The variables in Table 1 were not shown in the table; Standard error is in parenthesis; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding.

Table 5.7 The Effects of Concession Bargaining on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Unions in Concession	0.021 (0.031)	0.066 (0.065)	0.041 (0.041)	0.076 (0.074)	0.041 (0.042)	0.019 (0.014)	0.063 (0.044)	0.009 (0.020)	-0.244 (0.135)
Nonunion	-0.022 (0.023)	0.057 (0.049)	0.010 (0.016)	0.026 (0.028)	0.001 (0.023)	0.015+ (0.007)	0.029+ (0.014)	0.003 (0.009)	-0.171+ (0.092)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.622	0.685	0.713	0.770	0.709	0.525	0.640	0.689	0.640
N	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; The variables in Table 1 were not shown in the table; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,150 carrier-craft-month observations from October 1987 to December 2008 and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding (excluded in the paper).

Table 5.8 A Comparison of the Effects of Mediation/Arbitration and Strike

	(1) Estimated Effect (in log)	(2) Estimated Effect (in percent)	(3) Estimated Number of Cancelled Flights	(4) Number of Months (1987-2008)	(5) Cumulative Estimated Number of Cancelled Flight (3) × (4)	(6) Number of Passengers who Missed Their Flight (5) × 90 Passengers
Mediation/ Arbitration	0.066	6.8 (= $e^{0.066}-1$)	51 (=745*0.068)	1,051	53,245	4,792,090
Strike	0.378	45.9 (= $e^{0.378}-1$)	342 (=745*0.459)	21	7,187	646,828

Note: For the computations, several estimates were taken from the descriptive statistics for 1987-2008: the monthly average number of scheduled flights was 43,825 flights; the monthly average of flight cancellation was 1.7 percent; and the monthly average number of passengers was 90 passengers.

Table 6.1 Pre- & Post-9/11 Comparisons of the Effects of Broad Categories of Labor Turmoil on Service Quality

