What can be Expected from Mergers After Deregulation?  
The Case of the Long-Distance Bus Industry in France

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Abstract
This study estimates the competitive effects of horizontal mergers in the French long-distance bus industry. We examine the two mergers that followed the 2015 Deregulation Act (the Macron Law); we use an exclusive and exhaustive dataset that covers eight consecutive quarters. We analyze the merger effects by comparing bus links that were affected by mergers with those that were unaffected; we use difference-in-differences estimations. We find that the two mergers are associated with price increases of about 13.5% immediately that then moderate to 5.3%; and with the frequency decreases from −21.5 to −25.7%; we observe no effects on load factors. These findings show evidence of short-run anticompetitive effects, while the mergers under study were not scrutinized by the French competition agency, as they were below the notification thresholds.

Keywords  Long-distance bus industry · Mergers and acquisitions · Deregulated industry · Consolidation · Intramodal competition · Difference-in-differences estimation

JEL Classification  L11 · L41 · L43 · L92 · K23 · R40

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1 Introduction

France’s long-distance bus industry is a dynamic sector in which consolidation has played an important role since it was liberalized with the enactment of the Macron Law in the summer of 2015. Indeed, four mergers have occurred since its opening to competition in 2015: FlixBus/Megabus and Ouibus/Starshipper in 2016; Blablacar/Ouibus in 2018; and FlixBus/Isilines-Eurolines in 2019. These mergers have strongly affected the structure of this new market, in which new hopes for mobility have emerged.

This study analyzes the competitive effects of the 2016 acquisitions on three strategic variables—prices, load factors, and frequencies—for which sufficient hindsight and data are available. This exercise is important because French railways will be fully open to competition by 2023, and the Italian experience suggests that this will increase intermodal competition (Gremm, 2018).

The economics literature identifies two main types of impacts resulting from horizontal mergers: On the one hand, a merger can lead to a rationalization of the production system through efficiency gains or cost synergies. These are the pro-competitive effects of mergers. On the other hand, a merger may increase market power, leading to higher prices, less choice, or reduced innovation and quality: the anticompetitive effects on consumers. This tradeoff was analyzed from a theoretical perspective in the pioneering work of Williamson (1968) and within the oligopoly framework by Deneckere and Davidson (1985), who focused on price competition, and by Farrell and Shapiro (1990), who focused on quantity competition.

We address this tradeoff from an empirical perspective: We focus on how mergers affect prices, load factors, and scheduling frequencies in a new industry: France’s intercity bus industry. As was pointed out by Crozet and Guihéry (2018), load factors are a key variable for bus operators. One strategy is to increase load factors. Mergers can achieve this objective more readily. By rationalizing frequencies, mergers can lead to synergies that make it possible to offer fewer scheduled trips but with a larger number of passengers per bus. These two non-price variables—load factors and frequencies—are specific to mergers in transport markets and fully exploring the effect of the French intercity bus mergers on these variables is worthwhile.

We examine the 2016 mergers that have created changes in market concentration. We use original data that have been provided by the French transport regulator Autorité de régulation des transports (ART) to show that these two acquisitions

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1 The law No. 2015-990 of August 6, 2015 for growth, activity and equal economic opportunity, known as the Macron Law, aims at benefitting French consumers by strengthening competition in many economic sectors.
2 For a theoretical survey of the above tradeoff, see Whinston (2006). See also the 2018 special issue of this journal edited by Stephen Martin dedicated to the 50th anniversary of the publication of Williamson (1968).
3 In other words, the analysis is focused on the links wherein merging firms were already active before the acquisitions.
4 The transport regulator was renamed “ART” in October 2019. Its former acronym was “ARAFER,” Autorité de régulation des activités ferroviaires et routières.
affected the competitive dynamics of the French intercity bus industry. A difference-in-differences (DiD) analysis shows that the Megabus and Starshipper acquisitions resulted in more concentrated links (routes), which allowed operators to raise their prices and reduce their frequencies, although entry barriers appear to be low. In the first quarter after the acquisition, prices increased by 13.5%; but these increases diminished over time, reaching 5.3%. Frequency decreases started one quarter later and ranged from −21.5 to −25.7%, while there were no effects on load factors. Thus, we show that these mergers may have had raised anticompetitive effects. However, they were not scrutinized by the French competition agency (because the mergers were below the notification thresholds).

The remainder of this paper is organized as follows. Section 2 briefly reviews the relevant empirical literature. Section 3 provides a background on France’s long-distance intercity bus market. Section 4 describes our estimation strategy and data sources, as well as the methodology that we used to construct the merger and comparison markets. Section 5 presents the study’s empirical findings. Section 6 concludes the paper.

2 Related Literature

The bus city-pair merger analysis and airline city-pair merger analysis are similar in many ways. This section reviews the recent literature on merger retrospectives. We focus first on airlines and then on the intercity bus industry in Europe.

Peters (2006) analyzes five airline mergers from the 1980s and compares the observed post-merger price with merger simulations. This retrospective study questions the predictive performance of merger simulation and pleads for more flexible models of firm conduct. These results are likely to be heterogeneous across industries. However, most retrospective studies focus on U.S. cases or specific industries (e.g., banking, airlines, hospitals, and petroleum); European mergers remain largely unstudied, partly because of the relatively poor data availability.

Several interesting studies have involved airline merger retrospectives and have used the methodology employed in this study. For example, Dobson and Piga (2013) analyzed business model assimilation following two mergers between low-cost European carriers. Using a DiD approach, they show that—except for the prices that were advertised only a few days before departure—the acquirer firms maintained prices that were below their pre-acquisition levels and increased or stabilized capacities and flight frequencies on the acquired routes. However,

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5 Unlike most of these studies that rely on data from the 10% airline ticket sample, our analysis uses exhaustive data that have been collected by the ART. The data collection procedure is rigid and enshrined in the Macron Law (see Sect. 4.1 for more details). Our data are exhaustive but more aggregated—at the segment level and on a quarterly basis—than the studies that are generally derived from the 10% ticket sample.

6 They analyze two important mergers involving European low-cost carriers: EasyJet’s acquisition of Go Fly in 2002 and Ryanair’s acquisition of Buzz in 2003.
these effects were not persistent over time, but were observed only during the first year following the merger.

Shen (2017) uses DiD estimation to examine the price effects of the United-Continental airline merger. He finds that prices on nonstop links (routes) increased significantly after the merger relative to the competitive rates of the separate airlines. In direct-route markets where they were formerly competitive, the prices of United and Continental Airlines increased by 7.8%, \textit{ceteris paribus}. Here, the effect of market power outweighed the possible efficiency gains. Interestingly, the effect of consolidation in the airline industry is also linked to airport dominance; e.g., see Bilotkach and Lakew (2014)’s study of US airports.

Of course, a merger may affect market outcomes other than pricing, such as flight frequencies, firm productivity, cost synergies, or product repositioning. For instance, Chen and Gayle (2019) analyzed the effect on service quality of two airline mergers: the Delta-Northwest (DL-NW) (2008) and the Continental-United (CO-UA) (2010) mergers. They show that each merger increased the routing quality of the merging firms’ products—0.45\% and 5.28\% for the DL-NW and CO-UA mergers, respectively—in markets where the merging firms did not compete before the merger.

Das (2019) focuses on price and quality effects that are related to the mega-merger between American Airlines (AA) and US Airways (US). Using a similar DiD approach, Das (2019) shows that the post-merger price effects are directly related to market size. Indeed, post-merger prices decreased for larger city-pair markets but increased for smaller ones. Furthermore, the AA-US merger also had both positive and negative effects on quality—e.g., decreases in canceled flights, but also increases in departure and/or arrival delays—but these effects are not differentiated according to market size, unlike the price effects. In the same vein, Carlton et al. (2019) carried out a comprehensive investigation of the effect on fares and output of three recent US airline mergers: They show that these mergers have been pro-competitive overall, with significant increases in passenger traffic and frequency, and no significant unilateral effect on fares.

Doi and Ohashi (2019) focus their retrospective work on quality responses to airline mergers. They estimate a structural model that allows firms to choose not only prices but also product characteristics, such as flight frequency. They studied the 2002 horizontal merger between Japan Airlines (JAL) and Japan Air System (JAS) in Japan. They find that the efficiency gains from the merger are significant and that, while the welfare effects of the merger are positive, they vary across market structures. Using a quasi-natural experiment involving a political choice made by the Chinese government, Yan et al. (2019) show that mergers in the early 2000s increased airline companies’ productivity.

On-time performance is another variable that is used to approximate service quality. Prince and Simon (2017) analyze five major airline mergers that have occurred in the US since 2000 and study how these mergers affected on-time performance. The authors found that service quality improved because of efficiency gains from mergers. Nonetheless, efficiency gains may not materialize following a merger or from targeting other strategic variables. Cao et al. (2017) analyze the effect of airline competition on service quality, allowing for nonlinear effects. Using a large database...
of 5472 US route-carrier combinations, they found that the average length of flight delays and cancelation rates increased with the concentration level.

Finally, a stream of research focuses on the effects of deregulation in the intercity bus industry. Aarhaug and Fearnley (2016) observe that deregulation in Norway led to significant growth in passenger numbers and the emergence of a new form of competition based on innovation and digital technologies. New entry has been important in Italy and Germany (Dürr et al., 2017; Beria et al., 2018), although deregulation resulted in strong consolidation in Germany (Dürr et al., 2016; de Haas & Schäfer, 2017). Deutsche Bahn exited the intercity bus market in 2016. Average fares tend to decrease (see Dürr et al. (2016) for Germany, supported by the increased intermodal rail competition found by Gremm (2018)), but some prices have increased (see the notable British case analyzed in White (1990)). Finally, Fageda and Sansano (2018) showed that intermodal competition matters in Europe. They analyzed the determinants of prices and frequencies depending on competition type. Using data collected from a sample of links in six large European countries, they find that intramodal competition is based on frequency, while intermodal competition is based on prices.

