

Workshop on Financing, Regulation and  
Performance of the European Rail Sector  
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# PPPs and the Headache of Financing New High Speed Rail Lines

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LABORATOIRE  
AMÉNAGEMENT  
ÉCONOMIE  
TRANSPORTS

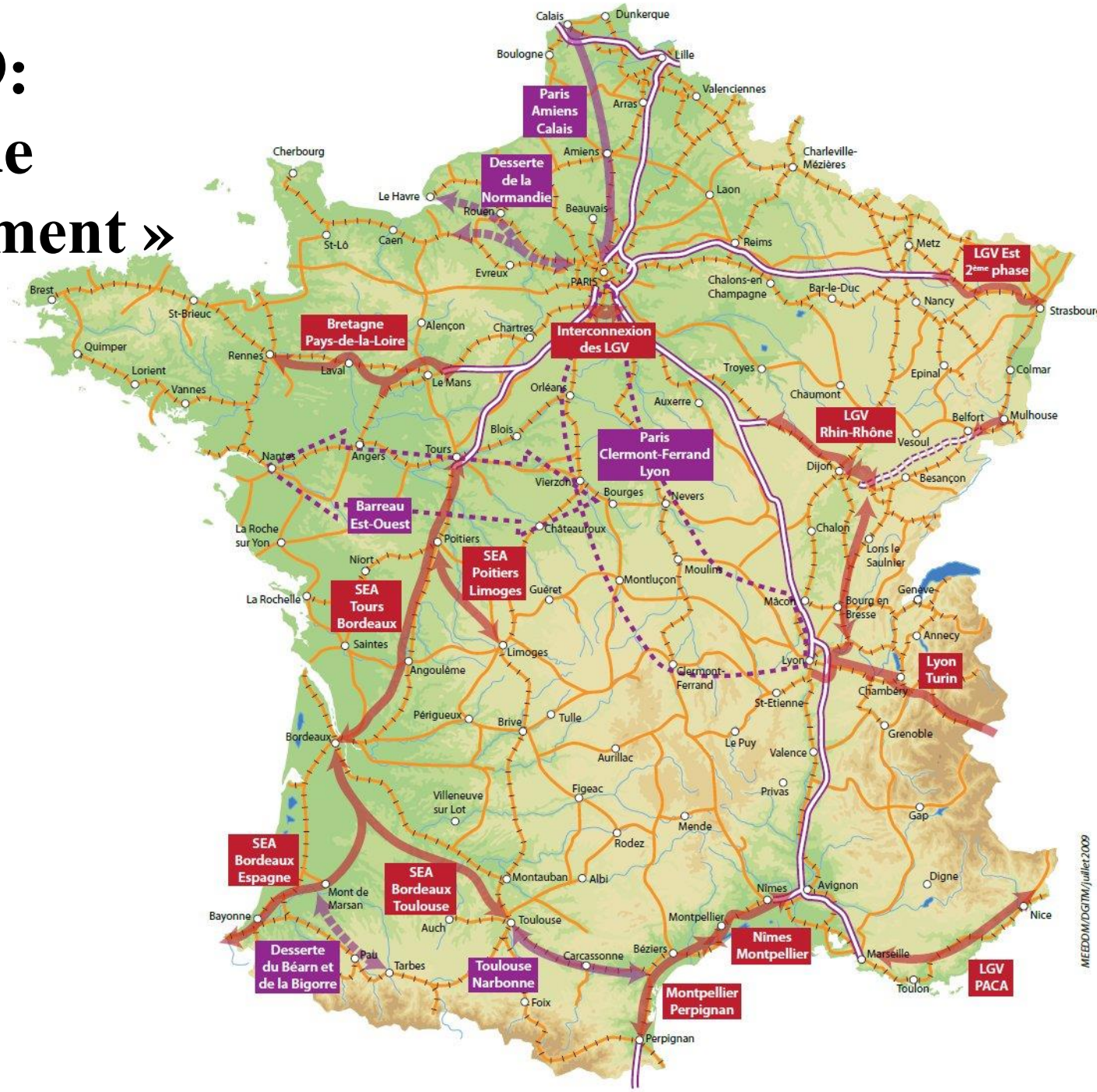
TRANSPORT  
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LABORATORY



# Introduction

- High speed rail development: a strong political support
- But financing is a big issue
- Up to what extent PPPs are a solution ?

# France 2009: « Grenelle de l'environnement »



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**1) The demand for High Speed Rail**

