Transport Policy 99 (2020) 136–144

Contents lists available at ScienceDirect

Transport Policy

journal homepage: http://www.elsevier.com/locate/tranpol

Cost structure effects of horizontal airline mergers and acquisitions

Sveinn Vidar Gudmundsson [a,*], Rico Merkert [b], Renato Redondi [c]

[a] Reykjavik University, Department of Business, IS-101, Reykjavík, Iceland
[b] The University of Sydney Business School, NSW, 2006, Australia
[c] University of Bergamo, Via Pasubio 5b, 24044, Dalmine, Italy

ARTICLE INFO

Keywords:
Cost competitiveness
Cost structures
Mergers and acquisitions
Profitability
Incentives
Efficiency

ABSTRACT

The purpose of this research is to test the ex-post cost structure effects in horizontal mergers and acquisitions (M&A). Our proposed methodology quantifies cost structure effects empirically to inform competition policy around M&As in the airline industry. The results show that horizontal M&As involving unprofitable firms significantly reduce variable costs and increase fixed costs ex-post. M&As involving only profitable firms show no significant impact on the cost structure. We offer support that the ex-post cost structure effects of airline M&As depend on the incentives to improve efficiency, reflected in the ex-ante performance of the merging firms. We further argue that market behavior may not just depend on market structure but cost structures too, all of which should be accounted for in antitrust decision making and regulation around airline M&As.

1. Introduction

Mergers and acquisitions (M&As) constitute one of the key competitive strategies for firms, having global worth in excess of $3.7 trillion in 2019 (Statista, 2020). Despite extensive literature documenting meager efficiency effects of M&As (Bauer and Matzler, 2014; Datta, 1991; Gates and Very, 2003; Ingham et al., 1992; Lubatkin, 1983; Seth, 1990; Vaara et al., 2014), managers readily embrace this strategy, policy makers such as antitrust authorities keep approving such transactions without having full information (for the airline context see for example, Nannes, 2000) and academics are increasingly focusing on explaining their variance rather than overall performance (Keil et al., 2012).

From a competition policy perspective, airline M&As are often approved by antitrust authorities and regulators (i.e. in the US) despite evidence suggesting that the proposed transaction would reduce the level and intensity of competition in this market. This happens because the antitrust authorities focus not only on consumer welfare but also employment and hence jobs by allowing a failing airline to merge (or be acquired by) a financially stronger airline (Merkert and Morrell, 2012). We argue that ensuring healthy levels of competition will work best if the resulting (merged) entity is cost competitive and this paper aims to show that under certain conditions merging two airline firms can strengthen the cost position of the merged entity, assuming there are remaining players in the market ex-post. It would hence be justifiable for the regulator in certain circumstances, as highlighted in this research, to approve the transaction despite the reduced level of competition.

Williamson (1968) argued that mergers can affect variable costs (VC) and improve the firm's relative competitiveness despite an increase in fixed costs (FC). We therefore predict that changes in VC and FC following M&As occur but the direction of these changes affect the competitiveness of the firm differently. Our argument is that the direction of the cost changes depends on conditions surrounding ex-ante profitability of the firms and therefore management incentives to improve efficiency.

Efficiency improvement is not only useful for airline management to compensate for costs outside of their control (Swidan and Merkert, 2019) but may also help or hinder airlines to compete, having implications on competition policy in the relevant jurisdiction (Schnell, 2005). There is a large body of extant literature on market power considerations in airline policy (e.g. Oliveira and Oliveira, 2018; Manuela Jr et al., 2019) demonstrating that an increase in market power is a potential downside of M&A transactions.

In this present paper the focus is on the internal cost effects and we do not try to address revenue growth, market power or private benefit effects that may occur in parallel and which are important to competition policy. Ample research already exists on these aspects due to the data being readily available, whereas cost structure effects have been largely neglected due to a lack of detailed cost data (e.g. Gayle and Le, 2013; Jeziorski, 2014).

In our paper, the cost structure is seen as fixed with VC varying

* Corresponding author.
E-mail addresses: sveinng@ru.is (S.V. Gudmundsson), rico.merkert@sydney.edu.au (R. Merkert), renato.redondi@unibs.it (R. Redondi).

https://doi.org/10.1016/j.tranpol.2020.08.017
Received 5 March 2019; Received in revised form 3 August 2020; Accepted 18 August 2020
Available online 27 August 2020
0967-070X/

before/ex-ante and after/ex-post a specific M&A transaction. This is important as extant M&As studies have generally focused on total costs, or total factor productivity (TFP) but not explored specific cost types. Most of this research found negligible or even negative gains (Caves, 1989; Gudmundsson et al., 2017; King et al., 2004; Scherer, 1980; Tichy, 2002), while only few revealed positive gains (Capron, 1999; Chatterjee, 1986), including studies using TFP analysis that showed positive gains following M&A in the airline industry (Yan et al., 2019). M&As scholars have as a consequence of these diverse results called for research using new approaches and detail industry data (Meeks, 1977; Moatti et al., 2015; Tichy, 2002).

Thus, the key contribution of our research is to illustrate how horizontal M&As affect the cost structure of the firm which has implications on strategies of airlines and competition policies of regulators. Our specific contribution is to isolate the effects on VC and FC and therefore offer insights under what conditions the merged firm can strengthen its cost position in an industry (Porter, 1985; Powell, 2001; Röller et al., 2006; Williamson, 1968) which is of particular interests to situations where the merger is aimed to protect a financially ailing carrier.

In the airline context VC tend to be volume-related costs as fuel, landing fees, catering, crew expenses (travel, hotel and per diem), crew salaries (if paid per flight hour), maintenance (most airlines consider maintenance costs as VC with the exception of annual inspections, scheduled overhauls and avionics updates). Fixed costs FC tend to be time-related, such as salaries or rents, and are referred to as overhead costs. If an airline stops operating a specific flight, such as during the COVID-19 crisis, it would continue to incur time related costs like rental, salaries, interest expenses, depreciation, and insurance expenses. Our key contribution to the M&As literature is therefore filling a research gap pertaining to the varied effects of M&As on cost types.

In what follows we provide the literature background for our study and the predicted relationship between the cost structure effects of M&As and efficiency improvement incentives of merging firms. Then we describe the cost disaggregation measurement approach, followed by the results. We conclude the paper by discussing the academic and practical implications of our findings.

2. Literature review

2.1. Conditions for cost structure effects

In part we base our arguments in this paper on Williamson (1968), deliberating the competition effects of changes in the cost structure following M&As, and Sitkin and Pablo (2005) as well as Lander and Kooning (2013) when we argue that merger incentives and the conditions surrounding the initiation of the M&A process has a significant effect on the cost structure effects.

As pointed out before, the extant literature is meager on studies focusing on VC following mergers, principally due to lack of data, but also suggesting a complex set of conditions that are necessary a priori, hindering all-encompassing generalizations. For example, scholars have pointed out that M&As are guided by external industry conditions (Gort, 1969; White, 1986) that enable or hinder welfare enhancing effects of M&As, while mergers that generate efficiencies are likely to induce entry to an industry (Werden and Froeb, 1998).

In the background of this literature, we develop our cost structure arguments taking into account different types of M&As guided by specific conditions surrounding target selection and timing that affect the ex-ante performance disparity of the merging firms and therefore efficiency improvement incentives ex-post. For example, the initial Delta – Northwest merger discussions took place in the background of soaring oil prices and crashing post-bankruptcy share-prices. Hence, understanding merger conditions and their merger impact have been suggested in order to pre-evaluate mergers and potential ex-post efficiency gains (Bai et al., 2019).

