HSR in California: Uncertainty, Risk and Risk Transfer.

What does this mean and why does it matter?

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System Planned as of June 2012

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What does “risk”mean and why does it matter?

- Risks in the abstract
- HSR specific risks
- Interaction of business model with risk, especially transfer
- The Peer Review Group’s concerns
- Further materials for the HSR specialist

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What Does “Risk” Mean

- A number of possible outcomes, not just one
- Some risks are knowable and calculable (roll the dice). The “knowns.” Then “uncertainty” comes into play.
- Some risks are identifiable but not readily calculable (climate change). The “known unknowns”
- Some are only clear in hindsight (1000 year storm this year) The “unknown knowns”
- Sometimes we don’t know either the risk or the probability (Prophesy?). The “unknown unknowns”
- Distortions from risk aversion, optimism or political bias leading to “success orientation”. “Don’t believe everything you think”
- Avoid betting against either the odds or the Gods

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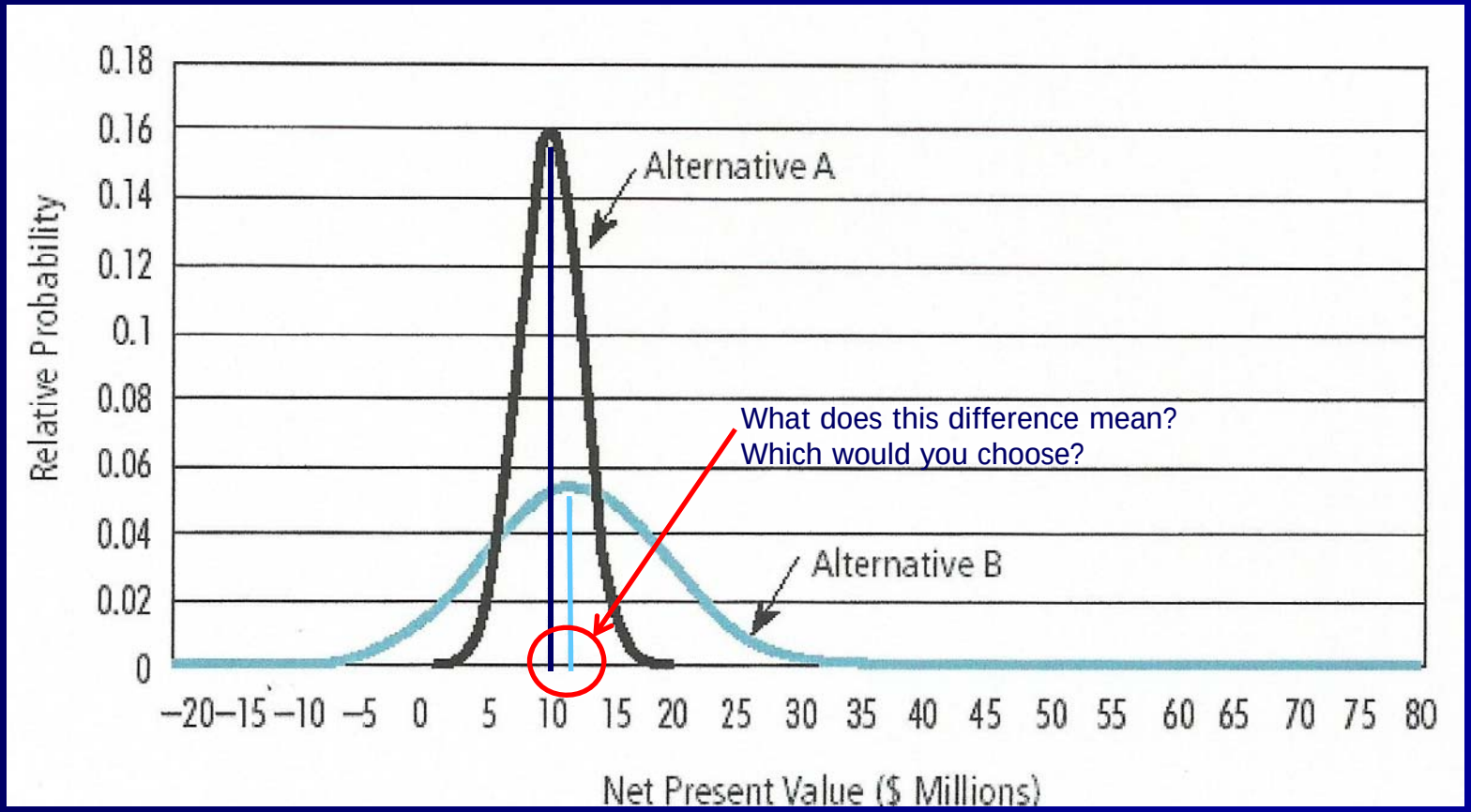
A Better Way to Think About Risk and Uncertainty: NOT a point, but a RANGE



