



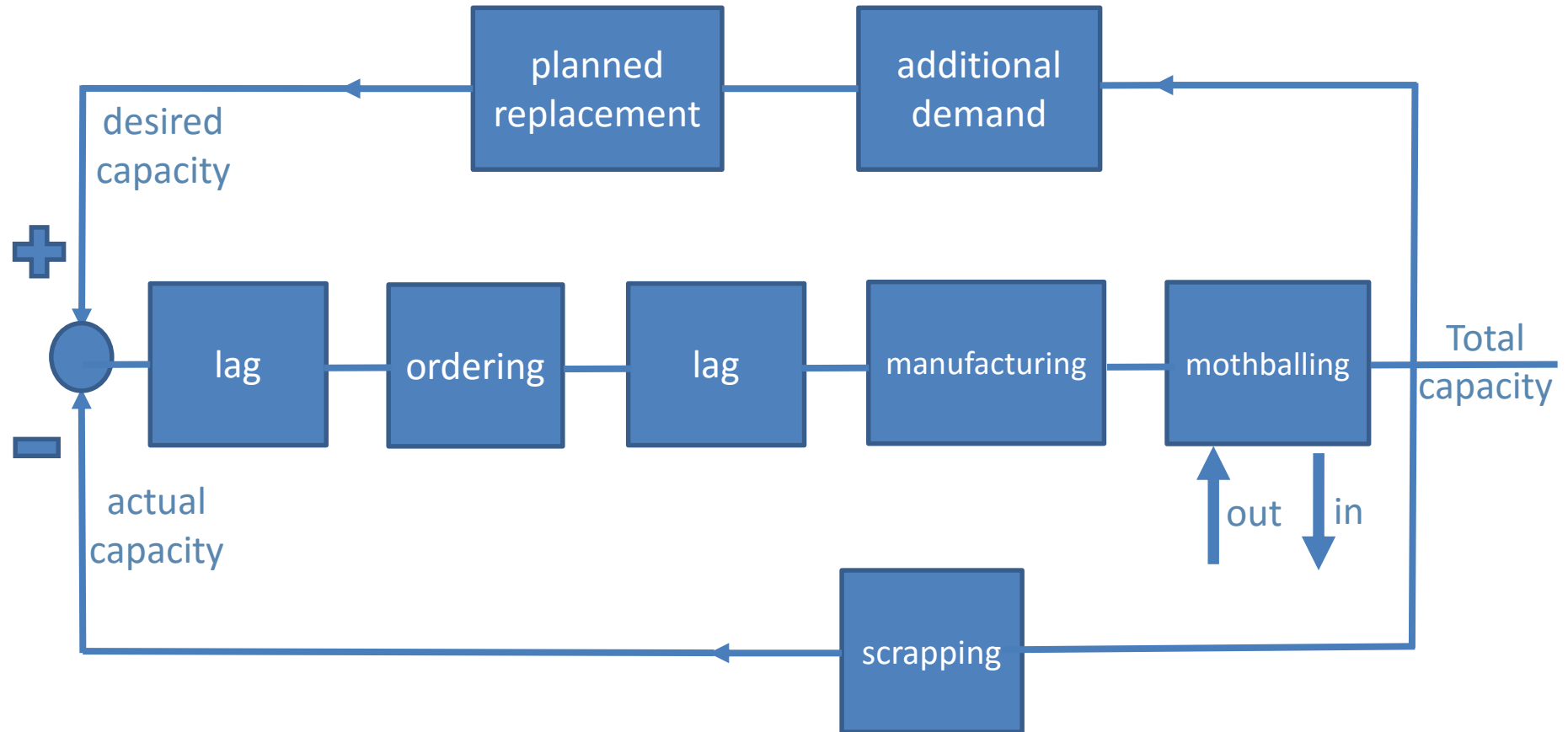
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