

LOW-COST, HIGH IMPACT: A DiD ANALYSIS OF AVELO AND BREEZE'S DISRUPTION IN THE U.S. DOMESTIC AIR TRAVEL MARKET

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I, the undersigned, **Carsen Essing**, candidate for the MA degree in Economic Policy in Global Markets declare herewith that the present thesis titled “Low-Cost, High Impact: a DiD Analysis of Avelo and Breeze’s Disruption in the U.S. Domestic Air Travel Market” is exclusively my own work, based on my research and only such external information as properly credited in notes and bibliography.

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ABSTRACT

This thesis examines the pricing impact of Avelo Airlines and Breeze Airways, two hybrid low-cost carriers that launched in 2021, on domestic airfares in the United States. Using a difference-in-differences approach with two-way fixed effects and matched route-level data, I find that their entry led to an average fare reduction of approximately 19% on affected routes. These effects appeared immediately and were not preceded by anticipatory fare changes, suggesting that incumbents did not view the new entrants as credible threats. In many cases, legacy carriers exited rather than competed, leaving Avelo or Breeze as the sole provider. These findings highlight the pricing influence of small-scale entrants and suggest the need for policy attention to infrastructure access and route-level market dynamics.

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LIST OF ABBREVIATIONS

LCC- Low-cost carrier

ULCC- Ultra-low-cost carrier

DiD- Difference-in-difference

TWFE- Two-way fixed effects

INTRODUCTION

In 2021, Avelo Airlines and Breeze Airways became the first new U.S. commercial carriers to launch in over two decades, a rare moment of change in an extremely concentrated and important industry. Despite serving hundreds of millions of passengers annually, the U.S. airline industry is dominated by a small number of major carriers that control most routes and market share. The entry of Avelo and Breeze offers a unique opportunity to examine how new competitors influence pricing and market dynamics in a sector where barriers to entry are high and successful disruption is uncommon.

Unlike earlier low-cost carriers (LCCs) such as Southwest, or ultra-low-cost carriers (ULCCs) like Spirit and Frontier, Avelo and Breeze use hybrid models and focus on underserved city pairs and secondary airports. Their strategy intentionally avoids major hubs and minimize direct rivalry with legacy carriers, with the goal of having sustainable footholds in overlooked markets through low fares and simplified service bundles. However, they still entered routes that were being directly served by incumbents, creating an interesting mix of direct and indirect competition. Prior research on airline competition has consistently found that LCC entry leads to significant fare reductions, particularly in the case of Southwest Airlines (Borenstein, 1989; Morrison & Winston, 1995). Yet little is known about whether smaller, more recent entrants like Avelo and Breeze can generate similar effects. Their limited scale and niche market strategies raise an open question: can these hybrid low-cost carriers still meaningfully influence fare structures where they overlap with incumbents?

This thesis investigates the extent to which Avelo and Breeze Airways have disrupted airfare pricing and competitive dynamics on U.S. domestic routes where they entered direct competition with established airlines. Using a difference-in-differences (DiD) approach applied

to matched routes from the U.S. Department of Transportation's DB1B dataset, I find that entry by Avelo and Breeze led to a statistically significant and persistent reduction in average fares, approximately 19% on treated routes compared to matched control routes. These effects appeared immediately upon entry and remained stable over time, indicating sustained competitive pressure. While the results provide strong evidence of pricing disruption, several limitations, including potential selection bias, dataset constraints, and spillover effects, are discussed in detail in later chapters. Notably, in many cases where Avelo or Breeze entered, incumbent carriers chose to exit the route entirely rather than compete, leading to substantial shifts in market structure. This pattern suggests that the competitive impact of new entrants may extend beyond pricing to reshape route-level market composition itself.

1. LITERATURE REVIEW

1.1 Historical Context and Deregulation

To understand how new entrants like Avelo and Breeze compete, it's useful to consider the broader evolution of the U.S. airline industry. The modern era began with the 1978 Airline Deregulation Act, which ended the Civil Aeronautics Board's control over routes, fares, and mergers, which shifted the industry from strict regulation to open competition (Cook 1996, 6). Before deregulation, airlines couldn't compete on price, leading to non-price strategies like increased flight frequency, lower seating density, and enhanced in-flight service. These changes significantly increased costs by creating excess capacity, too many flights for too few passengers. As a result, average load factors declined from 70% in 1950 to just 50% by 1970 (Cook 1996, 33). The system became increasingly inefficient, with airlines operating underfilled aircraft, duplicating routes, and relying on fragmented networks that often required unnecessary transfers between local and trunk carriers. This was all because profitability was guaranteed by fare and route regulation. Deregulation addressed these inefficiencies by allowing price competition and free market entry and exit. This prompted industry-wide shifts toward higher load factors and the, now widely used, hub-and-spoke network optimization method (Cook 1996, 35). These changes allowed airlines to better align capacity with demand and reduce per-passenger costs, creating the productive and allocative efficiencies that deregulation aimed to achieve.

1.2 Liberalization, Access Barriers, and Infrastructure Constraints

Although the 1978 Airline Deregulation Act ended government control over fares, routes, and market entry (Cook 1996, 6), competition in practice remains limited, not by policy, but by access to airport infrastructure and the strategic behavior of dominant carriers. Deregulation solved problems like redundant service and low load factors (Cook 1996, 33–35), but it didn't

remove deeper structural barriers to entry. Slot scarcity, long-term gate leases, and terminal control continue to block new entrants, allowing established airlines to maintain dominance even in formally open markets. (Cook 1996, 33–35)

A 2010 study using the DB1B data set explains how control over airport infrastructure shapes airline competition. By estimating a structural econometric model, the study links dominant gate control to higher fares and reduced entry, particularly at congested hubs like Atlanta compared to more accessible airports such as Nashville (Ciliberto and Williams 2010, 13–15). Carriers with gate dominance can raise rivals' costs and deter entry through aggressive competitive responses, effectively recreating barriers even in deregulated markets (16). This shows that infrastructure, rather than regulation, continues to determine who can compete and under what conditions.

A 2015 study of Spring Airlines in China reveals a similar competitive pattern. Using route-level data and a multinomial logit model, the researchers find that the airline avoids congested hubs and instead targets underserved, high-yield routes (Fu et al. 2015, 5–7). This “cream-skimming” strategy reflects not just cost efficiency, but a deliberate effort to bypass infrastructure bottlenecks and dominant competitors. Despite differences in regulatory context, the structural barriers are comparable, access is shaped more by physical control than by formal policy. Spring's behavior offers real-world evidence of the competitive dynamics outlined in the U.S.-based modeling work, and Avelo and Breeze follow a similar business model as Spring Airlines in order to deal with these barriers.

Ultimately, while deregulation improved efficiency and enabled price competition (Cook 1996, 35), access to markets is still shaped by who controls key infrastructure. Breeze and Avelo's choice to avoid major hubs and focus on secondary airports reflects a strategic response to these persistent limitations.

1.3 Competitive Fare Effects of Low-Cost and Ultra-Low-Cost Carriers

The emergence of LCCs and ULCCs has been one of the most significant competitive developments in the post-deregulation U.S. airline market. Numerous studies have quantified their impact on fare levels, fare structure, and incumbent responses. Morrison (2001) provides evidence using 1998 DB1B data, showing that Southwest's direct entry into a market reduced fares by up to 46%. He also finds that even adjacent or potential competition from Southwest produced smaller yet meaningful price effects, suggesting the airline's influence extended beyond the specific routes it served (240).

