



Economic Modelling – the influence of ownership

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Founding Members





Outline presentation



- Ownership models today in ATM
- Influence of ownership
 - Literature
 - (Small) economic model
 - What does the data have to say?
- Conclusions



Effect of ownership?



Ownership and governance models

- A large variety over countries (some examples

Country	ANSP	Employees	Organisation
Australia	Airservices Australia	4.204	Gov. Owned corporation
Belgium	Belgocontrol	919	Public company
Canada	Nav Canada	4.832	Private company
Finland	Finavia Corporation	1.612	Gov onwed public limited corporation
France	DSNA France	7.846	State agency
Germany	DFS	5.938	Gov. Owned company
Greece	Hellenic Civil Aviation Authority	680	Civil service agency
Ireland	Irish Aviation Authority	642	Commercial state –sponsored body

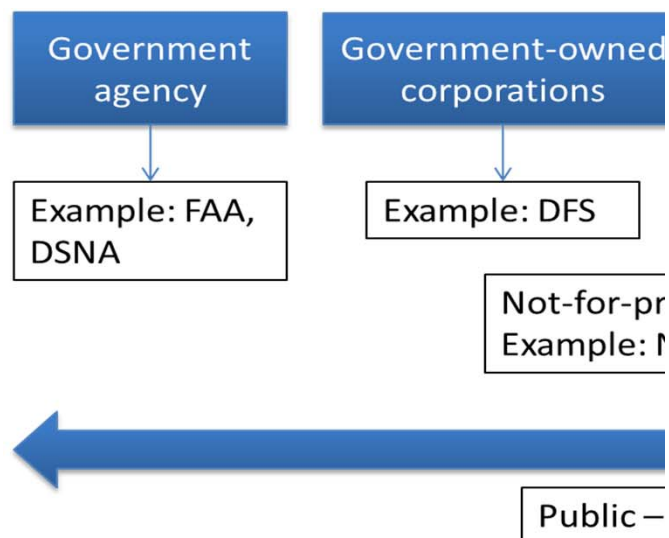


Effect of ownership?

The privatisation of the FAA: Does it go far enough?

Ownership and governance models

- Continuum of governance models



President Trump's recent announcement that he is to 'privatise' the air traffic management of the Federal Aviation Administration is a welcome development.

- Increased involvement of ATM customers

It is not a true privatisation, but, if it can be achieved, it will help to eliminate the current roundabout of political interference and management-accountable-to-political-whimsy to which the Air Traffic Office of the FAA is currently subject, when it should instead be focusing on its customers: the airlines.

Literature is mixed



- ANSPs
 - Elias (2015): no evidence one is better than the other
 - Button & Neiva (2014): DEA analysis: more efficient if closely linked to government (“counterintuitive”)
 - Robyn (2015): “A cooperative approach, such as the NavCanada case, has shown to be superior, in theory and in practice”
- Airports
 - Adler & Liebert (2014): DEA analysis - public airports operated less cost efficiently than fully private airports (in absence of competition). If competition, equally efficient but private sets higher charges (EU & Australia)
- General economic literature
 - Focusses on incentives
 - Laffont & Tirole (1991), Armstrong & Sappington (2007) : Cannot know a priori which one is better
 - Sappington & Stiglitz (1987): role of transaction costs



What does theory have to say? (1)



Assume the following mixed goal function for ANSP

$$Goal^{ANSP} = \gamma_1^{ANSP_i} CS + \gamma_2^{ANSP_i} \pi^{ANSP} + \gamma_3^{ANSP_i} NI$$

- With consumer surplus (CS), with weight parameter $\gamma_1^{ANSP_i}$
- Maximization of profits (π^{ANSP}), with weight parameter $\gamma_2^{ANSP_i}$
- National interest (NI), with weight parameter $\gamma_3^{ANSP_i}$
- Argue that weights depend on ownership form

ANSP has operating costs

$$OC_{ANSP} = D \cdot c(e) = D \cdot (a + \theta - e)$$

- With D demand
- a - fixed cost per flightkm controlled
- θ ANSP dependent cost – imperfectly observable (eg. Function of complexity)
- e imperfectly observable cost reduction potential – which comes at a cost $C_e = D \cdot \frac{\phi \cdot e^2}{2}$