Source http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer00.cfm

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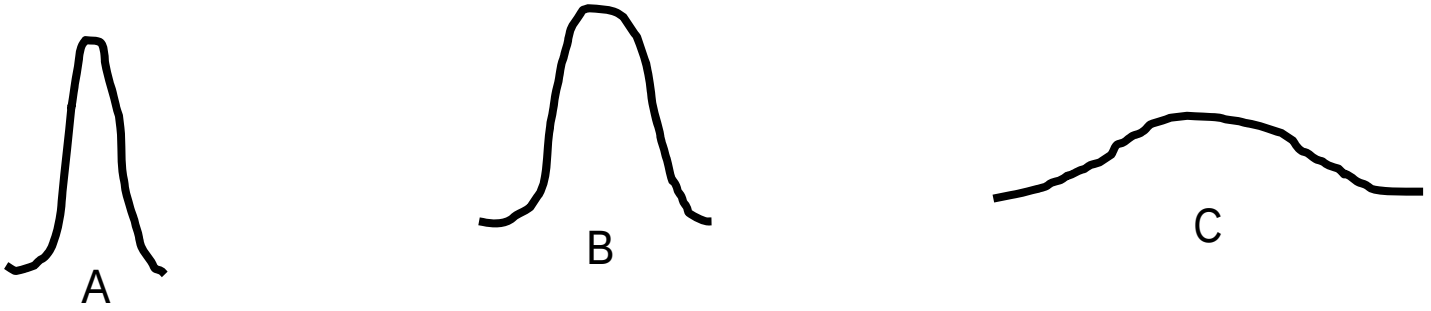
Some Probability Distributions

Symmetrical Showing Spread



Symmetry Change With Same Spread

Which ones would YOU use or expect for demand, capital cost, operating costs, overall NPV or IRR?

Evolution of Demand Estimates for CA HSR

CA HSRA Demand Estimates in the Various Business Plans

(millions of passengers)

Greater Fin. IRR
↕ Regulation?
Greater Econ. IRR →

	Phase I (SF to LA/Anaheim)		Full System (SF and Sacto to LA/Anaheim and San Diego)	
	50% of air	83% of air	50% of air	83% of air
2000 Business Plan (Charles River Assoc)*			30.3	~24.0 (estimated from graph on pg E-14)
2008 Business Plan (Cambridge Systematics)**	54.6	39.9		
2009 Business Plan (CS)***	58.0	41.0		
2012 Draft Business Plan (CS)****	53.0	36.8	77.0	51.2
2012 Revised Business Plan (CS)*****	50.0	26.4	75.0	50.0

What do YOU think the probability distribution of demand really is?

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Evolution of Capital Costs for CA HSR

Report	Original Estimate*	Revised Estimate (2011 $)**	Miles	Cost/mile ($ millions)
2000 Business Plan**	25.0	31.9	703	45.4
2008 Business Plan	33.2	34.7	520	66.7
2009 Business Plan	35.7	36.9	520	70.9
2012 Business Plan	70.0	70.0	520	134.6
2012 Revised Business Plan***	59.7	57.9	490	118.2

* Uses average of hi/lo estimates for some years

** GDP Deflator from BEA

*** Blended system, not full build SF to SJ

**** 2000 uses 25% contingency, all others use 30%

What do YOU think the probability distribution of capital cost really is?

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Capital Risks -- Checklist

Capital			
	Type of Risk	**Management/Mitigation**	**Who Bears? (allocation)**
Environmental	Litigation/Delay	Outreach/Design	Public
Right of Way Acquisition	Delay, litigation cost	Eminent Domain/Careful Mgt.	Public
ROW Improvements	Cost and Schedule	Careful design, competition	Public or pvt
Track Design/Construction	Cost, Schedule, Compatability	Competition, unified design	Public or private
Electrification Design/Construction	Cost, Schedule, Compatability	Competition, unified design	Public or private
Signal design/Construction	Cost, Schedule, Compatability	Competition, unified design	Public or private
Stations Design/Construction	Cost, Schedule, Coordination	Outreach and Careful Agreements	Pvt, based on full agreements
Rolling Stock Design/Construction	Cost, Delay, Performance	Proven designs, Leasing, System Approach	Private sector
Information Technology	Unacceptable performance	Proven designs, Leasing, System Approach	Private sector can bear
Financial	High Debt cost, equity unavailable	Public guarantee of private borrowing	Public or private guarantors