**2) PPP: charms and limits**

**3) The risks of overinvesting in HSR**

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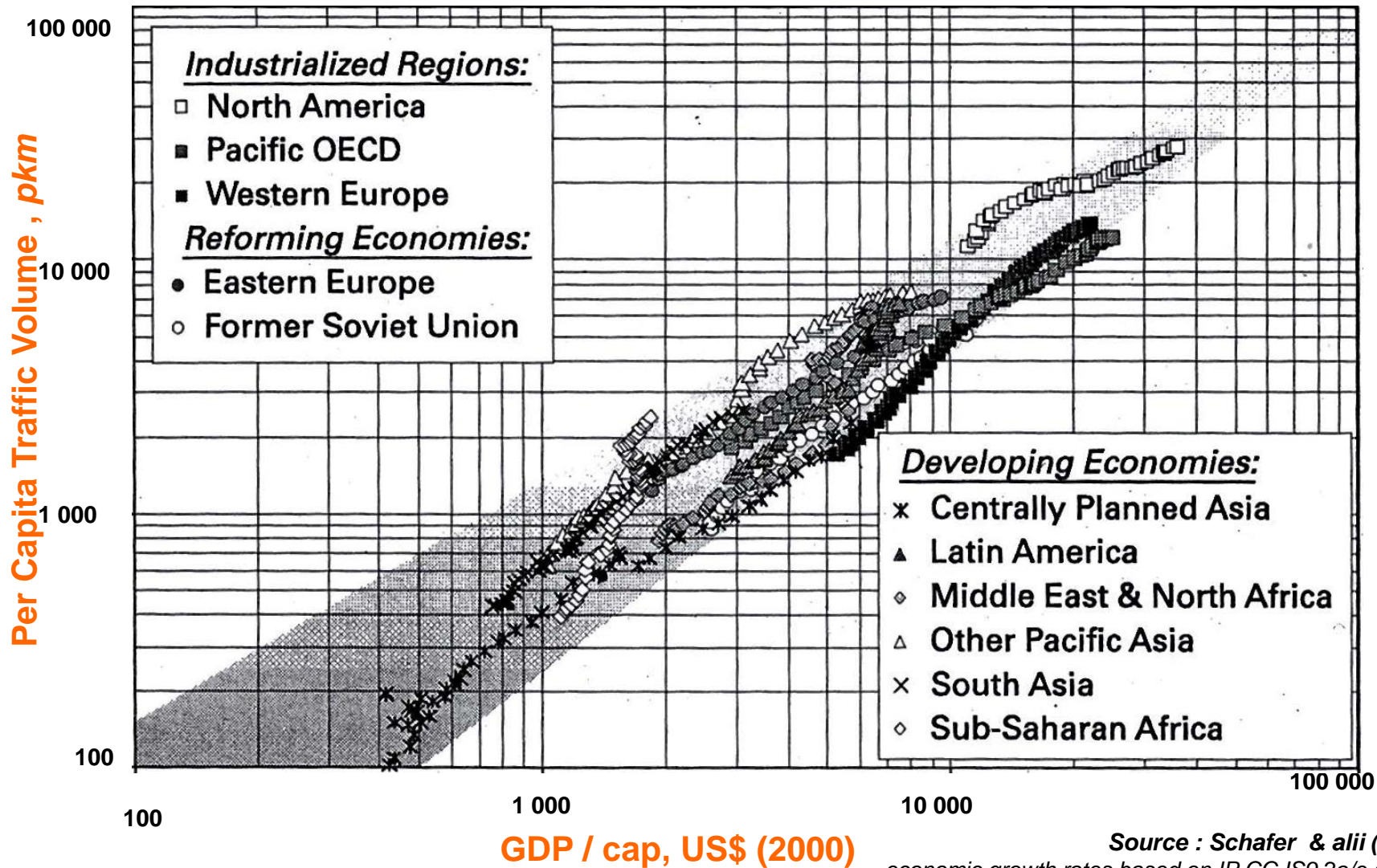
## **1) The demand for HSR**

- **Transport demand, speed and GDP elasticities**
- **E.U. Objectives:  
triple the length of HSR network**
- **HSR networks and projects in Europe**



# Global mobility

(data points : 1960-2000)



Source : Schafer & alii (2009) :  
economic growth rates based on IP CC IS9 2a/e scenario

# HSR Traffic in Europe

Thousand M pkm	1995	2000	2005	2010
France	21.43	34.75	43.13	51.89
Germany	8.70	13.93	20.85	23.90
Spain	1.29	1.94	2.32	11.72
Italy	1.10	5.09	8.55	11.61
Sweden	0.42	2.05	2.33	3.10
Belgium	-	0.87	0.98	1.06
UK	-	-	0.45	1.01
Others	-	0.17	1.50	1.75
<b>Total</b>	<b>32.94</b>	<b>58.80</b>	<b>80.11</b>	<b>106.04</b>
<b>% of all rail</b>	<b>9.4</b>	<b>15.9</b>	<b>21.2</b>	<b>26.3</b>

Source: DG TREN, D. Banister and M. Ghivoni 2012

By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail.

**E.U. White Paper 2010**



2010

- more than 250km/h in operation
- - - more than 250km/h in development
- 180 < v < 250km/h
- Other lines

