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Do European Reforms Increase Modal Shares of Railways?

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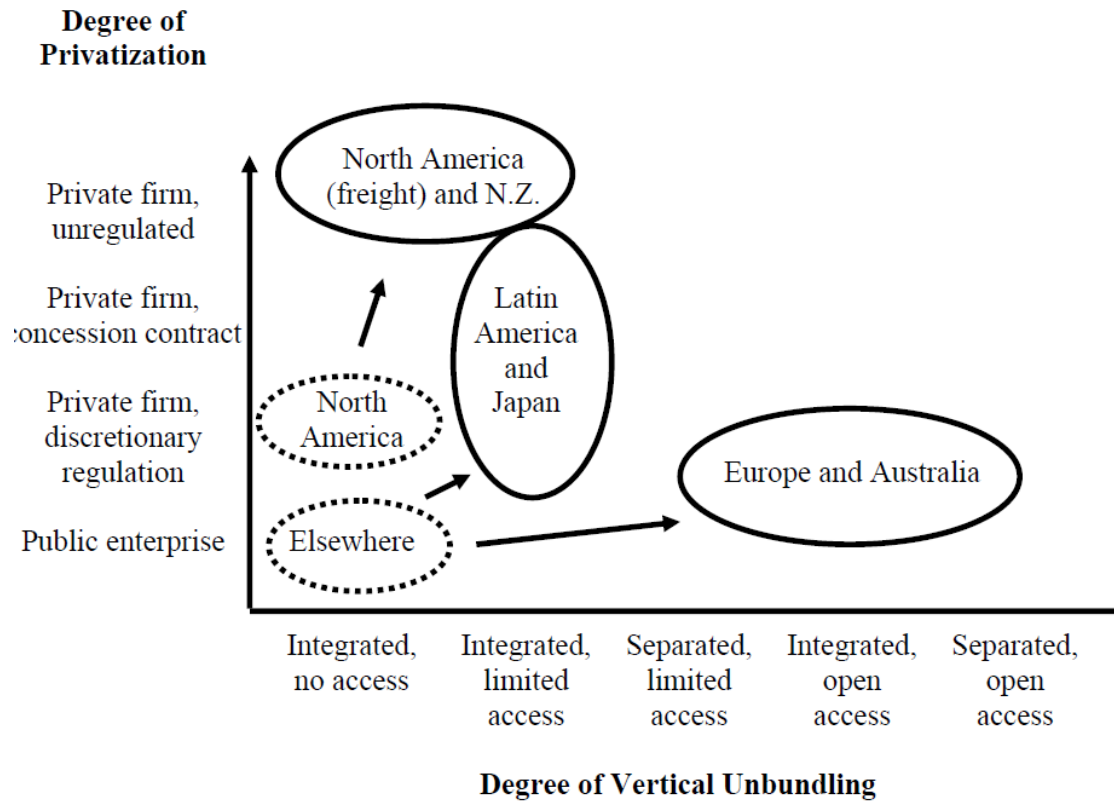
Motivation

- 50% of road freight over 300 km should shift to rail and water and the majority of medium distance passenger transport should go by rail by 2050 (EC, 2011)
- These goals underpinned by reform initiatives (vertical separation, competition entry)
- However, there are many factors causing long term structural decline of railways (DiPietrantonio – Pelkmans, 2004) and net benefits of vertical separation are questioned by some scholars (Pittman 2003, van de Velde et al. 2012)
- Do European reforms actually increase modal share of railways?

Railway reforms in the EU

- Vertical separation = a complete institutional separation of the infrastructure manager and the incumbent operator
- Competition entry = actual entry of the non-incumbent operators on the freight and passenger rail market
- Horizontal separation = institutional separation between passenger and freight operations of the incumbent

Reform options



(Gómez-Ibáñez, 2006)

Western x Eastern Europe

| | Western | Eastern |
|---------------------------|----------------|----------------------|
| Modal shares | Stable/rising | Falling |
| Government support | Stable | Insufficient/erratic |
| Incumbent's profits | Positive | Negative |
| Infrastructure investment | High | Low |
| Regulatory capacity | High | Low |

