



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

The Reference Price Effect on Crop Producers Hedging Behaviors

Dermot Hayes, Ziran Li*

Department of Economics

Iowa State University

Selected Poster prepared for presentation at the
2015 Agricultural & Applied Economics Association and Western Agricultural Economics Association
Joint Annual Meeting, San Francisco, CA, July 26-28

Copyright 2015 by [Dermot Hayes, Ziran Li]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

*Corresponding author. Contact: zirani@iastate.edu

Dermot J. Hayes, Professor; Ziran Li, Research Assistant

The Reference Price Effect on Crop Producers Hedging Behaviors

Motivation

The optimal hedge ratio is determined by

➤ under expected utility theory:

1. the level of risk aversion; 2. price uncertainty; 3. and the futures price relative to the expected future spot price.

➤ Under prospect theory:

a reference point shall also play an important role (Kim et al. 2010, AJAE).

Yet, there is no empirical evidence that supports the existence of such a reference price.

Our objectives are two:

1. explore empirically the existence of a reference price;
2. Examine the reference price effect on the producer's hedge ratio.

Data and The Hedge Ratio

H: the # of futures short contracts, held by producers/merchants according to CFTC's weekly Commitment of Traders Reports, 2006.8 -2014.8.

I: the total storage in U.S., reported by USDA quarterly, with linear interpolation between each data point to match the weekly frequency of **H**. (See figure 1 for the case of corn).

Q: the expected production, updated in every March using planted acreage data and trend yield of last five years.

P: the nearby futures price.

ΔP: the weekly return of the nearby futures price.

P^R: the reference price

HR: the producer's hedge ratio, equal to $\frac{H * 5000}{I + Q}$

• The contemporaneous correlation between the **HR** and $(P - P^R)$ is the highest with the choice of **P^R** being the nearby futures price in 12 month prior.

• The Dickey- Fuller test rejects unit- root hypotheses of **HR** and $(P - P^R)$.

The Hedge Ratio vs. Change in Futures Prices

➤ There is no existing theory that suggests that the hedge ratio should respond to the change in the price level alone yet as can be seen from the data shown below this appears to be the case.

Figure 1.