A later study based on 2007–2008 DB1B ticket data compares the pricing impact of LCCs and legacy carriers. It finds that LCC entry lowers fares by up to 33% on nonstop routes and around 20% in adjacent markets, while legacy carrier entry results in much smaller reductions, typically around 5.3% or less showing that LCCs have a stronger competitive influence (Brueckner et al. 2013, 8). Another analysis looks beyond average fares to explore fare structure. Using panel data from 1993 to 2006 and fixed-effects models, researchers show that new carrier entry, especially by LCCs, reduces price dispersion by lowering high-end fares more than low-end ones (Gerardi and Shapiro 2009, 198). These findings challenge earlier views that competition increases dispersion through product differentiation, and instead support the classic prediction that competition narrows fare spreads.

While traditional LCCs tend to lower fare, ULCCs created a different pricing dynamic, one that expands fare dispersion through extreme unbundling and targeted price segmentation. Shrago (2023) shows that ULCC entry increases fare dispersion primarily by driving down base fares through aggressive unbundling. Using an econometric model, he linked this pressure to the rise of Basic Economy fares, or as they are sometimes referred to “Spirit match” price, offerings introduced by legacy carriers as a defensive response. Unlike traditional LCCs, ULCCs

influence pricing less through direct route competition and lowering all fares but by forcing incumbents to segment products and undercut at the lowest tier (Shrago 2023, 15–17).

LCCs and ULCCs have each reshaped the U.S. airline industry, although they have done so through different strategies. LCCs lowered fares broadly by competing across networks with reliable, high-frequency service, prompting incumbents to cut prices and improve efficiency. ULCCs took a different approach, using unbundled pricing to reduce base fares and reshape the leisure travel market. Their entry triggered more targeted responses, such as the introduction of Basic Economy, as legacy carriers sought to compete at the lowest price tier without changing their core offerings. In contrast, hybrid carriers like Avelo and Breeze follow a more selective, cost-conscious model. They focus on secondary airports and underserved routes, aiming to avoid direct competition rather than provoke it. Because they lack the scale and pricing aggressiveness of earlier disruptors, it is unclear whether their impact on fares will replicate, diverge from, or fall short of the patterns observed with LCCs and ULCCs. Understanding whether and how these new entrants influence fare structures is the central question of this.

1.4 Anticipatory Pricing and Strategic Response

While many studies document fare reductions after LCC entry, some also show that incumbents react even before service begins. Goolsbee and Syverson (2008) examine how legacy airlines respond to announced entry by Southwest Airlines. Using a DiD approach, they compare markets where Southwest announced service to similar markets without such announcements, controlling for broader trends. They find that more than 50% of Southwest's total fare impact occurred before it operated a single flight, with average fares falling by 8%-9% in the pre-entry period (Goolsbee and Syverson 1612). This effect was most pronounced on routes where Southwest had a strong history of follow-through, suggesting that incumbents respond not just to actual entry, but to credible competitive threats (1620–22).

In the case of Avelo and Breeze, it remains unclear whether incumbents will respond in the same way. These carriers operate on a smaller scale, focus on less contested routes, and primarily serve secondary airports, making them less likely to be viewed as immediate competitive threats. This suggests that when incumbents possess strong infrastructure advantages, such as gate or slot control, there may be less incentive to engage in preemptive pricing. Although legacy airlines have historically reacted quickly to the entry of large, disruptive low-cost carriers, their pricing behavior remains uncertain when faced with smaller, more targeted challengers.

1.5 Research Gap and Contribution

While much research has examined the fare effects of LCCs and ULCCs, little is known about newer hybrid entrants like Breeze Airways and Avelo Airlines. These carriers follow distinct strategies, targeting underserved routes with limited frequencies, that fall outside traditional low-cost models. Unlike earlier disruptors, they avoid direct competition and focus on niche markets. Because they did not exist when foundational studies were conducted, their competitive effects remain unclear. Their impact may be geographically narrow, demographically concentrated, or short-term, yet still meaningful in low-competition or high-elasticity markets.

This thesis addresses that gap by doing an empirical analysis of Breeze and Avelo's fare effects on contested routes. In doing so, it broadens our understanding of modern airline competition and informs policy debates about how even smaller entrants can influence pricing, access, and service in overlooked markets.

2. CASE STUDIES

As explained earlier, Avelo Airlines and Breeze Airways represent a new wave of low-cost carriers that diverge from both the traditional LCC model exemplified by Southwest and the aggressively unbundled ULCC strategies of Spirit or Frontier. Both carriers aim to avoid direct competition with legacy airlines by focusing on underserved routes and secondary airports, a strategy that reflects how infrastructure constraints and market concentration continue to shape modern airline competition. The following sections examine each airline's origin, strategy, network design, and profits.

2.1 Avelo Airlines

Avelo Airlines launched in April 2021 under CEO Andrew Levy, a former executive at United Airlines and Allegiant Air. Recognizing gaps in the U.S. airline market, Levy envisioned a lean, customer-focused ULCC that would serve neglected city pairs with low fares and streamlined operations (AirlineGeeks 2021). The airline began service from Hollywood Burbank Airport, offering a more accessible alternative to LAX.

Adhering in some ways to an ultra-low-cost model, Avelo's base fares start at \$19 and charge for ancillary services such as seat selection, checked bags, and onboard refreshments (Mitchell 2022). However, it distinguishes itself by not charging fees for flight changes or cancellations, a departure from typical ULCC practice. Rather than stimulating new markets, Avelo targets existing demand in high-leisure, low-frequency routes (Simple Flying 2024). A core element of Avelo's strategy is its reliance on secondary and underserved airports. These locations provide faster turnarounds, lower landing fees, and fewer logistical constraints. This airport strategy also reflects broader structural barriers that hinder market entry. Fu and Oum's research

highlights how slot scarcity, exclusive terminal arrangements, and long-term gate leases allow incumbents to entrench themselves.

Operationally, Avelo's fleet is made up of mid-life Boeing 737-800s, giving them lower acquisition costs and capital flexibility over newer, more fuel-efficient models (AP News 2023). It generates ancillary revenue through à la carte pricing and depends on direct-to-consumer sales via its website, minimizing fees and competitive disadvantages tied to third-party booking platforms (Avelo Airlines 2024a). The airline expanded from three to ten aircraft in its first year and, by early 2024, grew to 16 aircraft, 85 routes, and 56 destinations (Business Insider 2024). It plans to grow to nearly 100 routes by the end of 2025 (Sloan 2023). Levy often frames Avelo's simplicity and agility as competitive advantages over legacy carriers, which he argues suffer from slower decision-making, higher fixed costs, and structural complexity (LinkedIn News 2024).

Despite early success, Avelo faces familiar challenges for new entrants, including limited brand recognition, regulatory burdens, and the difficulty of scaling while maintaining operational reliability. It has earned strong rankings in on-time performance and low cancellation rates, but sustaining these metrics as the network grows will be crucial. Regulatory friction persists as well; Levy has publicly criticized the requirement for uninvolved carriers to respond to DOJ inquiries related to mergers like JetBlue–Spirit (U.S. News 2024). Still, Avelo maintains a disciplined approach to growth, positioning itself as a long-term national carrier focused on sustainable expansion rather than rapid scale.