Situation as at 12.2010  
Information given by the Railways

400km / 250 miles



2025

- more than 250km/h in operation
- $180 < v < 250\text{km/h}$
- Other lines

Forecasting 2025  
Information given by the Railways



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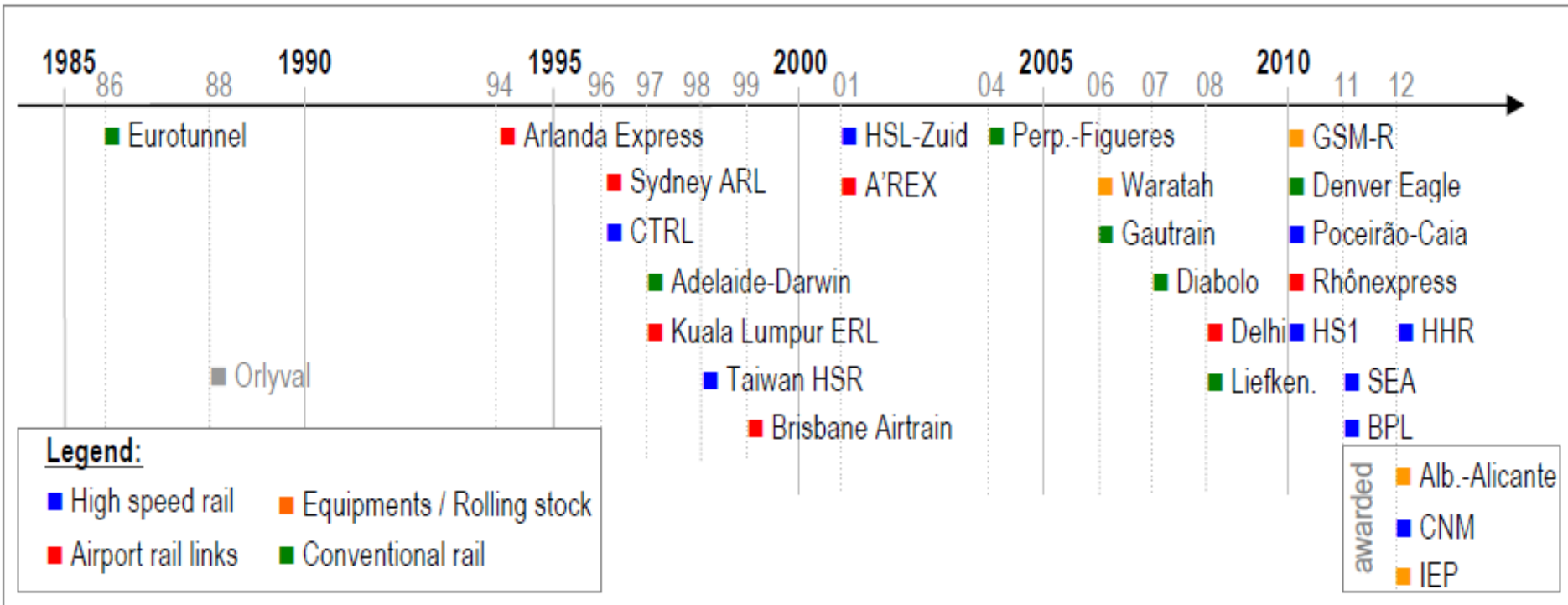
## **2) PPP: charms and limits**

- **PFI and public funds**
- **Rail PPPs in France**
- **PPP and “risk lovers” politicians**

# PFI and PPPs

- The **private finance initiative (PFI)** is a way of creating public-private partnerships (PPPs) by funding public infrastructure projects with private capital
- Less public funds ?
- Or debt off-balance-sheet?
- And what about the relevancy of the project?

# PPPs in the rail sector



Source: J. Dehornoy - 2012

# The main sources of failures

politics	complexity	commercial
<ul style="list-style-type: none"> <li>- lengthy decisions processes may cause scope deviations</li> <li>- failure to execute / interference by public authority</li> <li>- “political entrepreneur syndrome”</li> <li>- public and market acceptance</li> <li>- involvement in incumbent train operating company</li> <li>- quality of legal and institutional framework</li> </ul>	<ul style="list-style-type: none"> <li>- long and complex completion phase</li> <li>- technical intensity: proven technologies but complex integration:               <ul style="list-style-type: none"> <li>↳ structures and ground conditions</li> <li>↳ interaction of a variety of systems</li> <li>↳ safety</li> <li>↳ technical interfaces</li> <li>↳ functional interfaces</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- revenue structure</li> <li>- demand forecast</li> </ul>

Source: Painvain 2010

## 2 main categories of PPP

- Traffic-based concession. The concessionaire receives commercial revenue (rail access charges or fares revenue) and does not receive any payments from the public authority during operating years
- Availability-based PPP. The public authority retains the commercial risk: it perceives commercial revenue (rail access charges or lease fees for asset-only PPPs, or fares revenue for integrated PPPs) but makes payments to the concessionaire based on performance indicators



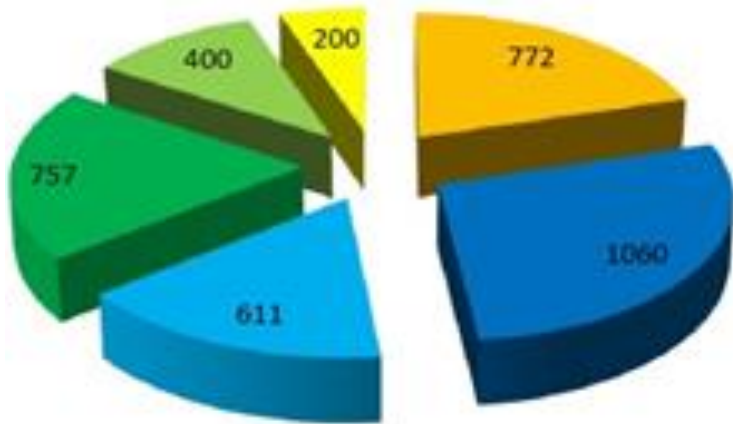
# 4 new HSR lines, 3 financing schemes

- HSR East (2008, 106 km), Public financing
- HSR SEA (2010, 303 km), Traffic-based Concession with a private company: Lisea, subsidiary of Vinci
- HSR BPL (2011, 182 km), Availability based PPP with Eiffage
- HSR CNM (2012, 80 km) Availability based PPP with Bouygues