3 Industry Background

The Macron Law of August 6, 2015 marked the start of a deregulation process in line with the general trend toward liberalization in the transport services sector and, more broadly, the network industries in the EU and the US. With the opening to competition of the intercity bus services, the French government aimed to increase the mobility of the more price-sensitive population and offer alternative transport modes.

3.1 Before 2011

In retrospect, the development of the intercity bus services has been particularly hampered in France compared with other modes of transport, as has been true of many other European countries’ experiences (Jones, 1995). In the 1920s, these services were active (i.e., buses made many stops and their operating costs were lower than those of the rail mode) and evolved according to the innovations of manufacturers. In the 1930s, a double crisis appeared: a structural crisis that arose from the appearance of the new intermodal competition (“the rise of the road”); and the

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7 The operator FlixBus acquired MeinFernBus (2015) and Postbus (2016). Both acquisitions were below the notification threshold, thus they were not reviewed by the German competition authority.
8 There are similarities in the effects of such liberalization between Germany and Italy; the differences are caused by industrial, geographical, and historical factors (see Grimaldi et al. (2017)).
9 Empirical evidence has been found with respect to the effect of liberalization in the rail industry. The UK, Norway, and Sweden were among the first to open their rail industries to competition in Europe. See Nilsson et al. (2013) for the Swedish case.
general economic crisis of the 1930s. The rail sector, which was very powerful and benefited from broad political support, developed a set of regulations to protect its activity and limit the growth of road transport (Guihéry, 2015). The SNCF group, the public rail operator, was created in the wake of this in 1936 during the Front Populaire government.

From the 1930s to 2011, long-distance regular bus services hardly existed in France. They mainly responded to the business activities of tour operators, and the local transport authorities organized them for specific events or occasions. The services of tour operators corresponded to transport to specific visits in tourist destinations (e.g., Lourdes). They were not regularly scheduled services, as compared with the bus services that are analyzed in this article.

In terms of the local transport organizing authorities, before the territorial reform of 2015, metropolitan France was administratively divided into 21 regions (the 1982 Decentralization Act). These regions include départements. The départements were responsible for bus transport, and the regions were responsible for rail transport. Thus, the départements were considered transport organizing authorities. They were free to set up transport systems that primarily serviced relatively remote areas (e.g., school transport and transporting senior citizens); however, this service was limited to a specific geographical area within the départements.

Few data on this market were available during that period, as regular interurban transport by bus was not statistically distinguished from urban public transport by bus. Bus transport is less developed in France than elsewhere because of the successive governments’ decisions to favor rail over buses. Beginning in the 1970s, the rail policy was a great national success, as seen in the TGV (high-speed rail) speed records in the 1970s, the TGV Atlantic line in 1989 designed to run at 300 km/h in commercial service, then Eurostar in 1994, and Thalys and TGV Duplex 2 years later. However, this has prevented the emergence of alternative modes of low-cost transportation.

3.2 The Cabotage Regulation (2011–2015)

From 2011, France enforced the inclusion into its national law of the European regulation that introduced cabotage, which thus allowed some foreign-based bus companies to provide intercity bus services in France. The cabotage services had to comply with the following three cumulative conditions: 1) between any two stops in the national territory, the number of passengers on a domestic service had to be less than 50% of the total number of passengers carried by that service between those two points; 2) the annual turnover of the service from all domestic services had to be
less than 50% of the turnover from the transport service carried out in the national territory; 3) cabotage services had to be concerned with at least two administrative regions: The carrier was prohibited from allowing national passengers to board and alight between two stops within the same region.\textsuperscript{12}

### 3.3 The Macron Law (2015)

The Macron law removed these cabotage constraints and opened the long-distance market completely.\textsuperscript{13} This led to the offer of new links that would have been impossible under cabotage. The transport regulator ART was responsible for monitoring the deregulation process, and the Macron Law endowed the agency with the responsibility for data collection and monitoring for the new market (see below).

By late 2015, five intercity bus operators emerged: Isilines-Eurolines was a subsidiary of the Transdev group\textsuperscript{14} and is a leader in the European international bus transport market. The group is particularly active in the Netherlands, Belgium, the Czech Republic, and Spain. It operates a bus network that covers 25 countries. The second operator, Ouibus (formerly IDBus), was launched by the French rail incumbent operator SNCF—Société Nationale des Chemins de Fer—which can be considered a multimodal operator.\textsuperscript{15} The third operator, the German FlixBus uses a platform business model with rapid entry and multiple stops. It does not own any buses but connects customers via independent and local bus operators.\textsuperscript{16} The fourth and fifth operators were Megabus—which is owned by the UK Stagecoach group—and the French Starshipper: a network of independent bus operators that are based mainly in Southwest France. It is worth mentioning that besides these five major operators, the market also includes other local independent operators (see Fig. 2).

Competition on France’s bus links has been relatively heterogeneous since liberalization. For instance, in early 2019, the 10 busiest links accounted for approximately 30% of the total demand.\textsuperscript{17} On some representative links with particularly fierce intermodal competition, bus operators have enhanced their position by offering lower tariffs (Blayac & Bougette, 2017). Bus operators seem to have used an aggressive pricing strategy to generate demand in this new market. Over time, there

\textsuperscript{12} See Fig. 1 for the key events in the deregulation of the French intercity bus industry. Blayac and Bougette (2017) provide further details and identify some of the pricing strategies that were used.

\textsuperscript{13} By “long-distance services,” we mean links of over 100 km. Below this threshold, the ART verifies the absence of any negative repercussions on transport options provided by local authorities, such as regional express rail services.

\textsuperscript{14} Transdev was owned by the Caisse des Dépôts group and Véolia. In October 2018, Rethmann—a German industrial group—acquired Véolia’s stake in Transdev (33%).

\textsuperscript{15} In November 2018, the leading EU carpooling operator Blablacar announced its intention to acquire Ouibus. Blablacar entered the intercity bus market via a new fundraising campaign ("BlaBlaCar rachète Ouibus à la SNCF," Les Échos, Nov. 12, 2018).

\textsuperscript{16} More precisely, FlixMobility GmbH is the parent company of mobility platforms FlixBus and FlixTrain. Ownership positions include equity firms such as the General Atlantic, Silver Lake, TCV, Permira, and HV Holtzbrinck Ventures. For further information on the group’s strategy, see “How FlixBus conquered the European coach market”, The Economist, May 10, 2018.

\textsuperscript{17} Ibid.
has been a gradual increase in the prices offered to consumers (see Fig. 3 for the evolution of average revenue from 2015 to 2019). In addition, entries have occurred on various scales for many of the links studied. This pattern is expected in most deregulated markets.

This dynamic new entry phase tends to be followed by a consolidation phase and mergers between operators (e.g., Dürr et al., 2016). The long-distance bus markets in France and Germany generally adhere to this classic pattern. In France, the first wave of acquisitions occurred three quarters after Macron Law: On July 1, 2016, FlixBus took over Megabus’s retail business in continental Europe (i.e., Germany, Italy, France, Spain, and Benelux) and its cross-border services to London. 18 On July 24, 2016, Starshipper became part of the Ouibus franchise, which complemented Ouibus’s connections. These two mergers did not have to be approved by the French competition agency because they were below the notification threshold.

Both mergers may be indicative of the development of specific business strategies. The effects of such strategies are the focus of this study. This study assesses the competitive effects of these two mergers on the entire French intercity bus market. The acquisitions of Ouibus by Blablacar in 2018 and of Isilines-Eurolines by FlixBus in 2019 cannot be included in the study because of a lack of data.19

18 The Megabus Europe business comprises both retailing activities and coach operating activities. “We have agreed to the sale to FlixBus of the retailing part of that business. We will continue to operate a number of European inter-city coach services as a contractor to FlixBus, and we look forward to building on our relationship with it.” (Stagecoach Group, news release, June 29, 2016).

19 The integration of the Eurolines-Isilines brands by FlixBus has been effective since May 1, 2019, while that of Ouibus into BlaBlaBus has been effective since July 1, 2019 (ARAFER, 2019a). The following period was marked by a quasi interruption of bus services as a result of the COVID-19 pandemic.
4 Data and Empirical Strategy

This section describes the database that has been provided by the ART (Sect. 4.1). We also explain how we created variables from the original dataset (Sect. 4.2). Finally, we briefly describe the empirical strategy that we use to assess the effects of the bus operator mergers (Sect. 4.3).
4.1 Database and Useful Data Set

The data used in this study were provided by the ART. Under the Macron Law, bus operators are obliged to provide the ART with information on all marketed links. This data collection obligation concerns only domestic links: the links that begin and end in French territory. Therefore, the database did not include any international links.

Owing to data-collection constraints, a link between a city of origin A and a destination city B is non-oriented in the study. In other words, one cannot distinguish between the number of passengers that travel from A to B or from B to A. Figure 4 shows the aggregation of both. A link is a segment of a commercial line that is marketed by a bus operator. Figure 4 illustrates the situation in the database. Bus operators X and Y operate a commercial line between origin city A, and destination city E (commercial line No. 3 and commercial line No. 2 in the database, respectively); however, bus operators X and Y choose alternative strategies. While X chooses to make only one intermediate stop at D, Y chooses to make three intermediate stops at B, C, and D.

As a customer of bus operator X wishing to travel from city A to city E can buy a single ticket A–E, or buy one ticket for A–D and one ticket for D–E, the X company stopover strategy leads to three distinct links for commercial line No. 3: A–E; A–D; and D–E. Similar reasoning applied to the Y company stopover strategy identifies 10 links for commercial line No. 2: A–E; A–D; A–C; A–B; B–E; B–D; B–C; C–E; C–D; and D–E. Therefore, in this context, there is real competition on three links (A–E, A–D, and D–E), and no competition on the seven remaining links (A–C, A–B, B–E, B–D, B–C, C–E, and C–D) because of the strategies chosen by bus operators X and Y. Nevertheless, there could be competition on link B–C that is operated by operator X or by another operator Z on a commercial line that links, for instance, city T to city P (with intermediate stops at B and at C). Reasoning “by links” rather than commercial lines allows for capturing these potential phenomena in our study, as well as avoiding the multiple counting of the same passengers.