The classic arguments for M&As are efficiency enhancements and market power (e.g. survival, competitive advantage, market-share, diversification, etc.). For example, managers may seek mergers to realize efficiency related synergies to prevent bankruptcy (Shrieves and Stevens, 1979) or to preempt competitors from acquiring strategically important firms in the industry (Fridolfsson and Stennek, 2005). Having these arguments in mind and our focus on the cost structure, the extant literature suggests that M&As cost effects are shaped by several conditions that are not necessarily exclusive.

The first condition is relatedness and complementarity (Yu et al., 2015; Wang and Zajac, 2007). Thomas (2004) found that integration costs are lower if both firms run similar operations, because they can better optimize and join together complementary resources for value creation, findings that were later supported by the work of Wang and Zajac (2007). Drawing on this work, we assume that horizontal mergers in the same industry involving both relatedness and complementarity should generate positive value in the form of lower costs, although in combination with the other conditions that follow here.

The second condition is a performance deficit that generates stronger incentive to improve management processes (Bruton et al., 1994). In support of this condition we draw on Leibenstein's (1966) work on value creation from superior management processes in M&As and later research that came to similar conclusions (Berger and Humphrey, 1994; DeYoung, 1997). These value creation effects have been found to exist when M&As involve unprofitable target firms (Hotchkiss and Mooradian, 1998).

If the acquiring firm is unprofitable it, may seek a profitable target to obtain superior management processes or some tangible assets (Arikan, 2002). In the case of two unprofitable firms the incentive to act and impact costs should be no different from the other two scenarios we just described. Therefore, in all three cases a potent incentive should exist to improve efficiency of the ex-post merged firm.

The third condition is adverse industry conditions. Early research considered economic disturbance or shocks as an influencing factor both in the timing and intensity of M&As (Gort, 1969; Jensen, 1993). Under these circumstances, observant managers may assume that if two competitors merge, profits of their firms will decline because of outsider disadvantage (Trautwein, 1990). They therefore attempt to preempt their competitors from acquiring or merging with strategically important firms.

In fact, in the context of our focus on the cost structure, Fridolfsson and Stennek (2005) argued that preemption exists, especially if M&As are likely to enhance the ability of the firm to compete through lower prices (shifting focus to VC reduction) and by inflicting negative externalities on merger outsiders.

2.2. The role of efficiency improvement incentives

M&As vary in terms of the incentive to seek efficiency improvement ex-post. For example, firms in competitive industries with many players (e.g. airlines) have higher efficiency improvement incentive (Hay and Liu, 1997) than firms in less competitive industries with fewer players (e.g. aircraft manufacturing). In the same vain, unprofitable firms have higher efficiency improvement incentive than profitable firms.

Leibenstein (1966) in his work on X-efficiency, used the term incentive efficiency, to reflect the motivation to act, and we use the term here to underline the presence of an incentive to act when there is a performance gap. Thus, in the present research we draw a parallel between ex-ante profitability of merging firms and the incentive to achieve specific cost effects (cost reduction) ex-post. Managers of profitable firms have lower incentive to secure efficiency improvements ex-post compared to those of unprofitable firms. Hence, in the former case M&As are largely motivated by other reasons than efficiency, such as market power or private benefit.

To clarify our assumptions, we draw up in Table 1 the ex-post incentive matrix influencing efficiency improvement actions in M&As coming from the ex-ante profitability of the firms. As is clear from the

Table 1
Ex-ante performance and ex-post efficiency improvement incentives.

		Firm β	
		p < 0	p > 0
Firm α	p < 0	Potent Efficiency Improvement Incentive α and β	Potent Efficiency Improvement Incentive α
	p > 0	Potent Efficiency Improvement Incentive β	Weak Efficiency Improvement Incentive α and β

p = profit (operating).

table we assume that potent incentives for efficiency improvement exist in all ex-ante profitability combinations, except when two profitable firms are involved. According to our framework, such M&As are less likely to involve potent cost efficiency improvement incentives and affect the cost competitiveness of the ex-post firm.

Scholars have argued that external shocks to an industry create opportunities for better performing firms to add management value by acquiring and restructuring poorer performing firms (Andrade et al., 2001; Gort, 1969). Such mergers may preempt competitors from seizing firms with superior combination potential (Fridolfsson and Stennek, 2005). However, this research departs from the view that mergers between large firms are predominantly a preemptive tactic against take-overs (Gorton et al., 2009) and exclusive of efficiency motives.

Along these arguments we attempt to reveal evidence supporting our prediction that horizontal M&As involving unprofitable firm(s) have stronger management incentive for efficiency improvement ex-post than if both firms are profitable, which is important for competition policy and relevant to regulators approving mergers. In other words, we anchor our arguments in the efficiency domain by building upon the assumption that efficiency outcomes of M&As are not only affected by the ex-ante profitability of the firms themselves but also the variance in the average profitability of the industry itself, i.e. opportunities to acquire or merge with unprofitable and undervalued firms during industry downturns.

Incentive asymmetries are common in M&As (Parvinen and Tikkanen, 2007). For example, executives of better performing firms may be motivated to pass on superior management processes to poorer performing firms and create value ex-post (Akhavein et al., 1997; Leibenstein, 1966; Berger and Humphrey, 1994; DeYoung, 1997), while executives of unprofitable firms, facing loss of confidence, may be motivated to consider bold strategic actions like becoming a target to restore confidence and bring in external resources (Hitt et al., 1996; Morrow et al., 2007; Weitzel; Jonsson, 1989).

According to the work of Graves (1981) and Napier (1989) employees of unprofitable firms are more prone to accept changes that bring about efficiency improvements, than employees of profitable firms. These contributions emphasize that unprofitable firms develop employee dissatisfaction that can be positively reduced following M&As through rationalization (reduced slack), more work to do (surge in activity to tackle inefficiency), increased scope and variety of work (Graves, 1981), and a feeling of increased job security (Napier, 1989).

Further elaboration on this theme highlights the relationship between employee satisfaction, efficiency motivation ex-post, and potential productivity increases to bring costs down (Hotchkiss and Mooradian, 1998; Judge et al., 2001).

Assuming that the ex-ante performance asymmetry of firms boosts incentives for efficiency and therefore the motivation to reduce costs ex-post brings us to the competitive implications in an industry.

Airlines were generally considered as fixed costs operations before the rise in fuel prices starting in the 1970s. However, in today's context airlines face volatilities on both the demand and supply side, pushing VC to the fore. As mentioned earlier, Williamson (1968) argued that reduction in VC can greatly improve competitive advantage of the firm if cost reductions are passed directly on to customers through lower prices, a point accentuated in conceptual studies (Röller et al., 2006) independent of specific industries and case studies (Ryerson and Kim, 2014) on M&As in the airline industry that have shown that VC like fuel consumption are affected by fleet and network rationalization following mergers.

Harmonizing schedules of two merging airlines and rationalizing frequencies helps improve load-factors and increase average aircraft sizes (through density and scope economies), reducing VC per output unit. Following M&As, airlines can also return aircraft to lessors, and sell or park inefficient aircraft to bring about reduction in VC (maintenance and fuel costs per ASM). For example, in 2008, based on information from Airsafe (www.airsafe.com), the average fleet age of Northwest Airlines was 18.5 years and Delta Air Lines 13.8 years. Following the merger the combined fleet age was around 17 years, but not evenly distributed across fleet sizes. For example, for narrow body aircraft the average age of the fleet went from 15 years in 2008 to 20 years in 2009, and for wide body aircraft it went from 12.2 years to 11.8 years over the same period (Airinsight, 2016).

Having established the strategic importance of a reduction in VC, explanations must be sought why total costs may, on average, not be affected? One explanation rooted in the dynamics of costs is derived from Chandler (1990), arguing that when firms reduce average VC, FC may rise from acquiring more efficient technologies. For example, a firm aiming at reducing variable input costs, such as fuel consumption, can acquire more fuel efficient vehicles and realize cost reduction per output unit, but may incur higher FC associated with acquiring new vehicles. For example, a firm that decides to lease equipment would incur a reverse trade-off, namely an increase in VC and reduction in fixed costs. Delta Air Lines, in the 1990s, was a case in point, by choosing to operate and acquire older aircraft, resulting in lower fixed costs but higher VC (fuel and maintenance). This model allows quicker adjustment in supply to match demand, and therefore avoid the burden of higher fixed costs. However, a large increase in fuel prices would, using this strategy, trigger disproportionate increase in VC compared to a carrier with a younger fleet.