# 4 new high speed lines (2011-2017) and public subsidies

	EAST	BPL	CNM	SEA	Total
Total cost (million euro)	2000	3300	1800	7800	14900
Length (km)	106	182	80	303	671
Cost/km (million euro)	18,9	18,1	22,5	25,7	22,2
Paid by RFF (million euros)	520	1400	0	1000	2920
Paid by central government (million)	680	950	1200	1500	4330
Paid by local government (million)	640	950	600	1500	3690
Paid by EU + Luxembourg	160	0	0	0	160

# LISEA financing: who is bearing the risk?



- Money invested by Vinci
- Bank loans with public guarantee
- Bank loans without public guarantee
- CDC loans with public guarantee
- EIB loans with public guarantee
- EIB loans without public guarantee

# Moral hazard and strategic behavior

- Traffic forecasts are quite optimistic (30 return trips per day between Paris and Bordeaux)
- If the traffic is too low, the cost of bankruptcy is acceptable for the concessionaire (700 M/7000M)
- SNCF will face high rail access charges (RAC), on the new line and on the public HS lines connected to SEA
- SNCF's strategic behavior is therefore either to put the pressure on the IM to reduce the RAC or (and) to limit the supply in order to obtain the bankruptcy of LISEA

# The main risk of HSR projects

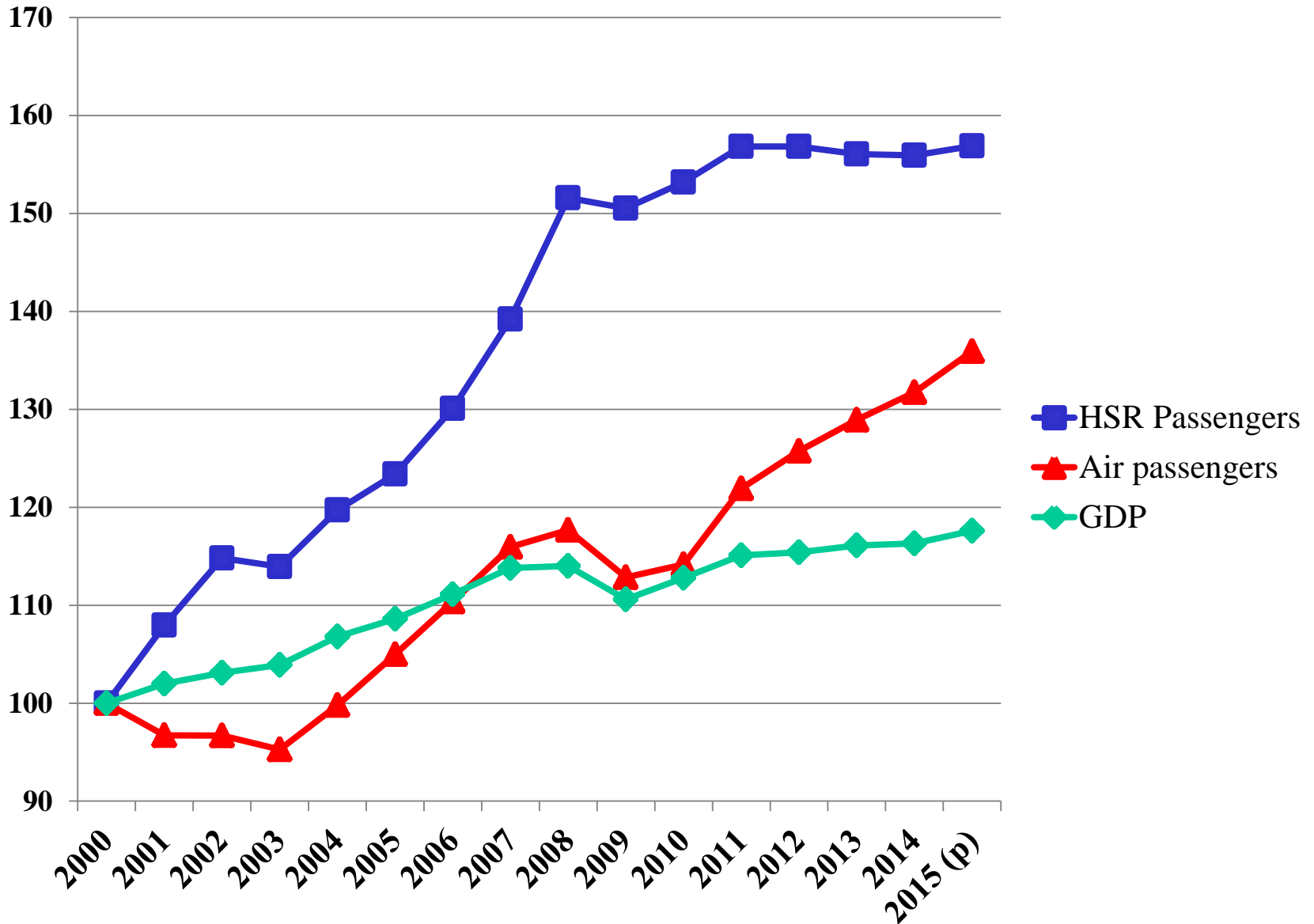
- Public authorities are risk lovers, they have a convex utility function.
- Due to (wrong, biased?) expectations concerning the economic impacts of the infrastructure, they prefer receiving a random wealth to receiving its mean with certainty (Expected utility).
- It is a big incentive for consultants and private companies to develop strategic behaviors
- Traffic forecast overestimation, building cost underestimation, high burden of financial charges..

