

# The Energy & Finance Systems: Mismatched Dynamics

Dennis Meadows

Address to 4<sup>th</sup> Annual:

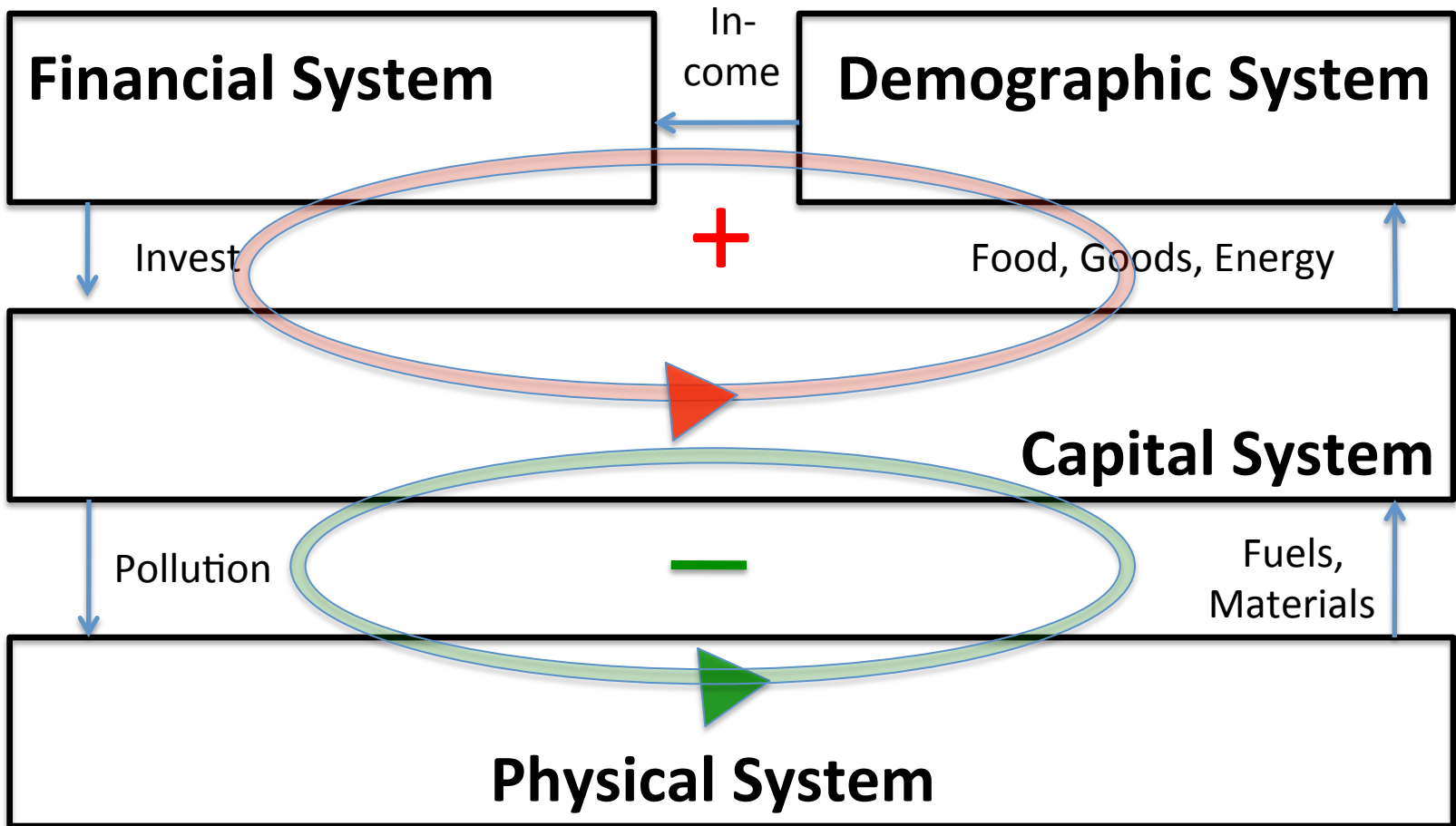
Biophysical Economics Conference

Burlington VT; October 26, 2012

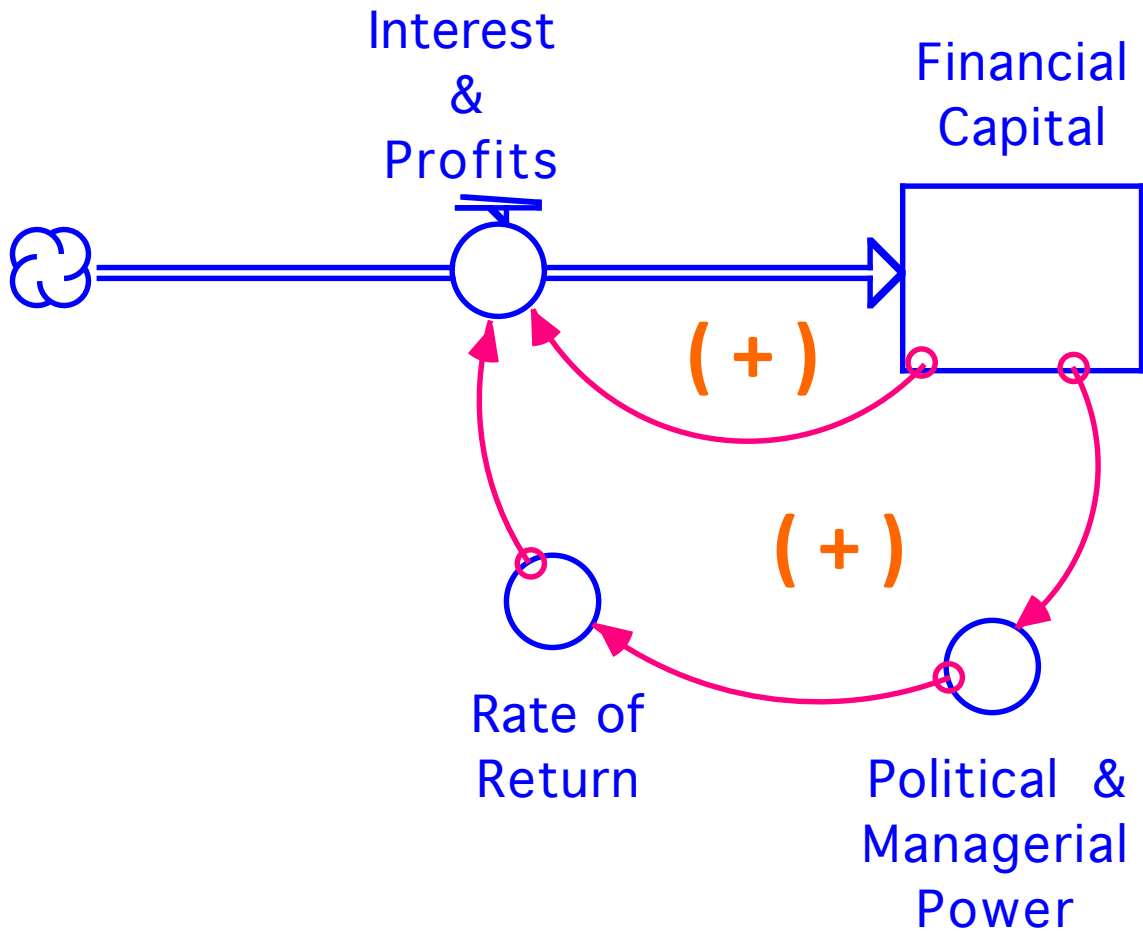
# Main Points

- The systems we have created to provide resources, including fossil fuels, are dominated by negative loops. They are homeostatic; they act to resist or offset outside changes; always seeking some stable point.
- The systems we have created to provide financing are dominated by positive loops. They are explosive; they act to magnify outside changes; always explosively growing away from any stable point.
- Therefore present financial systems will not permit us to manage energy systems sustainably.

