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U.S. Department of Agriculture

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Milk Price Volatility: What's Old is New (but what's new is different)

Mark Stephenson  
Cornell Program on Dairy Markets & Policy



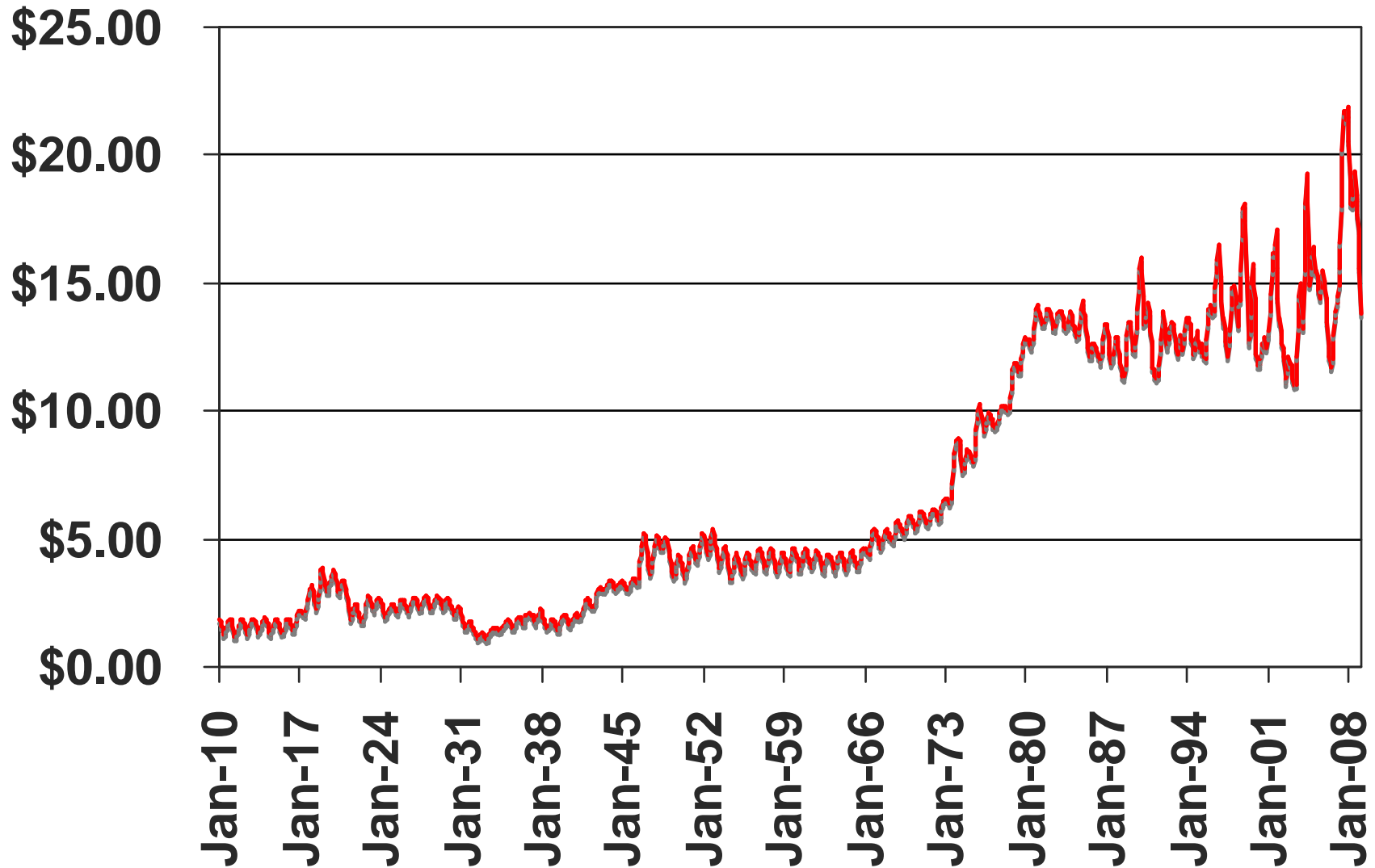
# Milk Price Volatility: What's Old is New

**(but what's new is different)**

Mark Stephenson, Ph.D.

*Cornell Program on Dairy Markets & Policy*

# U.S. All Milk Price

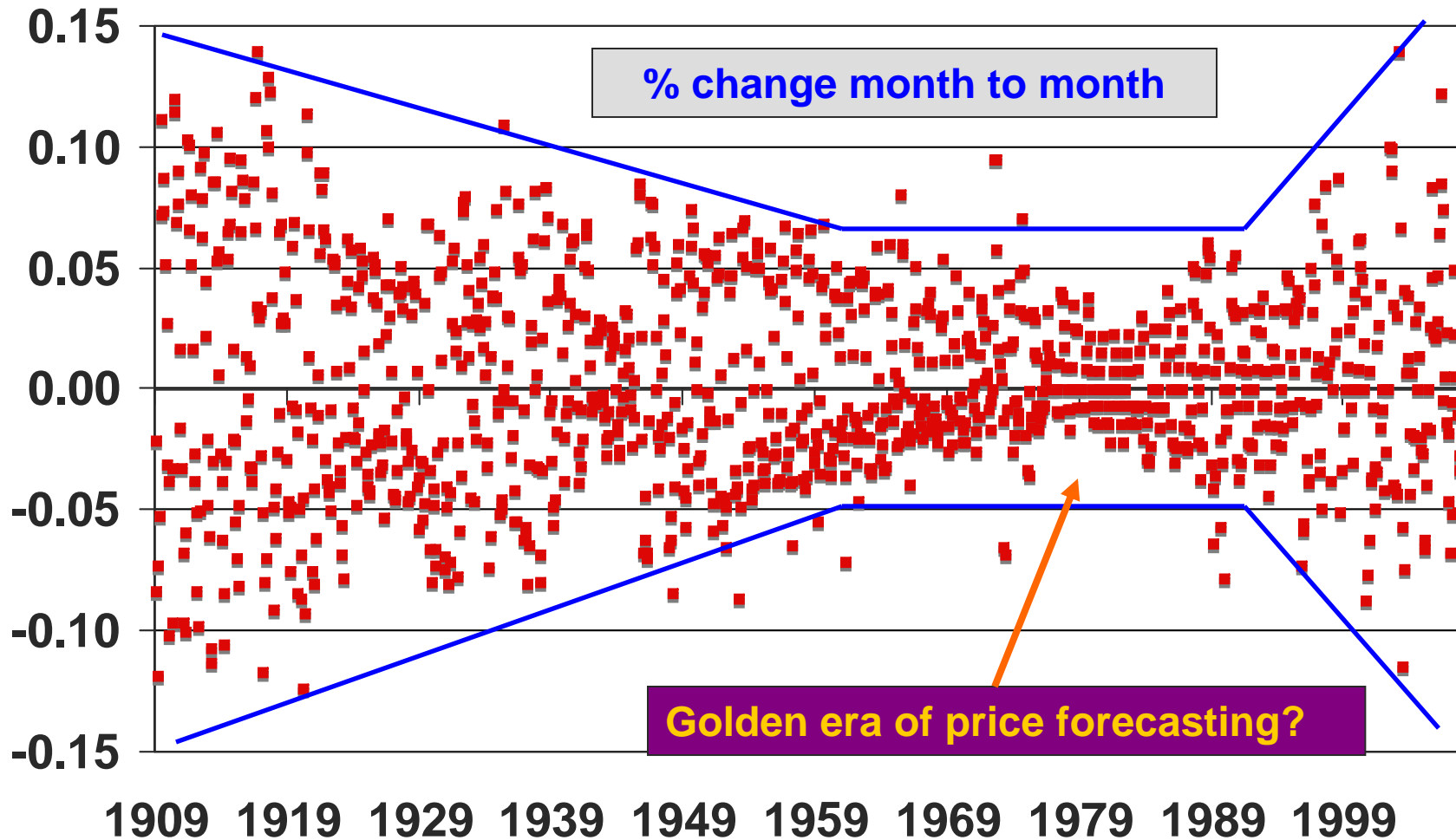


# What Are We Looking For?



- Anticipated Variation
  - Seasons
  - Cycles
  - Trends
- Unanticipated Variation
  - Shocks

# Relative Variability Over Time



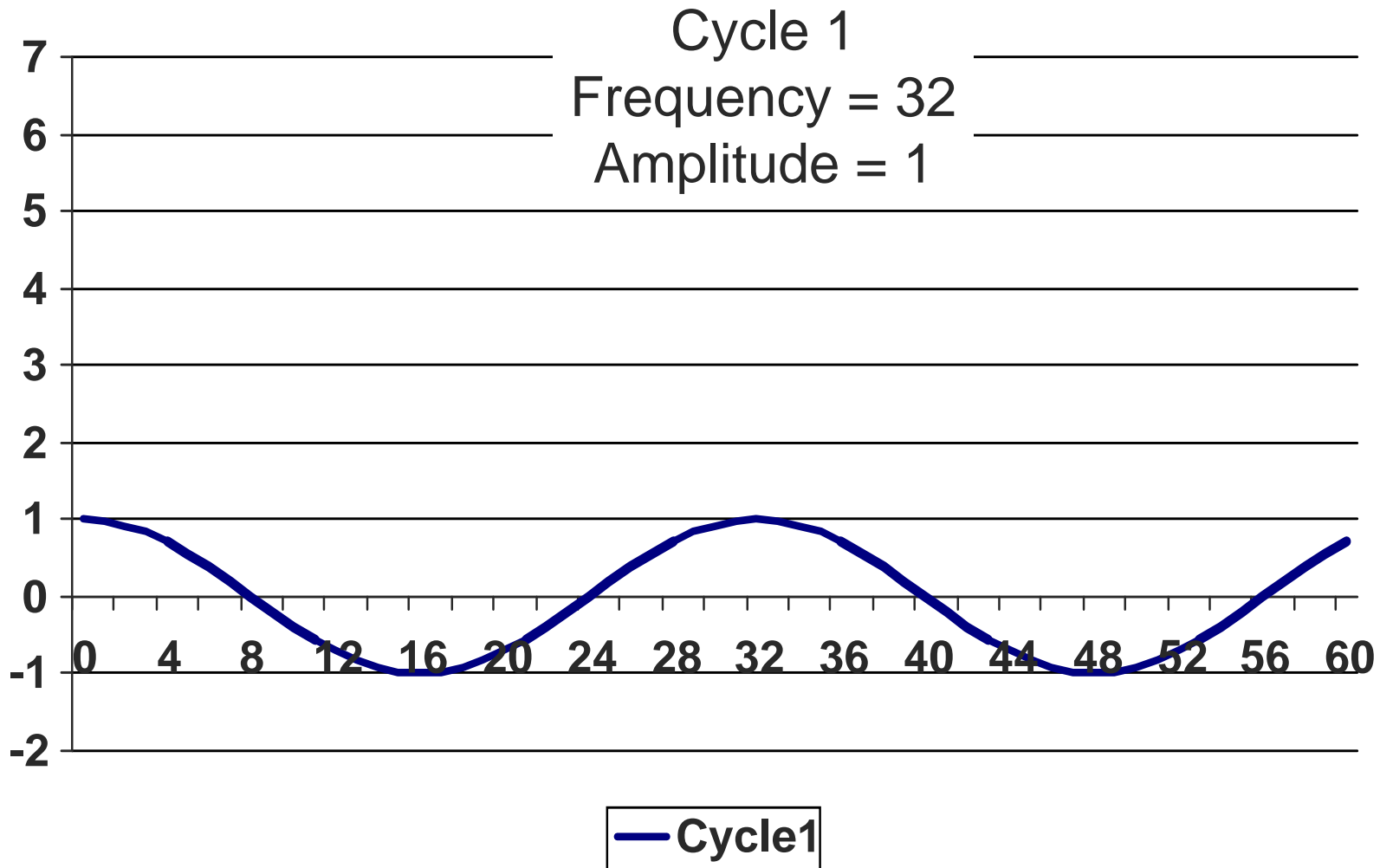
Current variability of similar magnitude to early 20<sup>th</sup> century – but less predictable?