Reverting to FC, case-based evidence shows, that despite improvement in operations, the management may attempt to influence employee buy-in of M&As causing increases in employee related fixed cost. Several studies have provided support of this analogy pointing out that merging firms tolerate duplication of activities and may harmonize pay-scales upwards to engage staff and achieve smoother integration ex-post (Gayle and Le, 2013; Huck et al., 2008; Prechel et al., 1999). Underlining that a firm, being acquired, commanding valuable resources (often a profitable firm) is more likely to be in a strong bargaining position causing upward shift in employee related FC. In addition, M&As do not just make firms larger, but also more complicated, moving from a simple to a complex organizational form (Prechel et al., 1999) accelerating decreasing returns to size (Merkert and Morrell, 2012).

Another important consideration is the role of the preemption motive on the cost structure following M&As. Firms preempting competitors from merging with strategically important firms, often pay acquirer premium affecting the profitability of the ex-post firm (Molnar, 2002; Slusky and Caves, 1991). Preemption holds that despite a loss in profitability due to a rise in FC, it is still a better position for the firm than if a rival merged with the target firm. Hence, it follows that the ex-post merged firm has an incentive to offset such premium. This premise is supported by acquiring firms being more prone to pay acquisition premiums when expectations of post-merger synergies are higher (Agarwal and Kwan, 2018; Slusky and Caves, 1991). If an efficiency improvement in VC is realized ex-post, it forges cost competitiveness of the merged firm in an industry. Hence, we predict that managers accept, ex-post, an increase in FC (merger costs, acquirer premium, etc.) if anticipating reduction in VC.

In contrast, if both firms are profitable either management team is less adept to seek efficiency improvements and if trying, employee

tensions may rise as diverse but "good" management practices and processes compete for retention ex-post. Supporting this, past research has shown that M&As among two profitable firms are more likely to focus on the market value of the firm, market power, financial synergies or asset divesture (Capron et al., 2001; Fluck and Lynch, 1999; Mueller and Sirower, 2003; Rubinovitz, 2009; Walter and Barney, 1990), rather than efficiency. Fluck and Lynch (1999) argued that if firms harvest valuable intangible assets, they may avoid coordination costs by divesting much of the tangible assets of one firm.

Building on this aforementioned work we contend that divestment is more likely to occur in M&As if both firms are profitable and intangible assets valuable. If the target controls valuable resources sought by the bidder and the acquirer is bidding for a firm in a strong bargaining position it is likely to pay a premium (Capron and Pistre, 2002). In such mergers, absorption of valuable complementary resources takes place followed by the divestiture of redundant assets (Capron and Pistre, 2002) or even part of the workforce if the value is vested in tangible rather than intangible assets (Krishnan et al., 2007).

Hence, we predict that M&As involving profitable firms are different from M&As involving unprofitable firms and are likely to involve both reduction in FC (asset divestiture) and an increase in VC as the incentive to improve efficiency is lacking at the same time that merger related costs and inefficiencies are sustained.

3. Methods

Our predictions are tested on a sample of firms engaged in horizontal M&As in the airline industry (a highly competitive industry). A merger between firms that belong to the same industry and sell the same products is considered horizontal. Since significant horizontal mergers can reduce competition and are scrutinized by the competition authorities, the cost structure effects of such mergers pose a particular interest to M&A scholars.

We conduct our modeling in two stages. First, we decompose costs into variable and FC. Then we test our predictions about the two merger types, potent efficiency improvement incentive versus weak efficiency improvement incentive. This second stage helps identify if prior profitability typologies are associated with the distinctive ex-post incentives to realize M&As efficiencies affecting the cost structure.

Our sample of international airlines has inherently similar strategic fit characteristics, a sampling approach suggested by Lubatkin (1987: 40). The airline industry benefits from a relatively uniform international statistics program standardized by the International Civil Aviation Organization (ICAO). What is more, ICAO sets worldwide standards regarding operations and safety making airline operations within and between countries highly homogeneous, process wise. However, airlines in most countries around the world are considered a national strategic resource, similar to the defense industries, precluding or limiting foreign direct investment and cross-border mergers. Thus, all but one of the M&As in our dataset are considered single country or single market (EU) M&As. In addition, ICAO issues international regulation and standards to countries around the world that assures high degree of relatedness in airline operations from one country to another and one airline to another.

What is more, anti-trust authorities scrutinize M&As in the airlines mostly on network overlaps, implying that airlines are concerned with complementarity for both strategic (Shaw and Ivy, 1994) and policy reasons (Morrison, 1996). Thus, we deem the combination potential among firms in our dataset inherently high because of joint standards (relatedness/fit) and network separation (complementarity) (Wang and Zajac, 2007). What is more, M&As with high degree of network overlap are rare and routinely challenged by anti-trust authorities.

3.1. Sampling

Gayle and Le (2013) point out the difficulties finding decomposed cost data for firms explaining the scarcity of studies focusing on the effects of M&As on the cost structure. In fact, previous research decomposing VC and FC effects used a cost estimation method not requiring actual cost data (i.e. Gayle and Le, 2013). What makes our paper different and original is testing our predictions with actual cost data from the international airline industry. The data was collected from annual reports and government statistical sources spanning the period 1980 to 2013.

Table 2 illustrates the 19 M&As considered in our analysis, including information on the year of the transaction, the geographical regions involved, and the number of years under observation.

To estimate the necessary sample size for our study we used an approach suggested by Overall and Doyle (1994) taking into account its longitudinal design. In our sample size analysis we assumed a range of statistical power levels (Cohen, 1992), two groups, 6 time-points, and a 95% probability level, resulting in a minimum required sample sizes of 30 firms for power level 0.70, 35 for level 0.75, and 40 for level 0.80. Since our sample was composed of 333 (38 firms) firm-year observations our study was in the proximity of power level 0.80.

As the firms do not exist throughout the data collection period, we worked with an unbalanced sample. However, given the longitudinal characteristics of the sample we capture both the timing of M&As and external industry conditions. Although the study can be considered a small sample study the effect sizes (Cohen, 1988; Lakens, 2013) are large.

The sample firms were first analyzed as a single group and then divided based on ex-ante profitability. As mentioned before the profitability segregation was based on the assumed strength of incentives to improve efficiency. A further justification in the context of M&As is that the airline industry is characterized by intense rivalry depicted by a steady decline in revenues per output unit over many decades implying that average prices decline along with average costs (Maillebiau and Hansen, 1995). In other words, cost savings are reflected in prices.

What is more, the industry shows constant returns to scale (Gillen et al., 1990), a relationship that holds following an instant enlargement through M&As (Gudmundsson et al., 2017). These industry characteristics, high rivalry and lack of economies to scale, cause high fluctuations in industry profitability (and variance in the number of unprofitable firms) over time, induced by industry shocks like the aftermath of deregulation, changes in input costs, and innovations (Mitchell and Mulherin, 1996).

Table 2
Mergers, years and geographical regions.

