



Railways of the Future

Why do we need them? How can we make them successful?

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Lou Thompson

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Thompson, Galenson and Associates, LLC
14684 Stoneridge Drive
Saratoga, CA 95070-5745

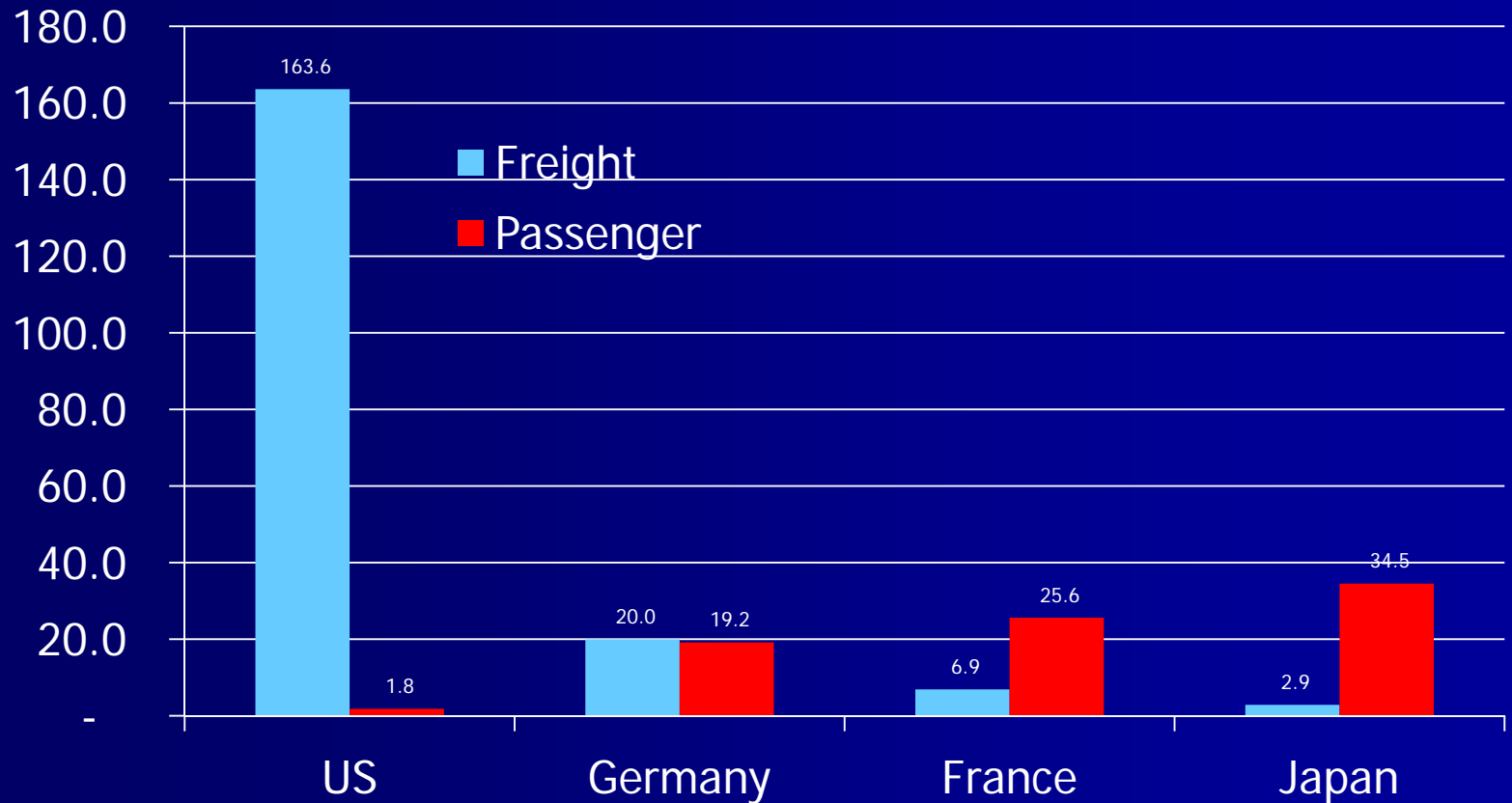
Tel: (408) 647-2104
Fax: (408) 647-2105
lou.thompson@gmail.com

Why Railways?

- Freight service is key to economic development
- Passenger service is key to personal mobility
- BUT, roles are specific to each country