# Is There Order Within the Chaos?



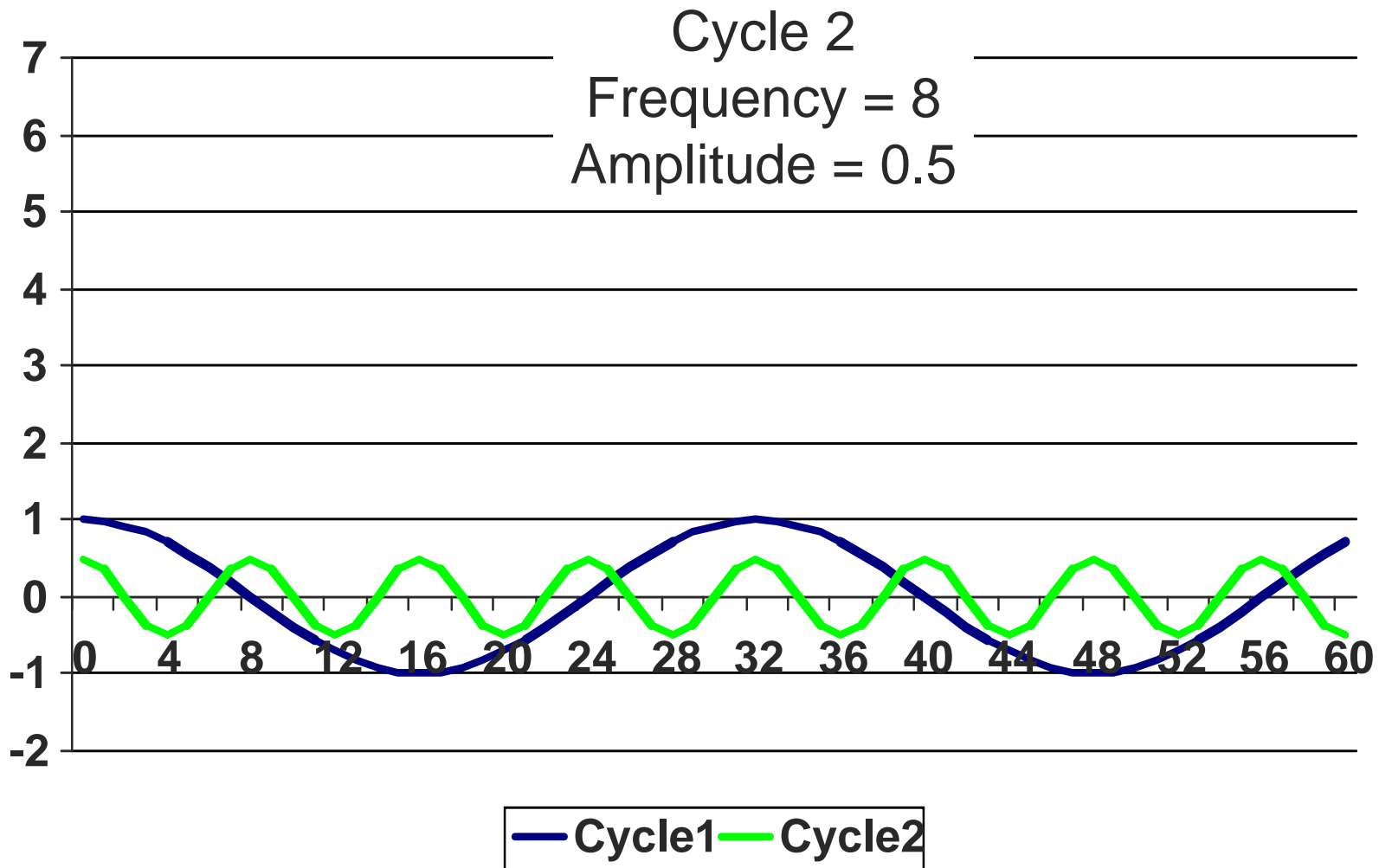
- The All Milk price series looks chaotic but is there order underlying the volatility?
- Let's examine with “State-Space Methods” or “Spectral Decomposition”

