

# The Financialization of the DAP market

Some research results from:

**Chair OCP-Mines ParisTech: Economics, Finance and Management of  
Commodities**

Pierre-Noël Giraud

Presentation at OCP

Casablanca 23 06 2016

# Plan

- 1. The Chair OCP-Mines ParisTech: Economics, Finance and Management of Commodities
- Two questions:
- 2. The **possibility** of a new DAP future market
  - 2.1 About the failure of the last attempt( CME 2004-2008)
  - 2.2 Price risks along the phosphate fertilizers value chain
    - 2.2.1 Volatilities
    - 2.2.2 Transmission of price shocks
- 3. The **opportunity** of a new DAP future market
  - Right, wrong and open questions about the financialization of commodities

# 1. The Chair OCP-Mines ParisTech: Economics, Finance and Management of Commodities

- Set up January 2014 at Mines ParisTech, aimed at being transferred to UM6P
- Three research domains:
- Economics: commodity prices models
  - Exploration
  - Cost curves
  - Fly up
- Finance: **management of price risks along the value chain**
- Management:
  - The “resource curse” in Africa
  - Quantification of OCP’s spill overs on Morocco and abroad
  - Mobile phone end the green revolution in Africa

# Scientific outcome as of end 2016

- 4 books

- Economie des matières premières ( La Découverte, November 2015)
- Principes d'Economie ( Course at UM6P) ( La Découverte, September 2016)
- Richesses de la Nature et Pauvreté des Nations. La malédiction de la rente minière et pétrolière en Afrique (Mines ParisTech Press, October 2016)
- Economie des Phosphates ( Mines ParisTech Press, November 2016)

- 7 Research working papers

- 3 commodity models
- 2 papers in Finance
- 2 papers in Management ( excluding book chapters)

## 2. The possibility of a new DAP future market

# Requirements and test

## Requirements

Standardisation of the underlying product

Volatility: demand for both short and long hedging

Market structure: enough players on both side of the demand for hedging

Trust in the settlement price ( recent affairs: €/\$, euribor, gold, silver, oil ( Platts))

## Test

Information must flows from the future to the spot market

Therefore, the nearest future becomes the reference price for commercial contracts