Previous studies (1) – impact of reforms on effectiveness

| Authors | Period | Sample | Meth | EFFECT OF: | | | |
|------------------------------|-----------|--------|------|---------------------|-----------------------|-----------------------------|---------------------------|
| | | | | Vertical separation | Horizontal separation | Competition entry passenger | Competition entry freight |
| Cantos Sánchez (2001) | 1973-1990 | 12 | COST | ~ | + | | |
| Driessen (2006) | 1990-2001 | 13 | DEA | + | | + | - |
| Wetzel (2008) | 1994-2005 | 22 | SFA | 0 | | - | + |
| Growitsch – Wetzel (2009) | 2000-2004 | 27 | DEA | - | | | |
| Asmild et al. (2009) | 1995-2001 | 23 | DEA | 0 | | + | + |
| Friebel et al. (2010) | 1980-2003 | 12 | SFA | + | | + | + |
| Cantos Sánchez et al. (2010) | 1985-2004 | 16 | DEA | + | + | + | + |
| Cantos Sánchez et al. (2012) | 2001-2008 | 23 | DEA | 0 | | + | + |
| Mizutani et al. (2012) | 1994-2007 | 25 | COST | ~ | + | | |
| Mizutani et al. (2014) | 1994-2010 | 28 | COST | ~ | + | 0 | 0 |

Previous studies (2) – impact of reforms on modal shares

| Authors | Period | Sample | EFFECT OF: | | | | | | |
|----------------------------|-----------|--------|---------------------|----------|-----------------------|----------|-------------------|----------|--|
| | | | Vertical separation | | Horizontal separation | | Competition entry | | |
| | | | Passenger | Freight | Passenger | Freight | Passenger | Freight | |
| Drew-Nash (2011) | 1998-2008 | 25 | 0 | 0 | | | | | |
| Laabsch-Sanner (2012) | 1994-2009 | 9 | - | 0 | | | + | 0 | |
| Van de Velde et al. (2012) | 1994-2010 | 26 | - | 0 | 0 | 0 | - | 0 | |
| Kougioumtzidis (2014) | 2003-2011 | 28 | - | 0 | | | | | |

Empirical strategy

- include all reform variables (VS, CE, HS)
- include broad sample of countries (27 = EU_15 + Switzerland and Norway + EU_10)
- explicitly control for differences between West and East
- data for period 1995-2013

Reform variables

- VERTICAL SEPARATION variable measures whether or not a country has carried out a complete institutional separation of infrastructure manager and incumbent operator.
- HORIZONTAL SEPARATION measured whether a country made a complete institutional separation of the freight and passenger operations of the national incumbent operator.
- FREIGHT PRIVATISATION measured whether a country privatised horizontally separated freight division.
- COMPETITION: index measuring total intensity of competition

| COMPETITION (values) | 0 | 1 | 2 | 3 | 4 |
|--|-----|---------|---------|-----------|------|
| Market share of non-incumbent operators | <1% | 1–4.99% | 5–9.99% | 10–24.99% | ≥25% |