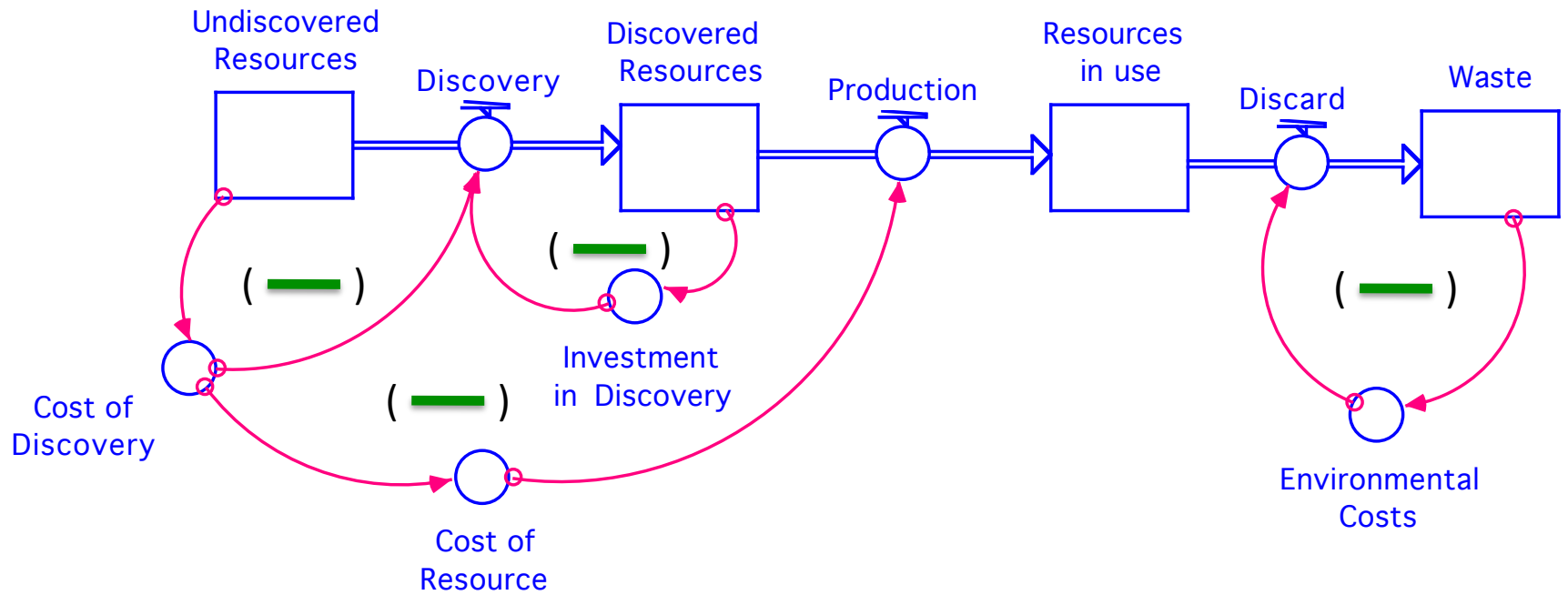
# Three Levels; Two Loops



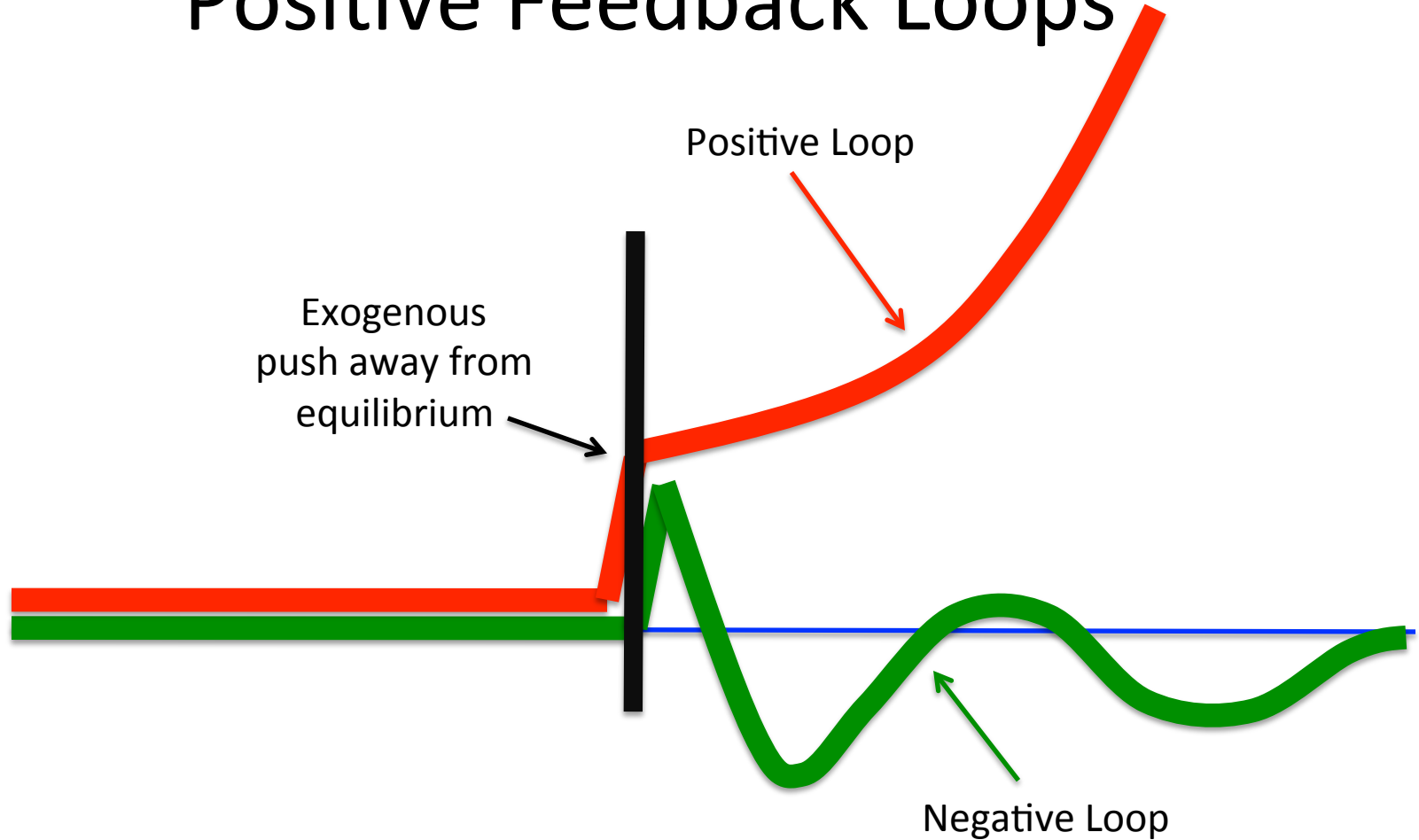