For each link, bus operators provide two quarterly spreadsheets: one spreadsheet for the areas served, access arrangements to the services (e.g., stopover points, bus stations), the use of the services delivered, and the main economic and social results (e.g., the number of people employed by the companies including the bus drivers); and another spreadsheet for the quality of their services. They are also required to provide annual financial and economic information.20

We use only quarterly information. The database is exhaustive, and the data period covers eight consecutive quarters from the creation of this new market in France: from the fourth quarter of 2015 (Q4-2015) to the third quarter of 2017 (Q3-2017). The market opened in August 2015 (Q3-2015). However, the Q3-2015 data are not used as observations, since the period covered only half of the quarter.

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20 For further details on the ART’s data-collection process, seehttps://www.autorite-transports.fr/les-autocars/transmission-de-donnees-par-les-autocaristes.
The database provided by the ART includes information on each link for each bus operator and each quarter. The ART database consists of an Excel spreadsheet with 23,411 observations and 14 variables. The exhaustive list of variables comprises the name of the bus operator (commercial brand), quarter, commercial line number, city of origin, destination city, and INSEE code of the city of origin, the INSEE code of the destination city, a dummy variable that indicates whether the link is actually marketed, the number of passengers carried, the number of seats on the bus, the length of the trip, the number of trips made, and the average revenue per passenger (€/100 km). Based on the information provided, we create new variables that are useful for econometric modeling (see Sect. 4.2).

In the first step, we restrict the data set to observations that are fully available for the 14 variables: the restricted database contains 17,303 observations. Then, we reduced the dataset to only those links that operated throughout the period under consideration; from Q4-2015 to Q3-2017. The database contains 4904 observations. However, this level of disaggregation is not relevant to our research question because we do not aim to analyze the merger effects by operator or link, but rather the overall merger effects on the complete set of links.

Consequently, in the final step, we aggregated the data to the link level. Overall, at this aggregate level, the database includes 257 links operated from Q4-2015 to Q3-2017, and were used to study the overall merger effects. As mentioned, observations for the three calendar quarters are available in the pre-merger period (Q4-2015, Q1-2016, and Q2-2016) and four quarters of observations are available post-merger (Q4-2016, Q1-2017, Q2-2017, and Q3-2017). The quarter Q3-2016, in which the two mergers occurred, was omitted. Ultimately, 257 links were observed for seven quarters. Finally, econometric models are estimated based on 1799 observations.

4.2 Description of Variables Used in the Econometric Modeling

This section first describes the aggregation process from individual observations to a link and then provides a short description of the variables used in the econometric analysis (see Sect. 5). Descriptive statistics are provided in Tables 1 and 3. The variables used in the econometric modeling are described in Table 2. We start with the dependent variables: price, load factor, and frequency.

4.2.1 Construction of Dependent Variables

For a given quarter, the average price on a given link $i$ is computed as the weighted mean of the average revenue per passenger (€/100 km) of each bus operator on this
link for this quarter. The weighting factor is the number of passengers that were carried by the corresponding bus operator on this link for this quarter divided by the total number of passengers on the given link and in the given quarter. Formally, we obtain

$$\text{Price}_{i,t} = \sum_j w_{i,j,t} \times \text{Price}_{i,j,t}$$

(1)

where subscript $i$ denotes the link, $j$ the bus operator, and $t$ is the quarter under consideration. $w_{i,j,t}$ represents the weight of the bus operator $j$ for link $i$ and quarter $t$. Therefore, we have

$$w_{i,j,t} = \frac{\text{Passengers}_{i,j,t}}{\sum_j \text{Passengers}_{i,j,t}}$$

(2)

The methodology that is used for the two other dependent variables (load factor and frequency) is similar, but the weighting factor changes. We use the number of seats x kilometers that were supplied by bus operators for a given link and a given quarter as the weighting factor. The load factor variable is not directly provided in the ART database; however, for a given link and a given quarter, we can compute the total number of seats that were supplied by each bus operator, which is equal to the product of the number of trips that were made (frequency) by the number of seats on the bus (bus size). The load factor for bus operator $j$ on link $i$ and for quarter $t$ is then obtained by dividing the number of passengers that were carried by bus operator $j$ by the total number of seats that were supplied by $j$. Formally, we obtain:

$$\text{Load}_{i,j,t} = \frac{\text{Passengers}_{i,j,t}}{\text{Frequency}_{i,j,t} \times \text{Bus-Size}_{i,j,t}}$$

(3)

We then compute an average load factor for a given link $i$ and a given quarter $t$ with the use of the weighted average. The weighting factor is the number of supplied seats x kilometers of a given bus operator $j$ divided by the total number of supplied seats x kilometers of link $i$ for quarter $t$. Formally, we obtain
Table 1: Sample descriptive statistics

| Variables                  | Whole sample (# 1799) | Pre-merger (# 771) | Post-merger (# 1028) |
|----------------------------|------------------------|--------------------|----------------------|
| Price (€/100 km)          | 4.38 (61.03), (1.34–14.46) | 3.54 (39.10), (1.34–9.70) | 4.83 (47.89), (2.56–14.46) |
| Load factor (%)           | 13.39 (39,257), (0.02–58.86) | 12.13 (38,365), (0.02–58.86) | 14.23 (39,659), (0.07–56.76) |
| Frequency                 | 1554 \(4.82E^6\), (12–6835) | 1698 \(4.93E^6\), (21–6835) | 1457 \(4.71E^6\), (12–6583) |
| Distance (km)             | 357.20 (200.51), (101.33–1043.65) | 347.56 (192.73), (101.33–1028.00) | 364.44 (205.95), (102.59–1043.65) |
| Passengers (per link)     | 4622 (11,215), (1–114,727) | 3815 (10,570), (1–114,727) | 5228 (11,643), (4–111,668) |
| HHI passenger             | 0.71 (0.25), (0.26–1.00) | 0.73 (0.26), (0.26–1.00) | 0.69 (0.24), (0.33–1.00) |
| HHI frequency             | 0.66 (0.26), (0.21–1.00) | 0.69 (0.27), (0.21–1.00) | 0.64 (0.25), (0.33–1.00) |
| HHI capacity              | 0.66 (0.26), (0.21–1.00) | 0.68 (0.28), (0.26–1.00) | 0.64 (0.25), (0.33–1.00) |
| Seat \(\times\) km. supplied | 11.6E^6 \(14.3E^6\), (1.46E^5–155.9E^6) | 10.9E^6 \(14.0E^6\), (1.77E^5–141.3E^6) | 12.1E^6 \(14.5E^6\), (1.46E^5–155.9E^6) |
### Table 1 (continued)

| City-pair geometric mean (Year 2016, # 257) | Mean $(SD)$ | Minimum | Maximum |
|-------------------------------------------|-------------|---------|---------|
| Population                                | 260,203 $(196,025)$ | 25,745 | 1,378,835 |
| Unemployment rate (%)                     | 8.93 $(1.16)$ | 5.93 | 13.44 |
| Reference tax income (€/year/household)   | 19,130 $(3836)$ | 11,885 | 31,303 |

| Radial (from/to Paris) | Frequency | Percent |
|------------------------|-----------|---------|
| Yes                    | 64        | 24.90   |
| No                     | 193       | 75.10   |
| #                      | 257       | 100.00  |

Note 1: For Price, Load Factor, and Frequency, a weighted average is used. The weighting factors are the number of passengers carried for the Price variable and the number of supplied seats × kilometers for Load Factor and Frequency variables. Unweighted means were used for all other variables.

Note 2: All figures are computed on links, not on commercial lines (see Sect. 4.1 and Fig. 4 for links’ definition).
Table 2  Short description of variables used in the econometric modeling

| Name (notation) | Description |
|-----------------|-------------|
| **Dependent variables** | |
| **Price** (LPRICE) | This is the average revenue per passenger (€/100 km). For each quarter and each link, we have the average revenue per passenger (€/100 km) for each bus operator. We compute a weighted average for the link. The weight factor is the number of passengers carried by the corresponding bus operator on this link for this quarter divided by the total number of passengers of the given link and quarter. In the regression, we take the logarithm of this variable |
| **Load Factor** (LLOAD) | This is the average load factor on a given link for a given quarter. For each quarter and link, we first compute a load factor for each bus operator, which is equal to the total number of passengers carried by this operator divided by the capacity of this operator (Frequency × Bus-Size). We then compute an average load factor for a given link and a given quarter using the weighted average. The weight factor is the number of supplied seats × kilometers of a given bus operator divided by the total number of supplied seats × kilometers of the link for this quarter. In the regression, we take the logarithm of this variable |
| **Frequency** (LFREQ) | This is the average frequency on a given link for a given quarter. Frequencies provided by bus operators are directly available in the ART database. We compute the weight-average frequency for a given link and a given quarter. The weighted factor was the same as that for the load factor. In the regression, we take the logarithm of this variable |
| **Explanatory variables** | |
| **Time Fixed Effect** (Q4–2015 to Q3–2017) | Dummy variable associated with each quarter. Therefore, we obtain seven dummy variables: Q4–2015 to Q3–2017. The quarter in which the mergers between operators occur is omitted: Q3–2016 |
| **Treatment** (Two variables: TREAT, TREAT) | Dummy variable equals 1 if the links belong to the treatment group irrespective of the identity of the merger, and 0 otherwise. TREAT is equal to 1 if the links belong to the treatment group and are affected by merger k (k=A, B, or AB). See Sect. 5.1 |
| **Interaction** (InterQ4–2016 to InterQ3–2017) | These interaction terms are defined as the product of the treatment variable by the time fixed effect, only for quarters posterior to the mergers. Therefore, we have four interaction terms (i.e., InterQ4–2016 to InterQ3–2017) when dealing with the overall effect. Interaction terms are also used with treatment variables related to merger k (k=A, B, or AB). See Sect. 5.1 |
| **Distance** (KM) | This is the distance in kilometers between the two cities of the city-pair |
| **Radial Trip** (PARIS) | Dummy variable equals to 1 if the link begins or ends in Paris (French capital) |
where subscript $i$ denotes the link, $j$ is the bus operator, and $t$ is the quarter under consideration. $w_{i,j,t}$ represents the weight of the bus operator $j$ for link $i$ and quarter $t$. Therefore, we obtain

$$w_{i,j,t} = \frac{\text{Frequency}_{i,j,t} \times \text{Bus-Size}_{i,j,t} \times \text{Distance}_{i,j,t}}{\sum_j \text{Frequency}_{i,j,t} \times \text{Bus-Size}_{i,j,t} \times \text{Distance}_{i,j,t}}$$  \tag{5}$$

