Are prices reduced from direct competition in high-speed rail? Some unexpected evidences from Italy

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27 February 2020

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WORKING PAPER

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Abstract

The literature on open-access rail competition has been quite unanimous in pointing out the positive effects of the entry of the (few) newcomers in their respective markets. Generally speaking, quality has increased and frequency too. The effect on prices has also generally been what everybody expected: the newcomer is pricing less than the incumbent and overall the prices on the liberalised market are lower than the counterfactual ones.

Without denying all the positive effects that rail competition in Italy has brought since 2012, thanks to the large-scale direct competition of NTV/Italo vs. the incumbent Trenitalia, in this paper we will provide the first evidence of something new, happened in the last 12 months. Since 2018, in fact, while frequencies and passengers continue to grow, for the first time also the average prices started increasing, even in those routes just opened to competition.

The scope of this work is limited to analyse everyday train prices in a period of three years on numerous Italian routes, showing how prices changed over time and in particular according to the presence of competition and route characteristics. Findings are interesting: prices do not fall in all routes where competition starts, or at least just for a short period. In general, 2019 saw a consistent realignment of prices to a higher level than 2017-2018, for both competitors. One obvious explanation could be that the competitors are just *apparently* competing, or that production costs have raised (or both). This would be by far the worst outcome of a liberalisation process: costs up and cartel prices up with the costs. But the same phenomenon could be explained differently if there is no overcapacity: competition is working on parameters different than average prices (quality, frequency, product differentiation, price discrimination). We are still not able to demonstrate the existence of a cartel, so this work is just intended to show what has happened, and not why.

keywords: rail prices; competition; intermodality; Italy

1. Introduction

Literature on open-access rail competition has been quite unanimous in pointing out the positive effects of the entry of the (few) newcomers in their respective markets. Generally speaking, quality has increased and frequency too. The effect on prices has also generally been what everybody expected: the newcomer is pricing less than the incumbent and overall the prices on the liberalised market are lower than the counterfactual ones. In the literature review section we will document more precisely these findings, but not many surprises have happened until now.

In this work we will provide new quantitative evidences about the well-known case of Italy, where Trenitalia – the national incumbent – and the newcomer NTV/Italo are competing in high-speed since 2012. Without denying all the positive effects that rail competition has brought, in this paper we will provide the first evidence of something new, happened in the last 12 months: frequencies and passengers continue to grow, but for the first time also the average prices started increasing, even in those routes just opened to competition. In other words, we find evidences that the competition – or at least competition in some specific markets – is not necessarily pushing down prices.

In this work we will limit to analyse everyday train prices in a period of three years on numerous Italian routes, showing how prices changed over time and in particular according to the presence of

competition and route characteristics. Findings are interesting: prices do not fall in all routes where competition starts, or at least just for a short period. In general, 2019 saw a consistent realignment of prices to a higher level than 2017-2018, for both competitors. One obvious explanation could be that the competitors are just *apparently* competing, or that production costs have raised (or both). This would be by far the worst outcome of a liberalisation process: costs up and cartel prices up with the costs. But the same phenomenon could be explained differently if there is no overcapacity: competition is working on parameters different than average prices (quality, frequency, product differentiation, price discrimination). We are still not able to demonstrate the existence of a cartel, so this work is just intended to show what has happened, and not why.

The paper is structured as follows. Section 2 shortly introduces the case of Italian rail market, mainly referring to published works. Section 3 describes the dataset of rail prices used in the paper and Section 4 provides the results, city-pair by city-pair. Section 5 concludes, trying to find patterns and explanations to Section 4's findings.

2. Italian rail market, in brief

Italy represented until now an *unicum* in the World, being the only country with direct on-track competition in high-speed rail services.[1] Therefore it is just partially comparable to the well-known cases of Czech Republic and neighbours (Tomeš and Jandová, 2018), Sweden and Austria and moreover with the recent case of Flixtrain in Germany. Direct competition is however not the only relevant fact in introducing Italian long-distance rail market, as already described in Beria and Bertolin (2019), Beria et al (2018a and 2018b).

The most relevant facts can be summarised in:

a. A peculiar urban geography, with many large and small cities aligned along a limited number of corridors, differently from Spain or France, but also from the network of cities of Germany.
b. A reasonably well-performing rail network, with some severe saturation problems on some lines, but not on the main corridors Turin-Naples[2] (thanks to the HS doubling built mainly between 1990 and 2010) or Turin-Venice. Nodes remain instead a problem (today mostly Milan and Florence).
c. A lively coach sector connecting almost every city and a forever-dying national airline (Alitalia) that opened the doors to the low-cost carriers also on domestic routes, mostly Ryanair and easyJet.
d. An increasing specialisation of rail services by NTV/Italo and Trenitalia, accompanied by an excellent quality (on board services, new rolling stock, etc.).
e. An incredible level of frequency on main long-distance routes, reaching even 5 minutes of headway during peak-hours (Milan – Rome pair is connected 175 times *per day* in 2020).
f. A relatively scarce integration (especially with respect to best cases of Germany or France) between regional and long-distance trains.

The effects of competition between the two companies are important and well-studied. In addition to the already mentioned aspects of high-frequency and specialisation, fares are one of the main levers of competition between the two and between train and other modes. Early studies find a 30-40% decrease in prices with respect to former Trenitalia prices (see Table 1) in the very first years of entry. Later works looking at a market more in equilibrium find lower reductions. For example, Beria et al (2019) compares routes with and without competition, finding that NTV/Italo is usually 10% to 20% cheaper than Trenitalia, but that Trenitalia prices are not significantly different among routes with and without the competitor. The impression is therefore that a step down in Trenitalia prices occurred before 2013, but that later yields remain substantially similar.

[1] Competition in HS is also expected to start in the coming years in Spain and France.

[2] Actually, the success of HS has dramatically increased the traffic also on new lines which are now near to capacity, even if no double-composition trains are used yet. The main saturation problems remain on the Florence-Rome, the oldest section and used also by some fast regional trains.

source	*observed price reduction*	*period*	*notes*
Cascetta & Coppola (2015)	-34%	between 2011 and 2013	Overall fares reduction
Cascetta & Coppola (2017)	-31%	between 2009 and 2012	Overall fares reduction
Giuricin (2018)	-40%	Period not specified	
NTV (2019)	-30% and -43%	2011-2012 and 2011-2018	Overall yield reduction
Beria et al. (2016)	-15% (observed prices)	between 2013 and 2014	Milano-Ancona route

Table 1. Impact of competition on prices in Italy according to the early studies.

In this study we will try to provide further evidence on that, looking both at situations where NTV/Italo is not present and at routes where NTV/Italo has entered during the period of observation.

3. The dataset

The paper is based on a large dataset of observations collected directly from booking websites, including all rail prices (classes, levels) on a selection of OD pairs representing relevant situations in Italian domestic market. The database has already been used in Beria et al. (2019), mainly as a cross-section sample, while here we exploit, for the first time, also its time-dimension.

3.1 OD pairs analysed

We monitored 30 origin-destination pairs, chosen to be representative from the geographical and supply-level points of view. The pairs, in fact, are among the most important of the country in terms of patronage and range from North to South. They belong to routes differently served by alternative modes (air and coach), and with different level of competition. They also include short, medium and long pairs, as it has been clearly demonstrated the distance-dependency of unit prices applied in Italy (Beria et al., 2019).

OD pairs considered are described in Table 2 (supply) and Table 3 (distance and travel time).

Table 2. Supply levels of the OD pairs analysed (long-distance only)

OD pair	*Average Rail supply* [trains/day per direction]*			*Air supply***	*Coach supply***
	Trenitalia	*Of which PSO*	*NTV*	*[flights per day]*	*[coaches per day]*
Bari - Ancona	15	5	-	-	3
Bologna - Ancona	20	6	-	-	7
Bologna - Bolzano	6	0	-	-	5
Bologna - Firenze	43	1	20	-	27
Bologna - Trieste	3	2	-	-	4
Bologna - Venezia	20	0	8	-	11
Milano - Pisa	6	5	-	-	2
Milano - Ancona	13	2	-	-	9
Milano - Bologna	41	5	10	-	26
Milano - Brescia	26	0	-	-	-
Milano - Firenze	19	1	10	-	18
Milano - Genova	12	11	-	-	6
Milano - Napoli	28	2	15	14	5
Milano - Rimini	13	2	-	-	5
Milano - Roma	39	0	17	34	19
Milano - Torino	20	0	12	-	22
Milano - Udine	2	0	-	2	3
Milano - Venezia	26	0	-	-	10
Roma - Bari	4	1	-	7	14
Roma - Bologna	57	2	20	4	18
Roma - Ferrara	5	2	2	4	2
Roma - Firenze	40	0	20	-	29
Roma - Genova	9	2	-	6	10
Roma - Reggio C.	7	4	-	6	5
Roma - Torino	13	0	12	9	7
Roma - Venezia	21	2	8	6	4
Roma - Verona	8	0	4	4	6
Torino - Brescia	10	0	-	-	2
Torino - Venezia	10	0	-	1	3
Venezia - Firenze	18	2	8	-	6

* Average number of train/day per direction based on the current offer in a sample of days in 2017.
** Number of flight or coach/day per direction based on the supply of Wednesday, 31st of October 2018.

Table 3. Distance and travel time and for OD pairs analysed*

OD pair	Distance [km]	Rail		Air	Coach
		HS trains	Conventional		
Bari - Ancona	442	3h40'	4h10'	-	6h30'-7h30'
Bologna - Ancona	218	1h50'	2h0'	-	3h00'-3h30'
Bologna - Bolzano	261	2h30'	2h40'	-	4h00'
Bologna - Firenze	95	0h40'	1h10'	-	1h15'-1h30'
Bologna - Trieste	296	3h0'	3h50'	-	5h30'
Bologna - Venezia	151	1h10'	1h30'	-	2h00'-2h30'
Milano - Pisa	301	-	4h10'	-	4h30'-5h15'
Milano - Ancona	429	3h0'	4h10'	-	5h30'-6h15'
Milano - Bologna	213	1h10'	2h20'	-	3h00'-3h30'
Milano - Brescia	83	0h40'	0h50'	-	-
Milano - Firenze	306	1h50'	3h50'	-	4h00'-5h30'
Milano - Genova	140	1h30'	1h40'	-	2h00'-2h30'
Milano - Napoli	790	4h30'	8h50'	1h20'	10h00'-13h00'
Milano - Rimini	330	2h10'	3h20'	-	4h45'-5h15'
Milano - Roma	567	3h10'	6h50'	1h10'	8h00'-10h30'
Milano - Torino	143	0h50'	1h30'	-	2h00'-2h30'
Milano - Udine	365	4h0'	4h0'	0h55'	5h30'
Milano - Venezia	258	2h10'	2h20'	-	3h30'-4h00'
Roma - Bari	498	4h0'	6h20'	1h05'	5h30'-6h30'
Roma - Bologna	356	2h10'	4h10'	0h55'	5h00'-6h00'
Roma - Ferrara	400	2h40'	4h40'	0h55'	5h00'-5h30'
Roma - Firenze	261	1h30'	2h50'	-	3h30'-4h00'
Roma - Genova	494	4h0'	5h0'	1h 10'	6h30'-8h30'
Roma - Reggio C.	663	4h50'	7h10'	1h 10'	9h00'-10h00'
Roma - Torino	711	4h10'	-	1h 15'	10h00'-10h30'
Roma - Venezia	504	3h30'	5h40'	1h 05'	6h30'-7h00'
Roma - Verona	507	3h0'	-	1h 00'	7h00'-7h30'
Torino - Brescia	226	1h40'	2h30'	-	3h15'
Torino - Venezia	401	3h10'	4h10'	1h 25'	6h00'-6h30'
Venezia - Firenze	243	1h50'	-	-	3h30'-4h00'

* Travel time values based on our database for trains and commercial offers in October 2018 for air and coach

3.2 Dataset description

Our dataset includes data collected for more than three years, from June 2016 to October 2019, with an average sample of 15 days of survey per month, both in weekdays and weekends.[3] We observed all fares available for each train running on the chosen routes. We simulated five anticipated booking: 1, 2, 5, 10 and 20 days before the date of travel. A "fully-booked combination" occurs when a specific ticket combination (flexibility and level of service) is sold out. A "fully-booked train" occurs when no seats are available, whatever is the class[4]. We mainly look at the lowest available fare, that could even be a fully-flexible first class seat if the rest of seats are unavailable. For this reason, it can be that in some periods the average price is above the typical 2nd class ticket.

We collected prices only for long-distance trains and ignored regional trains. Their price is fixed and regulated by regional public service contracts. To the contrary, national PSO trains are included and surveyed, as their price is capped, but not fixed and promotional fares are commonly used exactly as in the market segment. To sum up, the categories of trains surveyed are classified as in Table 4.

[3] It must be noticed that some periods are missing, for example -1 days for NTV/Italo during Christmas 2016 and 2017.
[4] With the exception of the highest level of service ("Executive") for both operators.

Table 4. Train category and type of service

Train category	Operator	Type of service	Regulation	Label used
Italo	Nuovo Trasporto Viaggiatori	High-speed	Market	**NTV**
Frecciarossa	Trenitalia	High-speed	Market	**TI_MK**
Frecciargento	Trenitalia	High-speed	Market	**TI_MK**
Frecciabianca	Trenitalia	Conventional	Market	**TI_MK**
Intercity	Trenitalia	Conventional	PSO	**TI_IC**
Eurocity	Trenitalia (or partner operator)	Conventional	PSO	Excluded

Each observation is the combination of:

- Train (e.g. Train 8971 from Milan to Venice);
- Company;
- Day of travel;
- Category of train;
- Days of advance booking (1, 2, 5, 10 or 20 days);
- Departure and arrival time;
- Fare name and level of service;
- Price per fare and level of service (upon availability).

Through this data, considering the route length, we calculate also the average price per kilometer (€/km) for the 30 routes surveyed, in several different conditions of advance booking and type of fare.

4. City-pairs evidences

4.1 Pairs already in competition

A first set of routes is made of those where competition was already ongoing, because NTV/Italo was present since before the start of our observations. The Milan-Rome is by far the most important, but others have significant traffic, too. On these pairs, as literature showed, prices have reduced in the past but the dynamics remain interesting, for reasons that will be commented in a while.

Figure 1. Map of analysed routes (already in competition)

In most pairs we will comment referring to four periods in the observations:

1. Until the end of 2016 summer
2. September 2016 – July 2018
3. August 2018 – approx. Easter 2019
4. Easter 2019 onwards.

Starting from the Milan – Rome one day before departure, we can notice that the second period of the series shows the lowest prices, with Trenitalia slightly above 80 € and Italo around 65 € but with large variability day by day. After Summer 2018 prices rise significantly, especially for Italo/NTV and the average route price levitate to 85/90€, which is very near to the base flexible fare. This means that no more discounted fares are available before departure (and sometimes even higher than the base flexible price) and/or that trains are almost full. Looking at the 20 days before departure prices, the fares are much more variable (as low as 20 € for Italo/NTV and 40 € for Trenitalia, with an average route price floating around 50 € (but near to 60 € in the fourth period).

Very visible, especially in the -20 days series, are some specific periods of holiday, when trains are usually full (in addition to touristic trips, all out-of-home workers tend to return home): Easter and Christmas, especially. Summer periods, for this pair, are not particularly peaking: the Milan – Rome is not a specifically touristic route and it is used at full capacity on working periods, differently from other pairs (e.g. Milan – Pisa, see later).