# Financial Stocks



# Nonrenewable Resource Stocks

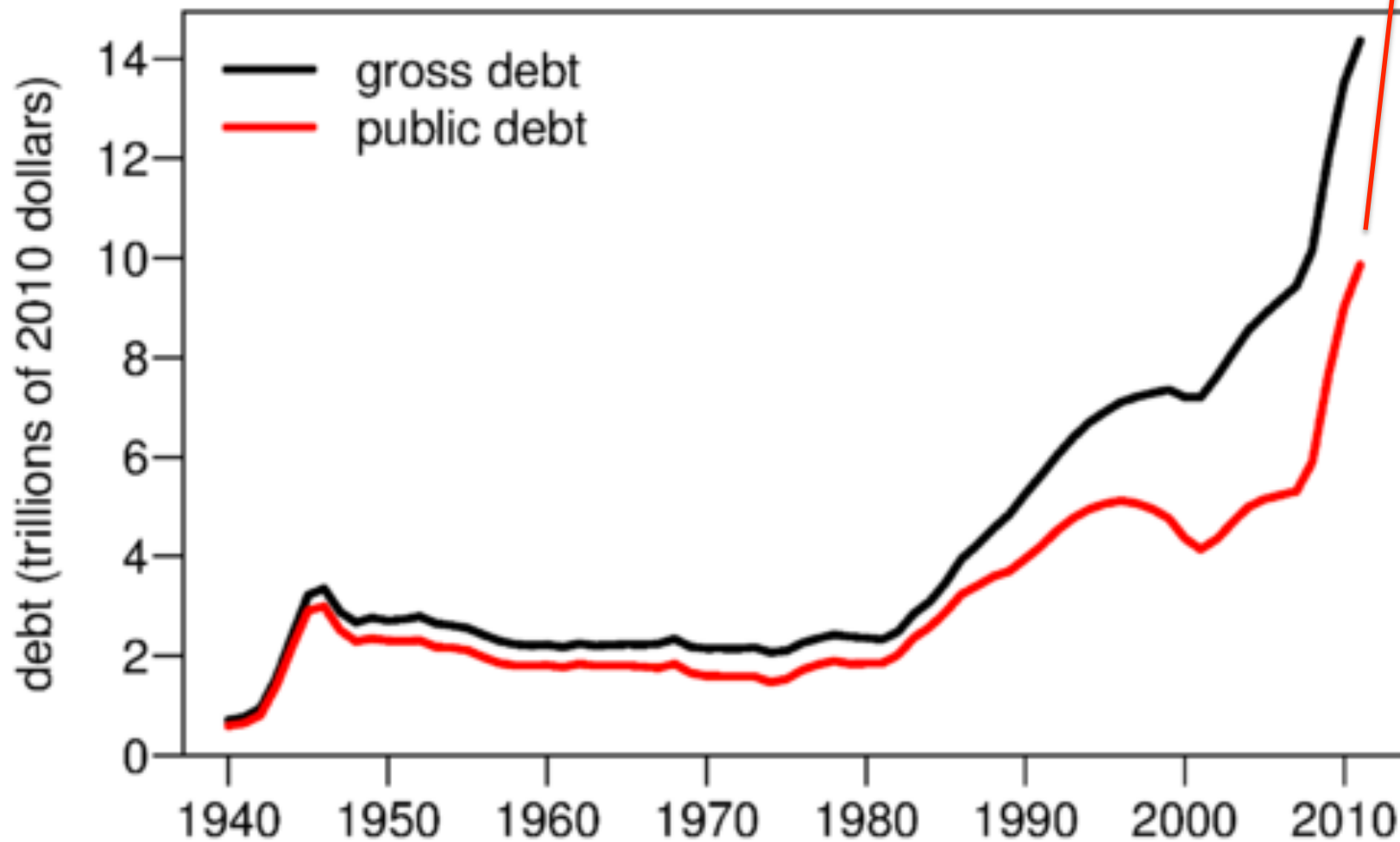


# Typical Behavior of