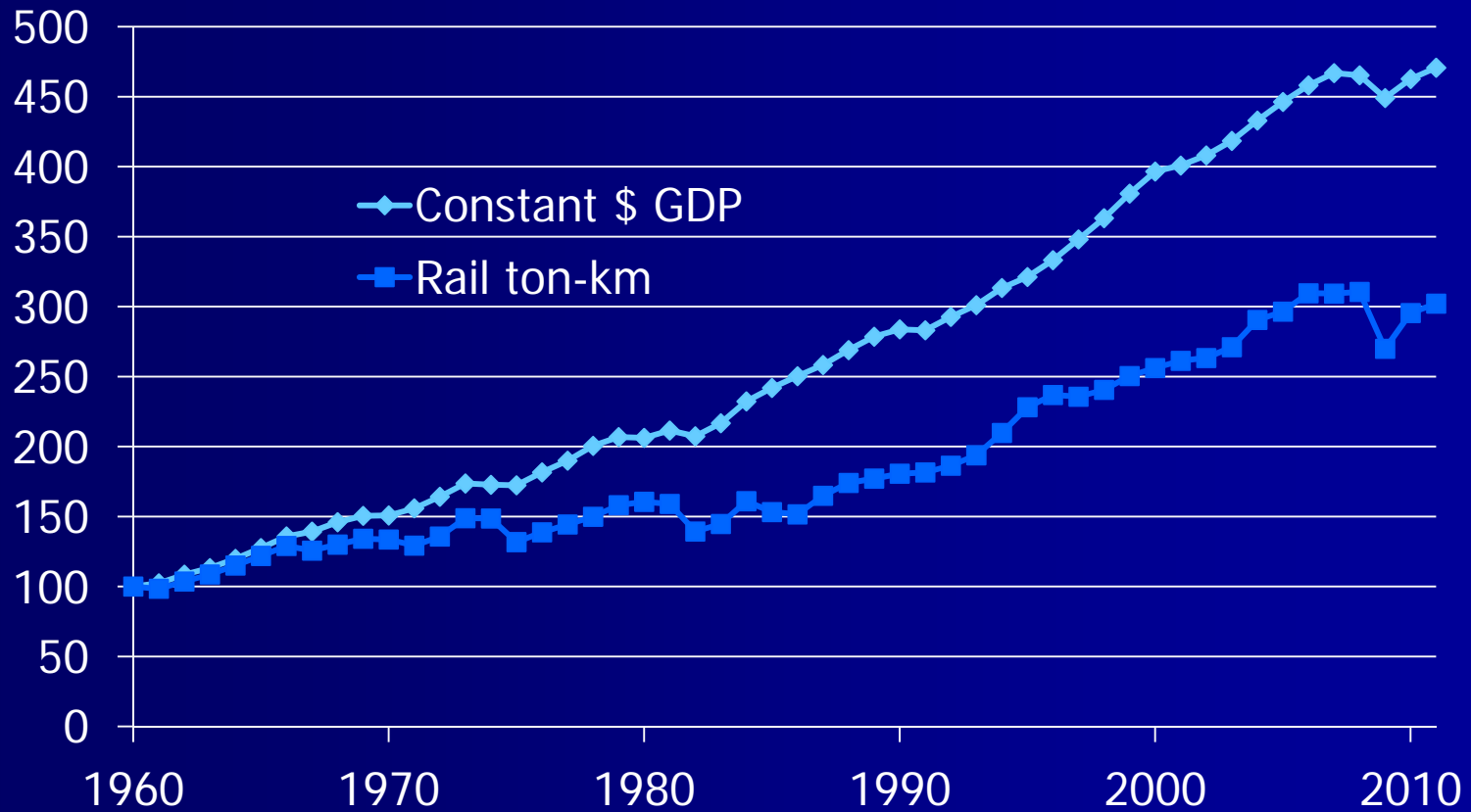
Transportation Intensity

(Rail Ton-Km or Passenger-Km per 000\$GDP, PPP adjusted)



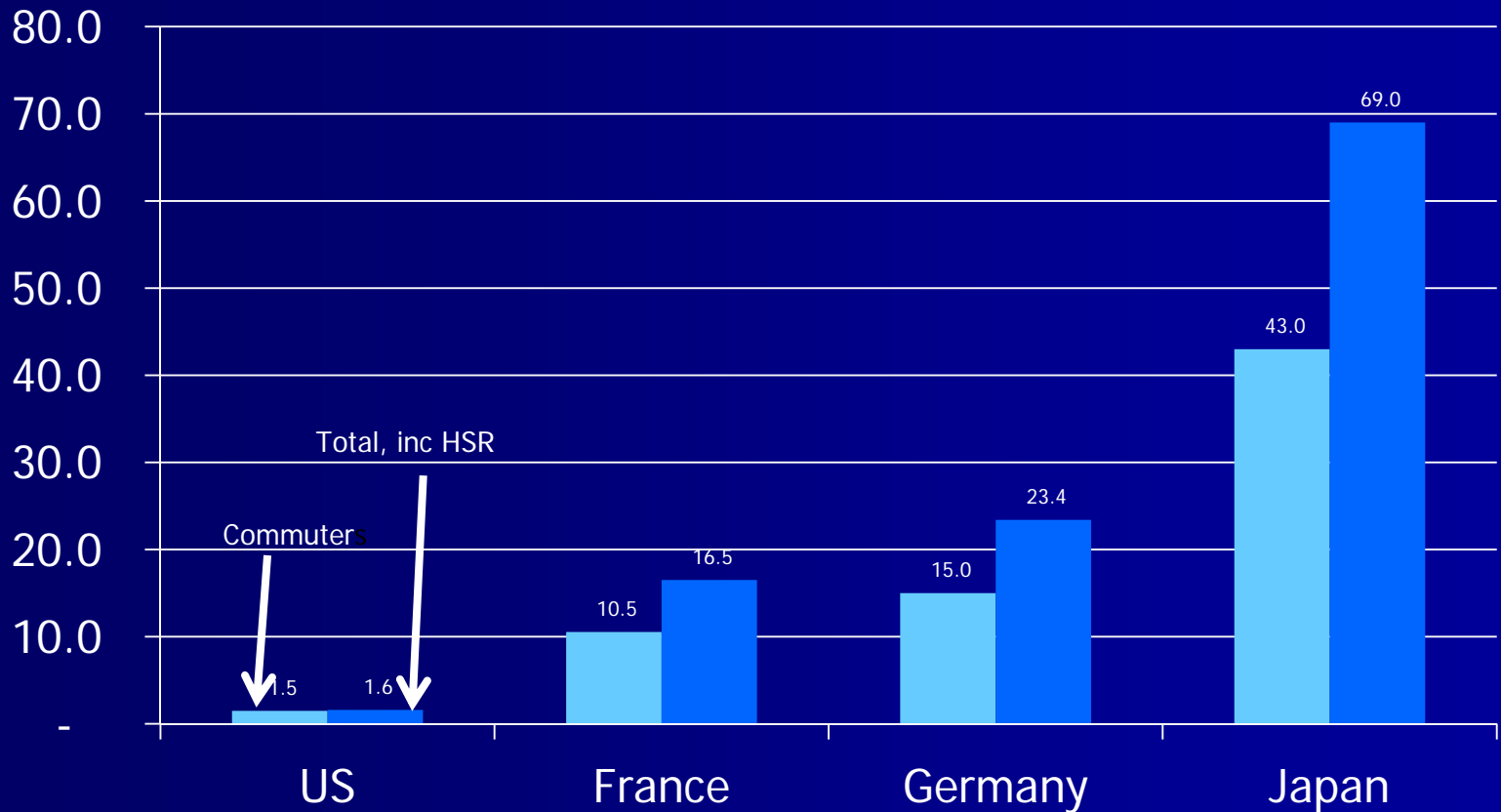
Why the U.S. Economy Needs Rail: GDP and Rail Freight Traffic