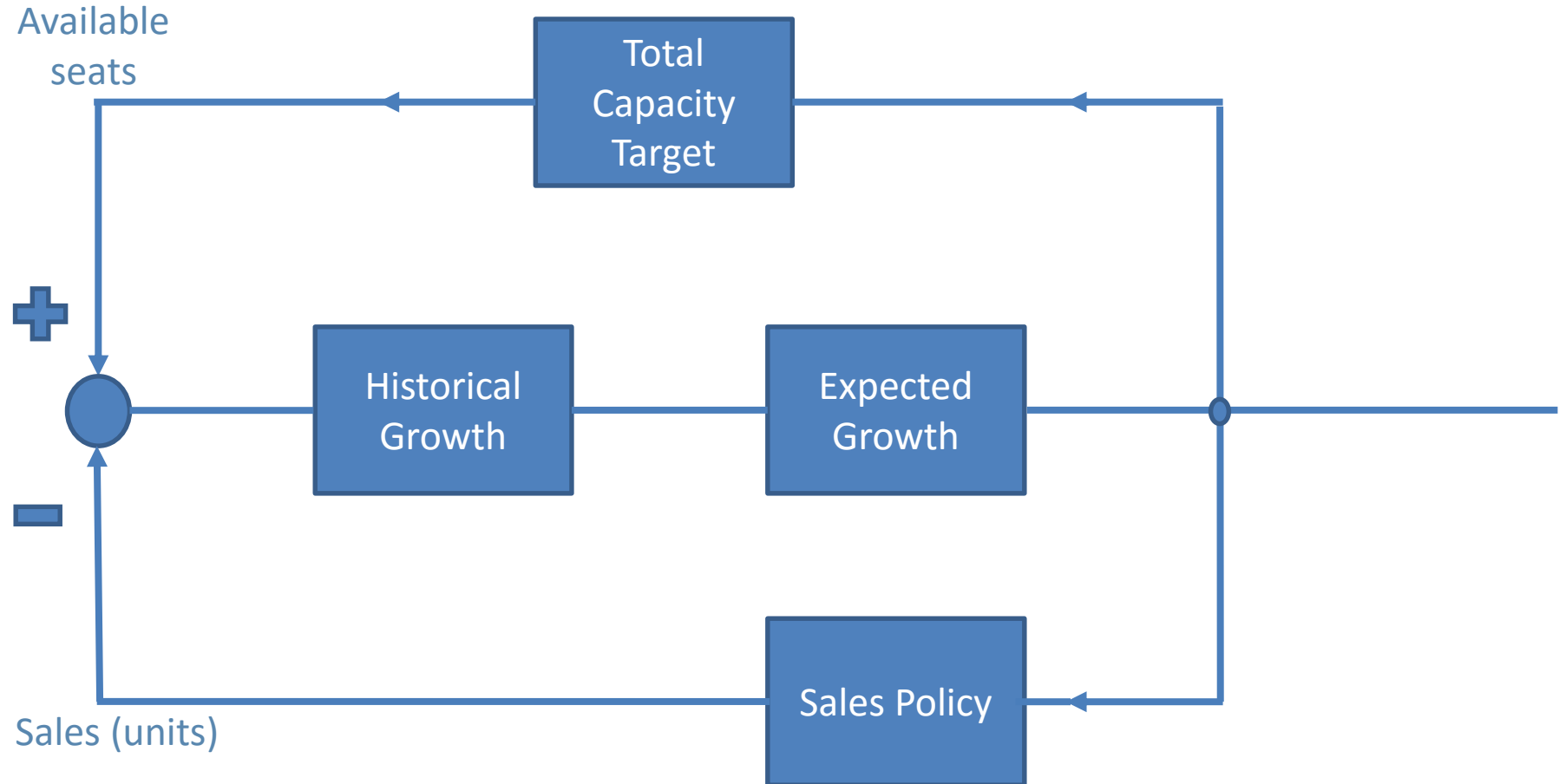
Control Systems View Of Cyclical Industries