M&A	Year	No. Yearly Observ.	Area[a]
Midway - Air Florida	1984	10	NA
PeopleExpress - Frontier	1985	6	NA
Southwest Airlines - Muse Air	1985	9	NA
Air Wisconsin - Aspen Airways	1991	12	NA
Air Canada - Canadian Airlines	2000	11	AP
Air New Zealand - Ansett	2000	10	NA
American Airlines - TWA	2001	17	NA
easyJet - GO Fly	2002	9	EU
BA Citiexpress - Brymon & British Reg.	2002	9	EU
Japan Airlines - Japan Air System	2002	12	AP
Air France - KLM	2004	11	EU
US Airways - America West	2005	16	NA
SkyWest - Atlantic Southeast	2005	11	NA
Flybe - BA Citiexpress	2006	9	EU
Bmi - British Mediterranean Airways	2007	9	EU
Kingfisher - Air Deccan	2008	7	AP
Delta Air Lines - Northwest	2009	14	NA
United Air Lines - Continental	2010	13	NA
Southwest Airlines - AirTran	2010	13	NA
Average		10.9	
Weighted average[b]		9.9	

Note: [a] NA: North America; EU: Europe; AP: Asia-Pacific. [b] Computed with respect to ASKs in the M&A year.

3.2. Variables

The dependent variable we use in our models is total annual operating costs of the firm, composed of total FC and total VC. The arguments so far are that different types of M&As will cause different cost structure effects ex-post, in other words, a different impact on FC and VC. However, the line between fixed and VC is often blurred and information from the profit and loss accounts not always specific enough to permit this separation. As a result, we employ a regression approach to separate FC and VC (Hansen et al., 2009). In this way, our approach estimates FC independent of the firm's annual unit output, typically including overhead and administrative costs. Meanwhile, VCs are dependent on output, typically associated with serving one more customer (including a fuel cost component in our industry setting). The model classifies other operating costs depending on the presence of excess operating capacity, in which case a higher portion of costs would be identified as fixed, and uncorrelated with output.

Aviation fuel is one of the most important input costs affecting VC in airlines (e.g. Merkert; Swidan, 2019), whereas inflation affects FC associates with items such as property. In fact, changes in fuel prices affect arguably most of the VC of an airline and usually immediately (with either short-term negative or positive comparable cost effect if the airline hedges its fuel costs), whilst catering, ramp, and air traffic charges will lag behind.

Although fixed costs remain constant with airline output level, it is affected by inflation. Airlines incur fixed administration, reservations, marketing, group services, route costs, aircraft costs (financing and depreciation), maintenance, station costs, and offices and ramp handling costs. Inflation affects all of these costs, including aircraft financing and leasing costs. For example, private equity firms financing aircraft leases usually require inflation protection by resetting regularly the financial terms. For these reasons, the value of aircraft whether bought or leased is influenced by the rate of inflation.

In our models we control for cost increases associated with changes in input prices and inflation versus the merger effect on costs. Changes in fuel costs and inflation as external shocks can influence the number of M&A deals (Haleblian et al., 2012; Gort, 1969). Thus, to control for external shocks when decomposing costs (over the full sample period) we used an industry index of the main input cost (Δ jet fuel prices - in $ per BTU) obtained from the Energy Information Agency (EIA). To control for changes in the external economic environment on a national basis, we measured inflation through average consumer prices (Δ consumer price index – CPI) coming from the International Monetary Fund (IMF).

The full sample was divided into two sub-samples, one for unprofitable firms and another for profitable firms. In the former sub-sample, firms were included if at least one firm incurred an operating loss one year before the M&A (t-1), and in the latter firms were included if both firms made operating profits one year before the merger (t-1). M&As in the unprofitable sub-sample involved mostly unprofitable targets, although in very few cases there were unprofitable acquirers, and also both an unprofitable acquirer and a target (see Table 1).

In merger models it is common to test various control variables, such as level of growth, annual average change in consumer prices, and inflation. In our case, these control variables became integral part of the model rather than endogenous controls. This approach is appropriate when modeling cost effects of multiple M&As measured over longer period of time with various event dates. External conditions can influence the post-merger cost structure and must therefore remain an integral part of the cost model to separate between cost changes associated with the merger itself and other cost changes.

3.3. Analysis

We employed a dyad-level design approach (Kenny et al., 2006) to evaluate whether the individual M&As brought significant cost variations to the merged firms. Using the dyad-level approach the observations of each firm pair were grouped together by summing their respective output units (available seat miles) and total operating costs.

Within a relevant range in terms of a firm's output (Anthony et al., 2006), we assume that the cost function has a linear form (we also tested size effects but those models did not yield any robust results). The linear form allows separation between fixed and VC and thus enables us to test the cost-structure effects resulting from M&As. This approach computes total costs as follows:

$$TC_{i,t} = FC_{i,t} + vc_{i,t}{*}OU_{i,t} \quad (1)$$

where $TC_{i,t}$ denotes the total annual operating cost of airline i at time t, $FC_{i,t}$ represents annual FC, $VC_{i,t}$ the variable unit cost, and $OU_{i,t}$ stands for annual output in available seat miles, a typical measure of airline output. To allow for heterogeneity in both the intercept and the slope coefficients, we extend the fixed effect methodology of Wooldridge (2004) and O'Connell (2007). We account for industry-specific effects in accordance with the Hausman's (1978) specification test. The traditional fixed effect panel model is not appropriate because not only are the intercepts (FC) heterogeneous, but the slopes (VC) can vary among individual firms.

We account for longitudinal dynamics (annual variations) by assuming that FC change with inflation (Δ consumer prices) and unit VC change with key input costs (Δ fuel costs). To describe these relationships we employ the following model:

$$TC_{i,t} = \alpha + \beta_i{*}IN_{i,t} + \gamma_i{*}OU_{i,t}{*}IC_{i,t} + \delta_1{*}SD_{i,t}{*}IN_{i,t} + \delta_2{*}SD_{i,t}{*}OU_{i,t}{*}IC_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $TC_{i,t}$ is the total operating cost for firm i in year t; $IN_{i,t}$ and $IC_{i,t}$ are indices related to inflation (Δ consumer prices) and input costs (Δ fuel costs) for firm i at time t standardized to 1 for every firm in the year of the M&A; $OU_{i,t}$ denotes output units measured as ASMs for firm i at time t; and $SD_{i,t}$ symbolizes a step dummy taking a value of 0 for firm i, in the years before the event, and 1 starting from the year of the event; and finally $\varepsilon_{i,t}$ is the estimation error for firm i at time t. We converted all operating costs into U.S. dollars by employing the average exchange rates of the related fiscal year.

Model (2) has three functions: 1) one to separate total costs $TC_{i,t}$ into fixed and variable cost using the output unit $OU_{i,t}$ as independent variable (see equation (1)); 2) another to introduce a year by year dynamic for the fixed and variable cost components, where the former changes with the inflation index $IN_{i,t}$ and the latter changes with the fuel cost index $IC_{i,t}$; and 3) a function to estimate whether the fixed and variable cost components change after the year in which the M&A takes place through a step dummy $SD_{i,t}$ that interacts with the estimated fixed and variable cost components.

To test the models we use least square dummy variable regression (LSDVR). See the appendix for a discussion about the methodology aspects related to endogeneity. The estimated coefficient denoted as α is the constant of the model and represents the average fixed cost common to all firms; β_i are the FC that are specific to each firm i. To account for variations in the firm specific FC over time (i.e., inflation), β_i is multiplied by average annual inflation (IN) measured as change in the consumer price index. To account for the variations of VC over time, the coefficient γ_i for firm i is multiplied by output units (OU), and by the input costs (fuel costs (IC)) since airline VC are more closely correlated with fuel costs than consumer prices (IN).

We could have employed real (inflation-adjusted) costs, by using the country-specific consumer prices (IN) to adjust the annual figures. However, as explained above, our model has two different cost dynamics: 1) inflation for FC; and 2) fuel for VC. If we employ inflation-adjusted costs, we need to adjust input costs accordingly, leading to a complication in the model. Furthermore, since our panel includes M&As

spanning three decades, using real costs by adjusting all costs to a reference year would introduce a bias into the model. We therefore employ nominal (unadjusted) costs and consider inflation as an independent variable.