(Index 1960=100)



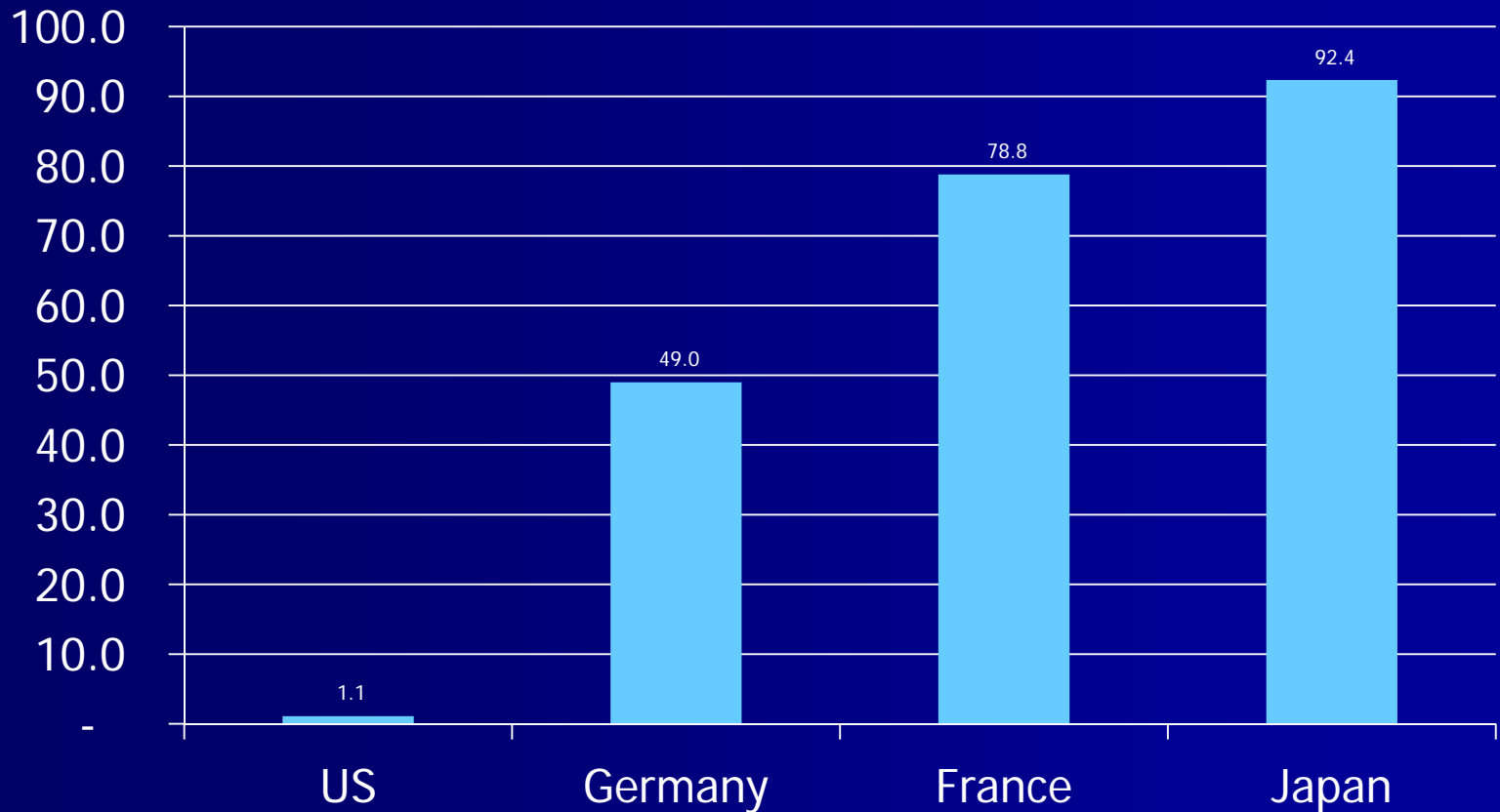
GDP: 3.1% cpd annual growth, Rail 2.2% cpd annual growth