# Spectral Composition Example

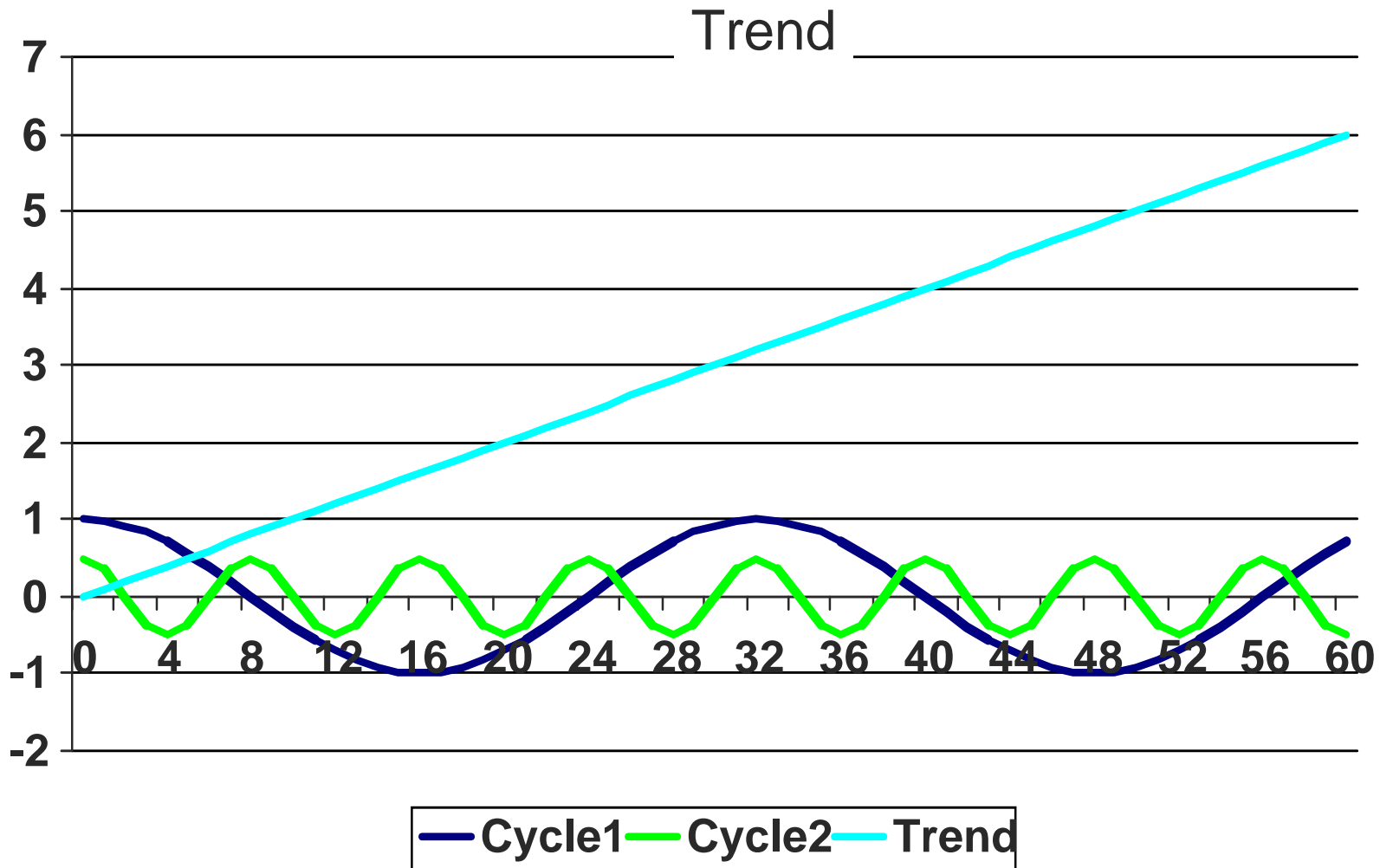




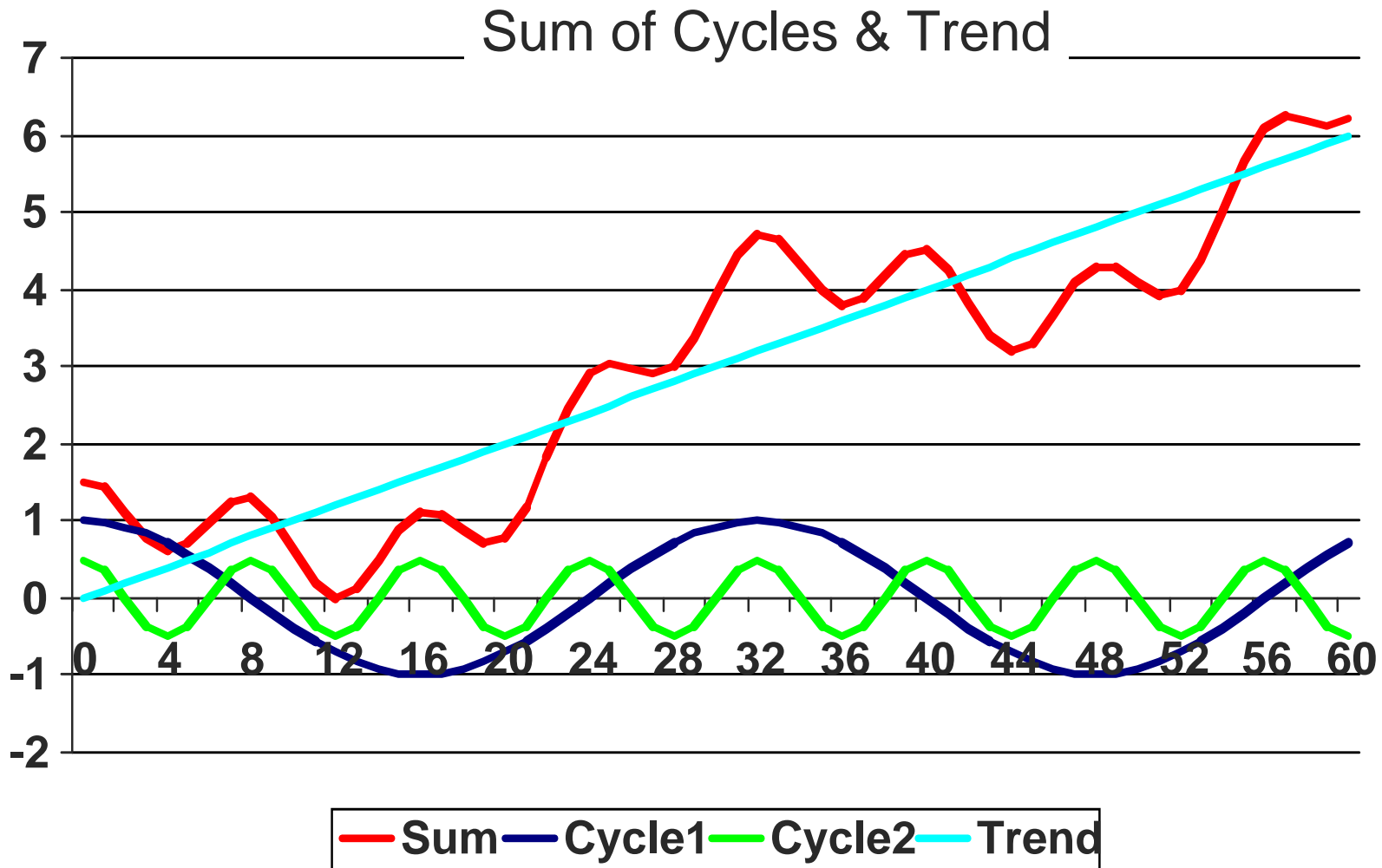
# Spectral Composition Example



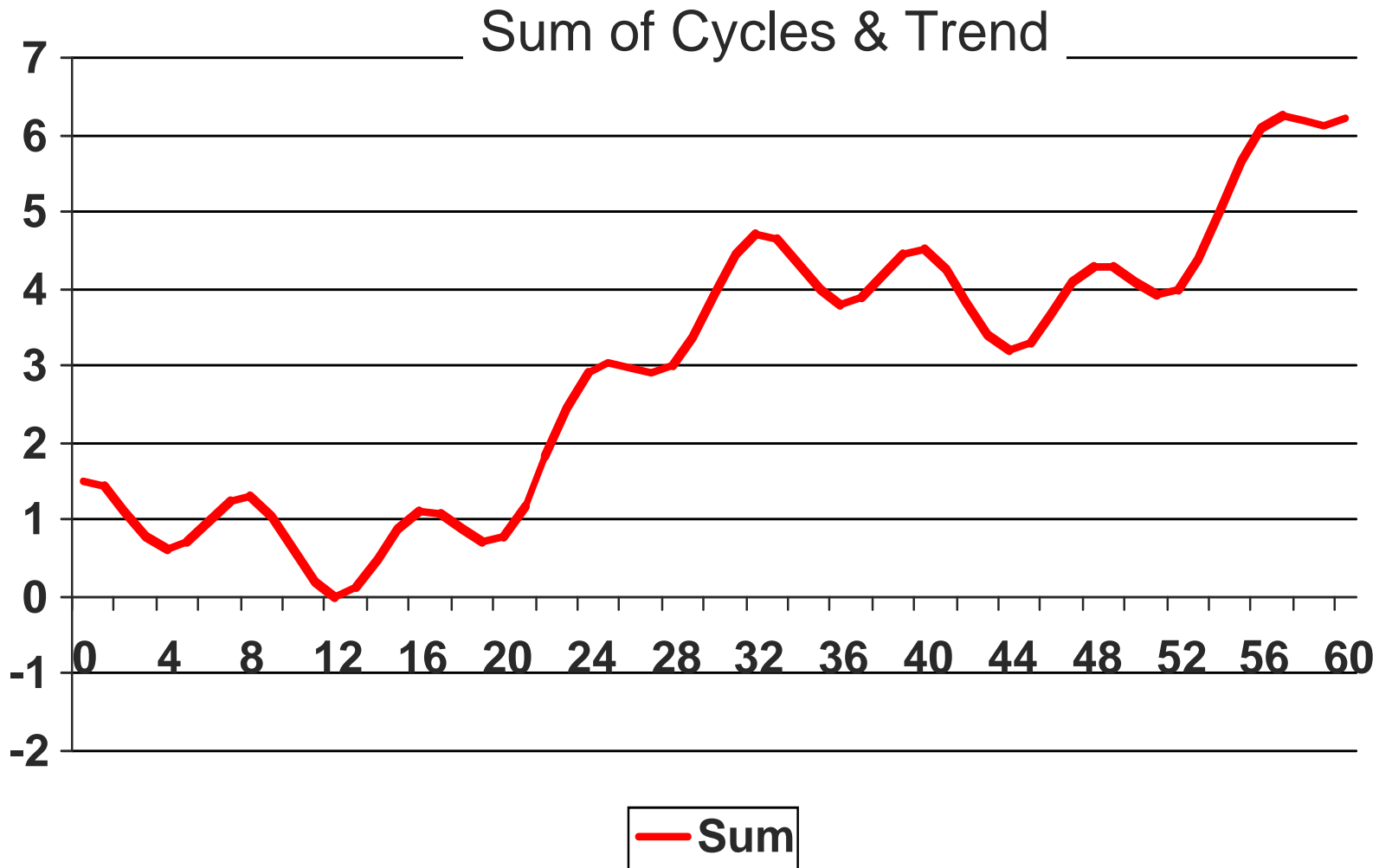
# Spectral Composition Example



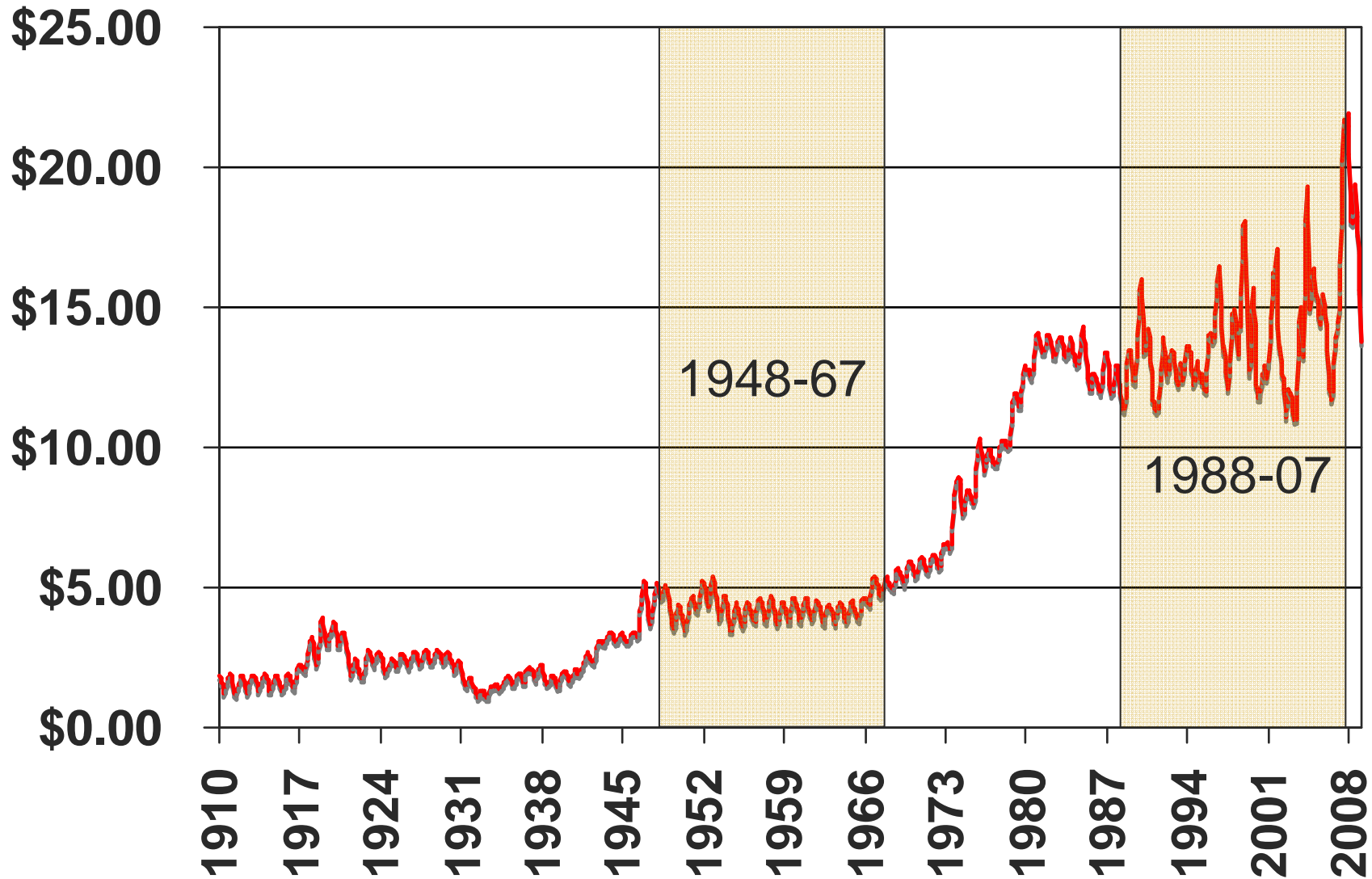