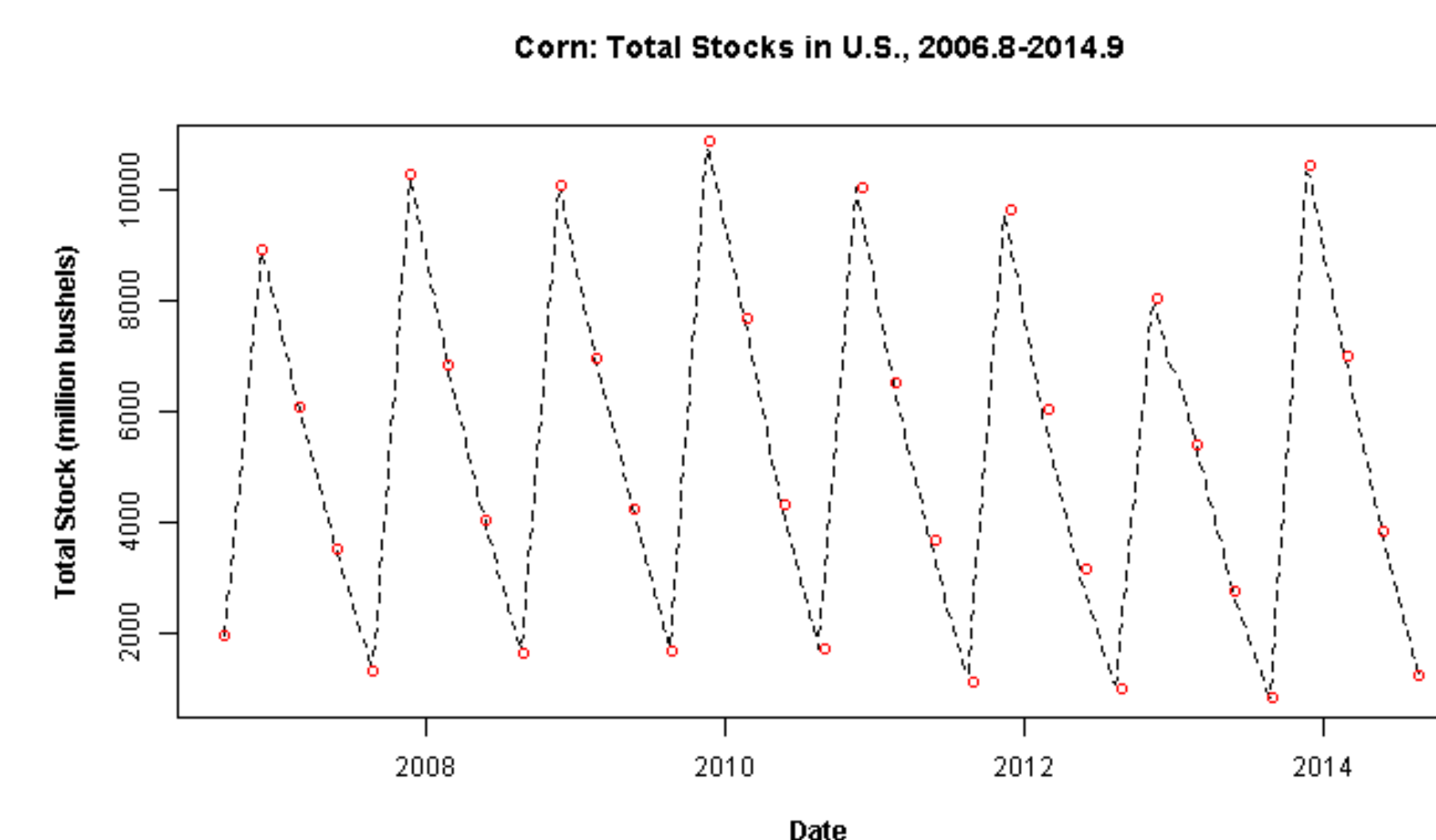


Figure 3.