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## **3) The risks of overinvesting in HSR**

- **Demand is not as high as expected**
- **IRRs are decreasing (scissors effect)**
- **“Rebound” or “obsolescence” of (high speed) rail ?**

# France: coupling and decoupling





# An unexpected “decoupling”

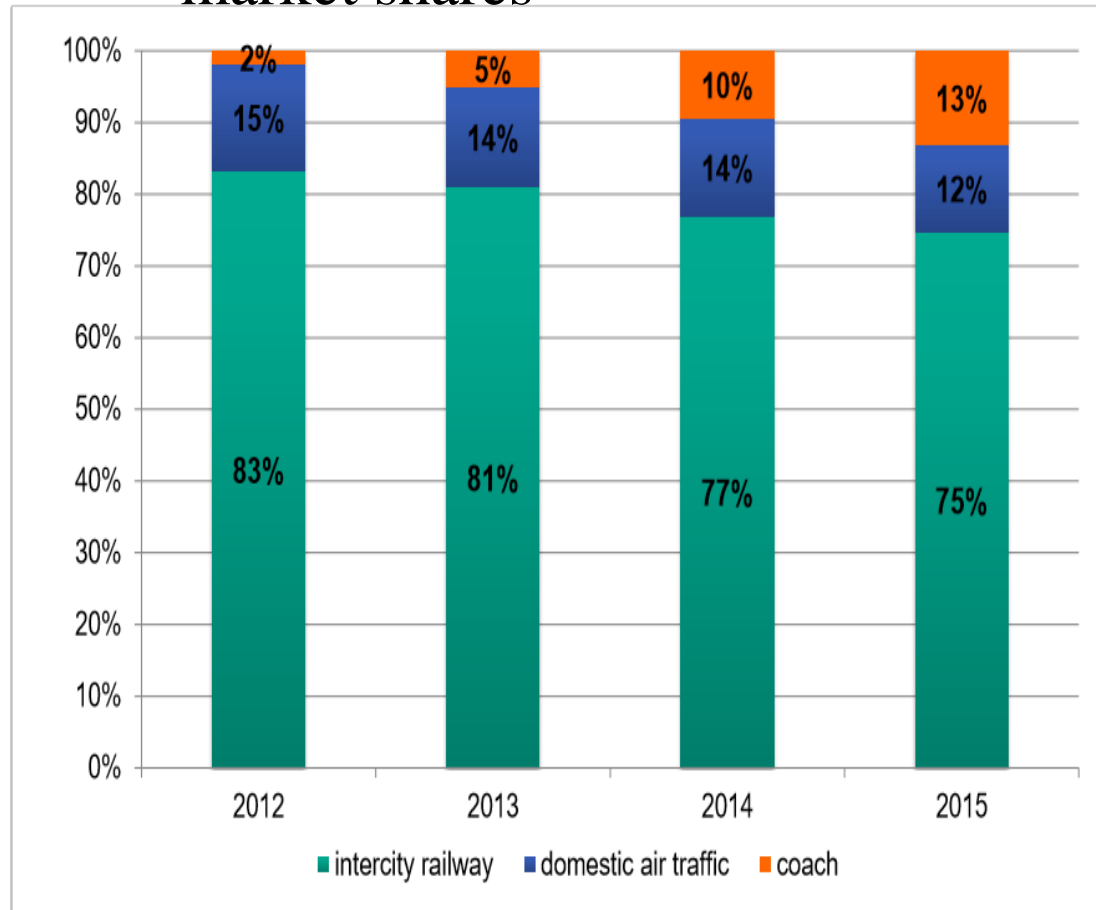
“While the EU economy did not even grow by +3% between 2008 and 2015, passenger traffic at EU airports increased by +13,6% over the same period. Such a wide gap is pointing to a lasting discontinuity in the usual relationship between GDP growth and passenger traffic performance. This is reflective of new market dynamics, changing consumer behaviours and the increased importance of air transport for the European economy.”

Olivier Jankovec, Director General ACI EUROPE (5 February 2016)

# Uncertainties about rail

- Low cost airlines
- Collaborative economy
  - Ridesharing « Blablacar =1 million trips/month : about 20 empty TGV tra sets / day...
  - Car sharing
- New entrants
  - Coaches on road and motorways
  - Competition on rail services (on track, off track...)