# Spectral Composition Example



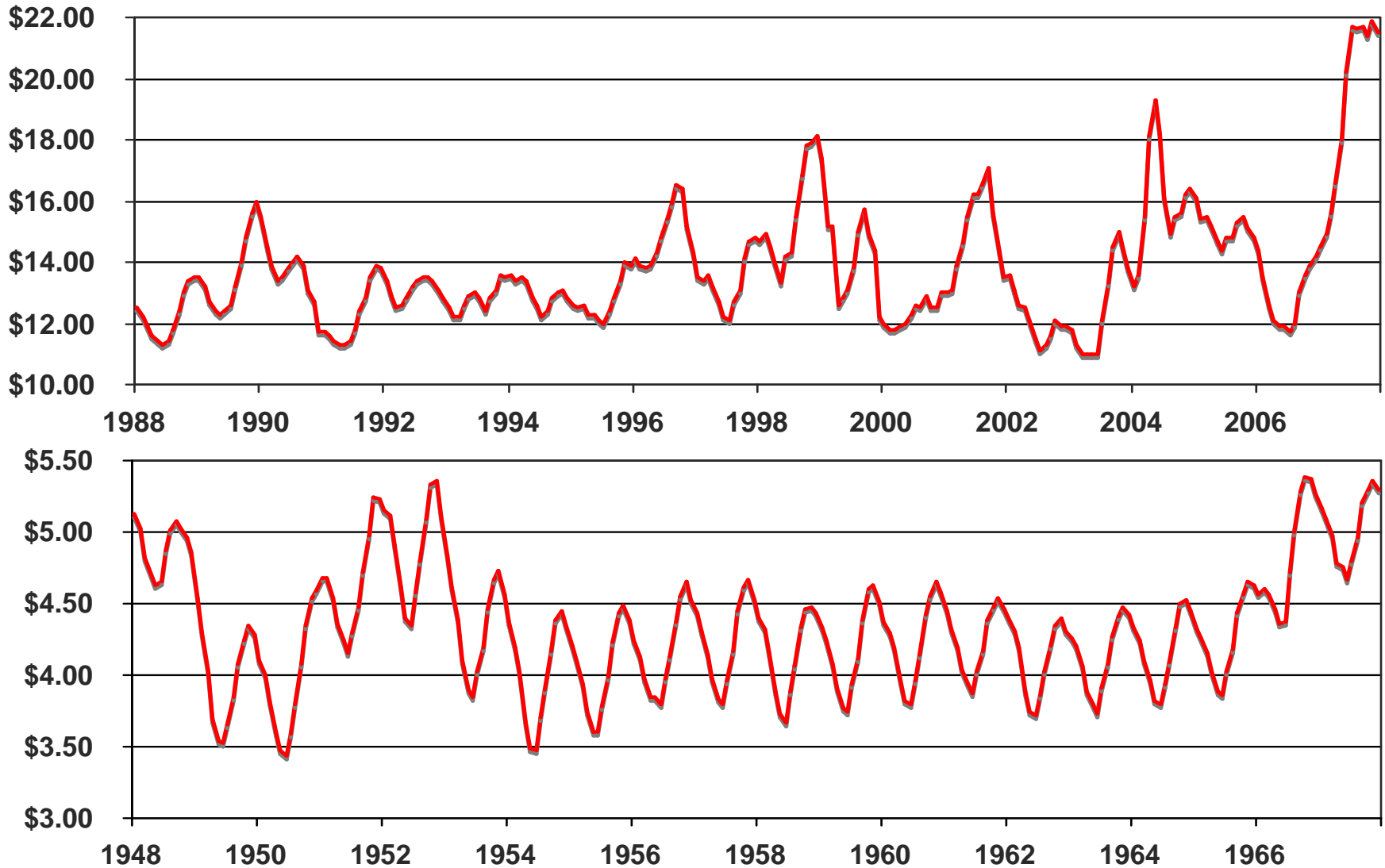
# Spectral Composition Example



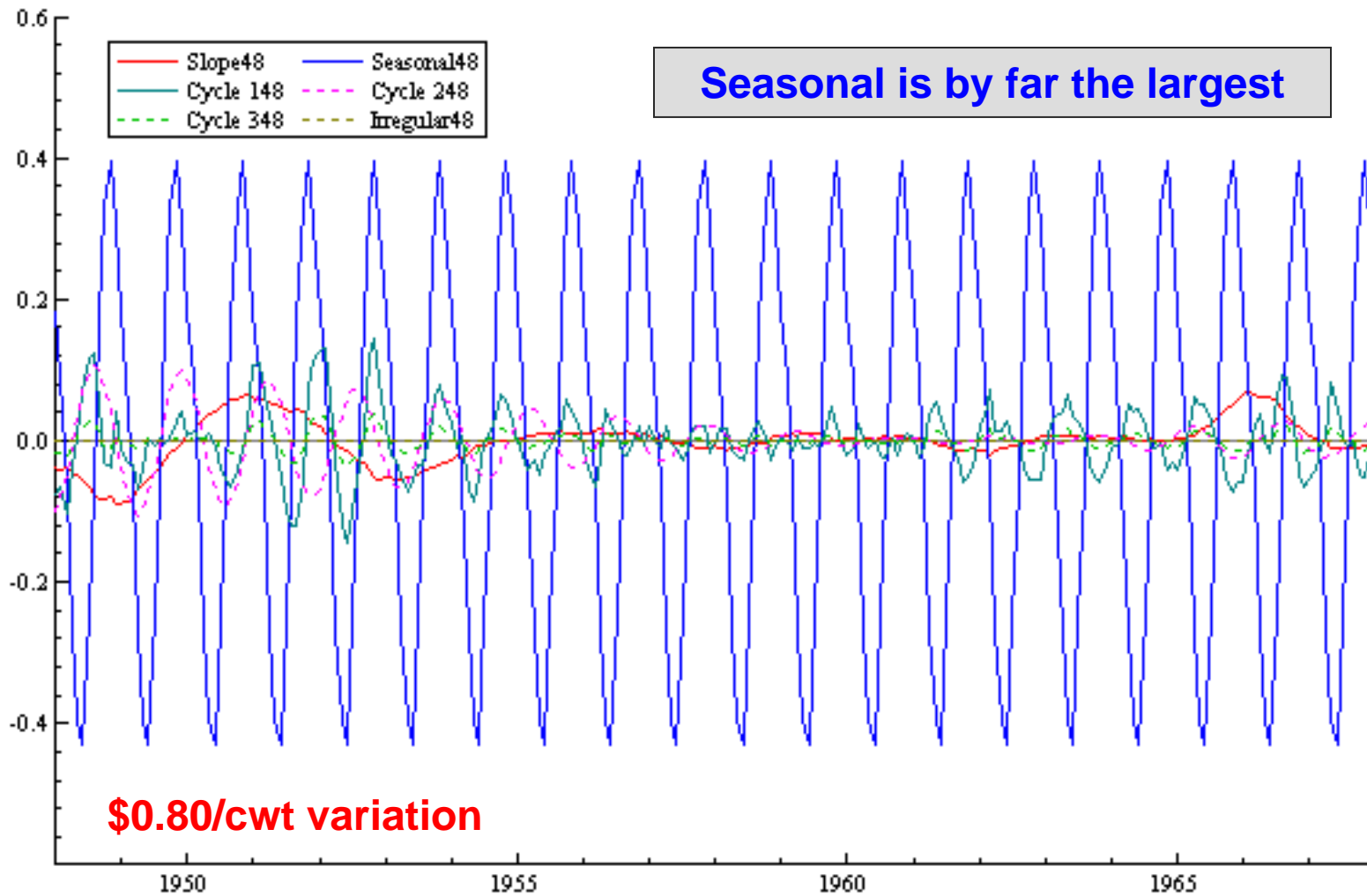
# Look At Two Time Periods



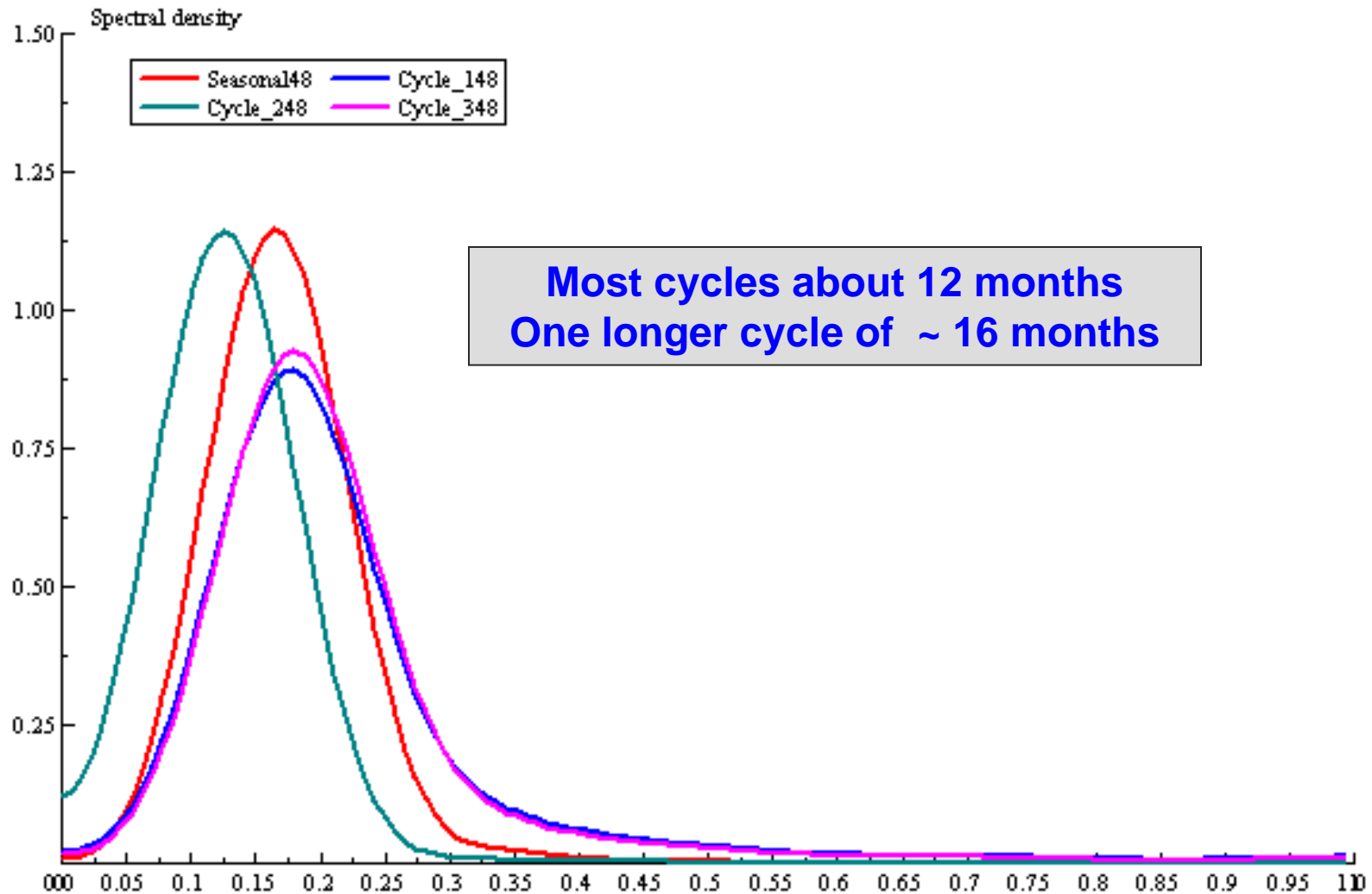
# A Closer View of the Two Series



# Components 1948 to 1967

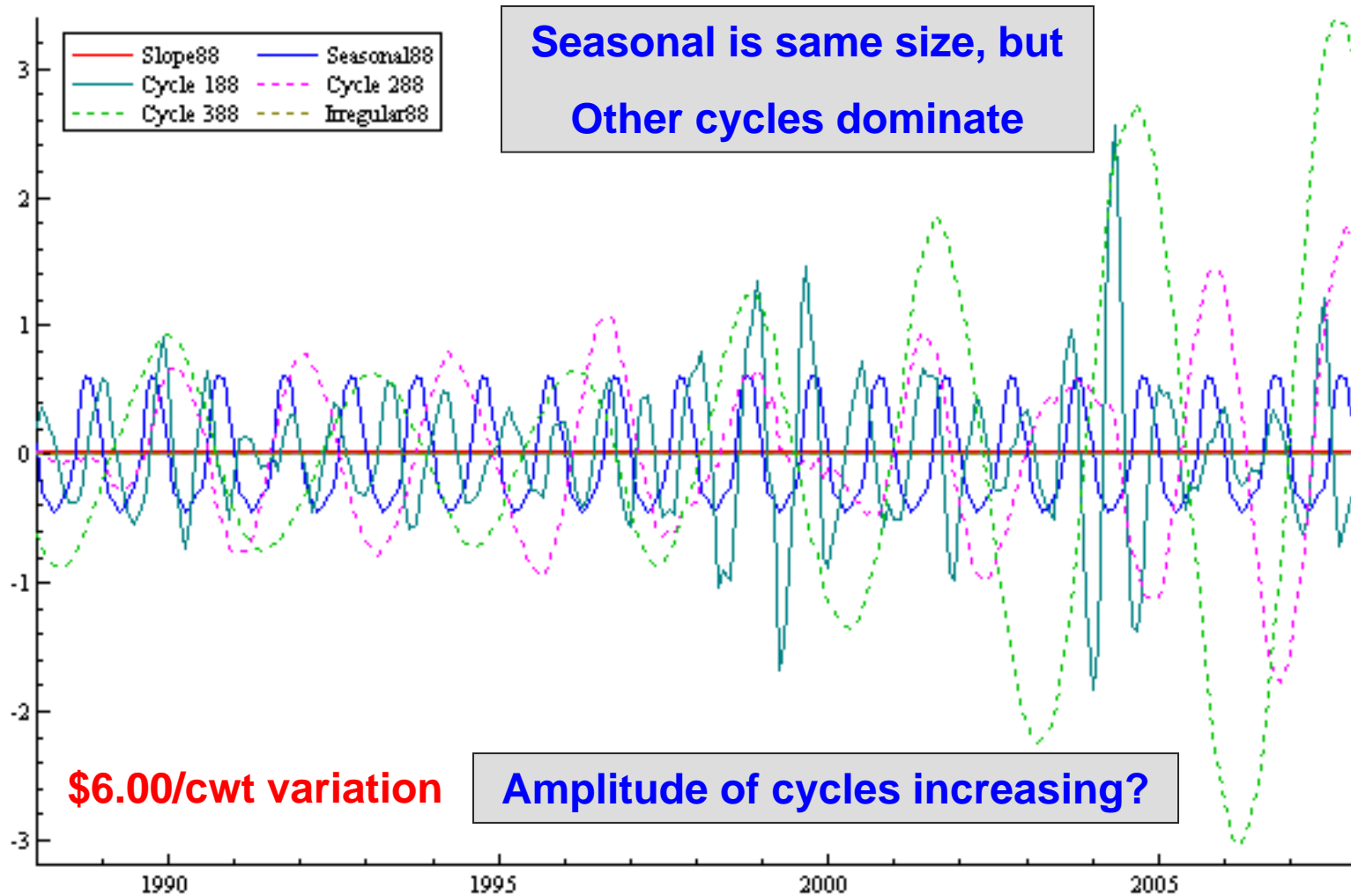


