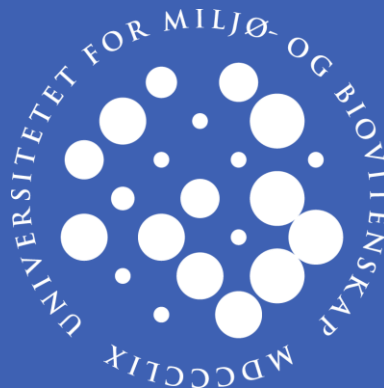


Climatic Evidence from the Grain Markets

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November 21, 2014

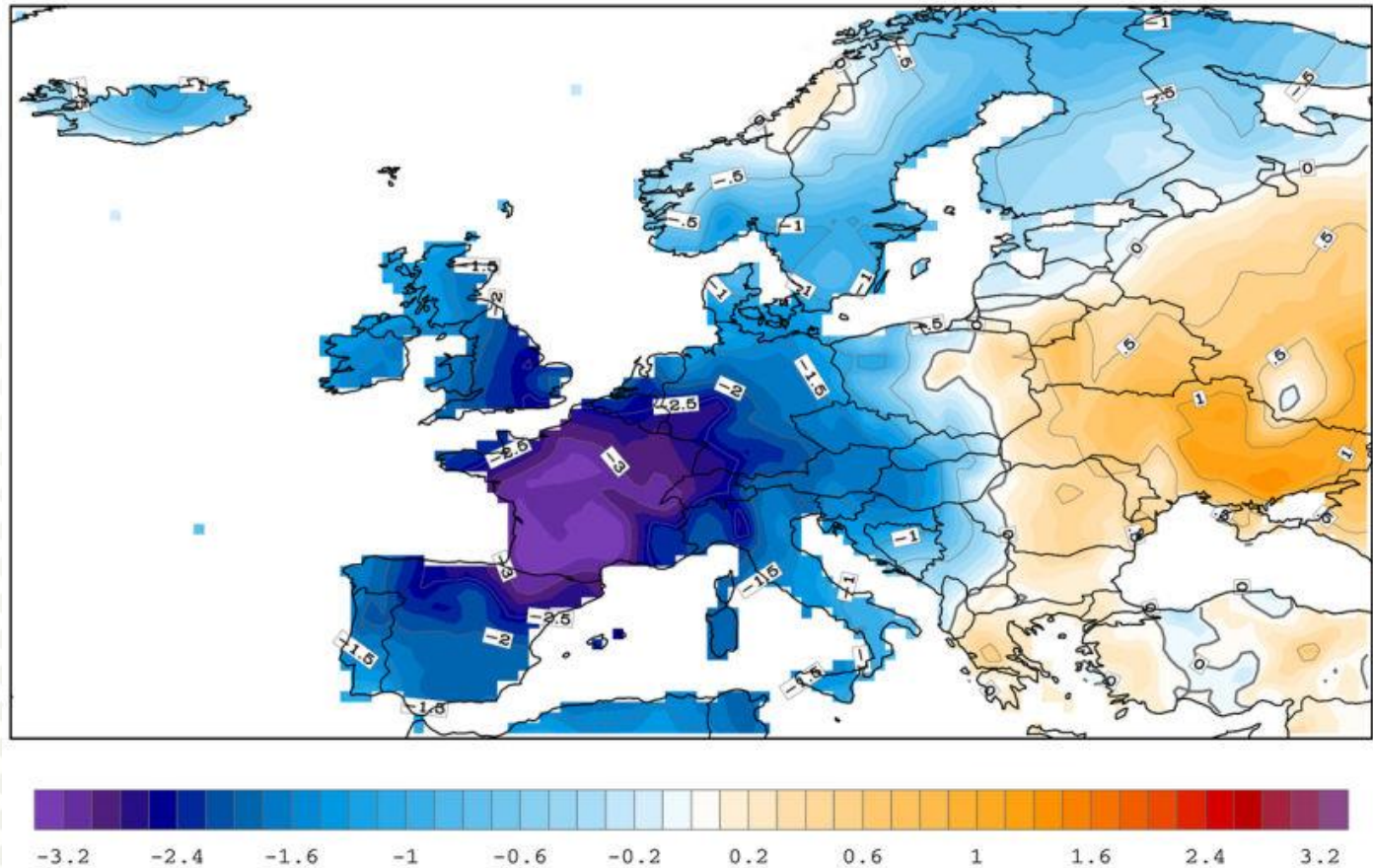


April 1815 – The eruption of the Tambora volcano, Indonesia

- The largest volcanic eruption in recorded history
- Dramatic effects on the weather in Europe the year after
- 1816: «The year with no summer»