2.2 Breeze Airways

Breeze Airways was founded by David Neeleman, the same businessman behind 3 other airlines, JetBlue, WestJet, and Azul. The airline began operations in May 2021 (Peterson 2020; Breeze Airways 2025; Carey 2025). Headquartered in Salt Lake City, Breeze was designed to

connect underserved city pairs with affordable, nonstop service and a more customer-friendly experience under the tagline “The Seriously Nice Airline” (Breeze Airways 2025). The airline follows a hybrid “Nice Low-Cost Carrier” model, combining low-cost efficiency with optional premium features. It targets secondary airports and mid-sized cities, favoring point-to-point routes that avoid hub congestion and reduce travel time (Semuels 2023; Fly Breeze 2025). Its fare structure includes three tiers, “Nice,” “Nicer,” and “Nicest”, allowing passengers to choose their level of service, with prices starting at \$39 (Simple Flying 2024; Axios 2021).

Breeze began with Embraer 190/195 jets but then transitioned to Airbus A220-300s, which better support its longer, thinner routes and offer improved fuel efficiency (Peterson 2020). By the end of 2024, Breeze operated 33 A220s, with more than 120 additional aircraft on order through 2028 (Fly Breeze 2025). A key element of Breeze’s network strategy is avoiding direct competition. By late 2024, it was the sole carrier on 87% of its nonstop routes (Fly Breeze 2025). This reflects a deliberate focus on uncontested markets, what Hüscherlath, Müller, and Bilotkach identify as a crucial factor for new entrants, helping Breeze preserve pricing power and avoid retaliation from incumbents.

The airline prioritizes innovation and simplicity, with investments in mobile-first booking, onboard apps, and adaptable scheduling. It remains agile in responding to macroeconomic shifts, including labor constraints and fuel volatility (Carey 2025; Yahoo Finance 2025). While competition and operational scale pose challenges, Breeze’s disciplined growth and high route exclusivity give it a strong foundation in the market.

2.3 Financial Performance in Comparative Context

Having examined the operational models of Avelo and Breeze, it is useful to assess how those strategies have translated into financial outcomes. This section compares each carrier’s profitability and benchmarks them against competitors. Avelo and Breeze have both have

demonstrated early signs of financial viability. These outcomes contrast the more established ULCCs like Spirit and Frontier, offering important insights into how new entrants are competing not only operationally but also financially.

Avelo Airlines achieved its first profitable quarter in Q4 2023 and reported a net profit of \$2.3 million in the first half of 2024, despite holding the second-lowest load factor among national carriers (Avelo Airlines 2024). Breeze Airways also reached profitability in Q4 2024, reporting over \$680 million in annual revenue and an operating margin exceeding 4% (Breeze Airways 2025). Both results are noteworthy for relatively young carriers. In contrast, Spirit Airlines reported a \$1.1 billion operating loss in 2024 and filed for Chapter 11 bankruptcy protection in November of that year, citing ‘unsustainable debt burdens and declining revenues’ (Simple Flying 2025). Frontier Airlines fared better, with a 5.1% pre-tax margin in Q4 2024, following a \$3.78 billion revenue year (TipRanks 2025). Still, the airline’s margin recovery highlights the volatility inherent in ULCC operations.

These financial outcomes suggest that Avelo and Breeze are not only establishing network presence but are also on paths to sustainable growth. Their ability to outperform a legacy ULCC like Spirit within just a few years of operation highlights the changing dynamics of U.S. domestic aviation.

3. DATA SOURCE AND METHODOLOGY

3.1 Data Source

The primary data source for this analysis is the U.S. Department of Transportation's Bureau of Transportation Statistics DB1B Market Data. This dataset is a 10% sample of all domestic airline tickets sold in the U.S each quarter, and it is one of the most widely used resources for studying airline pricing behavior and market dynamics. The DB1B data covers all route types, from popular hub-to-hub flights to small and underserved flights. The variables it measures include route distance (in miles), number of passengers, average fare, the airline with the lowest fare, and the airline with the highest market share on the route. The data begins in the 1990s but for my analysis I am only looking at data from 2017-2024.

3.2 Methodology

This study uses a DiD approach with two-way fixed effects (TWFE) to estimate the impact of Avelo Airlines and Breeze Airways on airfare pricing. Specifically on routes that were served by incumbents and then by one of the two new entrants. A DiD analysis compares changes in outcomes over time between treated and control groups, attributing any differential change after treatment to the intervention itself, in this case, airline entry. A TWFE DiD method is particularly well-suited for this context because Avelo and Breeze entered different routes at different times, resulting in staggered treatment timing. In this case, a traditional single-period DiD model would be inadequate, because it assumes uniform treatment timing and cannot account for variation in treatment exposure across routes. The TWFE framework addresses this by including both route fixed effects (α_r) and time fixed effects (δ_t), which control for unobserved heterogeneity across routes and time periods.

This structure allows the model to better isolate the causal effect of airline entry while accounting for both cross-sectional and temporal confounders. By leveraging this quasi-experimental setup, the analysis can attribute changes in airfare more credibly to the presence of Avelo and Breeze, rather than to unrelated trends or shocks. The model for the TWFE DiD model for this analysis is as follows:

$$y_{rt} = \sum_{k=-20}^{+15} \beta_k D_{rt}^{(k)} + \alpha_r + \partial_t + \varepsilon_{rt}$$

The outcome variable y_{rt} is the natural logarithm of the average fare on route r in quarter t , meaning the coefficients can be interpreted as approximate percentage changes. For each event-time k , ranging from -20 to +15 quarters relative to the airline's entry on a specific route, I construct a dummy variable $D_{rt}^{(k)}$, which equals 1 if route r in quarter t is exactly k quarters from entry, and 0 otherwise. The indicator for $k=-1$ is omitted and serves as the reference period, meaning all other coefficients are interpreted relative to the quarter immediately before entry.

The model includes TWFE α_r , which controls for time-invariant route characteristics such as geography and baseline market structure; and ∂_t , which accounts for quarter-specific shocks common to all routes. Standard errors are clustered at the route level to correct for serial correlation within routes over time. The estimated coefficients β_k represent the causal treatment effect at each event time k , measuring the percentage difference in fares between treated and control routes relative to the baseline period. This is especially useful in this context, as it captures how competitive pressure from new entrants develops and persists. It also enables the use of pre-entry coefficients to visually and statistically assess the parallel trends assumption.

A valid DiD analysis relies on several key assumptions that must be met in order to allow a causal interpretation of the estimated treatment effects. The most important of these is the

parallel trends assumption, which states that in the absence of treatment, treated and control routes would have experienced similar trends in airfare over time. This assumption ensures that any observed divergence in outcomes after airline entry can be attributed to the treatment itself rather than to pre-existing differences in trends. In this study, the parallel trends assumption is assessed empirically through the event-study specification by examining pre-entry coefficients. Additionally, to improve comparability and support this assumption, a matching procedure was used to pair treated and control routes based on airport size and route distance.

The analysis also assumes the absence of spillover effects between routes. Specifically, the treatment of one route, should not affect fare outcomes on other routes that are used as controls. This requires that competition is occurring independently at the route level. If incumbents were to respond to entry by adjusting fares on untreated routes, the estimates could be biased. The model assumes that pricing decisions are made at the route level, and this supports the use of the route as the unit of analysis. Standard errors are clustered at the route level to account for serial correlation in fares within routes over time.