Negative and Positive Feedback Loops

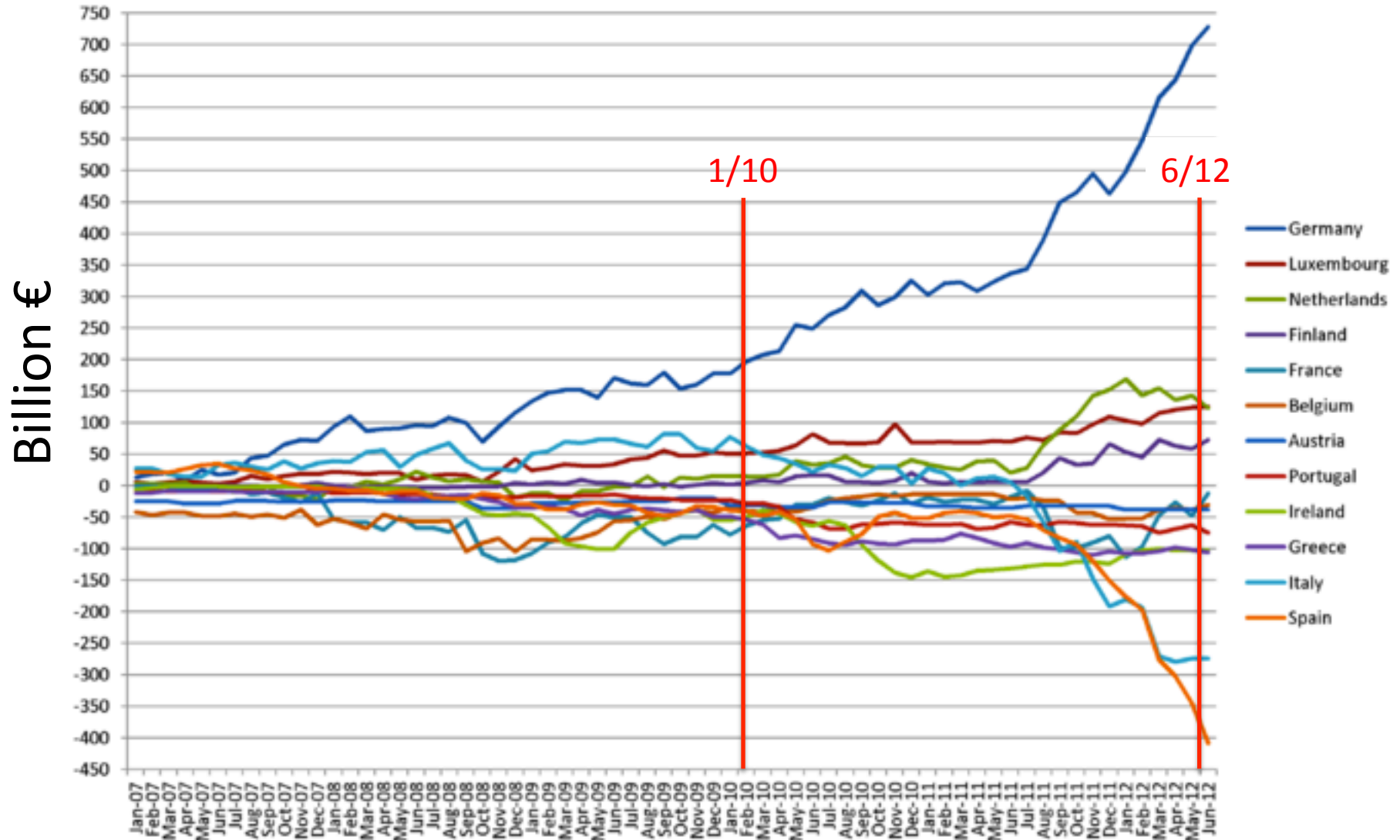


# Exponential Growth in US Debt

9/2012  