The number of trips that were supplied by bus operator $j$ on link $i$ for quarter $t$ is directly provided in the ART database; it is denoted “Frequency.” To compute the average frequency on link $i$ for quarter $t$, we use a weighted average with the same weight factor as that used for the load factor (see equation 5). We thus obtain

Table 2 (continued)

| Name (notation)          | Description                                                                                                                                 |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Population (POP–GM)      | We use the population of the city of the city pair to compute the geometric mean of the population on each link. To this end, we used data from 2016 |
| Unemployment (UR–GM)     | We use the unemployment rate of the city of origin and destination to compute the geometric mean of the unemployment rate on each link. To this end, we used data from 2016 |
| Reference Tax Income (INC–GM) | Each year, the French tax authorities compute the “Reference Tax Income” of each household. The latter is an indicator of the standard of living for a tax household. This provides the average reference tax income of households living in a given city. We then compute the geometric mean of the average reference tax income for each link. To this end, we used data from 2016 |
| Market Structure (X–TO–Y) | We define a dummy variable for the evolution of every market structure possible in the data set. To this end, we focus on the quarter immediately before the merger (Q2–2016) and the quarter immediately after it (Q4–2016). For instance, the dummy variable 5–TO–3 equals 1 if there were 5 bus operators on the link before the merger, and 3 after it, and 0 otherwise. Therefore, we create the following nine dummy variables: 5-TO-3, 4-TO-3, 3-TO-2, 3-TO-1, 2-TO-1, No changes, 1-TO-2, 1-TO-3, and 2-TO-3 |
| Entry (ENTRY-POST)       | We build a dummy variable equal to 1 if an entry has occurred on the link between the quarter before the merger (Q2–2016) and the quarter after the merger (Q4–2016). Therefore, ENTRY-POST takes the value 1 if the dummy variable describing the market structure is equal 1-TO-2 or 1-TO-3 or 2-TO-3 |

$$\overline{\text{Load}}_{i,t} = \sum_j w_{i,j,t} \times \text{Load}_{i,j,t}$$  \tag{4}$$

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where: subscript $i$ denotes the link; $j$ is the bus operator; and $t$ is the quarter under consideration. $w_{i,j,t}$ represents the weight of the bus operator $j$ for link $i$ in quarter $t$.

In all of the econometric regressions, we use the logarithm of the dependent variable.

Table 1 provides some descriptive statistics for the price. For all of the links under study, the average price is about 4.38 €/100 km. This average price is strongly increasing before and after the mergers (from 3.54 €/100 km to 4.83 €/100 km). One of our aims is to determine whether these price increases are due to the two mergers or to other factors that affected the market. This average bus

\[
\text{Frequency}_{i,t} = \sum_{j} w_{i,j,t} \times \text{Frequency}_{i,j,t}
\]  

(6)

Table 3 Pre and post-mergers market structures

| Variables                  | Pre-merger (Q2–2016) | Post-merger (Q4–2016) |
|----------------------------|-----------------------|------------------------|
| Number of links            | 257                   |                        |
| **Market structure**       |                       |                        |
| Monopoly                   | 67 (26.07%)           | 71 (27.63%)            |
| Duopoly                    | 88 (34.24%)           | 85 (33.07%)            |
| Oligopoly                  | 102 (39.69%)          | 101 (39.30%)           |
| **Herfindahl–Hirschmann Index** | Mean (SD)       | Mean (SD)               |
| Passenger                  | 0.67 (0.25)           | 0.68 (0.24)            |
| Frequency                  | 0.59 (0.26)           | 0.64 (0.25)            |
| Capacity                   | 0.60 (0.27)           | 0.64 (0.25)            |
| **Δ Bus operators**        |                       |                        |
| From 5 to 3                | 5 (1.95%)             |                        |
| From 4 to 3                | 39 (15.18%)           |                        |
| From 3 to 2                | 17 (6.61%)            |                        |
| From 3 to 1                | 1 (0.39%)             |                        |
| From 2 to 1                | 19 (7.39%)            |                        |
| No changes                 | 144 (56.03%)          |                        |
| From 1 to 2                | 15 (5.84%)            |                        |
| From 1 to 3                | 1 (0.39%)             |                        |
| From 2 to 3                | 16 (6.22%)            |                        |
| **Δ HHI Passenger:**       |                       |                        |
| $\Delta HHI > +10\%$      | 80 (31.13%)           |                        |
| $-10\% \leq \Delta HHI \leq +10\%$ | 105 (40.86%) |                        |
| $\Delta HHI < -10\%$      | 72 (28.01%)           |                        |
price is lower than that of carpooling or train services in France: 5.94 €/100 km and 13.42 €/100 km, respectively, in the same period (Blayac & Bougette, 2017).

As Table 1 shows, the average load factor is low, at approximately 13%, with a relatively modest evolution before and after the merger; this is far from the load factor that would be required to reach the breakeven point (Crozet et Guihéry, 2018). This average load factor is heterogeneous within the links, as is illustrated by the standard deviation.

For the 257 links under study, the frequency supplied is about 1554 trips per quarter on average, with a significant reduction after the mergers (from 1698 to 1457). It will be interesting to analyze whether this reduction is due to mergers and supply rationalization or to the other factors that affected the links.

4.2.2 Details of the Explanatory Variables

We now discuss the explanatory variables that are used in our econometric modeling. In addition to the classical variables used in the DiD method—time fixed effects, treatment, and interaction terms—we also introduce several variables that are useful for capturing the specificity of each link.

We use the distance between the city pairs. In our sample, the average distance of the links is approximately 357 km which is relatively short (Table 1). Indeed, according to CGDD (2018), the average distance (one-way) of long-distance trips in France in 2016, for all modes of transport, varies from 708 to 738 km respectively for personal and business purposes (for trips that required at least one night at the destination; 79% of long-distance trips in France) and from 208 to 263 km, respectively, for personal and business purposes (for trips for which the return trip is made during the day; 21% of long-distance trips in France).

We also use a dummy variable that reflects the radial characteristics of the links, so as to account for beginnings or endings in Paris, these radial links account for about 25% of the links under consideration.

The sociodemographic characteristics of the links likely play a major role in the pricing and frequency strategies of bus operators. Therefore, we include in our analysis population, unemployment rate, and reference tax income: We use the geometric mean of the city-pair variables. Table 1 shows that the trips provided by bus operators joined medium-sized cities, of approximately 260,000 inhabitants. The city pairs are characterized by an unemployment rate of about 9% and an annual reference tax income of approximately 19,130 € per household. These three sociodemographic characteristics have a high degree of heterogeneity.

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24 More information about these variables is provided in Table 2.
25 CGDD stands for Commissariat général au développement durable. Set up in 2008 within the Ministry of Ecological Transition, the General Commission for Sustainable Development (CGDD) informs and contributes to the Ministry’s actions in all of its areas of competence by producing data and insights.
26 In contrast to transversal links.
27 For more details about these variables, see Table 2. Data are from 2016.
Table 1 also provides information about several variables that are not directly used in the econometric analysis but that are useful for building weight factors or other variables, such as Passenger, HHI Passenger, HHI Frequency, HHI Capacity, and Seat×Kilometer supplied. The quarterly number of passengers on a bus link is approximately 4600 (thus approximately 50 passengers per day in both directions; the potential for traffic development is therefore significant), with substantial heterogeneity across the links: up to 115,000 quarterly passengers, or 1300 passengers per day. At the same time, the number of seats × kilometers supplied is high, which helps explain the low values of the load factors. With the data in the ART database, we compute three HHIs—Passenger, Frequency, and Capacity—which are each about 0.7 and thus illustrate the generally high concentration of the links in our sample.

Let us take a more in-depth view of this long-distance bus market for the quarter immediately preceding the merger operations—Q2–2016—as well as for the quarter immediately following Q4–2016. As Table 3 shows, the overall market structure does not significantly change after the two mergers: 27% of the links are monopoly, 33% are duopoly, and 40% are oligopoly. Nevertheless, link concentration seems to be increasing, especially in terms of frequency and capacity. While the number of bus operators does not change for 56% of the links considered, it decreases for 32% of them, which generally follows from the mergers between the operators. However, we also observed an increase in the number of bus operators for 12% of the links. Focusing on the variation of the HHI for passengers, mergers lead to an increase in market concentration for 31% of the links, a decrease for 28% of the links and stability for 41% of the links.

These elements are sufficiently interesting to be introduced into the econometric analysis—not in their current form, but via dummy variables (see Table 2). Thus, with respect to the evolution of the market structure, we create nine dummy variables to reflect the evolution of the number of bus operators on each link between the quarter immediately before the merger (Q2–2016) and the quarter immediately after it (Q4–2016). Finally, the phenomenon wherein bus operators enter a link is captured by the creation of a final dummy variable that is equal to 1 for links on which at least one operator enters and 0 otherwise—always for the quarters immediately before and after the merger (ENTRY-POST).