	Passenger Complaints																	
	Arrival Delay		Flight Cancellation		Mishandled Baggage		Total # of Complaints		Flight Problems		Reservation/ Ticketing/ Boarding		Baggage		Customer Service		AQR	
	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11
Union	0.034 (0.032)	0.000 (0.003)	-0.016 (0.036)	0.003 (0.014)	-0.003 (0.013)	-0.001 (0.005)	0.009 (0.028)	-0.003 (0.003)	0.025 (0.030)	-0.002 (0.003)	-0.009 (0.006)	0.000 (0.001)	-0.010 (0.010)	-0.002 (0.002)	0.009 (0.013)	-0.001 (0.001)	0.090 (0.077)	0.007 (0.009)
M&A	0.118** (0.025)	-0.055 ¹ (0.074)	0.150 (0.113)	-0.262+ ¹ (0.120)	0.097* (0.040)	0.072 (0.083)	0.067 (0.099)	-0.005 (0.037)	0.078 (0.096)	-0.016 (0.024)	0.006 (0.026)	0.015+ (0.008)	0.025 (0.044)	0.009 (0.009)	0.038 (0.041)	0.003 (0.011)	-0.374 (0.270)	-0.088 (0.188)
Bankruptcy	-0.026 (0.098)	-0.046 (0.035)	0.010 (0.111)	-0.173+ (0.093)	-0.040 (0.050)	0.030 (0.059)	-0.075 (0.071)	-0.117** (0.033)	-0.078 (0.062)	-0.067* (0.027)	-0.026+ (0.013)	-0.043** (0.012)	-0.045 (0.031)	-0.018 (0.016)	-0.063+ (0.032)	-0.030* (0.010)	0.483* (0.198)	0.033 ¹ (0.152)
Representation Turmoil	0.013 (0.031)	-0.035 (0.022)	0.045 (0.041)	0.045 (0.072)	-0.022 (0.017)	-0.032+ (0.015)	0.112** (0.031)	0.013 ³ (0.024)	0.079** (0.017)	0.010 ⁴ (0.012)	0.017 (0.009)	0.010 (0.007)	0.048* (0.020)	0.002 ² (0.007)	0.036** (0.011)	0.006 ² (0.009)	-0.056 (0.103)	0.072 (0.040)
Bargaining Turmoil	0.027 (0.019)	-0.025 ¹ (0.016)	0.074* (0.031)	0.019 (0.054)	0.023 (0.018)	-0.009 (0.026)	0.051+ (0.025)	0.023 (0.017)	0.044+ (0.021)	0.013 (0.014)	0.013 (0.009)	0.002 (0.004)	0.024* (0.010)	0.011* (0.005)	0.022+ (0.010)	0.009 (0.007)	-0.142+ (0.065)	0.002 ¹ (0.050)
Arrival Delay					0.110+ (0.058)	0.316*** ² (0.063)	0.126 (0.080)	0.095* (0.031)	0.149 (0.085)	0.130*** (0.023)	-0.002 (0.015)	0.003 (0.013)	-0.016 (0.035)	-0.001 (0.025)	0.026 (0.035)	0.004 (0.022)		
Flight Cancellation					0.050+ (0.026)	0.031 (0.042)	0.112* (0.037)	0.039 (0.021)	0.109* (0.034)	0.046* (0.016)	0.021+ (0.011)	0.009 (0.005)	0.042* (0.015)	0.003 ¹ (0.010)	0.037* (0.014)	0.008 ¹ (0.006)		
Mishandled Baggage							0.057 (0.089)	0.173+ (0.077)	0.057 (0.072)	0.048 (0.032)	0.028 (0.024)	0.014 (0.030)	0.042 (0.037)	0.199** ² (0.057)	0.041 (0.030)	0.026+ (0.012)		
Load factors	0.005 (0.003)	0.019** ² (0.006)	-0.016 (0.011)	-0.035* (0.014)	-0.005 (0.003)	-0.015 (0.008)	-0.003 (0.007)	0.006 (0.004)	-0.004 (0.006)	0.002 (0.002)	0.001 (0.002)	0.004* (0.001)	-0.003 (0.003)	0.005* ² (0.002)	-0.001 (0.002)	0.003+ (0.001)	0.013 (0.019)	0.000 (0.015)
ln(Average Miles flown per Departure)	0.096 (0.069)	-0.073 ² (0.041)	0.064 (0.063)	0.087 (0.125)	-0.034 (0.026)	0.096 ¹ (0.057)	0.101 (0.061)	0.071 (0.043)	0.107+ (0.056)	0.044 (0.025)	0.033* (0.014)	0.049** (0.011)	0.055 (0.031)	-0.025* ² (0.008)	0.053+ (0.024)	0.039+ (0.017)	-0.042 (0.186)	-0.187 (0.108)
ln(# of monthly passengers (000s))	0.262* (0.082)	-0.016 (0.146)	-0.070 (0.258)	-1.068+ (0.566)	0.382*** (0.075)	0.147 (0.212)	0.164 (0.168)	-0.367** ² (0.102)	0.198 (0.122)	-0.115 ¹ (0.071)	0.073 (0.046)	-0.086* ² (0.030)	0.190+ (0.097)	-0.292*** ³ (0.038)	0.009 (0.059)	-0.026 (0.045)	-1.234* (0.480)	0.349 ² (0.233)
Constant	-1.934 (1.118)	2.435 (2.259)	0.248 (3.638)	19.407* ¹ (8.465)	-3.813** (1.030)	-0.850 (3.449)	-1.821 (2.367)	4.793* (1.646)	-2.731 (1.574)	1.088 (1.275)	-1.034 (0.638)	0.846+ ¹ (0.402)	-2.296 (1.383)	4.225*** ³ (0.597)	-0.236 (0.836)	0.118 (0.746)	14.193+ (6.624)	-6.521 ² (3.731)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.616	0.723	0.737	0.616	0.727	0.794	0.783	0.816	0.712	0.707	0.552	0.563	0.688	0.645	0.711	0.594	0.675	0.709
N	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750

Note: ¹ significant at the 0.10 level; ² significant at the 0.05 level; ³ significant at the 0.01 level; ⁴ significant at the 0.001 level; † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,100 carrier-craft-month observations from October 1987 to December 2008 (except September 2001) and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding (excluded in the paper).

Table 6.2 Pre- & Post-9/11 Comparisons of the Effects of Detailed Categories of Labor Turmoil on Service Quality