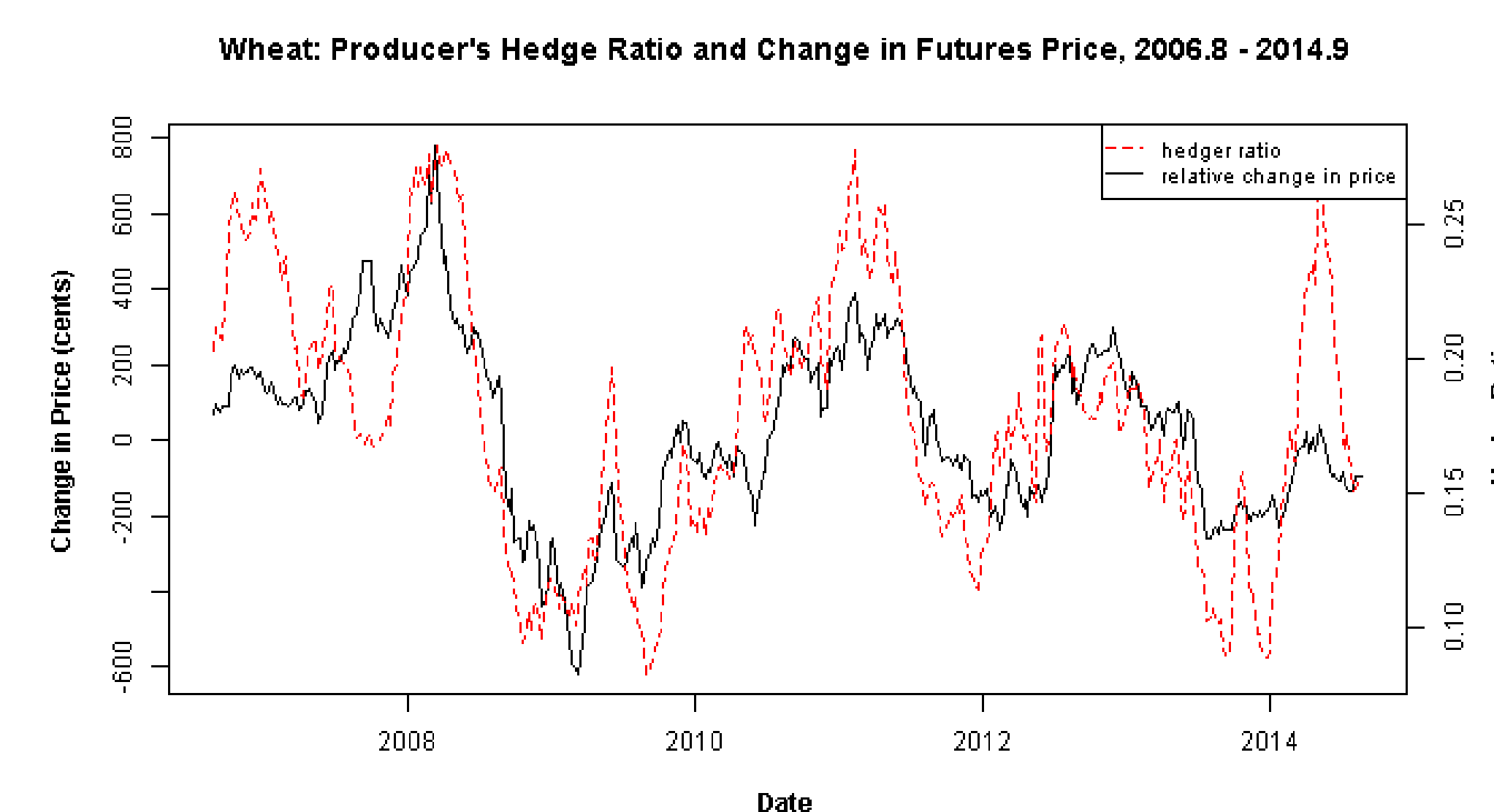


Figure 2.