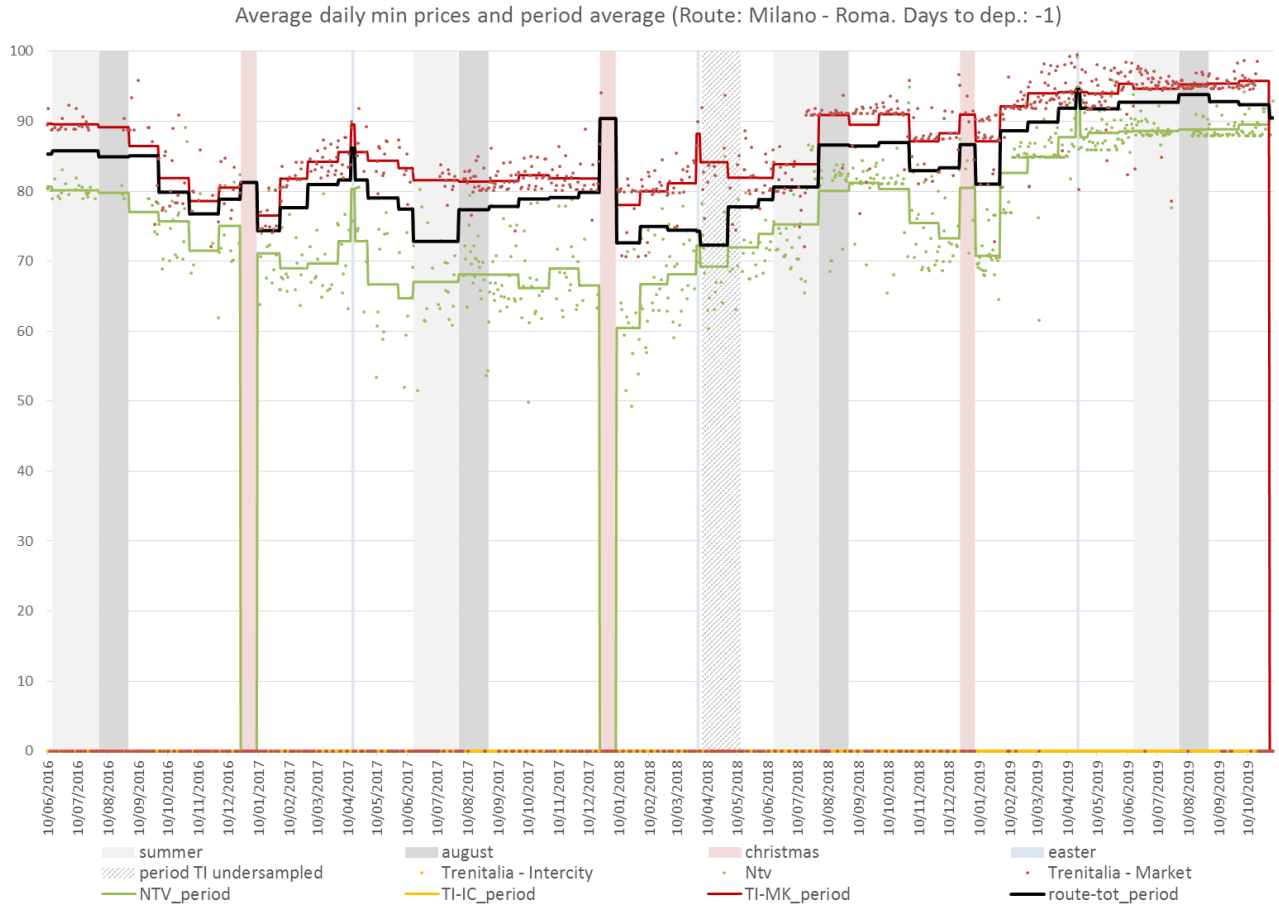

Figure 2. Average daily minimum price (shown) on the Milan - Rome route. Days to departure: -1

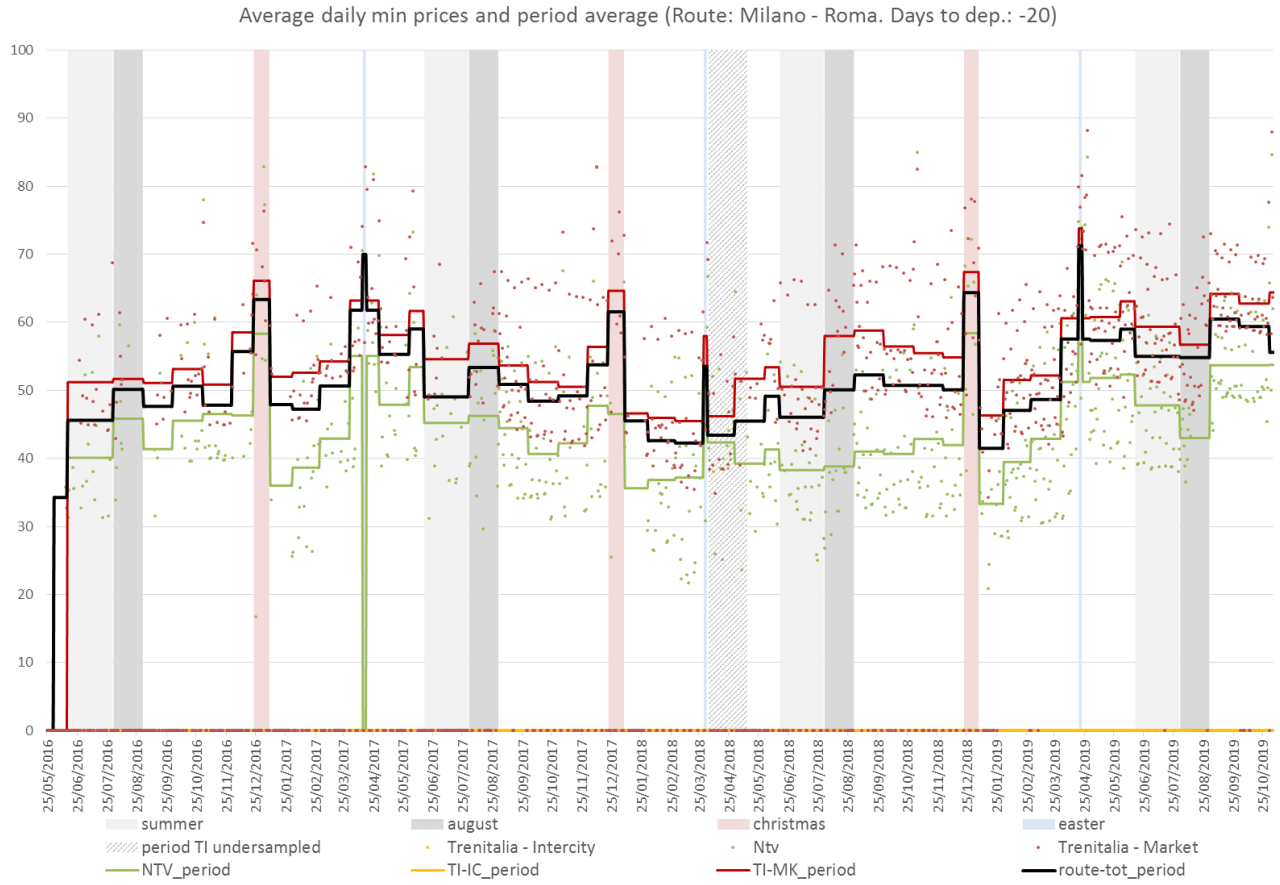

Figure 3. Average daily minimum price (shown) on the Milan - Rome route. Days to departure: -20

A second route of the group is the Bologna-Florence. It is the shortest HS pair, but also the most crowded (in terms of demand and trains) due to the fact that it belongs to any O-D pair of the network going from North to South (i.e. not only From Turin/Milan, but also from Verona/Venice).

The price trend of the route is similar to the Milan-Rome. Here the distinction between 1st and 2nd periods is less visible, while 3rd and 4th remain clearly above those of the first part of 2018. Concerning the 20 days to departure prices, the variability is much lower than Milan-Rome and prices range between 15 and 20 €, except for some very visible peaks (see for example Easter 2019).

Interestingly, while on the Milan – Rome Italo/NTV prices have always been below Trenitalia ones, on this route we have an example of Italo/NTV pricing more than the competitor until April 2018 (-20 days to departure). This is a first evidence of a discontinuity of Italo/NTV price strategy that will be found also elsewhere.

In this OD pair there is another price level that is PSO intercity. They are not present in the Milan – Rome. Numerically, these trains are not many, around one per hour, and much slower. But the shortness of Bologna – Florence pair makes them relatively interesting as if they were a regional train (which actually do not exist anymore between the two cities). Despite Trenitalia can apply dynamic prices (and does it), in this route prices are almost fixed, around 12 € before departure and 10 € 20 days earlier (slightly increased in the 3rd and 4th periods). Most likely Trenitalia is not willing to sell seats too cheap (cheaper than a regional fare) taking passengers out from HS services and occupying seats in the middle of the long O-D pairs these trains are intended to serve to (e.g Trieste – Naples).

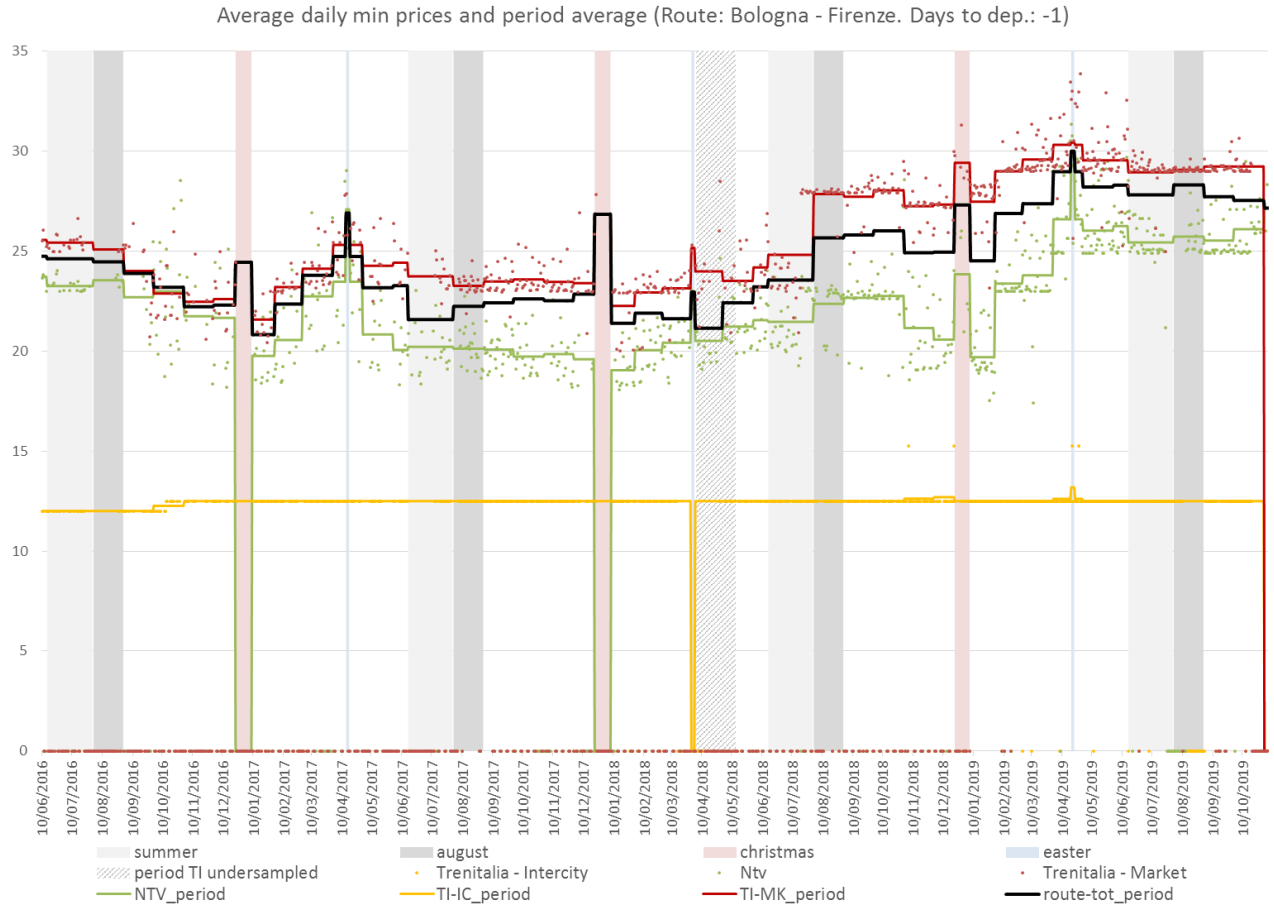

Figure 4. Average daily minimum price (shown) on the Bologna – Florence route. Days to departure: -1

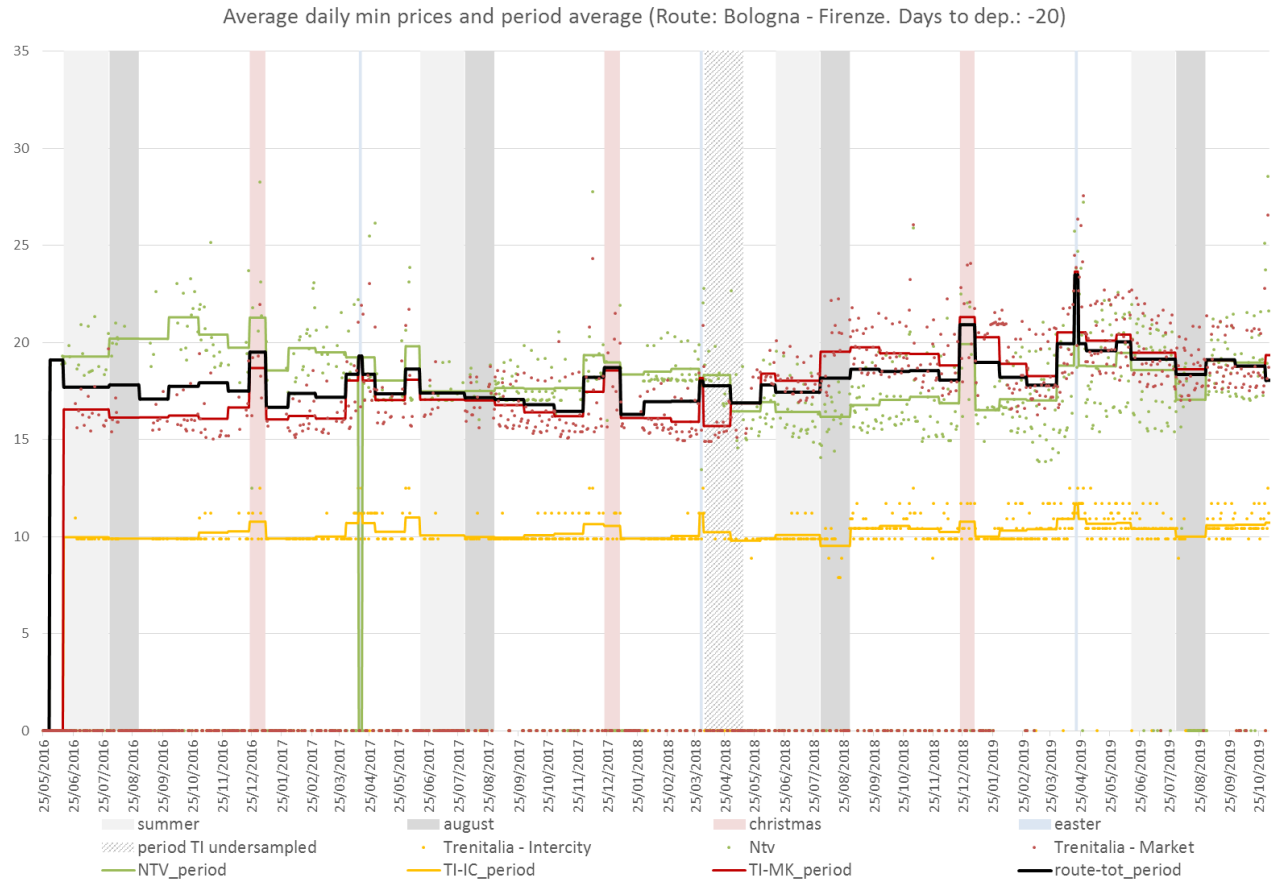

Figure 5. Average daily minimum price (shown) on the Bologna – Florence route. Days to departure: -20

A third route is the Milan – Bologna. It is quite short (213 km), characterized by a lot of traffic, premium passengers (business trips) and also by long-distance commuters using discounted carnets of tickets (no data available, however).