The Role of Rail Passenger Service: Annual Rail Trips/Capita



Different Focus for the Railways

Rail Passenger Traffic as % of Total Rail Traffic



Pass-km as % of (pass-km+ton-km)

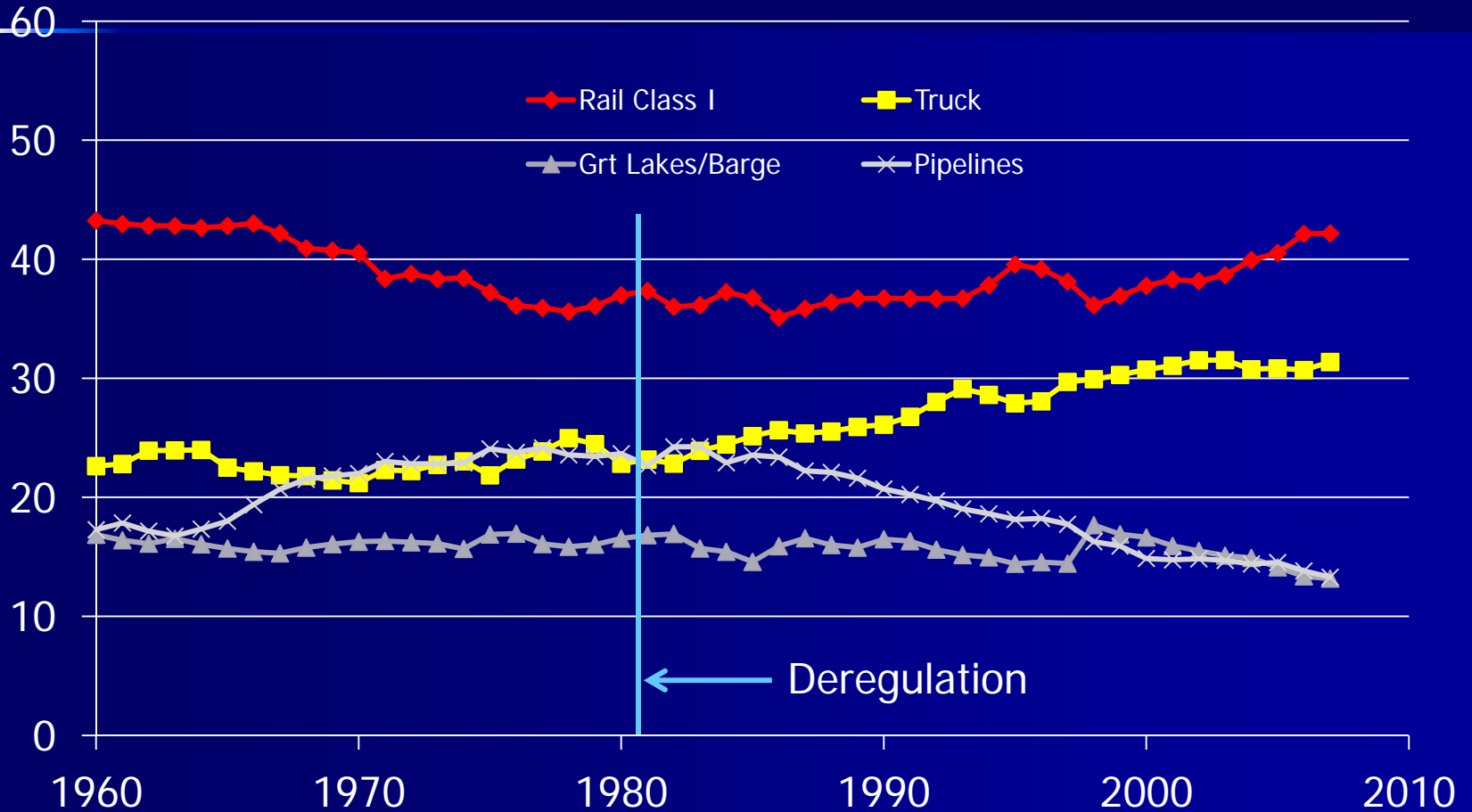
Making Railways Successful: Innovations in Technology

Technical Innovations	Freight	Passenger
High-Speed Rail	New HSR tracks reduce freight congestion	Reduced weight, better aerodynamics: speed increase from 200 to 350 km/hr (?) MAG LEV
Information Technology	Cargo management, better costing and pricing systems, digital Communications, Automatic equipment identification (AEI)	Efficient ticketing and reservations, digital communications permit revenue maximization and better service
Intermodal	Rails fully participate in containerization trends (fastest growth in US freight)	Better connections to air and bus: local/long haul connections
Energy efficiency	US freight energy intensity reduced by half. AC traction on diesel locomotives.	A.C. traction, solid state controls. Shinkansen energy intensity cut by half.
Heavy haul/better infrastr.	Higher axle loads, longer trains, larger locomotives, rail metallurgy. U.S. operating cost/tonne-km reduced by 59% 1978 to 2011	Continuous welded rail reduces maintenance and energy.
Signalling	Higher traffic density and improved safety: accident rates down by 2/3	Improved capacity and safety, especially with mixed freight and passenger traffic.