by Dr. John Coustas



- Advantage of system modelling.
- All parameters can be identified.
- Their independency made clear.
- Feedback loops' explain stabilizing factor.
- Delays and feedforward signals **explain instability**.
- Can be used to forecast orders.



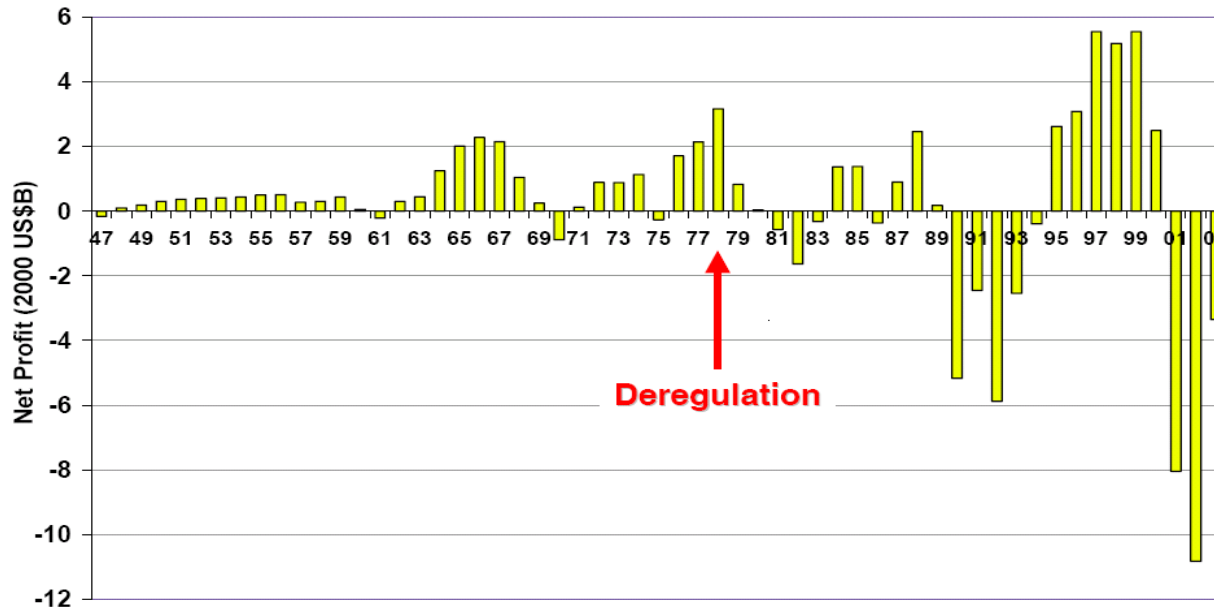


- The data for US airline industry profits shows some cyclicity since before deregulation



US Airline Net Profit (1947-2002)