1816 – the year with no summer

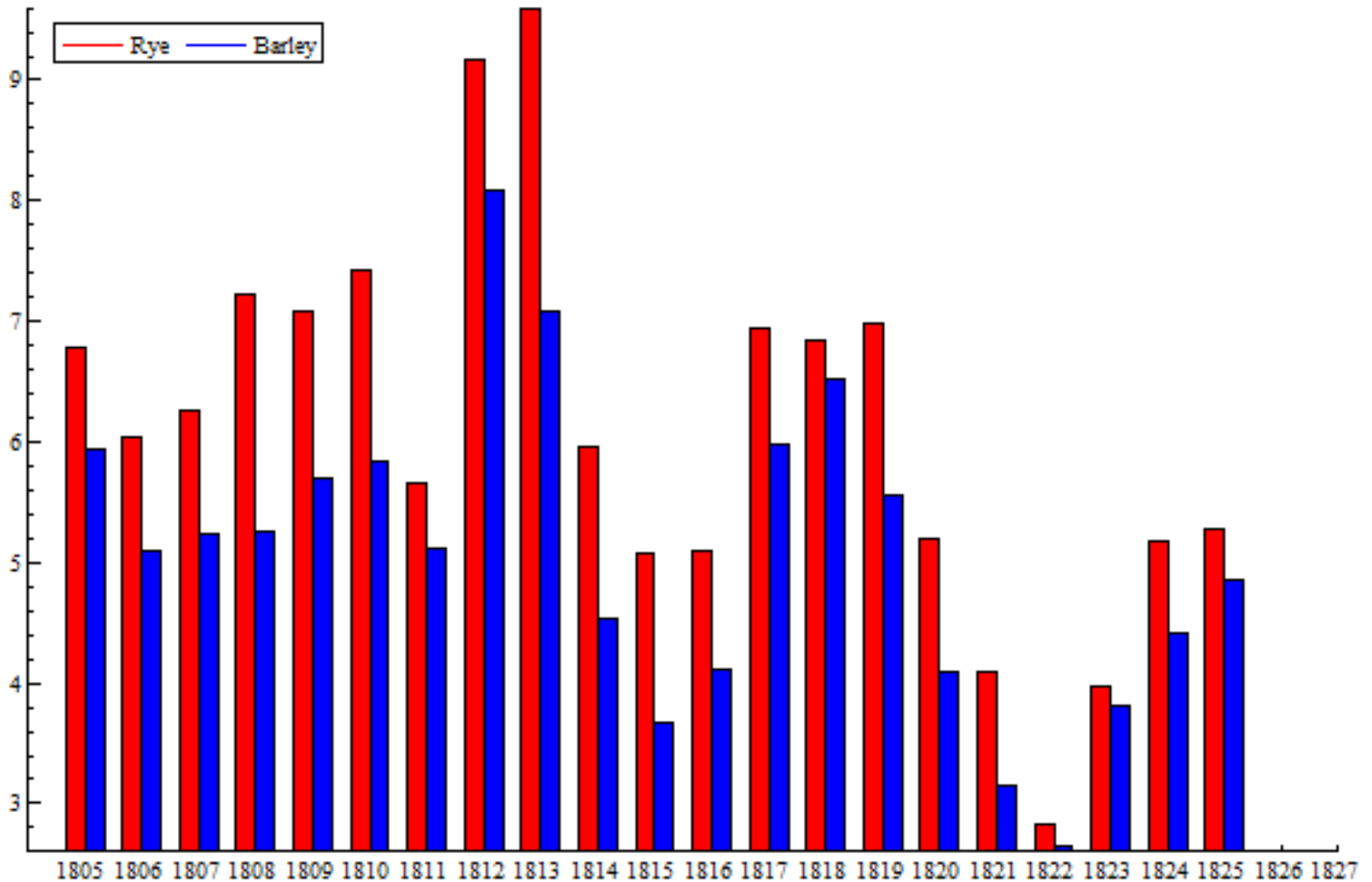
1816 Summer temperature anomaly



The Tambora aftermath

- Estimated death tolls 100,000 -200,000 in Europe and North America in 1816-17 due to crop failures caused by the eruption
- Aftenposten November 6, 2014: «the worst famine of the 19th century» (.....???)

Grain prices 1805-25. Climatic evidence?



IPCC, 2014

“Based on many studies covering a wide range of regions and crops, negative impacts of climate change on crop yields have been more common than positive impact (high confidence) Climate change has negatively affected wheat and maize yields for many regions and in the global aggregate (medium confidence) Since AR4 (i.e., 2007) several periods of rapid food and cereal price increases following climate extremes in key producing regions indicate sensitivity of current markets to climate extremes among other factors (medium confidence)”

IPCC 2014

- Claims that several studies find that more frequent weather extremes reflected in the grain markets through more erratic prices
- IPCC presents some rough box-plots indicating relationships between crop yields and climate over recent decades, together with a graph showing the variations in food, cereal and oil prices since 1990
- The graphs are not connected to systematic statistical analyses and offer limited evidence on the frequency of extreme weather events and their effects on food production and prices.