### 4.3 Assessing the Various Effects of Mergers

Two methods can be used to assess the effects of mergers between operators: one based on merger simulations and the estimation of a structural model, and the other based on the DiD approach. We chose the DiD approach as the most appropriate technique for two main reasons (Ormosi et al., 2015): First, the DiD approach does not require an assumption about the type of competition within the market. Second,
the lack of cost characteristics data would have led to less relevant merger simulation results.\textsuperscript{28}

The DiD approach requires the identification of a control group that is associated with the treatment group 4.3.1 and the test of the parallel trend assumption between the two groups 4.3.2.

4.3.1 Defining Control and Treatment Groups

This method requires the identification of the links where the operators are active before the acquisitions. We use data from Q4-2015 to Q2-2016 and retain only the links for which information is available across all three quarters.

The treatment group comprises links for which at least one merger occurs. These are the overlapping links for the merged firms. In the control group, we find links where operators other than the four were present (mainly Isilines-Eurolines) or links where only one of the two merging entities was active (Ouibus or Starshipper, FlixBus or Megabus).

Finally, to define the two groups, we ensure that the selected links—in the control as well as the treatment groups—are still marketed after the merger and for each of the four quarters observed: Q4-2016 to Q3-2017.

The quarter in which the mergers took place—Q3-2016—was omitted in our study. This procedure led to 168 links in the control group and 89 in the treatment group.\textsuperscript{29} The two groups accounted for more than 90% of the passengers transported during the three quarters preceding the mergers between the operators.

4.3.2 Testing DiD Assumptions

The validity of the DiD method relies on the assumption of a parallel trend between the treatment and control groups before the mergers (Q4-2015 to Q2-2016). We checked the validity of this assumption via graphical analysis. For each group, we computed the average price per passenger (€/100 km), the average load factor, and the average frequency for each quarter during the period analyzed. We use a weighted approach to compute the average price, load factor, and frequency. For the former variable, the weighting factor is the total number of passengers carried on each link, while for the latter two variables, it is the number of seats × kilometers supplied.

Thus, for a given group and quarter, the price of a link contributes to the average price in proportion to the number of passengers carried, while the load factor and the frequency of a link contribute to the average load factor and the average frequency, respectively, in proportion to the number of seats × kilometers supplied.

\textsuperscript{28} For a discussion on which approach to use for retrospective merger studies, see the EC report by Ormosi et al. (2015). Both methods can be applied to the same case. See also Peters (2006).

\textsuperscript{29} See the online appendix detailing the links included in the treatment group as well as the links in the control group. http://www.gredeg.cnrs.fr/research/blayac_bougette_online_material.pdf
The computational results are provided in Table 4 and are depicted graphically in Fig. 5 below.

Figure 5 shows that this assumption is not unrealistic, although the evolution between the first and second quarters—Q4-2015 and Q1-2016—with regard to average prices raises some questions. One possible explanation is that the operator FlixBus (the market leader in Germany) entered the market in Q4-2015 but not necessarily at the beginning of the period.30

In addition to the graphical analysis, the parallel trend assumption can be tested based on a comparison of the evolution rates of the three variables under consideration between the two groups. For each group, we compute the relative price evolution, the relative load factor evolution, and the relative frequency evolution between the quarter preceding the merger (Q2-2016) and the first quarter of the study period (Q4-2015). As the groups are sufficiently large, we use a Z-test to compare the average price evolution, the average load factor evolution, and the average frequency evolution in each group. Table 5 presents the results.

The Z-test’s decision rule does not allow us to reject the common trend assumption at the 5%-level for any of the variables under investigation. Therefore, we use the DiD method to assess the impact of carrier mergers on the long-distance bus market in France.

5 Results

This section presents the econometric modeling (Sect. 5.1) and the results of the estimation process (Sect. 5.2). Finally, we provide the economic interpretations and policy implications of the results in Sect. 5.3).

5.1 Econometric Modeling

Following the recommendation of Mariuzzo and Ormosi (2019), we use a temporal disaggregation model that is more detailed than the classical DiD model with two groups and two periods. Mariuzzo and Ormosi (2019) underline the importance of considering post-merger dynamics.31 This method consists of introducing a dummy variable for each quarter and another dummy variable for each of the interaction terms between the treatment group and the quarters post-merger. Formally, for the three dependent variables under study—price, load, and frequency—we estimate the following equation to assess the overall effects of the two mergers:

30 We tried to account for this by introducing a correction factor in terms of frequency and passengers carried for the links that were operated by FlixBus. However, this method was not sufficiently convincing to be retained: It leads to strategic reactions from the rivals, especially in terms of prices being ignored. It would be legitimate to assume that considering the strategic response of other suppliers would probably result in a decrease in the average price in the treatment group for Q4-2015.

31 Specifically, Mariuzzo and Ormosi (2019) show that using pooled models can lead to erroneous conclusions about post-merger effects. They recommend using unpooled models for a period of at least two years after the merger.
### Table 4  Weighted average—price, load factor, and frequency

| Period | Price (€/100 km) | Load factor (%) | Frequency (per quarter) |
|--------|------------------|----------------|-------------------------|
|        | Control          | Treatment       | Control | Treatment | Control | Treatment |
| Q4-2015 | 3.27             | 3.26            | 3.31    | 8.63      |        |          |
| Q1-2016 | 3.66             | 3.22            | 3.68    | 8.86      |        |          |
| Q2-2016 | 3.95             | 3.65            | 5.53    | 12.21     |        |          |
| Q3-2016 | –                | –               | –       | –         | –       | –         |
| Q4-2016 | 4.57             | 4.90            | 6.13    | 12.59     |        |          |
| Q1-2017 | 4.35             | 4.58            | 5.63    | 13.48     |        |          |
| Q2-2017 | 4.66             | 4.86            | 6.60    | 15.84     |        |          |
| Q3-2017 | 4.99             | 4.99            | 7.50    | 15.39     |        |          |

Weight factor: Passengers × km supplied  Seats × km supplied

### Fig. 5 Pre- and post-merger evolution of three dependent variables

- **(a)** Bus average prices
- **(b)** Bus average load factors
- **(c)** Bus average frequencies
Table 5  Test of the common trend assumption³¹

|                      | Price          | Load factor | Frequency       |
|----------------------|----------------|-------------|-----------------|
|                      | Control        | Treatment   | Control         | Treatment   | Control | Treatment   |
| Pre-merger evolution rate | 0.1600        | 0.0936      | -0.1773        | -0.1417    | 0.0603  | 0.0612      |
| Standard deviation   | 0.2570         | 0.6093      | 0.2123          | 0.1707     | 0.3441  | 0.1980      |
| Sample size          | 168            | 89          | 168             | 89         | 168     | 89          |
| Null hypothesis H₀   | Same evolution between groups (Q4-2015 to Q2-2016) | | |
| Z-test               | 0.98           | -1.46       | -0.03           |           |
| Decision rule        | Accept H₀      | Accept H₀   | Accept H₀       |            |

In our econometric modeling, we use variables that are transformed into logarithms. Therefore, the tests concern the evolution of the various quantities taken in logarithms

\[
\ln(Y_{i,t}) = \beta_1 + \sum_{t=2}^{7} \beta_{2,t} \cdot Q_t + \beta_3 \cdot \text{TREAT} + \sum_{t=4}^{7} \beta_{4,t} \cdot \text{InterQ}_t + \beta_5 \cdot \text{KM} + \beta_6 \cdot \text{PARIS} + \beta_7 \cdot \text{POP-GM} + \beta_8 \cdot \text{UR-GM} + \beta_9 \cdot \text{INC-GM} + \beta_{10} \cdot 5\text{-TO-3} + \beta_{11} \cdot 4\text{-TO-3} + \beta_{12} \cdot 3\text{-TO-2} + \beta_{13} \cdot 3\text{-TO-1} + \beta_{14} \cdot 2\text{-TO-1} + \beta_{15} \cdot \text{ENTRY-POST} + \epsilon_{i,t} \tag{7}
\]

where the subscript \(i\) refers to an observation—specifically a link between a city of origin and a destination city. The subscript \(t\) defines quarters. \(\beta_k\) and \(\beta_{k,t}\) are the coefficients to be estimated. Quarter 1 (Q4-2015) was used as the base period. Thus, Quarters 2 and 3 (Q1-2016 and Q2-2016) reflect the pre-merger period, while Quarters 4 to 7 (Q4-2016 to Q3-2017) correspond to the post-merger period (the merger period Q3-2016 is omitted).

We can be more specific and disentangle the effects of the various mergers within the treatment group. To do this, we create three dummy variables—\(\text{TREAT}_A\), \(\text{TREAT}_B\) and \(\text{TREAT}_{AB}\)—to determine whether there were any differential effects of the two mergers on the overall conditions of the links. Therefore, we can estimate the following equation

\[
\ln(Y_{i,t}) = \beta_1 + \sum_{t=2}^{7} \beta_{2,t} \cdot Q_t + \beta_3 \cdot \text{TREAT} + \sum_{t=4}^{7} \beta_{4,t} \cdot \text{InterQ}_t + \beta_5 \cdot \text{TREAT}_A + \sum_{t=4}^{7} \beta_{6,t} \cdot \text{Inter}_A Q_t + \beta_7 \cdot \text{TREAT}_B + \sum_{t=4}^{7} \beta_{8,t} \cdot \text{Inter}_B Q_t + \beta_9 \cdot \text{PARIS} + \beta_{10} \cdot \text{POP-GM} + \beta_{11} \cdot \text{UR-GM} + \beta_{12} \cdot \text{INC-GM} + \beta_{13} \cdot 5\text{-TO-3} + \beta_{14} \cdot 4\text{-TO-3} + \beta_{15} \cdot 3\text{-TO-2} + \beta_{16} \cdot 3\text{-TO-1} + \beta_{17} \cdot 2\text{-TO-1} + \beta_{18} \cdot \text{ENTRY-POST} + \epsilon_{i,t} \tag{8}
\]

We cannot publish data at the bus operator level for confidentiality reasons that are linked to the research agreement. Thus, A refers to one of the two mergers, which affected 33 links in the treatment group; and B is the other merger, which affected
46 links. We use AB when the links were affected by the two mergers simultaneously: The four merging parties all offered service on the link. This occurred for 10 links in the treatment group. The total number of links affected (33 + 46 + 10) is equal to 89, which is the size of the treatment group.