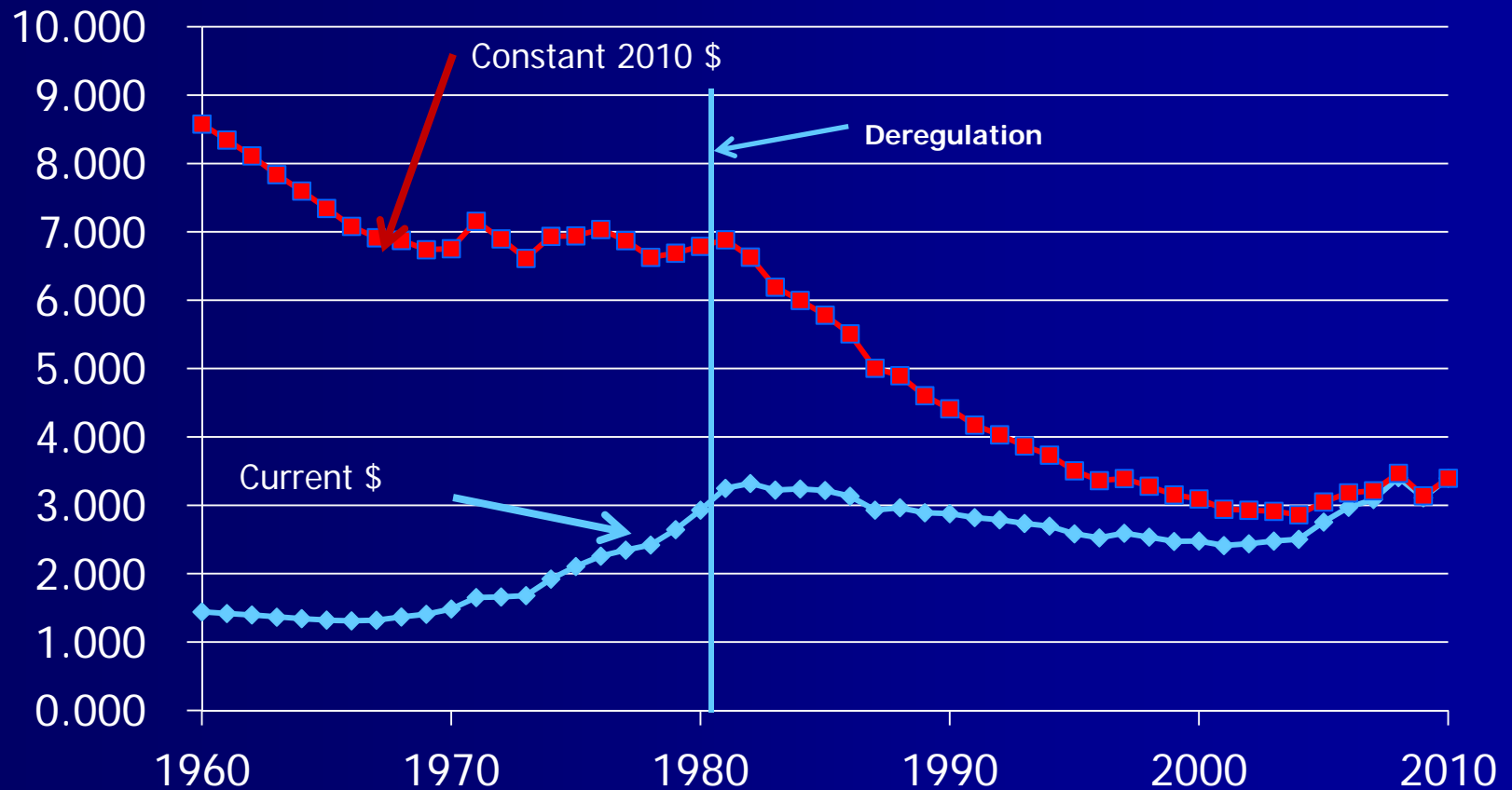
Making Railways Successful: Innovations in Policy

Policy/Managerial	Freight	Passenger
Structure: monolith to owner-tenant or separation	U.S./Canada approach: freight dominant, passenger pays as tenant. E.U. freight operators can serve Europe-wide	E.U. model of infra separation permits franchising and cross-border operation. Introduces competition for markets as well as in markets
Private sector and Public Interest Capitalism	Privatization of CN, concessioning in Latin America, privatization in U.K. and E.U.	Franchising in E.U., PPPs in France, PRIVATIZATION of JNR
Deregulation	Staggers Act in U.S.: tariffs fell in real terms by half. Permits contract tariffs and customer investments. Key to earnings and investment	Amtrak and VIA deregulated.