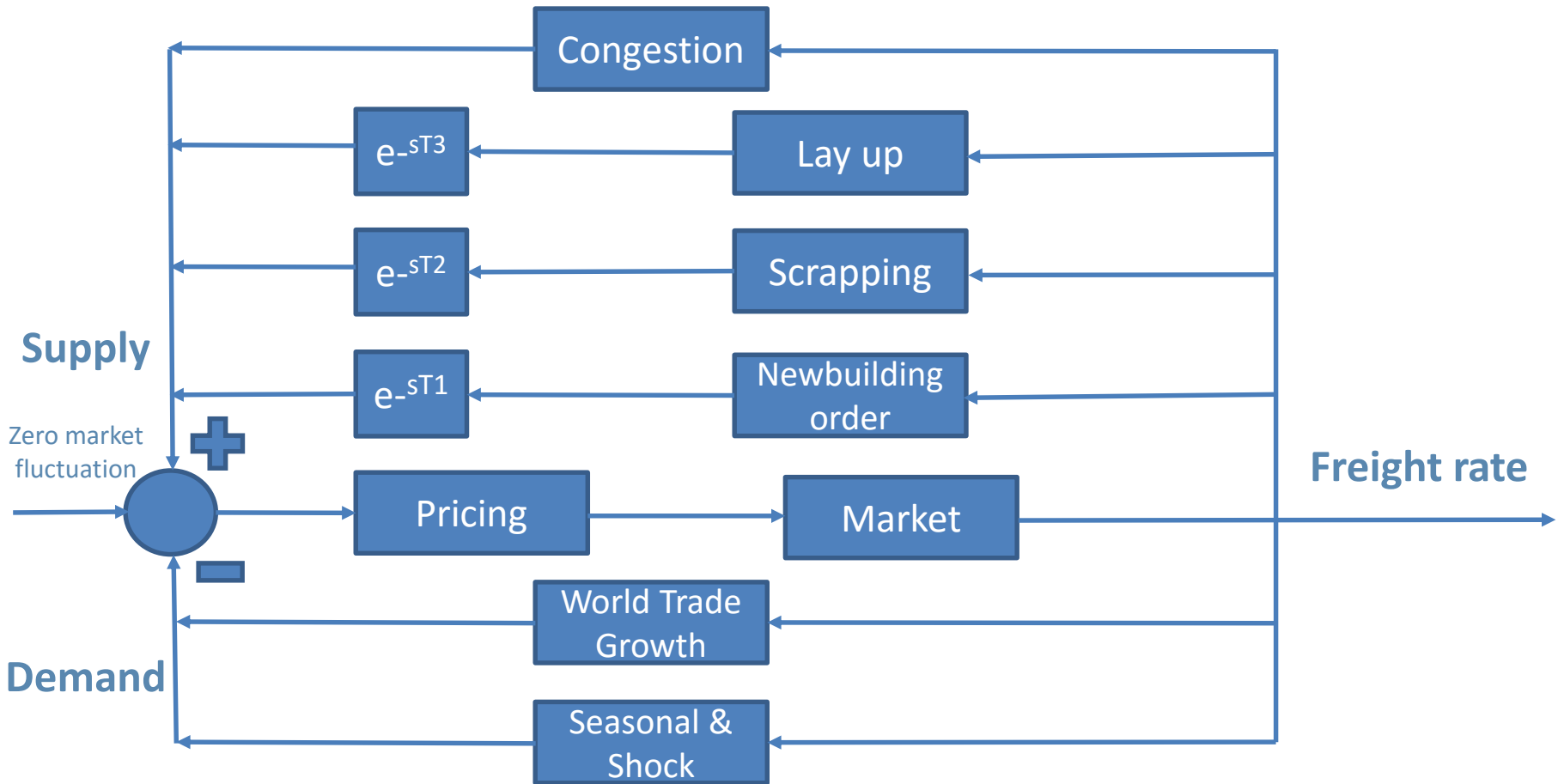
Cyclic Industry Undamped 2nd Order System Since Deregulation



