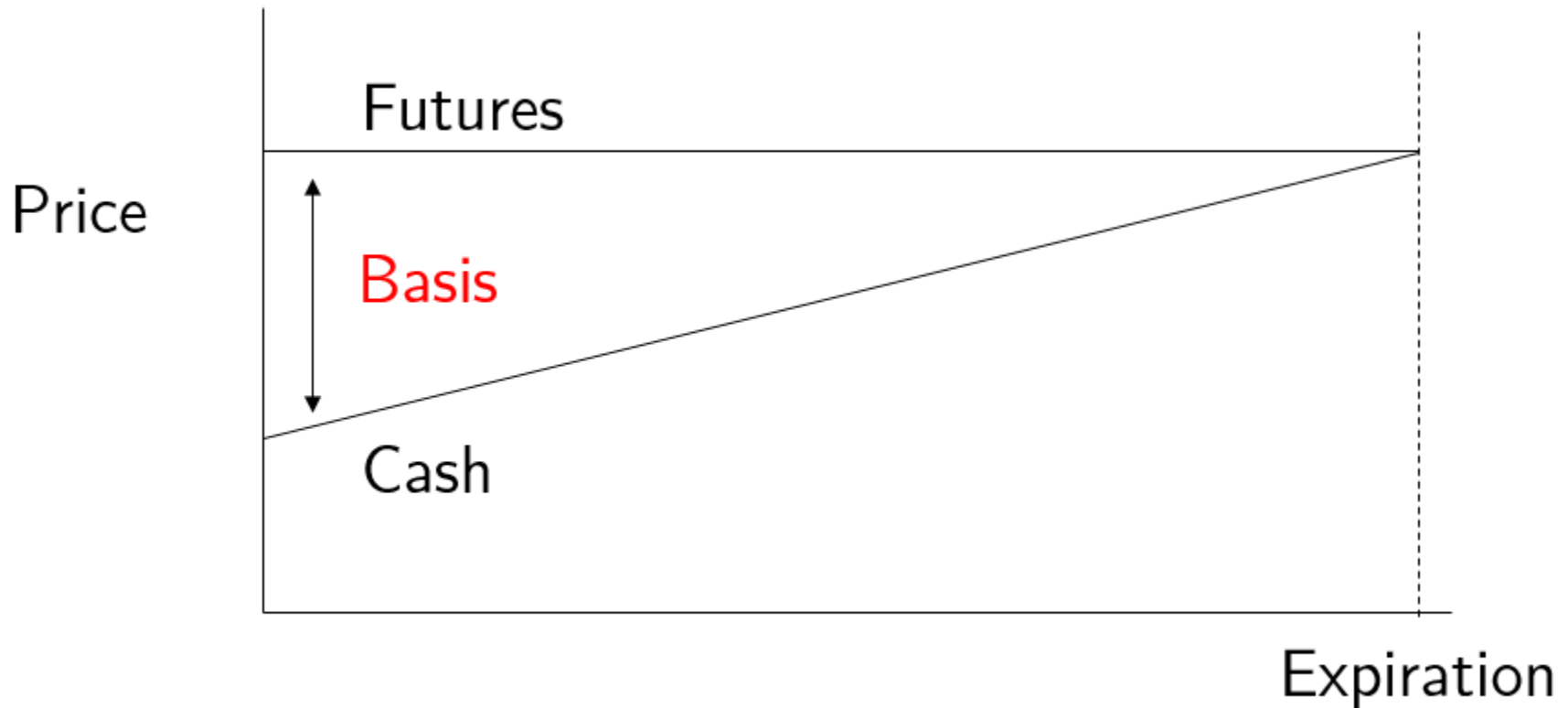


Trilogy for
Troubleshooting
Convergence:
Manipulation,
Structural Imbalance,
and Storage Rates

Scott H. Irwin

Convergence: The pattern of cash and futures prices tending to come together, that is, basis approaching zero at the delivery market as the futures contract expires



Convergence Essentials

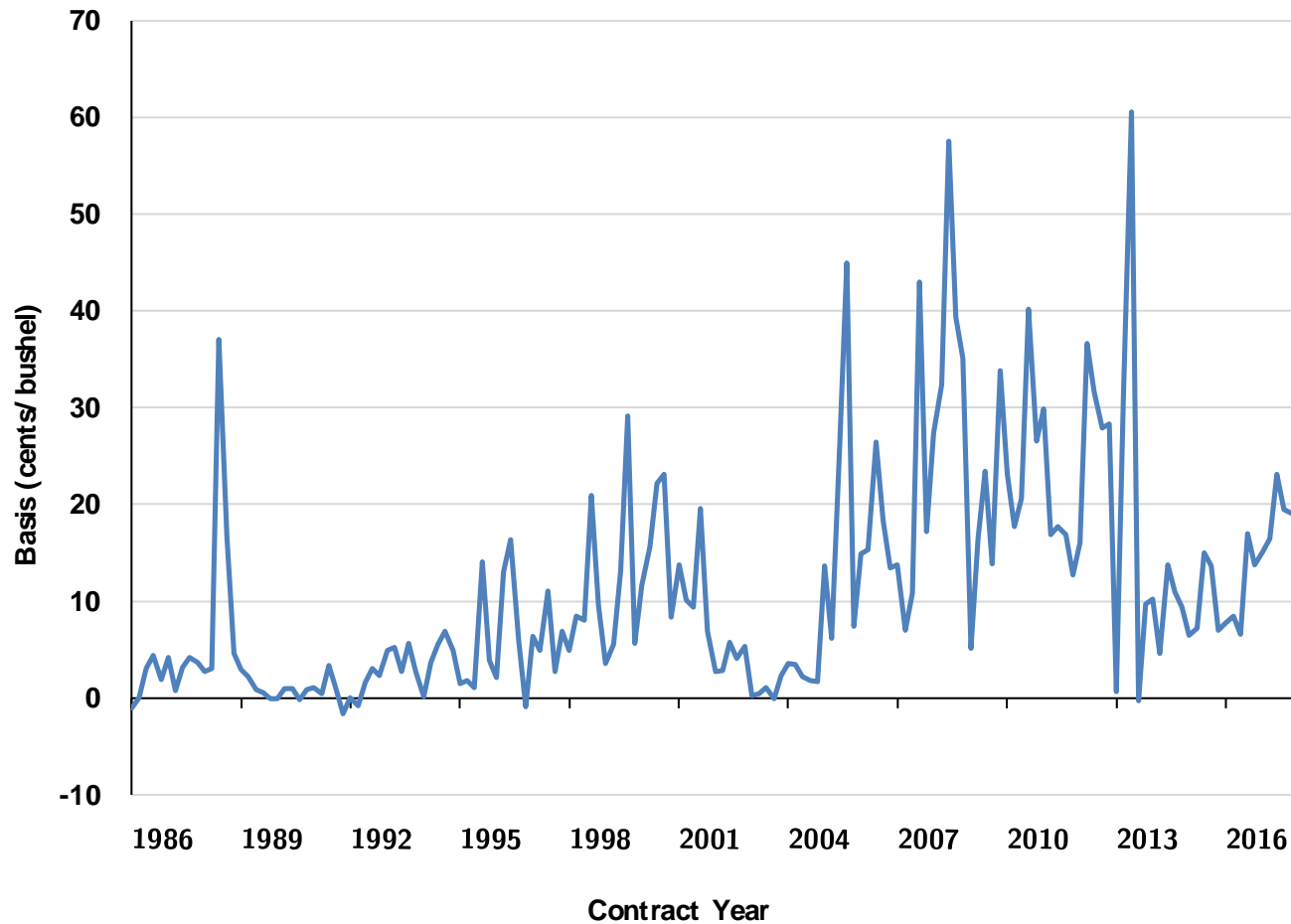
Arbitrage in the cash and futures markets should force prices to converge during the delivery period (law of one price)

- Futures $>$ cash price: buy cash commodity, sell futures, and deliver
- Futures $<$ cash price: Buy futures, stand for delivery, and then sell cash