\$16 Trillion

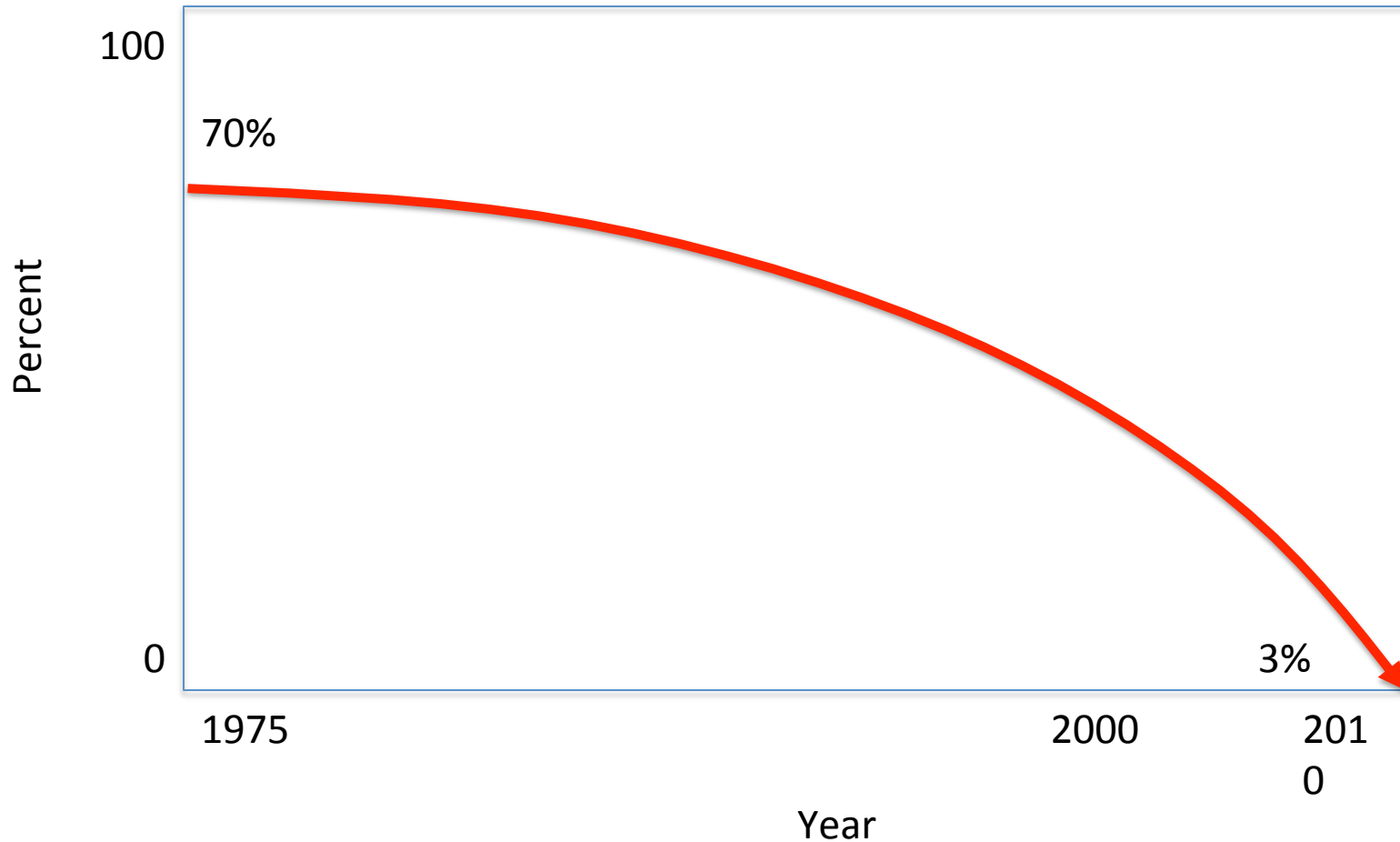


# History of Target2 Balances

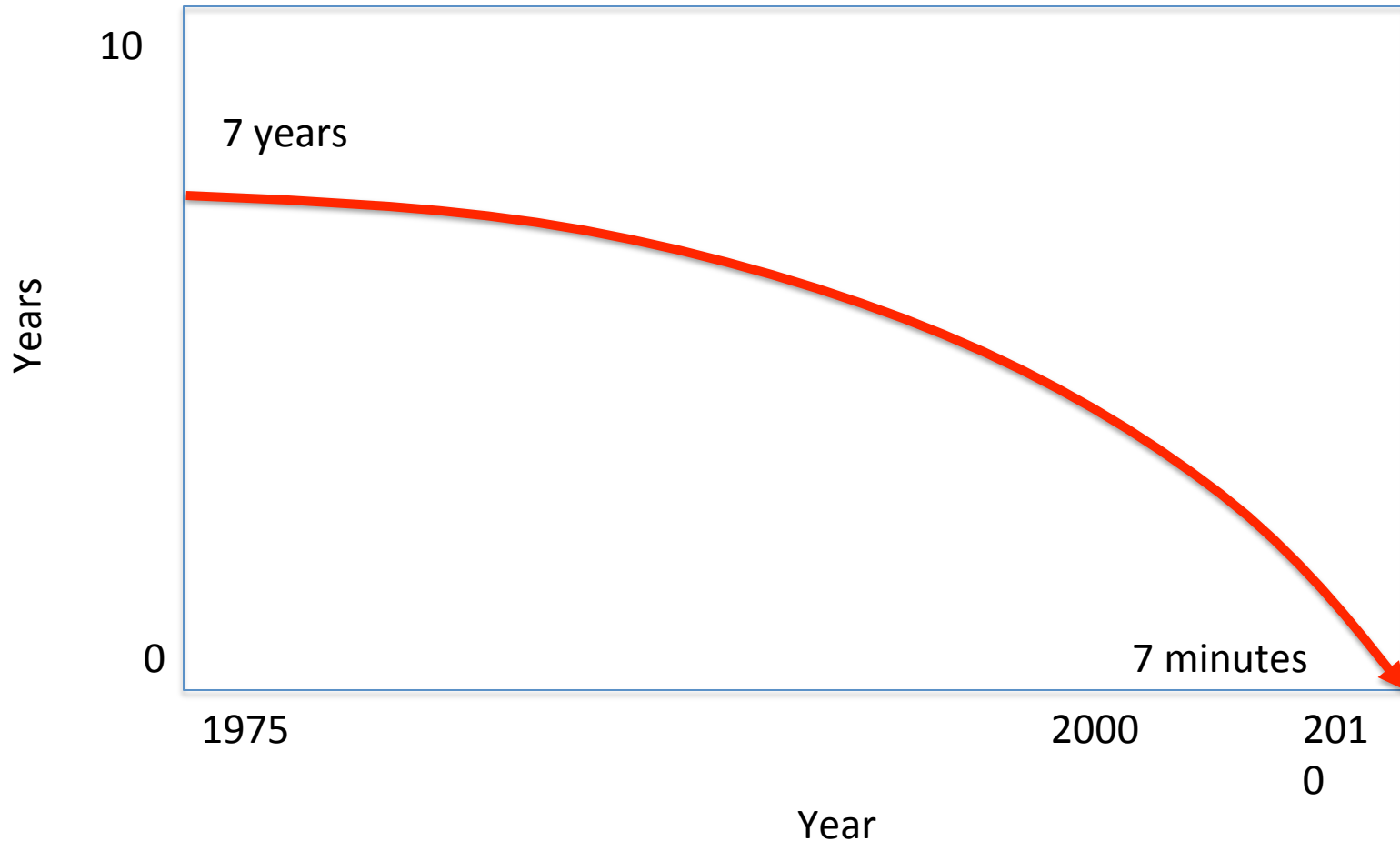