Source: ATA, US Airline, all services

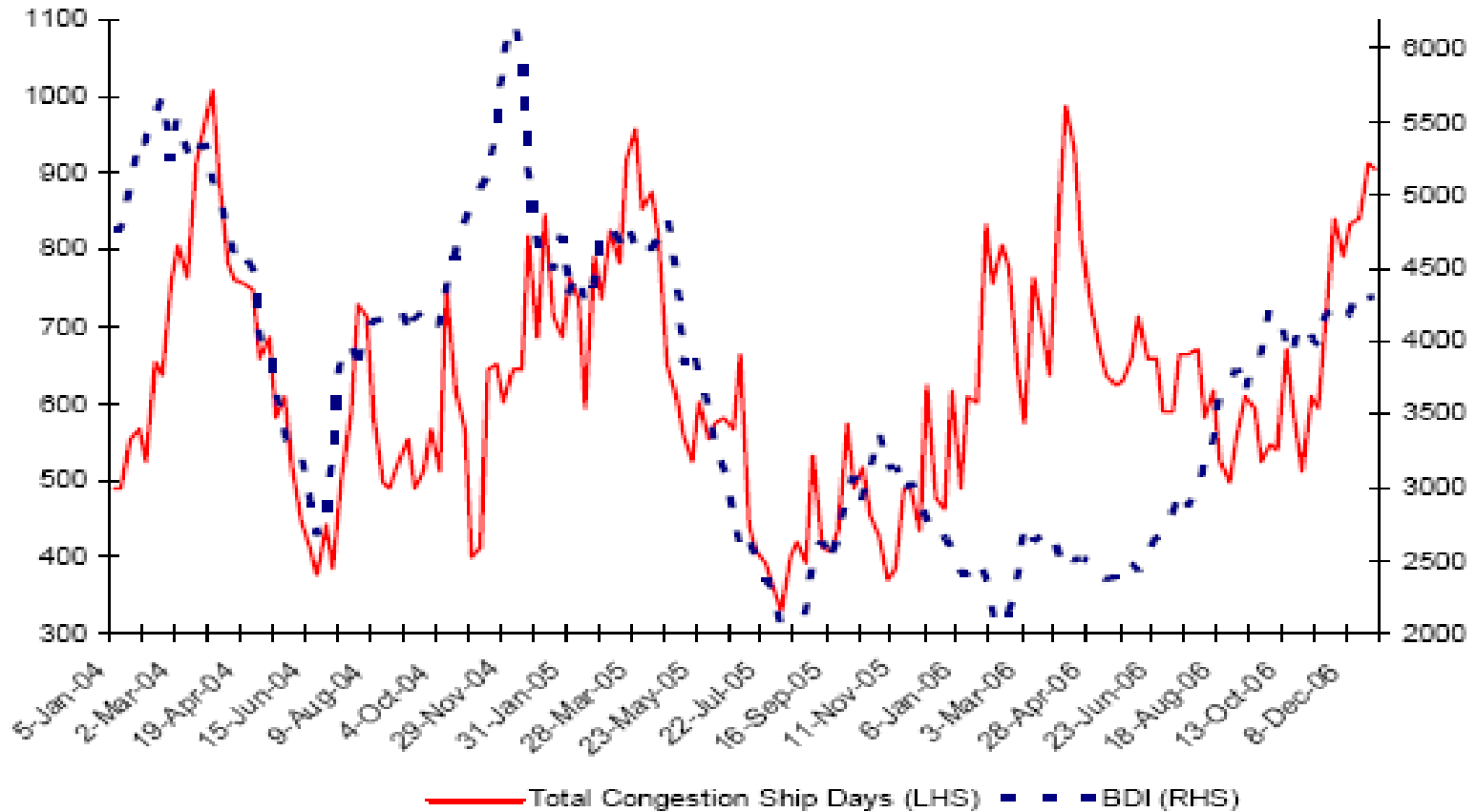
NB: 2001 data includes Air Trans Stabilization Act receipts 2

Taken from a presentation by Prof. R. John Hansman and Helen Jiang Nov. 2004



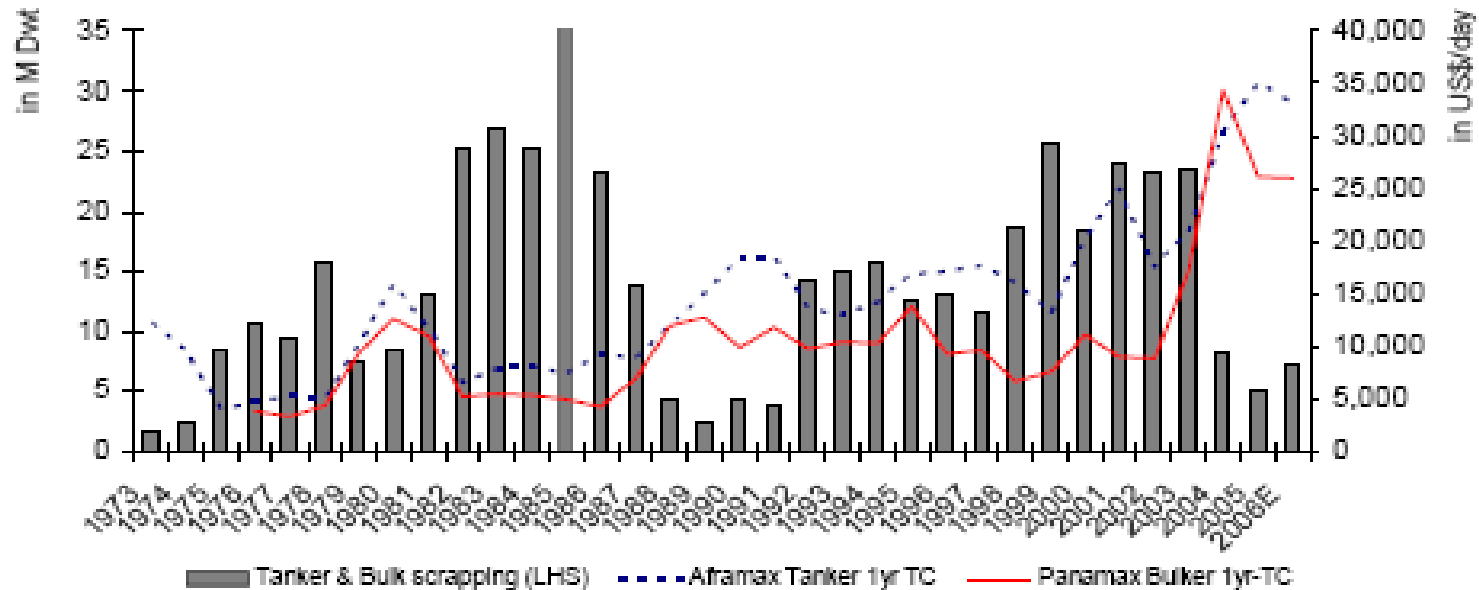
Shipping, due to the extreme fragmentation, controls supply mainly via supply-demand imbalances and resulting price increases, rather than forecasting methods.