Long distances in Germany:  
market shares



Source: C. Gremm -KIT

# Rail passenger traffic: a strange fact (Eurostat)

## Traffic Growth 2006 - 2015

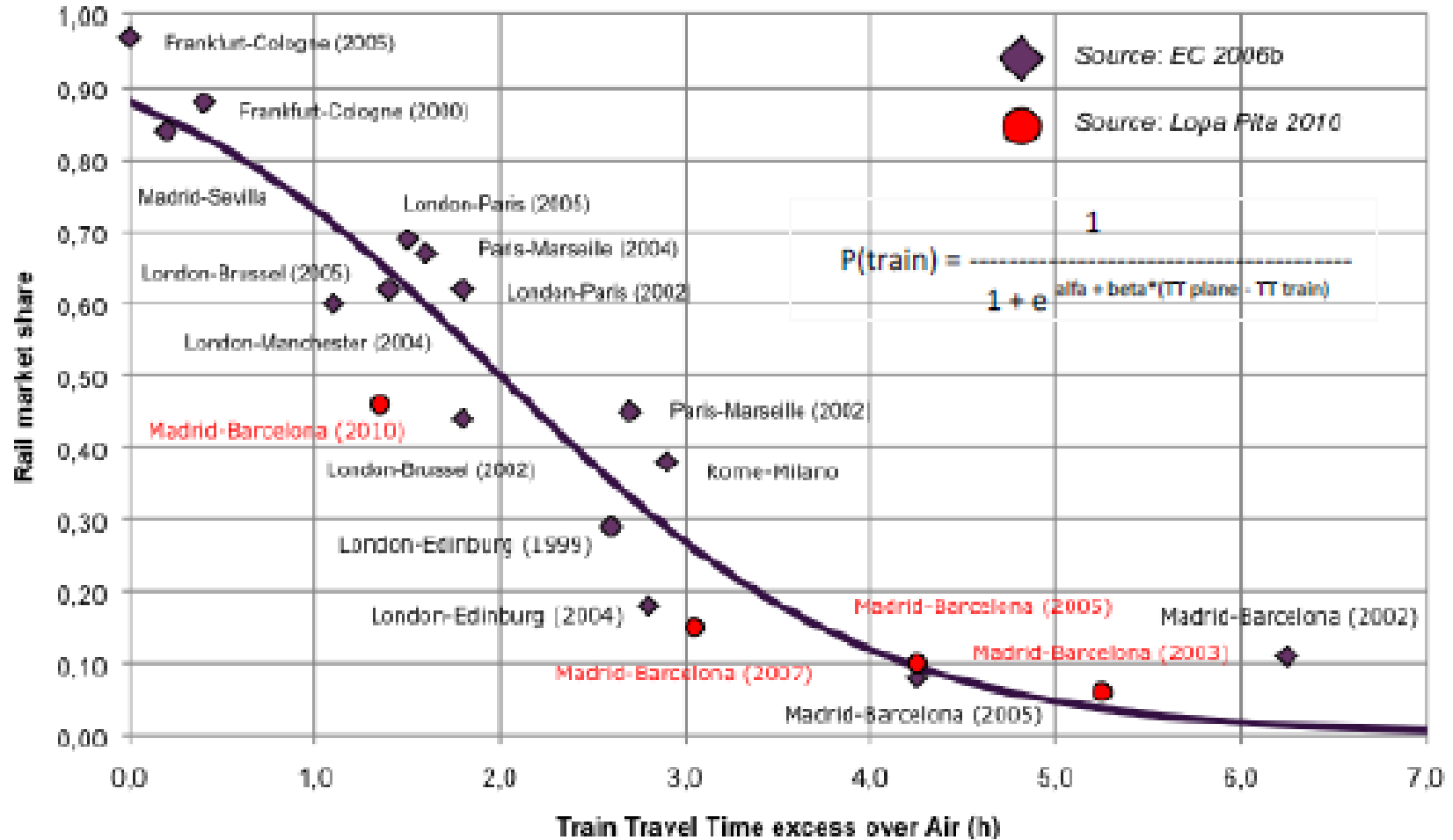
- **Italy** + 4%
- **Spain** + 21%
- **France** + 15%
- **Germany** +16%

## Traffic growth 2006-2015

- **United Kingdom** + 40%
- **Austria** + 35%
- **Sweden** + 32%
- **Switzerland** + 30%