Equations (7) and (8) for the three dependent variables considered were estimated using weighted regression. The weights were determined using the method proposed by Carlton et al. (2019). The main characteristic of these weights is that, for a given link, they do not vary across the quarters; we thereby reduce concerns that the weights are endogenous (i.e., affected by the mergers). For the price regression, the weight is the total number of passengers carried for each link; and for the load factor and frequency regressions, the weight is the total number of seats × kilometers supplied for each link. Thus, for the price regression, the weight of link \( i \)–prw\(_i\) is equal to

\[
prw_i = \frac{\sum_{t=1}^{7} \sum_{j=1}^{5} \text{Passengers}_{i,j,t}}{\sum_{i=1}^{257} \sum_{t=1}^{7} \sum_{j=1}^{5} \text{Passengers}_{i,j,t}}
\]

For the load factor and frequency regressions, the weight of link \( i \)–lfrw\(_i\) is equal to

\[
lfrw_i = \frac{\sum_{t=1}^{7} \sum_{j=1}^{5} \text{Supplied-Seat-Kilometer}_{i,j,t}}{\sum_{i=1}^{257} \sum_{t=1}^{7} \sum_{j=1}^{5} \text{Supplied-Seat-Kilometer}_{i,j,t}}
\]

The effects of the mergers are captured by the coefficients that are associated with the interaction terms. As Eqs. (7) and (8) are estimated in a semi-logarithmic form, the true proportional change in \( Y \) that is due to the mergers is equal to the exponential function of the estimated coefficient associated with the considered dummy variable minus 1.

### 5.2 Econometric Results

In this subsection, we estimate the models that are defined in Eqs. (7) and (8) for the three dependent variables under study. The results of the econometric estimations are provided in Table 6, where we distinguish between variables that are directly associated with the DiD method (part 1 of the table) and those that are introduced to capture the specificity of each link (part 2 of the table). The overall statistical validity of the six models is good, as is evidenced by the F-tests. Their explanatory power is substantial, with an adjusted \( R^2 \)–squared ranging from 0.60 to 0.70.
5.2.1 Mergers Effects on Prices

The econometric results show that the two mergers had a significant effect on prices. Given the positive and highly significant coefficient for each interaction term, the results show that prices rose for the treatment group: the links that were direct overlaps for the mergers between FlixBus and Megabus and between Ouibus and Starshipper. However, the price effect diminished over time from 13.5% in Q4-2016, immediately following the mergers to 5.3% in Q3-2017. The price increase was therefore somewhat transitory, which supports the recommendation of Mariuzzo and Ormosi (2019) to focus on post-merger dynamics. These results are consistent with the findings in the merger retrospective literature, where several studies show that price effects are high immediately after the merger and then diminish quickly (Focarelli & Panetta, 2003; Dobson & Piga, 2013). Although the price effect diminished, it was still above 5% a year after the mergers. According to the general guidelines of competition agencies, these would constitute anticompetitive mergers.

If one now looks at the differential effects of the two mergers in terms of prices (column (4)), we find that one of the two mergers (A in the estimates) mainly drives prices upward, both when this merger appears without the presence of two remaining merging firms on the links—e.g., +17% in Q4-2016—and when B is also present: e.g., +15.4% in Q4-2016. When only B is present on the links, the estimated coefficients associated with the interaction terms are not significant, except for Q2-2017 at only the 10%-level. Thus, it is A that causes the upward post-merger trend in the price of the links.

Among the other factors that influence prices on a given link, prominent roles are played by the variable PARIS (positive sign) and the population size (negative sign). Thus, ceteris paribus, links from or to Paris have higher prices, while links between two large cities have lower prices. This means that bus operators consider both “market value” and “customer value” in their pricing strategies. This appears sensible and is in line with the Macron Law’s objective of providing consumption benefits to French consumers.

5.2.2 Mergers Effects on Load Factors

None of the estimated coefficients that are associated with the interaction terms in model (2) are statistically significant at the individual level (t-test). This means

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32 As was mentioned above, one needs to use the exponential to compute the dependent variable change that is related to a dummy variable.
33 “Market value” and “customer value” are terms that are inherited from the introduction of yield management techniques in France into the pricing strategies of transportation companies. “Market value” refers to the concept that each link exhibits specific characteristics (different economic potential of cities, more or less strong intermodal competition, etc.) and that posted prices cannot be solely based on the strict application of a mileage scale. This leads to what we call different market values depending on the city-pairs. “Customer value” refers to the fact that a customer’s willingness to pay may vary depending on the reason for travel, departure time, travel time, and the mode of transport considered.
34 Indeed, the long-distance bus services that were allowed by the Macron Law give the less wealthy customers greater opportunity to travel long distances. Initially, within the framework of the Macron Law, the expected consumption benefits for French consumers amounted to about €6 billion, all measures combined.
Table 6 Econometric results of the mergers effects

| Variables | \( LPRICE \) | \( LLOAD \) | \( LFREQ \) | \( LPRICE \) | \( LLOAD \) | \( LFREQ \) |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
|           | (1)         | (2)         | (3)         | (4)         | (5)         | (6)         |
| Constant  | 1.185***    | \(-6.533***\) | 3.984***    | 1.020***    | \(-6.566***\) | 4.071***    |
|           | (0.072)     | (0.319)     | (0.262)     | (0.068)     | (0.320)     | (0.265)     |
| \( Q_{1-2016} \) | 0.111       | 0.001       | 0.863***    | 0.011       | 0.001       | 0.863***    |
|           | (0.011)     | (0.063)     | (0.051)     | (0.010)     | (0.062)     | (0.051)     |
| \( Q_{2-2016} \) | 0.121***    | 0.358***    | 0.734***    | 0.121***    | 0.358***    | 0.734***    |
|           | (0.011)     | (0.063)     | (0.051)     | (0.010)     | (0.062)     | (0.051)     |
| \( Q_{4-2016} \) | 0.274***    | 0.441***    | 0.799***    | 0.274***    | 0.441***    | 0.799***    |
|           | (0.019)     | (0.082)     | (0.067)     | (0.017)     | (0.081)     | (0.067)     |
| \( Q_{1-2017} \) | 0.227***    | 0.388***    | 0.595***    | 0.226***    | 0.387***    | 0.596***    |
|           | (0.019)     | (0.082)     | (0.067)     | (0.017)     | (0.081)     | (0.067)     |
| \( Q_{2-2017} \) | 0.303***    | 0.494***    | 0.620***    | 0.302***    | 0.494***    | 0.621***    |
|           | (0.019)     | (0.082)     | (0.067)     | (0.017)     | (0.081)     | (0.067)     |
| \( Q_{3-2017} \) | 0.371***    | 0.634***    | 0.837***    | 0.634***    | 0.634***    | 0.838***    |
|           | (0.019)     | (0.082)     | (0.067)     | (0.017)     | (0.081)     | (0.067)     |
| \( TREAT \) | \(-0.047***\) | 0.081       | 0.419***    | \(-0.166***\) | 0.162**    | 0.455***    |
|           | (0.015)     | (0.070)     | (0.057)     | (0.017)     | (0.084)     | (0.069)     |
| \( TREAT_A \) | \(-\)       | \(-\)       | \(-\)       | \(-0.166***\) | 0.162**    | 0.455***    |
|           | \(-\)       | \(-\)       | \(-\)       | (0.017)     | (0.084)     | (0.069)     |
| \( TREAT_B \) | \(-\)       | \(-\)       | \(-\)       | 0.082***    | \(-0.164*\) | 0.386***    |
|           | \(-\)       | \(-\)       | \(-\)       | (0.017)     | (0.089)     | (0.073)     |
| \( TREAT_{AB} \) | \(-\)       | \(-\)       | \(-\)       | \(-0.001\) | 0.066       | 0.361***    |
|           | \(-\)       | \(-\)       | \(-\)       | (0.021)     | (0.136)     | (0.112)     |
| \( \text{Inter}_{Q_{4-2016}} \) | 0.127***    | \(-0.149\)  | \(-0.096\)  | \(-0.166***\) | 0.162**    | 0.455***    |
|           | (0.021)     | (0.103)     | (0.084)     | (0.017)     | (0.084)     | (0.069)     |
| \( \text{Inter}_{Q_{1-2017}} \) | 0.108***    | 0.007       | \(-0.275***\) | \(-\)       | \(-\)       | \(-\)       |
|           | (0.021)     | (0.103)     | (0.084)     | \(-\)       | \(-\)       | \(-\)       |
| \( \text{Inter}_{Q_{2-2017}} \) | 0.096***    | 0.029       | \(-0.242***\) | \(-\)       | \(-\)       | \(-\)       |
|           | (0.021)     | (0.103)     | (0.084)     | \(-\)       | \(-\)       | \(-\)       |
| \( \text{Inter}_{Q_{3-2017}} \) | 0.052**     | \(-0.100\)  | \(-0.297***\) | \(-\)       | \(-\)       | \(-\)       |
|           | (0.021)     | (0.103)     | (0.084)     | \(-\)       | \(-\)       | \(-\)       |
| \( \text{Inter}_{A_{Q_{4-2016}}} \) | \(-\)       | \(-\)       | \(-\)       | 0.157***    | \(-0.376***\) | 0.007        |
|           | \(-\)       | \(-\)       | \(-\)       | (0.021)     | (0.118)     | (0.097)     |
| \( \text{Inter}_{A_{Q_{1-2017}}} \) | \(-\)       | \(-\)       | \(-\)       | 0.127***    | \(-0.162\)  | \(-0.294***\)|
|           | \(-\)       | \(-\)       | \(-\)       | (0.021)     | (0.118)     | (0.097)     |
| \( \text{Inter}_{A_{Q_{2-2017}}} \) | \(-\)       | \(-\)       | \(-\)       | 0.132***    | \(-0.173\)  | \(-0.215**\) |
|           | \(-\)       | \(-\)       | \(-\)       | (0.021)     | (0.118)     | (0.097)     |
| \( \text{Inter}_{A_{Q_{3-2017}}} \) | \(-\)       | \(-\)       | \(-\)       | 0.089***    | \(-0.334***\) | \(-0.273***\) |
|           | \(-\)       | \(-\)       | \(-\)       | (0.021)     | (0.118)     | (0.097)     |
| \( \text{Inter}_{B_{Q_{4-2016}}} \) | \(-\)       | \(-\)       | \(-\)       | 0.011       | 0.378**     | \(-0.300**\) |
|           | \(-\)       | \(-\)       | \(-\)       | (0.029)     | (0.159)     | (0.132)     |
| \( \text{Inter}_{B_{Q_{1-2017}}} \) | \(-\)       | \(-\)       | \(-\)       | \(-0.022\)  | 0.423***    | \(-0.211\)  |
|           | \(-\)       | \(-\)       | \(-\)       | (0.029)     | (0.159)     | (0.132)     |
| \( \text{Inter}_{B_{Q_{2-2017}}} \) | \(-\)       | \(-\)       | \(-\)       | \(-0.051*\) | 0.473***    | \(-0.225*\) |
|           | \(-\)       | \(-\)       | \(-\)       | (0.029)     | (0.159)     | (0.132)     |
What can be Expected from Mergers After Deregulation? The Case…