Congestion Days Lost Versus BDI



Source: Baltic Exchange; Howe Robinson; Citigroup Investment Research

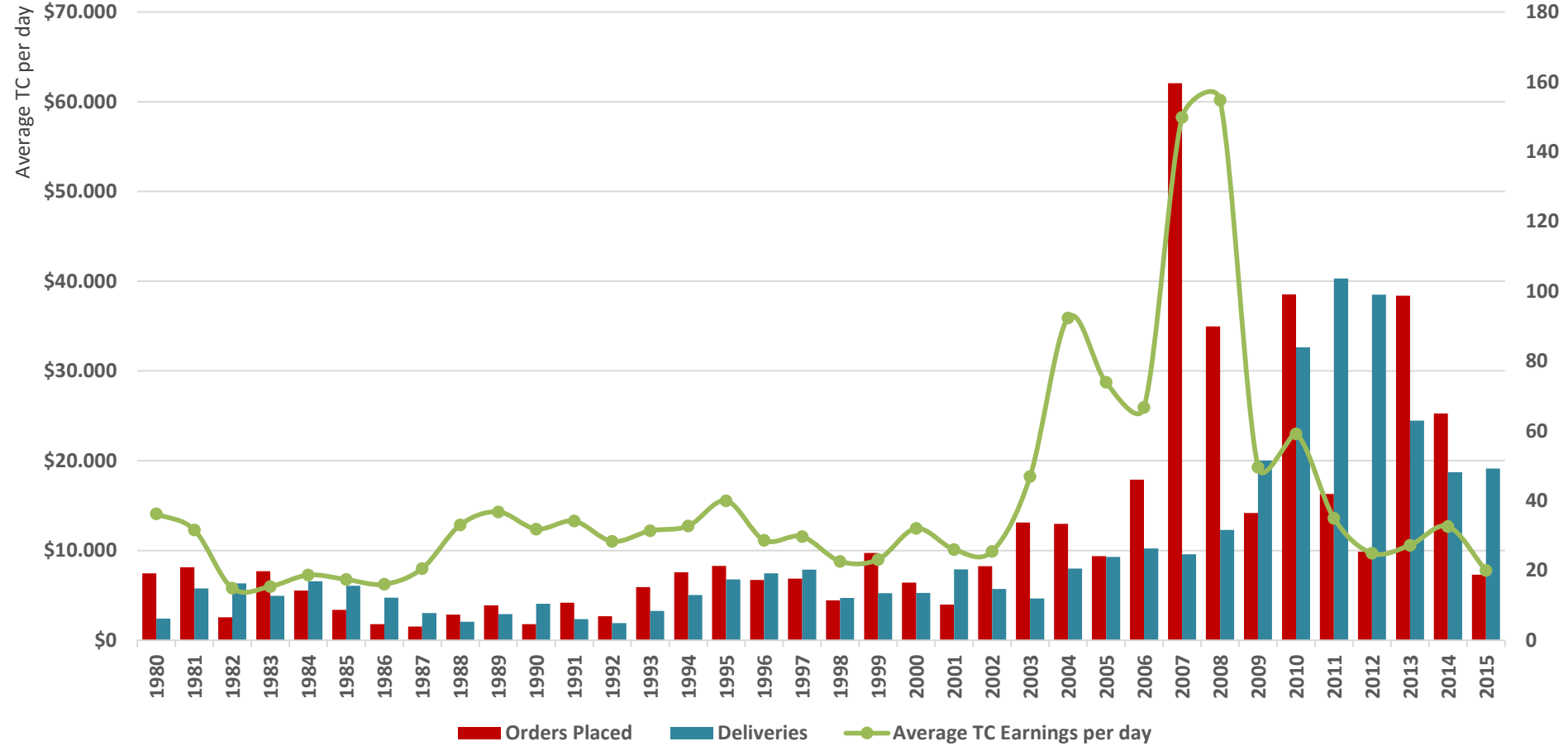
Scrapping Levels vs. Day Rates, 1973 – 2006E