1 day to departure, we can notice again the same four periods described for the Milan – Rome. Italo/NTV, for example, sold last-day tickets at nearly 40 € initially, then felt to 35 € or less and then up again recently to 40 to 45 €. Very seldom prices are below 30 €, which means that the price per km is about 50% higher here with respect to Milan – Rome. While Trenitalia last day prices are quite constant and Italo/NTV well below it, the latter is able to reach Trenitalia levels in specific periods (for example Easter 2019, with Italo/NTV even higher than Trenitalia).

The 20 days to departure prices are quite different: the three services (including PSO intercity) are almost overlapped (ranging from 20 to 30 €) and they are also very high (is seldom possible to purchase a ticket for less than 20 €). Similarly to what happened for the Bologna – Florence, we see again that Italo/NTV in 2016-2017 had discounted prices *above* Trenitalia ones, which probably explains the worse performances of the newcomer with respect to the incumbent.

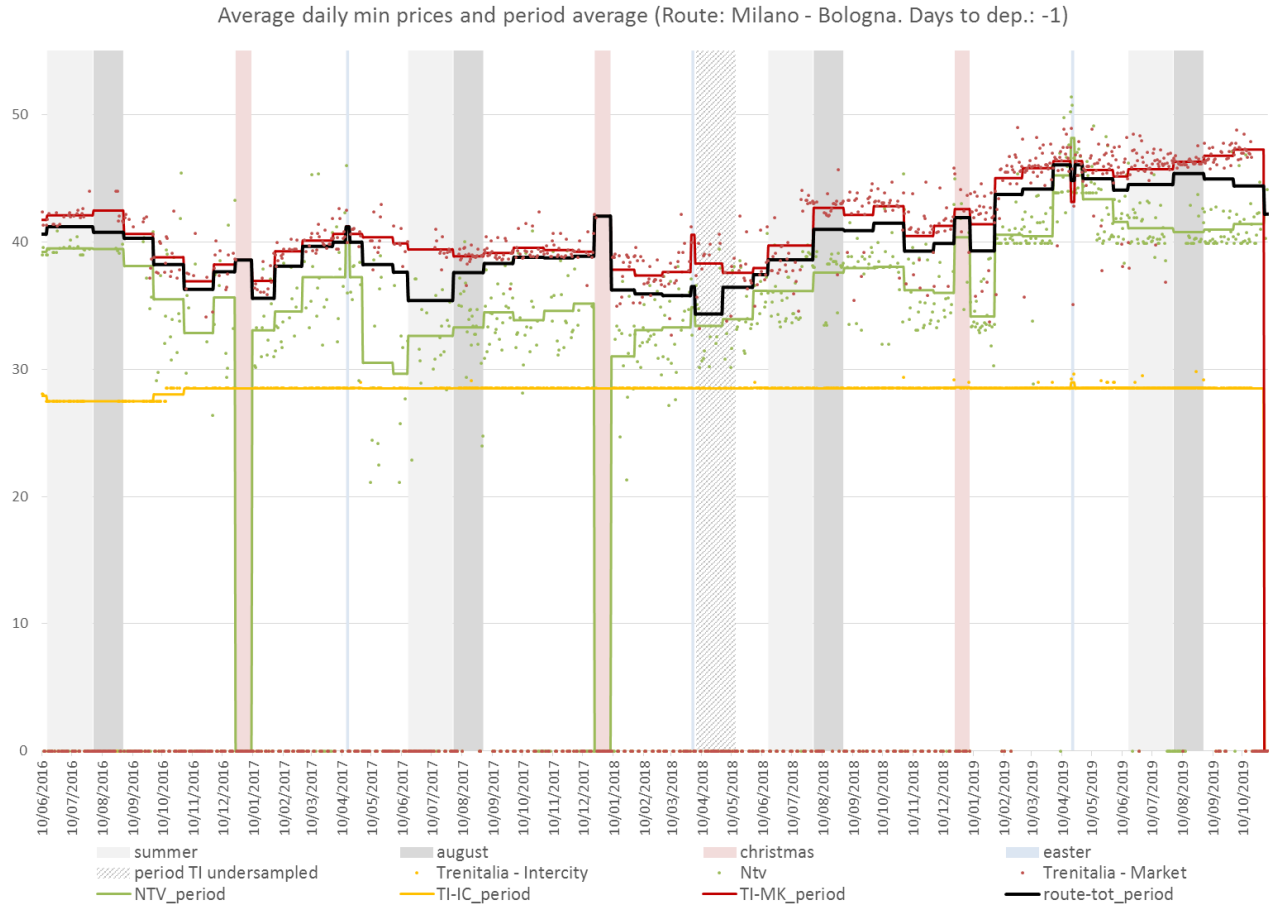

Figure 6. Average daily minimum price (shown) on the Milan – Bologna route. Days to departure: -1

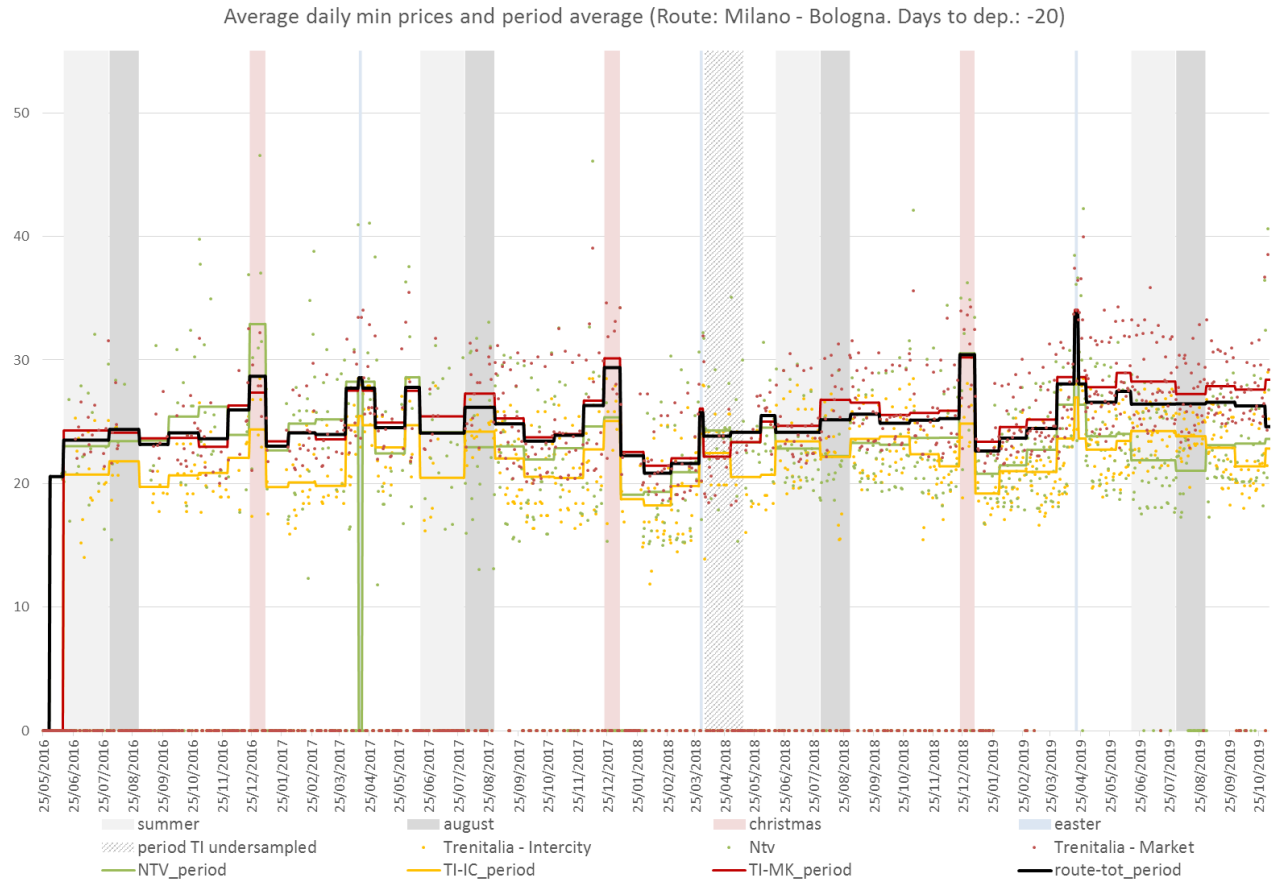

Figure 7. Average daily minimum price (shown) on the Milan – Bologna route. Days to departure -20.

A last OD pair with early competition is the Rome – Verona route. Initially, the frequency was much lower than on the main route, but it improved rapidly and Trenitalia is now offering 1 train/h during peaks and Italo/NTV 5 frequencies per average day.

Again, the 4 periods are recognizable. Trenitalia had much cheaper prices (falling from 80 to 60-70€) between September 2016 and Summer 2018, when Italo/NTV increased the services. But now prices are up again to 80 € or more and Italo/NTV's are not that far (70-80€). In other words, suddenly (Autumn 2018) both players rose prices, Trenitalia in one step and Italo/NTV in two steps (Autumn 2018 and Spring 2019).

Similarly to what happened in other routes, the 20-days to departure route is more unstable (high prices during public holidays, lower elsewhere). Italo/NTV is below Trenitalia also during peaks. Interestingly, sometimes the Intercity PSO trains are even more expensive than HS ones. This is because they are used by other passenger, i.e. those going south of Rome, which purchase tickets much more in advance. See for example prices before Christmas 2018.

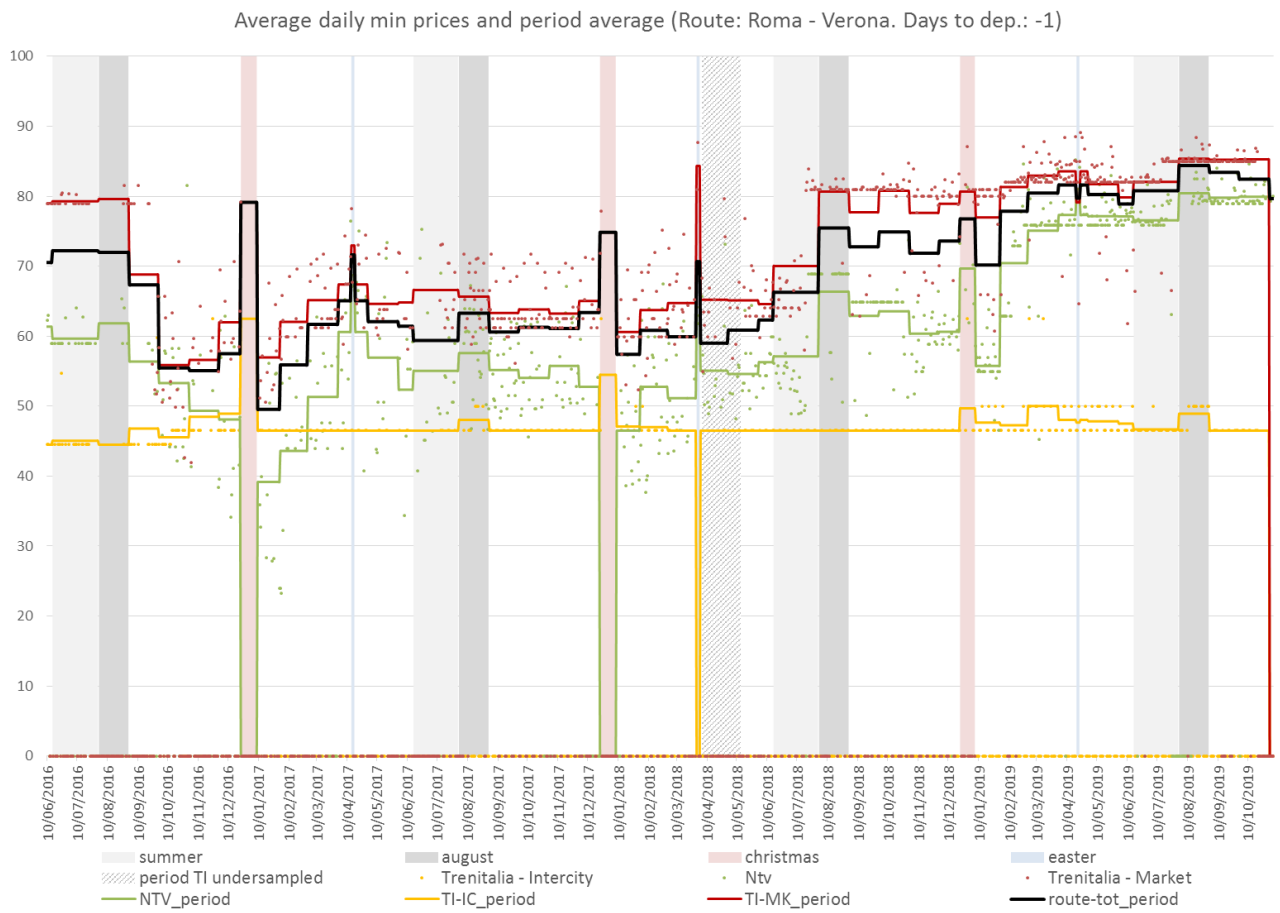

Figure 8. Average daily minimum price (shown) on the Rome – Verona route. Days to departure -1.