# 2.1. About the failure of the last attempt (CME 2004-2008)

Btissam El Bahraoui

# Requirements and test

## Contract: CME 2004-2008

### Requirement

### Contract: CME 2004-2008

see Btissam El Bahraoui WP

Standardisation

Yes

Volatility

moderate

Market structure

**Doubts**

Trust in the settlement price

**Doubts**

### Test

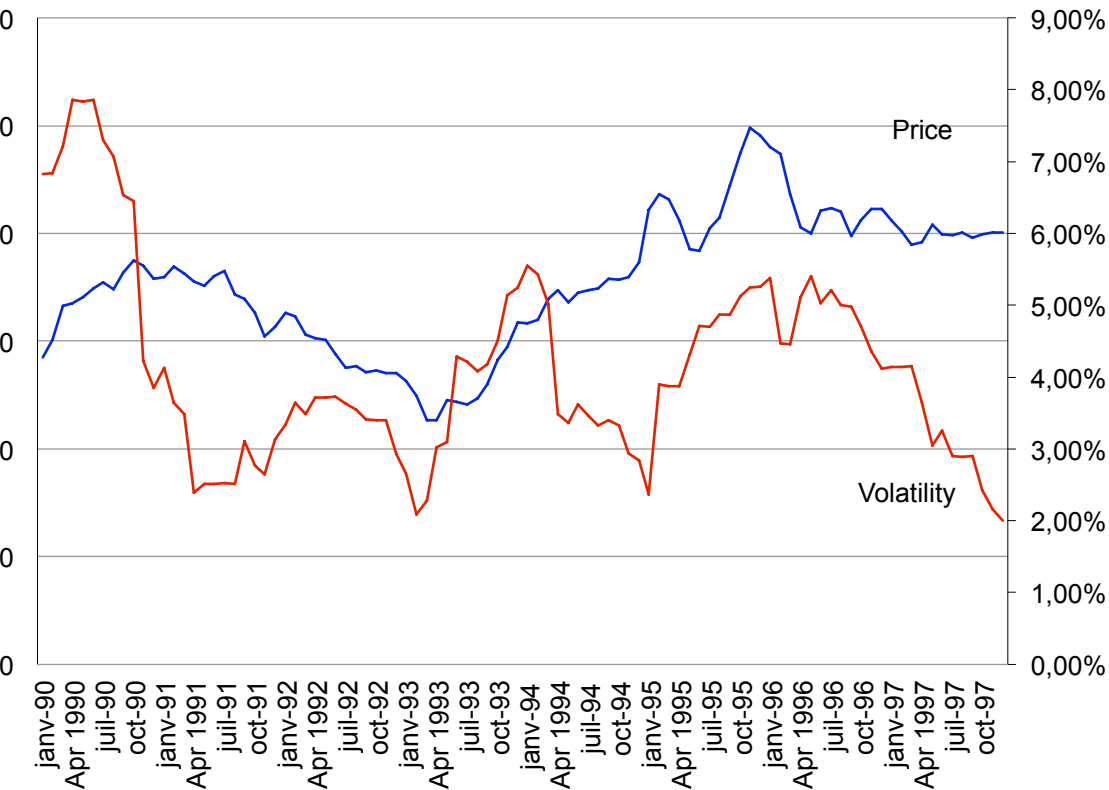
Information flows

**No**

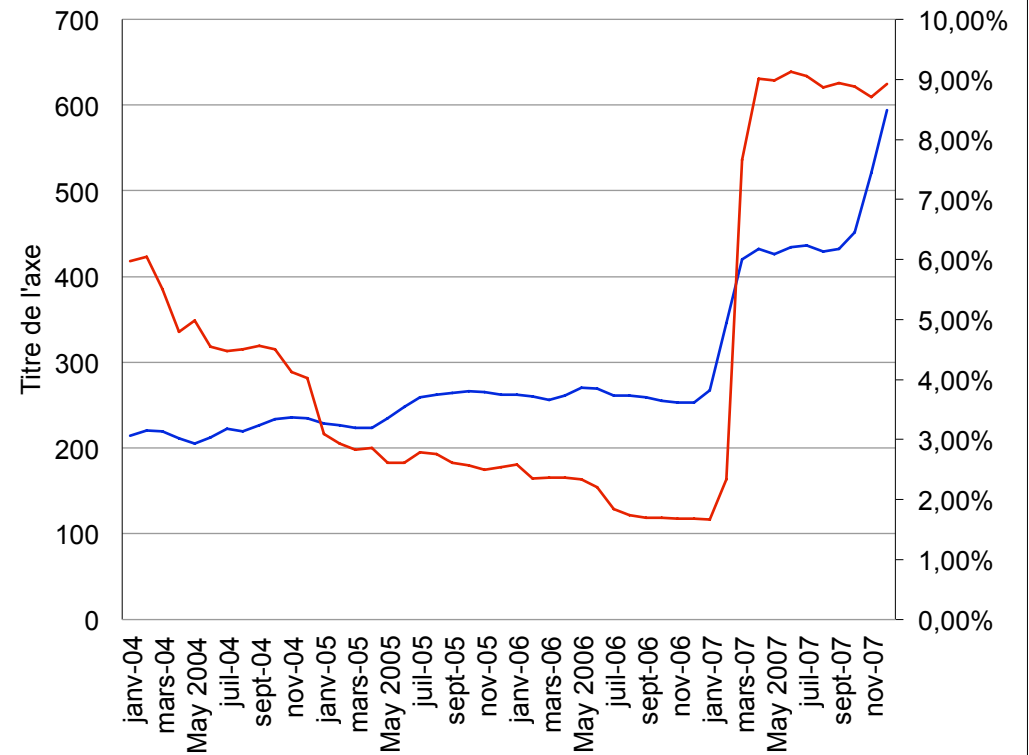


# DAP price and volatility ( 12 months)

DAP Volatility in the first trial period of future contracts (CBT)



DAP Volatility in the second trial period of future contracts (CME)