	Passenger Complaints																	
	Arrival Delay		Flight Cancellation		Mishandled Baggage		Total # of Complaints		Flight Problems		Reservation/Ticketing/ Boarding		Baggage		Customer Service		AQR	
	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11	Pre-9/11	Post-9/11
Union	0.041 (0.033)	0.000 (0.004)	-0.013 (0.037)	0.008 (0.014)	-0.001 (0.011)	-0.002 (0.004)	0.010 (0.032)	-0.004 (0.004)	0.027 (0.033)	-0.003 (0.004)	-0.009 (0.007)	0.001 (0.001)	-0.010 (0.012)	-0.002 (0.002)	0.009 (0.014)	-0.002 (0.001)	0.083 (0.081)	0.008 (0.007)
M&A																		
Financial Integration	0.069 (0.045)	-0.169* ² (0.068)	0.133 (0.123)	-0.346+ (0.186)	0.018 (0.068)	-0.038 (0.086)	0.146 (0.094)	-0.051 (0.069)	0.139 (0.092)	-0.043 (0.039)	0.022 (0.026)	-0.002 (0.022)	0.070+ (0.038)	-0.004 (0.021)	0.078 (0.047)	0.014 (0.021)	-0.345 (0.231)	0.189 (0.120)
Workforce Integration	0.133* (0.043)	0.001 (0.070)	0.158 (0.141)	-0.213+ ¹ (0.104)	0.124*** (0.025)	0.117 (0.081)	0.013 (0.107)	0.018 (0.033)	0.032 (0.100)	0.003 (0.018)	-0.006 (0.029)	0.019+ (0.010)	-0.005 (0.057)	0.012 (0.011)	0.012 (0.039)	0.001 (0.013)	-0.363 (0.299)	-0.205 (0.196)
Bankruptcy	-0.022 (0.095)	-0.034 (0.033)	0.010 (0.110)	-0.173 (0.102)	-0.040 (0.053)	0.037 (0.066)	-0.060 (0.078)	-0.111** (0.034)	-0.067 (0.065)	-0.061* (0.027)	-0.023 (0.015)	-0.042** (0.012)	-0.037 (0.034)	-0.016 (0.017)	-0.059 (0.033)	-0.028* (0.009)	0.467+ (0.212)	0.010 (0.170)
Representation Turmoil																		
Petition to Determination	-0.026 (0.032)	-0.022 (0.024)	0.042 (0.048)	0.016 (0.071)	-0.009 (0.012)	-0.015 (0.020)	0.092* (0.035)	0.028 (0.021)	0.064* (0.021)	0.021* ¹ (0.008)	0.010 (0.008)	0.008 (0.008)	0.039* (0.013)	0.006 ² (0.007)	0.029*** (0.006)	0.006 ¹ (0.010)	-0.060 (0.060)	0.050 ¹ (0.048)
Determination to the 1 st Contract Settled	0.075+ (0.037)	-0.062 ² (0.038)	0.047 (0.034)	0.192 (0.123)	-0.037 (0.035)	-0.078 (0.078)	0.126 (0.076)	-0.050 ¹ (0.030)	0.091+ (0.047)	-0.036* ² (0.016)	0.025 (0.020)	0.019 (0.011)	0.052 (0.052)	-0.013+ (0.007)	0.040 (0.023)	-0.001 (0.008)	-0.042 (0.228)	0.099 (0.164)
Bargaining Turmoil																		
Direct Negotiation	0.033 (0.022)	-0.047* ³ (0.020)	0.060 (0.035)	0.024 (0.066)	0.020 (0.018)	-0.010 (0.033)	-0.009 (0.021)	0.004 (0.018)	0.003 (0.015)	-0.003 (0.013)	0.002 (0.009)	-0.002 (0.004)	-0.008 (0.011)	0.007 (0.006)	0.003 (0.006)	0.001 (0.006)	-0.059 (0.055)	0.026 (0.076)
Mediation/Arbitration	0.026 (0.018)	0.001 (0.017)	0.076+ (0.035)	0.005 (0.064)	0.027 (0.023)	-0.012 (0.028)	0.102+ (0.047)	0.038* (0.014)	0.074+ (0.036)	0.030+ (0.015)	0.023 (0.013)	0.005 (0.003)	0.053* (0.022)	0.012+ (0.006)	0.037* (0.015)	0.020** (0.006)	-0.206* (0.082)	-0.020 (0.042)
Cooling-Off Period	0.098 (0.055)	0.105* (0.040)	-0.078 (0.114)	0.041 (0.251)	-0.010 (0.044)	0.074 (0.103)	0.092+ (0.050)	0.034 (0.054)	0.100+ (0.047)	-0.001 ¹ (0.014)	0.022 (0.013)	0.007 (0.028)	0.024 (0.020)	0.063** (0.019)	0.029 (0.024)	0.030 (0.054)	-0.223+ (0.111)	-0.136 (0.185)
Strike	-0.018 (0.079)	0.005 (0.019)	1.773** (0.424)	0.088 ³ (0.065)	0.125 (0.091)	-0.084 ² (0.070)	0.105 (0.255)	0.058* (0.023)	0.076 (0.232)	0.037* (0.014)	0.116 (0.066)	0.043* (0.014)	0.007 (0.087)	-0.016 (0.013)	0.067 (0.107)	0.022* (0.010)	-0.781+ (0.424)	0.105 ¹ (0.118)
Released-but-No-Strike	-0.045 (0.057)		-0.263* (0.102)		0.030 (0.049)		0.015 (0.054)		0.056 (0.048)		-0.015 (0.009)		0.004 (0.024)		-0.012 (0.026)		-0.073 (0.155)	
Arrival Delay					0.111+ (0.056)	0.303*** ² (0.058)	0.129 (0.080)	0.085* (0.031)	0.151 (0.086)	0.123*** (0.022)	-0.001 (0.015)	0.000 (0.012)	-0.014 (0.033)	-0.003 (0.025)	0.027 (0.035)	0.002 (0.022)		
Flight Cancellation					0.049+ (0.026)	0.032 (0.042)	0.110* (0.036)	0.040 (0.023)	0.108** (0.033)	0.047* (0.016)	0.020+ (0.010)	0.010 (0.006)	0.041* (0.014)	0.003 (0.010)	0.036* (0.013)	0.009 ¹ (0.006)		
Mishandled Baggage							0.069 (0.091)	0.168+ (0.075)	0.067 (0.073)	0.044 (0.031)	0.031 (0.025)	0.014 (0.030)	0.048 (0.038)	0.198** ² (0.056)	0.046 (0.030)	0.026* (0.011)		