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Operating Risks -- Checklist

	Type of Risk	Allocation and/or Mitigation Measures	Who is Best Suited to Bear the Risk?
Revenue (Demand/Fares)	Revenue Low (or High)	Avoid over optimism, define and enforce regulatory regime. Public can guarantee minimum demand levels	Public (gross cost franchise) typical. Net cost transfers risk to franchisee
Train operations costs	Low demand causes unit costs to be too high or overoptimistic cost estimates	Competition for train operations, or for franchise	Private sector within agreed demand levels.
Energy Supply/Costs	Energy supply restricted or costs too high	Futures or long term contracts	Public/Private sharing
Infra. Maint.	Costs/ Poor Coordination	Enforceable agreement with operations dispatching	Private sector can bear risks
Rolling Stock Maint.	Cost, Reliability or Availability	Contract maint. or Franchise	Private sector can bear risks
Liability	Cost of injury and property damage	Self insure, purchase insurance	Public may have to bear some risk or cap liability
Public support	Public support inadequate, not paid in full or on time	Enforceable agreements subject to international arbitration	Public

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Big Unknowns Not On The List

- Meeting the Federal ARRA deadline?
- Funding beyond the Central Valley ICS?
- Future political support?

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Business Models for HSR

	Comments	Typical Length	Examples
Public Agency	Public ownership and Management	Permanent	Typical mass transit model (BART), but also China HSR
Management Contract	Assets publically owned, all services and fares specified: private contractor serves as agent	Short: 3-5 years	Caltrain, Metrolink, MBTA
Gross Cost Franchise	Similar to management contract, but operator can own some assets and has some demand and fare flexibility	Short: 3-7 years	Most UK franchises, Most Argentine concessions
Net Cost Concession	Concessionaire has demand, operating cost and some investment responsibility	20-30 years	Some UK Franchises, some Argentine concessions, Brazilian concessions
Infrastructure Separation	Public owns and controls infrastructure, separated operators can be fully private or concessions	Permanent for infrastructure, 3-30 years for operators	UK and EU model, also Chile
"Private"	Private sector owns and controls all operating assets, can own or lease infrastructure	Permanent	Japanese JRs, THSRC (sort of)

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Business Models

Public/Private Roles

		ROW	Track	ET	Signals	R/S	Operations	Attributes (why do it?)	Examples
Public agency	**Full Public Operation**	public agency	public agency	public agency	public agency	public agency	public agency	Transparency. Popular when social benefits and/or public agencies are dominant.	China, Korea
Gross cost or management contract	**Management contract**	contracted	contracted	contracted	contracted	contracted	Contractor under agency instruction	Mostly social benefits, but permits more efficient operation through competition for the management contract. Pricing done by pubic, securing social benefits.	Capitol trains in California
	Gross Cost Franchising	franchise manages	franchise manages	franchise manages	franchise manages	UK has separate ROSCOs	Franchise manages operations	Competition **for** the market if desired. Usually shorter periods. Requires that rolling stock be handled separately.	UK franchises, Germany, Sweden, NL franchises
Net cost	**Net cost Concessioning**	Concession does maint.	Concession does maint.	Concession does maint.	Concession does maint.	Leased or owned	Concession	Usually for 30 years or more. Minimizes public outlay and maximizes positive concession payments to the public.	Argentina, Brazil, Mexico
Infrastructure separation	**Infrastructure separation**	Network manager	Network manager	Network manager	Network manager	Leased or owned	Provides multiple operators	Can provide competition in a given market, and can permit easy accommodation of no-competing operators.	Basic E.U. model
Essentially private	**BOOT**	Public owns after transfer	Concession	Concession	Concession	Leased or owned	Unitary or Multiple Operators	Fundamentally works when public is only needed to define the activity and secure the ROW.	Taiwan (at first)
	Exclusive BOO	By owner	By owner	By owner	By owner	Leased or owned	By owner	Works when private benefits exceed private costs. Limited or no transparency for public.	Channel Tunnel

public

private

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The Balance of Benefits and Costs: Why it Matters to Private and Public