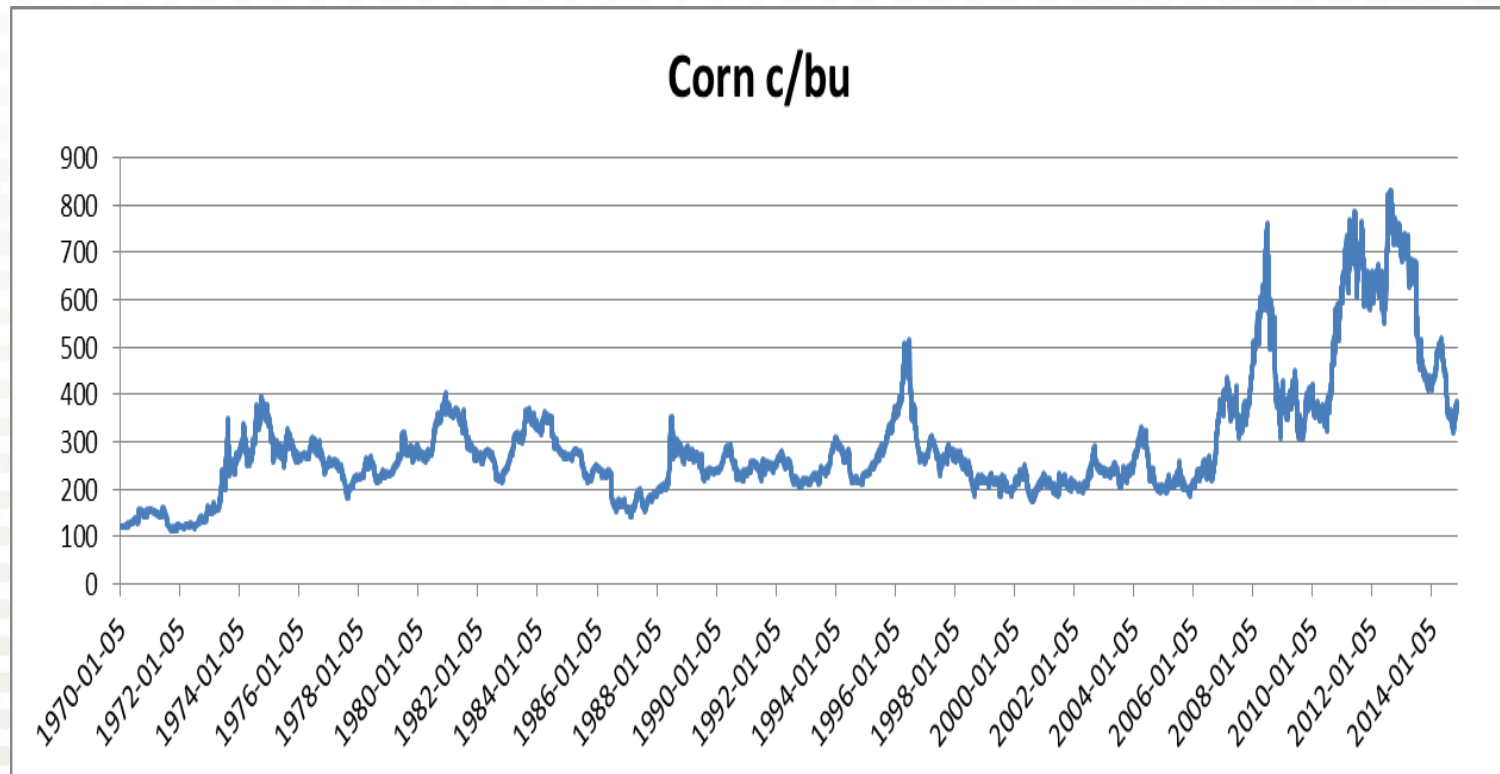
Steen & Gjølberg 2014: Warmer, Wilder, Wetter?

- A more systematic statistical analysis of grain price variations focusing on
 - 1. Price trends and price variations
 - 2. Skewness: Dramatic price increases
 - 3. Real or perceived shortages: convenience yield