Source: Clarksons; MSI; Citigroup Investment Research

Dry Bulk Market

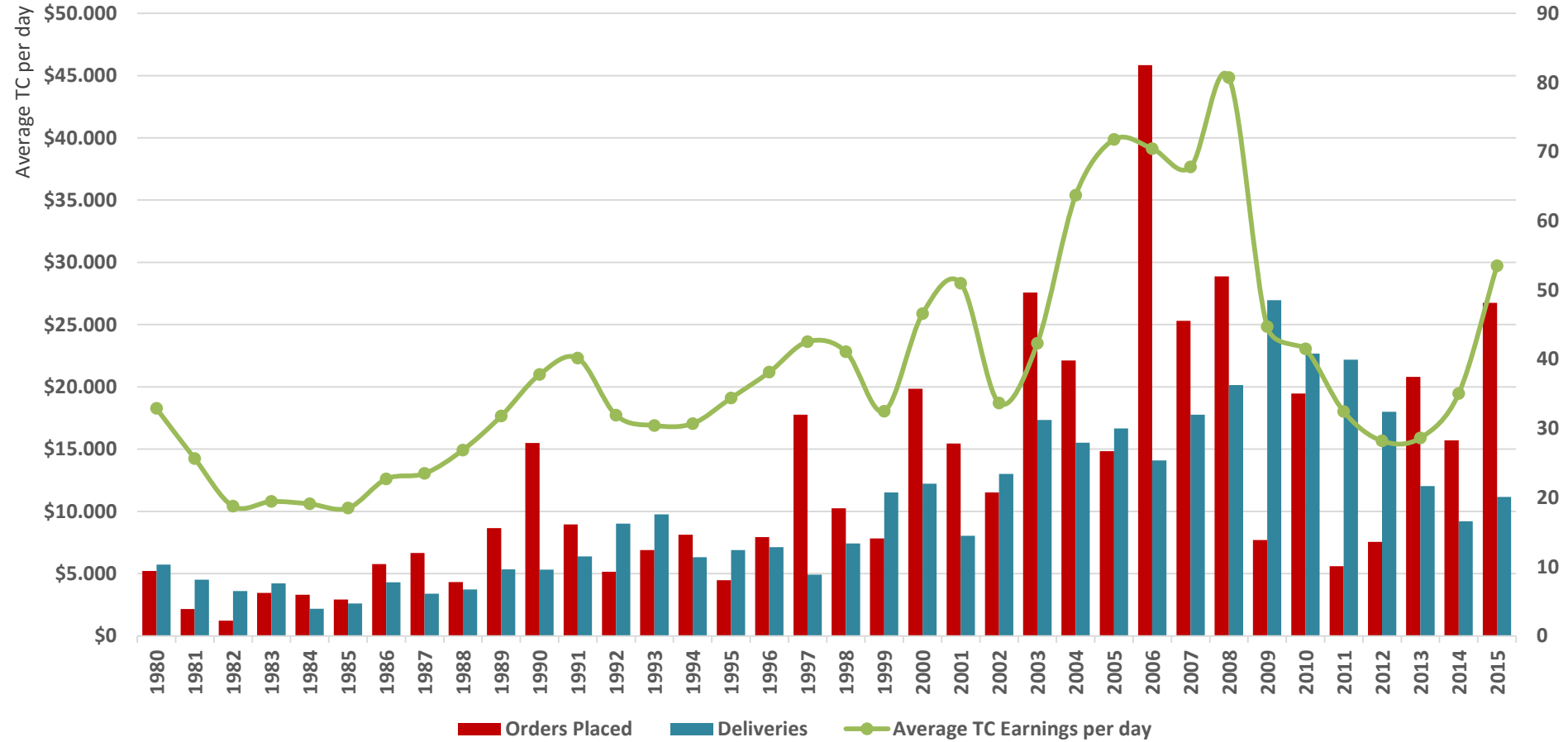
(million DWT)