# Spectra 1948 to 1967

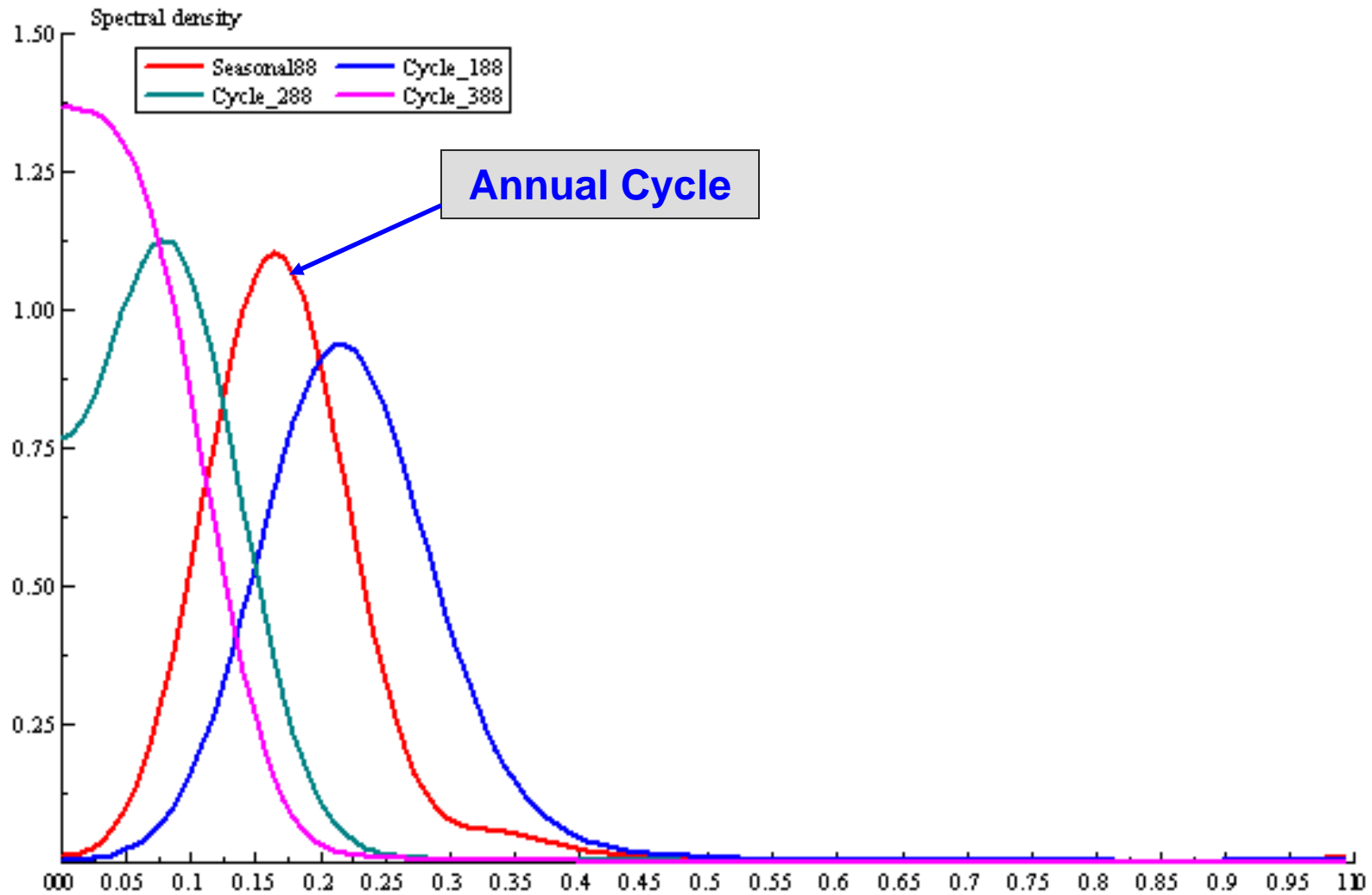




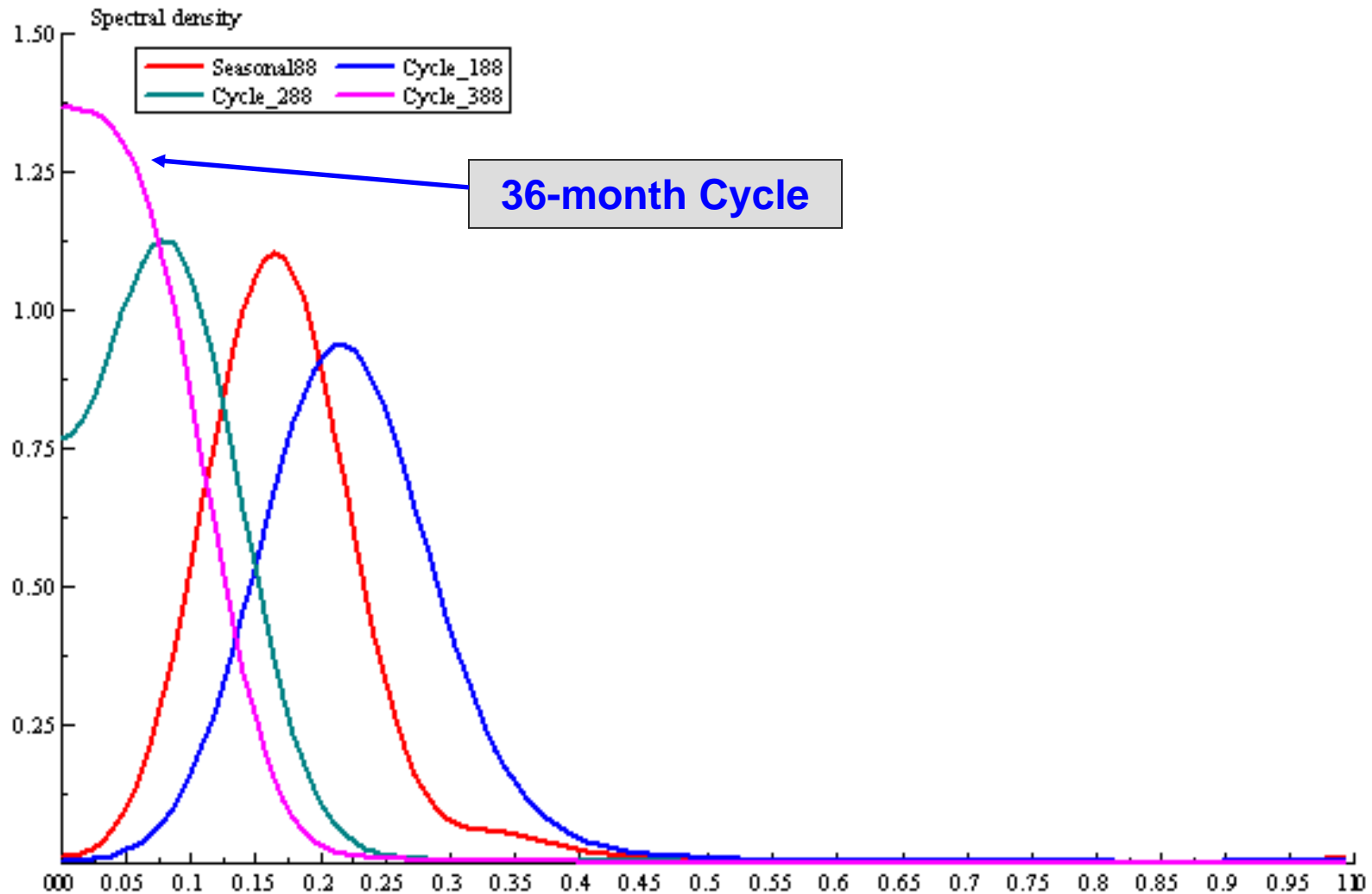
# Components 1988 to 2007



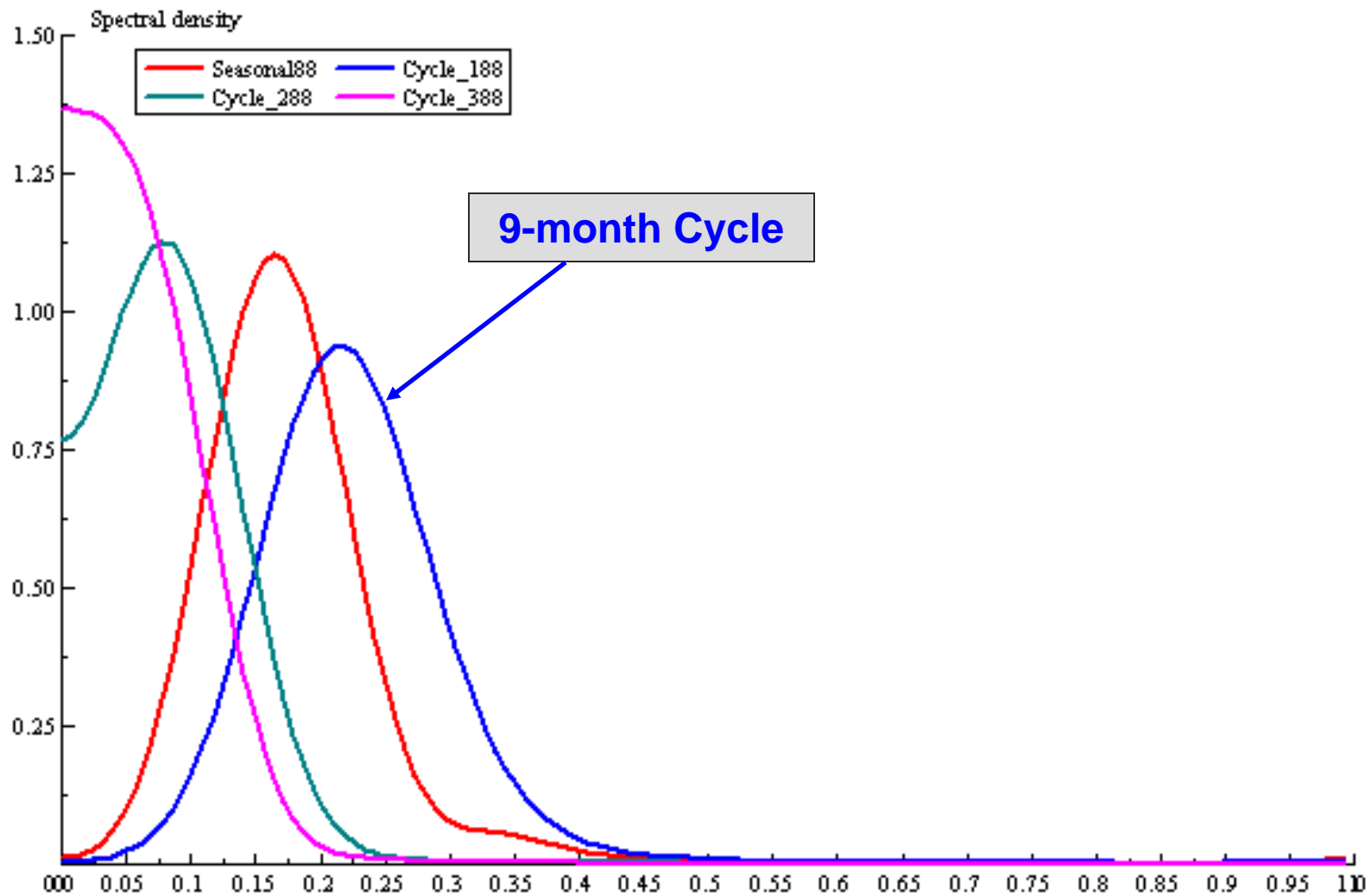
# Spectra 1988 to 2007



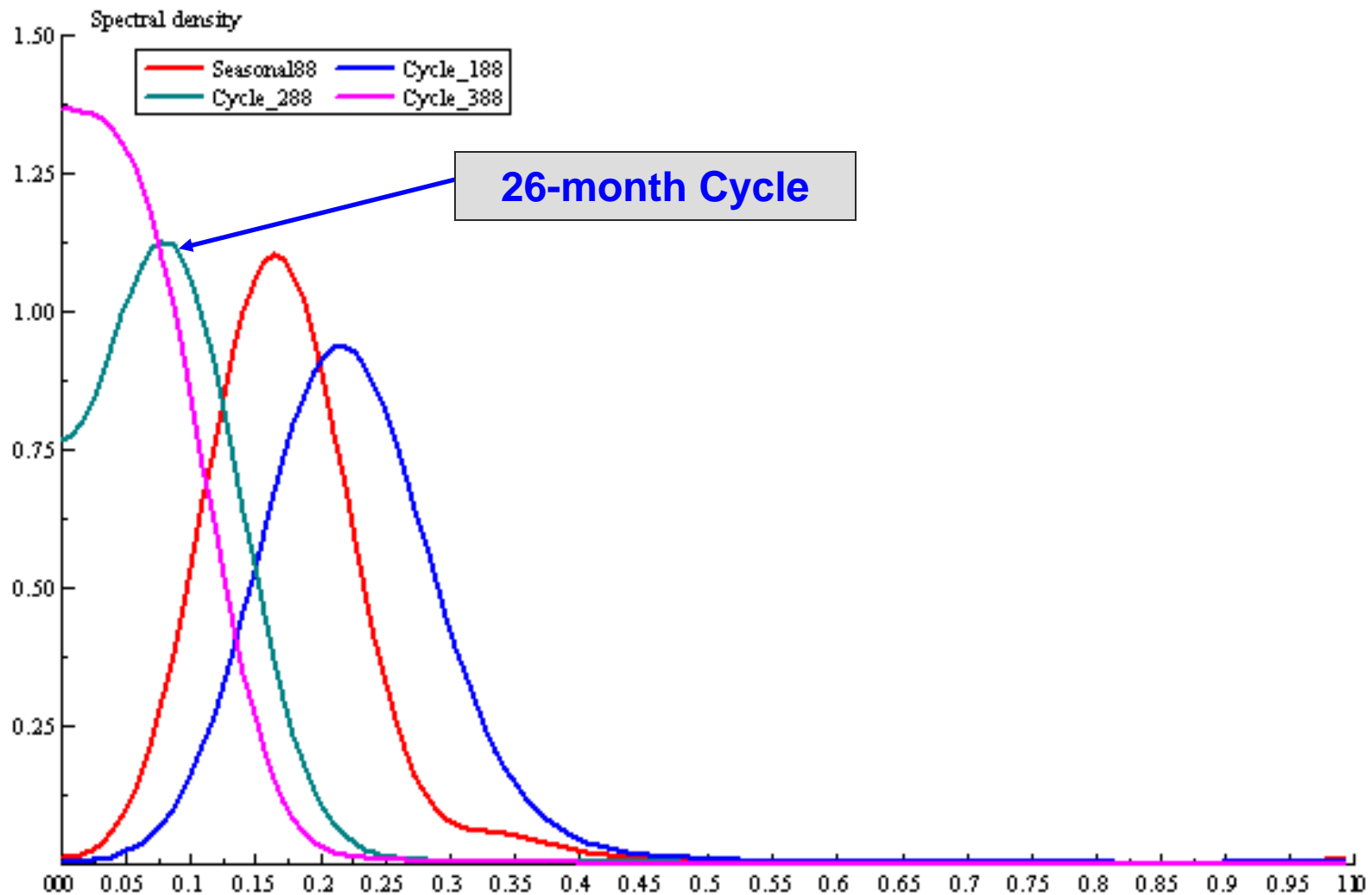
# Spectra 1988 to 2007



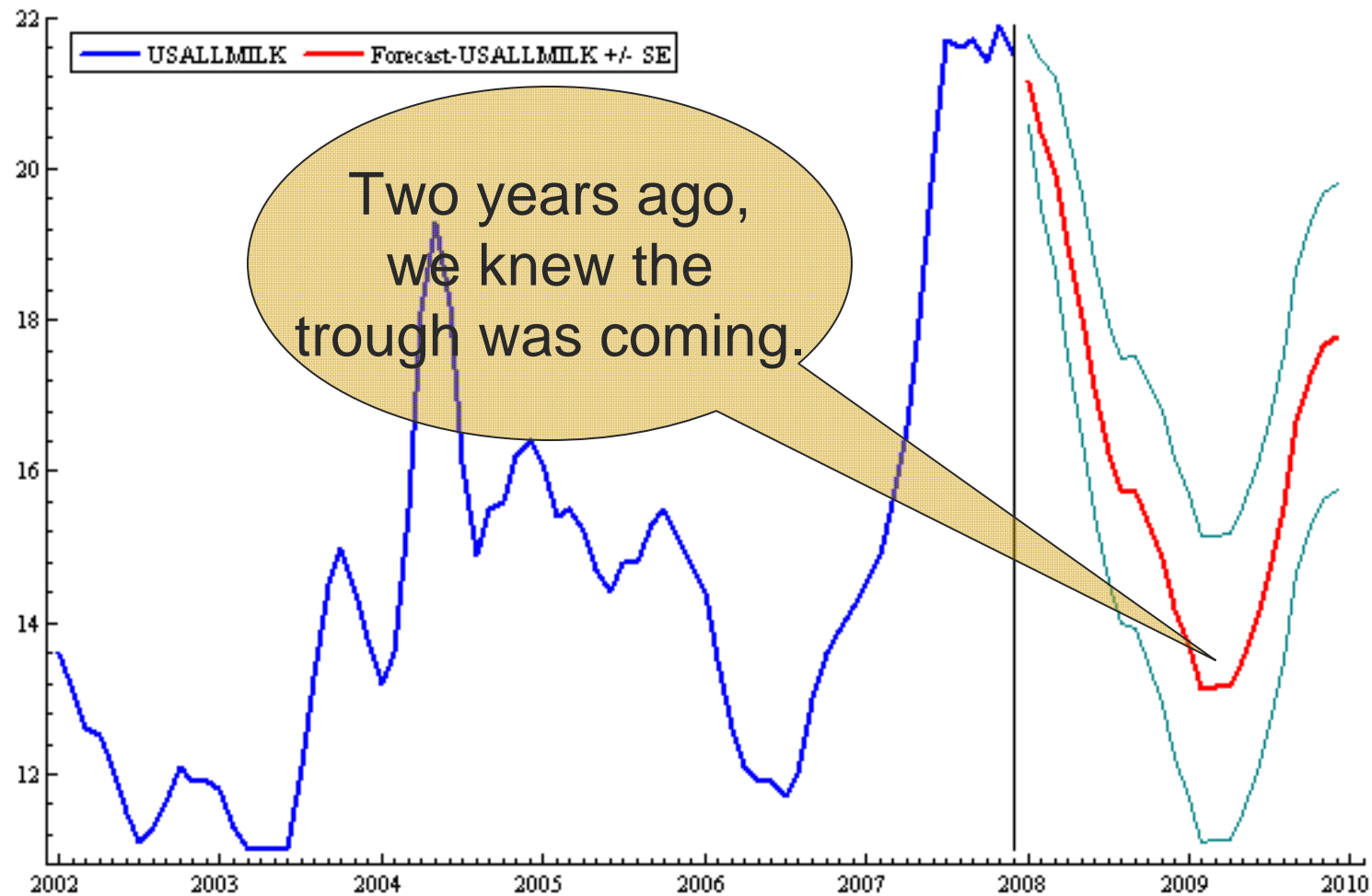