Another important assumption in DiD is the absence of simultaneous external shocks that differentially affect treated and control routes. If a regulatory policy, economic event, or industry-wide pricing shift occurred around the time of entry and disproportionately influenced treated markets, the estimated treatment effect could be confounded. While the COVID-19 pandemic introduced major disruptions across the airline industry, these effects were largely uniform and not route-specific. Therefore, it is unlikely that they introduced systematic differences between treated and control groups. This strengthens the interpretation that observed post-entry fare changes are primarily due to the market presence of Avelo and Breeze.

As mentioned earlier, to run a proper TWFE DiD analysis, it is crucial to compare treated and untreated routes that are as similar as possible in their underlying characteristics. So in my

analysis I utilize a matching method based on distance, number of passengers, and size of airports. This practice is consistent with recent work in airline competition research. For example, Miller and Yagan use a similar strategy by matching treated and untreated airport pairs on factors such as airport size and route distance in order to ensure that their DiD estimates reflect true competitive effects rather than underlying differences in market structure (Miller and Yagan 2022, 5). To match treated routes were first identified, and their treatment dates recorded. Each route was then assigned an airport size score for both its origin and destination airports. This score was based on two components: the total annual passenger volume and the total number of departures at each airport. The scores were calculated by summing the number of departures with the passenger volume divided by 1,000. These scores were then merged back into the dataset to represent the size of the airports served by each route. Airport size and route distance were standardized and combined into a single measure of route size. These characteristics were selected because they are strong predictors of fare levels and market competitiveness, capturing key differences in supply and demand conditions across routes.

Using this route size metric, a one-to-one nearest-neighbor matching procedure was applied without replacement, meaning that each control route could only be matched to a single treated route and was not reused. Matches were based on Euclidean distance between treated and potential control routes. After reviewing the distribution of matched characteristics, a caliper of thirty was implemented for route size to ensure high-quality pairings. Treated routes without a suitable match within this threshold were excluded from the sample. This process removed 26 treated routes and produced a final sample of 154 matched pairs for analysis.

To further assess the validity of the matching procedure, each matched pair was reviewed individually to identify potential outliers or mismatches that could distort the analysis. This manual review confirmed that the treated and control routes were reasonably similar on observable characteristics. By improving balance between the two groups, the matching process

increases the plausibility of the parallel trends assumption and supports the overall credibility of the identification strategy.

4. RESULTS

4.1 Parallel Trends Assumption

A key assumption underlying the DiD approach, previously discussed, is that treated, and control routes would have followed similar fare trends in the absence of airline entry. Verifying the parallel trends assumption is essential for interpreting post-entry differences as causal effects rather than results of unrelated pre-existing dynamics.

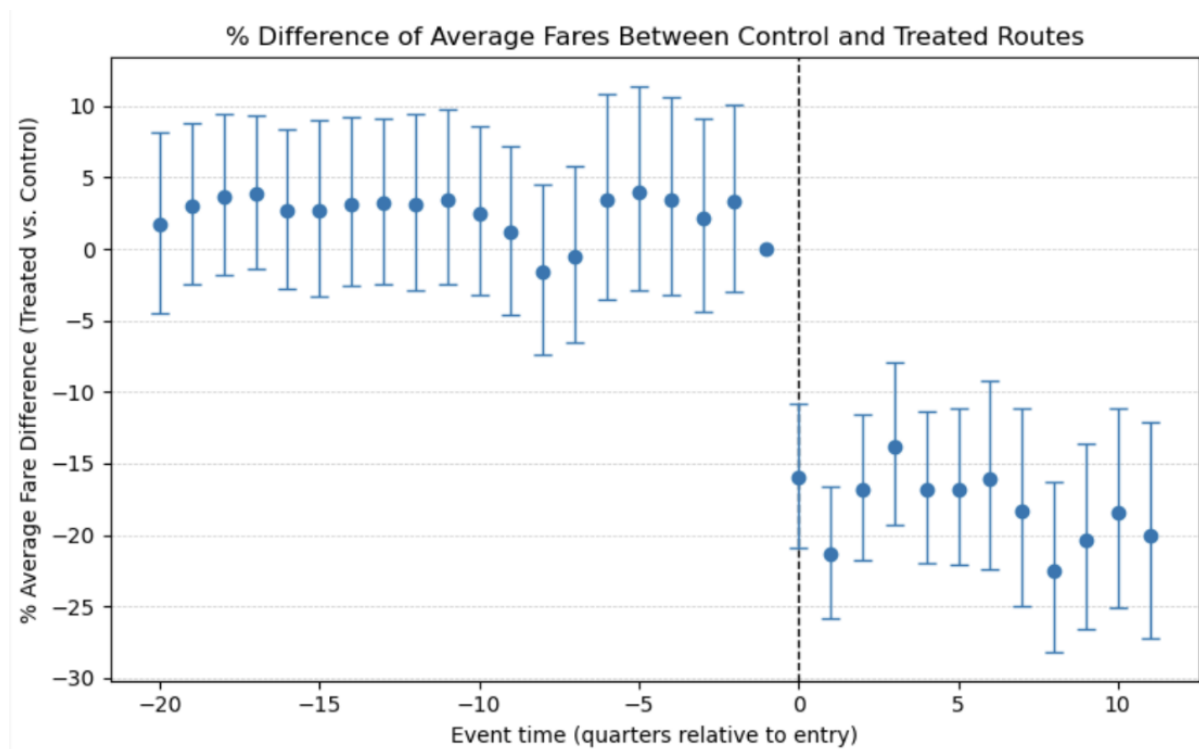


Figure 1: Percent difference of average fares (Treated and control routes)

Figure 1 is an event-study plot showing the percentage difference in average fares between treated and control routes. The x axis represents event time, measured in quarters relative to the first quarter in which Avelo or Breeze began service on a given route. The y axis shows the percent change in fares for treated routes relative to their matched controls. Each point corresponds to a DiD estimate for a specific quarter, and the vertical lines represent 95% confidence intervals. During the pre-entry period, from quarter -20 to quarter -1, the estimates

remain close to zero, and none of the confidence intervals exclude zero. This indicates that, prior to entry, fares on treated and control routes followed similar trends. The lack of any significant divergence provides strong support for the parallel trends assumption and suggests that, in the absence of entry, treated routes would have continued to follow similar fare patterns as their matched controls.

4.2 Impact of New Airline Entry on Average Fares

Figure 2 shows the estimated DiD effects on average fares across all treated routes.

Average Treatment Effects from Event Study DiD Analysis				
Event Time	Coefficient	Std. Error	95% CI (Lower)	95% CI (Upper)
avg_pre (avg pre-treatment difference)	0.045	0.013	0.020	0.070
avg_post (DiD effect)	-0.191	0.019	-0.229	-0.154

Figure 2: DiD effect- Average Fare Change on Treated Routes After Entry

Following entry, the regression estimate indicates that average fares declined by approximately 19% on routes that were already being served by incumbent carriers when Avelo and Breeze began operating in those markets. This drop is measured relative to matched routes that did not experience entry. The post-entry coefficients are statistically significant, indicating that the

observed changes are unlikely to be due to random variation or unrelated market factors.

