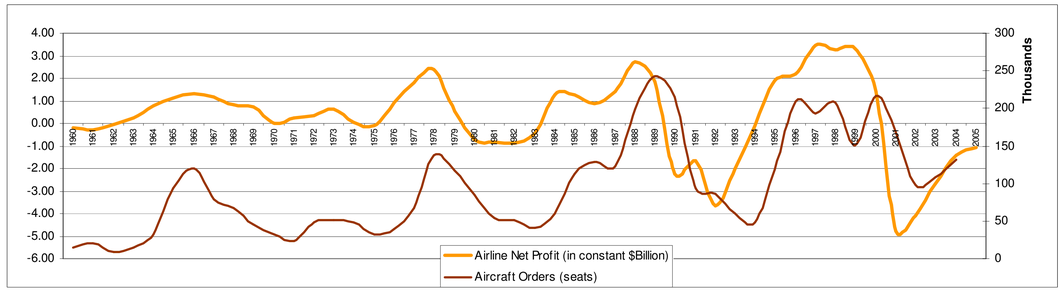
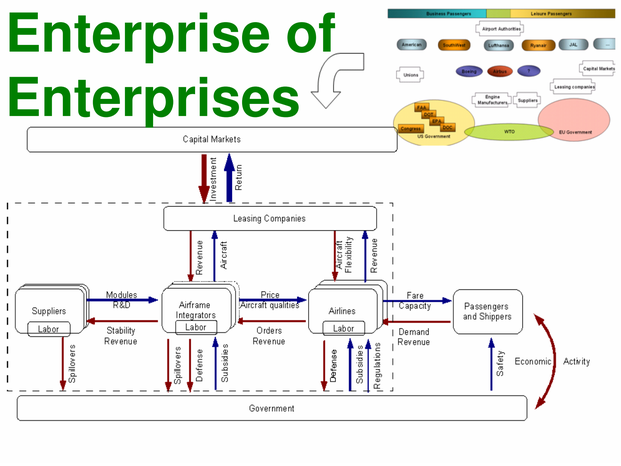
Strategies in Enterprise Ecology: Symbiotic Models for Commercial Aviation as an Enterprise of Enterprises



Cyclical Boom-busts: Increasing amplitude of oscillation

Framework: Enterprise of Enterprises



Increasing costs to enterprise and society by:

- Econ. Return < Cost of Capital for long periods
- Sub-optimal use of resources
- Labor distress and subsidies

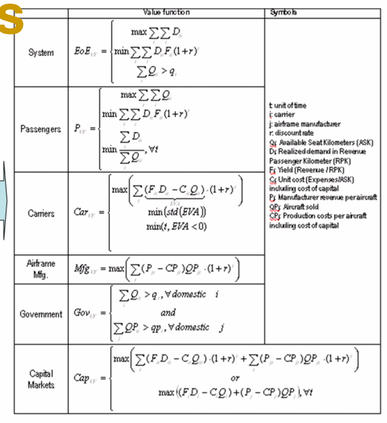
‘Causes’ of Cyclicality

Triggers	**Disruptive technologies**	Jets, 2-pilot cockpit, fuel efficient designs, product families etc.
	Technical regulations	Noise abatement, stage 2,3,4 aircraft
	Input shocks	Fuel prices, materials, interest rates
	Demand shocks	Iraq war I, 9/11, SARS etc.
Endogenous	**Reinvestment cycle Intertemporal substitution**	Aircraft as large capital investment with limited but adjustable lifetime
	Bullwhip in supply chains, labor, and inventory	Long lead times for both labor and capital.**Irreversibility**
	Industry characteristics	Scale economies and large investment in upfront R&D incentivize airframe mfg. to promote their wares aggressively in short term Low marginal costs for airlines
	Market regulations	Deregulation combined with imperfect financing allows multiple entrants. Subsidies, bankruptcy protections, and national pride policies retain players in weak markets
	Decision-making	Bounded rationality and strategic optimism create overreaction by multiple entrants. Large number of decision makers.
	Financing volatility	Debt and equity financing available in economic upturns lowers barriers to entry BUT dries quickly in downturns increasing risk of price wars. Short-term returns can be overemphasized over long-term stability.

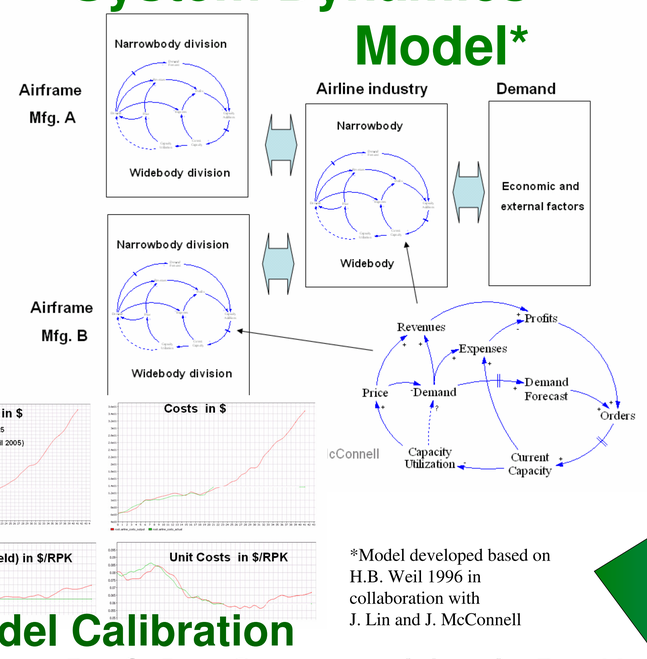
MITIGATE CYCLES

Stakeholder Value Functions

Stakeholder	Values
Passenger/ Shipper	Availability of air travel
	Affordability of air travel
	Service of air travel
Carriers	Economic/investment return
	Stability of return
	Minimum time in recession
Airframe Mfgs.	
Capital markets	Combination of carriers and airframe manufacturers returns maximized and stable
Governments	Availability of air travel
	Returns of domestic champions



System Dynamics Model*



*Model developed based on H.B. Weil 1996 in collaboration with J. Lin and J. McConnell

Model Calibration

Strategic Alternatives

- **Pricing**
- **Profit-sharing agreements**
- **Aircraft ordering vs. Leasing vs. Service**
- **Aircraft operating characteristics / Standardization**
- **Capacity managements**
- **Aircraft lead time reductions**
- **Mergers / Partnerships**

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