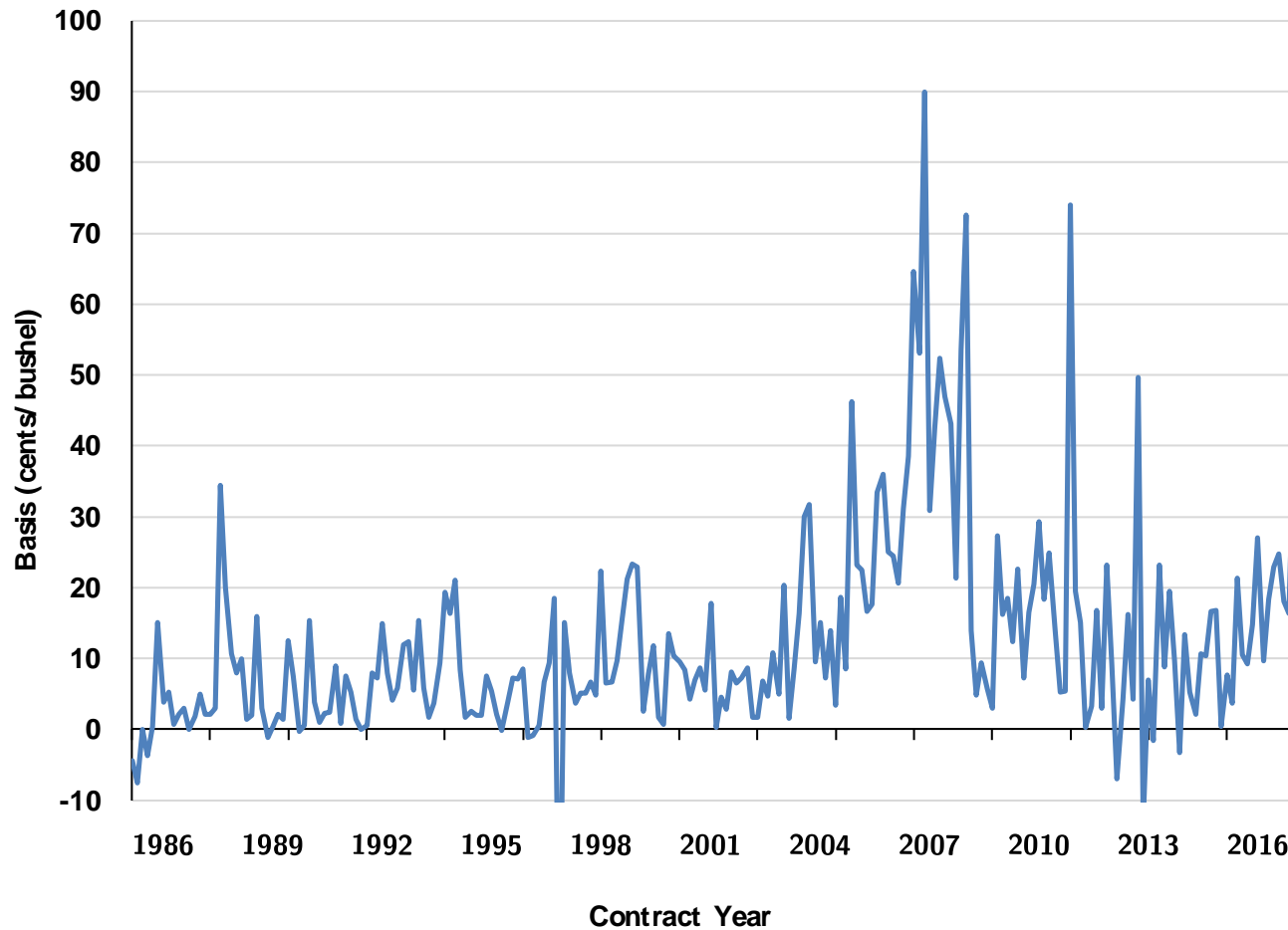
Convergence is necessary for:

- Effective futures hedging
- Efficient discovery of prices and storage returns ("the carry")
- Performance of crop insurance revenue contracts

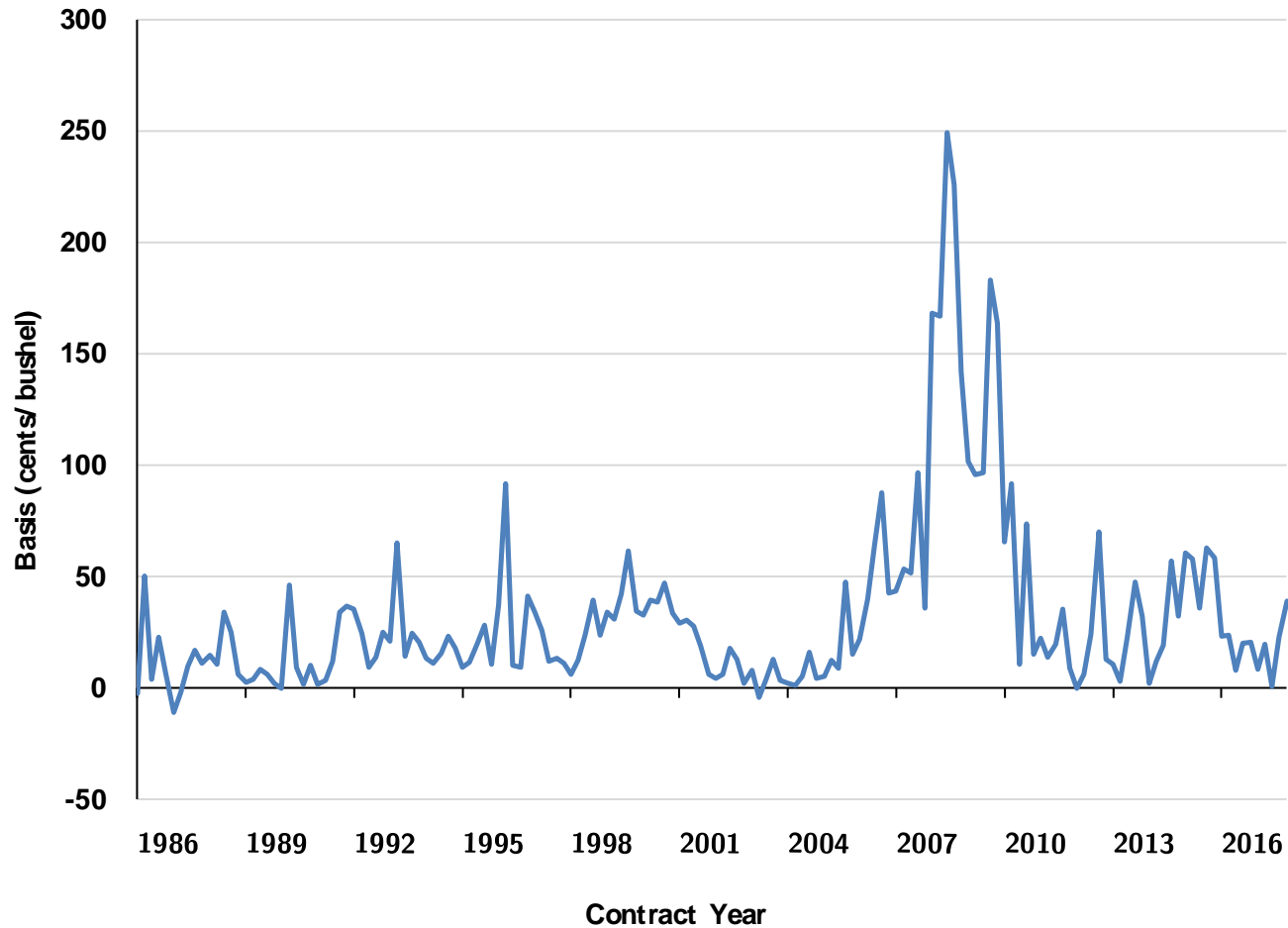
Cheapest-to-Deliver Basis for CBOT Corn Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts (basis = futures - cash)



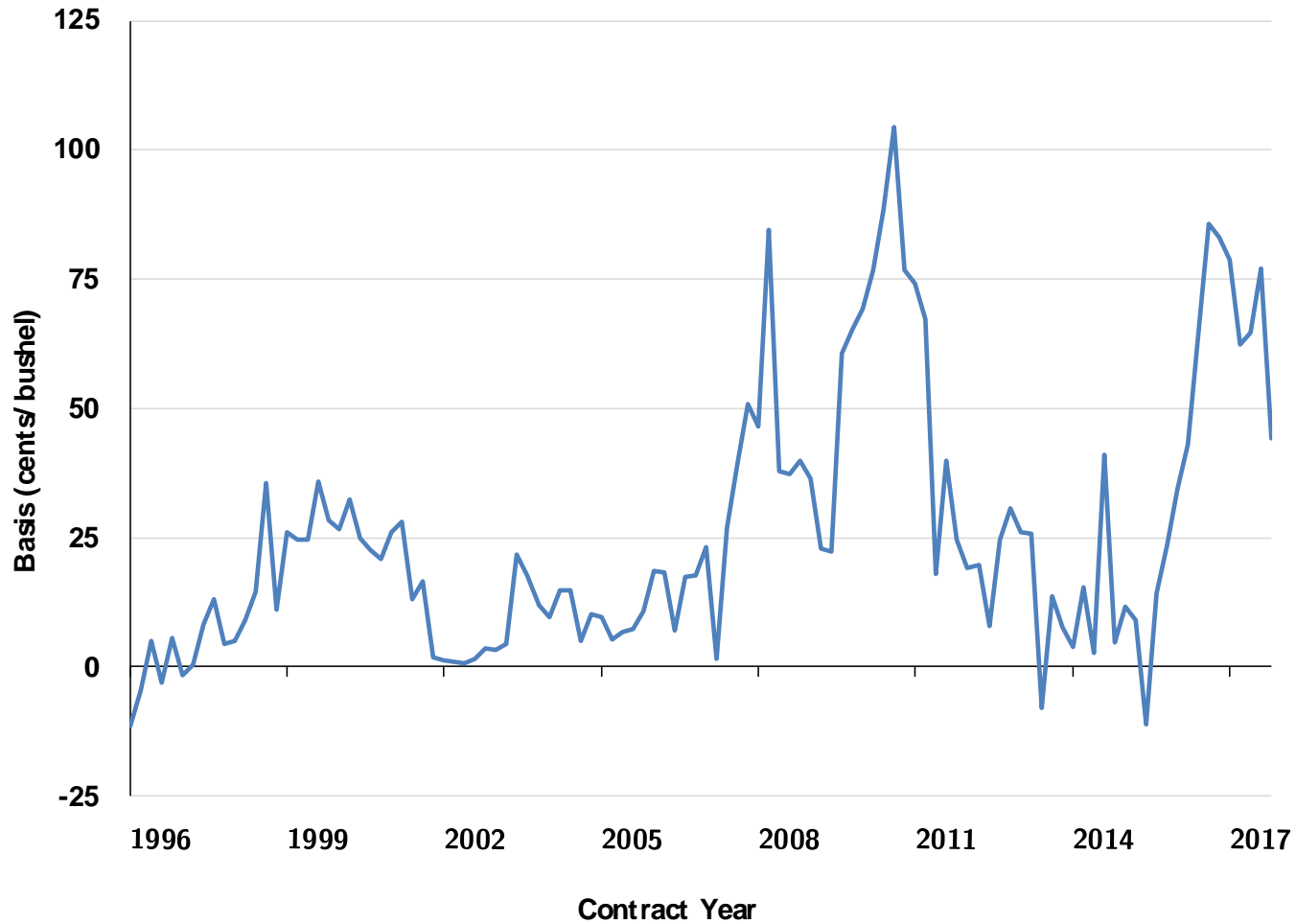
Cheapest-to-Deliver Basis for CBOT Soybean Futures Contracts, Average of First Five Days of Delivery, March 1986 - November 2017 Contracts (basis = futures - cash)



Cheapest-to-Deliver Basis for CBOT Wheat Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts (basis = futures - cash)



Cheapest-to-Deliver Basis for KCBOT Wheat Futures Contracts, Average of First Five Days of Delivery, March 1996 - December 2017 Contracts (basis = futures - cash)



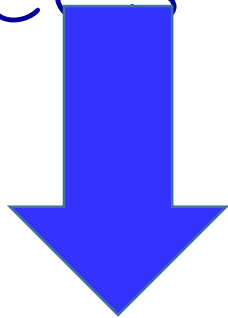
Whodunnit?

