Long-distance rail prices in a competitive market. Evidences from head-on competition in Italy

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- Introduction and aims
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- Prices and competition
- Prices and capacity
In a previous work we discussed in deep some **consequences of long-distance land transport liberalization in Italy**:

- The reach of a good level of intramodal and intermodal competition, but also the existence of overlaps between market, PSO and regional services;
- A first discussion about the fare systems, that will be further discussed here;
- The rise of an increasing specialization of long-distance products, both in terms of specialization and niche-focus.

We also studied in detail the **prices of the coach sector**, finding the influence of seasons, single operators and limitedly but significantly, of rail competition.


Introduction and aims
Paper aims

2-years long database of rail prices + 30 relevant OD pairs in Italy

We aim at providing a quantitative description of rail fares system, in presence or not of competition:

1. To what extent the “classical” price discrimination techniques are used, in particular seat classes and flexibility in booking change;

2. If, and how much, prices of routes in competition differ from routes provided by the incumbent only;

3. How early-booking price discrimination is applied;

4. The load factors of trains through the analysis of incidence of fully-booked trains.
Italian market situation is quite peculiar:

- long-distance rail is liberalised and ITALO is the largest non-incumbent competitor in the EU.
- Coaches are fully liberalised since 2014 and market is rapidly evolving.
- Alitalia is still there, but negligible.

Italo has now a non-irrelevant market share in routes where present.
Introduction and aims

The state of liberalisation in Italy

**Italo** is mainly operating on the HS infrastructure with HS rolling stock, but mixed services exist and are growing:

a. Turin-Milan-Rome-Salerno
b. Venice-Rome-Salerno
c. Bolzano/Brescia-Verona-Salerno
d. Turin-Milan-Venice (Dec 2017)

Clearly, Italo’s turnarounds try to maximize speed, so out-of-HS services are limited and using the new 250kmh trains.
Introduction and aims

The state of liberalisation in Italy

A second element of discontinuity is the rise of the coach sector, well above the historical supply and now less and less South-centric.

In 2018 Flixbus alone counted nearly the supply of the entire sector in 2013, but upside-down.

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We collected prices for Trenitalia and Italo, for 30 origin-destination pairs, chosen to be geographically representative, but also considering the level of supply of alternative modes (air and coach), the level of competition and different distance ranges.

Table 1. Supply levels of the OD pairs analysed (long-distance only)

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

* 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.
We collected prices for Trenitalia and Italo, for 30 origin-destination pairs, chosen to be geographically representative, but also considering the level of supply of alternative modes (air and coach), the level of competition and different distance ranges.
Data

Database contents

Data cover **June 2016 to April 2018**, with an average sample of 15 days of survey per month, both in weekdays and weekends.

We retrieved **all fares for each train running on the chosen routes** with an advanced purchase of **1, 2, 5, 10 and 20 days** from the date of inquiry.

Whenever a specific ticket combination (flexibility and level of service) was **sold out**, the corresponding fare amount was not shown.

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

Currently, database size is about 6Gb…
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Traditional fare systems in public transport were based on **distance-based fares, usually decreasing with distance**. The only price discrimination existing since the beginning of rail is the **division in classes**, differentiated by comfort and crowding.

Air market liberalisation has brought into long-distance transport a range of **marketing techniques** to further differentiate pricing, with the **aim of maximizing load factors and revenues**.

### Prices and competition

#### Classical price discrimination

<table>
<thead>
<tr>
<th>technique</th>
<th>examples</th>
<th>IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of service</td>
<td>Classes</td>
<td>√</td>
</tr>
<tr>
<td>Combination tickets</td>
<td>discounted daily return tickets</td>
<td>√</td>
</tr>
<tr>
<td>Level of flexibility</td>
<td>refundable of modifiable tickets</td>
<td>√</td>
</tr>
<tr>
<td>Targeted discounts</td>
<td>young, elderly, companies…</td>
<td>√</td>
</tr>
<tr>
<td>Individual discounts</td>
<td>promotional codes</td>
<td>√</td>
</tr>
<tr>
<td>Season or multiple tickets</td>
<td>10 travels in 6 months</td>
<td>√</td>
</tr>
<tr>
<td>Bundle-tickets</td>
<td>discounted fares if purchased with hotel</td>
<td>~</td>
</tr>
<tr>
<td>Subscription-based discounts</td>
<td>a fixed discount for card holders, like the BahnCard</td>
<td>x</td>
</tr>
<tr>
<td>Advanced purchase</td>
<td>Prices increasing with time or load factor</td>
<td>√</td>
</tr>
</tbody>
</table>
Today both players adopt a **very similar and complex fare system**, mostly based on the cross of three dimensions, and increasing with load factors:

- **Class**
- **Flexibility**
- **Group**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Train</th>
<th>Seat class</th>
<th>Flexibility</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trenitalia</td>
<td>Frecciarossa</td>
<td>Standard Premium Business Business area silenzio Business salottino Executive</td>
<td>Super economy Economy Base</td>
<td>(normal) Senior Young “Cartafreccia” Newsletter discounts</td>
</tr>
<tr>
<td>Other trains</td>
<td>2 Class 1 Class</td>
<td></td>
<td>Super economy Economy Base</td>
<td>(normal) Senior Young “Cartafreccia”</td>
</tr>
<tr>
<td>Eurocity</td>
<td>2 Class 1 Class</td>
<td></td>
<td>Adult/Standard Offerta speciale 1</td>
<td></td>
</tr>
<tr>
<td>NTV</td>
<td>Italo</td>
<td>Smart Confort Prima Club executive</td>
<td>Low Cost Economy Flex</td>
<td>(normal) Senior Newsletter discounts</td>
</tr>
</tbody>
</table>
To clarify how the system works, let’s make an example.

A certain (unknown) number of 9€ “supereconomy” (not refundable) and 19€ “economy” (refundable) tickets are sold. The “base” (flexible) fare is always available.

When they run out, a second block of 19 and 29 € tickets is sold.

Typically, “supereconomy” tickets end soon. Often also the “economy” ones end.

1 day before they are retired anyway and “base” is the only available option.

The same things happen on every class, with different timing.

Figure. Example of discounted prices
Discounts are not forever… lower prices run out much earlier than normal tickets. Interestingly, 1st and 2nd class have similar rates of unavailable fares.

~85% of «low cost» seats in 2nd class («smart») are unavailable the day before departure.
We look at the cheapest fare still available on every train, whatever is the class and the flexibility level.

We computed the price-per-km for the two operators, and tested the effect of three elements on them:

- OD pair distance
- Level of competition
- Commercial speed

One can expect that routes in competition cost less than routes in monopoly and that faster routes cost more…

…Rather the opposite…
F1. the price is affected by the length of the OD pair

F2. Italo is 10-20% cheaper than Trenitalia

F3. Trenitalia’s routes in competition cost more than the ones in monopoly!!
F1. the price is affected by the length of the OD pair

F2. Italo is 10-20% cheaper than Trenitalia

F3. Trenitalia’s routes in competition cost more than the ones in monopoly!!
F4. conventional trains cost more with speed.

F5. HS trains no

F6. there is no significant difference with/without competition but competition is limited to top-speed routes!
F3. *Trenitalia’s routes in competition cost more than the ones in monopoly*

The fact is already found in literature in the air transport: Malighetti et al. (2014) see that low-demand routes show the lowest price level, whatever is the degree of competition. In other words, high-demand routes can sustain higher prices even if competition exists, which is exactly our for rail connections. Bilotkach et al. (2015) find that, excluding touristic routes, yield management is used by airlines whatever is the degree of competition on a route.

So, we can hypothesise that, being competition in Italy only on the “top routes” in terms of demand and performances, **price is the balance of 4 different forces** and not just of *competition*:

- Higher train productivity for speed
- Competition
- High demand pairs
- High WTP for speed
With the database we can compute the function linking prices and advanced purchase, per operator and market context.

The decline of Italo 10-5 days before departure is a systematic fact. Most likely, NTV reintroduces discounted fares in this period to secure higher load factors.
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We define a **fully booked train** if at 1-day before departure the most flexible (and therefore expensive) first/second class fare (or equivalent) is sold out.

The average monthly percentage is calculated as the quantity of sold-out fares over the number of trains.
F7. there is a peak of full trains during the Spring and the beginning of Summer.

F8. Frecciarossa is generally more full than Italo. Frecciargento are rarely full and never in Summer.

F9. both for FR and Italo, sold out 1\textsuperscript{st} class is systematically higher than the 2\textsuperscript{nd} \textbf{first-class seats onboard may be increased} by operators to take advantage of the greater willingness to pay of the users, probably impersonated by business users.
We empirically define “touristic route” if sold out full price 2\textsuperscript{nd} class in July and August is more than in February and March.

F10. sold-out trains are more in touristic routes, except Frecciarossa

F11. 1\textsuperscript{st} class sold-out is less on touristic routes than other

F12. on non-touristic routes conventional trains perform badly, while HS trains are often sold-out in Spring.
Conclusions & further research

Conclusions

Thanks to a huge database of rail prices observations we evidenced some general trends:

a. Competition in Italy is limited to top-demand routes and therefore prices of routes in competition are higher than routes in monopoly. Of course we do not have a counterfactual, and most likely in absence of competition prices would be much higher.

b. Italo is pricing 10-20% less than the competitor, has slightly lower sold-out rates and needs to “refill” the pool of discounted prices about 1 week before departure.

c. Rate of Sold-out trains is very different between touristic routes and business routes. The peak of the latter is Spring and conventional trains are never full. For touristic routes, instead, also conventional trains get full often during the entire year.

Further research: 1) perform an econometric model to put everything together; 2) try a cross-country comparison on prices strategies and levels.
Thank you for your attention!!!

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