Table 6 (continued)

| Variables       | LPRICE  | LLOAD  | LFREQ  | LPRICE  | LLOAD  | LFREQ  |
|-----------------|---------|--------|--------|---------|--------|--------|
|                 | (1)     | (2)    | (3)    | (4)     | (5)    | (6)    |
| $\text{Inter}_BQ3^{−}2017$ | –       | –      | –      | –       | 0.038  | –      |
|                 |         |        |        |         | 0.428***| –      |
|                 |         |        |        |         | –      | −0.252*|
| $\text{Inter}_BQ4^{−}2016$ | –       | –      | –      | 0.143***| –      | −0.143 |
|                 |         |        |        |         | –      | −0.159 |
| $\text{Inter}_BQ1^{−}2017$ | –       | –      | –      | 0.160***| −0.018 | −0.307*|
|                 |         |        |        |         | –      | −0.162 |
| $\text{Inter}_BQ2^{−}2017$ | –       | –      | –      | 0.121***| 0.081  | −0.375**|
|                 |         |        |        |         | –      | –0.162 |
| $\text{Inter}_BQ3^{−}2017$ | –       | –      | –      | 0.036   | –      | −0.063 |
|                 |         |        |        |         | –      | −0.469***|
| $\text{Inter}_BQ4^{−}2017$ | –       | –      | –      | 0.032   | –      | −0.47420 |
|                 |         |        |        |         | –      | −0.296 |
| $\text{Inter}_BQ1^{−}2016$ | –       | –      | –      | 0.121***| −0.018 | −0.307*|
|                 |         |        |        |         | –      | −0.162 |
| $\text{Inter}_BQ2^{−}2016$ | –       | –      | –      | 0.121***| 0.081  | −0.375**|
|                 |         |        |        |         | –      | –0.162 |
| $\text{Inter}_BQ3^{−}2016$ | –       | –      | –      | 0.036   | –      | −0.063 |
|                 |         |        |        |         | –      | −0.469***|

**Table 6**

| Variables       | LPRICE  | LLOAD  | LFREQ  | LPRICE  | LLOAD  | LFREQ  |
|-----------------|---------|--------|--------|---------|--------|--------|
|                 | (1)     | (2)    | (3)    | (4)     | (5)    | (6)    |
| $\text{KM}$    | −0.0002***| −7.345E^{−4}***| −0.001***| −2.254E^{−4}***| −7.18E^{−4}***| −0.001***|
|                 | 0.00002 | (1.049E^{−8}) | (8.635E^{−5}) | (2.22E^{−5}) | (1.053E^{−4}) | (8.724E^{−5}) |
| $\text{PARIS}$ | 0.032***| −0.485***| −0.280***| 0.082***| −0.47420***| −0.296***|
|                 | 0.012   | (0.061) | (0.050) | (0.011) | (0.062) | (0.051) |
| $\text{POP-GM}$| −1.082E^{−7}***| 1.69E^{−6}***| 1.11E^{−6}***| −6.276E^{−8}***| 1.71E^{−6}***| 1.07E^{−6}***|
|                 | (2.445E^{−8}) | (1.150E^{−7}) | (9.461E^{−8}) | (2.313E^{−8}) | (1.158E^{−7}) | (9.597E^{−8}) |
| $\text{UR-GM}$ | 0.012   | 0.049   | 0.053***| 0.028***| 0.052** | 0.045** |
|                 | 0.005   | (0.023) | (0.019) | (0.004) | (0.023) | (0.019) |
| $\text{INC-GM}$| 3.31E^{−6} | 1.404E^{−4}***| 8.697E^{−5}***| 1.7E^{−6} | 1.398E^{−4}***| 8.771E^{−5}***|
|                 | (2E^{−6}) | (8.69E^{−5}) | (1.87E^{−5}) | (8.64E^{−5}) | (7.16E^{−5}) | (7.16E^{−5}) |
| $\text{5-TO-3}$| 0.030   | 0.399***| 0.203** | −0.032 | 0.402***| 0.321***|
|                 | 0.017   | (0.106) | (0.087) | (0.021) | (0.142) | (0.118) |
| $\text{4-TO-3}$| −0.032**| −4.492E^{−4} | 0.255***| 0.018  | 0.019  | 0.239***|
|                 | 0.014   | (0.069) | (0.056) | (0.014) | (0.073) | (0.061) |
| $\text{3-TO-2}$| 0.099***| −0.219**| −0.424***| 0.062** | −0.228**| −0.412***|
|                 | 0.019   | (0.091) | (0.075) | (0.017) | (0.091) | (0.076) |
| $\text{3-TO-1}$| −0.071 | 0.572   | −1.532***| −0.098 | 0.553  | −1.506***|
|                 | 0.109   | (0.636) | (0.523) | (0.102) | (0.631) | (0.523) |
| $\text{2-TO-1}$| −0.013 | 0.280***| −1.013***| −0.007 | 0.282***| −1.017***|
|                 | 0.025   | (0.104) | (0.086) | (0.023) | (0.104) | (0.086) |
| $\text{ENTRY-POST}$| −0.005 | 0.046   | −0.059  | 0.008  | 0.050  | −0.067  |
|                 | 0.017   | (0.064) | (0.052) | (0.016) | (0.063) | (0.052) |
| $\text{Obs.}$  | 1799    | 1799    | 1799    | 1799    | 1799    | 1799    |
| $\text{F-test}$| 157.15  | 125.86  | 162.45  | 134.47  | 89.20   | 112.43  |
| ($p$ value)     | < .0001 | < .0001 | < .0001 | < .0001 | < .0001 | < .0001 |
| $\text{Adj.}R^2$| 0.6564  | 0.6044  | 0.6639  | 0.7037  | 0.6199  | 0.6648  |

Period: Q4-2015 as the base period. 3 quarters pre-merger and 4 quarters post-merger; Q3-2016 is dropped. Robust standard errors in parentheses below estimated coefficients. Significance level: ***=1%, **=5%, *=10%
that bus operators’ mergers had no overall effects between the treatment and control groups with respect to the load factor (see Fig. 5-b).

When the two mergers are differentiated, a positive effect on load factors was shown to come from B (model (5)). For instance, in Q4-2016, for all links on which B is present, the overall link load factors increase by 45.9%, which shows some evidence of efficiency. This effect is significant over the four quarters (statistically significant at least 5%). Conversely, on the links where A is present, we observe a reduction in the load factors, but only in two quarters: Q4-2016 and Q3-2017 with − 31.3% and − 28.4%, respectively. Among the variables that are used to characterize each link, the positive impact of the variable \(5-TO-3\) on the load factors can be seen: The links for which competition between operators was strong before the mergers and where the four merging firms operated simultaneously have, \(ceteris paribus\), a higher load factor than the other links. The same result can be established for the links where a duopoly turned into a monopoly immediately after the merger (\(2-TO-1\)).

5.2.3 Mergers Effects on Scheduling Frequencies

Overall the two mergers significantly affected the bus operators’ strategies in terms of the scheduling frequencies offered. Only the first post-merger quarter is not significant, while the following three quarters show a large reduction in frequencies (statistically significant at the 1% level): − 24% in Q1-2017; − 21.5% in Q2-2017; and − 25.7% in Q3-2017. Thus, the decline in bus frequencies does not appear immediately after the two acquisitions but from the following quarter until the end of the study period.

From the differential effects study (model 6), we show that the two mergers did not have the same impact in terms of frequency reduction. A participates more in the drop in frequency than in B. The presence of two—AB—fits the overall scenario. Over the three post-merger quarters, all three configurations (A, B, or AB) lead to a reduction in frequencies although the B scenario is associated with the smallest reductions in frequencies: The coefficients that are associated with some quarters—for example Q1-2017—are not statistically significant (or are weakly significant).

Apart from the variables that are specific to the DiD method, the econometric results show that distance (\(KM\)) plays a negative role in the scheduling frequencies on a given link. This result appears sensible and can be explained by French legislation on driving times.