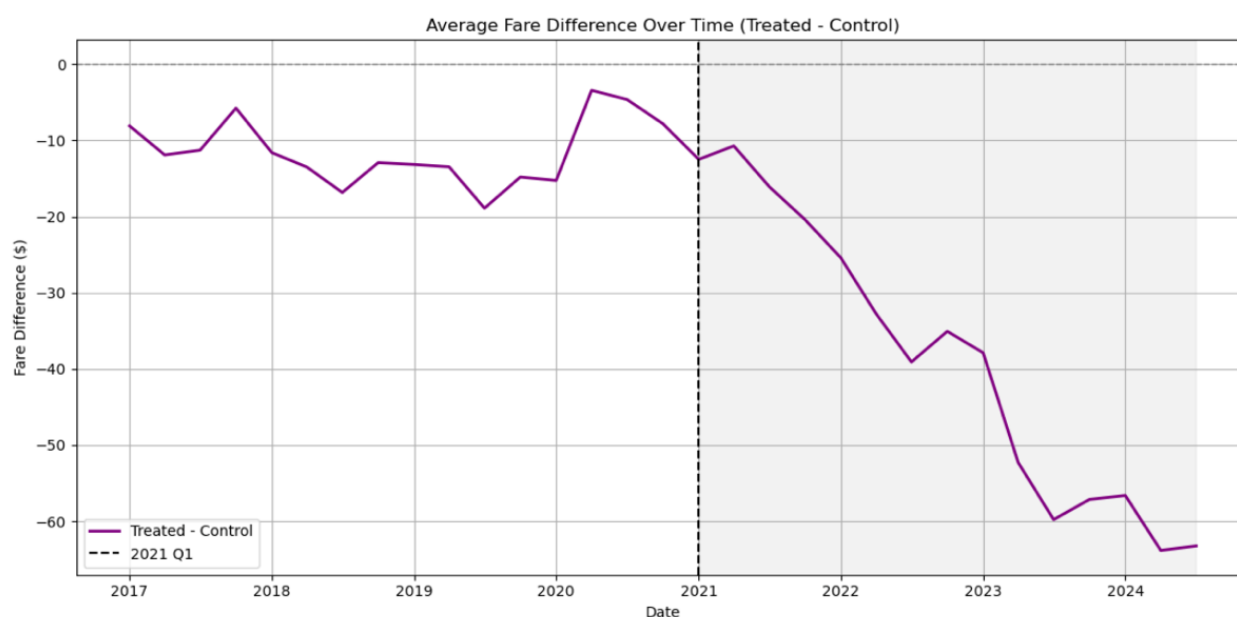


Figure 3: Average fare difference overtime (treated vs control)

Figure 3 gives a clear visual of these results. The graph shows the dollar average change in fares between treated and control routes over time. Prior to 2021, the fare gap remains stable, making insignificant fluctuations. After the first quarter of 2021, marked by the vertical dashed line, the line goes down rapidly. The clear and sustained downward trend in the fare difference highlights the long-term nature of the average fare reductions associated with Avelo and Breeze's market entry.

4.3 Pre-Entry Fare Impact

Prior literature has documented that incumbents sometimes lower fares in anticipation of new competition. To test whether similar anticipatory pricing behavior occurred with the entry of Avelo and Breeze, I conducted a placebo analysis by shifting the event window two quarters earlier than the actual entry date. This created a pseudo-announcement quarter, allowing me to

re-estimate the same log-fare specification used in the main analysis.

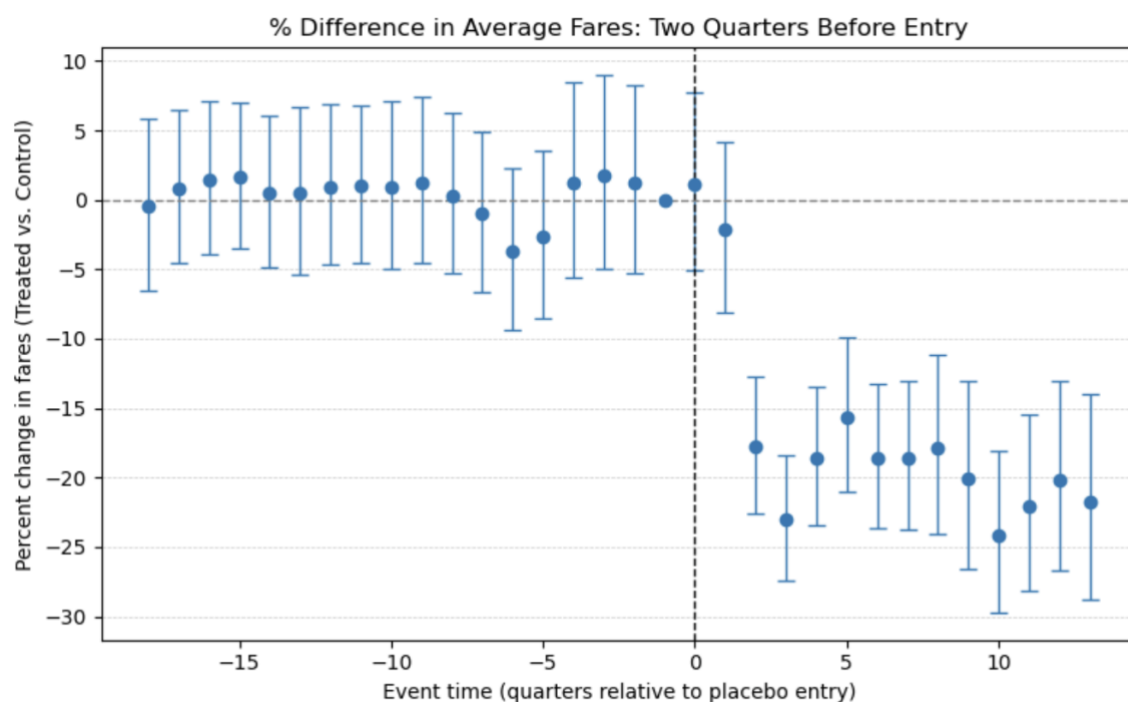


Figure 4: Pseudo-Announcement Test: Fare Differences (Treated vs. Control Routes)

As seen in Figure 4, the placebo event-study graph shows that in the two quarters immediately preceding the actual entry of Avelo and Breeze, which is treated here as the placebo entry point, fare differences between treated and control routes remained close to zero. The confidence intervals consistently overlap with zero during this pre-entry period, indicating that there was no statistically significant change in fares. This result suggests that incumbent airlines did not engage in anticipatory price-cutting in advance of Avelo and Breeze's entry. This contrasts earlier findings in the literature, such as those by Goolsbee and Syverson, who documented sizable pre-entry fare reductions by incumbents in response to Southwest's announced entry (Goolsbee and Syverson 1353).

4.4 Incumbent Response

This section examines how incumbents responded on routes where they were the sole carrier before Avelo or Breeze entered. Unlike earlier sections that looked at average fares across all

airlines, this analysis focuses specifically on the dominant carrier in each post-entry quarter. By isolating the behavior of the incumbent, it provides a more direct view of how legacy airlines adjusted their market share and pricing when faced with new competition.

quarters_to_dominance	num_routes	cumulative_percent_of_all_treated
0.0	54	32.3
1.0	22	45.5
2.0	5	48.5
7.0	4	50.9
8.0	2	52.1
9.0	2	53.3
10.0	2	54.5
11.0	3	56.3
17.0	1	56.9
20.0	1	57.5
29.0	2	58.7

Figure 5: Time from Entry to Market Dominance by Avelo and Breeze

Figure 5 illustrates how quickly Avelo and Breeze established market dominance on treated routes. Immediately upon entry, they became the leading carrier on 32.3% of routes. Within one quarter, that figure rose to 45.5%, and by the end of the observed period, they had secured majority market share on 58.7% of all treated routes.