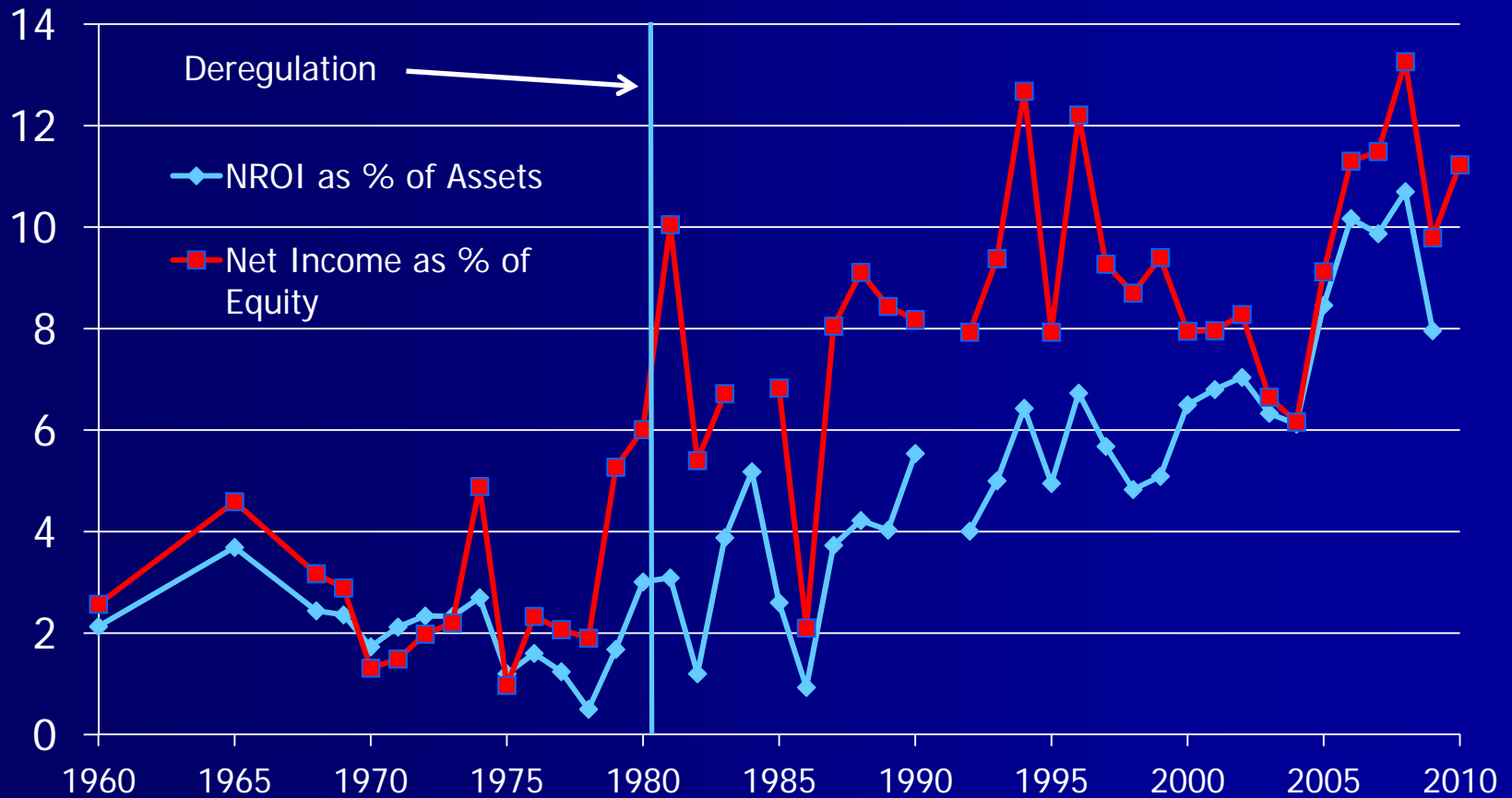
Freight Deregulation Was Good for the Country: Percent of Freight Ton-Km in the U.S.



Rail Deregulation Was Very Good for Shippers: Average Rail Freight Revenue (cents/ton-mile)



Rail Deregulation Was Also Good for the Railroads: Profitability Measures in U.S. Freight Railroads