Differentiating merger effects allows us to conclude that links where A was present seems to have experienced more anticompetitive effects than the links where B was present. For the links where the four merging firms were operating, we find the same results as the undifferentiated model.

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35 Note that \(ENTRY-POST\) does not appear significant for any model.

36 Bus drivers must take a break of at least 45 minutes every four and a half hours on the road, and must not work more than 10 hours per day.
**Table 7** Descriptive statistics from the treatment group. *Source:* Authors’ computations

| Variable                        | Pre-merger (Q2-2016) | Post-merger (Q2-2017) | Growth rate |
|---------------------------------|-----------------------|------------------------|-------------|
|                                 | Mean      | Min. | Max. | Mean      | Min. | Max. | Mean      | Min. | Max. |
| No. operators                   | 3.27   | 1    | 5    | 2.49     | 1    | 3    | −23.85 | 0    | −40.00 |
| Frequencies                     | 1408.74 | 72.8 | 5801.9 | 1004.24 | 78 | 4928 | −28.71 | 7.14 | −15.06 |
| No. of passengers               | 11,508.4 | 24   | 114,727 | 10,495.97 | 11 | 89,990 | −8.80 | 54.17 | −21.56 |
| Price                           | 3.95   | 2.26 | 8.07 | 5     | 3.93 | 7.67 | 26.58 | 73.89 | −4.96 |
| Load factor                     | 10.52 | 0.08 | 54.22 | 13.02 | 0.21 | 56.4 | 23.76 | 162.50 | 4.02 |
| HHI pass                        | 0.5   | 0.26 | 1    | 0.57 | 0.34 | 1    | 14.00 | 30.77 | 0    |
| HHI freq                        | 0.41 | 0.21 | 1    | 0.51 | 0.34 | 1    | 24.39 | 61.90 | 0    |
| HHI Capa                        | 0.41 | 0.21 | 1    | 0.51 | 0.34 | 1    | 24.39 | 61.90 | 0    |
| Seats x kilometers supplied     | 19,859,390.09 | 446,191.2 | 131,710,123 | 15,724,104.13 | 495,220.2 | 115,445,200 | −20.82 | 10.99 | −12.35 |
Table 8 Descriptive statistics from the control group. Source: Authors’ computations

| Variable                      | Pre-merger (Q2-2016) | Post-merger (Q 2-2017) | Growth rate |
|-------------------------------|-----------------------|------------------------|-------------|
|                               | Mean                  | Min. | Max. | Mean | Min. | Max. | Mean | Min. | Max. |
| No. operators                 | 1.83                  | 1    | 3    | 1.83 | 1    | 3    | 0    | 0    | 0    |
| Frequencies                  | 563.45                | 72.8 | 2503.4 | 451.21 | 34 | 2572 | −19.92 | −53.30 | 2.74 |
| No. of passengers            | 2052.8                | 21   | 16,452 | 2,172.54 | 4 | 22,484 | 5.83 | −80.95 | 36.66 |
| Price                        | 3.97                  | 2.48 | 6.82 | 5.08 | 3.46 | 14.46 | 27.96 | 39.52 | 112.02 |
| Load factor                  | 6.28                  | 0.24 | 29.77 | 7.32 | 0.24 | 30.82 | 16.56 | 0 | 3.53 |
| HHI pass                     | 0.76                  | 0.34 | 1    | 0.77 | 0.34 | 1    | 1.32 | 0 | 0 |
| HHI freq                     | 0.69                  | 0.34 | 1    | 0.72 | 0.33 | 1    | 4.35 | −2.94 | 0 |
| HHI Capa                     | 0.7                   | 0.34 | 1    | 0.72 | 0.34 | 1    | 2.86 | 0 | 0 |
| Seats x kilometers supplied  | 9,677,955.28          | 403,603.2 | 44,795,011.3 | 8,856,130.79 | 329,188 | 41,556,326.87 | −8.49 | −18.44 | −7.23 |
5.3 Economic and Policy Implications

This study allows the possibility of further analysis of the effects of mergers on other characteristics, such as operator costs. A merger can allow a bus operator to achieve the critical size required for profitability. However, even after a merger, the load factors may not be sufficient to ensure continued profitability (Crozet & Guehery, 2018).

Tables 7–8 recap the descriptive statistics of the main variables for Q2-2016 (pre-merger) and Q2-2017 (post-merger). We choose these two quarters, which are one year apart, to avoid the seasonality problems that might hinder direct comparison. On average, the number of operators decreased for the links that were included in the treatment group, while the control group was not affected by the two mergers.

All HHIs are increasing in the treatment and control groups. These increases are greater for the treatment group: between 14 and 24.39%, depending on the type of HHI—than for the control group: between 1.32 and 4.35%, depending on the type of HHI. Analysis of the descriptive statistics for the control and treatment groups shows that the groups are affected differently by the two mergers. These results are in line with those obtained for the number of operators.

Tables 7 and 8 show that the load factors increased by 23.76% in the treatment group and by 16.56% in the control group. Since the interaction coefficients in the DiD regression are not significant (see Table 6), these increases were not due to the two mergers. The econometric estimation demonstrates that there is no differential effect that occurred between the treatment and control groups. Thus, the load factors would have risen even in the absence of the two mergers.

In the treatment group, scheduling frequency decreased significantly—28.71%—and (as was mentioned above), the load factors increased significantly. This is consistent with rationalization and market maturity phenomena. Scheduling frequencies also decreased in the control group—19.92%—and load factors increased but to a lesser degree than the decrease in frequencies. As the interaction terms in the DiD regressions on frequencies are highly significant (see Table 6 for the last three quarters under study), this shows that the two mergers directly affected frequencies downwards, with a one-quarter lag.

These findings indicate that, in 2016, the market had yet to mature, and the bus operators were likely seeking the critical size at which they would become profitable. The latest acquisitions since then have confirmed this trend (see the timeline in Fig. 1): In early 2020, a duopoly emerged: BlaBlaBus and FlixBus.37 The strength of intermodal competition is a major challenge for the further development of the intercity bus market. In Germany, intermodal competition has been insufficient to counterbalance the market share of FlixBus.38 FlixMobility invested in rail transport

37 Despite its leading position in 2016, the Isilines-Eurolines group lacked the critical mass that is required to continue this consumer business. For this reason, Transdev decided to exit this activity to refocus the group’s activities and prepare for the French rail sector’s opening up to competition.

38 In 2021, FlixBus had about 80 percent share of the German intercity bus market. See “Munich-Based Startup FlixMobility Ready for Train and Bus Resurgence in Europe,” Skift, May 5, 2021).
after the German rail market was opened to competition. The FlixTrain brand was created. In France, the incumbent rail operator SNCF plans to offer low-price services on non-high-speed rail segments to counter competition from buses and carpooling.

Further, BlaBlaCar (BlaBlaBus brand) represents a challenge to FlixBus’s development strategy. Thus, BlaBlaBus appears to pose tough competitor for FlixBus by using the same business model. In 2021, BlaBlaCar raised $115 million to build all-in-one travel app. The startup intends to add train operators to its marketplace. BlaBlaCar’s objective is to become the reference application for transport from 50 to 1000 km.

Norway provides an other example, which shows a high degree of intermodal competition may affect the future of the bus market (Aarhaug et al., 2018). The success of Norway’s bus sector liberalization was largely due to the offer of links in markets that are underserved by other transport modes. These markets have benefited from better alternative transport services. Buses have become less attractive because of the emergence of competition among low-cost carriers via the offer of rail alternatives, and a slowdown has been observed in the number of passengers transported by bus in Norway in recent years (before the health crisis).

### 6 Conclusion

The effect of the two 2016 French intercity bus industry acquisitions triggered questions as to whether a newly deregulated market can lead to a monopoly, as in Germany. The mergers were aimed at achieving critical size and profitability. Using a DiD approach with original data provided by the ART, we find evidence of anti-competitive merger effects in terms of prices and frequencies and a less pronounced but significant positive effect on load factors if one distinguishes between the two mergers: In the first quarter post-acquisition, prices increased by 13.5%, although these increases diminished over time, to 5.3%. These raise anticompetitive concerns. Frequency decreases started one quarter later, and ranged from −21.5 to −25.7%.

This new market and data availability provide opportunities for future research. For instance, it would be interesting to measure the competitive effects of the latest acquisitions that resulted in the FlixBus-BlaBlaBus duopoly and to analyze the extent to which intermodal competition—especially from rail and carpooling—may

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39 In May 2021, FlixTrain services were launched abroad in Sweden connecting Gothenburg and Stockholm. See “FlixTrain to launch new routes and night trains,” Railway Gazette, May 11, 2021.
40 “SNCF: de nouveaux trains à petits prix,” FranceInfo, Sep. 24, 2021.
41 “BlaBlaBus: Fresh competition for FlixBus takes to the road in Germany,” The Local.de, June 26, 2019.
42 “BlaBlaCar raises $115 million to build all-in-one travel app,” Techcrunch, April 20, 2021.
43 “Le roi du covoiturage BlaBlaCar va vendre des billets de train,” Le Figaro, April 20, 2021.
44 Yves Lefranc-Morin, General Manager of FlixBus France, said “We are still too much in this market to make it profitable. It is a volume business, you have to reach a significant size to make our costs profitable,” (“Mauvais karma pour les cars Macron,” Libération, September 6, 2018).
offset their market-dominant position. Indeed, the opening up of the rail sector to competition “reshuffles the deck”: First, the SNCF group boosted their high-speed rail low-price offer. This may have been a reaction to the threat of the entry of foreign rail operators. However, because of the pandemic, a timetable for opening the French rail sector to competition has been postponed. Second, since April 2022, for the non-high-speed rail segment, the SNCF group has provided new low-price rail services.\(^{45}\)

The consequences for competition in surface transportation services should definitely be an interesting area for research.

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\(^{45}\) Source: https://www.sncf.com/en/passenger-offer/travel-by-train/ouigo-train-classique.
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