1. Manipulation in the form of traditional “corners” and “squeezes”
2. Structural imbalance in contract design or market conditions that favors one side of the market
3. Futures contract storage rates below the market-clearing price of storage in the physical market

Key Facts about Delivery Systems for Grain Futures Contracts

- Delivery is not satisfied literally by cash grain
- A “delivery instrument” must be used to make and take delivery
 - ✓ Warehouse receipt
 - ✓ Shipping certificate
- Terms for delivery instruments are matched as closely as possible to actual commercial grain transactions
- Delivery instruments are negotiable instruments that can be held indefinitely in theory
- Takers of delivery (longs) must pay storage fee because makers of delivery

KCBOT wheat futures prices this



STATE OF KANSAS
GRAIN INSPECTION DEPARTMENT
PUBLIC WAREHOUSE RECEIPT

THE SCOULAR COMPANY
SALINA, KANSAS

RECEIPT NO. 317

00001 - 01000 9-4725

SI-TECH TRUST

06 26 04 Wheat ISO1000 1200000 12000

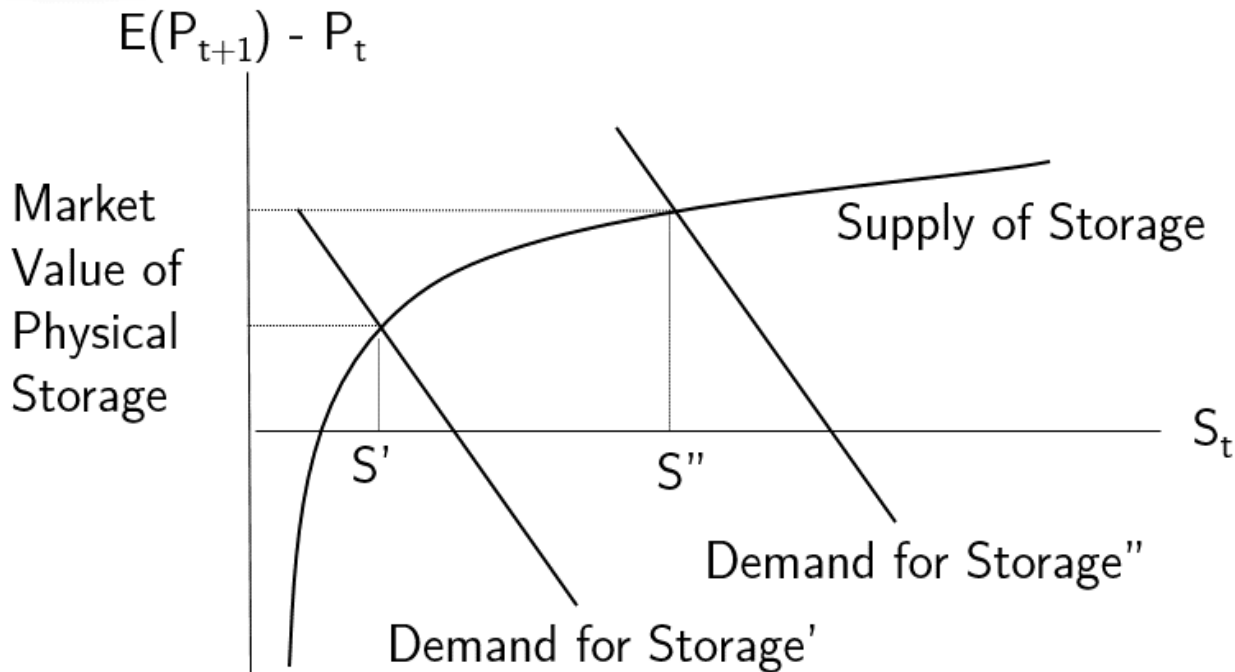
Moisture %	Protein %	Test Weight	Shrinkage	Other	Grade	Other	Other	Other	Other
13.5	16.3	1.0	-4	1.6	3.0	06	10	04	XX