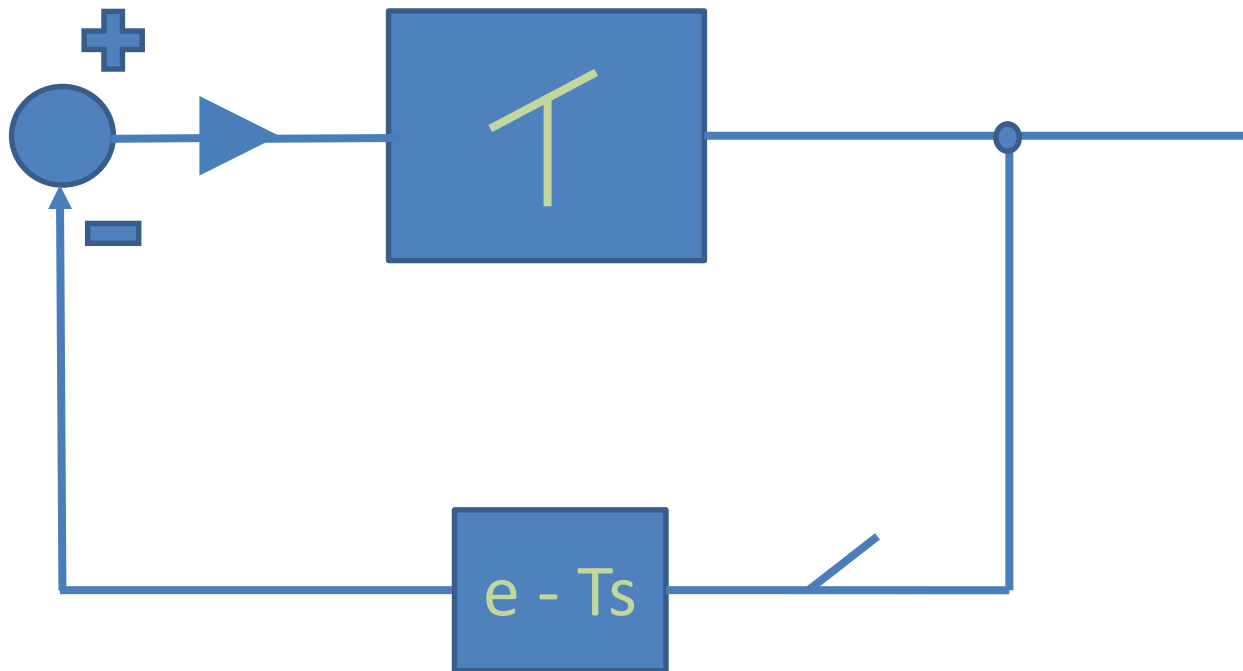
Source: Marsoft

Tanker Market

(million DWT)



Source: Marsoft



Systems that incorporate delays in their feedback loop are inherently unstable. To correct that we need to adjust the delay in the loop and the gain i.e the rate at which additional capacity can be added (shower example)



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