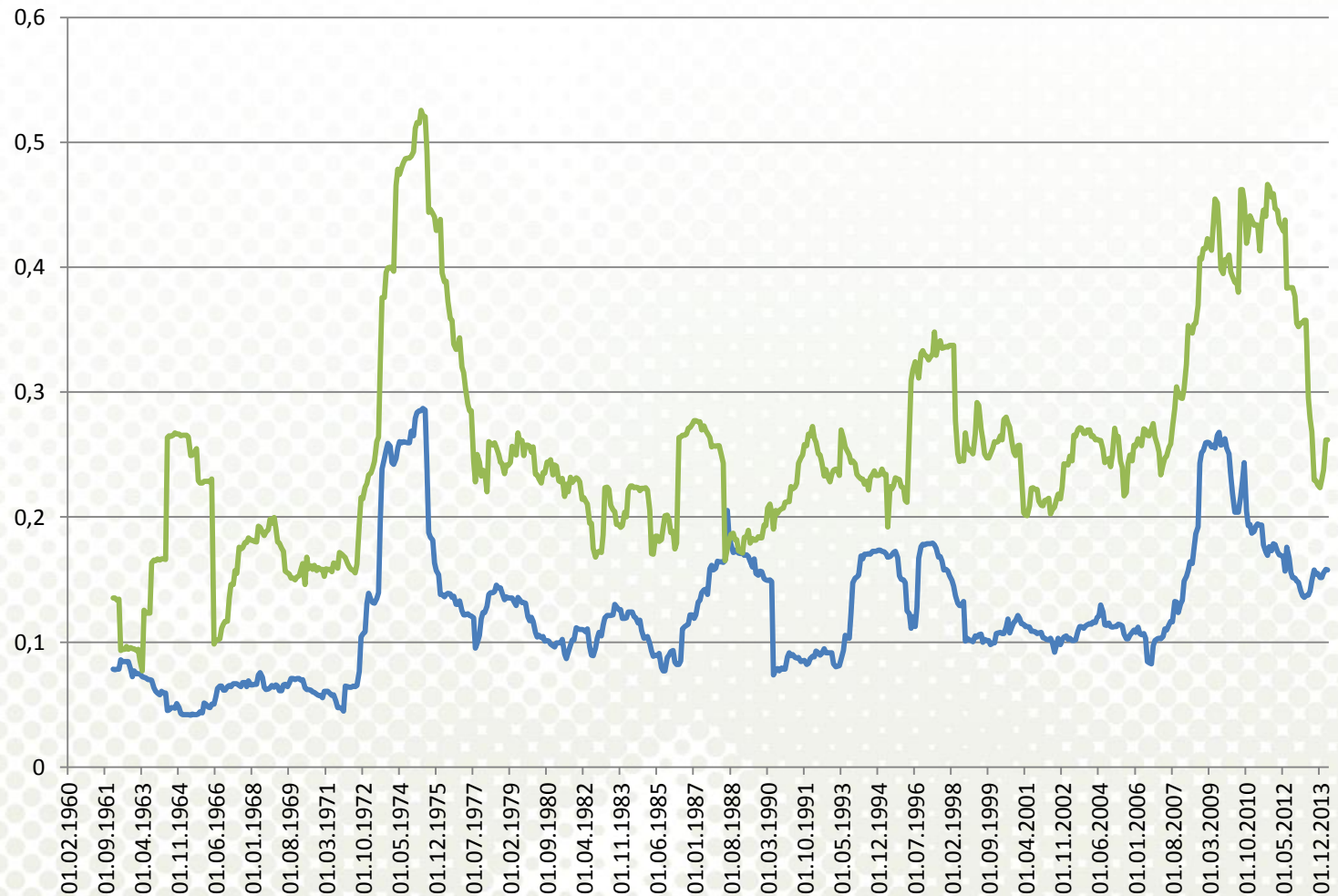
Hypotheses

- Climatic changes have had negative effects on aggregate grain production causing prices to trend strongly upwards
- Climatic changes have made the agricultural environment more uncertain, causing increased price volatility
- Climatic changes have caused substantial price increases to occur more frequently
- Climatic changes have generated more situations of increased worries about future supply