ORIGINAL, NEGOTIABLE

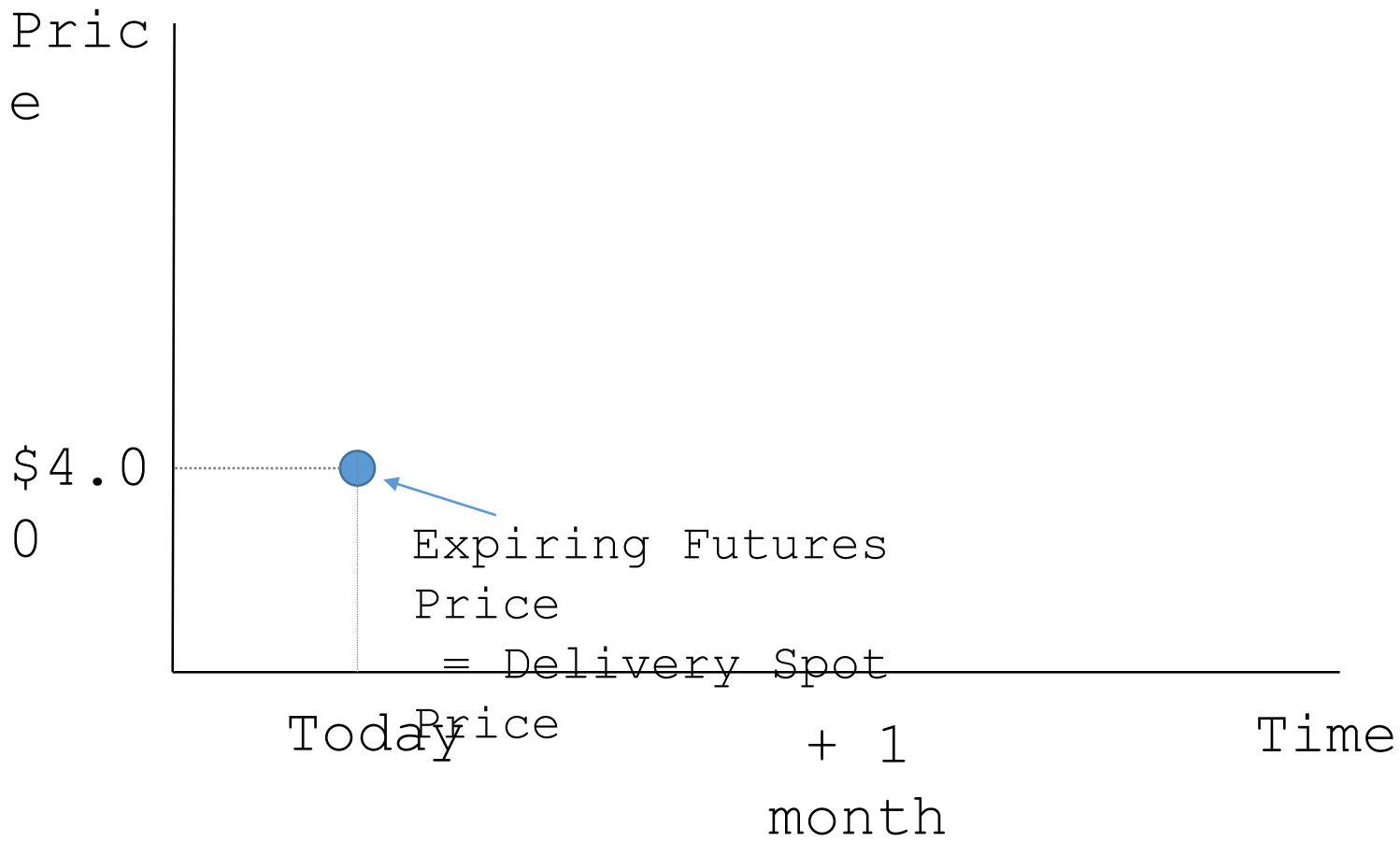


<https://www.flickr.com/photos/10038629@N02/801635470>

The Market for Physical Grain Storage

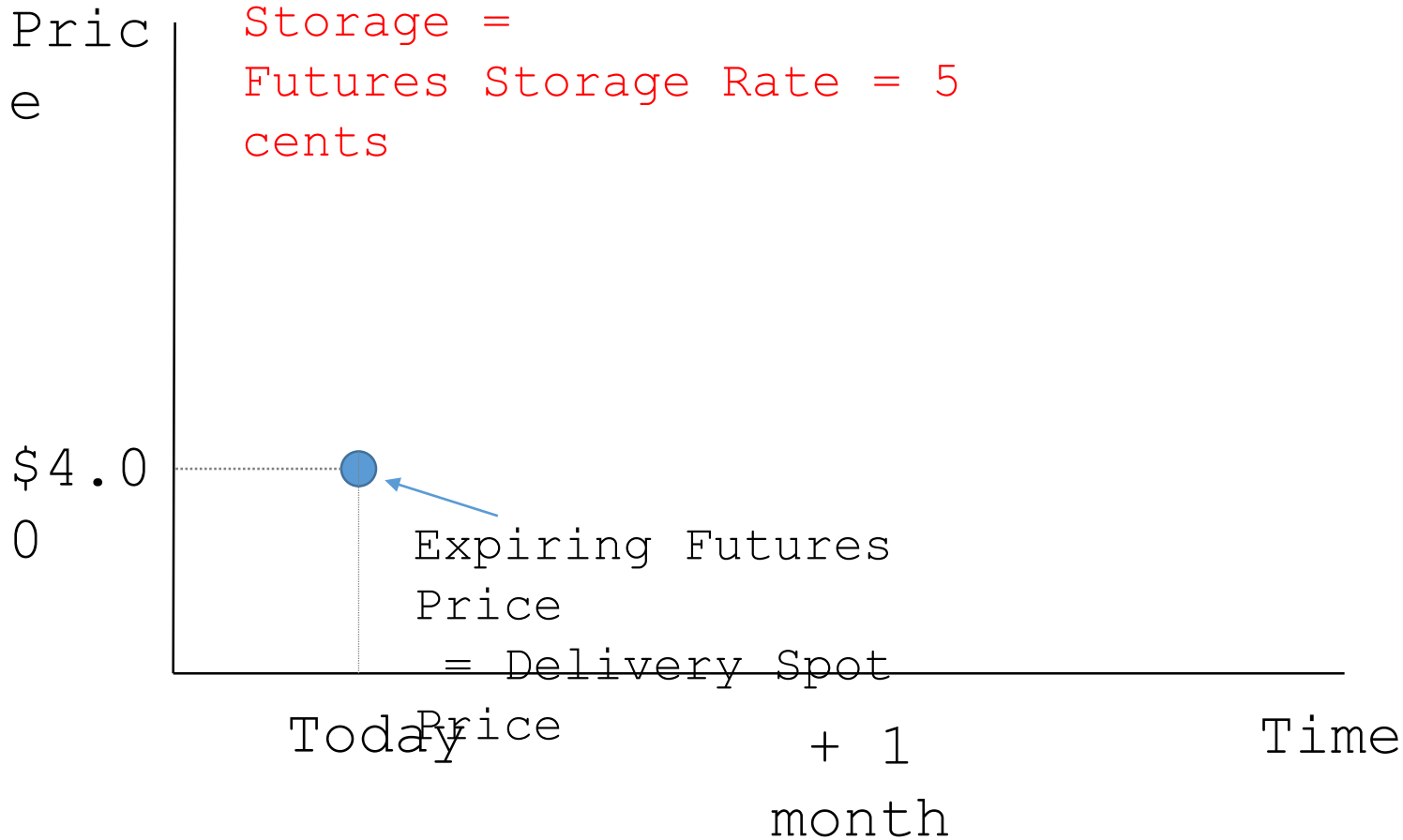


Storage Rates and Non-Convergence



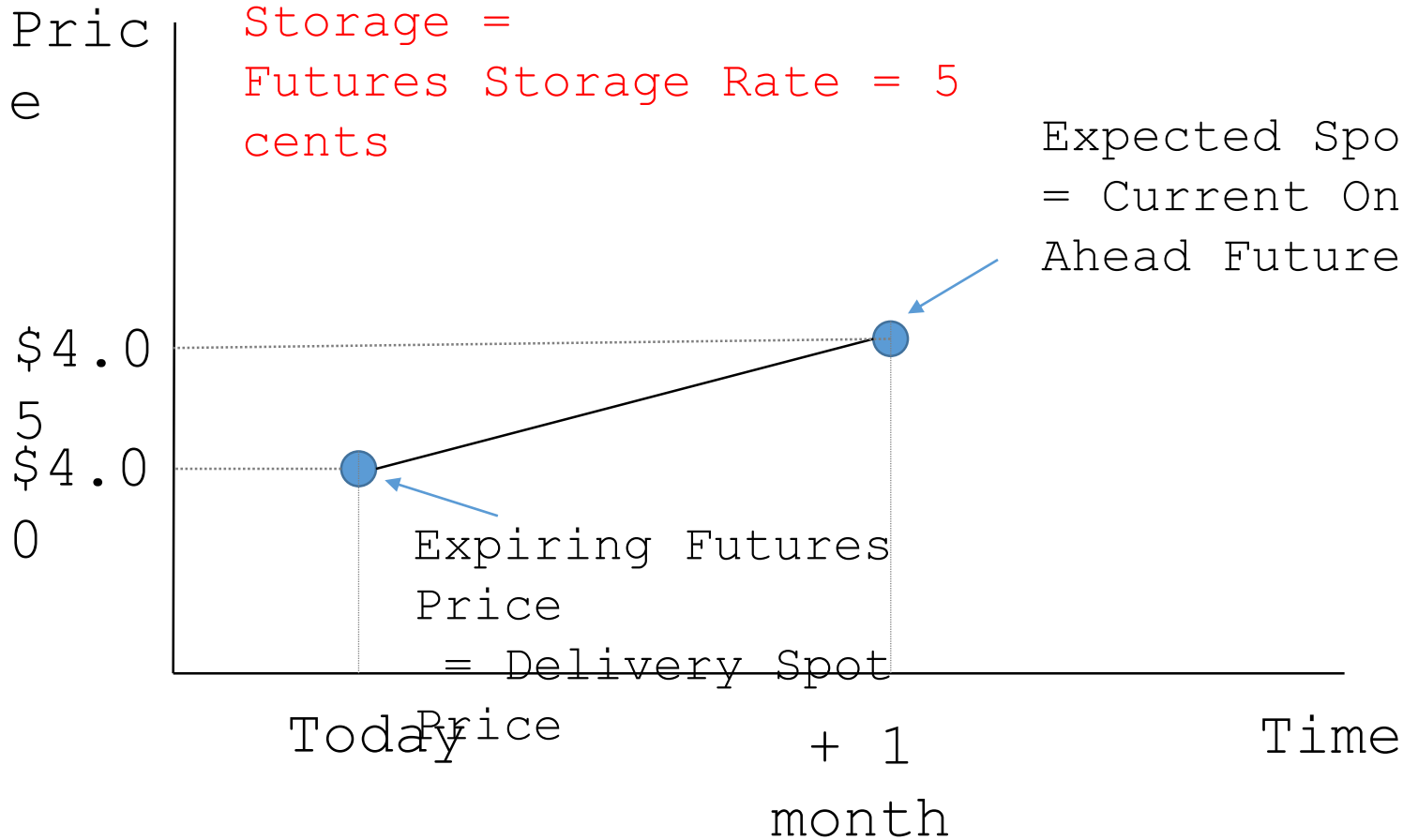
Storage Rates and Non-Convergence

Market Value of Physical Storage =
Futures Storage Rate = 5 cents



Storage Rates and Non-Convergence

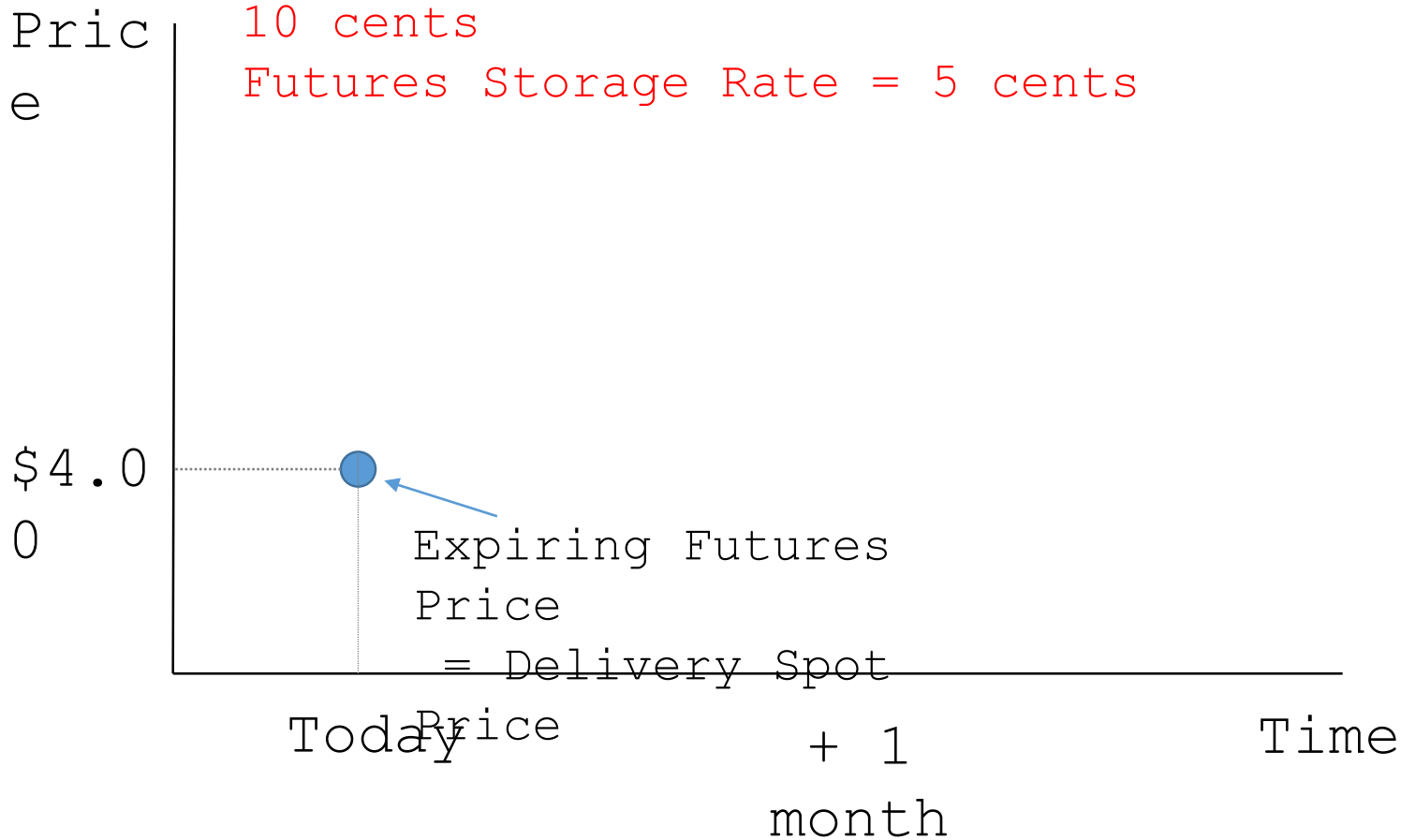
Market Value of Physical Storage =
Futures Storage Rate = 5 cents