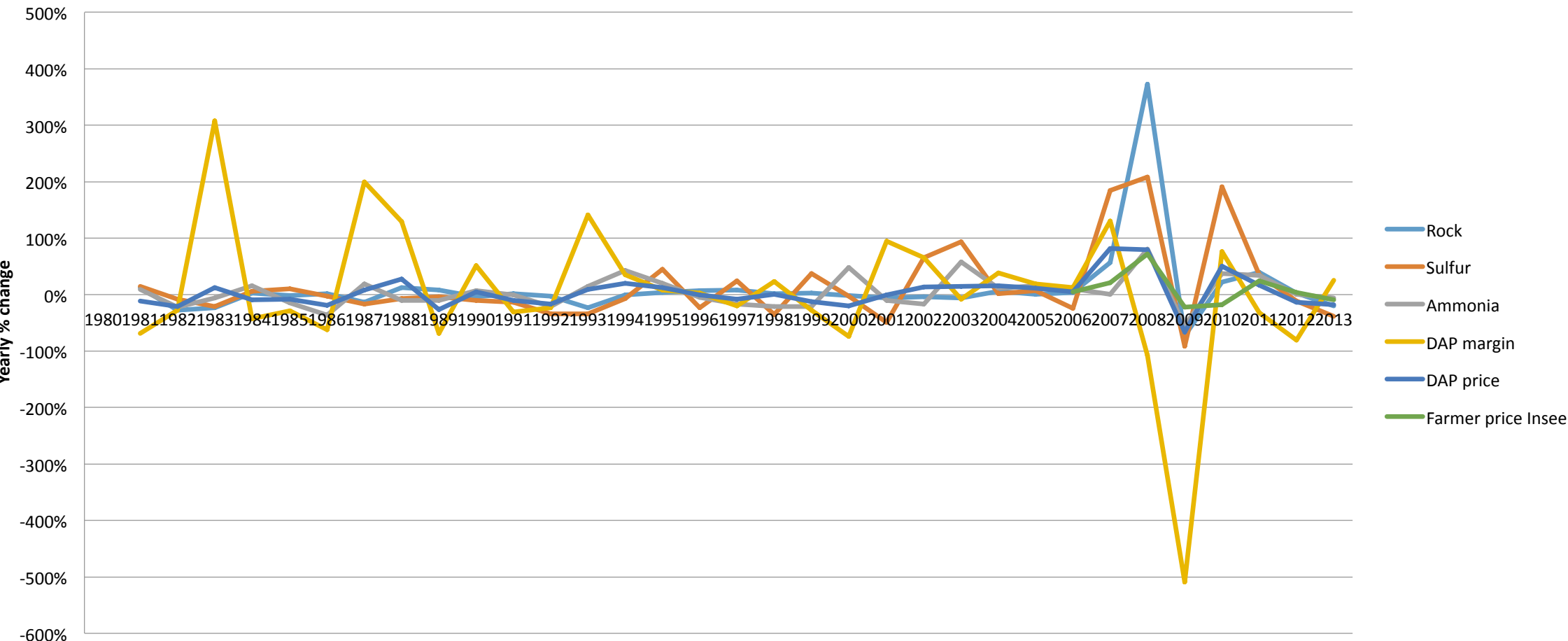


# 2.2. Price risks along the value chain

## 2.2.1. Volatilities ( Btissam El Bahraoui)

# Real ( \$ 2008) annual prices % change

Real price yearly % change

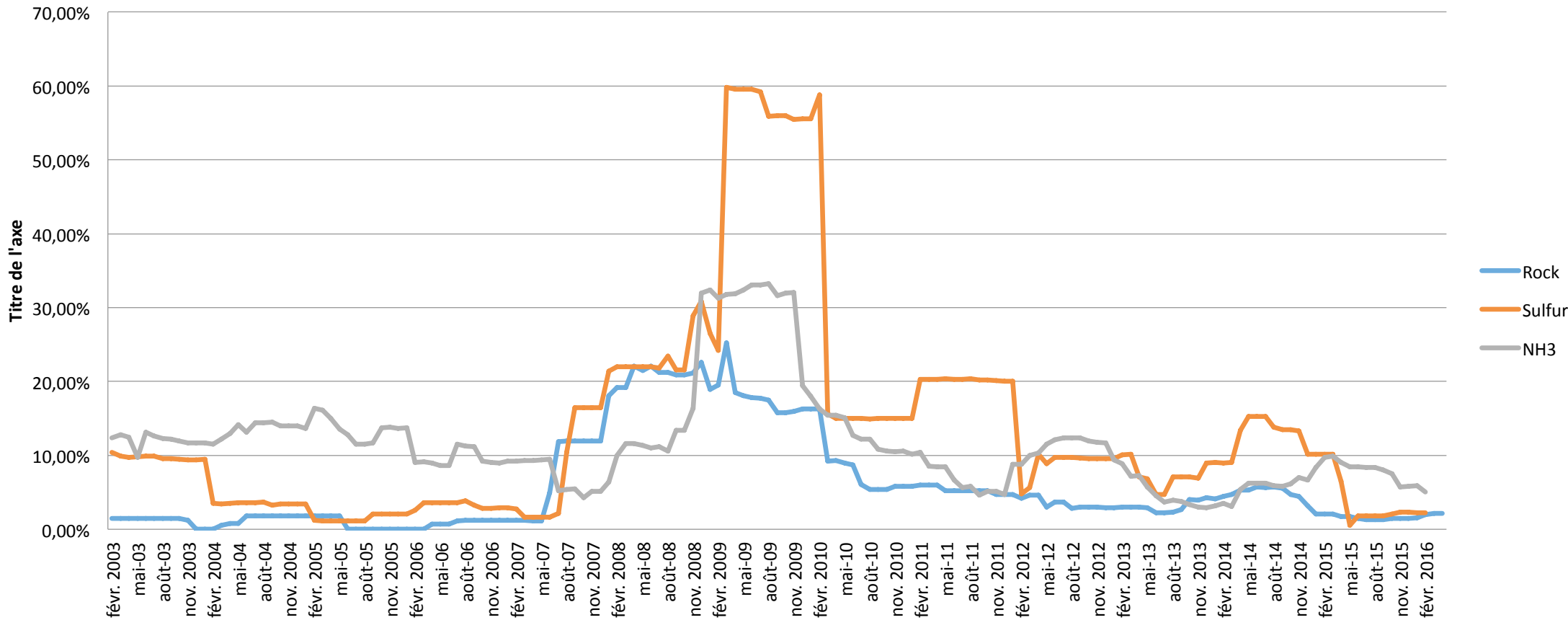


# Volatility of annual prices (1980-2016)

Rock	68 %
Sulfur	67 %
Ammonia	28 %
DAP margin	127 %
DAP price	28 %
French farmer price (Insee index)( 2005-2013)	30 %