# Spectra 1988 to 2007



# Spectra 1988 to 2007



# Forecasting with Spectral Decomposition

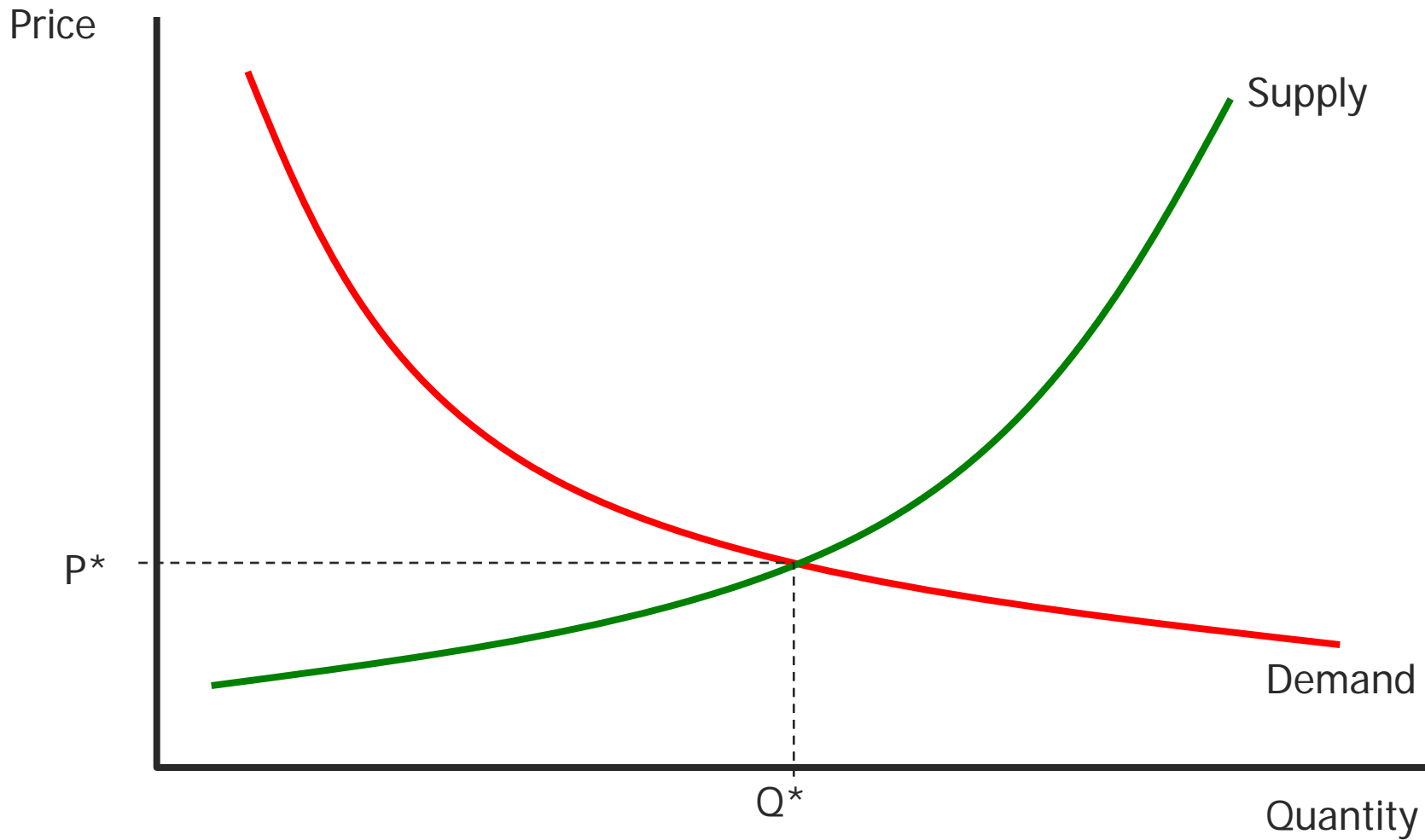


# Shocks



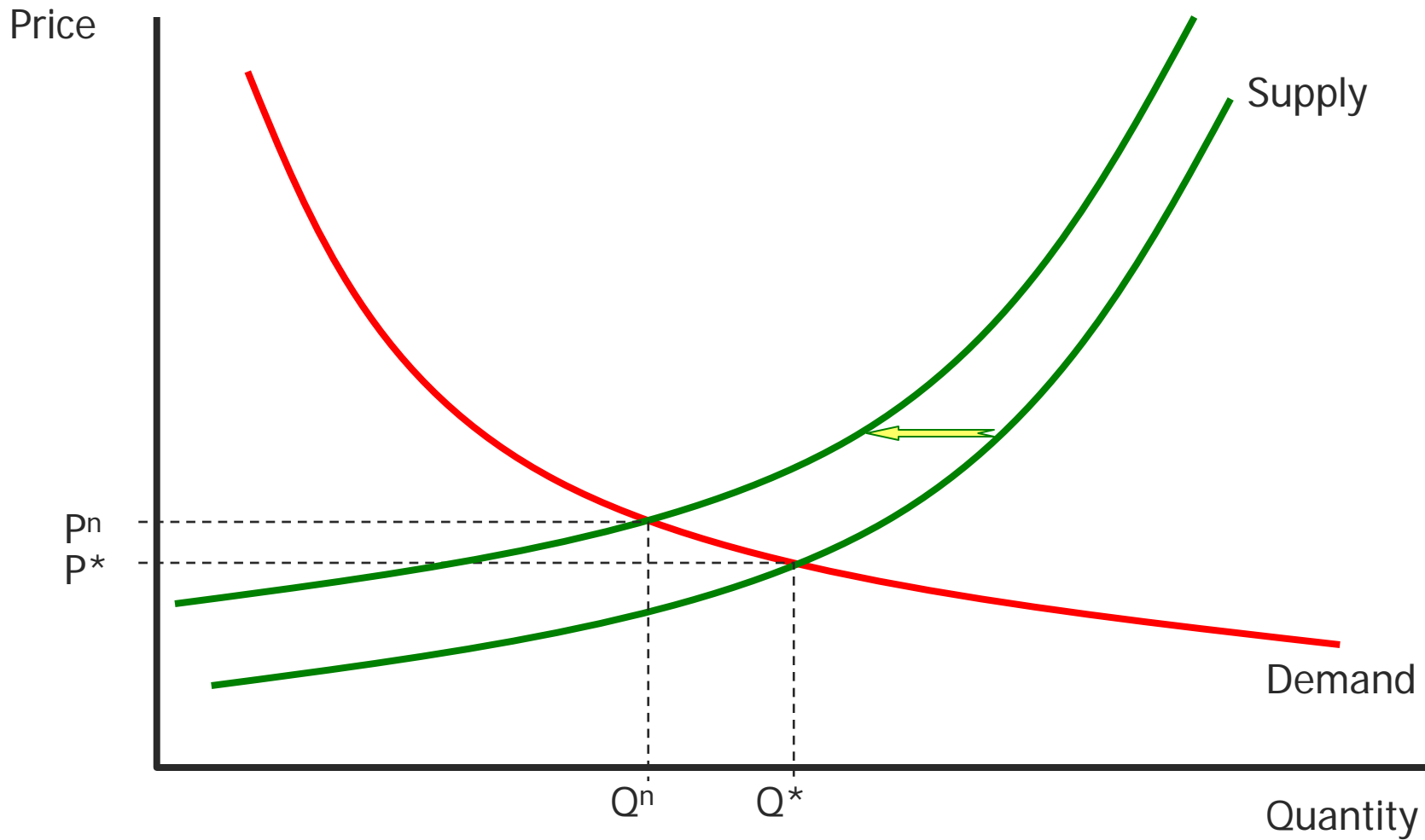
- A sudden surprise event that temporarily increases or decreases the **supply** or **demand** for goods or services