Results (1) Passenger

Dependent variable: MODAL SHARE PASSENGER

Estimation method: Fixed effects

| | (1) | (2) | (3) | (4) |
|--------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| Reform variables | | | | |
| VERTICAL SEPARATION | -1.685** (0.7730) | -0.7033* (0.4126) | -0.7703* (0.4448) | -0.7312* (0.4174) |
| COMPETITION | -0.1281 (0.3153) | 0.06591 (0.2649) | 0.2638 (0.2209) | 0.2425 (0.2100) |
| HORIZONTAL SEPARATION | 0.3559 (0.5712) | 0.9653** (0.4757) | 0.6581 (0.4204) | 0.7470* (0.4334) |
| Control variables | | | | |
| ln_GDP_pc | -6.545*** (1.941) | -4.389*** (1.259) | -3.415*** (0.6192) | -3.769*** (1.148) |
| WEST*TREND | 0.1328*** (0.04316) | 0.08849** (0.03621) | 0.1090*** (0.02583) | 0.08480*** (0.03214) |
| EAST*TREND | -0.004770 (0.08666) | -0.0009085 (0.07908) | | -0.006439 (0.07637) |
| HIGH SPEED | 1.001** (0.3948) | 1.147*** (0.4371) | 1.133*** (0.4256) | 1.139*** (0.4321) |
| EMPLOYMENT_RATE | 0.2371** (0.1173) | 0.04892 (0.04402) | | 0.01817 (0.03268) |
| PRICE_TICKET | | -4.425*** (1.162) | -3.860*** (0.9661) | -3.986*** (1.189) |
| PRICE_FUEL | | 1.607 (1.079) | | 1.142 (0.9523) |
| ROMANIA*TREND | | | -0.5659*** (0.07509) | -0.5507*** (0.07258) |
| Const | 11.87*** (4.292) | 18.32*** (3.505) | 19.26*** (2.165) | 18.45*** (3.372) |
| # observation | 513 | 458 | 458 | 458 |
| # countries | 27 | 27 | 27 | 27 |
| Within R ² | 0.5440 | 0.5935 | 0.6638 | 0.6686 |
| InL | -818.9 | -518.3 | -474.8 | -471.5 |

(based on HAC robust standard errors)

*** significant at 1 % level

** significant at 5 % level

* significant at 10 % level

Results (2) Freight

Dependent variable: MODAL SHARE FREIGHT

Estimation method: Fixed effects

| | (1) | (2) | (3) | (4) |
|--------------------------|------------------------|------------------------|------------------------|------------------------|
| Reform variables | | | | |
| VERTICAL SEPARATION | -3.337* (1.747) | -3.192* (1.786) | -3.343* (1.761) | -1.995 (1.422) |
| COMPETITION | -0.5381 (0.4716) | -0.6265 (0.4410) | -0.4974 (0.4510) | -0.3395 (0.4017) |
| HORIZONTAL SEPARATION | 2.669* (1.471) | | | |
| - WITH PRIVATIZATION | | 3.426** (1.705) | 3.385** (1.697) | 2.903* (1.631) |
| - WITHOUT PRIVATIZATION | | 1.201 (2.325) | 1.456 (2.301) | 1.756 (2.500) |
| Control variables | | | | |
| ln_GDP_pc | -14.67*** (4.043) | -15.03*** (3.740) | -14.39*** (3.574) | -13.46*** (3.975) |
| WEST*TREND | 0.3674** (0.1620) | 0.3758** (0.1528) | 0.2958** (0.1414) | 0.2223 (0.1753) |
| EAST*TREND | -0.7854*** (0.2721) | -0.7422*** (0.2610) | -0.8272*** (0.2374) | -0.9880*** (0.3201) |
| YEAR_2009 | -1.557*** (0.4800) | -1.522*** (0.4791) | -1.589*** (0.4554) | -0.8851 (0.7019) |
| INFRASTRUCTURE | 0.08961 (0.06864) | 0.1006 (0.06668) | | 0.1582** (0.07033) |
| PRICE_FUEL | | | | 4.143 (3.827) |
| Const | 60.08*** (10.63) | 60.01*** (10.10) | 66.97*** (9.240) | 47.60*** (9.923) |
| # observation | 513 | 513 | 513 | 458 |
| # countries | 27 | 27 | 27 | 27 |
| Within R ² | 0.7508 | 0.7531 | 0.7503 | 0.7383 |
| InL | -1308 | -1306 | -1309 | -1118 |

(based on robust standard errors)