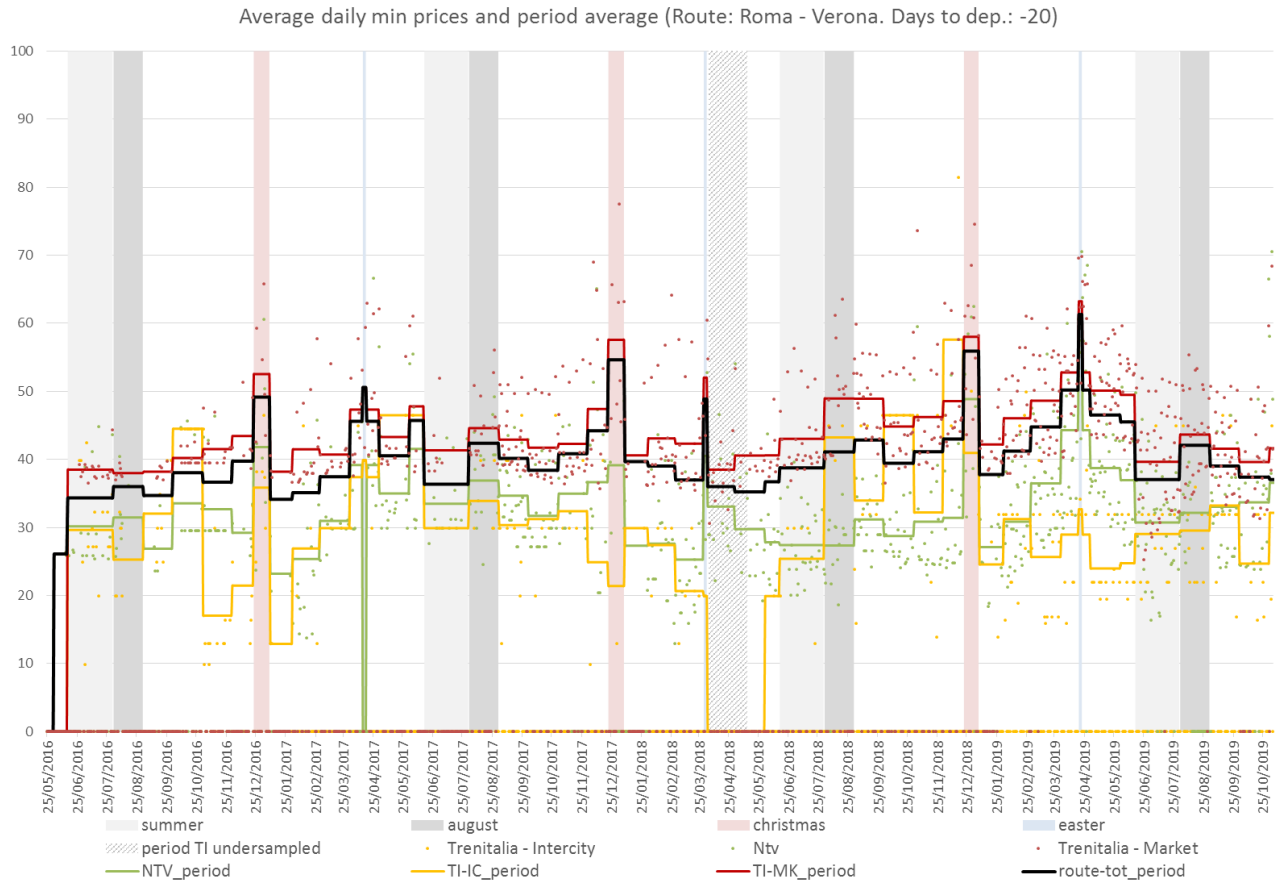

Figure 9. Average daily minimum price (shown) on the Rome – Verona route. Days to departure -20

4.2 Pairs where competition started during observations

These routes are the most interesting of the sample, as we can see what happens when Italo/NTV enters in a market previously monopolistic. In a simpler situation, we would surely expect a fall in prices: the monopolist is pricing high and the newcomer is at least temporarily exploiting its price advantage to gain passengers. But with respect to a stylised situation, here we have that:

a. Italo/NTV is a newcomer on *that* route, but already "known" by the monopolist on other routes
b. The incumbent is already using extensively price-discrimination techniques
c. In some cases there could be an initial situation of undercapacity (Milan – Venice, for example, is a very crowded route)
d. In some cases the beginning of competition matches with the opening of the HS line (e.g. Milan – Brescia), which therefore means higher performances and higher willingness to pay of users.
e. Competition could rise total costs, especially for thin routes.

Figure 10. Map of analysed routes (competition started during observations)

The Milan – Venice and Milan – Brescia routes (sharing the long-distance demand, but with the 90km long Brescia – Milan one having also commuters) show similar trends. Before competition, Trenitalia was steadily pricing around 40 € (Venice) and 20-25 € (Brescia) before departure and 10 € less on both routes 20 days before. After the entry of NTV/Italo we can observe on Milan – Venice a small decrease of prices 20 days in advance. But in general, in no case after the entry average prices were reduced. In particular, NTV/Italo entered below the average price and Trenitalia increased it correspondingly. In the last period, both further raised prices making the average pair price higher than any previous period. This is particularly visible in the Milan – Venice, with prices after April 2019 as high as 50€ while historically were 40€.

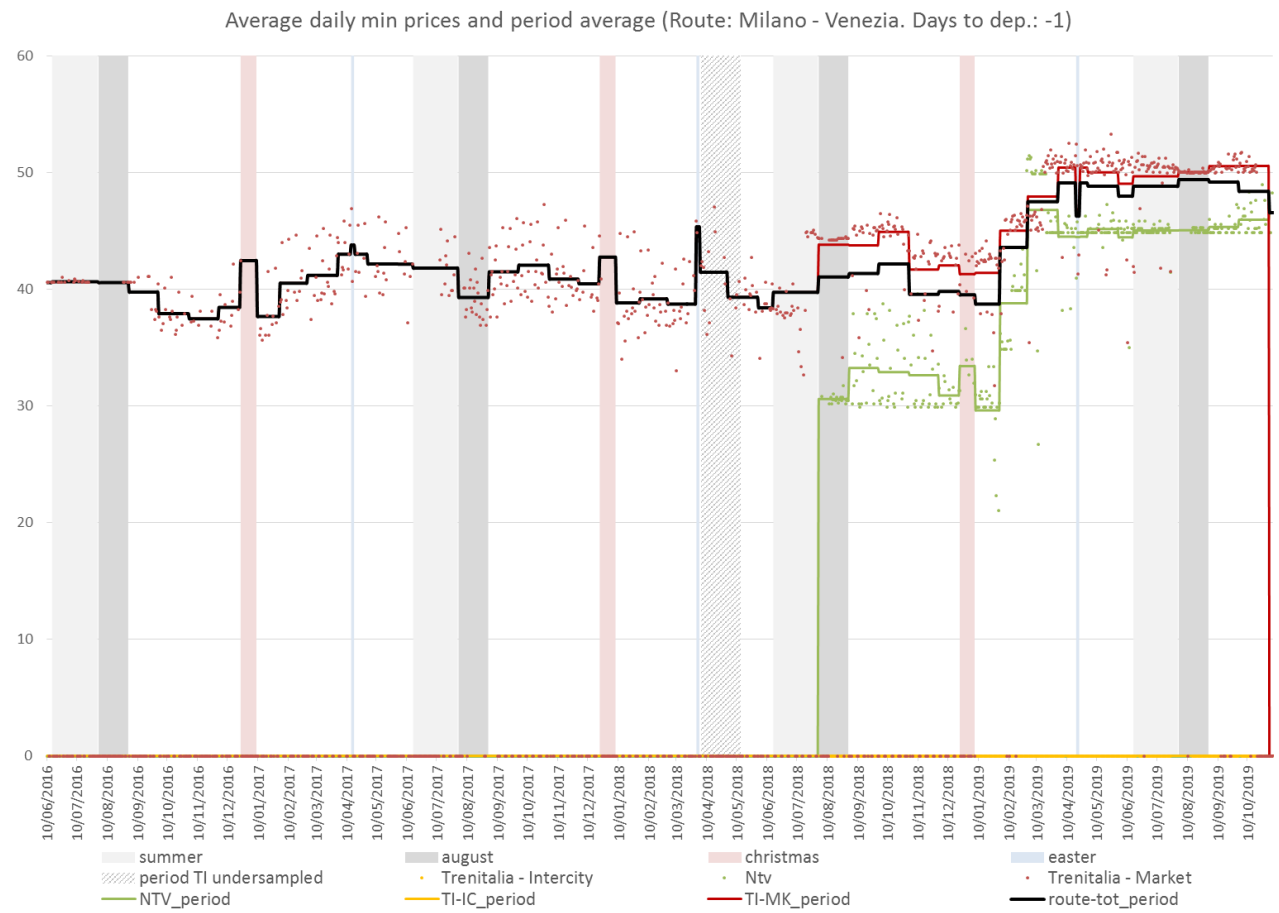

Figure 11. Average daily minimum price (shown) on the Milan – Venice route. Days to departure -1

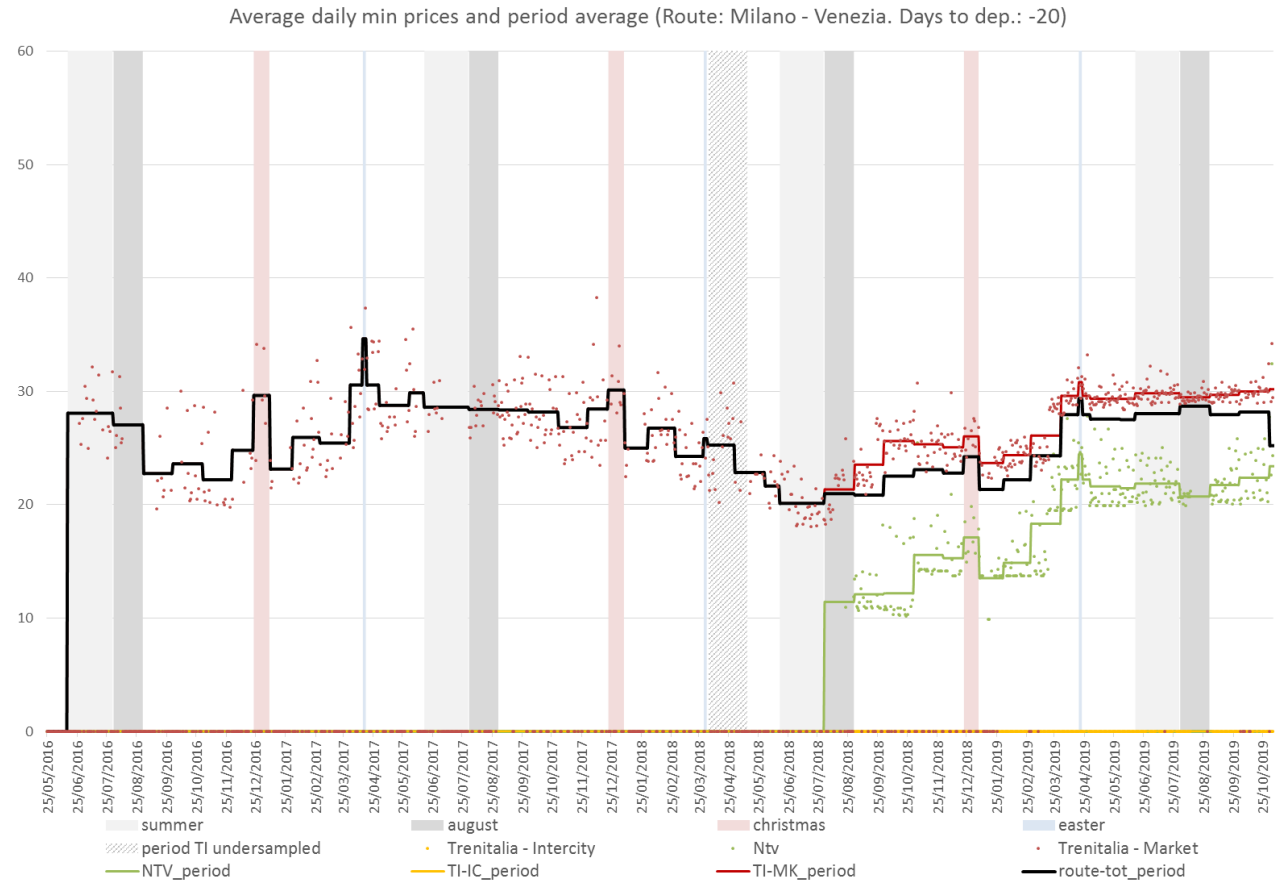

Figure 12. Average daily minimum price (shown) on the Milan – Venice route. Days to departure -20

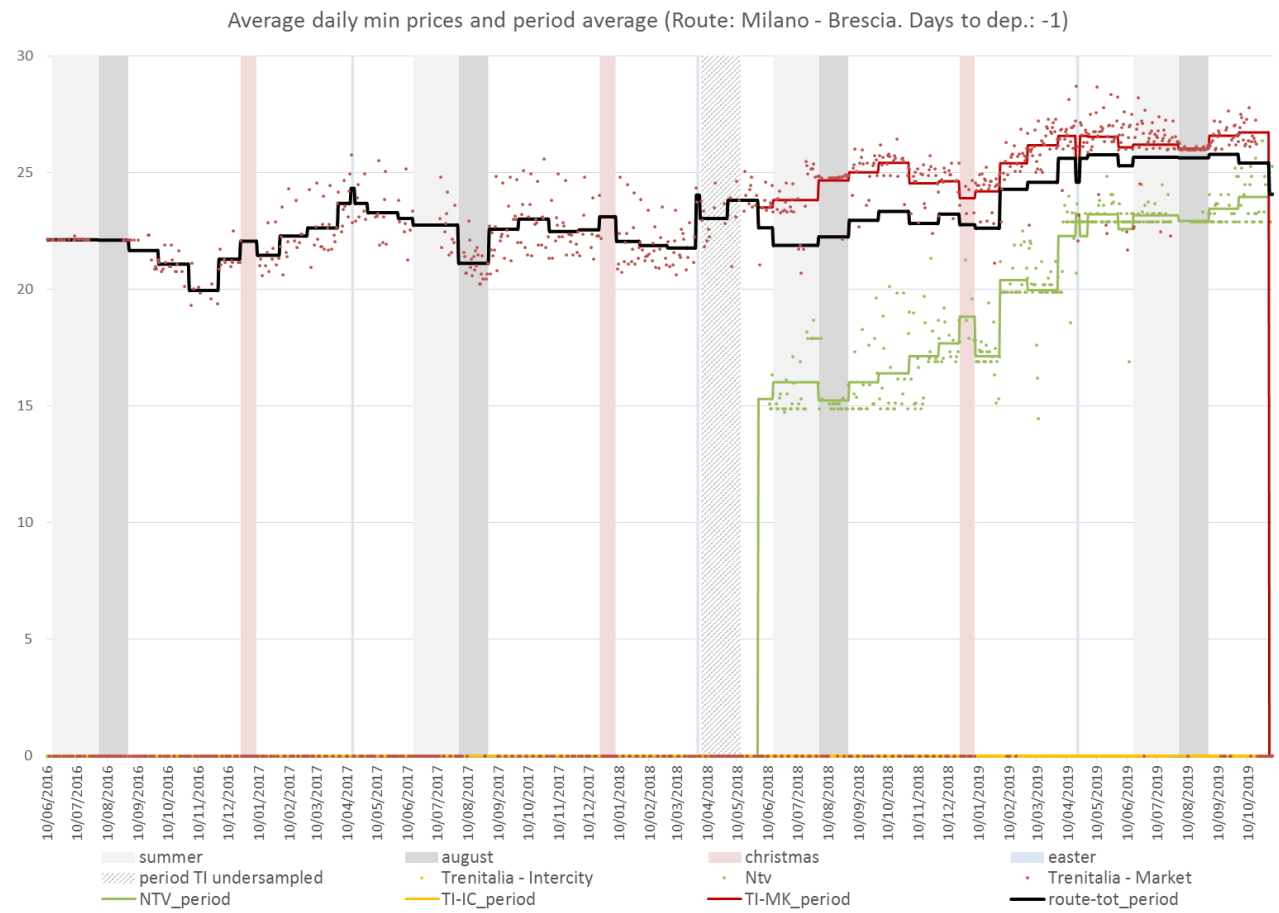

Figure 13. Average daily minimum price (shown) on the Milan – Brescia route. Days to departure -1