Storage Rates and Non-Convergence

Market Value of Physical Storage = 10 cents

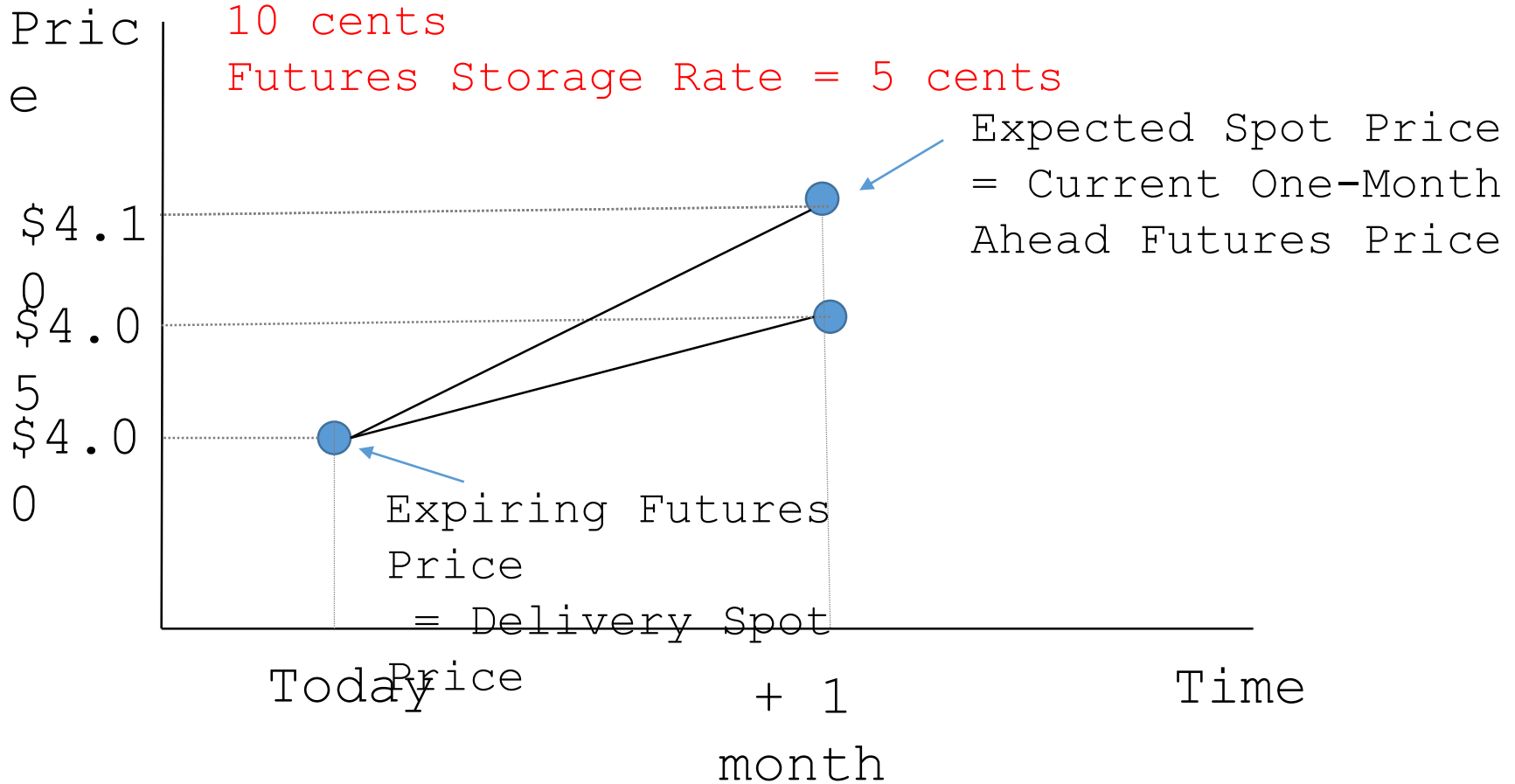
Futures Storage Rate = 5 cents



Storage Rates and Non-Convergence

Market Value of Physical Storage = 10 cents

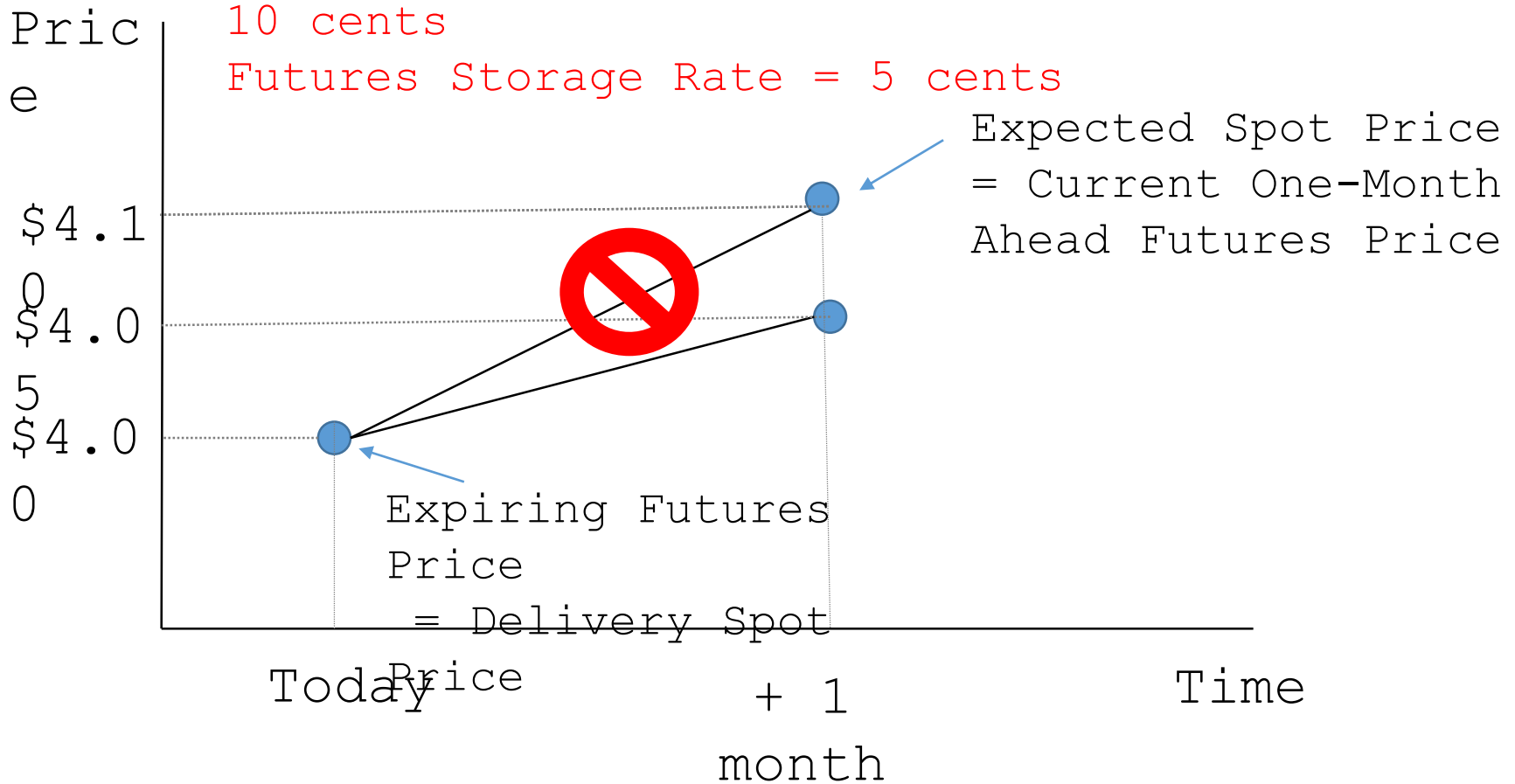
Futures Storage Rate = 5 cents



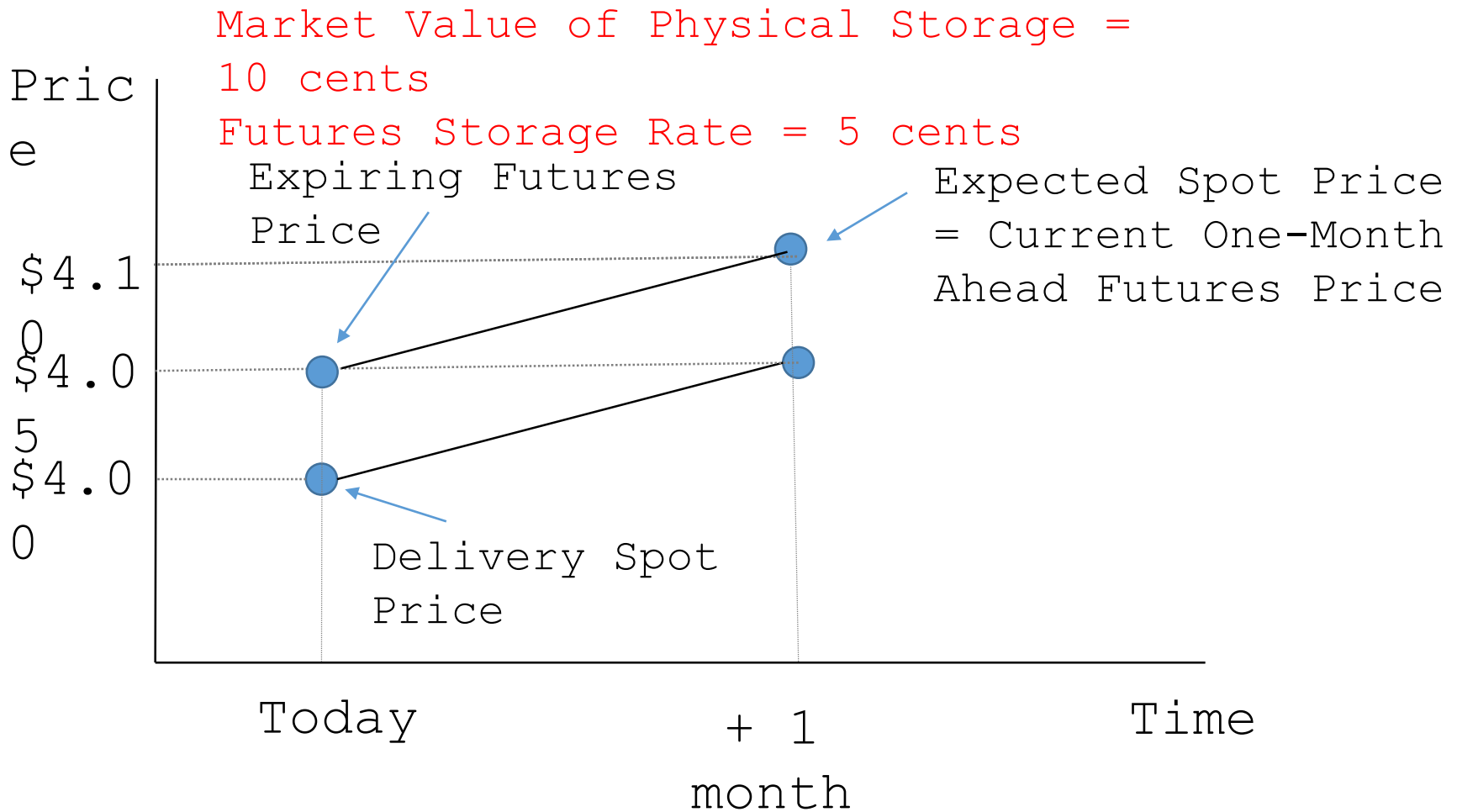
Storage Rates and Non-Convergence

Market Value of Physical Storage = 10 cents

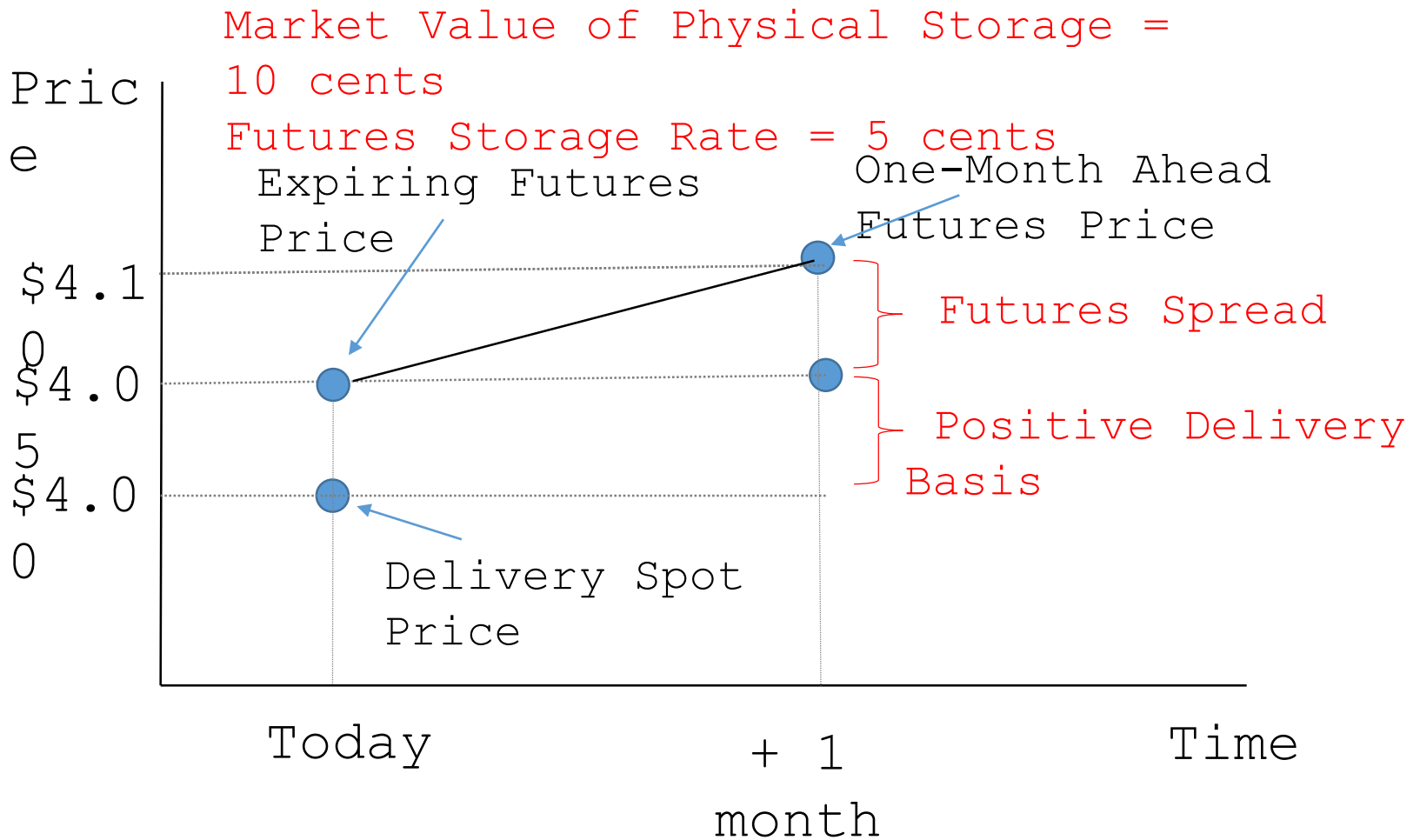
Futures Storage Rate = 5 cents



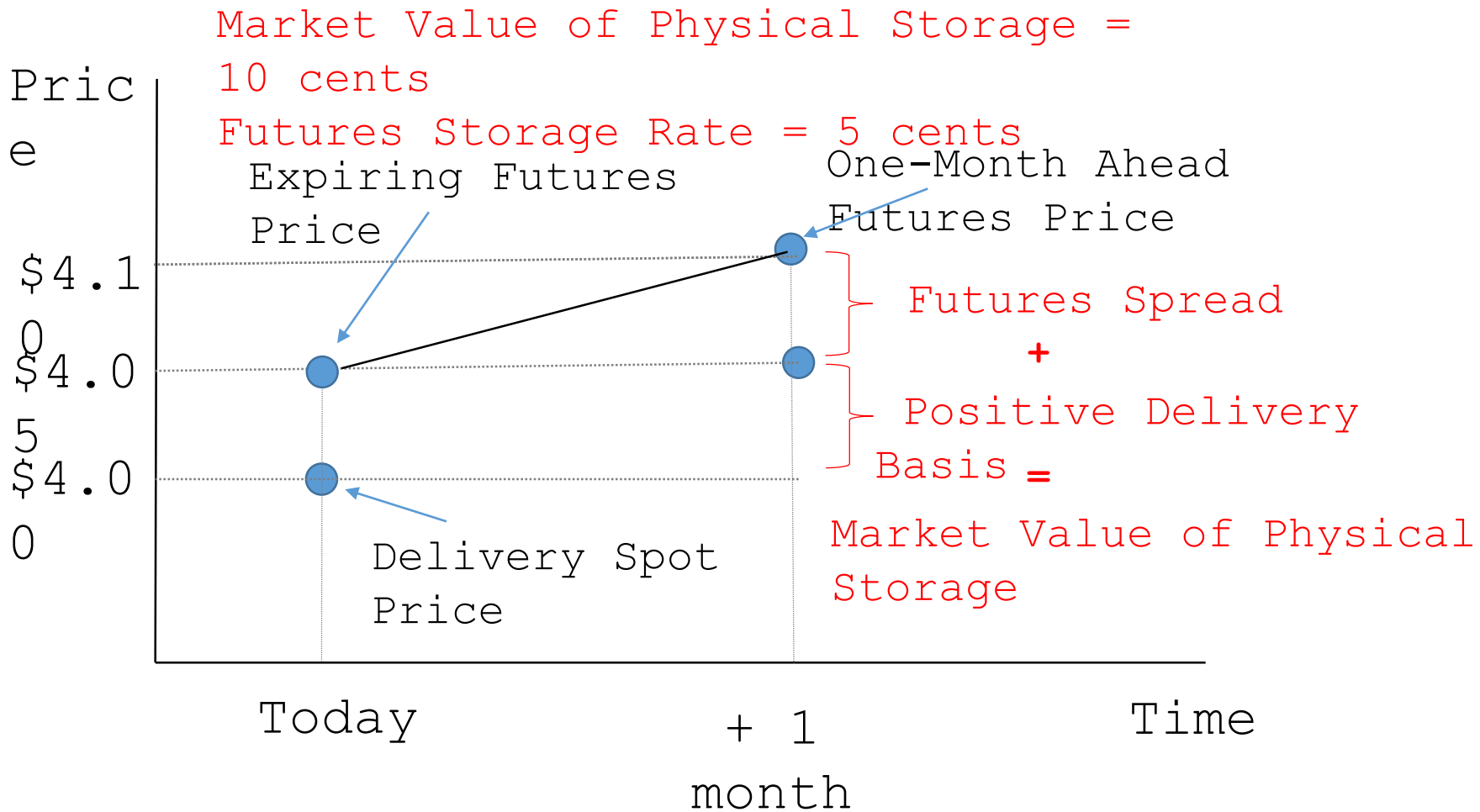
Storage Rates and Non-Convergence



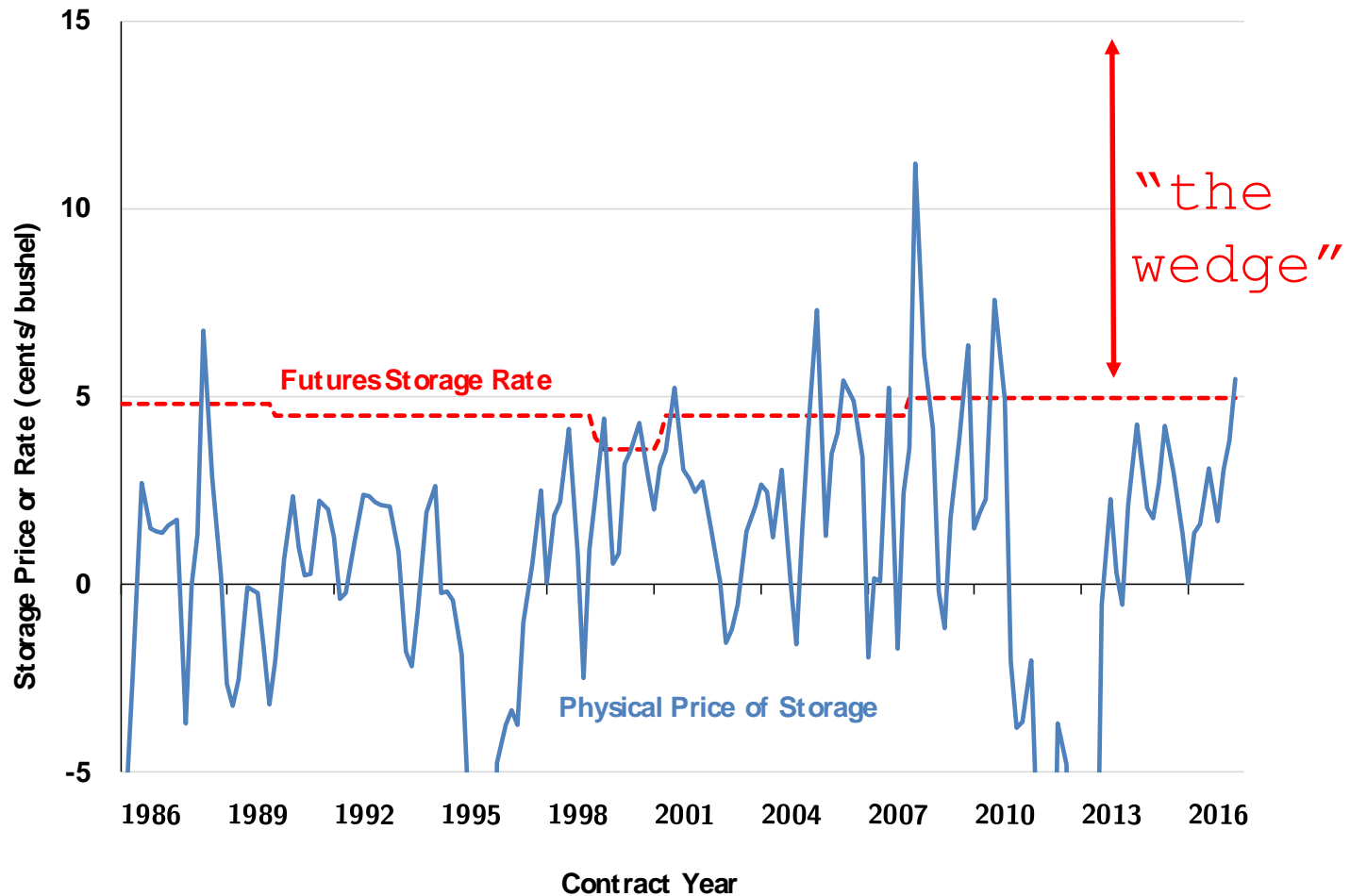