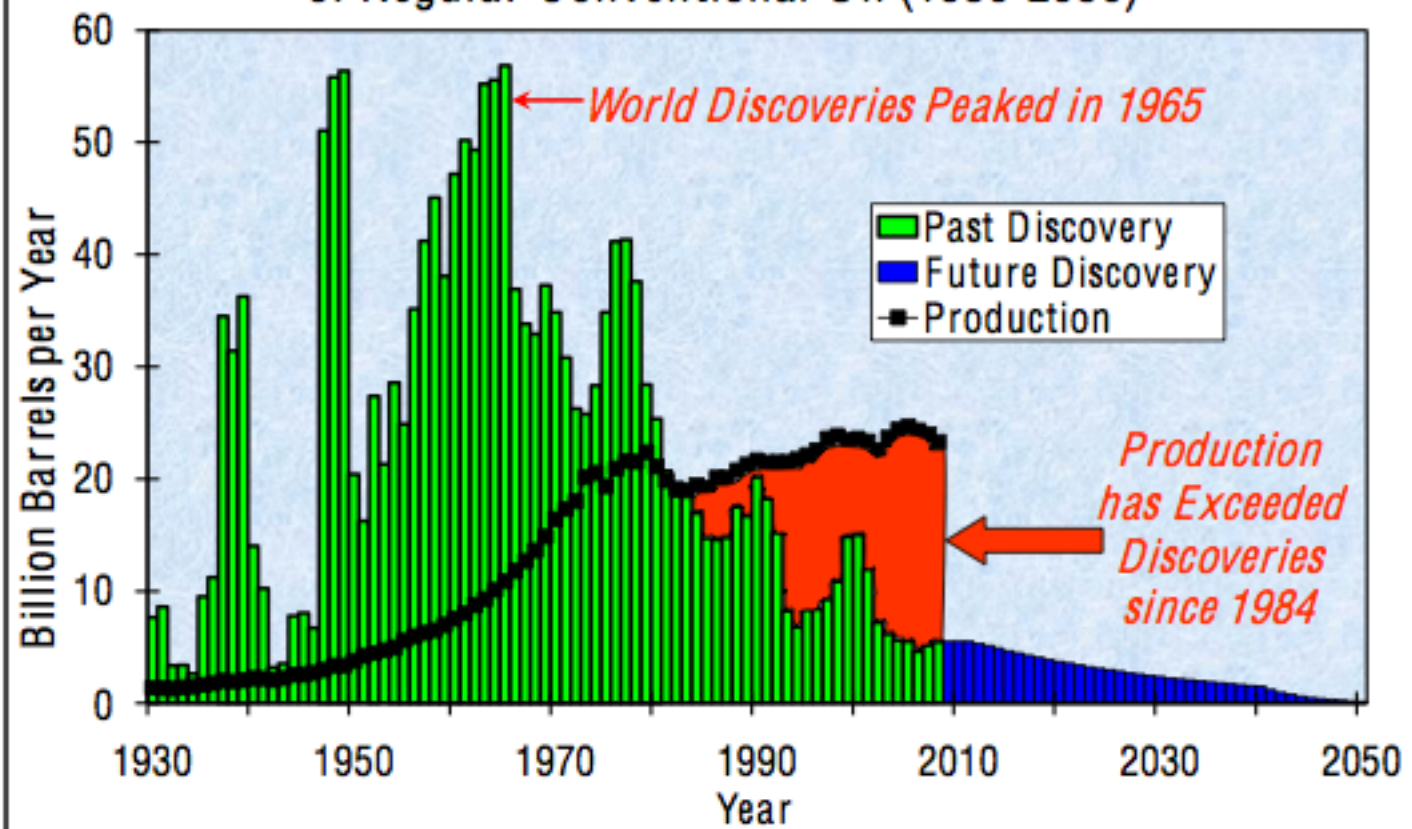
# Fraction of Foreign Currency Transactions for Trade