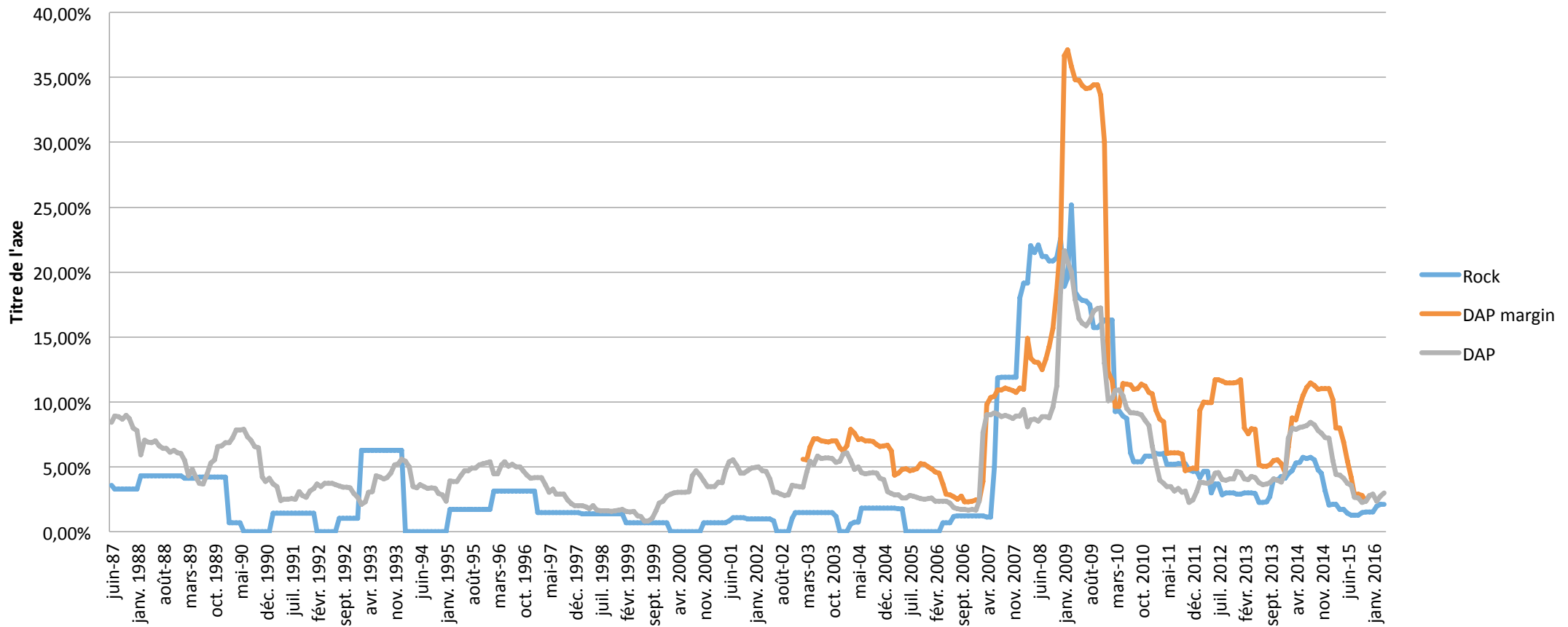
# Inputs current monthly prices volatility (2003-2016)