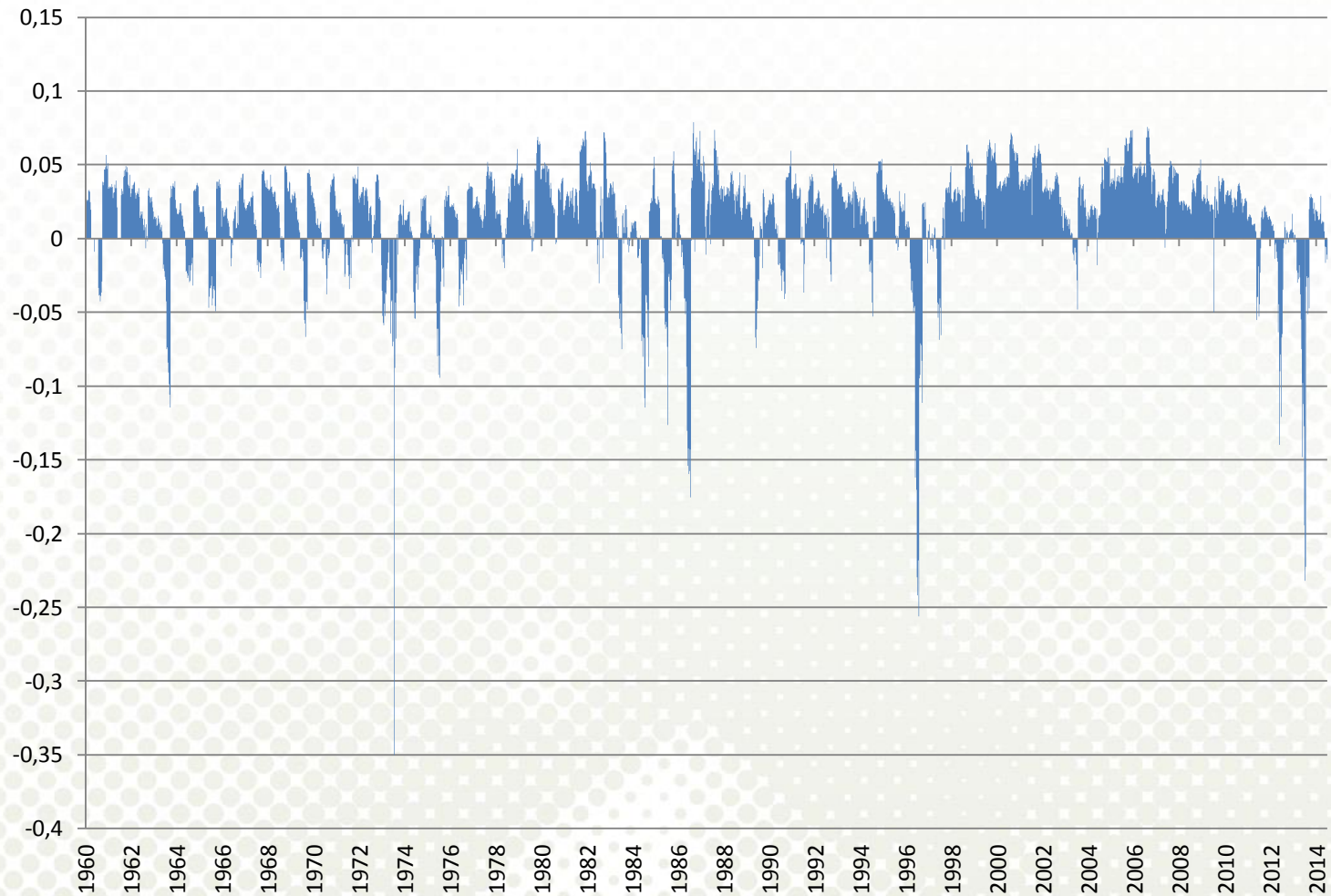
The Price of Corn since 1970



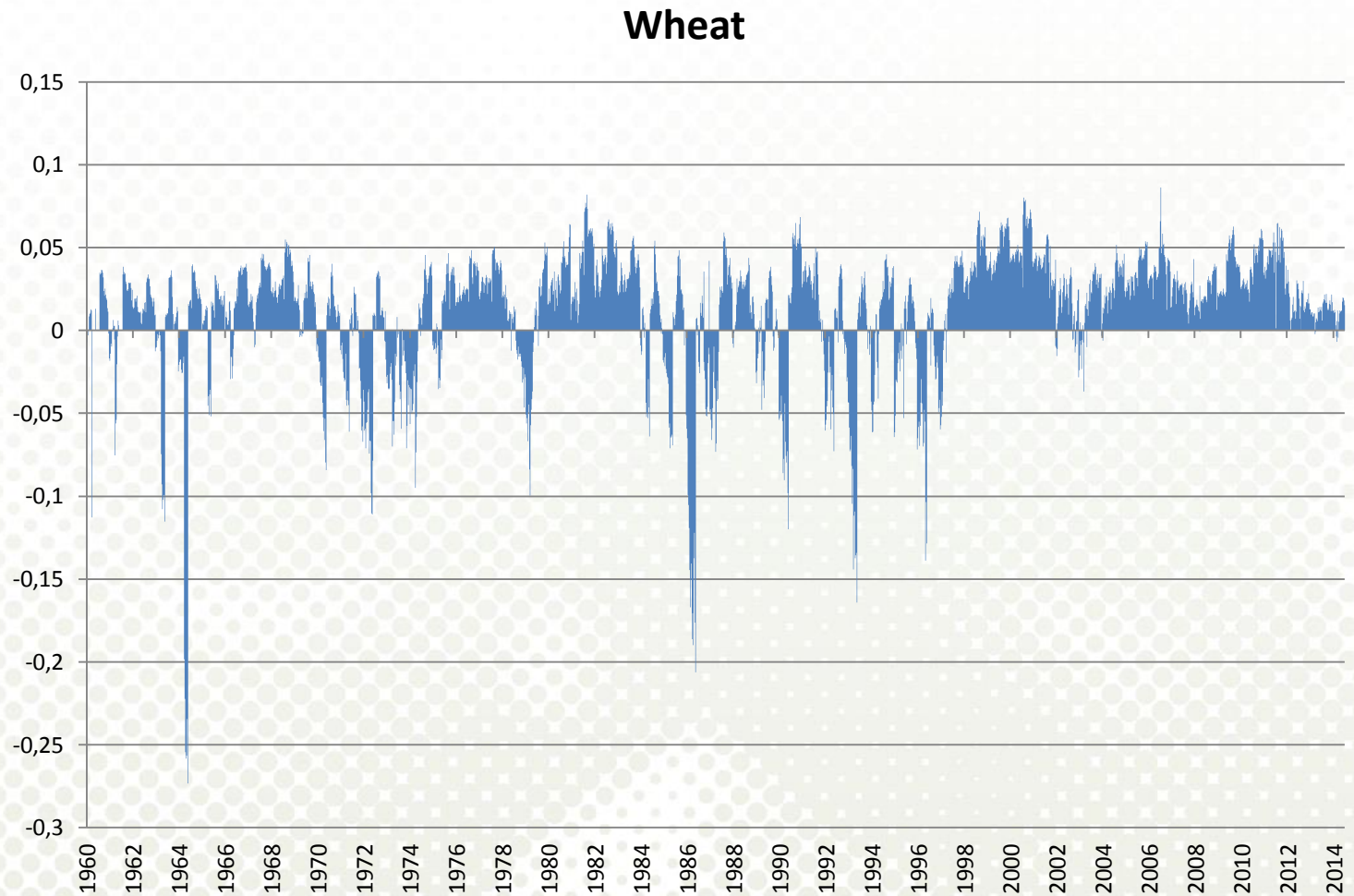
Price volatility for wheat (upper) and World Bank grain index (lower). Monthly price changes 1960–2014; 24-months rolling standard deviations (annualized)