Load factors	0.004 (0.003)	0.020** ³ (0.005)	-0.016 (0.011)	-0.034* (0.013)	-0.005 (0.003)	-0.014 (0.009)	-0.002 (0.007)	0.006 (0.004)	-0.004 (0.005)	0.002 (0.002)	0.001 (0.002)	0.004* (0.001)	-0.002 (0.003)	0.005* ² (0.002)	-0.001 (0.002)	0.002+ (0.001)	0.012 (0.019)	-0.002 (0.016)
ln(Average Miles flown per Departure)	0.092 (0.065)	-0.090+ ² (0.040)	0.062 (0.062)	0.070 (0.133)	-0.036 (0.027)	0.080 ¹ (0.059)	0.105 (0.059)	0.064 (0.042)	0.109+ (0.056)	0.039 (0.024)	0.033* (0.013)	0.048** (0.011)	0.057+ (0.029)	-0.026* ² (0.008)	0.054+ (0.024)	0.040* (0.018)	-0.042 (0.181)	-0.150 (0.104)
ln(# of monthly passengers (000s))	0.264* (0.084)	-0.070 (0.149)	-0.062 (0.256)	-1.130+ (0.573)	0.378*** (0.071)	0.105 (0.211)	0.160 (0.160)	-0.383** ² (0.096)	0.195 (0.116)	-0.124 ¹ (0.074)	0.072 (0.044)	-0.093** ² (0.027)	0.187+ (0.093)	-0.295*** ³ (0.034)	0.008 (0.056)	-0.020 (0.041)	-1.239* (0.484)	0.462+ ² (0.244)
Constant	-1.953 (1.152)	3.377 ¹ (2.333)	0.078 (3.611)	20.568* ¹ (8.614)	-3.765** (0.961)	-0.146 (3.433)	-1.801 (2.241)	5.085** ¹ (1.559)	-2.728+ (1.478)	1.273 (1.321)	-1.029 (0.608)	0.952* ¹ (0.353)	-2.275 (1.315)	4.286*** ³ (0.539)	-0.244 (0.782)	0.028 (0.668)	14.311+ (6.668)	-8.305+ ¹ (3.868)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.619	0.729	0.739	0.617	0.729	0.796	0.787	0.817	0.715	0.710	0.555	0.565	0.694	0.645	0.714	0.596	0.676	0.714
N	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750	8,350	3,750

Note: ¹ significant at the 0.10 level; ² significant at the 0.05 level; ³ significant at the 0.01 level; ⁴ significant at the 0.001 level; † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 12,100 carrier-craft-month observations from October 1987 to December 2008 (except September 2001) and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding .