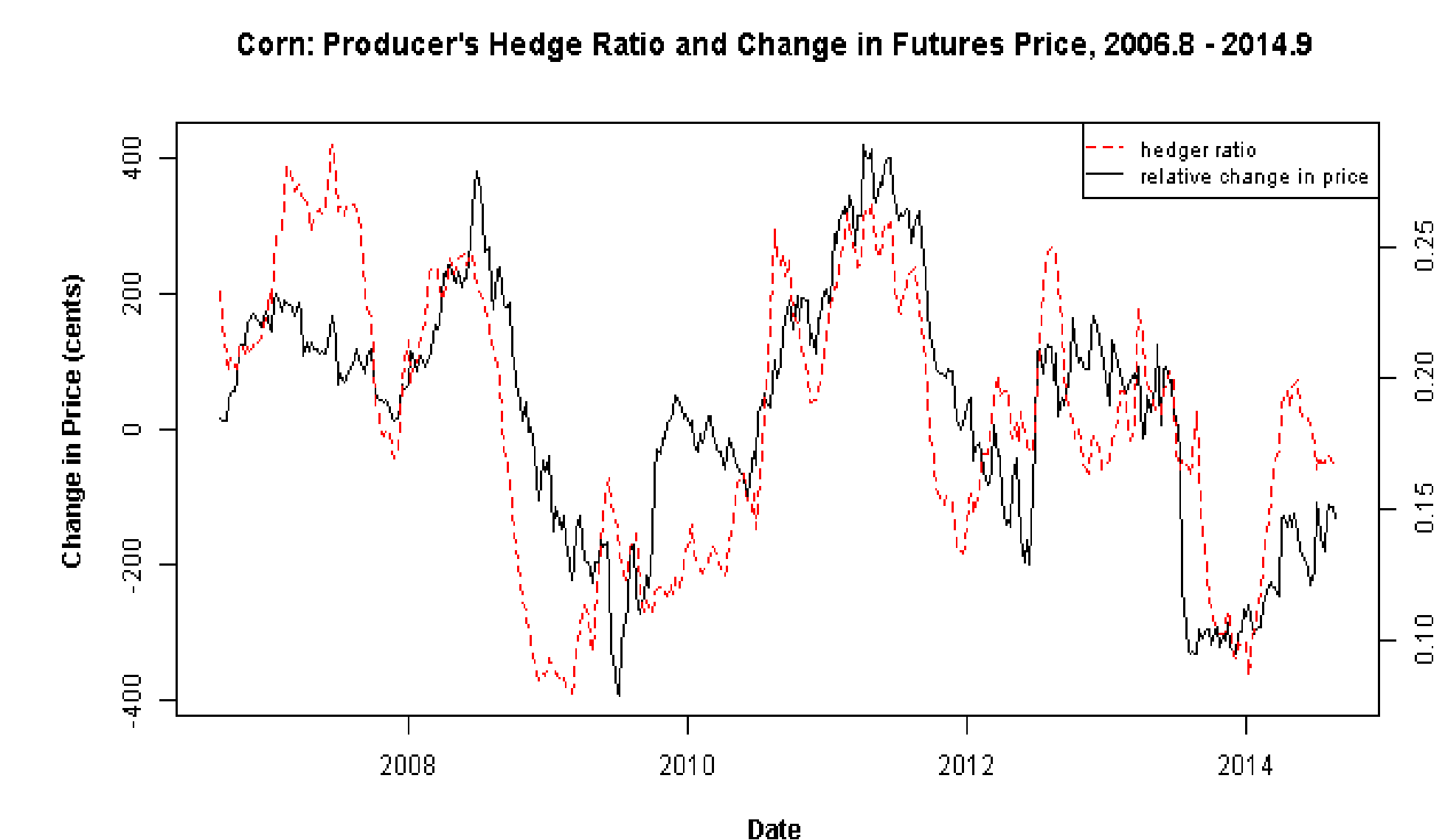
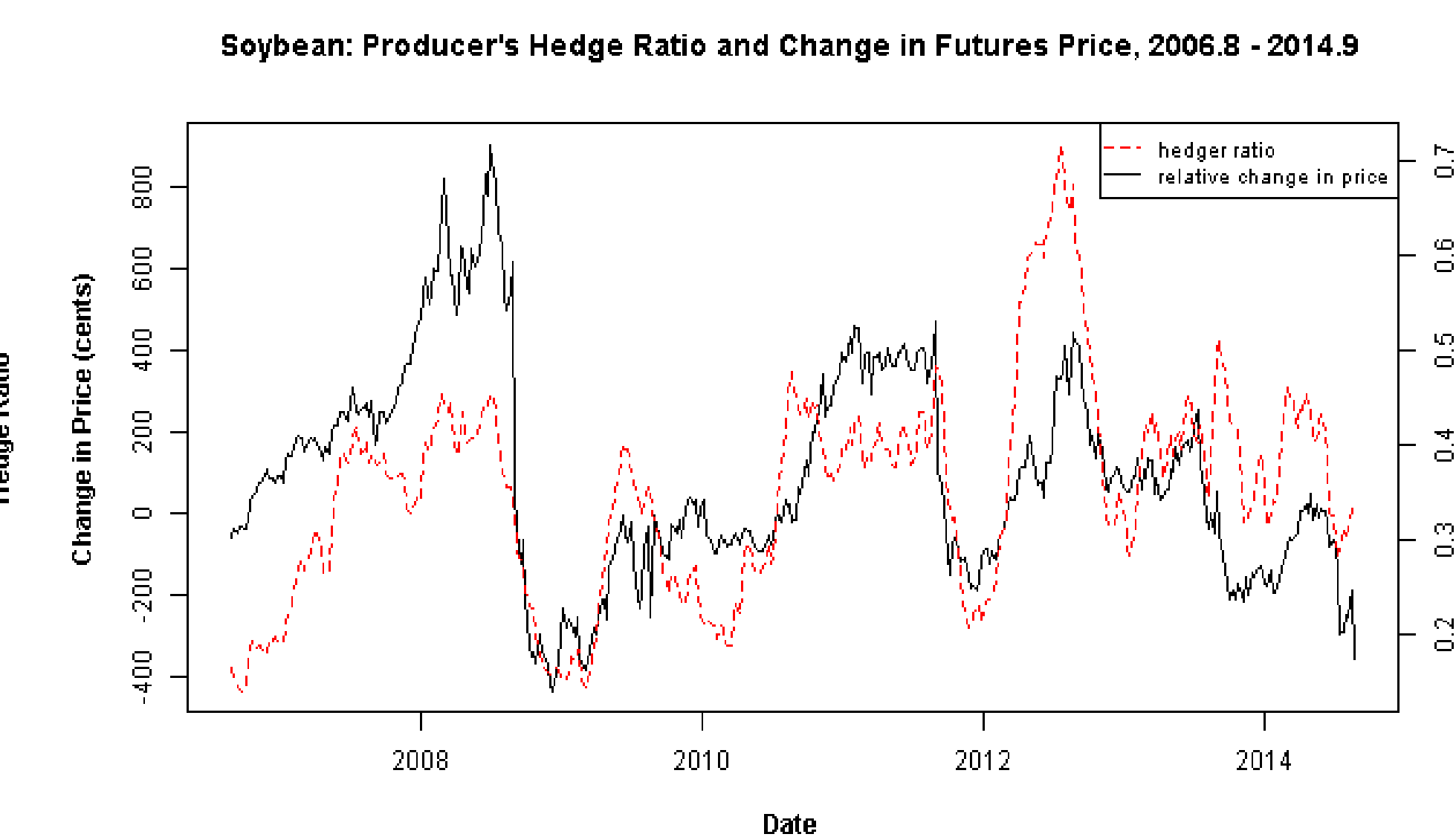