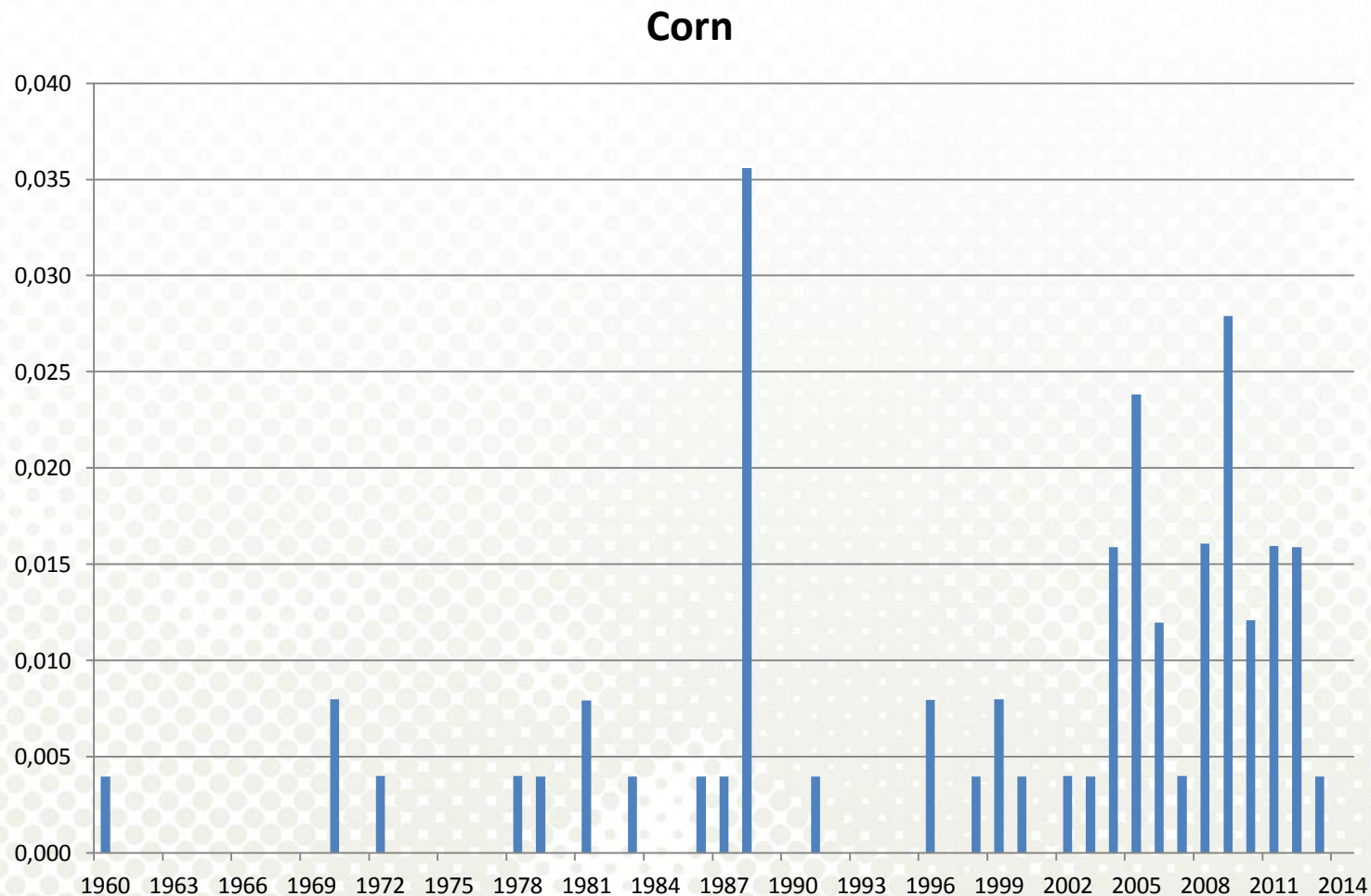
Relative Basis Corn: Convenience yield



Relative basis - wheat

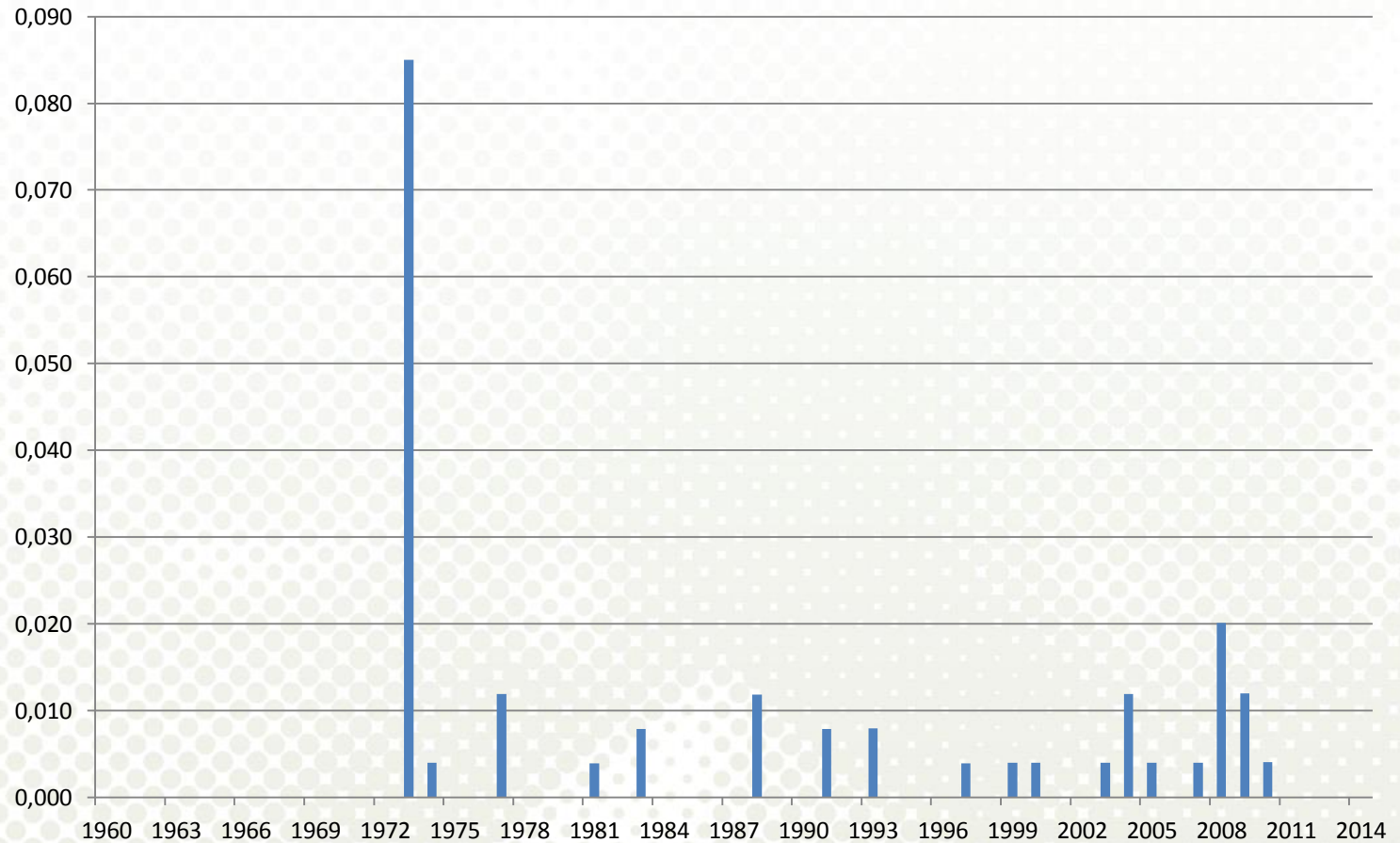


Per centage of days with price change > 5%

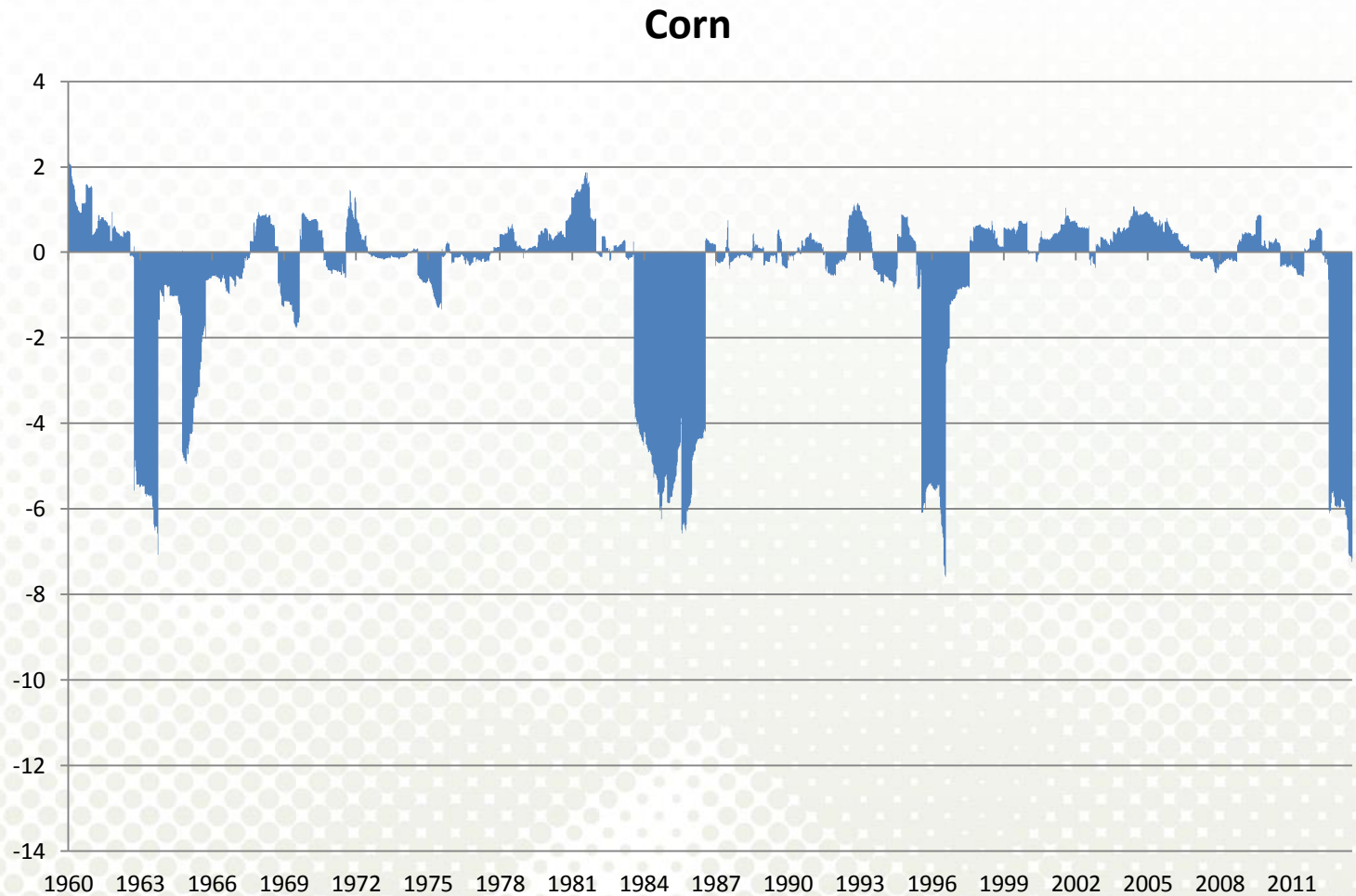


Frequency, days with price change > 5%

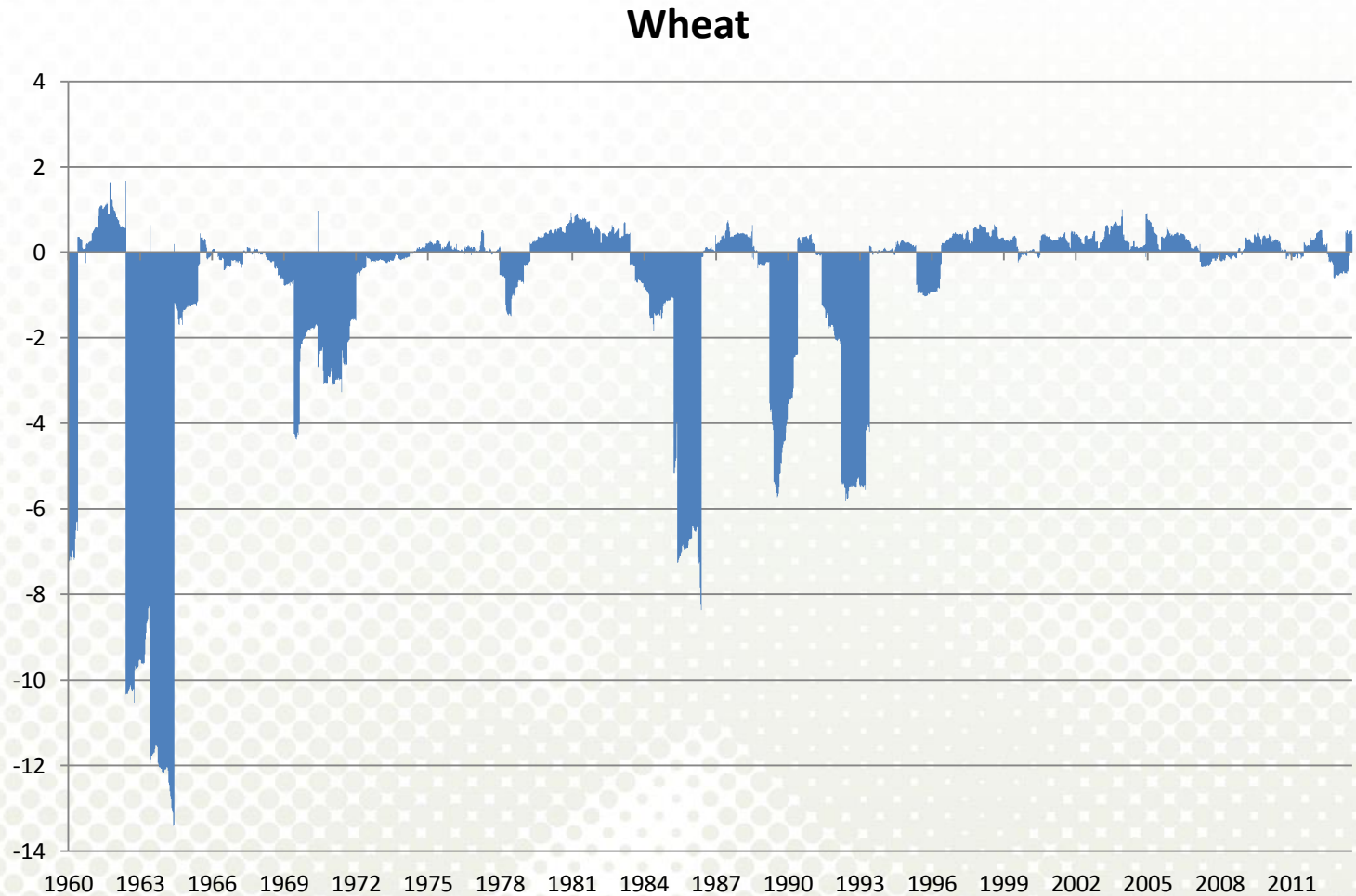
Wheat



Skewness daily price changes



Skewness daily price changes



Summing up (1)

- IPCC concludes that climate change is already causing more frequent extreme weather events with a negative impact on agricultural production over larger geographical areas.
- The Panel claims to find support for this conclusion in price movements in the grain markets.
- The evidence presented by the Panel, and in the studies referred to by the Panel, appears somewhat unsystematic and circumstantial,

Summing up (2)

- Grain prices increased substantially 2007 and 2009. However, prices have since fallen and real prices today are not substantially higher than 40 years ago
- Grain price volatility was very high during the food and financial crises – and a couple of years after
- The same applies to most other commodities, including commodities not influenced by the weather
- Price volatility in this period was almost as high as in the 1970s
- After 2011, volatility has decreased and, in many ways, returned to normal long-term levels.

Summing up (3)

- There is little evidence of increasing positive skewness in the distribution of price changes over time
- There is no evidence of increasing backwardation (higher convenience yields) in the grain markets over time

Conclusions

- The weather may have become Warmer, Wilder, and Wetter during recent years
- Still, this only to a limited extent seems to have affected the grain markets at an aggregate level
- There is little evidence of a persistent upward trend in grain prices and volatility
- There is little evidence of an increasing frequency of price jumps
- There is little evidence of increasing «fear» among agents in the grain markets

Explanations?

- Geographic variations in climatic changes?
- Efficient adaption to climatic changes in agricultural production and trade?