NROI=Net Railway Operating Income

Approaches to the Future: Japan, E.U. and China

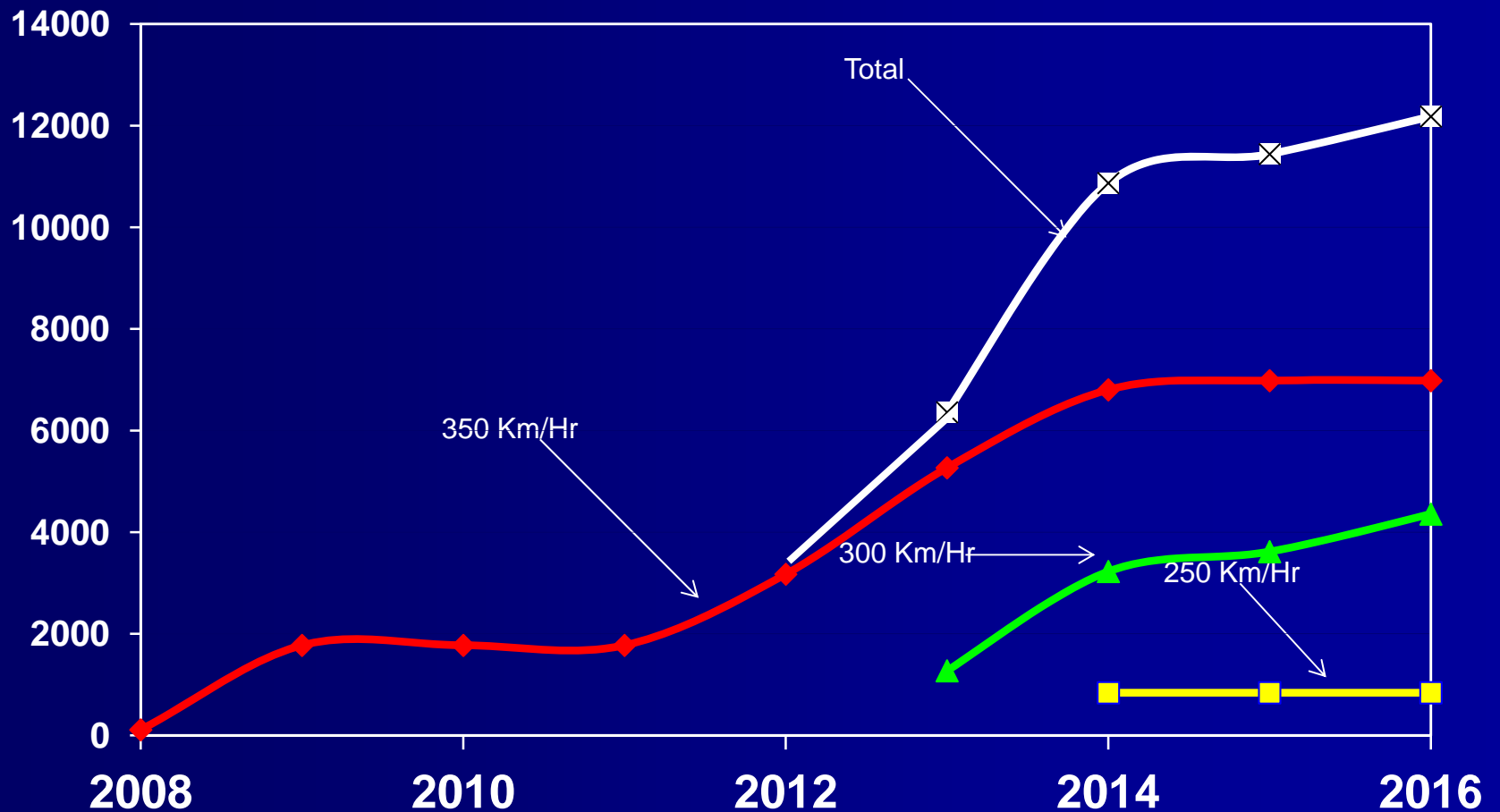
- Japanese policy to support rail is strong
 - Long established small private railways as part of economic development (30% of network)
 - East, Central and West Japan Railways privatized in 1987, but public support for a share of investment
 - Defined public support for 3 island JRs.
- E.U. and Chinese investing heavily in HSR (other rail as well)
 - E.U. Ten-T program supports rail planning and investment (passenger **and** freight)
 - France has extensive PPPs for HSR
 - U.K. system, including HSR-1, private with public support
 - Open access in E.U. promotes mixed ownership and operation
 - Chinese system wholly public, but with local government roles. Building HSR for passenger **and freight** capacity

E.U. HSR Line Miles by Category



Planned Km of HSR In China

(\$220 Billion program – probably going up)



The U.S. Challenge: The Heart of “Public Interest Capitalism”

- U.S. does not lack for wealth or skills, and has a good transport system in place, BUT the old model is no longer working.
- Need a clearer concept of public and private roles in transport (and elsewhere): **each** has a role in defining and paying for benefits and costs
 - Toll roads versus public roads, Alameda project
- Better definition of benefits and costs leads to new and better funding sources (but NOT free).
 - Usage taxing matches use with imposition of operating costs
 - Capacity pricing both for efficiency and funding
 - Taxing “bads” (carbon, pollution, noise, safety) generates public benefits
- Defending deregulation: key to private rail performance and match for public funding
- HSR: federal, state **and** private models needed

Federal Grants to Transportation

(1978 to present, 2010\$ Billions)

Highways	825
Mass Transit	201
Airports	74
Amtrak	64
Freight Rail	~0
Private Rail Freight	222

Note: State/Local Role is ~ equal to federal in highways, ~ 30% of federal in mass transit and airports