## 12 months volatility



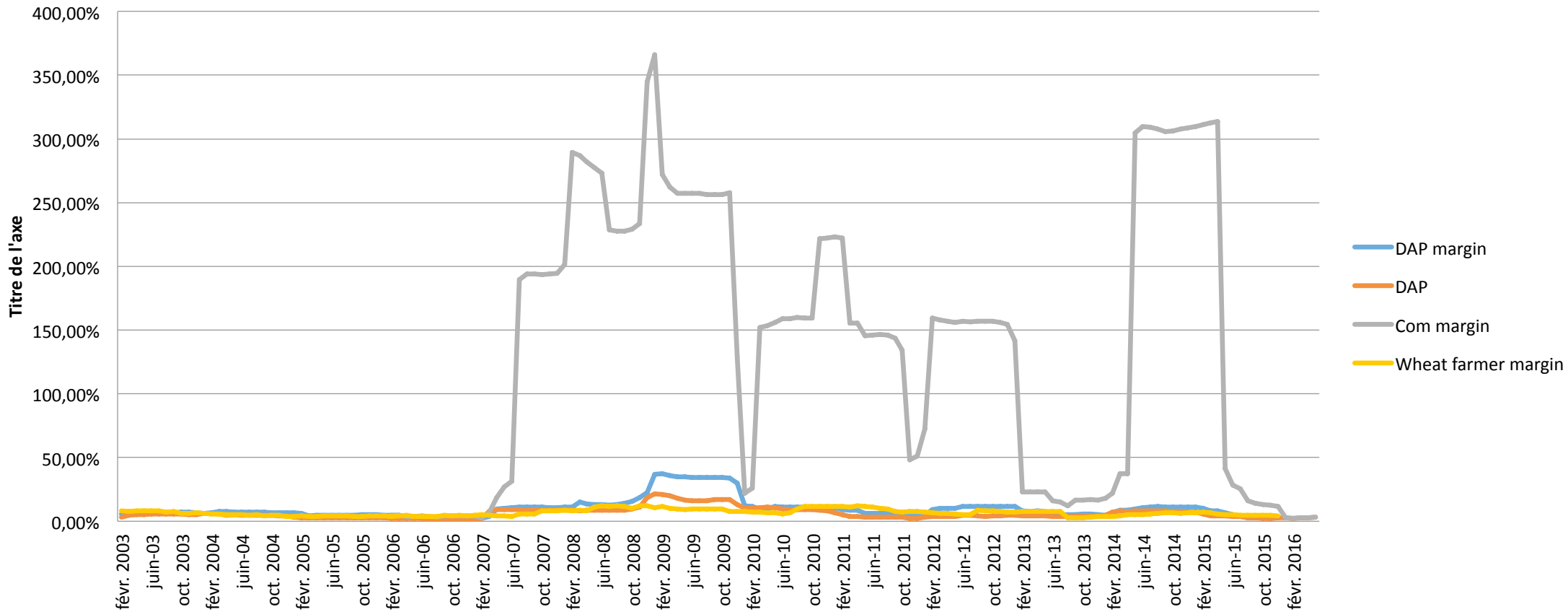
# Rock, DAP, DAP margin Volatility (1987-2016)

## 12 months Volatility



# DAP, commercial and farmer margins volatility (2003-2016)

## 12 months Volatility



# Volatility of monthly prices

	Before 2006	After 2006
Rock	2,4	11,15
DAP	4,6	9
DAP margin	6	14
Com margin	5 ( year 2005)	183
Farmer margin	5,7	7,9



# 2.2. Price risks along the value chain

## 2.2.2. Responses of margins to input shocks ( Jamal Azizi)

# Phosphate supply chain margin transmission mechanisms: Models

For the analysis of phosphate supply chain margin transmission mechanisms, a VAR model is used (Vector Autoregressive), which is a system with multiple variables written as follows:

$$Y_t = c + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \dots + \Phi_p Y_{t-p} + u_t \text{ where } Y_t = \begin{bmatrix} Z_t \\ X_t \\ V_t \end{bmatrix}$$

By using the impulse response and variance decomposition, we give an answer to :