Table 7.1 The Fixed Effect Estimates of Each Occupation's Broad Categories of Labor Turmoil on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Post 9/11	0.092 (0.224)	1.851* (0.582)	0.078 (0.232)	-1.064*** (0.197)	-0.954*** (0.168)	-0.284** (0.086)	-0.515** (0.114)	-0.247* (0.102)	1.331 (0.916)
M&A	0.052+ (0.028)	0.022 (0.067)	0.090* (0.037)	-0.001 (0.069)	0.020 (0.066)	-0.003 (0.018)	-0.013 (0.030)	0.012 (0.031)	-0.183 (0.178)
Bankruptcy	0.022 (0.054)	-0.155 (0.113)	-0.003 (0.054)	-0.085 (0.065)	-0.068 (0.055)	-0.034+ (0.018)	-0.019 (0.033)	-0.039 (0.025)	0.305 (0.237)
<i>Pilots</i>									
Union	0.248 (0.188)	-0.130 (0.181)	-0.267** (0.059)	-0.238 (0.158)	-0.117 (0.114)	-0.084+ (0.045)	-0.138* (0.054)	-0.029 (0.042)	1.213** (0.366)
Representation Turmoil	0.195 (0.122)	0.074 (0.117)	0.075 (0.050)	0.048 (0.048)	0.025 (0.046)	-0.002 (0.020)	-0.058 (0.045)	0.018 (0.029)	0.200 (0.109)
Bargaining Turmoil	0.036 (0.025)	0.108 (0.063)	-0.034+ (0.016)	0.034 (0.043)	0.045 (0.037)	-0.004 (0.009)	0.007 (0.013)	0.027 (0.017)	-0.022 (0.108)
<i>Flight Attendants</i>									
Union	0.217+ (0.099)	0.986*** (0.141)	-0.021 (0.139)	0.345* (0.112)	0.368* (0.142)	0.087** (0.021)	0.180** (0.052)	0.079+ (0.039)	-0.485 (0.495)
Representation Turmoil	0.088 (0.056)	0.097 (0.093)	-0.030 (0.046)	0.334*** (0.042)	0.231** (0.057)	0.064*** (0.007)	0.181** (0.043)	0.099** (0.022)	-0.611** (0.179)
Bargaining Turmoil	-0.008 (0.025)	0.086 (0.048)	-0.045** (0.010)	0.016 (0.044)	0.038 (0.035)	0.005 (0.010)	0.010 (0.024)	0.006 (0.017)	0.015 (0.094)
<i>Mechanics</i>									
Union	-0.055 (0.070)	-0.843*** (0.130)	0.183+ (0.092)	-0.051 (0.100)	-0.024 (0.077)	-0.049 (0.034)	-0.052 (0.044)	-0.007 (0.041)	-0.236 (0.217)
Representation Turmoil	-0.015 (0.042)	-0.042 (0.063)	-0.027 (0.038)	0.052+ (0.026)	0.051+ (0.028)	-0.005 (0.011)	0.018 (0.012)	0.032* (0.014)	0.056 (0.068)
Bargaining Turmoil	-0.020 (0.021)	-0.068 (0.074)	0.005 (0.048)	-0.058 (0.044)	-0.054 (0.036)	-0.017 (0.010)	-0.039+ (0.021)	-0.016 (0.019)	0.172 (0.115)
<i>Fleet Service Employees</i>									
Union	0.011 (0.111)	-0.095 (0.078)	0.060 (0.068)	-0.005 (0.095)	-0.026 (0.110)	-0.030 (0.018)	-0.037 (0.045)	-0.009 (0.029)	0.250 (0.378)
Representation Turmoil	-0.019 (0.054)	0.047 (0.090)	-0.079+ (0.037)	-0.010 (0.029)	-0.003 (0.028)	-0.015 (0.009)	-0.009 (0.013)	-0.004 (0.013)	0.320+ (0.150)
Bargaining Turmoil	0.040 (0.023)	0.061 (0.076)	0.049+ (0.026)	0.026 (0.046)	0.000 (0.036)	0.011 (0.008)	0.026 (0.025)	0.007 (0.020)	-0.268* (0.111)
<i>Passenger Service Employees</i>									
Union	-0.043 (0.058)	-0.178 (0.131)	-0.047 (0.078)	0.039 (0.102)	0.059 (0.083)	-0.003 (0.030)	0.003 (0.052)	0.031 (0.039)	0.049 (0.335)
Representation Turmoil	-0.107 (0.082)	-0.090 (0.081)	-0.017 (0.035)	0.113 (0.083)	0.095 (0.072)	0.035 (0.021)	0.078 (0.043)	0.044 (0.028)	-0.206 (0.222)
Bargaining Turmoil	-0.046+ (0.024)	-0.099 (0.064)	0.004 (0.054)	0.039 (0.038)	0.046 (0.034)	0.014 (0.009)	0.012 (0.017)	0.020 (0.013)	0.011 (0.165)
Arrival Delay			0.141** (0.036)	0.157* (0.051)	0.168* (0.059)	0.021** (0.006)	0.031 (0.018)	0.030 (0.024)	
Flight Cancellation			0.052 (0.029)	0.071* (0.023)	0.078** (0.019)	0.008 (0.006)	0.016 (0.010)	0.028* (0.012)	
Mishandled Baggage				0.136 (0.089)	0.085 (0.048)	0.030 (0.023)	0.124* (0.054)	0.037 (0.027)	
Load factors	0.007 (0.004)	-0.022* (0.009)	-0.006+ (0.003)	0.001 (0.004)	-0.002 (0.003)	0.002+ (0.001)	0.001 (0.003)	-0.001 (0.001)	-0.001 (0.011)
ln(Average Miles flown per Departure)	-0.013 (0.033)	0.091 (0.069)	0.004 (0.048)	0.085* (0.032)	0.069* (0.025)	0.037* (0.016)	0.038* (0.017)	0.034* (0.012)	-0.104 (0.145)
ln(# of monthly passengers (000s))	0.205** (0.059)	-0.131 (0.169)	0.150 (0.125)	-0.171+ (0.081)	0.013 (0.056)	-0.030 (0.024)	-0.064 (0.037)	-0.014 (0.029)	0.016 (0.245)
Constant	-1.001 (0.918)	1.609 (2.751)	-0.457 (1.842)	2.682* (1.179)	-0.288 (0.772)	0.384 (0.357)	1.091+ (0.502)	0.167 (0.414)	-3.814 (3.559)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.642	0.713	0.734	0.801	0.739	0.565	0.682	0.706	0.687
N	2,430	2,430	2,430	2,430	2,430	2,430	2,430	2,430	2,430

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 2,430 airline-month observations from October 1987 to December 2008 (except September 2001) and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or cancelled in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding (excluded in the paper).