*** significant at 1 % level

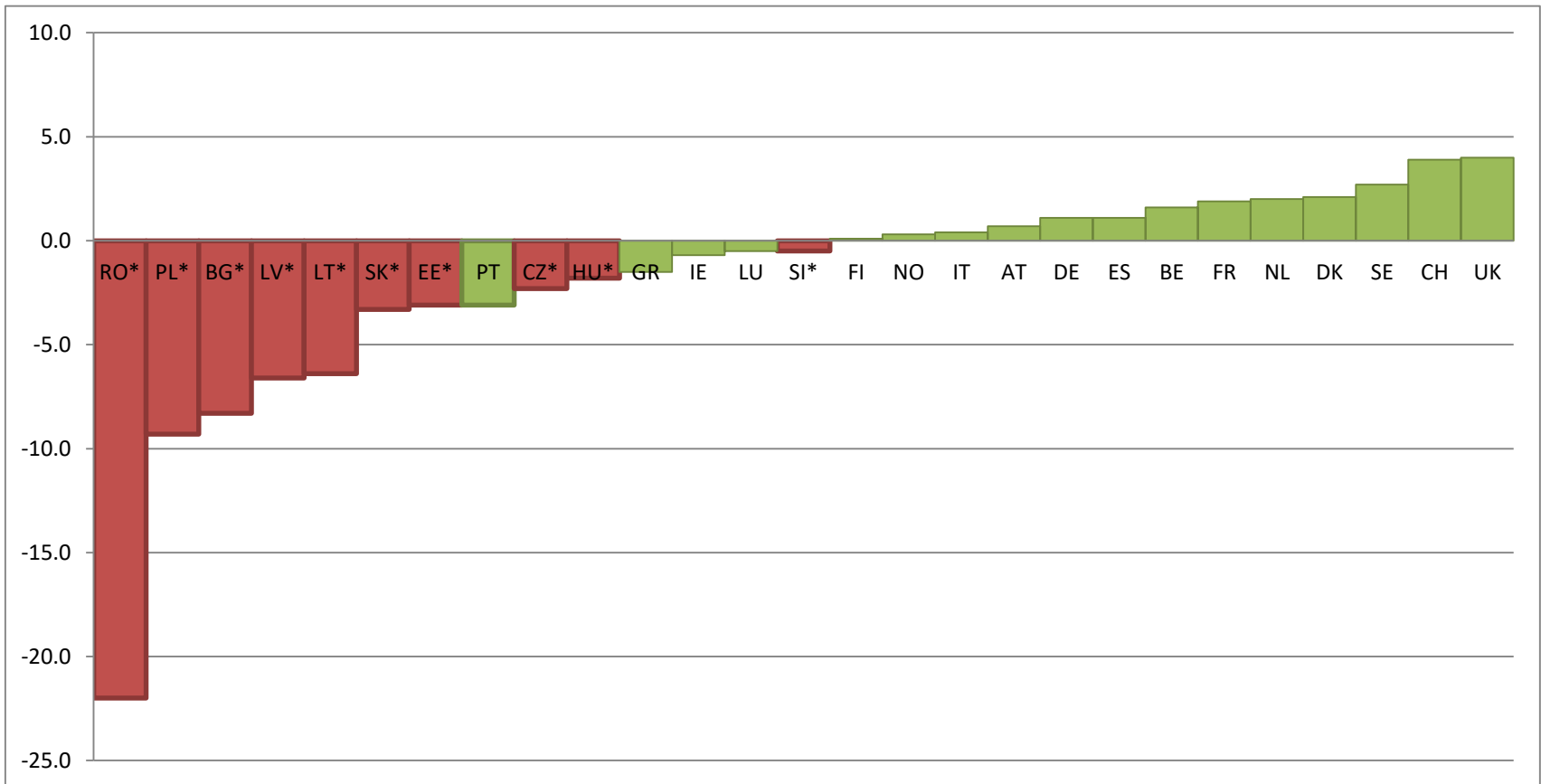
** significant at 5 % level

* significant at 10 % level

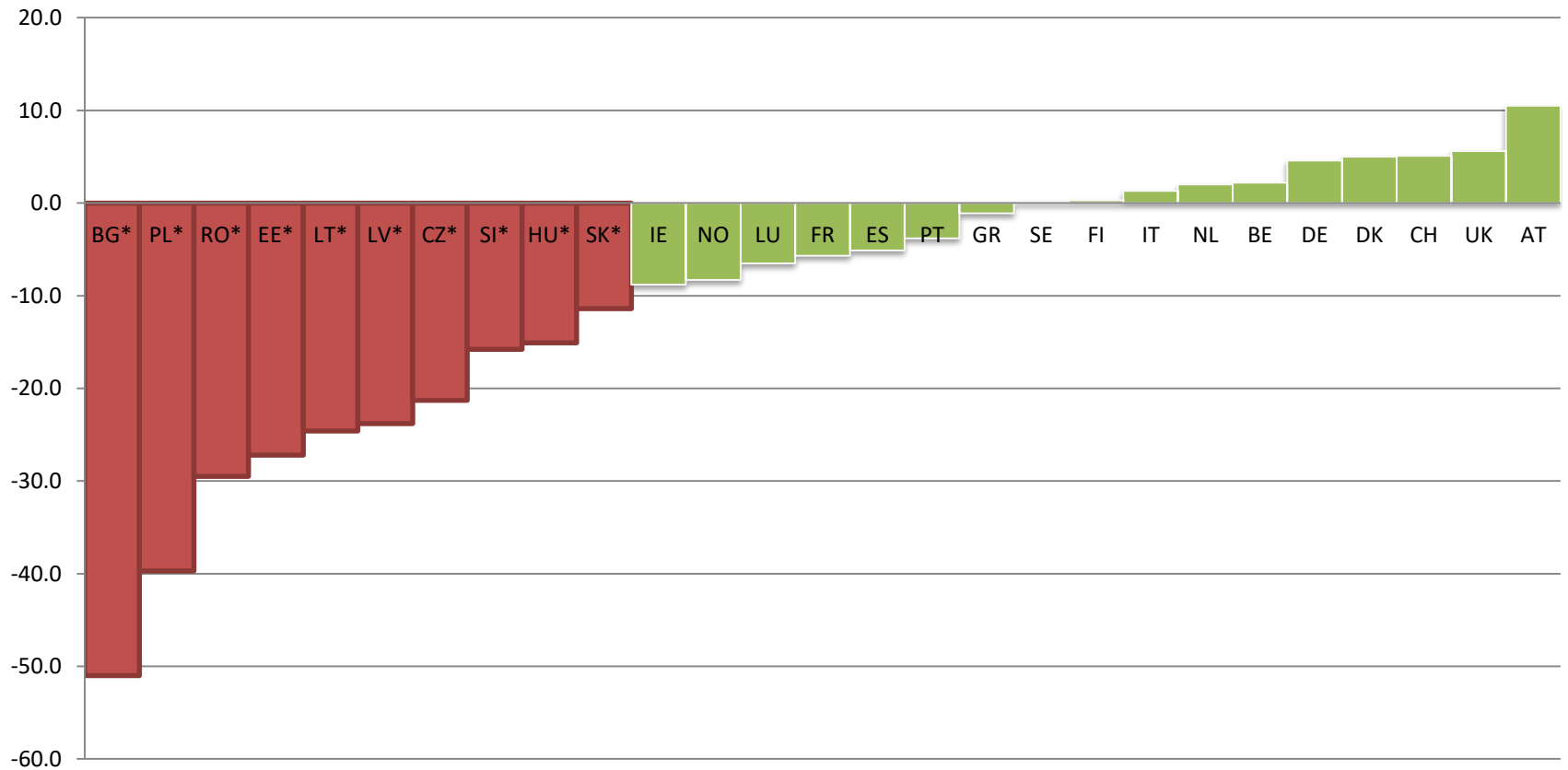
Results (summary)

- Main results: vertical separation has a weakly negative impact on modal shares, competition an insignificant effect and horizontal separation a positive impact, especially when followed by freight privatization.
- These results in line with previous studies, but with stronger effects from horizontal separation with privatization.

Change in the modal share of passenger rail 1995-2013 (%)



Change in the modal share of freight rail 1995-2013 (%)



Discussion

- Vertical separation and competition entry do not increase modal shares of railways
 - Possible reasons? → incentives misalignment; advantages of integrated structures; strong intermodal competition.

- Horizontal separation generates better results, especially when followed by freight privatization.
 - Why? → elimination of internal cross-subsidies, higher managerial and financial independence of freight; less pressure from domestic political representation.

Conclusion

- There is no evidence that principal European reforms (vertical separation and competition entry) are increasing modal shares of European railways.
- The more promising reform strategy seems to be horizontal separation, especially when followed by freight privatization.
- There are significant differences in the long term development of railway's modal shares between Western and Eastern Europe.