*“How the effect of a given price shock spreads to other prices and margin*

*and*

*How much time needed to return to equilibrium”*

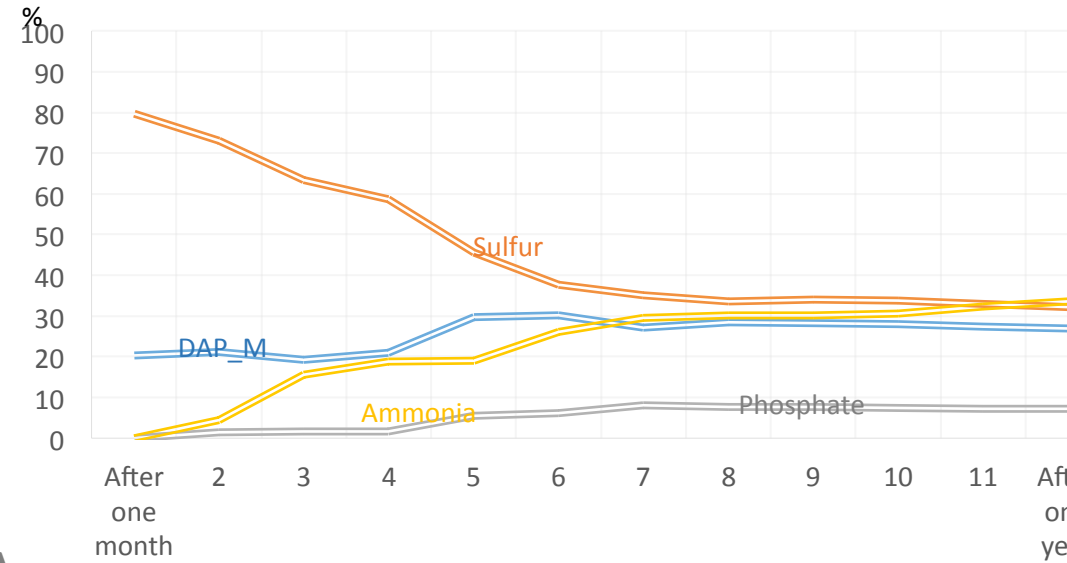
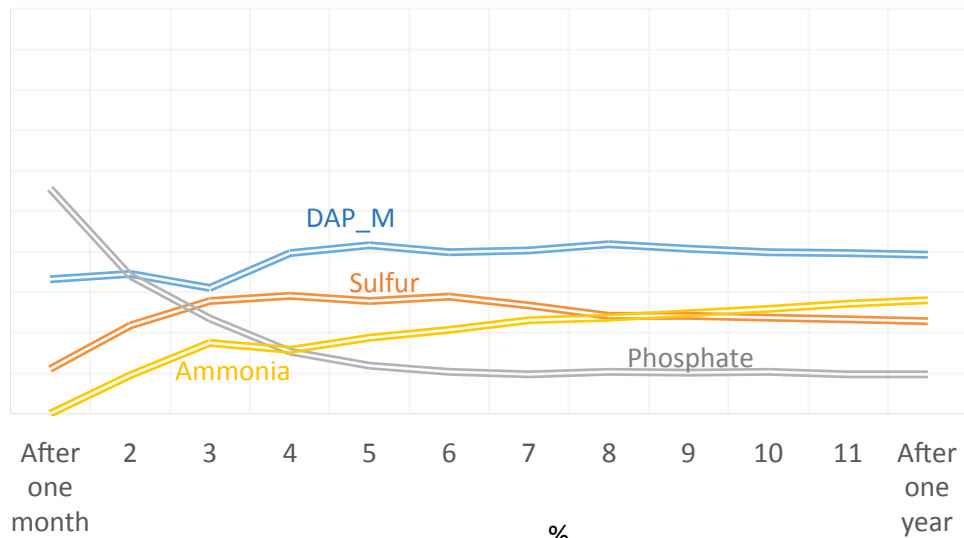
# Phosphate supply chain margin transmission mechanisms: Data

- Monthly data from 2005 to 2015
- CRU
  - Phosphate Rock FOB Morocco 68-72% BPL FOB
  - Sulphur CFR North Africa
  - Ammonia CFR Morocco - spot/contract
  - DAP FOB Morocco
- INSEE
  - Monthly raw agricultural means of production purchasing price index (IPAMPA) - Base 100 in 2010 - Ammonium phosphate
- World Bank
  - Maize (US), no. 2, yellow, f.o.b. US Gulf ports
  - Wheat (US), no. 1, hard red winter, ordinary protein, export price delivered at the US Gulf port
  - Rice (Thailand), 5% broken, white rice (WR), milled, f.o.b. Bangkok
  - Soybeans (US), c.i.f. Rotterdam

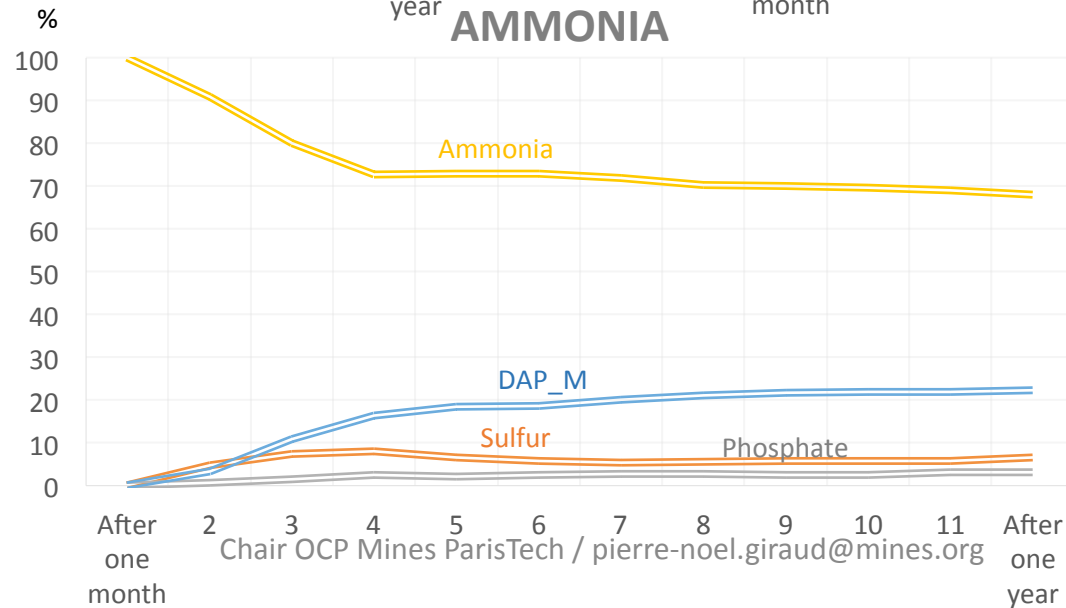
# Transmission of a negative shock on input prices on DAP margins