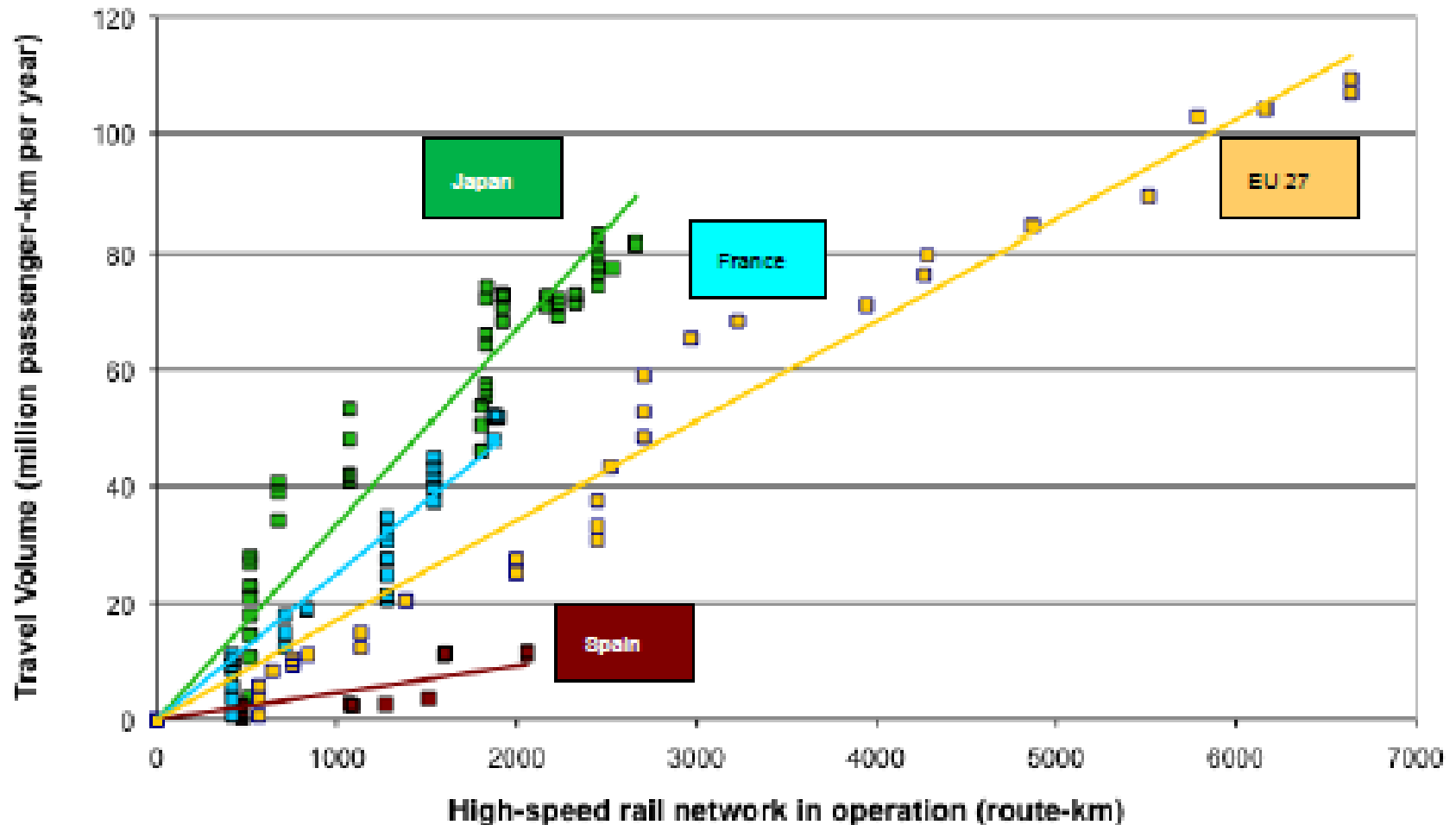
# Optimal area of relevancy?

## High Speed Rail/ Air Market Share

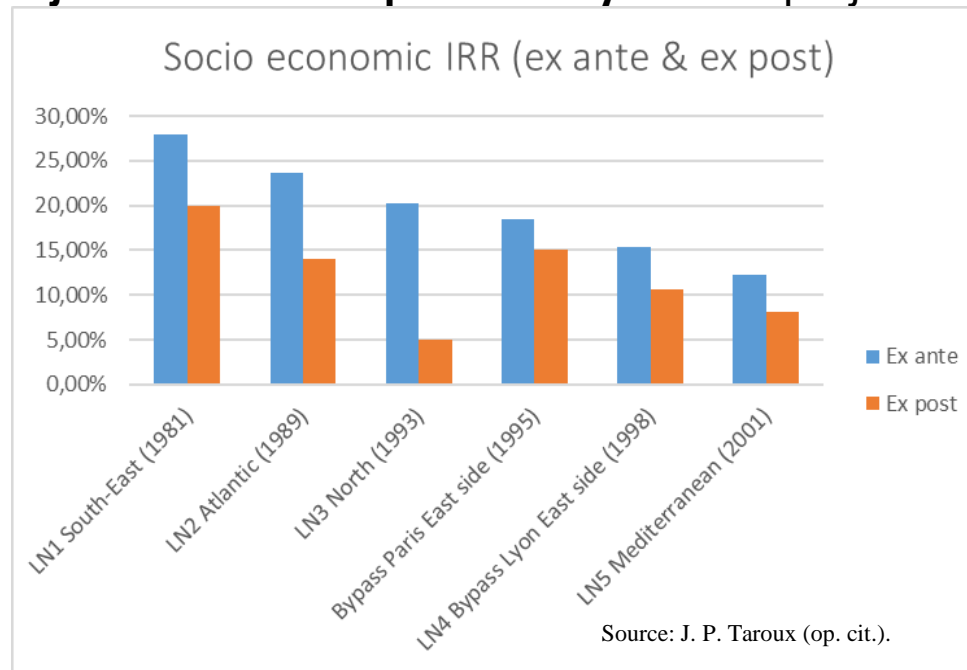


# Intensity of traffic

Travel Volume versus Network Length  
(1964 - 2011)