Figure 4.



Estimation Procedure and Hypotheses

Step1: HR , ΔP^R and ΔP are run on the monthly dummies to remove the seasonality.

Step2: A VAR regression is run on HR , ΔP^R and ΔP to remove serial correlations and control for variations among variables.

Step3: The residuals of HR and ΔP^R are collected from step 2 and the following regression is estimated with OLS for corn, soybean and wheat:

$$HR_{it} = \alpha_0 + \alpha_1 \Delta P_{it}^R + \alpha_2 \Delta P_{it}^R 1_{\{<0\}} + \varepsilon_{it}$$

where $1_{\{<0\}}$ is the indicator function equal to one if ΔP_{it}^R is negative and zero otherwise.

H1: The producer will hedge more when the futures price increases relative to that of 12 month prior.

H2: There might be asymmetric impact if the futures price is below the reference level while we are agnostic about the sign for there is no theoretical suggestion yet.

Empirical Results

Estimating the reference price effect on producers' hedge ratios

	Corn	Soybeans	Wheat
<i>Dependent variable: HR_t</i>			
ΔP_t^R	0.075 (0.002)	0.019 (0.003)	0.012 (0.002)
$\Delta P_t^R * 1_{\{<0\}}$	-0.002 (0.002)	-0.012 (0.005)	-0.004 (0.003)
<i>Dependent variable: ΔHR_t</i>			
ΔP_t^R	0.007 (0.002)	0.014 (0.003)	0.010 (0.002)
$\Delta P_t^R * 1_{\{<0\}}$	-0.002 (0.002)	-0.006 (0.004)	-0.002 (0.003)

Standard errors are reported in parentheses

- The hedge ratio tend to go up when the futures price is increasing and above the reference price for all three commodities;
- When the futures price is decreasing and below the reference price, the hedge ratio tends to reduce, but smaller in magnitudes and estimates on the interaction term are not significant for all commodities.
- Results are robust
 - when the same regression is performed on the change of the hedge ratio (the second panel) ;
 - when the monthly average price from last year is used as an alternative reference point.

Discussion & Future Research

The identification of the reference price effect depends on the efficient market hypothesis that the position change of hedgers doesn't affect the equilibrium price. This hypothesis finds empirical support among literature that there is little "hedging pressure" effect in futures markets for agricultural commodities.

If the efficient market hypothesis holds and farmers believe that the futures price is unbiased, which must be true on an aggregate level then it stems from the nature of expected utility theory that the hedge ratio should not respond to the change in the price from last year yet as we show in this paper this appear to be the case.

Besides identifying the reference price effect, another novelty of our paper is the construction of the hedge ratio that incorporates information about the underlying physical assets. Implicitly, we assume perfect foresight of producers and linear depletion rate of inventory. From figure 1, this seems appropriate.

Future research along this line of research will benefit from access to data at individual level that enables a better construct of hedge ratios and understanding about the timing of hedging.