## PHOSPHATE ROCK

## SULFUR



## AMMONIA

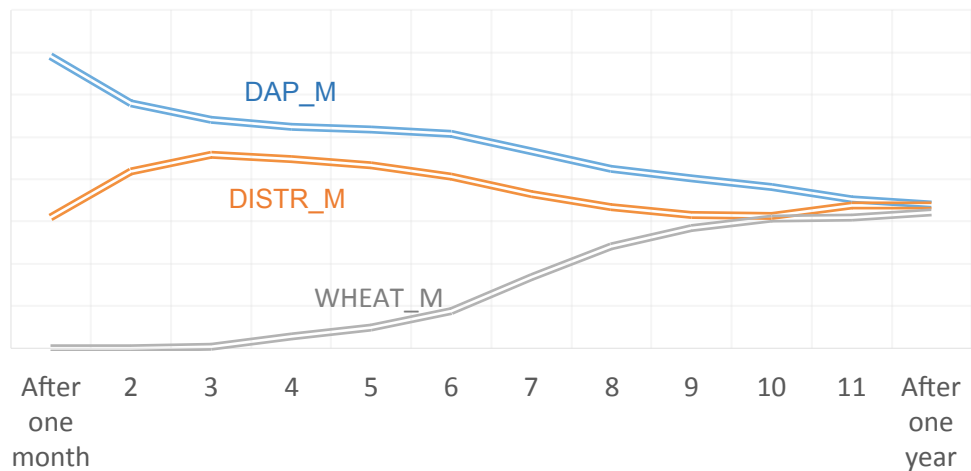


# Phosphate supply chain margin transmission mechanisms: Main Results 1

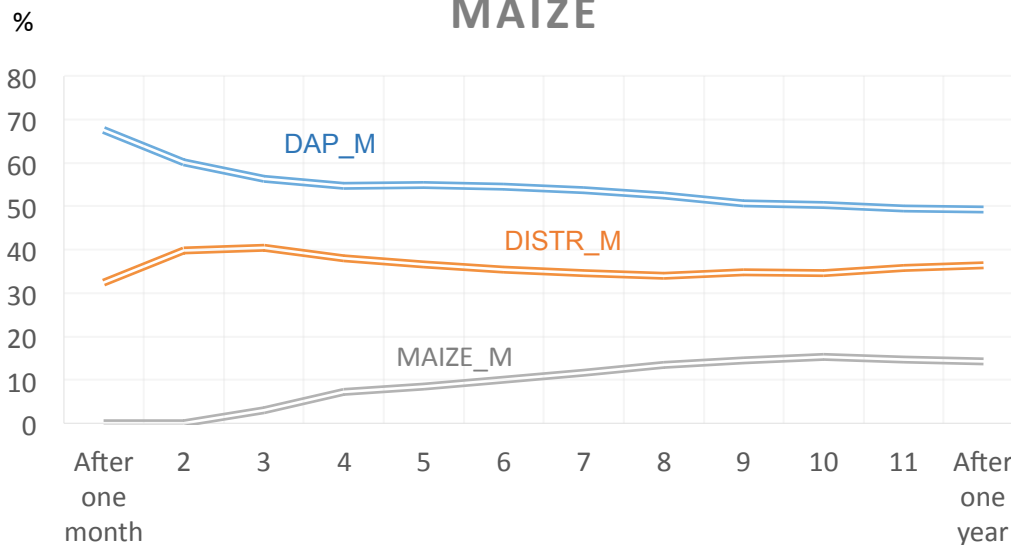
- A negative shock on phosphate rock prices would have an immediate positive effect on the gross margin of fertilizer producers. Sulfur suppliers will try to share that margin in the first month following the shock. Ammonia suppliers will also try to benefit a month later.
- A negative shock on sulfur prices would have an immediate positive effect on the gross margin of fertilizer producers. Ammonia suppliers will try to share that margin two months later.
- A negative shock on ammonium price has an effect on the gross margins of fertilizer producers after two to three months. The result suggest that this shock have a limited impact on sulfur and ammonia prices.