Finally, in order to test if cost variations depend on the M&As included in the sample rather than general industry cost trends, we consider an alternative model, in which the dependent variable is the total costs in excess of the world airlines average costs, i.e.:

$$TC_{i,t} - OU_{i,t} * WAC_{i,t} \quad (3)$$

where $WAC_{i,t}$ is the world average cost index per ASM for the world airlines based on ICAO's World Financials.

4. Results

Means, standard deviations, and correlations can be found in Table 3. All correlations are as expected. Table 4 shows the results of the models evaluating the effects of M&As on the cost structure, with total costs as the dependent variable. In the model results, negative coefficients signify reduction in costs, and positive coefficients depict increase in costs. The effect sizes (f^2) (Cohen, 1988, 1992) for all three models are very large, ranging from 6.59 (profit model) to 10.76 (loss model).

Referring to Table 4, we see in the base model a negative variable cost variation, signifying that this type of costs decreased on average ex-post ($\delta_2 = -0.008$, $p < 0.001$), with a confidence interval for the coefficient entirely below zero (−0.012 to −0.004). Conversely a positive coefficient for FC means that this type of costs increased ex-post ($\delta_1 = 724.8$, $p < 0.01$), with a confidence interval for the coefficient entirely above zero (216.1–1233.5). The R^2 of the regression is 0.90, and the effect size f^2 is very large, 9.53.

The results demonstrate that horizontal airline M&As, on average, are associated with a decrease in VC and an increase in FC. However, we maintain that this global relationship can be misleading as the effect of M&As on the cost structure may be influenced by the ex-post incentive to realize cost efficiencies depending on the ex-ante profitability of the firms, necessitating a finer grained picture, we depict in two additional models: a loss and a profit model.

For the loss model we argued that horizontal M&As involving at least one unprofitable firm are associated with a decrease in VC and an increase in FC. In the loss model, a reduction in VC occurred ex-post ($\delta_2 = -0.010$, $p < 0.001$) and an increase in FC ($\delta_1 = 877.8$, $p < 0.001$). A confidence interval for the VC coefficient was entirely below zero (−0.014 to −0.006) and the FC coefficient was entirely above zero (254.7–1500.9). The R^2 of the regression is about 0.91, and the effect size f^2 is very large about 10.76. Hence, horizontal M&As involving at least one unprofitable firm show reduced VC and increased FC.

For the profit model we proposed that horizontal M&As involving only profitable firms are associated with a decrease in FC and an increase in VC. In the profit model the coefficient for fixed cost variation is negative ($\delta_1 = -291.7$, n.s.) and the coefficient for variable cost variation is positive ($\delta_2 = 0.007$, n.s.). However, the confidence intervals for VC (−0.003 to 0.017) and FC (−1284.4 to 701.0) include zero, suggesting that M&As among profitable firms do not affect the cost structure of merged firms in one particular direction. The R^2 of the regression is about 0.86, and the effect size f^2 is very large about 6.58. Thus, although the signs of the coefficients were as expected, the coefficients are not significant and the results do therefore not support our prediction. Horizontal M&As involving profitable firms do not show statistically significant effects on variable- or FC.

Table 4
Effects of horizontal M&As on the cost structure[a,b,c,d].

Variables	Base Model	One-Year Loss		Three-Year Loss	
		Loss Model	Profit Model	Loss Model	Profit Model
Constant	3738** (1240)	3757** (1371)	3452 (3812)	3191* (1522)	2785 (2040)
δ_1- Fixed Cost Variation (million $)	724.8** (258.0)	877.8*** (315.3)	−291.7 (494.7)	327.5 (456.4)	658.5 (339.3)
δ_2 - Variable Cost variation -($ per ASM)	−0.008*** (0.002)	−0.01*** (0.002)	0.007 (0.005)	−0.009*** (0.002)	−0.005 (0.003)
Adjusted R^2	0.90 n = 206	0.91 n = 151	0.86 n = 55	0.89 n = 78	0.90 n = 128

*p < 0.05, **p < 0.01, ***p < 0.001.
[a] Dependent variable = total costs.
[b] Fixed-effect estimation.
[c] Standard errors are reported in parenthesis.
[d] Avg. VIF = 1.82 (range 1.02–2.88).

To test if the cost effects are different between the two types of M&As we carried out an ad-hoc test of the significance of the difference between the slopes of the regression lines for the two groups (Cohen et al., 2003). The results confirm a statistically significant difference for both FC (loss-δ_1: profit-δ_1, $t = 1.99$, $p < 0.05$) and VC (loss-δ_2: profit-δ_2 $t = 3.15$, $p < 0.01$). Based on these results we can state with confidence that the two groups of horizontal M&As are not the same.

In order to account for the high volatility in the airlines' yearly operating results, we also considered a second, much more demanding criterion to identify whether an airline belongs to the loss group or not. As such, the M&As are classified as belonging to the loss group if at least one of the merging airlines incurred operating losses in all the three years before the transaction occurred. The results shown in Table 4 confirm our hypothesis suggesting a significant reduction of variable costs for M&As of the loss group, whereas M&As among two profitable firms do not impact on the cost structures of merged firms. We also show that the increase in fixed costs for the profit group is not statistically significant.

In order to separate out M&As ex-post cost changes from the industry average cost changes we ran separate models using as a dependent variable the total costs in excess of the world airlines average costs (see Table 5). The resulting models supported all our predictions except M&As involving profitable firms that do show a significant positive increase in VC unlike our previous findings.

Table 3
Summary statistics and correlation matrix.

	Variables	Means	S. D.	1	2	3	4	5	6	7
1.	Total Cost, TCi,t	8.65E+09	1.02E+10	1						
2.	Output Units, OUi,t	6.90E+10	7.93E+10	0.953***	1					
3	Inflation, INi,t	97.99	9.70	−0.158*	−0.299***	1				
4.	Input Costs, ICi,t	102.03	53.40	0.113	−0.025	0.459***	1			
5.	OUi,t*ICi,t	6.93E+12	9.42E+12	0.882***	0.807***	0.030	0.397***	1		
6	Cost World Airlines, WACi,t	0.1202	0.0173	0.383***	0.279***	0.388***	0.380***	0.433***	1	
7	OUi,t*WACi,t	8.69E+09	1.02E+10	0.972***	0.991***	−0.242***	0.037	0.855***	0.350***	1

*p < 0.05, **p < 0.01, ***p < 0.001.

Table 5 shows the results of the alternate models evaluating the effects of M&As on the cost structure using total costs in excess of the world airline average costs as the dependent variable. In particular, we confirmed our prediction that horizontal M&As involving at least one unprofitable firm (loss model) bring a decrease in VC ($\delta 2 = -0.005$, $p < 0.01$) and an increase in fixed cost ($\delta 1 = 601.3$, $p < 0.05$). In this case, all main results of the basic model of Table 4 are validated.

Regarding our prediction that horizontal M&As involving only profitable firms (profit model) are associated with a decrease in FC and an increase in VC taking into account average cost trends of the worlds' airlines, we find the coefficient for fixed cost variation to be negative and not significant ($\delta 1 = -237.7$, n.s.). However, when considering the coefficient for the variable cost variation, we find it positive and statistically significant ($\delta 2 = 0.014$, $p < 0.01$). The R^2 of the regression is about 0.91, higher than in the basic model (0.86).

Based on the analysis in Table 5 describing three alternative models that take into account the cost developments for the world's airlines, our results appear for the most part robust. Controlling for the industry cost trends all our models hold except the profit model that shows significant increase in VC in line with our original predictions.

The second part of Table 5 shows the results of applying the alternative criterion for classifying the M&As based on ex-ante profitability. The significant reduction of variable costs for M&As of the loss group is confirmed, whereas M&As among profitable firms have no significant impact on the cost structure of merged firms. Our results appear robust even when choosing an alternative ex-ante profitability condition.