# Supply Shocks

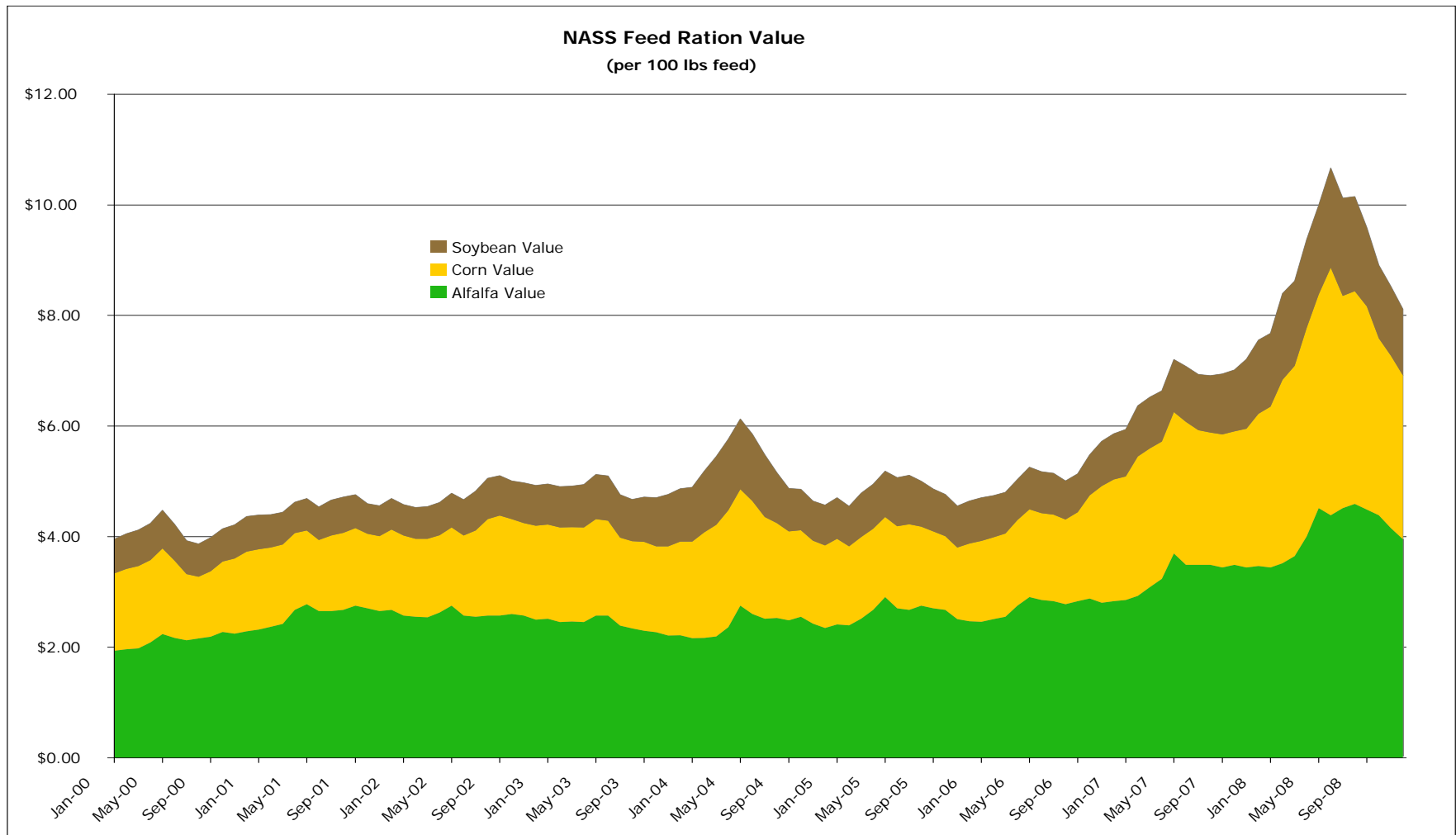




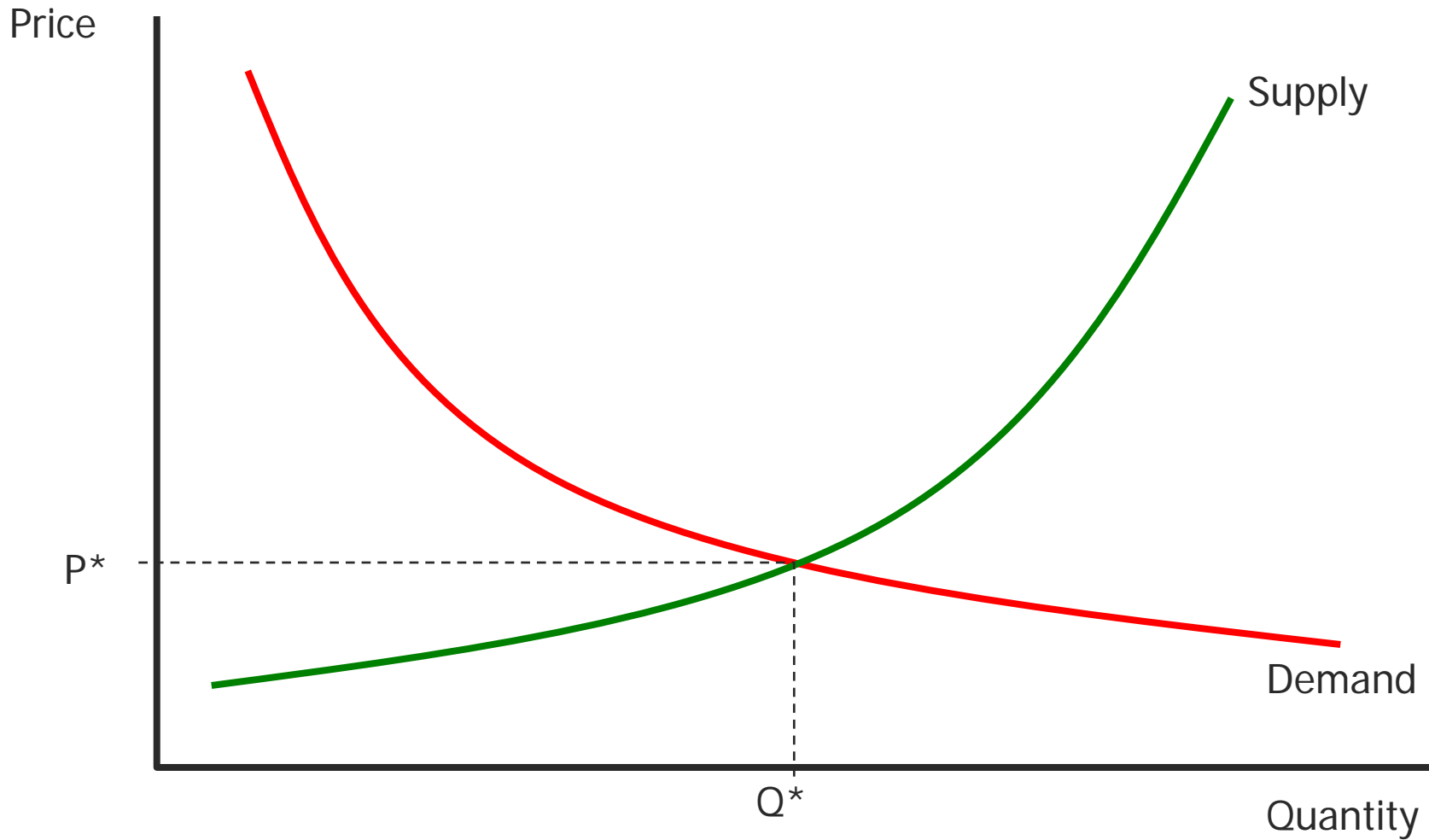
# Supply Shocks



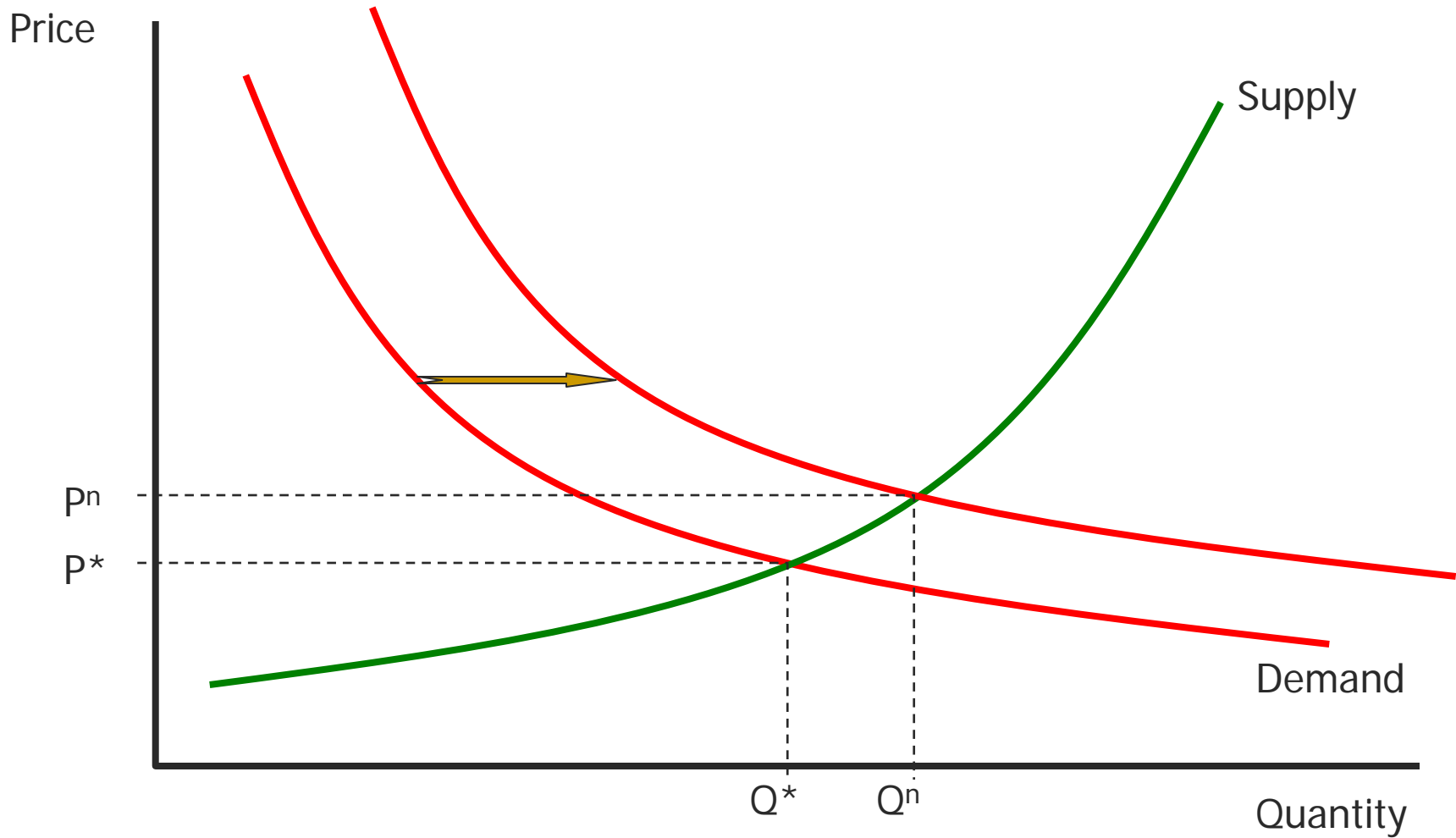
# Feed Costs Have Been Way Up



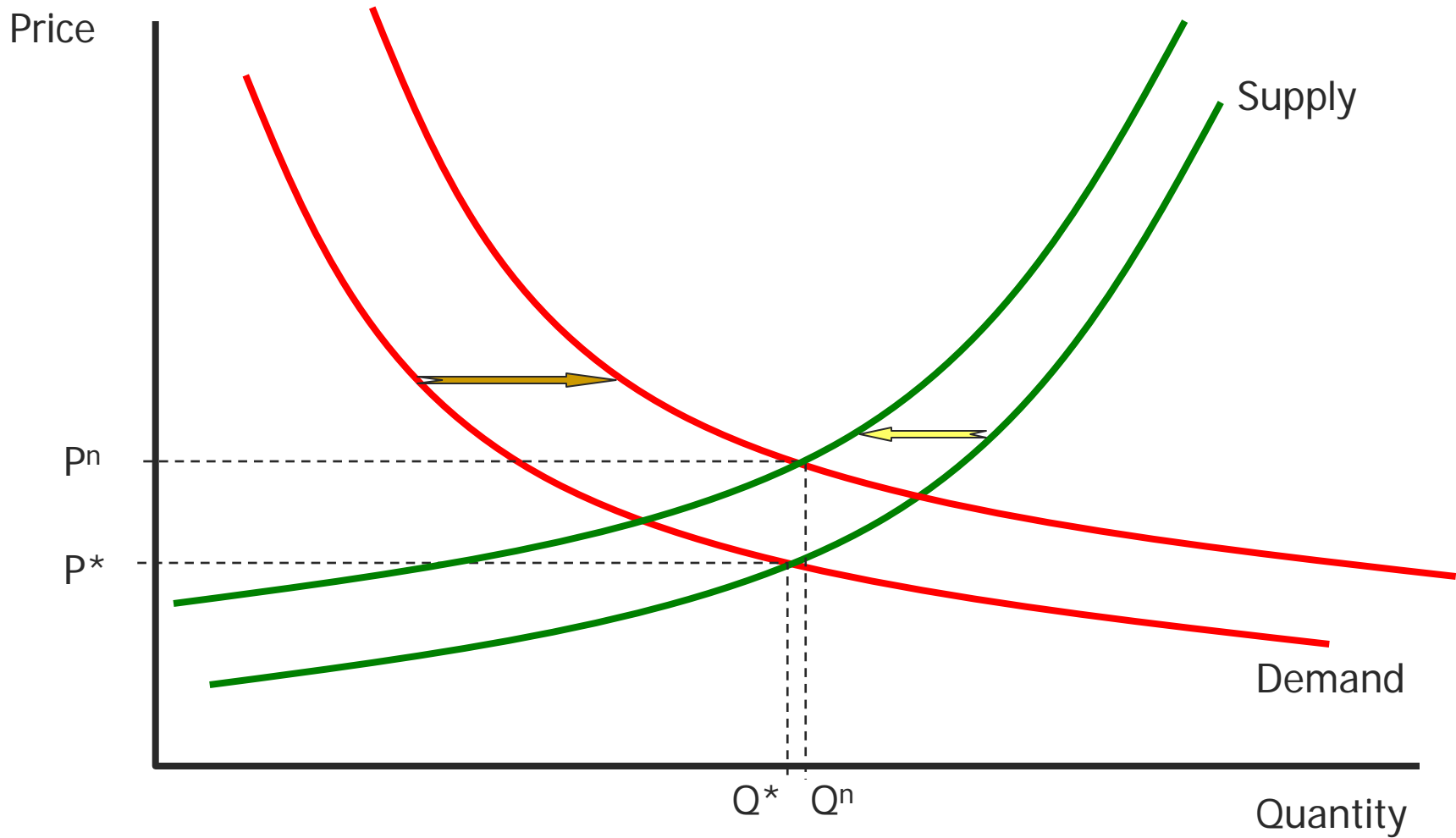
# Demand Shocks



# Demand Shocks



# Supply & Demand Shocks



# A Series of Unfortunate Events

—with respect to Lemony Snicket's

- Seasons, cycles and trends would have forecasted a major price trough in 2009
- On top of that we have experienced a huge demand shock
- Volatility was inevitable... or was it?