ANSP receives income via charges – mix of price cap and cost-plus – B is weight of cost-plus

$$p_{charge} = A + Bc(e)$$



What does theory has to say? (2)



We can show by differentiating objective function:

The first order condition leads us to the following choice of efficiency

$$e^* = \frac{\gamma_2^{ANSP_i} + B(\gamma_1^{ANSP_i} - \gamma_2^{ANSP_i})}{(\gamma_2^{ANSP_i} + \gamma_3^{ANSP_i})\phi}$$

Hence we find that

- Effort is increasing in the weight attached to consumer surplus ($\gamma_1^{ANSP_i} > \gamma_2^{ANSP_i}$) and ($\gamma_1^{ANSP_i} > \gamma_3^{ANSP_i}$) – except if pure price cap.
- Effort is decreasing in the weight attached to national interest
- The effect decreases with the weight attached to profit

Assuming that public firms care more about national interest, this could lead to a lower effort level than a private firm with consumers in the board.

If the private firm is mainly interested in profit, it is not clear if the effort would be larger or smaller than in the case of a public firm/private firm with board.



And if we look into the data?

Estimation of

- Cost function
- Production function

Separately for En Route & Terminal

Using a dataset 2006-2014

- Data quality testing
- Missing data
- Construction of variables

Used STATA – Stochastic Frontier Analysis

- Different specifications
- Different explanatory variables/sets of explanatory variables



En route – cost function ** signif 1%



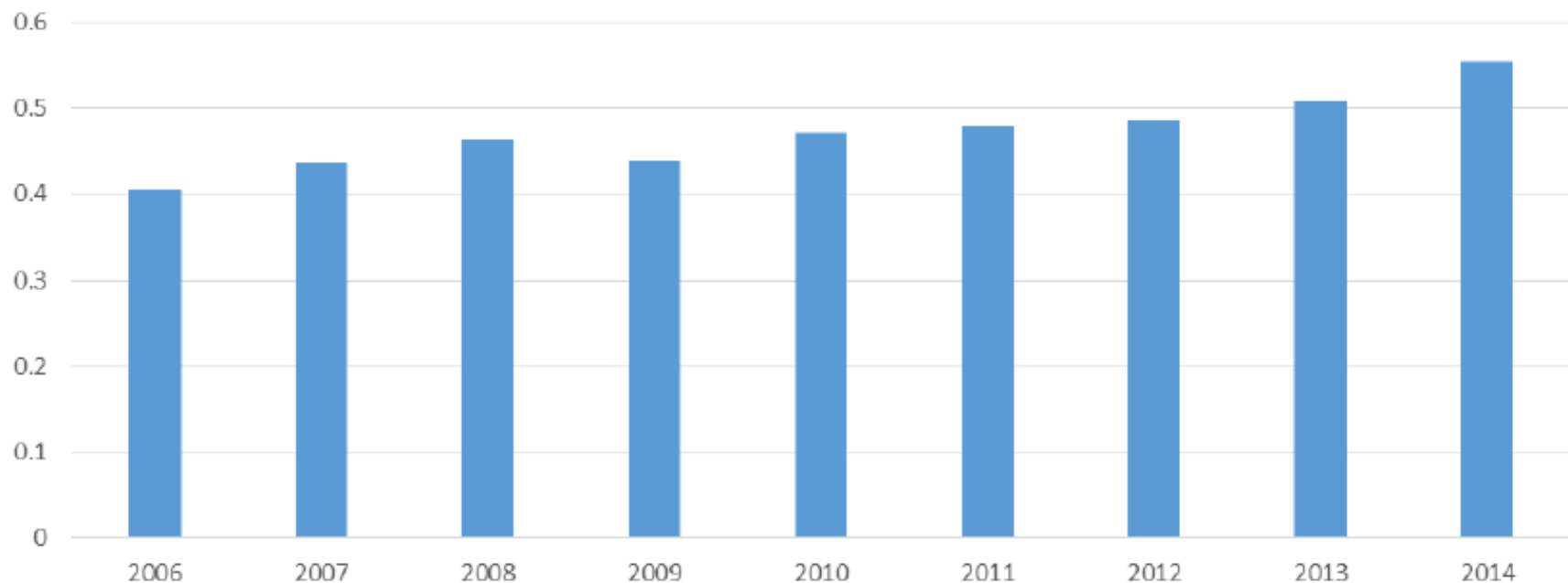
		Model 1	Model 2
Elasticities		estimates	
β_1	x_1 total IFR flight hours controlled	0.919**	0.905**
β_2	x_2 labour cost	0.385**	0.417**
β_3	x_3 capital cost	0.216**	0.218**
Environmental variables			
β_{Z1}	Z_1 seasonality	1.379**	1.686**
β_{Z2}	Z_2 complexity		0.700**
Exogenous inefficiency determinants (pos = neg. effect)			
δ_1	Z_{u1} complexity		-0.846**
δ_2	Z_{u2} ownership gov/corp		1.596**
δ_3	Z_{u3} ownership agency		1.563**
	Sigma_u	0.080	0.296**
	Sigma_v	0.327**	0.181**
	Lambda	0.246	1.633**
	Log likelihood	-97.510	-57.280