	Private net benefits (FIRR)	Public net benefits (EIRR)	Outcome	When could this happen?	Remarks
Case I	**+ (>10%)**	**+ (>7%)**	Project should go ahead	Rail project is profitable to the private operator with purely private financing, **and** it reduces road or air congestion, reduces total emissions or improves road or air safety	Private sector will do; no PPP needed, but some public coordination or regulation needed. Very rare case for HSR
Case II	**+ (>10%)**	**- (<7%)**	If private net benefits are sufficiently > public net dis-benefits, regulation or tax can shift enough benefits from private to public for project to go ahead. If not, project should stop.	Rail project is profitable to the private operator with purely private financing, **but** it generates added road or air congestion, increases total emissions, reduces road or air safety, or causes undesirable development	PPP is appropriate if benefits and dis-benefits can be balanced. More likely for air than for HSR.
Case III	**- (<10%)**	**+ (<4-7%)**	If net public benefits are sufficiently > than private losses, then public support (capital or operating) can cause the project to go ahead. If not, project should stop.	Rail project is unprofitable to the private operator, **but** it improves road or air congestion, improves road or air safety, or reduces total emissions	PPP is appropriate if benefits and dis-benefits can be balanced. Common case for mass transit, possible case for some HSR corridors
Case IV	**- (<10%)**	**- (<4%)**	Progect should not go ahead	Rail project is unprofitable **and** it adds to road or air congestion, increases total emissions or increases accidents	Should not be done by either private or public sector. Less common, but possible if rail load factors are too low

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PPP Risks and Financing: The Feasible Options for HSR

Option	Risk Management	Financing	Remarks
Management Contract	Public sector takes all design and construction risks. Contractor may take some operating cost risks if demand is as specified by public sector	All financing from public except for working capital needed by contractor. Rolling stock may be leased, but will be guaranteed by public owner	Common for non-commercial activities where risk is high. Less appropriate with competiiton
Gross Cost Franchise	Public sector takes investment (including environmental and schedule) and demand risks, franchise takes operating cost risk within specified demand levels	Public responsibility: franchise can provide financing (but with public guarantee). Public and private can share investement with agreed payback approach	Common approach when the benefits are heavily social and commercial activity is secondary
Net Cost Franchise	Demand risk, and some part of investment risk shifted to franchise	Private sector can provide more financing, but some forms of public contribution or guarantee are always required	Appropriate for commercial activities, of which HSR could be an example if demand risk is manageable
Infrastructure Separation	Public sector takes infrastructure investment risk. Access charges pass some investment cost to operator(s) and shift some demand risk if desired. Used with gross cost or net cost franchising, or with purely private operators	Infrastructure initially financed by public (but can be repaid from access charges. Operators responsible for all rolling stock.	Appropriate when competition is an explicit objective and when public sector is willing to take initial infrastructure capital risk.

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Indicators of “Risky” Risk Transfer

- **Compressed time frame** (you want it bad, you get it bad, and negotiating power shifts to contractor/operator)
- **Pushing technology** (ask the Chinese HSR managers)
- **Improper location of risk** (all risks can be transferred at a cost, but transfer works best when risk lies with the one who can manage it best)
- **Risk too large** for contractor/operator (bankruptcy is not the answer)
- **“Irrational Exuberance”** (or strategic bidding)
- **Policy objectives poorly defined** (the FIRR/EIRR gap)
- **Unclear or overlapping authorities** (FRA/AAR/CPUC/HSRA/Caltrain/Metrolink)
- By and large, the actual record of risk transfer is poor. Nobody got it right the first time!

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California Project Issues: The Peer Review Group's Concerns

- >$350 million spent and many design and specification issues still open
- Business Model: which one, and which risks to transfer?
- Capital cost estimates: in total, uncertainties ($43, or $61, or $80 billion?), probability distribution?
- Financial Plan: credible statement of who pays what, when?
- Demand forecasts: new projections with probability distribution. Key to defining public benefits (EIRR) vs Profitability (FIRR).
- Overall Project Risks: clear definition, allocation and presentation of EIRR and FIRR in probabilistic form
- Impact of the Federal role: State risk if ARRA deadline not met or no further Federal money -- and limited private money depending on Business Model

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If you want to look further

- Yuki Tanaka and Louis S. Thompson, “High Speed Rail Passenger Services: World Experience and U.S. Applications”, See TGA website at www.tgaassoc.com under Publications. See also FHWA project analysis at http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer00.cfm
- Peer Review Group reports (http://www.cahsrprg.com/documents.html)
- Legislative Analyst’s Office reports (http://www.lao.ca.gov/laoapp/main.aspx)
- CA HSRA Business Plans (http://www.cahighspeedrail.ca.gov/library.aspx)
- “Mega-Projects and Risk: An Anatomy of Ambition” by Bent Flyvbjerg, Nils Bruzelius and Werner Rothengatter, 2003/2006
- “Decision-Making on Mega-Projects” by Hugo Priemus, Bent Flyvbjerg and Bert van Wee, 2008
- Pedro Belli, et al, “Economic Analysis of Investment Operations”, World Bank Institute, 2001
- Or, even, see, “The Northeast Corridor Project” by Louis S. Thompson, 1982, last item on TGA website.

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