After a closer look at these dominant routes, it reveals that Avelo and Breeze now operate as the sole carriers on nearly all of them. Of the 67 treated routes where they gained majority market share, only one still features another airline (Frontier) providing competing service. This suggests that, rather than lowering prices to compete, incumbents often chose to exit these routes entirely in response to Avelo or Breeze's expansion.

To examine fare dynamics more closely, I conducted an event study analysis of log fare differences between treated and control routes, aligned relative to each route's entry quarter.

To isolate the response of incumbent carriers, I exclude routes from the analysis once Avelo or Breeze become the dominant provider. While there is some indication of fare declines following entry, the estimates become increasingly noisy in later quarters due to limited data availability. However, variation in the pre-treatment period weakens support for the parallel trends assumption. Together, these limitations suggest that while some fare adjustments may have occurred, the evidence does not strongly support a causal interpretation.

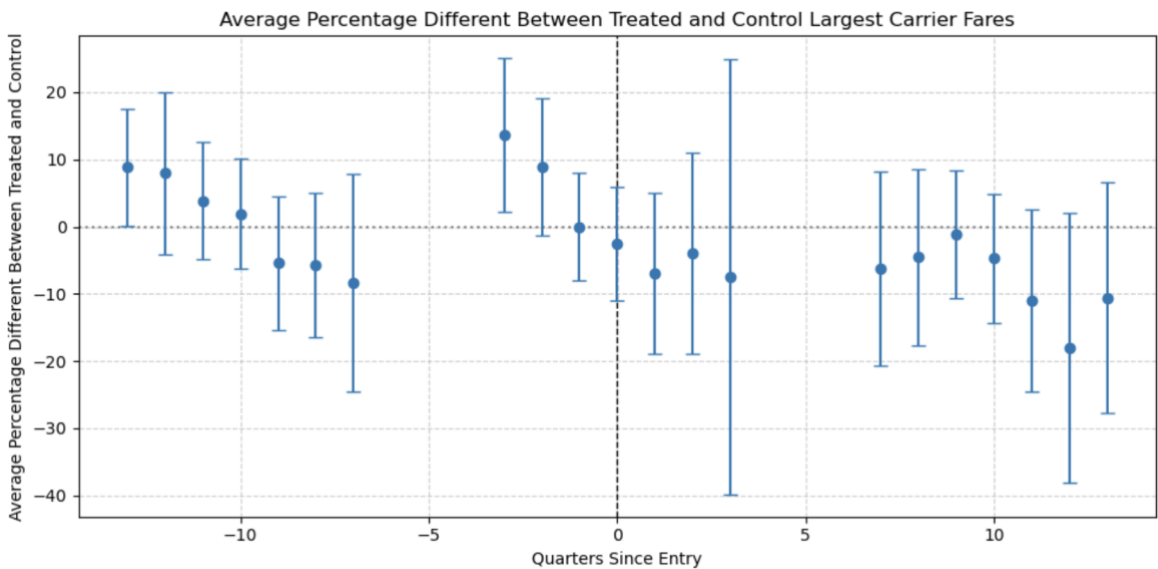


Figure 6: Event Study of Incumbent Fare Differences Relative to Entry

Despite this, I still performed a DiD analysis to estimate average post-entry fare changes among incumbents. The model shows an average fare reduction of 4% following entry. However, because of the prior discussion there is limited reliability of this estimate as causal effect

Average Treatment Effect (DiD Estimate)				
Event Time	Coefficient	Std. Error	95% CI (Lower)	95% CI (Upper)
avg_post (DiD effect)	-0.0400	0.0168	-0.0729	-0.0070

Figure 7: Estimated Fare Impact of Avelo and Breeze Entry on Incumbent Pricing (DiD Estimate)

5. DISCUSSION

5.1 Interpretation of Findings

The following section synthesizes the empirical results presented in Chapter 5. It aims to contextualize the observed fare changes and competitive responses within the broader literature and strategic dynamics of the U.S. airline industry.

5.1.1 Impact of New Airline Entry on Average Fares

The main empirical results shown in this study provide strong evidence that the entry of Avelo and Breeze Airlines into the markets has led to substantial and persistent reductions in average airfares on routes where they are directly competing with incumbents. The 19% fare reduction occurred immediately upon entry and persisted over time, evidence of substantial competitive impact. These results are notable given the early-stage status of Avelo and Breeze.

These findings indicate that the fare change is not the result of short-term promotional strategies but rather reflects a structural change in competitive dynamics. Despite entering markets that already had relatively low base fares, their presence still triggered meaningful price reductions, highlighting the intensity of their competitive pressure and the responsiveness of incumbents. Since their launches in 2021, Avelo and Breeze have rapidly expanded their route networks and increased flight frequencies. As discussed in the case studies, both carriers have achieved notable early success: Avelo reported its first profitable quarter in 2023 and continues to grow its presence in secondary airports (Avelo Airlines 2024), while Breeze has aggressively scaled using a flexible, low-fare model that has attracted price-sensitive travelers and allowed rapid market entry (Leff; Sampson; Schaper). Their ability to capture market share and expand operations reinforces the idea that their pricing impact is likely to persist and maybe expand as their networks do.

5.1.2 Placebo Test

The placebo test, shown in Figure 4, reveals no evidence of fare reductions prior to Avelo or Breeze beginning service. This stands in contrast to patterns observed for other low-cost carriers, particularly Southwest. Goolsbee and Syverson (2008) found that more than 50% of the fare reduction associated with Southwest's entry occurred before the airline operated a single flight, with average fares falling by 8%–9% in the pre-entry period (1612–13). This anticipatory effect was strongest on routes where Southwest had a history of following through, suggesting that incumbents respond not only to actual entry but to credible competitive threats (1620–22).

Strategic models of entry deterrence support this kind of early response. Anderson and de Palma (2010) argue that preemptive price cuts can be effective only when they are credible and observable, and when incumbents can sustain the lower prices to influence entrant expectations (398). If the threat is not perceived as credible, or the price change is not viewed as binding, early cuts may have little effect.

In the case of Avelo and Breeze, the lack of anticipatory pricing suggests that incumbents did not view these carriers as credible threats. Both were new entrants with unproven business models and limited networks at the time. Their initial focus on smaller, secondary-airport routes likely reduced their perceived strategic importance. For large carriers managing national networks, these routes may have seemed too marginal to warrant early fare cuts, especially when the opportunity cost of cutting prices on low-yield markets outweighed the benefits.

This interpretation is consistent with the results presented in Section 5.2. The 19% fare reduction occurred only after Avelo and Breeze began flying, indicating that incumbent responses were reactive rather than preemptive. The placebo analysis thus reinforces the idea

that incumbents' decisions are shaped by the credibility of new entrants and the perceived value of the contested routes.

More broadly, this pattern reveals how legacy carriers make selective competitive decisions. On thinner or less strategically important routes, they may hold prices steady and delay action until entry materializes. Their broader networks and customer loyalty programs reduce pressure to respond unless the competitive threat is both credible and sustained. The absence of early fare cuts in this context highlights how incumbents evaluate not just the fact of entry, but who is entering, where, and with what strategic implications.

