

Price transmission at the micro-level

What accounts for the heterogeneity?

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Four Features of this Research

- High frequency retail scanner data
- Estimation of vertical price transmission at barcode specific level by retailer
- Highlight heterogeneity even for a homogenous product
- Methodological innovation – propose a simple way to incorporate imperfect competition into the estimation of price transmission.

Background

- Until recently, price transmission undertaken at aggregate level
- Availability of retail scanner data presents opportunities to unpack aggregate analysis of the past
- Recent literature using scanner data emphasises heterogeneity:
 - among different categories of food (degree of processing)
 - Private labels vs national brands (vertical coordination)
- Differences by retailer less common but potentially important given the imperfectly competitive nature of retail food markets
- Market power typically implicated in 'imperfect' price transmission

Why would price dynamics potentially vary across retail chains?

Retail markets are highly concentrated

ASDA

TESCO



Sainsbury's

YOUR M&S

Waitrose



Somerfield

Why would price dynamics potentially vary across retail chains?

Variation in market share

ASDA

TESCO



Sainsbury's

YOUR M&S

Waitrose



Iceland

Somerfield

Why would price dynamics potentially vary across retail chains?

Variation in use of Private labels

ASDA

TESCO



CO
OP

Sainsbury's

YOUR
M&S

Waitrose

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MORRISONS

Iceland

Somerfield

Why would price dynamics potentially vary across retail chains?