Table 7.2 The Fixed Effect Estimates of Each Occupation's Specific Categories of Labor Turmoil on Service Quality, 1987-2008

	Passenger Complaints								
	Arrival Delay	Flight Cancellation	Mishandled Baggage	Total # of Complaints	Flight Problems	Reservation/Ticketing/Boarding	Baggage	Customer Service	AQR
Post 9/11	0.145 (0.207)	1.771* (0.553)	0.053 (0.191)	-1.046** (0.248)	-0.949** (0.222)	-0.291* (0.094)	-0.513** (0.130)	-0.248+ (0.117)	1.393 (1.014)
<i>Strategic Turmoil</i>									
Financial Integration	0.009 (0.046)	0.058 (0.097)	-0.005 (0.035)	0.048 (0.065)	0.061 (0.059)	0.004 (0.016)	0.035 (0.026)	0.039 (0.036)	-0.112 (0.135)
Workforce Integration	0.066 (0.039)	-0.019 (0.082)	0.140** (0.034)	-0.010 (0.073)	0.006 (0.067)	-0.003 (0.025)	-0.033 (0.040)	0.002 (0.031)	-0.207 (0.222)
Bankruptcy	0.020 (0.050)	-0.179 (0.103)	-0.004 (0.063)	-0.049 (0.079)	-0.036 (0.063)	-0.036 (0.021)	-0.004 (0.037)	-0.022 (0.027)	0.302 (0.231)
<i>Pilots</i>									
Union	-0.018 (0.082)	-0.316* (0.133)	-0.205** (0.059)	-0.499** (0.113)	-0.241* (0.088)	-0.150*** (0.028)	-0.275** (0.068)	-0.072+ (0.033)	1.814*** (0.256)
Petition to Determination	0.095 (0.096)	-0.041 (0.119)	0.115* (0.039)	0.028 (0.074)	-0.005 (0.066)	-0.001 (0.018)	-0.048 (0.050)	-0.002 (0.038)	0.085 (0.211)
Determination to the 1 st Contract	0.178 (0.110)	0.008 (0.102)	-0.022 (0.092)	-0.032 (0.111)	0.023 (0.083)	-0.027 (0.023)	-0.149** (0.040)	0.035 (0.031)	0.768** (0.231)
Direct Negotiation	0.024 (0.025)	0.092 (0.057)	-0.035+ (0.017)	0.039 (0.051)	0.046 (0.047)	-0.001 (0.011)	0.015 (0.014)	0.031 (0.021)	-0.055 (0.117)
Mediation/Arbitration	0.083 (0.060)	0.064 (0.109)	-0.016 (0.038)	0.063 (0.051)	0.068 (0.041)	0.000 (0.011)	0.020 (0.017)	0.026 (0.023)	-0.016 (0.162)
Cooling-Off Period	0.078 (0.098)	-0.126 (0.186)	0.012 (0.101)	-0.067 (0.086)	-0.130 (0.076)	-0.029 (0.030)	-0.039 (0.022)	-0.037 (0.040)	0.080 (0.231)
Strike	-0.127 (0.139)	1.625+ (0.763)	0.056 (0.109)	0.379+ (0.190)	0.444+ (0.214)	0.228** (0.058)	0.062 (0.048)	0.217+ (0.105)	-0.896+ (0.400)
Released-but-No-Strike	.	.	.	.	.	.	.	.	.
<i>Flight Attendants</i>									