# Transmission of DAP margin shocks on distributors and farmers margins

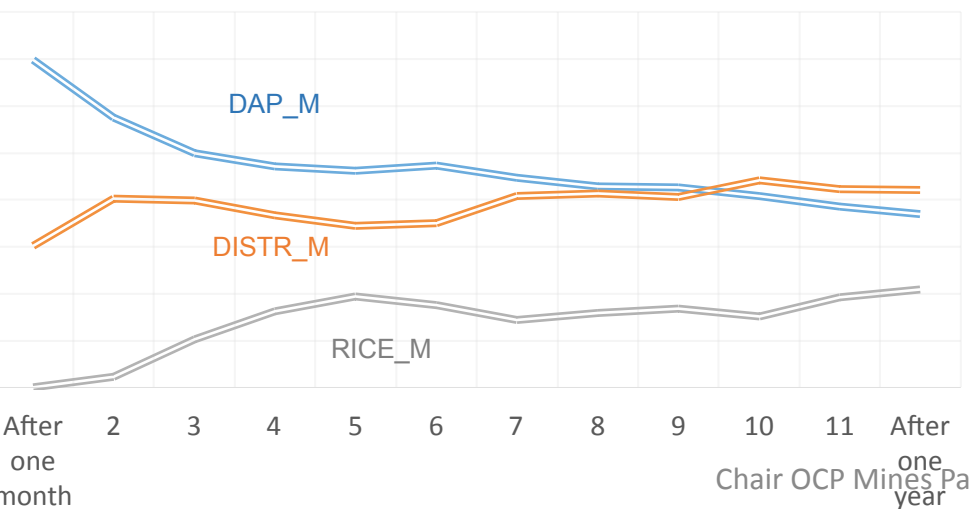
## WHEAT



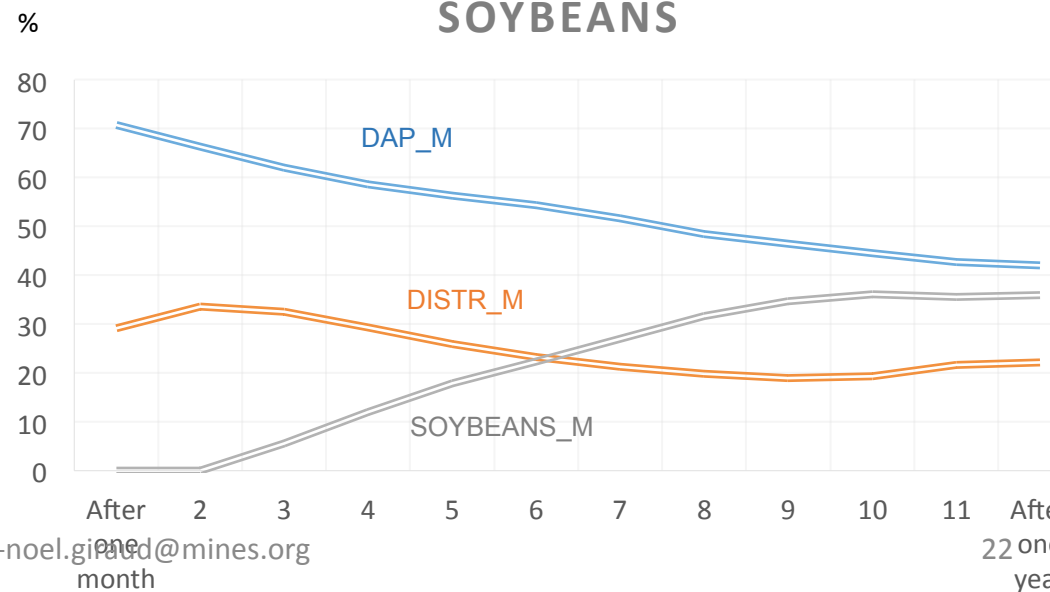
## MAIZE



## RICE



## SOYBEANS



# Phosphate supply chain margin transmission mechanisms: **Main Results 2**

- There is an immediate effect of a DAP margin shock on distributors margins
- slowly translated to farmers margins
- more rapidly for rice than for wheat

# Requierevements and test

## A new DAP future contract ?

### Requirement

Standardisation

Volatility

Market structure

Trust in the settlement price

### Test

Information flows

### New Contract

Yes

Has increased: **distributors and big farmers into the play ?**

**? Crucial issue**

**? Crucial issue**

Let's try and see



# 3. The opportunity of a DAP future market

# Financialisation: definition and issues

- Financialisation: **more** actors and instruments on the markets
- Volatility is not an issue: price volatility may be good
- **Effects on welfare** are the issue
- But average price is driven by the physical market: no welfare issue

# Open questions

- Open theoretical questions on market instability and efficiency:
  - More players = larger diversity of players behaviours or not ?
  - **If yes**, effects on volatility, price of hedging, etc. are very diverse: **no clear effects of an increased « speculation »** ( Ekeland, Lautier, Villeneuve 2015)
  - **If not, does:**
    - More players = more stability ( Friedman) because of a larger diversity of anticipations
    - or :
    - Less stability (Guesnerie-Rocher) because of more mimetism ?
- Operational issues:
  - Actual market imperfections
  - **Reliable price index**

# Thank You !