5.1.3 Incumbent Response

The evidence in Section 5.4 shows that incumbent carriers often exited contested routes following the entry of Avelo and Breeze. Rather than lowering fares or maintaining presence, legacy airlines frequently withdrew, leaving the new entrants as sole providers. This was a broad pattern: Avelo or Breeze became the dominant carrier on nearly 60% of treated routes, and in all but one case, no other airline remained to compete.

This behavior also unfolded quickly. As shown in Figure 6, Avelo and Breeze became the dominant carrier on nearly one-third of treated routes immediately upon entry, and on almost half within just one quarter. Within two quarters, they had majority market share on nearly 49% of all treated routes. This rapid transition suggests that incumbents exited these markets swiftly, often before mounting any price-based or capacity-based defense. The speed of this shift further supports the interpretation that legacy carriers saw little strategic value in contesting these routes.

This behavior raises important questions about market power and strategic priorities. One interpretation is that these routes were not profitable enough to defend. Large carriers with extensive networks may see low-yield, secondary-airport routes as expendable, choosing to

redeploy resources to higher-value markets. From this perspective, exit reflects strategic discipline rather than weakness. Incumbents may be exercising portfolio-level market power by relinquishing marginal routes while preserving their broader network strength. As Ciliberto and Williams argue, network carriers often make exit decisions based on strategic optimization rather than route-level losses, especially when competing in uncongested airports where access is not a constraint (Ciliberto and Williams 2010, 14).

This reframes the nature of competition. Rather than engaging in fare wars, incumbents may be practicing passive resistance, yielding isolated markets while maintaining pricing power elsewhere. This helps explain the limited pushback Avelo and Breeze encountered. The threat they posed was local, not system-wide. For major incumbents, these new entrants may have represented more of a nuisance than a strategic disruption.

At the same time, incumbent withdrawal has important implications. With no legacy competitors remaining, Avelo and Breeze now hold monopoly positions on many of these routes. While fares initially remain low, this market control raises concerns about long-term pricing discipline, service reliability, and consumer choice. Without ongoing competitive pressure, there is a risk that prices could rise, frequencies could decline, or quality could deteriorate over time. These outcomes would undermine the initial benefits of entry and suggest that the full impact of new competition cannot be assessed now of entry alone but must also be tracked over time as market dynamics evolve.

On the smaller set of routes where incumbents stayed, fare changes were limited. As shown in Section 5.4, the average post-entry fare reduction was just 3 percent, and even that estimate was clouded by data limitations. This suggests that incumbents competed cautiously where they remained, likely relying on loyalty programs, scheduling advantages, or other non-price strategies rather than deep fare cuts. However, Avelo and Breeze continue to expand their

networks, and if their growth accelerates or reaches higher-revenue markets, the current pattern of passive retreat may begin to shift. It remains to be seen at what point incumbents will move from selective disengagement to more active competition through pricing. Future fare wars may depend less on the presence of new entrants and more on whether incumbents perceive them as credible challengers in strategically important markets.

5.2 Limitations

While this study uses a thorough DiD approach, several important limitations should be acknowledged. These limitations reflect inherent challenges in working with observational data, particularly in dynamic, networked markets like commercial aviation. Although thought has been taken to construct a credible identification strategy, certain obstacles to validity, such as selection bias, data constraints, and potential spillover effects, are not shown in the analysis. Recognizing these constraints is essential to appropriately interpreting the results and identifying opportunities for further research.

5.2.1 Selection bias

A key methodological limitation in this study is the potential for selection bias stemming from the non-random entry decisions of Avelo and Breeze Airlines. Unlike in a randomized experiment, where treatment assignment is independent of underlying characteristics, these carriers likely chose routes based on strategic and commercial considerations. These may include factors such as high latent demand, under-served city pairs, weak incumbent presence, favorable airport agreements, or operational advantages at secondary airports.

Consistent with this, descriptive statistics show that the routes entered by Avelo and Breeze differ systematically from those they did not enter. As shown in Figure 8, the mean number of passengers per route-quarter on entered routes was 156.7, compared to 217.7 on non-entered routes.

Passenger Volume Comparison: Routes Entered by Avelo/Breeze vs. Not Entered

entry_status	Entered by Avelo/Breeze	Not Entered
Passenger Count Statistics per Route-Quarter		
count	5576.00	149805.00
mean	156.67	217.73
std	221.15	726.76
min	10.00	10.00
25%	45.00	20.00
50%	92.50	40.00
75%	180.00	120.00
max	2699.00	24735.00

Figure 8: Passenger Volume Comparison: Routes Entered by Avelo/Breeze vs. Routes Not Entered

While both groups contain routes with as few as 10 passengers, the upper end of the distribution diverges sharply: the maximum passenger volume for a non-entered route exceeds 24,000, compared to just 2,699 for the entered group. These patterns suggest that Avelo and Breeze targeted smaller, mid-traffic markets and avoided larger routes likely dominated by entrenched competitors. This type of self-selection reinforces the concern that treated routes are not a random sample of U.S. domestic markets.

To address this, I implemented a nearest-neighbor matching procedure based on observable characteristics. This improves balance between treated and control routes by ensuring that comparisons are made among markets with similar profiles. However, matching cannot adjust for unobserved factors that may have influenced market entry. For instance, airport-specific incentives, local economic development programs, or differences in consumer behavior—none of which are captured in the dataset, may affect both the likelihood of entry and fare dynamics. If these unobserved factors are correlated with price movement, the estimated treatment effect could be biased.

While the matching strategy and fixed effects reduce the influence of observable and time-invariant characteristics, selection bias from strategic self-selection remains a core limitation.

As such, the results should be interpreted as conditional on the observed characteristics used in matching, and not necessarily generalizable to all U.S. routes or future entrants.

5.2.2 Database Limitations

Another key limitation of this study stems from the characteristics of the DB1B dataset used for fare analysis. While it provides detailed base fare information, it does not include ancillary charges such as baggage fees, seat selection, priority boarding, in-flight purchases, or bundled service packages. This limitation is particularly important in the context of LCCs like Avelo and Breeze, whose business models rely heavily on unbundled pricing and ancillary revenue. As a result, changes in reported base fares may not accurately reflect the total cost of air travel for consumers. A route may appear to become more affordable following LCC entry, even if passengers ultimately pay more once optional fees are included. This discrepancy introduces a form of measurement error into the outcome variable. If the use of ancillary fees differs systematically between treated and control groups, or if pricing strategies change after entry, the estimated fare effects may misrepresent the true economic impact.

This challenge also affects interpretation of airline strategy. For example, Avelo and Breeze may keep base fares artificially low to stimulate demand while increasing ancillary charges. At the same time, legacy carriers might respond by matching base fares but maintaining or even raising fees for extra services, further obscuring price competition. The growing prevalence of unbundled pricing in the domestic airline market amplifies this issue. While the DB1B remains one of the most comprehensive datasets for airline pricing research, its omission of total fare information limits the precision of this analysis. Readers should interpret the reported fare reductions as changes in base prices only, which may understate or mischaracterize broader market dynamics.

5.2.3 Spillover

A further limitation of this study arises from potential spillover effects, which are particularly relevant in the context of the highly interconnected and strategically responsive airline industry. When a new entrant such as Avelo or Breeze begins service on a given route, incumbent carriers may respond not only on that route but also across other, related routes. These responses can include pricing adjustments, changes in flight frequency, or shifts in capacity on nearby or strategically linked markets, especially those sharing endpoint airports or within the same region. Such spillovers present a challenge for causal identification.