Union	0.321* (0.139)	1.173*** (0.145)	-0.107 (0.132)	0.507** (0.140)	0.468** (0.143)	0.121** (0.029)	0.285*** (0.042)	0.128* (0.049)	-0.854+ (0.454)
Petition to Determination	-0.035 (0.052)	0.003 (0.065)	-0.039 (0.026)	0.164+ (0.089)	0.119 (0.092)	0.029+ (0.015)	0.088 (0.049)	0.058* (0.022)	-0.193 (0.162)
Determination to the 1 st Contract	0.310** (0.086)	0.334** (0.096)	-0.102+ (0.054)	0.611*** (0.065)	0.427*** (0.062)	0.120*** (0.020)	0.323*** (0.049)	0.177*** (0.023)	1.057*** (0.163)
Direct Negotiation	-0.018 (0.035)	0.146+ (0.076)	-0.036 (0.038)	0.007 (0.042)	0.015 (0.032)	0.008 (0.007)	-0.002 (0.027)	-0.003 (0.013)	0.067 (0.135)
Mediation/Arbitration	0.018 (0.020)	0.040 (0.036)	-0.067*** (0.012)	0.028 (0.041)	0.065+ (0.034)	0.003 (0.012)	0.013 (0.020)	0.024 (0.017)	0.060 (0.084)
Cooling-Off Period	0.085 (0.110)	-0.223 (0.286)	-0.014 (0.091)	0.111 (0.228)	0.215 (0.199)	0.060 (0.047)	0.057 (0.090)	0.043 (0.083)	-0.587 (0.583)
Strike	0.210+ (0.102)	1.690*** (0.229)	-0.038 (0.099)	-0.094 (0.074)	-0.121+ (0.060)	0.088** (0.022)	-0.107+ (0.049)	-0.079+ (0.039)	-0.306 (0.190)
Released-but-No-Strike	-0.010 (0.060)	-0.237 (0.194)	0.167* (0.052)	-0.008 (0.078)	-0.045 (0.068)	-0.028 (0.019)	-0.040 (0.041)	-0.029 (0.037)	-0.137 (0.236)
<i>Mechanics</i>									
Union	0.082 (0.063)	-0.827*** (0.161)	0.115 (0.127)	0.083 (0.107)	0.037 (0.090)	-0.020 (0.039)	0.008 (0.057)	0.017 (0.058)	-0.433+ (0.199)
Petition to Determination	-0.021 (0.029)	-0.048 (0.083)	0.002 (0.038)	0.030 (0.022)	0.044+ (0.023)	-0.012 (0.011)	0.009 (0.011)	0.024+ (0.012)	0.061 (0.108)
Determination to the 1 st Contract	0.087 (0.089)	-0.121* (0.053)	-0.097 (0.110)	0.053 (0.085)	-0.008 (0.072)	0.009 (0.030)	-0.012 (0.018)	0.003 (0.045)	0.110 (0.162)
Direct Negotiation	-0.022 (0.034)	-0.091 (0.090)	-0.003 (0.032)	-0.085+ (0.040)	-0.073+ (0.034)	-0.027* (0.011)	-0.054* (0.021)	-0.028 (0.016)	0.212+ (0.114)
Mediation/Arbitration	-0.048 (0.040)	-0.026 (0.076)	0.044 (0.066)	-0.007 (0.045)	-0.037 (0.041)	-0.007 (0.015)	-0.003 (0.027)	-0.001 (0.017)	0.018 (0.121)
Cooling-Off Period	0.154 (0.097)	0.115 (0.210)	0.000 (0.051)	0.021 (0.049)	0.041 (0.061)	-0.015 (0.024)	0.001 (0.027)	0.011 (0.029)	0.055 (0.164)