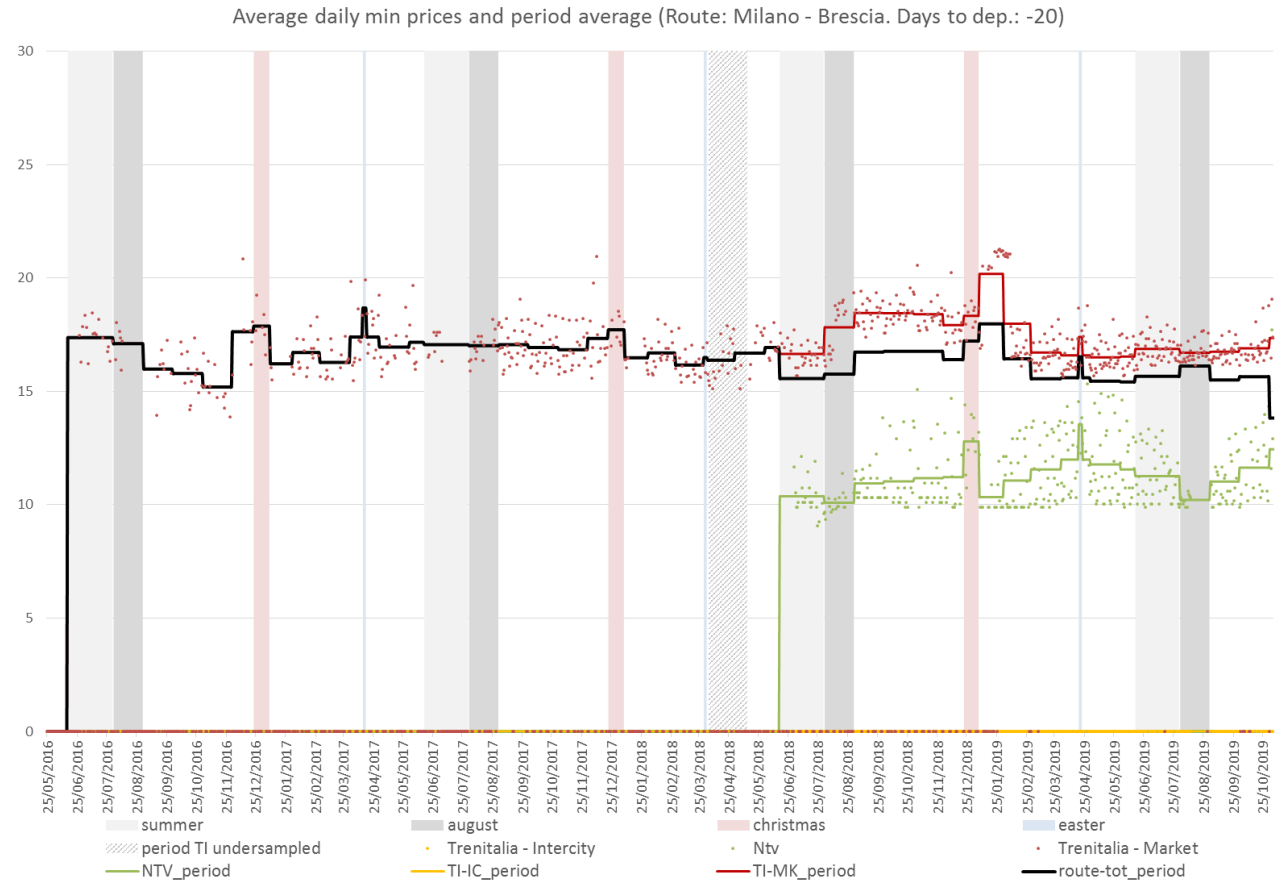

Figure 14. Average daily minimum price (shown) on the Milan – Brescia route. Days to departure -20

A third interesting pair is the Rome – Ferrara. The service belongs to the Rome – Venice route, but NTV/Italo introduced the new stop of Ferrara since August 2018 and progressively increased the service until now, making the pair the only one of the sample where NTV/Italo has more services per day than Trenitalia (12/13 vs. 6). On the pair, a subsidised slow Intercity also exists.

The dynamics of prices is somehow similar to the previous ones and can be summarised into: we see no price decrease due to entry, but at least the -20 days prices did not increase. The higher frequency of NTV/Italo is counterbalancing the lower brand power: the two competitors have now analogous prices, differently from the other mentioned cases.

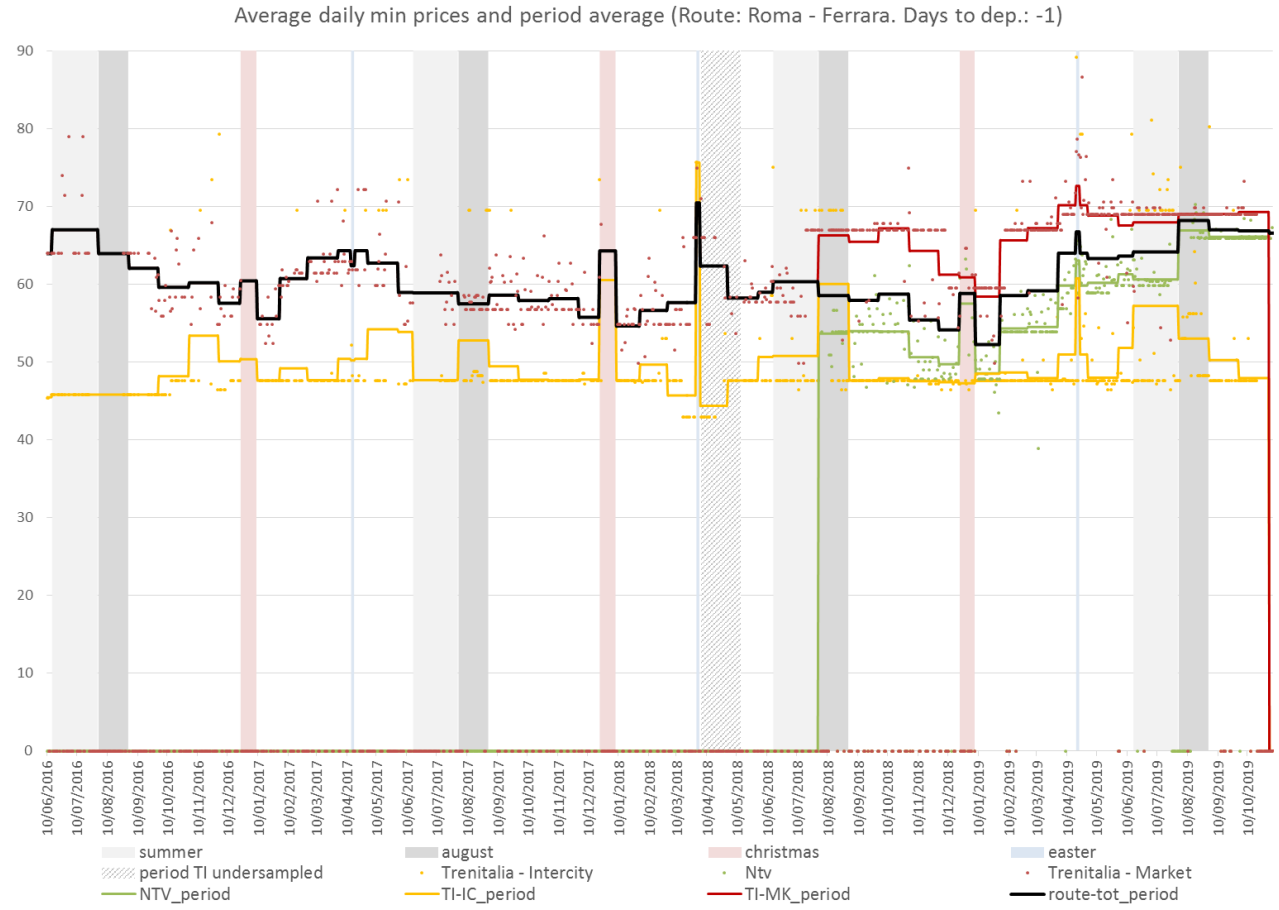

Figure 15. Average daily minimum price (shown) on the Rome – Ferrara route. Days to departure -1

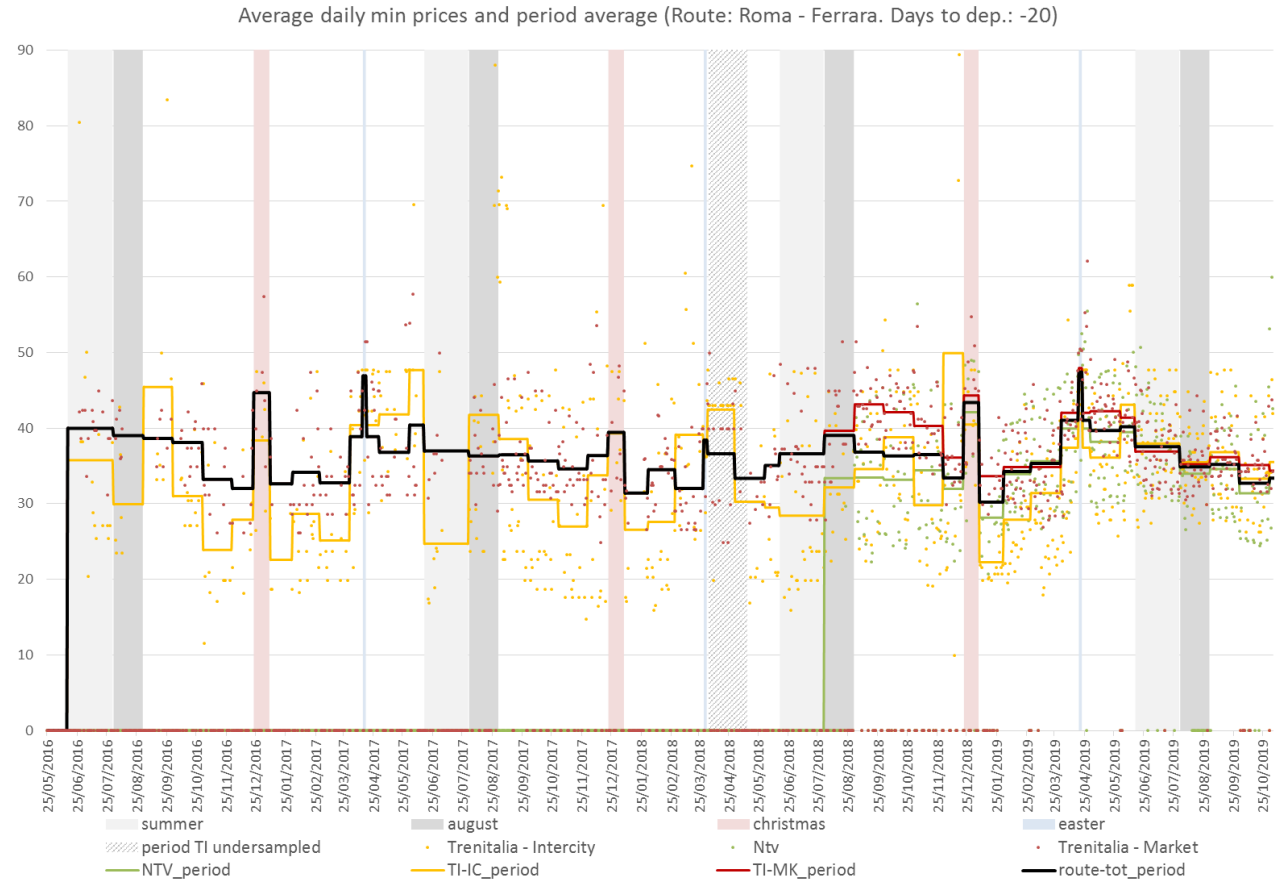

Figure 16. Average daily minimum price (shown) on the Rome – Ferrara route. Days to departure -20

4.3 Pairs with no competition

In the sample we analysed also routes where NTV/Italo is not present. It is important to mention that today these monopoly routes are basically all on the conventional network or use the HS segments very limitedly (e.g. few Milan – Bari trains for the first 200 km). The following pictures show the average Trenitalia price for all of them (market services only).

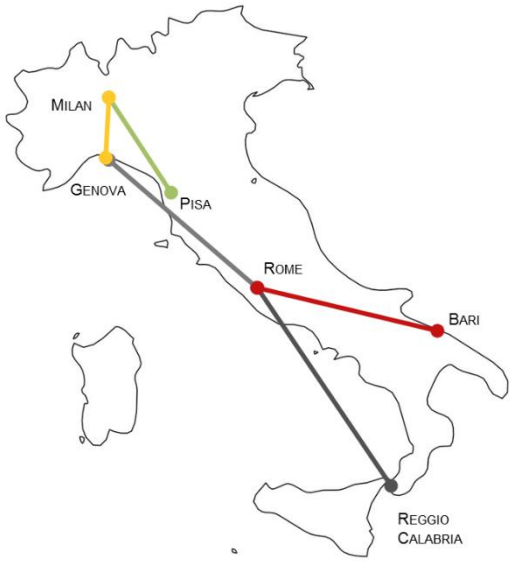

Figure 17. Map of analysed routes (routes without competition)

Without entering too much into detail, we see no clear difference from the previous routes. In particular, there is no visible price increase after Summer 2018 as observed above (rather a slight increase one day before departure).