# Average Length of Time a Stock Investment is Held



### The Growing Gap between Production and Discovery of Regular Conventional Oil (1930-2050)

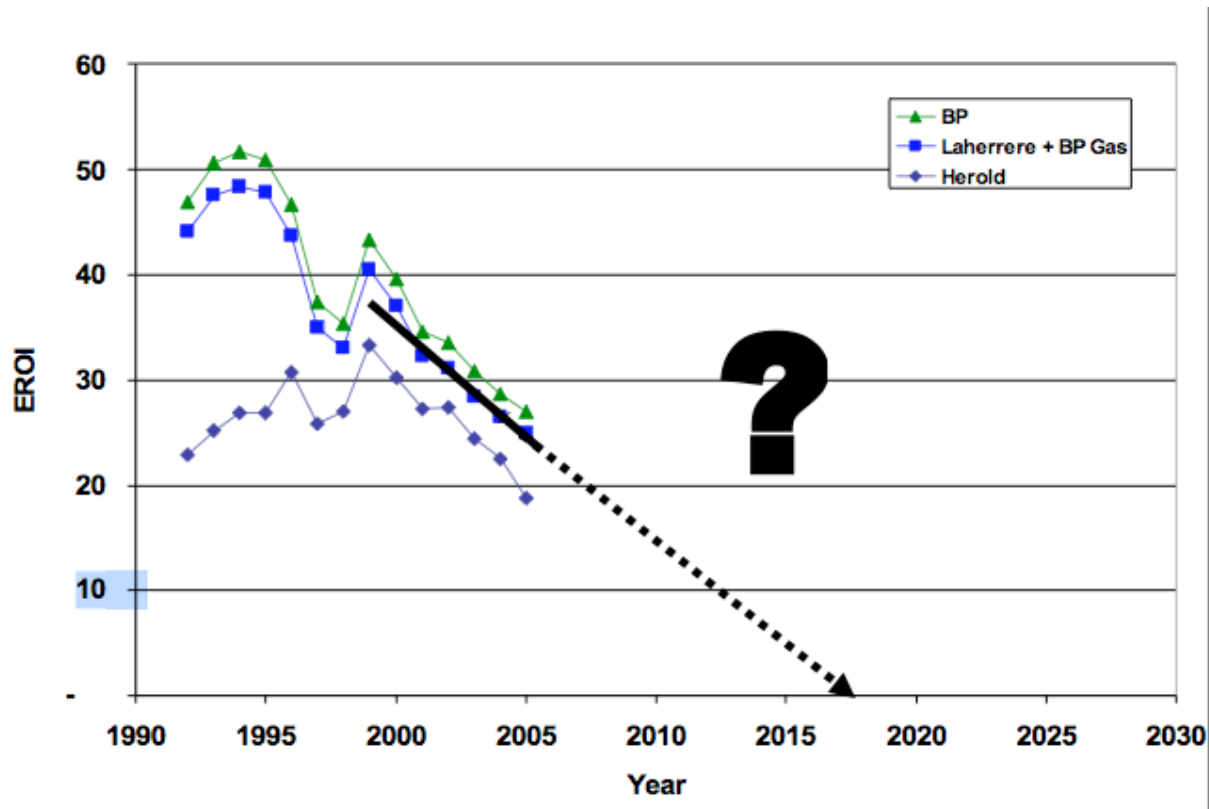


Past discoveries have been backdated with revisions to reflect **“Reserve Growth”**

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(data from Campbell, personal communication, October, 2009)

# Global Trends in Energy Return on Investment



# The Financial System Hinders Sustainability in Five Ways

- It amplifies oscillations
- It reduces the time period of interest
- It forces promotes indefinite growth
- It increases the gap between rich and poor
- It devalues social capital

This list is adapted from *Money and Sustainability*, Bernard Lietaer, et. al., Chapter V, pp 93- 118.