Strike	0.113+	0.153	-0.158*	-0.151	-0.155+	0.027	-0.092*	-0.045	0.281
	(0.053)	(0.273)	(0.064)	(0.086)	(0.080)	(0.026)	(0.038)	(0.034)	(0.255)
Released-but-No-Strike	.	.	.	.	.	.	.	.	.
<i>Fleet Service Employees</i>									
Union	-0.006	-0.132	0.095	-0.052	-0.061	-0.039	-0.087+	-0.025	0.446
	(0.111)	(0.106)	(0.062)	(0.094)	(0.100)	(0.022)	(0.044)	(0.035)	(0.329)
Petition to Determination	0.006	0.073	-0.093*	0.013	0.003	-0.009	0.012	0.003	0.228
	(0.051)	(0.072)	(0.040)	(0.036)	(0.034)	(0.009)	(0.017)	(0.013)	(0.195)
Determination to the 1 st Contract	0.005	0.007	-0.055	-0.015	0.014	-0.009	-0.054	-0.005	0.530*
	(0.103)	(0.192)	(0.092)	(0.077)	(0.079)	(0.026)	(0.041)	(0.030)	(0.173)
Direct Negotiation	0.045+	0.128	-0.020	-0.014	-0.014	0.005	0.006	-0.003	-0.139
	(0.024)	(0.089)	(0.014)	(0.043)	(0.042)	(0.008)	(0.021)	(0.022)	(0.146)
Mediation/Arbitration	0.017	-0.093	0.153***	0.033	-0.003	0.006	0.024	0.003	-0.339**
	(0.031)	(0.082)	(0.030)	(0.056)	(0.042)	(0.015)	(0.032)	(0.025)	(0.079)
Cooling-Off Period	-0.088	-0.002	-0.125	0.105	0.077	0.039	-0.003	0.043	-0.105
	(0.095)	(0.307)	(0.078)	(0.091)	(0.092)	(0.037)	(0.046)	(0.065)	(0.217)
Strike	.	.	.	.	.	.	.	.	.
Released-but-No-Strike	.	.	.	.	.	.	.	.	.
<i>Passenger Service Employees</i>									
Union	0.008	-0.155	-0.059	0.089	0.099	0.009	0.024	0.051	-0.027
	(0.049)	(0.155)	(0.080)	(0.094)	(0.082)	(0.026)	(0.039)	(0.034)	(0.318)
Petition to Determination	-0.115	-0.103	0.024	0.027	0.041	0.002	0.027	0.023	-0.127
	(0.099)	(0.123)	(0.032)	(0.054)	(0.056)	(0.013)	(0.015)	(0.023)	(0.084)
Determination to the 1 st Contract	-0.109	-0.136	-0.054	0.092	0.085	0.041	0.078+	0.038	-0.157
	(0.082)	(0.115)	(0.078)	(0.099)	(0.091)	(0.030)	(0.038)	(0.038)	(0.316)
Direct Negotiation	-0.071	-0.155+	0.114*	0.005	0.018	0.007	0.010	0.001	-0.148
	(0.039)	(0.075)	(0.040)	(0.021)	(0.021)	(0.012)	(0.015)	(0.007)	(0.151)
Mediation/Arbitration	0.002	0.034	-0.172**	0.080	0.082+	0.021+	0.019	0.048*	0.239+
	(0.031)	(0.061)	(0.038)	(0.050)	(0.039)	(0.011)	(0.025)	(0.020)	(0.112)
Cooling-Off Period	0.018	-0.987***	0.015	0.313*	0.099	-0.007	0.034	0.013	-0.227
	(0.080)	(0.138)	(0.064)	(0.103)	(0.082)	(0.022)	(0.039)	(0.042)	(0.218)
Strike	.	.	.	.	.	.	.	.	.
Released-but-No-Strike	.	.	.	.	.	.	.	.	.
Arrival Delay			0.160**	0.096	0.122+	0.009	0.004	0.012	
			(0.034)	(0.053)	(0.060)	(0.009)	(0.022)	(0.023)	
Flight Cancellation			0.057*	0.072*	0.078**	0.006	0.016	0.027*	
			(0.024)	(0.022)	(0.019)	(0.006)	(0.009)	(0.011)	
Mishandled Baggage				0.150	0.100+	0.036	0.129*	0.048+	
				(0.088)	(0.048)	(0.024)	(0.055)	(0.026)	
Load factors	0.007*	-0.019+	-0.006	0.003	0.000	0.003**	0.002	-0.001	-0.009
	(0.003)	(0.009)	(0.003)	(0.003)	(0.003)	(0.001)	(0.002)	(0.001)	(0.010)
ln(Average Miles flown per Departure)	-0.026	0.084	0.002	0.068+	0.058+	0.035*	0.028	0.031*	-0.058
	(0.026)	(0.066)	(0.042)	(0.031)	(0.029)	(0.015)	(0.015)	(0.013)	(0.140)
ln(# of monthly passengers (000s))	0.173**	-0.147	0.184+	-0.193*	0.003	-0.036	-0.085*	-0.018	0.053
	(0.047)	(0.155)	(0.097)	(0.079)	(0.056)	(0.023)	(0.035)	(0.028)	(0.275)
Constant	-0.528	1.725	-1.020	3.054*	-0.140	0.456	1.444*	0.195	-4.260
	(0.740)	(2.634)	(1.432)	(1.194)	(0.797)	(0.352)	(0.461)	(0.383)	(4.194)
Year × Month Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carrier Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.663	0.723	0.755	0.820	0.757	0.584	0.712	0.721	0.708
N	2,430	2,430	2,430	2,430	2,430	2,430	2,430	2,430	2,430

Note: † significant at the 0.10 level; * significant at the 0.05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by carrier; The full-sample contains 2,430 airline-month observations from October 1987 to December 2008 (except September 2001) and include the ten U.S. major domestic carriers, Alaska Airlines, American Airlines, America West Airlines (combined into US Airways in January 2006), Continental Airlines, Delta Airlines, Northwest Airlines, Southwest Airlines, Trans World Airlines (combined into American Airlines in January 2002), United Airlines, and US Airways; Arrival delay and flight cancellation are the percentage of flights that arrived more than 15 minutes after their scheduled arrival time or delayed in a given month; mishandled baggage is the number of claims per 1,000 passengers; passenger complaints is the number complaints per 100,000 passengers; and the airline quality rating (AQR) is the weighted scores of arrival delay, mishandled baggage, passenger complaints, and involuntary denied boarding (excluded in the paper).