5. Conclusion

Academics and practitioners have long sought explanations based on robust empirical evidence on the determinants of ex-post M&As performance. One pungent question in past research has been why so many firms cite efficiency motives when M&As are initiated, even if these gains are rarely realized in practice according to the lion's share of the literature that has examined total cost effects. Setting legal reasons aside, our results indicate that M&As do influence the cost structure under certain conditions but not total costs. This finding supports Williamson (1968) suggesting that firms, for competitive reasons, may seek reduction in VC to strengthen their competitive advantage regardless of an increase in FC, so far as lower VC are translated into lower prices. Our research lends strong support to this analogy offering an explanation why some mergers under certain conditions can have a beneficial cost structure impact strengthening the competitive position of the merged firm in an industry.

Our findings contribute to the M&As literature in an important way. First, we demonstrate that potential impact on the cost structure is influenced by the ex-ante profitability of firms, an important finding for antitrust and competitive policy in view of airliner mergers often getting approved on the hope that a financial healthy airline merging with a financially failing airline will save jobs. We explain this improvement of cost competitiveness of the merged entity based on the ex-post incentive to act on efficiency improvements. Second, our methodological contribution is that we decompose the cost structure by using a novel approach and thereby circumvent the data availability difficulties common in this research domain.

As such, our research fills a critical gap in the literature dealing with the cost structure effects of M&As using larger samples. Previous research on the cost structure effects of M&As was limited due to lack of detailed cost data but also the challenge of linking efficiency incentives and outcomes under competing perspectives. Our findings suggest that horizontal M&As have different efficiency incentives based on their performance/profitability ex-ante the transaction suggesting diverse strategic objectives across two ex-ante profitability groups.

Our findings further contribute to the growing transport and competition policy literature around airlines. In contrast to the extant literature which argues that airline market structure should have an impact on how airlines (Oliveira and Oliveira, 2018) are governed through policy measures (e.g., Choo, et al., 2018) taking cost structures into account. While there may be a reduction in capacity and diseconomies of scale (Merkert and Morrell, 2012), it may still be reasonable for antitrust authorities and regulators to approve the M&A transaction particularly when one of the airlines involved in the transaction is ex-ante in a weak financial position as the resulting ex post merged entity may enjoy significant improvements in cost competitiveness. This will not only to save jobs but may actually foster competition (assuming that there will be other players in the market ex post the transaction).

What is more, airline M&A transactions that will suffer from negative effects in the cost structure of the merged firm will be at the other end of the spectrum more likely to be incentivized to exercise their created market power. As such we argue that M&A transactions impact not only market structures but also cost structures and thereby market behavior and ultimately performance. All of that could potentially require transport policy responses such as foreign ownership restrictions that exists in many markets today (Walulik, 2016).

The findings of this study should be considered in light of its limitations, which also provide directions for future studies. First of all, we draw data from a single industry that has inherently high fitness, complementarity and competitiveness (cost savings run in tandem with reduced average prices) among firms. Although this sampling approach provides a well-defined context for our predictions, it limits the generalizability of the findings. Even though our study uses horizontal M&As among service firms in a network industry, we argue that our approach can be applied to any competitive industry where reduction in variable costs strategically matters.

While this research provides important evidence on how horizontal M&As impact on the cost structure of firms, it is limited to merger insiders (merging entities). Research could explore potential impacts on merger outsiders and test the preemption hypothesis (Fridolfsson and Stennek, 2005) as we do understand that firms do not embrace being merger outsiders (not to engage in mergers while key competitors merge) as it is synonym to potential competitive disadvantage in the minds of managers. Thus, the preemption hypothesis assumes that firms will race between themselves to acquire other firms even if it means giving up surplus to the targets (Laamanen and Keil, 2008).

Future research may extend the framework developed in this paper to include serial acquisitions (Laamanen and Keil, 2008). Serial acquisitions may help develop competence in managing acquisitions that in combination with acquisition timing may help the acquirer derive superior cost structure benefits along the lines demonstrated in this paper. Our study focused on the cost structure without investigating scale efficiencies directly. Future studies may examine unit costs in the context

Table 5
Effects of horizontal M&As on the cost structure with respect to the World Airline's Cost Benchmark[a,b,c].

Variables	Base Model	One-Year Loss		Three-Year Loss	
		Loss Model	Profit Model	Loss Model	Profit Model
Constant	947.4 (1252)	1101 (1415)	1803 (3244)	1263 (1680)	1209 (1728)
δ_1 - Fixed Cost Variation (million $)	484.5* (242.2)	601.3*** (300.7)	−237.7 (418.1)	209.0 (443.4)	472.5 (285.8)
δ_2 -Variable Cost Variation ($ per ASM)	−0.003 (0.002)	−0.005** (0.002)	0.014** (0.005)	−0.007** (0.002)	0.003 (0.003)
Adjusted R^2	0.84 n = 206	0.68 n = 151	0.91 n = 55	0.73 n = 78	0.87 n = 128

*p < 0.05, **p < 0.01, ***p < 0.001.
[a] Dependent variable = $TC_{i,t}$ - $OU_{i,t}$ * $WAC_{i,t}$.
[b] Fixed-effect estimation.
[c] Standard errors are eported in parenthesis.

of scale and cost structure using a similar sample setting and contingencies. Although, we have demonstrated in this research that pre-merger profitability plays a role in the incentives of merging firms to improve efficiency, further exploration is needed on M&As incentives among profitable firms. Finally, this study could be extended by examining merger conditions, incentives, and timing more directly with larger samples of M&As to help pre-evaluate efficiency gains from potential mergers and acquisitions (Bai et al., 2019) in the airlines.

In conclusion, this present paper shows that a finer grained cost structure analysis offers added insights into M&As cost performance which would otherwise remain underexplored. The conditions surrounding cost structure effects established in this paper help guide future studies and antitrust/competition authorities/regulators on M&A cost structure effects, taking into account ex-ante performance improvement incentives based on merger types and external conditions surrounding the deals.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tranpol.2020.08.017.

Appendix

One of the most common sources of endogeneity for this kind of study, is between price and quantity. Yet, in our model, specified in equation (1), the dependent variable is operating costs and not prices or revenues. In a highly competitive industry such as the airline industry, prices are not strictly related to costs. Due to competition, highly inefficient airlines, to offer a given product/quality mix, cannot increase prices to cover all their costs, and are eventually forced out of the market or to restructure.

Another possible source of endogeneity is between the dependent variable $TC_{i,t}$, operating costs, and quantity $OU_{i,t}$ measures in terms in available seat miles ASMs. In this case, quantity could be (circularly) determined by operating costs, in the sense that airlines with higher operating costs may decide to reduce capacity to become more efficient.

We tested endogeneity in the explanatory variable $OU_{i,t}$ by deploying the Hausman specification test (Hausman, 1978) and used the ASMs industry index as the instrumental variable, necessary to perform the test. A good instrumental variable needs to be correlated with the instrumented variable (ASMs of single airlines), but unrelated with the dependent one (operating costs of single airlines). In our case, the ASMs industry index is correlated with the ASM of single airlines, as both would depend on the growth of the industry, or to industry shocks (September 11th, SARS, etc). However, the operating costs of specific airlines could not significantly affect the overall ASM industry index. By performing the Hausman specification test we verified the validity of the exogeneity assumption.

References

Agarwal, N., Kwan, P., 2018. Pricing mergers with differential synergies. Strat. Change 27 (1), 3–7.

Airinsight, 2016. In: Delta's 787 Decision. https://airinsight.com/2016/12/28/deltas-787-decision/.

Akhavein, J.D., Berger, A.N., Humphrey, D.B., 1997. The effects of megamergers on efficiency and prices: evidence from a bank profit function. Rev. Ind. Organ. 12 (1), 95–139.