If incumbent carriers lower fares on routes adjacent to or strategically similar to the treated routes, some of those indirectly affected markets may be included in the control group. This “treatment contamination” violates the Stable Unit Treatment Value Assumption (SUTVA), a core requirement of the DiD method. When control units are partially exposed to treatment, the estimated treatment effect is biased toward zero, leading to conservative estimates of the true competitive impact. The risk of spillovers is particularly relevant in hub-and-spoke airline networks, where pricing on one route can influence nearby routes that share a hub or compete for similar demand. For example, a fare reduction on a Boston–Richmond route may influence prices on Boston–Norfolk, or even connecting flights routed through those same airports. This is especially likely for hybrid LCC like Avelo and Breeze, which target price-sensitive leisure travelers and may affect demand patterns across nearby vacation destinations.

Although this study partially mitigates the risk of spillovers by matching treated routes with control routes that differ in geography or network characteristics, perfect insulation from strategic externalities is not possible. As a result, any spillover-driven contamination likely biases estimates downward, suggesting that the true competitive effect of Avelo and Breeze entry may be even larger than the measured impact.

6. POLICY AND INDUSTRY IMPLICATIONS

6.1 Structural Barriers and Airport Access Reform

The fare reductions observed in this study were made possible not by entering major hubs, but by targeting secondary airports with available infrastructure and limited incumbent presence. Avelo and Breeze pursued this route intentionally, reflecting the structural barriers that continue to limit access to larger, more congested airports. These constraints, such as long-term gate leases, slot control, and exclusive terminal agreements, remain a defining feature of post-deregulation market dynamics (Ciliberto and Williams 2010).

To expand the scope of contestable markets, airport infrastructure policy needs targeted reform. Policymakers should consider shortening lease durations, enforcing “use-it-or-lose-it” slot rules, and requiring a minimum level of gate availability for new entrants at congested airports. These adjustments would not guarantee that smaller carriers enter these airports, but they would make it materially more feasible by reducing structural deterrents to entry (Brueckner, Lee, and Singer 2013). Still, greater access does not mean that new entrants will necessarily pursue it. Avelo and Breeze have succeeded by building their operations around speed, simplicity, and cost control in secondary markets. Even if slots at major hubs were made available, they may choose to stay within the niche they have developed. Their strategies suggest that access reform creates opportunity, not obligation. Whether hybrid carriers eventually scale into more contested markets will depend on a range of factors, including capital constraints, operational risk tolerance, and the perceived costs of confronting entrenched incumbents.

Ultimately, improving competitive conditions in U.S. domestic air travel depends less on further deregulation and more on expanding the infrastructure that enables entry. The ability of hybrid low-cost carriers to produce meaningful fare reductions in structurally open markets

highlights the competitive potential that exists, but only when the physical means to compete are accessible (Goolsbee and Syverson 2008).

6.2 Reconsidering Market Power and Route-Level Oversight

The finding that incumbents frequently exited routes following entry by Avelo and Breeze complicates the traditional interpretation of fare reductions as evidence of increased competition. While average fares declined by nearly 19% on treated routes, this effect often reflected the absence of competition rather than intensified rivalry. In many cases, Avelo or Breeze quickly became the sole provider, as legacy carriers withdrew instead of engaging in price-based responses.

This pattern suggests a strategy of selective retreat. For incumbents, the contested routes were likely of limited strategic value, with low yields or weak demand. Rather than lower fares to retain market share, they chose to reallocate aircraft and resources to higher-value routes (Ciliberto and Williams 2010). In doing so, they preserved their overall network strength while conceding specific city pairs. Market power, in this context, is maintained not through confrontation but by shaping where competition is allowed to occur.

These dynamics point to a gap in how airline competition is monitored. Current antitrust oversight tends to focus on national concentration, large mergers, or overlaps between major carriers at key hubs (Brueckner, Lee, and Singer 2013). Yet the most significant fare changes in this study occurred on small, thin routes that often fall outside traditional regulatory focus. These are the same markets where pricing power is most fragile, and where service reductions or provider exits can have outsized effects on consumers. Policymakers should consider a shift toward more detailed, route-level oversight. This would involve monitoring fare levels, carrier concentration, and entry or exit behavior on specific city pairs, particularly those with only one or two providers. Smaller markets are more vulnerable to shifts in carrier strategy, and their

competitive conditions can change quickly (Goolsbee and Syverson 2008). In these environments, standard indicators like national market share offer limited insight.

The evidence from Avelo and Breeze suggests that new entrants can generate large fare reductions, but also that they may become sole providers soon after entry. Without competitive discipline from incumbents or other challengers, there is a risk that these gains may erode over time. Route-level monitoring could help regulators identify when markets are trending toward monopoly conditions and consider interventions to sustain competitive pressure.

CONCLUSION

This thesis examined how two hybrid LCCs, Avelo Airlines and Breeze Airways, have influenced airfare pricing and competition in the U.S. domestic market since their launch in 2021. Using a TWFE DiD approach applied to matched route-level data, the analysis finds that entry by these carriers led to a significant and persistent reduction in average base fares, approximately 19% on affected routes. These effects appeared immediately and remained stable over time, suggesting durable competitive pressure rather than short-lived promotional pricing.

The findings contribute to a more nuanced understanding of airline competition in the post-deregulation era. While much of the existing literature has focused on large-scale LCCs or ULCCs, this study demonstrates that smaller, hybrid entrants targeting secondary airports can also generate meaningful fare reductions, particularly in markets with limited incumbent competition and fewer infrastructure constraints. However, the observed pricing responses often diverged from historical patterns. In many cases, incumbents exited the market rather than responded with fare cuts. This suggests a form of passive market power, where legacy carriers selectively withdraw from low-priority routes to maintain competitive strength elsewhere. As a result, Avelo and Breeze frequently became sole providers on most treated routes. These dynamics challenge the assumption that lower fares always indicate active price competition and highlight the need for route-level regulatory oversight to monitor the emergence of monopolies in smaller markets.

Although the core analysis focused on fares, broader implications should not be overlooked. New LCC entry may improve access to air travel for price-sensitive passengers and enhance connectivity for underserved cities. These potential social and economic benefits were beyond the scope of this study but represent promising directions for future research.

Ultimately, the early impact of Avelo and Breeze suggests that hybrid LCCs can influence pricing not by expanding rapidly but by strategically filling gaps left by incumbent carriers. Whether these effects persist will depend on how these airlines grow, how policy frameworks evolve, and whether regulators address the structural constraints that continue to shape market entry and competition.

Several directions for future research emerge from this analysis. First, it is important to examine total travel costs. The DB1B dataset does not include ancillary fees, so base fare reductions may not reflect the full cost to consumers. Second, this study finds that incumbents often exit rather than compete. Understanding why legacy carriers retreat, and under what conditions, could clarify how entry shapes both market power and service coverage. Third, spillover effects deserve attention. New entrant activity may influence pricing on nearby or connecting routes, even when those routes are not directly entered. Fourth, it remains unclear whether observed fare reductions will be sustained. If Avelo and Breeze continue to expand and become sole providers on certain routes, their pricing behavior may shift over time. These questions reflect the changing nature of airline competition and highlight the evolving role hybrid LCCs may play in reshaping U.S. air travel.

APPENDIX

Github like to code and data set: https://github.com/CarsenEssing/Essing_Thesis_Data

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