Storage Rates and Non-Convergence



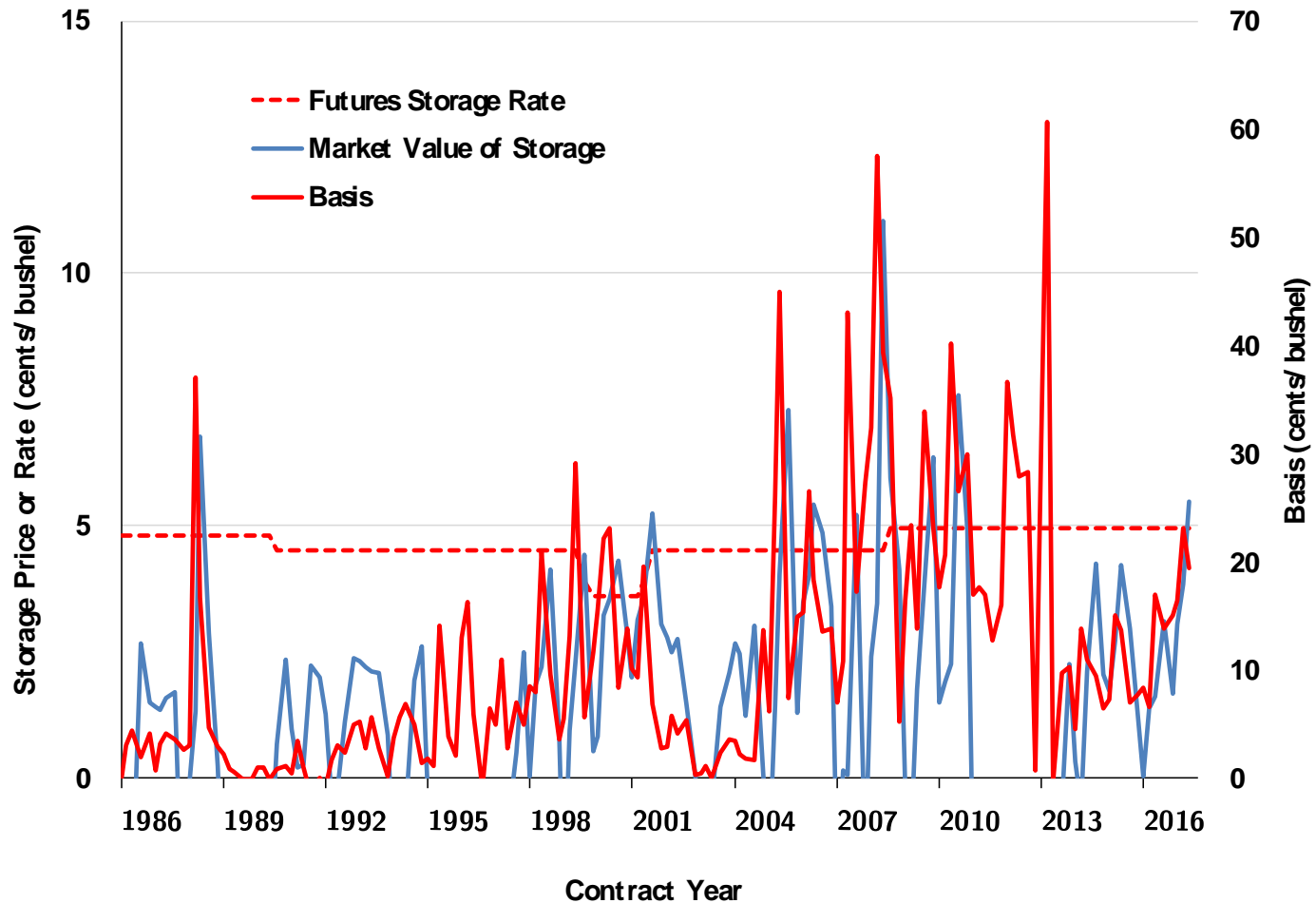
Storage Rates and Non-Convergence



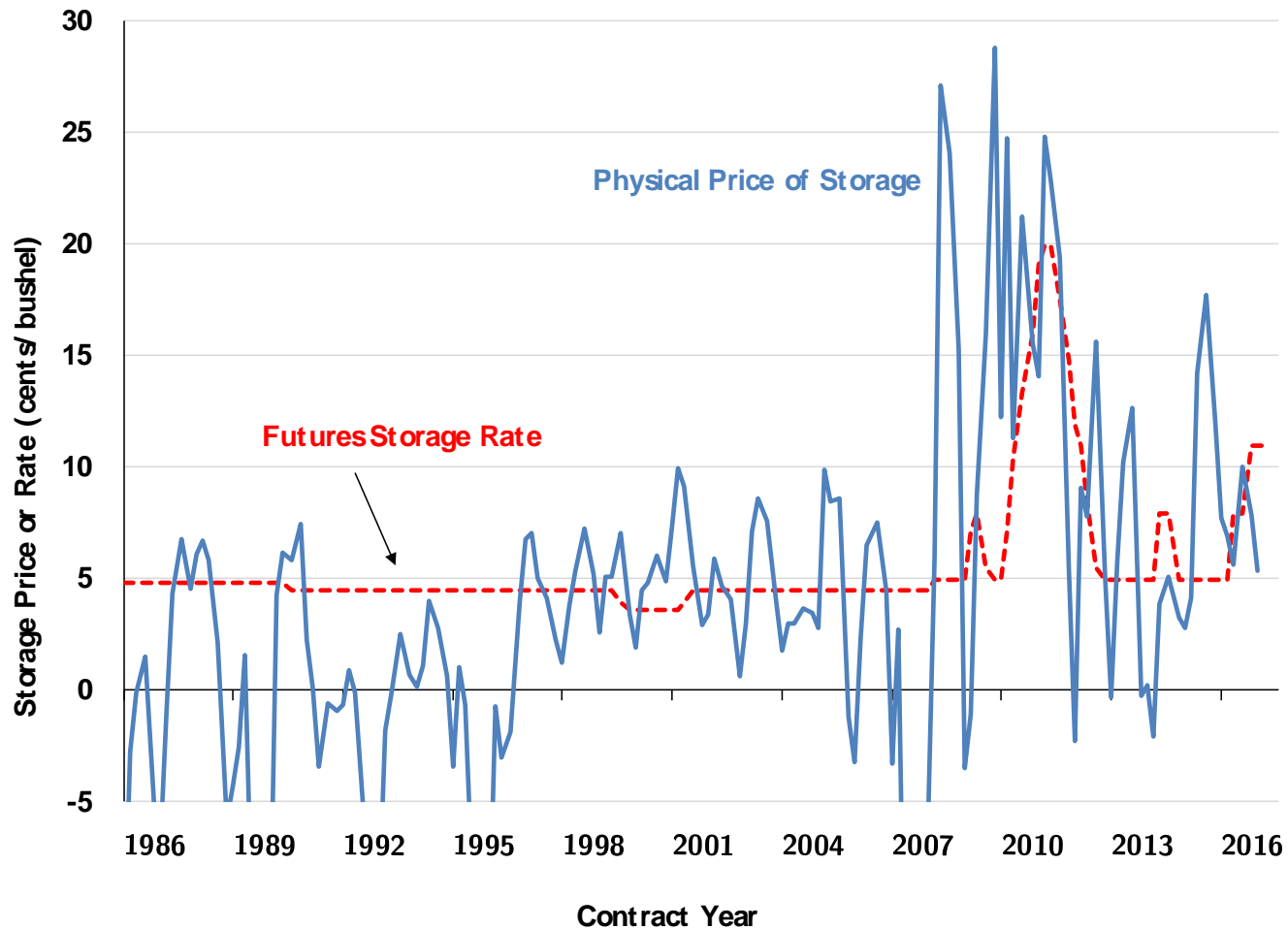
Estimated Market Price of Physical Storage and Storage Rate for CBOT Corn Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts



Estimated Market Price of Physical Storage, Storage Rate, and Basis for CBOT Corn Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts



Estimated Market Price of Physical Storage and Storage Rate for CBOT Wheat Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts



Fixed vs. Variable Storage Rates

Fixed rates:

- + Fixed financial full carry