Andrade, G., Mitchell, M., Stafford, E., 2001. New evidence and perspectives on mergers. J. Econ. Perspect. 15 (2), 103–120.

Anthony, R., Hawkins, D., Merchant, K.A., 2006. Accounting: Texts and Cases. McGraw-Hill/Irwin.

Arikan, A.M., 2002. Does it pay-off to capture intangible assets through mergers and acquisitions? Academy of Management Proceedings, Academy of Management.

Bai, X.J., Zeng, J., Chiu, Y.H., 2019. Pre-evaluating efficiency gains from potential mergers and acquisitions based on the resampling DEA approach: evidence from Chinas railway sector. Transport Pol. 76, 46–56.

Bauer, F., Matzler, K., 2014. Antecedents of M&As success: the role of strategic complementarity, cultural fit, and degree and speed of integration. Strat. Manag. J. 35, 269–291.

Berger, A.N., Humphrey, D.B., 1994. Bank scale economies, mergers, concentration, and efficiency: the US experience. The Wharton Financial Institutions Center Working Paper Series, pp. 351–370.

Bruton, G.D., Oviatt, B.M., White, M.A., 1994. Performance of acquisitions of unprofitable firms. Acad. Manag. J. 37 (4), 972–989.

Capron, L., 1999. The long-term performance of horizontal acquisitions. Strat. Manag. J. 20, 987–1018.

Capron, L., Mitchell, W., Swaminathan, A., 2001. Asset divestiture following horizontal acquisitions: a dynamic view. Strat. Manag. J. 22 (9), 817–844.

Capron, L., Pistre, N., 2002. When do acquirers earn abnormal returns? Strat. Manag. J. 23 (9), 781–794.

Caves, R.E., 1989. Mergers, takeovers, and economic efficiency: foresight vs. hindsight. Int. J. Ind. Organ. 7 (1), 151–174.

Chandler, A.D., 1990. Scale and Scope: the Dynamics of Industrial Capitalism. Harvard University Press, Cambridge, MA.

Chatterjee, S., 1986. Types of synergy and economic value: the impact of acquisitions on merging and rival firms. Strat. Manag. J. 7 (2), 119–139.

Choo, Y.Y., Corbo, L., Wang, K., 2018. Joint impact of airline market structure and airport ownership on airport market power and profit margin. Transport Pol. 72, 67–78.

Cohen, J., 1988. Statistical Power Analysis for the Behavioral Sciences, second ed. Lawrence Earlbaum Associates, Hillsdale, NJ.

Cohen, J., 1992. Statistical power analysis. Curr. Dir. Psychol. Sci. 1 (3), 98–101.

Cohen, J., Cohen, P., West, S.G., Aiken, L.S., 2003. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, third ed. Lawrence Earlbaum Associates, Mahwah, NJ.

Datta, D.K., 1991. Organizational fit and acquisition performance: effects of post-acquisition integration. Strat. Manag. J. 12 (4), 281–297.

DeYoung, R., 1997. Bank mergers, X-efficiency, and the market for corporate control. Manag. Finance 23 (1), 32–47.

Fluck, Z., Lynch, A.W., 1999. Why do firms merge and then divest? A theory of financial synergy. J. Bus. 72 (3), 319–346.

Fridolfsson, S.O., Stennek, J., 2005. Why mergers reduce profits and raise share prices: a theory of preemptive mergers. J. Eur. Econ. Assoc. 3 (5), 1083–1104.

Gates, S., Very, P., 2003. Measuring performance during M&As integration. Long. Range Plan. 36 (2), 167–185.

Gayle, P.G., Le, H.B., 2013. Measuring merger cost effects: evidence from a dynamic structural econometric model. In: Proceedings of the 11th Annual International Industrial Organization Conference (IIOC): Boston, Massachusetts.

Gillen, D.W., Oum, T.H., Tretheway, M.W., 1990. Airline cost structure and policy implications: a multi-product approach for Canadian airlines. J. Transport Econ. Pol. 24 (1), 9–34.

Gort, M., 1969. An economic disturbance theory of mergers. Q. J. Econ. 83, 624–642.

Gorton, G., Kahl, M., Rosen, R.J., 2009. Eat or be eaten: a theory of mergers and firm size. J. Finance 64 (3), 1291–1344.

Graves, D., 1981. Individual reactions to a merger of two small firms of brokers in the re-insurance industry: a total population survey. J. Manag. Stud. 18 (1), 89–113.

Gudmundsson, S.V., Merkert, R., Redondi, R., 2017. Cost functions and determinants of unit cost effects in horizontal airline M&As. Transport. Res. 103, 444–454.

Haleblian, J.J., McNamara, G., Kolev, K., Dykes, B.J., 2012. Exploring firm characteristics that differentiate leaders from followers in industry merger waves: a competitive dynamics perspective. Strat. Manag. J. 33 (9), 1037–1052.

Hansen, D.R., Mowen, M.M., Guan, L., 2009. Cost Management: Accounting and Control, sixth ed. South-Western Cengage Learning, Mason, OH.

Hausman, J.A., 1978. Specification tests in econometrics. Econometrica 46 (6), 1251–1271.

Hay, D.A., Liu, G.S., 1997. The efficiency of firms: what difference does competition make? Econ. J. 107 (442), 597–617.

Hitt, M.A., Hoskisson, R.E., Johnson, R.A., Moesel, D.D., 1996. The market for corporate control and firm innovation. Acad. Manag. J. 39 (5), 1084–1119.

Hotchkiss, E.S., Mooradian, R.M., 1998. Acquisitions as a means of restructuring firms in Chapter 11. J. Financ. Intermediation 7 (3), 240–262.

Huck, S., Konrad, K.A., Müller, W., 2008. Mergers without cost advantages. In: Collins, W.D. (Ed.), Issues in Competition Law and Policy, vol. 2, pp. 1575–1587. Chicago: (ABA, Section of Antitrust Law).

Ingham, H., Kran, I., Lovestam, A., 1992. Mergers and profitability: a managerial success story. J. Manag. Stud. 29 (2), 195–209.

Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. J. Finance 48, 831–880.

Jeziorski, P., 2014. Estimation of cost efficiencies from mergers: application to US radio. Rand J. Econ. 45 (4), 816–846.

Judge, T.A., Thoreson, C.J., Bono, J.E., Patton, G.K., 2001. The job satisfaction-job performance relationship: a qualitative and quantitative review. Psychol. Bull. 127, 376–407.

Keil, T., Laamanen, T., Mäkisalo, A., 2012. Acquisitions, acquisition programs and acquisition capabilities. In: Faulkner, D., Teerikangas, S., Joseph, R. (Eds.), Handbook of Mergers & Acquisitions. Oxford University Press.

Kenny, D.A., Kashy, D.A., Cook, W.L., Simpson, J.A., 2006. Dyadic Data Analysis. The Guilford Press.

King, D., Dalton, D., Daily, C., Covin, J., 2004. Meta-analyses of post-acquisition performance indications of unidentified moderators. Strat. Manag. J. 25, 187–200.

Krishnan, H.A., Hitt, M.A., Park, D., 2007. Acquisition premiums, subsequent workforce reductions and post-acquisition performance. J. Manag. Stud. 44 (5), 709–732.