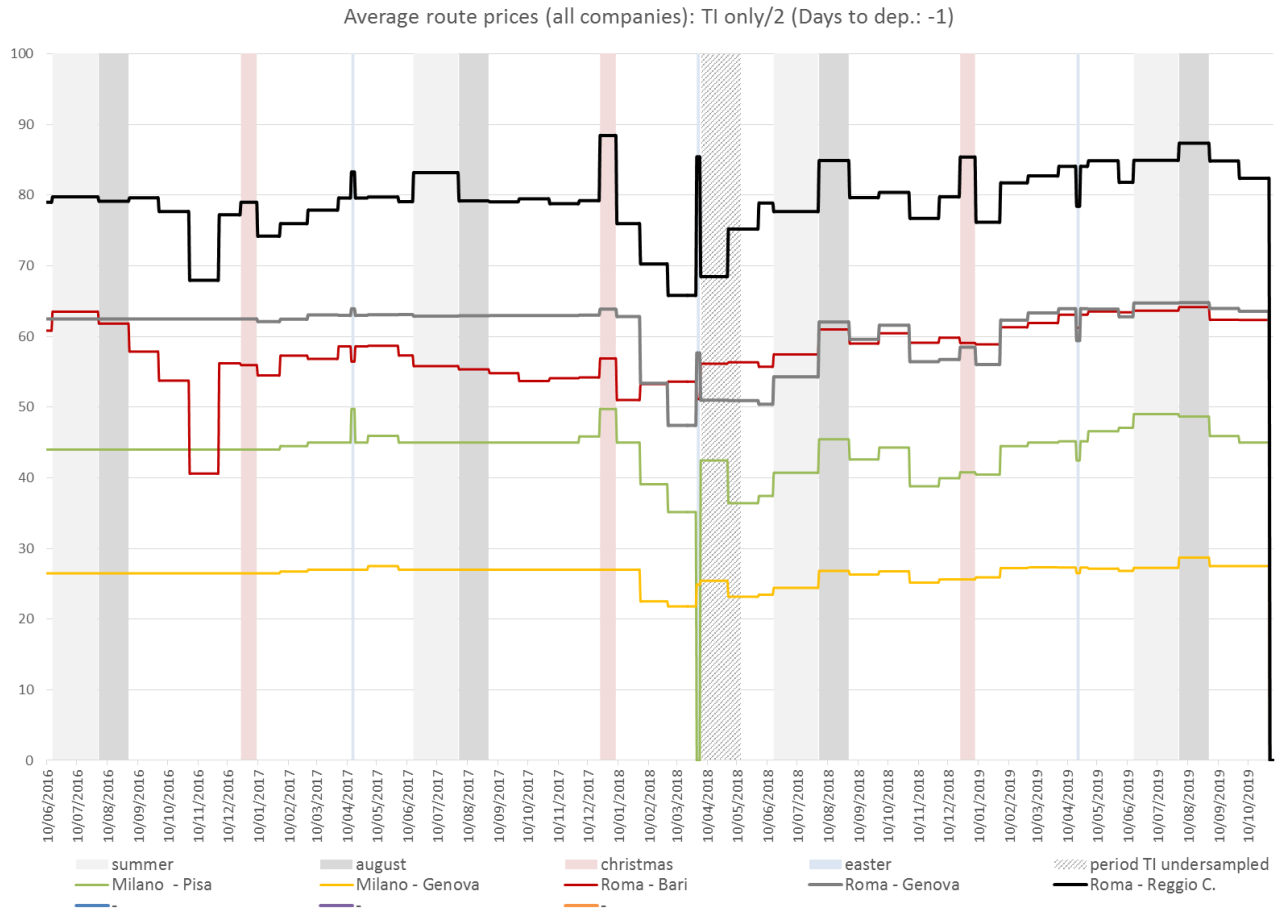

Figure 18. Average prices of Trenitalia monopolistic routes group 2. Days to departure -1.

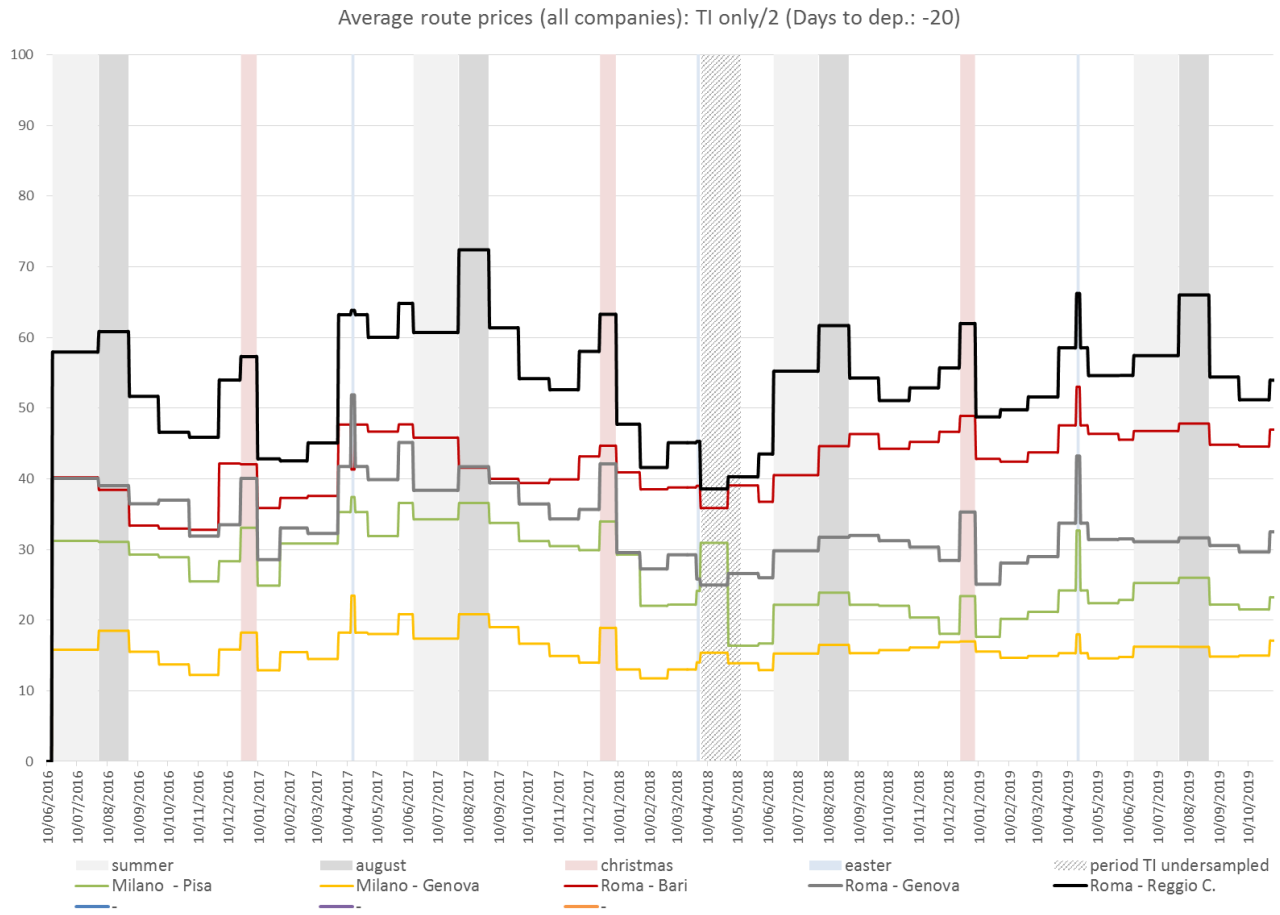

Figure 19. Average prices of Trenitalia monopolistic routes group 2. Days to departure -20.

We analyse just three cases. The Milan – Pisa one is a line characterised by high touristic flows but with a service almost totally under PSO. The Rome – Reggio Calabria is a 600 km pair with 8 PSO and 8 market services operated on a line out of the HS network, but with good speed performances. The Milan – Genova is a short but very crowded relation, with 22 PSO trains and 2 to 4 market trains.

The prices on the Milan – Pisa are basically the same for the market and PSO services (also performances are similar: market ones are a bit faster but less frequent). Series are very steady one day before departure, while -20 days we can appreciate the peaks during school holidays (but especially those of the weekends, blurred by the period average but visible among dots). Day by day prices are instead extremely variable due to the weekend tourism. The line is one of the few with market prices in 2018-2019 lower than before 2018, but well offset by PSO trains, showing the lack of success of the not-so-faster market services.

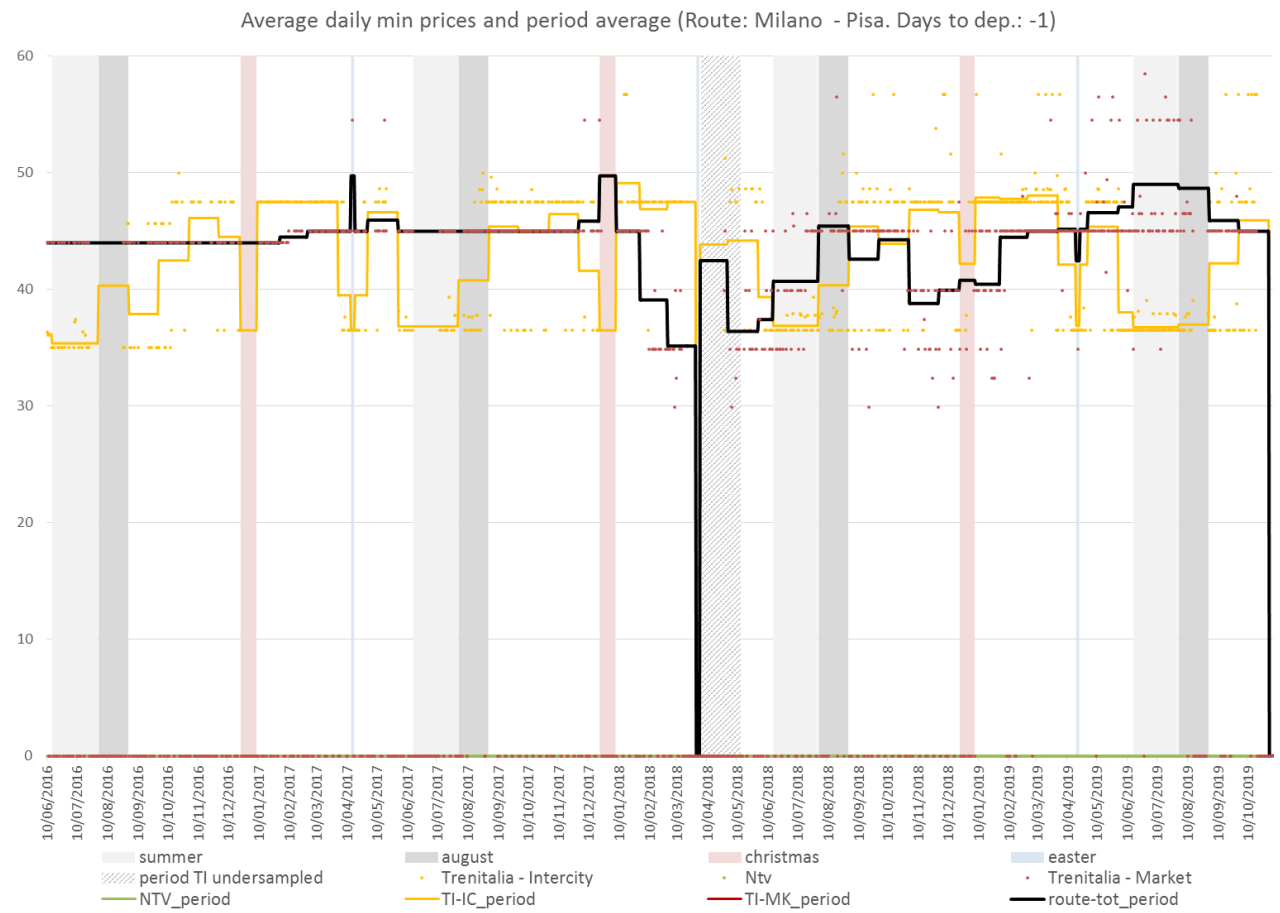

Figure 20. Average daily minimum price (shown) on the Milan - Pisa route. Days to departure -1

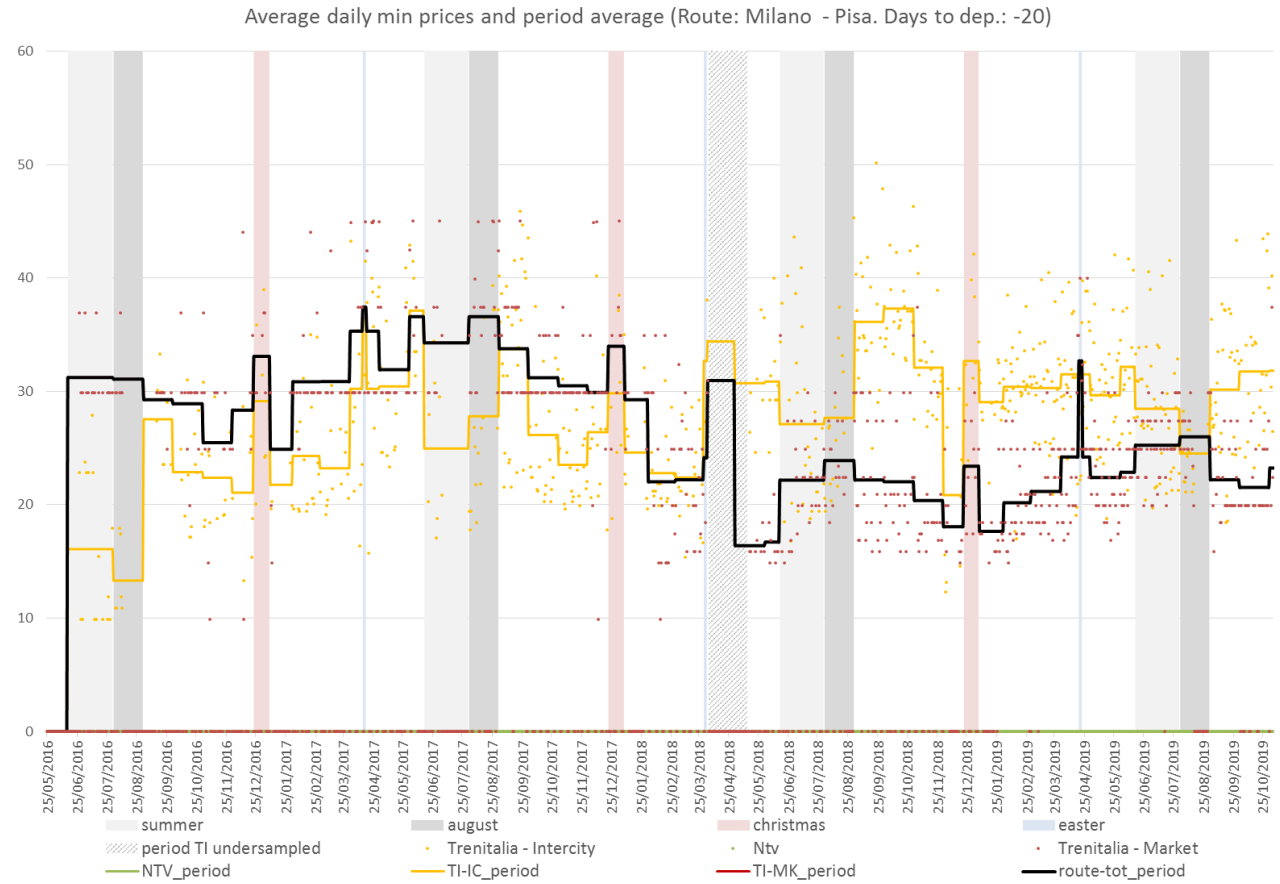

Figure 21. Average daily minimum price (shown) on the Milan - Pisa route. Days to departure -20

The Rome – Reggio Calabria shows a visible difference between PSO intercity (slow service s with many stops) and the faster market services. One day before departure PSO trains are almost always at full fare (60€), while 20 days before some discounts still exist and prices can fall even to 30€ or even 10€. Market prices are about 20€ above this level, with more price variability and well visible school holidays peaks.