# The Good Old Days?



- An active price support program did dampen the volatility that is endemic to the dairy industry.
- Producers are looking for ways to dampen it again.

# Growth Management Plan (GMP)



- Objective: Manage milk supply growth for more stable prices
  - All producers must participate
  - Facilities are not restricted from production growth



# How Would GMP Work?



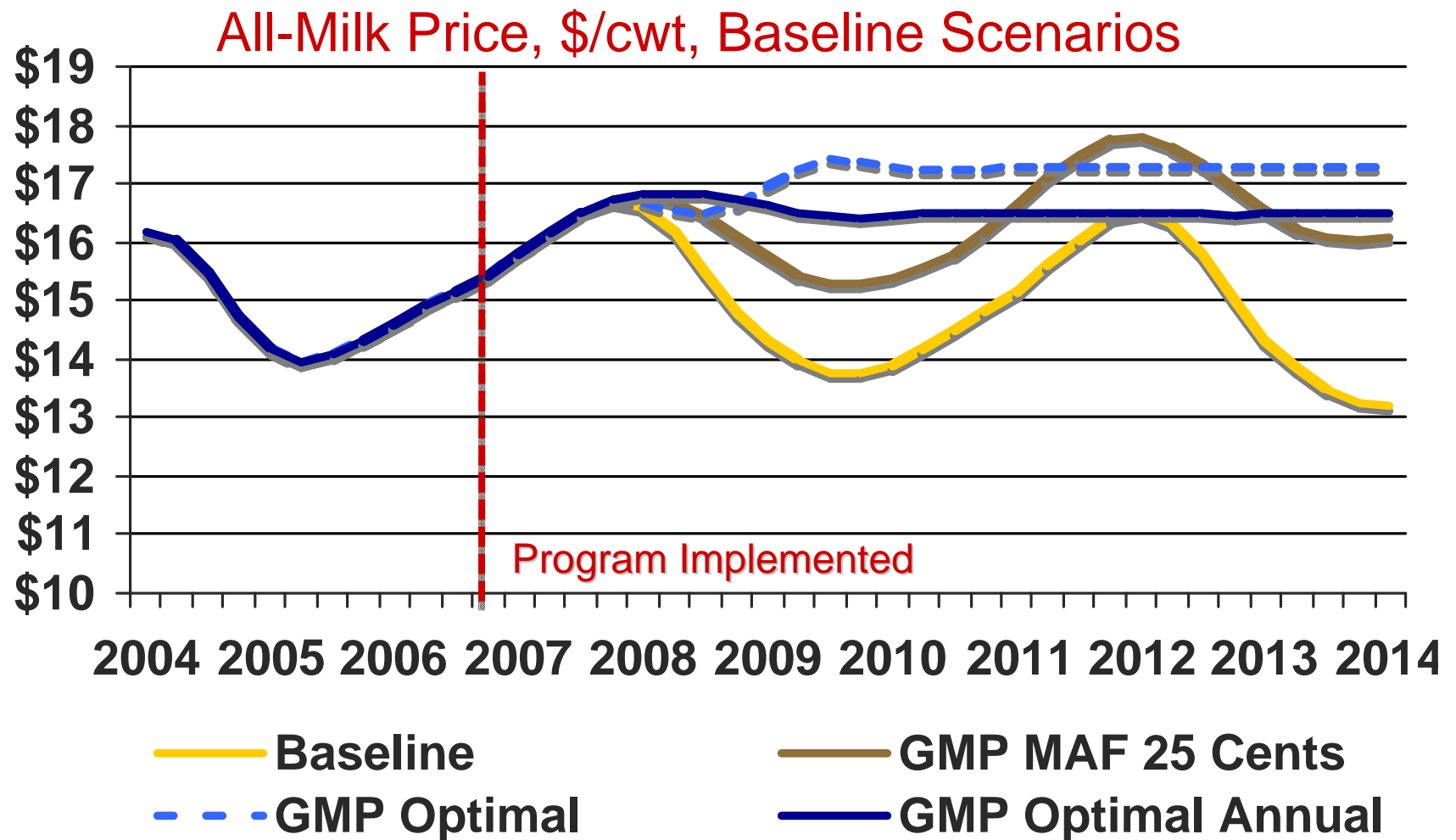
- Set and allowable annual % growth
  - Same for all producers
  - Typically greater than zero
- Milk production in current quarter is compared against same quarter last year plus allowable growth
- If milk is more than allowable growth, then facility pays a “market access fee” on all milk produced.

# How Would GMP Work?

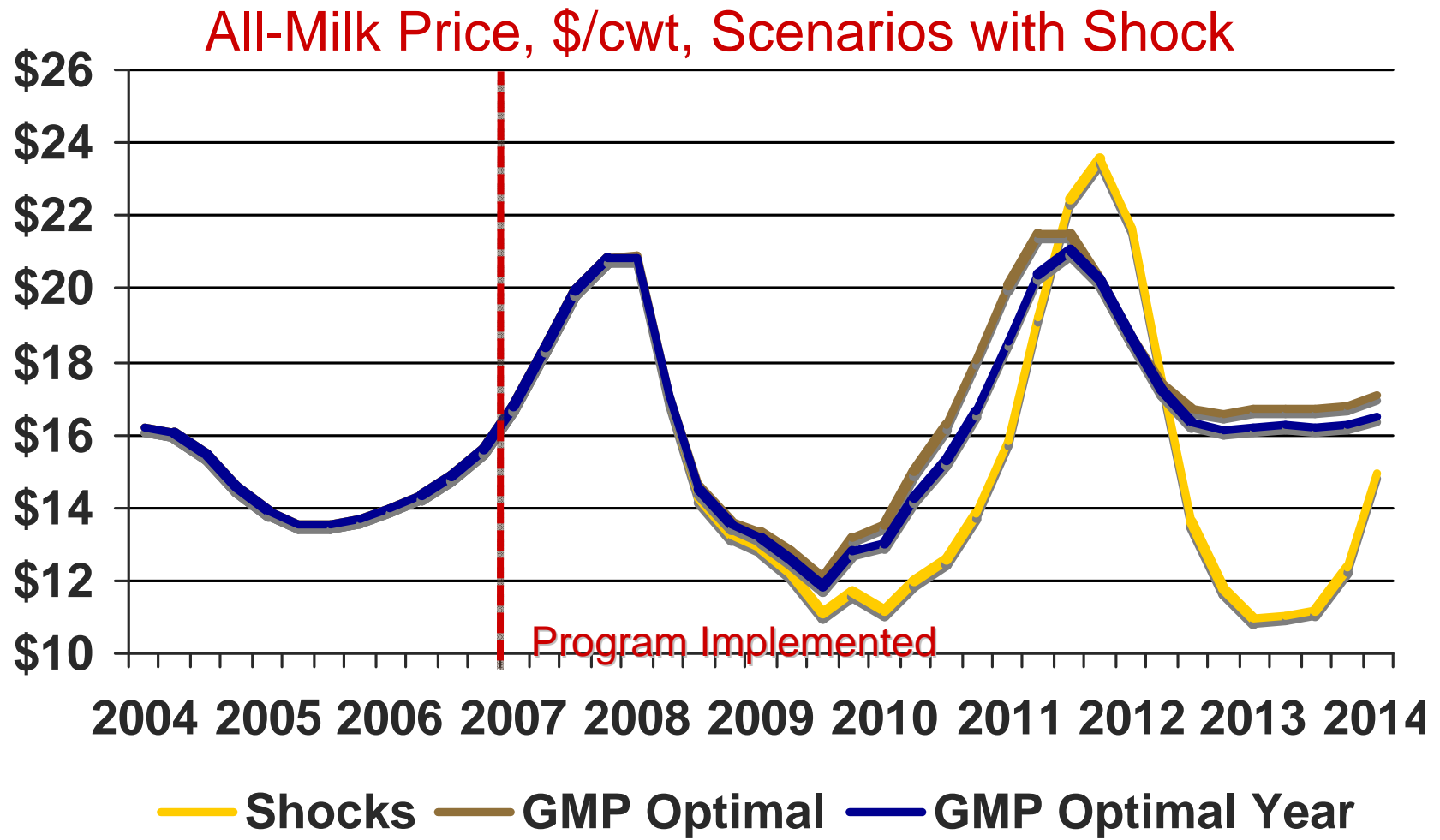


- Pool all market access fees
- Pay refunds to all facilities that did not exceed allowable growth
- Refund size depends on:
  - Size of the market access fee
  - Amounts of qualifying and non-qualifying milk

# GMP and “Normal” Cyclical Variation

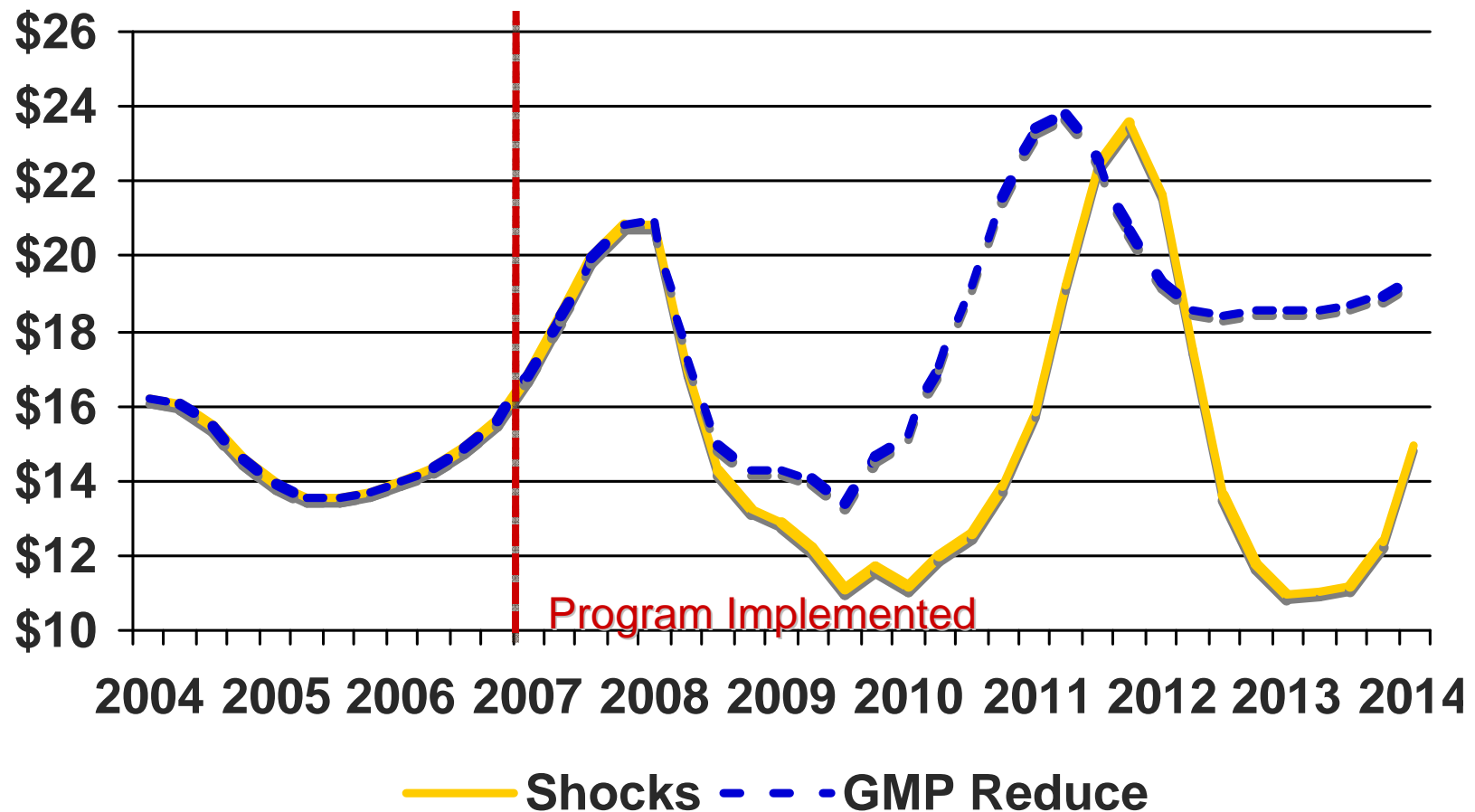


# GMP with Feed and Demand Shocks



# GMP with Shocks and Negative Growth

All-Milk Price, \$/cwt, Various Scenarios



If accept reductions in allowable milk production, can mitigate shock better

# Bottom Line...



- Volatility is endemic to the dairy industry
- Supply response to market signals seems stronger today causing cycles to be different and more pronounced than 40 years ago
- Policy could help to dampen price swings