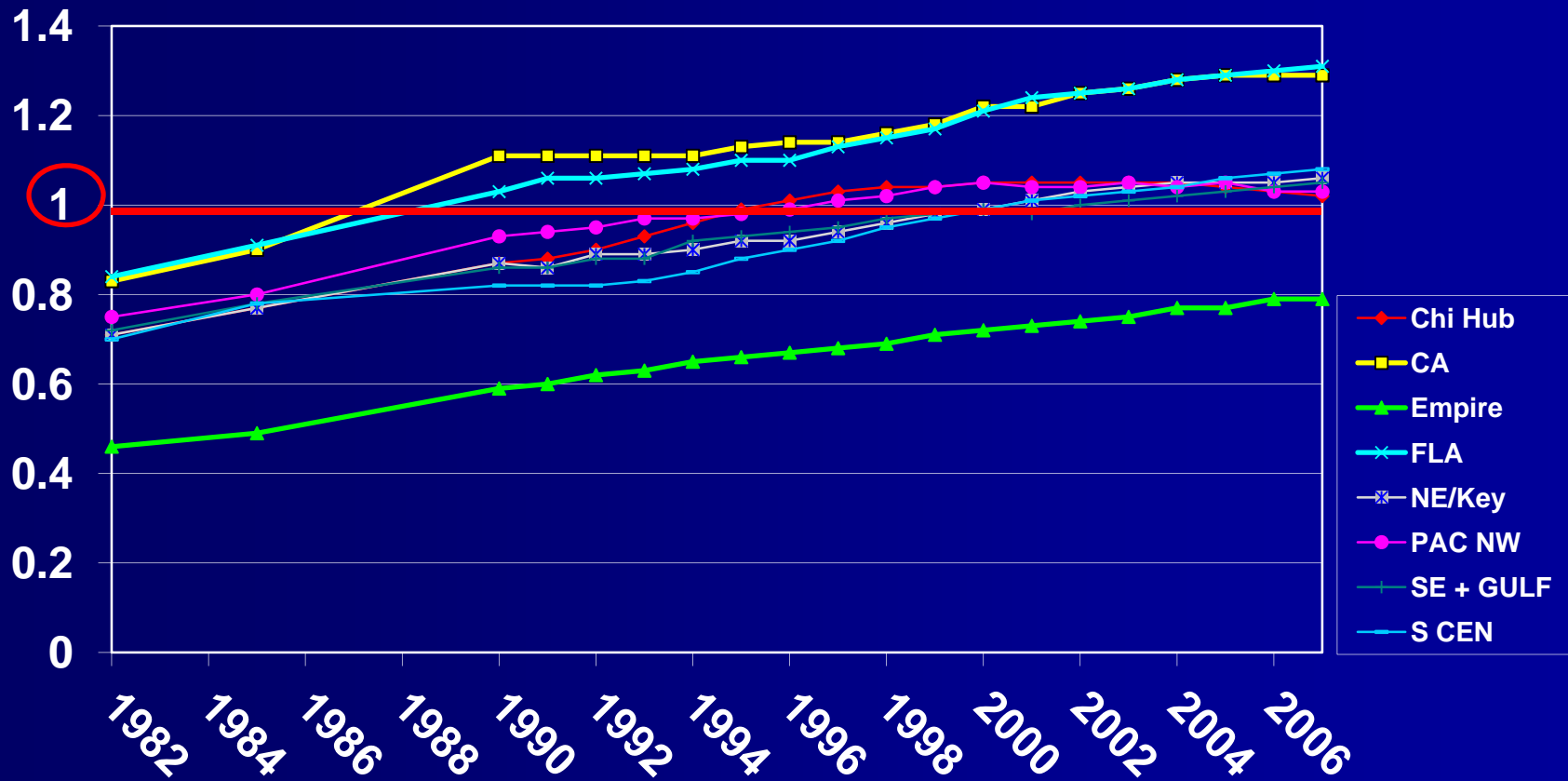
A U.S. HSR Program?

Corridor	HSR Line Miles	2050 Corridor Population (million)	2050 Corridor Trips (millions)	Total CO2 savings (metric tonnes)		Low Infrastructure Cost (2009\$ Millions)	High Infrastructure Cost (2009\$ Millions)
				Low	High		
California	1,088	54.1	101.0	1,292,113	3,878,697	35,904	63,104
Pacific Northwest	467	14.5	12.3	76,070	245,354	7,005	9,340
Florida	478	31.6	28.9	135,212	509,228	7,170	26,768
Chicago Hub	2,137	39.1	66.0	544,612	1,502,751	49,151	74,795
South Central	1,202	33.0	63.9	759,691	2,416,287	14,424	52,888
Southeast	1,659	33.2	84.4	795,858	2,604,359	29,862	49,770
Gulf Coast	1,024	22.0	21.6	219,380	688,417	18,432	30,720
NEC	457	54.5	35.0	289,370	874,338	11,425	26,049
Keystone	486	16.6	9.9	34,030	166,381	11,178	17,010
Empire	630	28.1	22.6	188,070	722,979	12,600	17,010
Northern New England	665	15.3	9.9	54,681	185,283	13,300	17,955
TOTAL	10,293	277.0	455.5	4,389,087	13,794,074	210,451	385,409

Note: This was 2009, NOT today

Highway Congestion Index in the HSR Corridors

All but Empire Corridor are congested **TODAY!**



Levels above 1.0 are considered congested

THANK YOU!