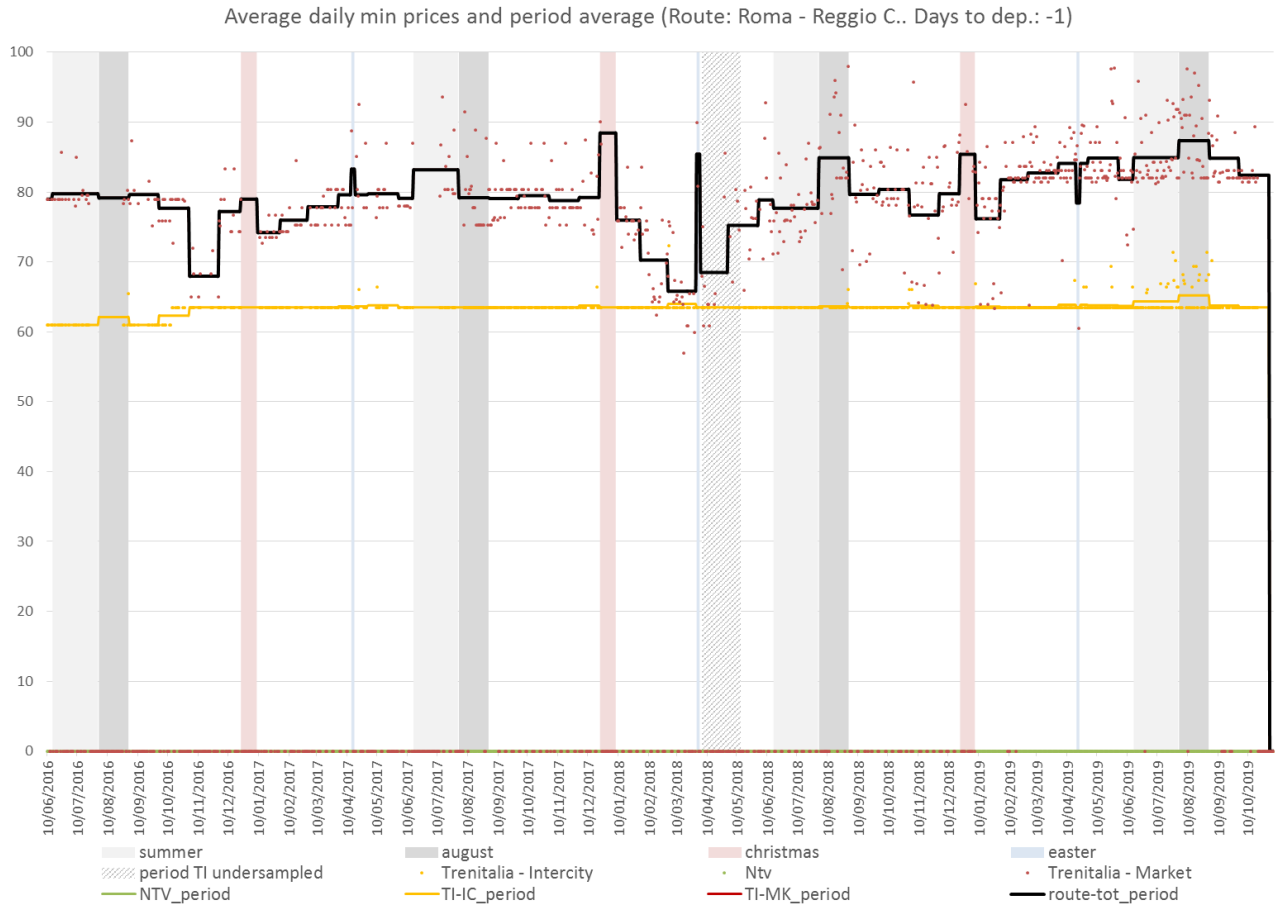

Figure 22. Average daily minimum price (shown) on the Rome – Reggio Calabria route. Days to departure -1

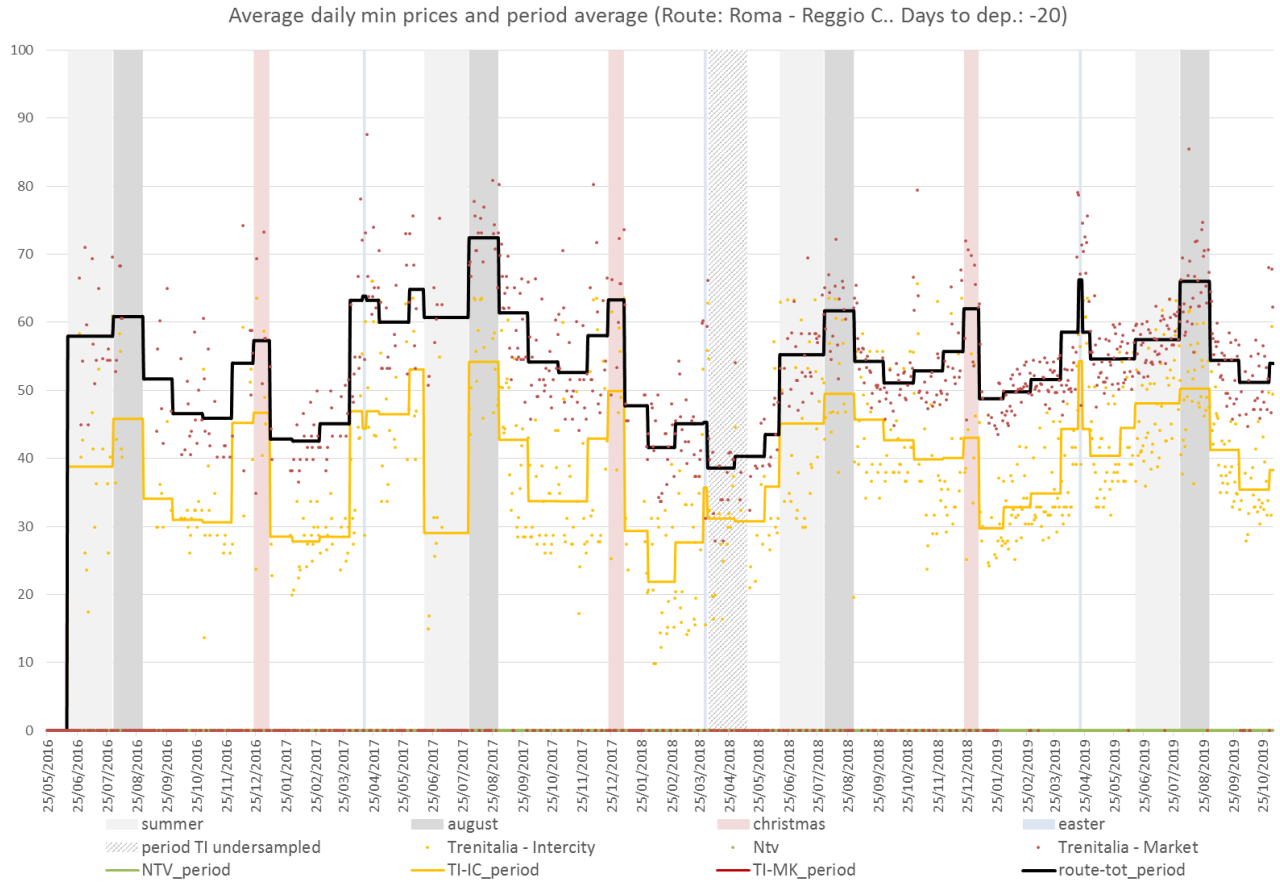

Figure 23. Average daily minimum price (shown) on the Rome – Reggio Calabria route. Days to departure -20

Finally, the Milan – Genova pair has an almost constant price for the numerous PSO trains one day before departure. This means that *on no train* any discounted ticket is available and all ticket reach the maximum cap fare. Interestingly, in the last months on some days the average is *above* the level recognisable as cap. The -20 days series are more variable, but prices are, once again, often near to the 20€ level, which is the cap price. Looking at market trains, one day before the situation is similar to the PSO: all trains are full and prices are around 27€. 20 days before the prices are instead even below the level of PSO trains, sign that these four connections are not particularly attractive for users (time savings to Genova is very limited and timetables are not necessarily the best ones).

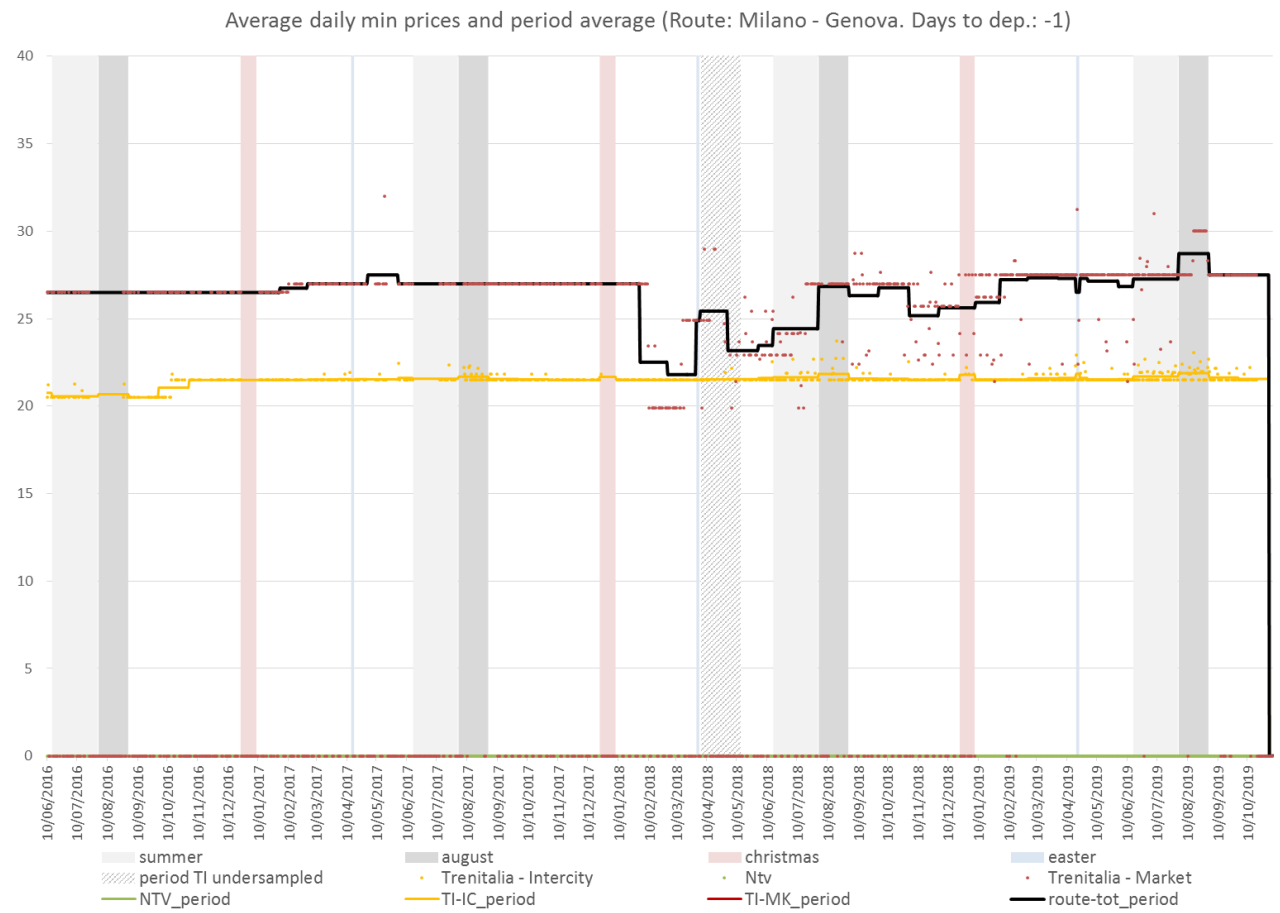

Figure 24. Average daily minimum price (shown) on the Milano – Genova route. Days to departure -1

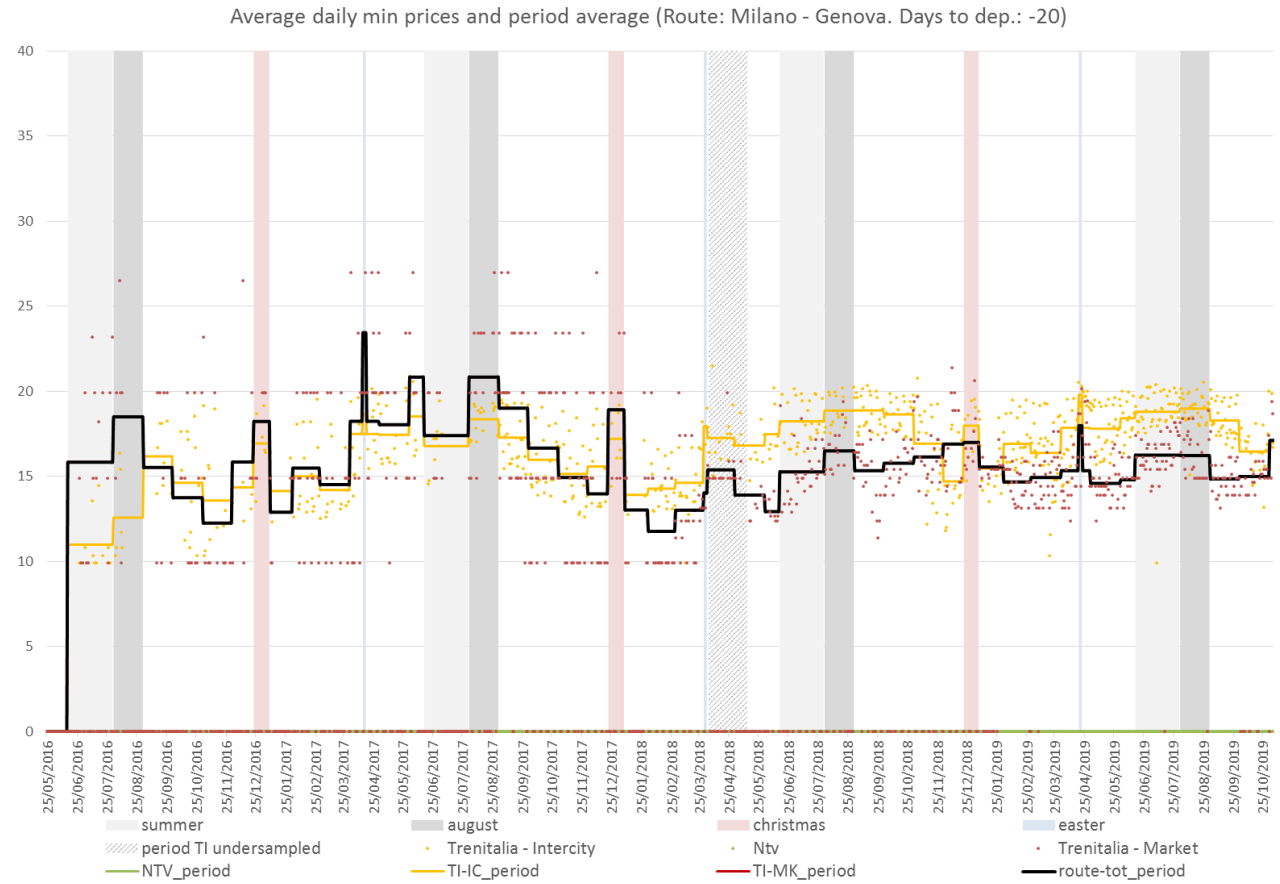

Figure 25. Average daily minimum price (shown) on the Milano – Genova route. Days to departure -1

5. Provisional conclusion

5.1 An increasing price level

Overall, we have shown that NTV/Italo is pricing below Trenitalia level of about 20%, with few exceptions. In the last period, NTV/Italo is pricing just 10% less (6% to 14% except for a couple of routes) one day before departure, suggesting better load factors.