Laamanen, T., Keil, T., 2008. Performance of serial acquirers: toward an acquisition program perspective. Strat. Manag. J. 29 (6), 663–672.
Lakens, D., 2013. Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. Front. Psychol. 4 (863), 1–12.
Lander, M.W., Kooning, L., 2013. Boarding the aircraft: trust development amongst negotiators of a complex merger. J. Manag. Stud. 50, 1–30.
Leibenstein, H., 1966. Allocative efficiency vs. X-efficiency. Am. Econ. Rev. 56 (3), 392–415.
Lubatkin, M., 1983. Mergers and the performance of the acquiring firm. Acad. Manag. Rev. 8 (2), 218–225.
Lubatkin, M., 1987. Merger strategies and stockholder value. Strat. Manag. J. 8 (1), 39–53.
Maillebiau, E., Hansen, M., 1995. Demand and consumer welfare impacts of international airline liberalisation: the case of the North Atlantic. J. Transport Econ. Pol. 29, 115–136.
Manuela Jr., W.S., Rhoades, D.L., Curtis, T., 2019. Market power at the seattle-tacoma international airport: the case of Alaska airlines. Transport Pol. 76, 90–99.
Meeks, G., 1977. Disappointing Marriage: a Study of the Gains from Merger. CUP, Cambridge.
Merkert, R., Morrell, P.S., 2012. Mergers and acquisitions in aviation: management and economic perspectives on the size of airlines. Transport. Res. E Logist. Transport. Rev. 48 (4), 853–862.
Merkert, R., Swidan, H., 2019. Flying with(out) a safety net: financial hedging in the airline industry. Transport. Res. E Logist. Transport. Rev. 127, 206–219.
Mitchell, M.L., Mulherin, J.H., 1996. The impact of industry shocks on takeover and restructuring activity. J. Financ. Econ. 41 (2), 193–229.
Moatti, V., Ren, C.R., Anand, J., Dussauge, P., 2015. Disentangling the performance effects of efficiency and bargaining power in horizontal growth strategies: an empirical investigation in the global retail industry. Strat. Manag. J. 36 (5), 745–757.
Molnar, J., 2002. Preemptive Horizontal Mergers: Theory and Evidence. IEHAS Discussion Papers. No. MT-DP - 2002/13.
Morrison, S.A., 1996. Airline mergers: a longer view. J. Transport Econ. Pol. 30 (3), 237–250.
Morrow, J.L., Sirmon, D.G., Hitt, M.A., Holcomb, T.R., 2007. Creating value in the face of declining performance: firm strategies and organizational culture. Strat. Manag. J. 28 (3), 271–283.
Mueller, D.C., Sirower, M.L., 2003. The causes of mergers: tests based on the gains to acquiring firms shareholders and the size of premia. Manag. Decis. Econ. 24 (5), 373–391.
Nannes, J.M., 2000. Antitrust Analysis of Airlines. U.S. Department of Justice, Presentation before the Committee on Transportation & Infrastructure U.S. House of Representatives, Washington, D.C.
Napier, N.K., 1989. Mergers and acquisitions, human resource issues and outcomes: a review and suggested typology. J. Manag. Stud. 26 (3), 271–290.
O'Connell, V., 2007. Dealing with panel data in accounting and managerial finance research. Int. J. Manag. Finance 3 (4), 372–389.
Oliveira, M.V.R., Oliveira, A.V.M., 2018. What drives effective competition in the airline industry? An empirical model of city-pair market concentration. Transport Pol. 63, 165–175.
Overall, J.E., Doyle, S.R., 1994. Estimating sample sizes for repeated measurement designs. Contr. Clin. Trials 15 (2), 100–123.
Parvinen, P., Tikkanen, H., 2007. Incentive asymmetries in the mergers and acquisitions process. J. Manag. Stud. 44, 759–787.
Porter, M.E., 1985. Competitive Advantage. Free Press.
Powell, T.C., 2001. Competitive advantage: logical and philosophical considerations. Strat. Manag. J. 22 (9), 875–888.
Prechel, H., Boies, J., Woods, T., 1999. Debt, mergers and acquisitions, institutional arrangements and change to the multilayered subsidiary form. Soc. Sci. Q. 80, 115–135.
Röller, L.H., Stennek, J., Verboven, F., 2006. Efficiency gains from mergers. In: Ilzkovitz, F., Meiklejohn, R. (Eds.), European Merger Control: Do We Need an Efficiency Defence? Edward Elgar Publishing.
Rubinovitz, R., 2009. The role of fixed cost savings in merger analysis. J. Compet. Law Econ. 5 (2), 233–247.
Ryerson, M.S., Kim, H., 2014. The impact of airline mergers and hub reorganization on aviation kilometer consumption. J. Clean. Prod. 85, 395–407.
Scherer, F.M., 1980. Industrial Market Structure and Economic Performance, second ed. Houghton Mifflin, Boston, MA.
Schnell, M.C.A., 2005. Perception of airline industry structure by regulators and managers. Transport Pol. 12 (3), 221–234.
Seth, A., 1990. Value creation in acquisitions: a re-examination of performance issues. Strat. Manag. J. 11 (2), 99–115.
Shaw, S.L., Ivy, R.L., 1994. Airline mergers and their effect on network structure. J. Transport Geogr. 2 (4), 234–246.
Shrieves, R.E., Stevens, D.L., 1979. Bankruptcy avoidance as a motive for merger. J. Financ. Quant. Anal. 14 (3), 501–515.
Sitkin, S.B., Pablo, A.L., 2005. The neglected importance of leadership in mergers and acquisitions. In: Stahl, G.K., Mendenhall, M.E. (Eds.), Mergers and Acquisitions. Stanford Business Books, Stanford, CA, pp. 208–223.
Slusky, A.R., Caves, R.E., 1991. Synergy, agency, and the determinants of premia paid in mergers. J. Ind. Econ. 277, 296.
Statista, 2020. Value of Merger and Acquisition Deals Worldwide from 1985 to 2019. www.statista.com. accessed 3 August 2020.
Swidan, H., Merkert, R., 2019. The relative effect of operational hedging on airline operating costs. Transport Pol. 80, 70–77.
Thomas, C.J., 2004. The competitive effects of mergers between asymmetric firms. Int. J. Ind. Organ. 22 (5), 679–692.
Tichy, G., 2002. What do we know about the success and failure of mergers? J. Ind. Compet. Trade 1, 347–394.
Trautwein, F., 1990. Merger motives and merger prescriptions. Strat. Manag. J. 11, 283–295.
Vaara, E., Junni, P., Sarala, R.M., Ehrnrooth, M., Koveshnikov, A., 2014. Attributional tendencies in cultural explanations of M&As performance. Strat. Manag. J. 35, 1302–1317.
Walter, G.A., Barney, J.B., 1990. Management objectives in mergers and acquisitions. Strat. Manag. J. 11, 79–86.
Walulik, J., 2016. At the core of airline foreign investment restrictions: a study of 121 countries. Transport Pol. 49, 234–251.
Wang, L.O., Zajac, E.J., 2007. Acquisition or alliance? A dyadic perspective on interfirm resource combinations. Strat. Manag. J. 28, 1291–1317.
Weitzel, W., Jonsson, E., 1989. Decline in organisations: a literature integration and extension. Adm. Sci. Q. 34, 91–109.
Werden, G.J., Froeb, L.M., 1998. The entry-inducing effects of horizontal mergers: an exploratory analysis. J. Ind. Econ. 46 (4), 525–543.
White, R.E., 1986. Generic business strategies, organizational context and performance: an empirical investigation. Strat. Manag. J. 7 (3), 217–231.
Williamson, O.E., 1968. Economies as an antitrust defense: the welfare tradeoffs. Am. Econ. Rev. 58 (1), 18–36.
Wooldridge, J.M., 2004. Fixed Effects and Related Estimators for Correlated Random Coefficient and Treatment Effect Data Models. Working Paper. Michigan State University, East Landing, MI, pp. 1–20.
Yan, J., Fu, X., Oum, T.H., Wang, K., 2019. Airline horizontal mergers and productivity: empirical evidence from a quasi-natural experiment in China. Int. J. Ind. Organ. 62, 358–376.
Yu, Y., Umashankar, N., Rao, V.R., 2015. Choosing the right target: relative preferences for resource similarity and complementarity in acquisition choice. Strat. Manag. J. 37 (8), 1808–1825.