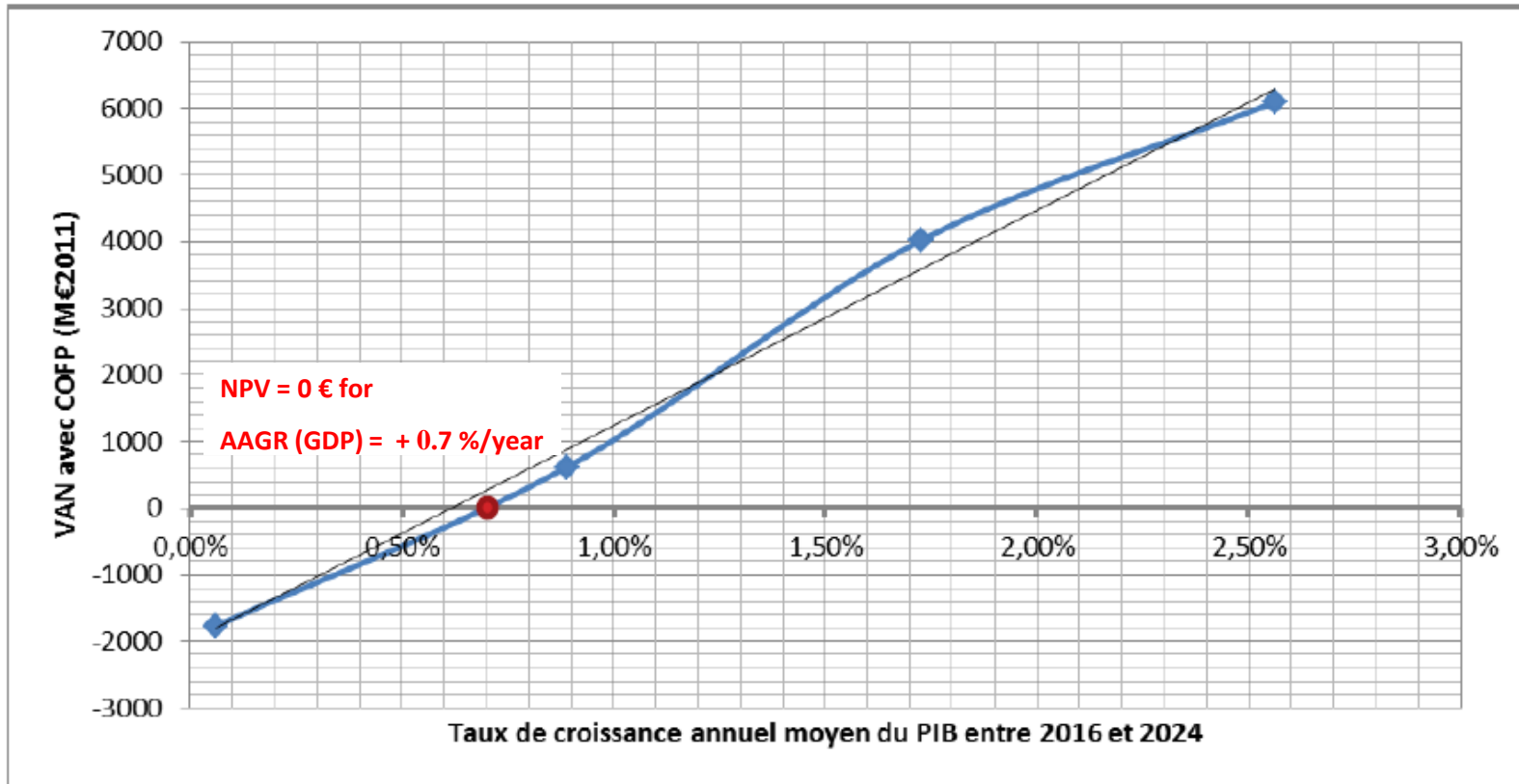


- France: newer **projects have lower profitability** => best projects had already been done



- Public investors are **now facing an economic slowdown and a growing scarcity of public funds**. At the same time, thousands of km of railways are in project
- A **key notion** to prioritize is to evaluate the **impact of an economic slowdown** on the project's profitability
- Public authorities will likely prefer to invest in a project with lower returns, but with a much higher probability of occurring (2 projects with the same NPV without risk don't have the same NPV with risk integration).

# HSR project – South West of France



- NPV is closely correlated with economic growth:
  - 1% growth would lead to an NPV of 1 billion euros
  - 0.7% growth would leave to NPV = 0.



# Conclusion (1)

- The optimistic bias of public authorities concerning HSR is the main issue
- PPP (availability based) is a way to underestimate the risk of traffic and then to increase the hidden public debt
- It is therefore necessary to obtain some relevant figures on the IRR of the project

# Conclusion (2)

- For Tours-Bordeaux, 3 billion of public money for 20 million of passengers per year = 3 euro/p/day during 50 years...
- But for Marseille-Nice, 15 billion of public money for 20 million of passengers per year = 15 euro/p/day during 50 years.
- 3 key questions
  - Is rail the good option?
  - How to be sure to have the expected traffic?
  - Do we need high speed or conventional rail?

- Crozet Y., 2017, *Where high-speed rail is relevant: the French case study*, in *High-Speed Rail and Sustainability*, Blas Luis Pérez Henríquez and Elizabeth Deakin editors, Routledge, pp. 50-65
- Crozet Y., 2016, *High-speed rail and PPPs: Between optimization and opportunism*, in *Evaluating High-Speed Rail*, Taylor and Francis, 2016, pp. 175-186
- Limon Th. & Crozet Y., 2016, *Risk analysis and high speed rail projects in France: introducing economic slowdown into appraisal methodologies* , *Procedia of 14<sup>th</sup> WCTR*, Shanghai July, Elsevier, 23p.
- Crozet Y. , 2014, *Extension of the High Speed Rail Network in France: Facing the Curse that affects PPPs in the Rail Sector*, in *Research in Transportation Economics*, Volume 48, December 2014, Pages 401–409

Legend :

- 310 - 320 km/h 190 - 200 mph
- 270 - 300 km/h 165 - 185 mph
- 240 - 260 km/h 150 - 160 mph
- 200 - 230 km/h 125 - 145 mph
- < 200 km/h < 125 mph
- Under construction/  
upgrading