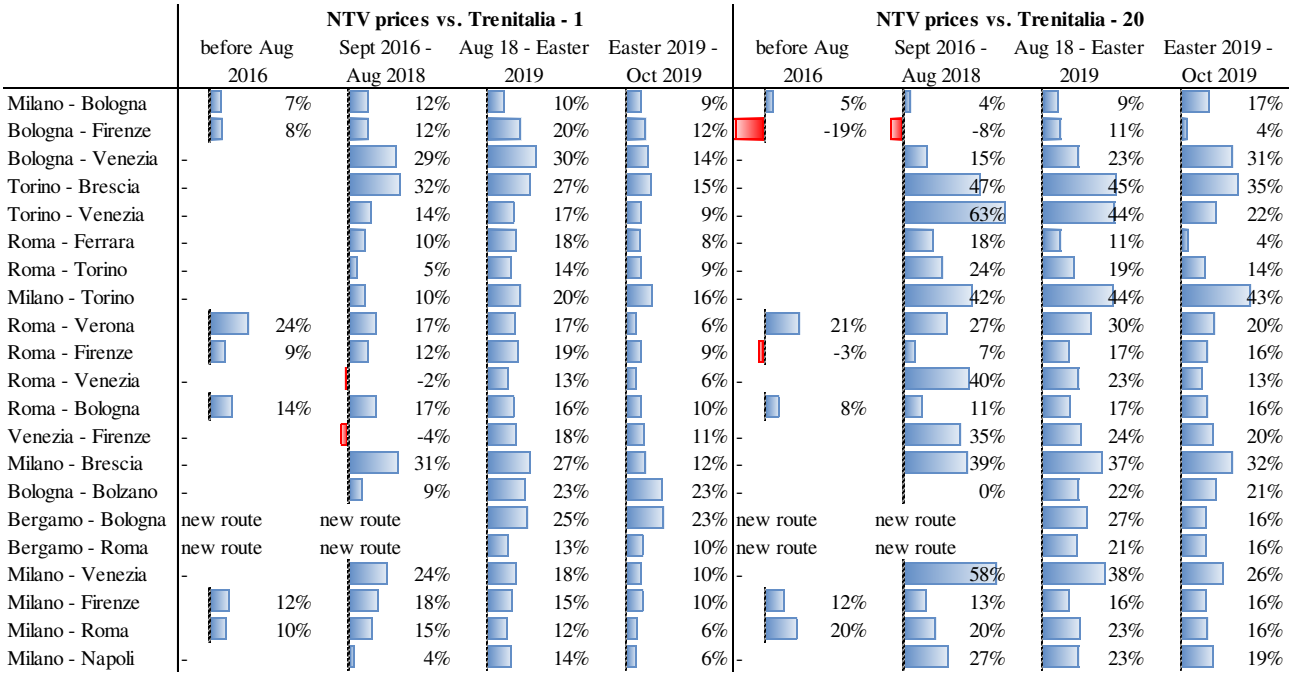

Figure 26. Difference in shown prices between Trenitalia (incumbent) and NTV/Italo (newcomer).

But the relevant fact is not that NTV/Italo is cheaper, but that the entry of it on the panel of routes where we have prices before and after does not seem to decrease prices (both average and Trenitalia ones). What is even more interesting is that the average route market prices after Easter 2019 are systematically higher (and with a step) than the prices in the previous periods. Looking at both Figure 27 and Figure 28 it is basically impossible to guess when NTV/Italo opened the route, as average route prices never fall (rather the opposite, for -1 days). Since after Italo entry prices of Trenitalia seem to rise, the effect for the customer is just a form of further price discrimination: low-WTP users move to NTV/Italo and Trenitalia gets the higher-WTP demand.

From the analysis of this large dataset we can therefore affirm that there isn't (anymore) an entry effect of NTV/Italo on prices, similarly to what has already been evidenced in Beria and Bertolin (2019) looking at average per km fare across different routes, but without comparing before/after periods.

This is obviously not meaning that competition is not influencing prices, as there is no counterfactual: what would have happened if NTV/Italo were not present? Moreover, we cannot also affirm that the price reduction documented in early literature (-30% to -40%) has disappeared. But, for sure, the typical effect of an entry in a directly competitive market is not just lowering prices. So, the point to understand is why this is not happening.

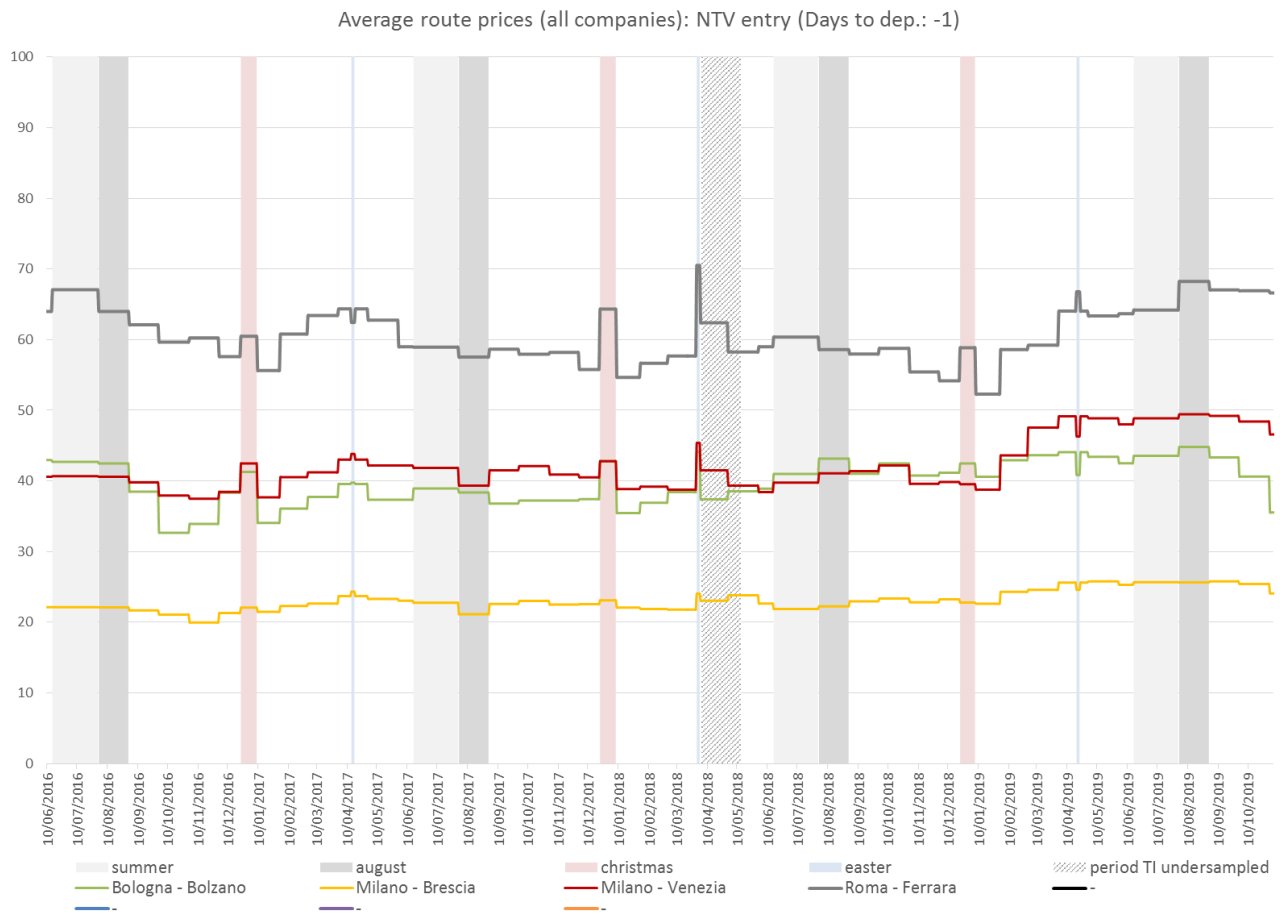

Figure 27. Average daily minimum price (shown) on routes where NTV/Italo entered in the market. Days to departure -1

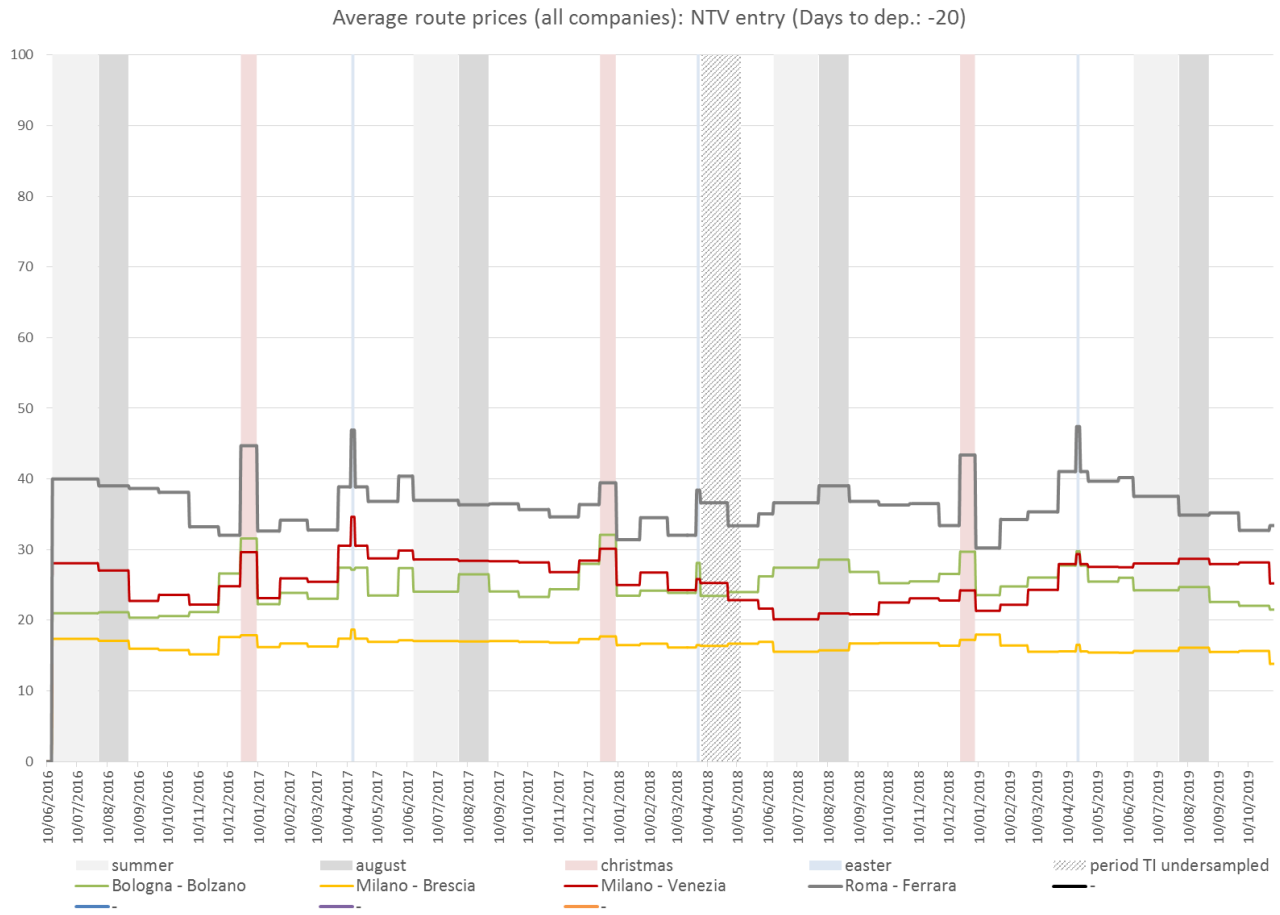

Figure 28. Average daily minimum price (shown) on routes where NTV/Italo entered in the market. Days to departure -20

5.2 Shown prices are not revenues

In Beria and Bertolin (2019) one possible explanation to the similar level of price on routes without competition was that Trenitalia was adopting the same pricing strategies and levels that would have adopted in presence of the competitor, even on routes where it was monopolist. This because the strategy proved to be effective for revenues or because preventing the entry of a possible newcomer. In parallel, it was also guessed that routes without NTV/Italo were mostly secondary routes: lower speed, lower competitiveness with plane/car, lower demand, lower demand and lower load factors.

Unfortunately, the evidence of this paper is not going in the direction of confirming these hypotheses. Analysing the data not across routes, but looking at the time series we observed that Trenitalia is not lowering prices even when Italo enters. This is not a good indicator, even if not necessarily the sign of a cartel. Two possible alternative explanations:

a) The entry of NTV rises total costs more than total revenues granted by new demand. Trenitalia has lower load factors and must increase prices to maintain the revenues. Actually it also "can" rise prices because demand is probably still willing to pay for the extra frequency and often NTV enters in the route when the line speed is increased (on the Torino-Venice entered when Milan-Brescia HS line was opened).

b) Shown prices are not perfectly correlated with revenues. Both companies are actively and massively using other yield management systems in addition to advanced purchase. NTV is issuing very often discount codes for newsletter subscribers applicable if booked during limited time-windows. Trenitalia has significant discounts for fidelity card owners (e.g. 11-14 Tuesday-Thursday 50% or couples or elder and young). Both offer multi-rides carnets for commuters. So, the price dynamics we measure is not necessarily the dynamics of the revenues.

Despite we have absolutely no access to detailed revenues data (for Trenitalia is even difficult to separate PSO and market revenues), an estimation of the average revenue per pax*km is shown in Figure 29. We can see that in 2018 per km revenues were not higher than in 2017; that 2010 market prices were higher than 2018; that Italo is about 20% below Trenitalia in terms of revenues (despite working on the core of the market, the HS); and that only PSOs increased. Unfortunately, data for 2019 are not available, and we cannot confirm this last hypothesis that revenues increased with prices.

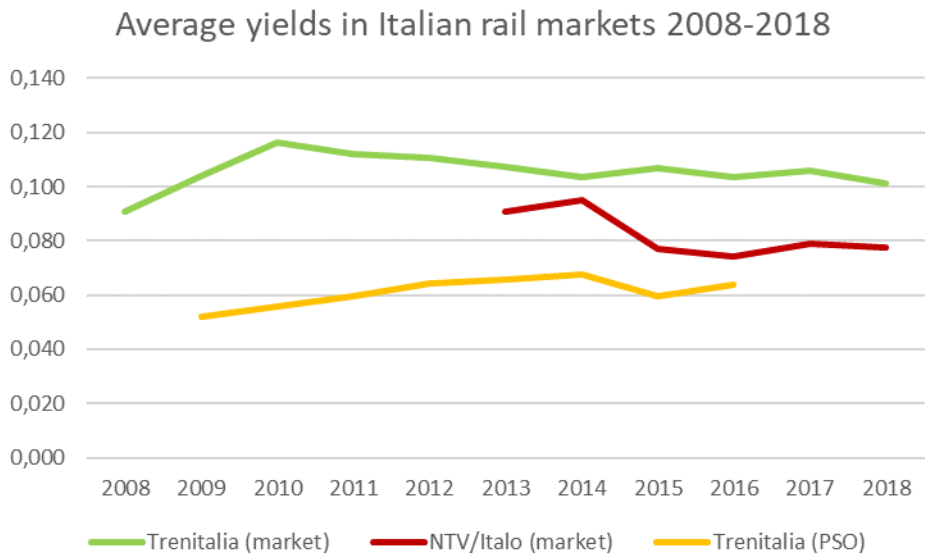

Figure 29. Estimation of unit revenues of long-distance market segment. Source: our elaborations on NTV, Trenitalia and Ferrovie dello Stato balances.

6. Acknowledgements

The paper is part of the project "QUAINT" (grant number: RBSI14JR1Z), supported by the Italian Ministry of Education University and Research (MIUR), within the SIR programme (D.D. n. 197 del 23 gennaio 2014).

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