- + Simplicity of carry calculations
- + May improve liquidity in deferred futures
 - Adjusted in an *ad hoc* manner

Variable storage rates:

- + Pre-specified rule for adjusting rates
- + With a lag, will fully adjust to market value of storage
 - Uncertainty about financial full carry
 - May be detrimental to liquidity in deferred futures

Where You Can Find Me

Personal website:

<http://www.farmdoc.illinois.edu/irwin/>

Twitter: @ScottIrwinUI

LinkedIn:

<https://www.linkedin.com/in/scotthirwin/>

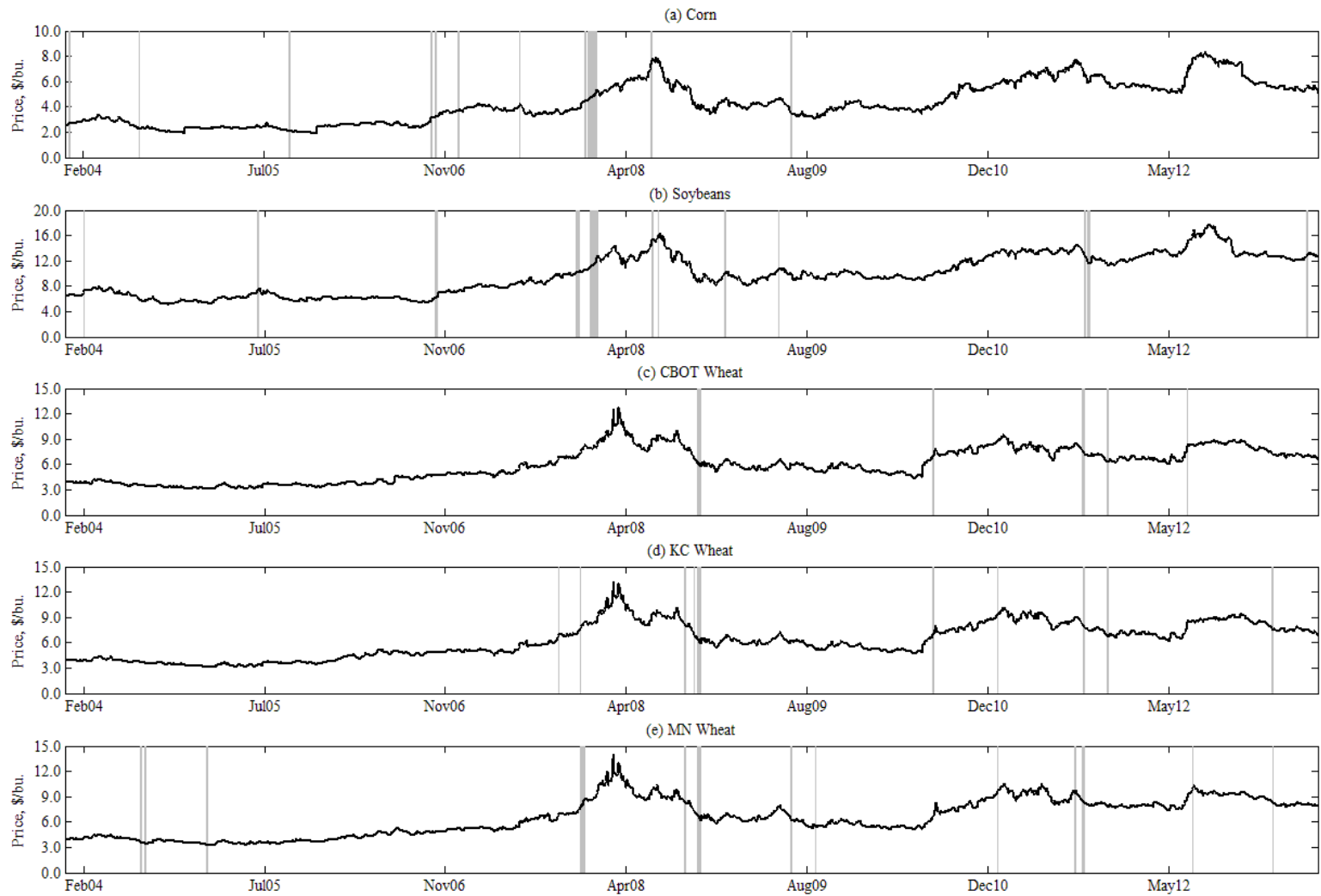
Email: sirwin@Illinois.edu

Disclosure Statement

- University Funding
 - Recent grants from USDA/ERS USDA/OCE
 - Regular support from endowments for research and extension program
- Occasional consulting projects
- Sometimes trade in commodity futures markets
- Principal in a private company that provides U.S. corn and yield forecasts
- Member of CME Agricultural Markets



Cheapest-to-Deliver Basis for KCBOT Wheat Futures Contracts, Average of First Five Days of Delivery, March 1996 - December 2017 Contracts (basis =



Estimated Market Price of Physical Storage and Storage Rate for KCBOT Wheat Futures Contracts, Average of First Five Days of Delivery, March 1986 - December 2017 Contracts

