EXPLORING SCALE AND SCOPE ECONOMIES IN THE ITALIAN BUS AND COACH INDUSTRY

work in progress

Yardstick competition in transport

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OUTLINE OF THE Presentation

- Cost function estimation for multiservice firms:
  - ⇨ scale and scope economies
- Methodology: different models
- Application to Italian specialized and diversified passenger transport companies (urban – intercity – coach renting)
- Results
- Policy implications

Passenger Transport Industry

➢The Italian bus and coach industry includes all urban and suburban land transport modes (such as motor bus, tramway, streetcar, trolley bus, and metro) was employing in year 2011 171,200 workers, with a turnover of about 11 EUR billion (0.7% of Italy's GDP)

➢In order to introduce more efficiency, enhance productivity and reduce huge deficits, many countries have put in place reforms in which the institutional reorganization of the industry is combined with the design of new incentivizing regulatory measures.

➢ **In Italy**:

- The programming of the services and the management of the subsidies have been shifted from the national to the regional level
- Firms were required to sign formal agreements with local governments (*service contracts*).
- More reliance on competitive tendering for the allotment of service concessions

Passenger Transport Industry

➢New laws and decrees were introduced in the 2000s, and a Transport Regulation Authority was established in 2011 (fully operational in September 2013).

➢An effective reform of the industry requires a detailed analysis of the cost structure of bus and coach operators, which helps:

- To identify the proper configuration of the network and to implement adequate regulatory interventions

- Efficiency-oriented policymakers to plan and design the provision of the service (i.e., extension of the service areas, frequencies of buses, choice of the number of bus lines, etc.).

Passenger Transport Industry

Operators are often multi-service firms, which operate in

- regulated markets: urban and intercity transport

- non-regulated markets: long distance express coach and hired coach services.

Hired coach travel is typically characterized by non-scheduled times and non-fixed routes. This service is mainly addressed to occasional users, as it occurs, for example, in the tourism sector.

Conversely, long distance coach transport plays a crucial role in connecting the most dispersed part of the countries to major destinations. As a result of the liberalization process (European Commission, 2009), express long distance coach transport is growing exponentially so as to directly compete with railways and airlines services.

Passenger Transport Industry

This work analyses the cost function of a sample of Italian transit firms which are providers, in combination or as specialised units, of

urban
intercity (including suburban and long-distance coach services)
for-hire (special regular and occasional coach services)

passenger services in the years 2008 to 2012.

The presence of specialised, two-output and three-output firms allows to investigate the presence of economies of scope for multi-service firms.

From a methodological point of view, we test the advantage of using the Composite Cost Function model (Pulley and Braunstein, 1992), which is well suited to analyse the cost properties of multi-product firms, w.r.t. commonly used specifications (Translog, Generalized Translog, Quadratic).

DATA AND VARIABLES

- 47 firms observed in years 2008-2012: 417 pooled observations
- Data on costs, output and inputs
- Variables of the cost function model:
  - c = labor costs + capital costs + fuel + other materials and services
  - y_U = vehicles km urban transit;
    y_I = vehicles km intercity transit
    y_H = vehicles km for-hire services (special regular and occasional coach services)
  - p_L = labor price (salary expenses/nr. of employees);
    p_k = (depreciation rate+interest)/vechicles;
    p_{MS} = fuel and other raw materials and services/liters of fuel consumption

Variants in which we used

- 4 inputs models instead of 3 inputs models
- operating costs instead of total costs

Table 3. Estimates of economies of scope and scale by scaled values of the average outputs (at the average prices)

Scaling procedure	$SCALE_T$	$SCOPE_T$	$SCOPE_H$	$SCOPE_U$	$SCOPE_I$	$SCOPEc_{HU}$	$SCOPEc_{HI}$	$SCOPEc_{UI}$
λ = 0.25	1.1465*	0.2889**	0.1312**	0.1382**	0.1581**	0.1914**	0.3081***	0.1633**
	(0.0847)	(0.1315)	(0.0648)	(0.0654)	(0.0671)	(0.0893)	(0.1155)	(0.0674)
λ = 0.5	1.0328	0.1338*	0.0389	0.0537	0.0957**	0.0566	0.1815**	0.1010**
	(0.0359)	(0.0732)	(0.0353)	(0.0362)	(0.0411)	(0.0518)	(0.0801)	(0.0416)
λ = 1	0.9173	-0.0201	-0.0409	-0.0115	0.0719**	-0.0616	0.1004*	0.0788***
	(0.0662)	(0.0792)	(0.0263)	(0.0232)	(0.0329)	(0.0389)	(0.0599)	(0.0291)
λ = 2	0.8640***	-0.0552	-0.1312***	-0.0764**	0.0788*	-0.1816***	0.0561	0.0936***
	(0.0289)	(0.0405)	(0.0444)	(0.0338)	(0.0461)	(0.0563)	(0.0825)	(0.0342)
λ = 4	0.7732***	-0.1418	-0.2484***	-0.1545***	0.1115	-0.3086***	0.0369	0.1554**
	(0.0362)	(0.1148)	(0.0713)	(0.0548)	(0.0750)	(0.0728)	(0.1499)	(0.0613)

ECONOMETRIC RESULTS:

- Global scale dis(economies): 0.91
- Scope Dis(economies) = -0.02 (not significant)
- Constant specific returns to scale (also for couples of services)
- Economies of scope only for small operators
- Global diseconomies of scale for large operators
- Scope economies for the couple **intercity-urban** and **intercity-for hire**
- Constant returns to scale for specialized operators

Policy Implications

Scope economies are mostly driven by the presence of the intercity bus service

→ $SCOPE_I$ (cost disadvantages in the stand-alone production of y_I), $SCOPE_{CUI}$ and $SCOPE_{CHI}$ are positive and significant at most size levels.

As far as the size of the firm increases, the synergies remain only for the pairwise combination of urban and intercity service.

Conversely, the negative values of $SCOPEc_{HU}$, $SCOPE_U$ and $SCOPE_H$ suggest that for large firms it is better to run hire coach services and urban transport as separate activities.

Our findings are in support of integrated urban-intercity tenders.

Policy Implications

- Convincing results coming from previous researches concern only small multi-service firms: they may benefit from cost reductions with respect to specialized operators.

- large operators: contradictory results about the dimension of the economies of scale and scope

Policy Implications

- We can improve our knowledge by a statistically representative sample of specialized and integrated firms providing urban, intercity and coach transport services (Italian network, but also the regions by different urban centres).
- Methodological approach: both parametric and non-parametric methods.
- The cost function allows simulating the change of scale and scope technological coefficients at different levels and combinations of the outputs.
- the use of non-parametric techniques allows evaluating the potential gains (or losses) associated with ex-ante realistic mergers that one can hypothesise in organisational restructuring of the industry.

  Such overall potential gains (or losses) may be disentangled into technical efficiency, scale and output mixes effects.