En route – production function ** signif 1%

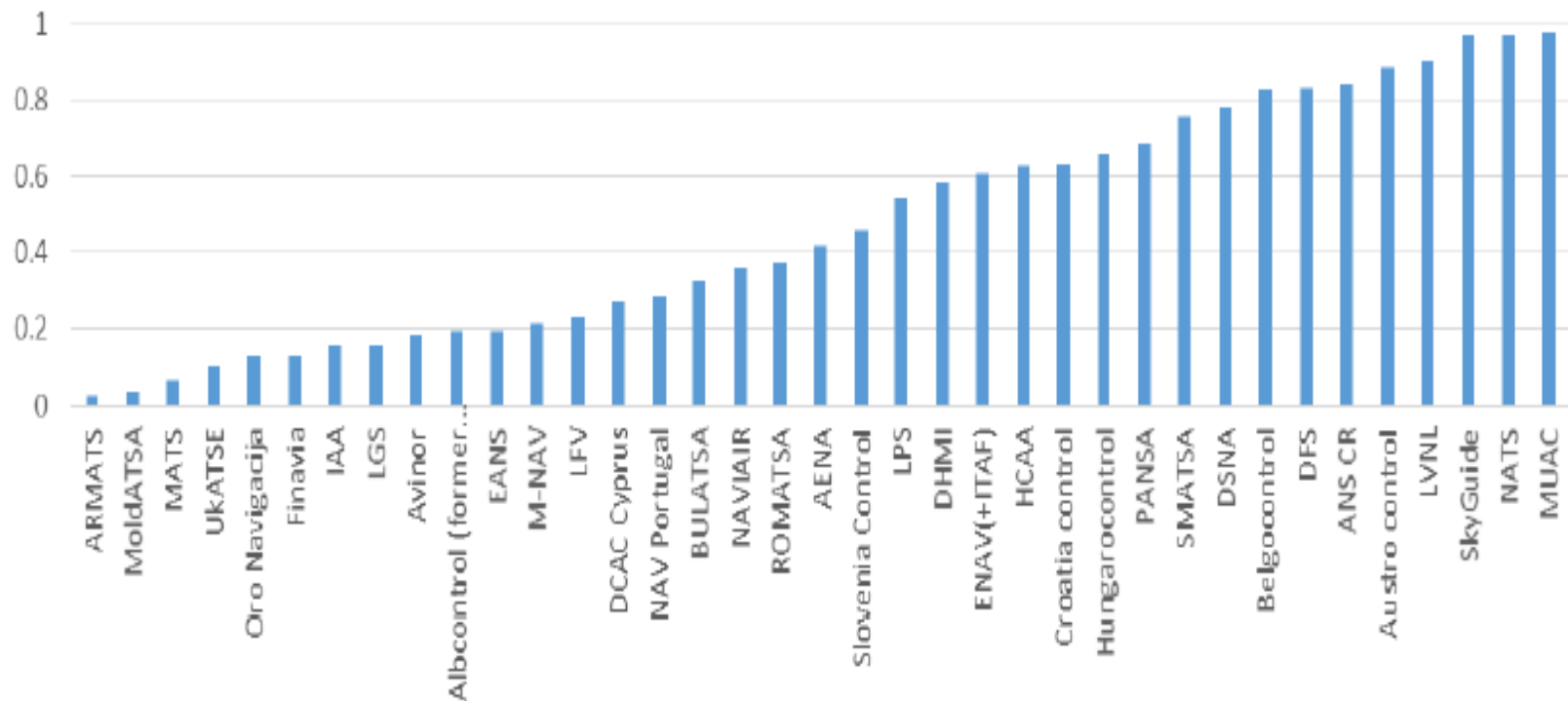


		Model 1	Model 2
Elasticities		estimates	
β_1	x_1 labour	0.451**	0.423**
β_2	x_2 capital	0.582**	0.520**
Environmental variables			
β_{Z1}	Z_1 seasonality	-1.017**	-2.492**
β_{Z2}	Z_2 complexity		-0.989**
Exogenous inefficiency determinants (pos = neg. effect)			
δ_1	Z_{u1} complexity		-1.553**
δ_2	Z_{u2} ownership gov/corp		2.935**
δ_3	Z_{u3} ownership agency		2.623**
	Sigma_u	3.723	0.340**
	Sigma_v	0.271**	0.142**
	Lambda	13.745	2.395**
	Log likelihood	-150.271	-59.249

Average production efficiency for en-route ANSPs from 2006-2014



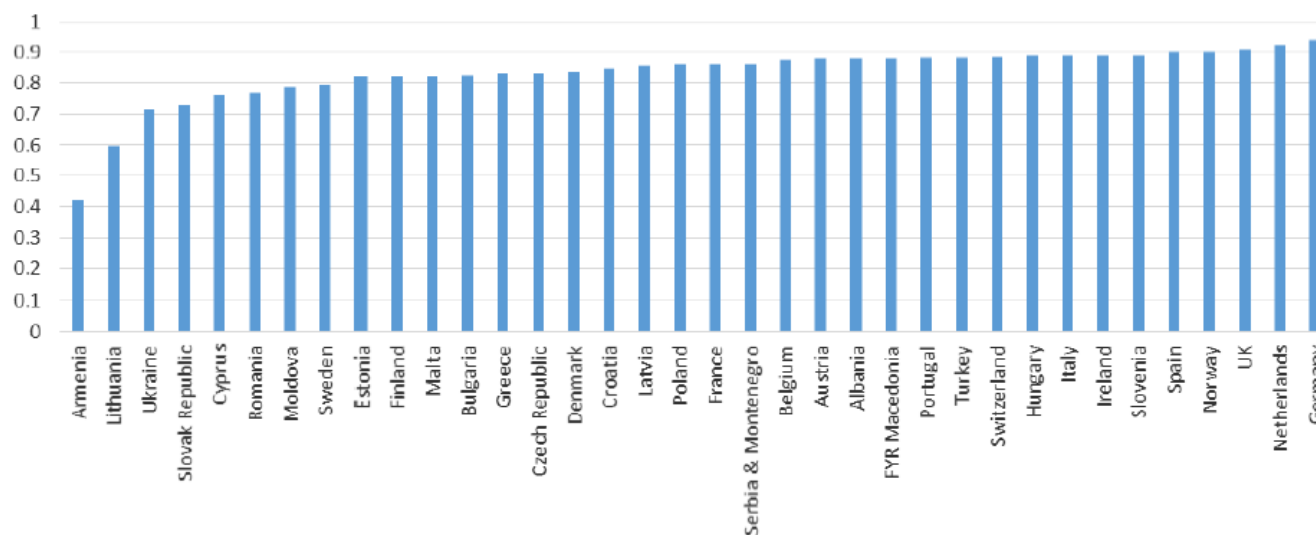
Average production efficiency estimate per en-route ANSP



And for terminals?

- Problem that terminals are reported at national level – aggregate of small and large airports
- All variables are statistically significant and with expected sign
 - Ownership significant for cost function
 - But not for the production function

Average production efficiency



Conclusion



In theory, one would expect positive effects (higher effort to control costs) of

- privatisation with stakeholders as shareholders
- inclusion of a board of stakeholders (public company)
- Impact of strong national interests (buying local, unions) decrease efficiency.

We also find this back in the data

-> ownership/governance matters!



Questions?



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Welcome and introducing the COMPAIR project

Thank you very much for your attention!



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