Differences in positioning and sales strategy

ASDA

TESCO



Sainsbury's

YOUR M&S

Waitrose

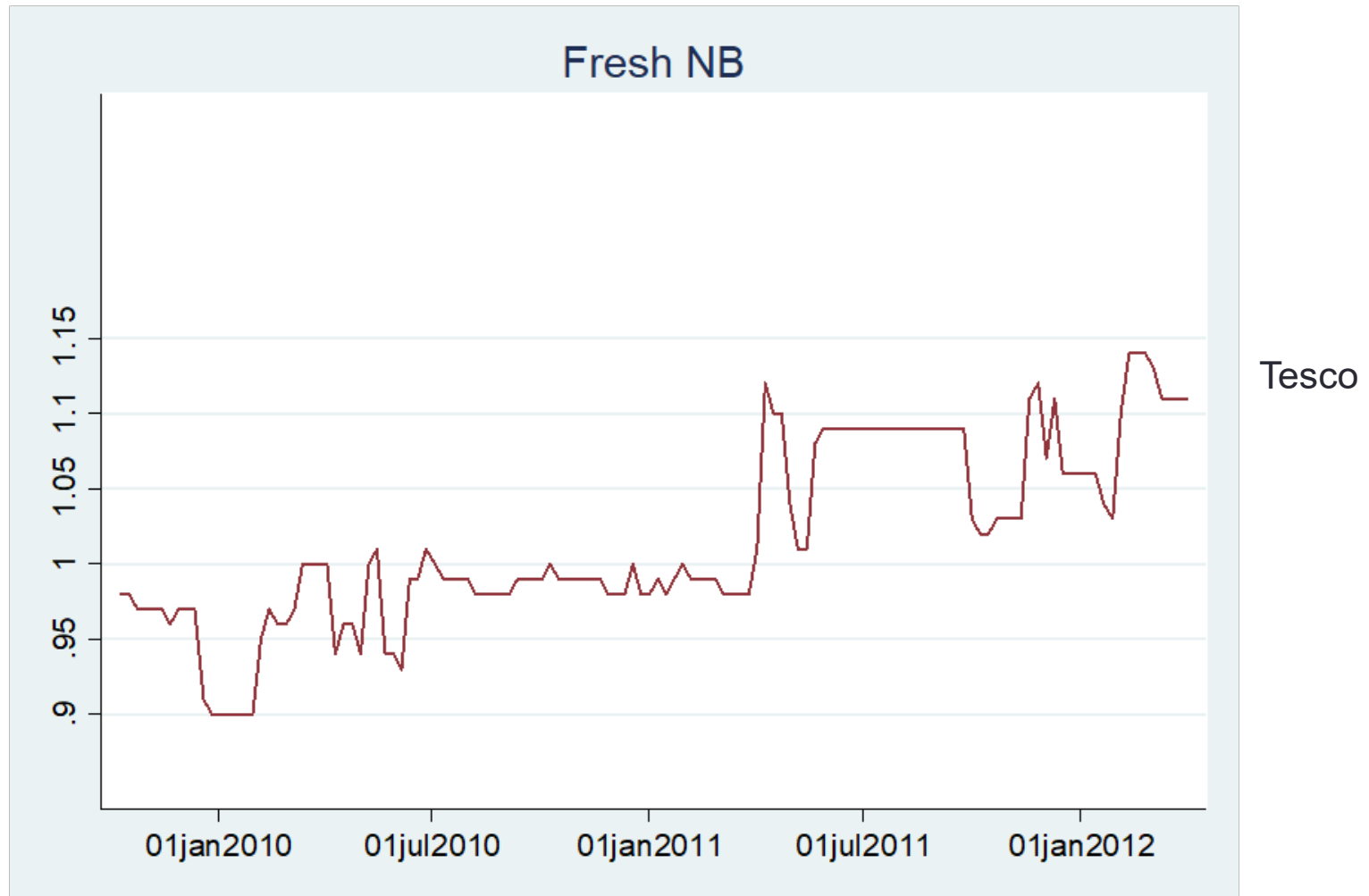


Somerfield

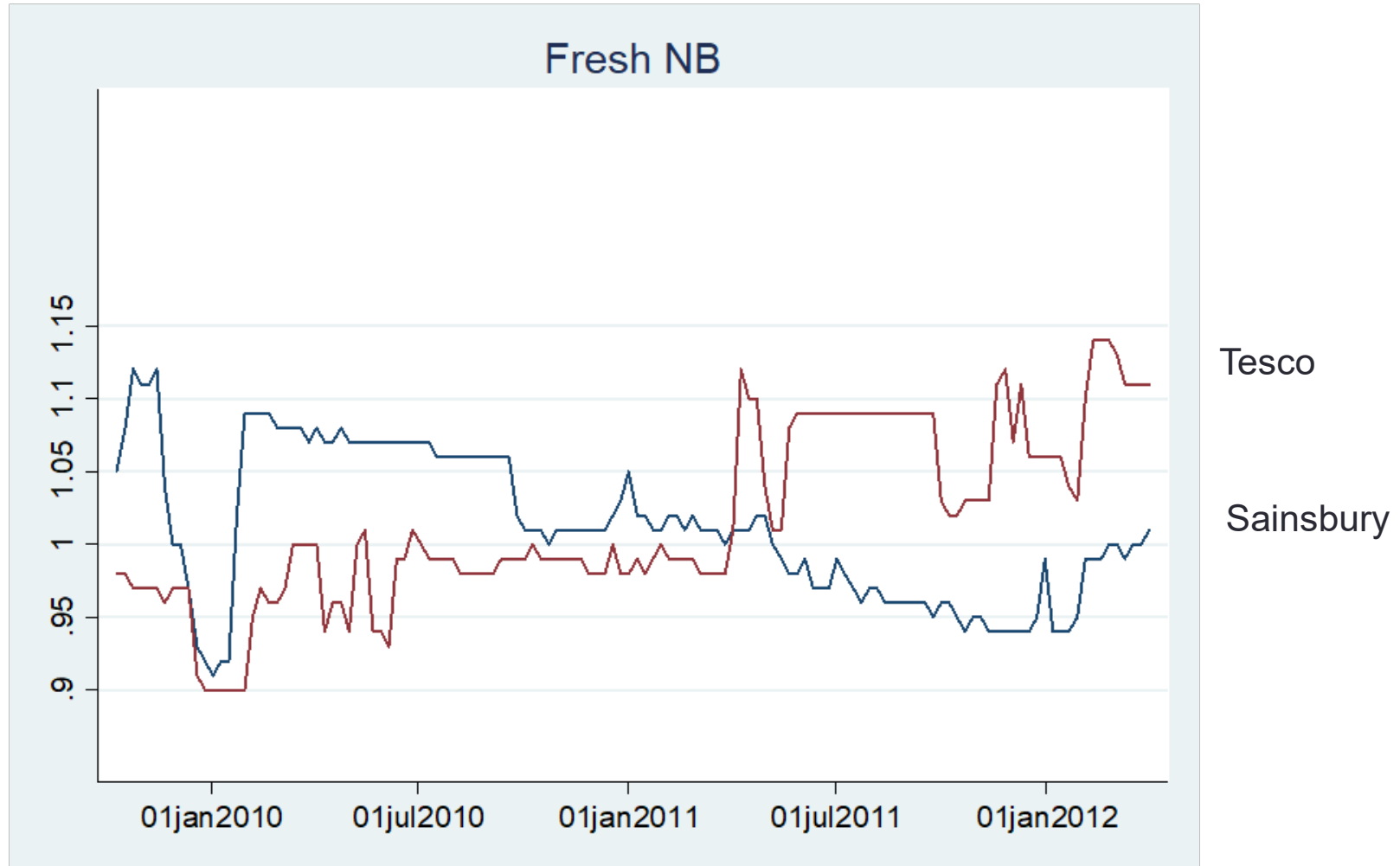
We focus on orange juice. Why?

- Simple, relatively unprocessed product
- Clear link with upstream product (oranges)
- Private labels and national brands
- Sold in all retailers

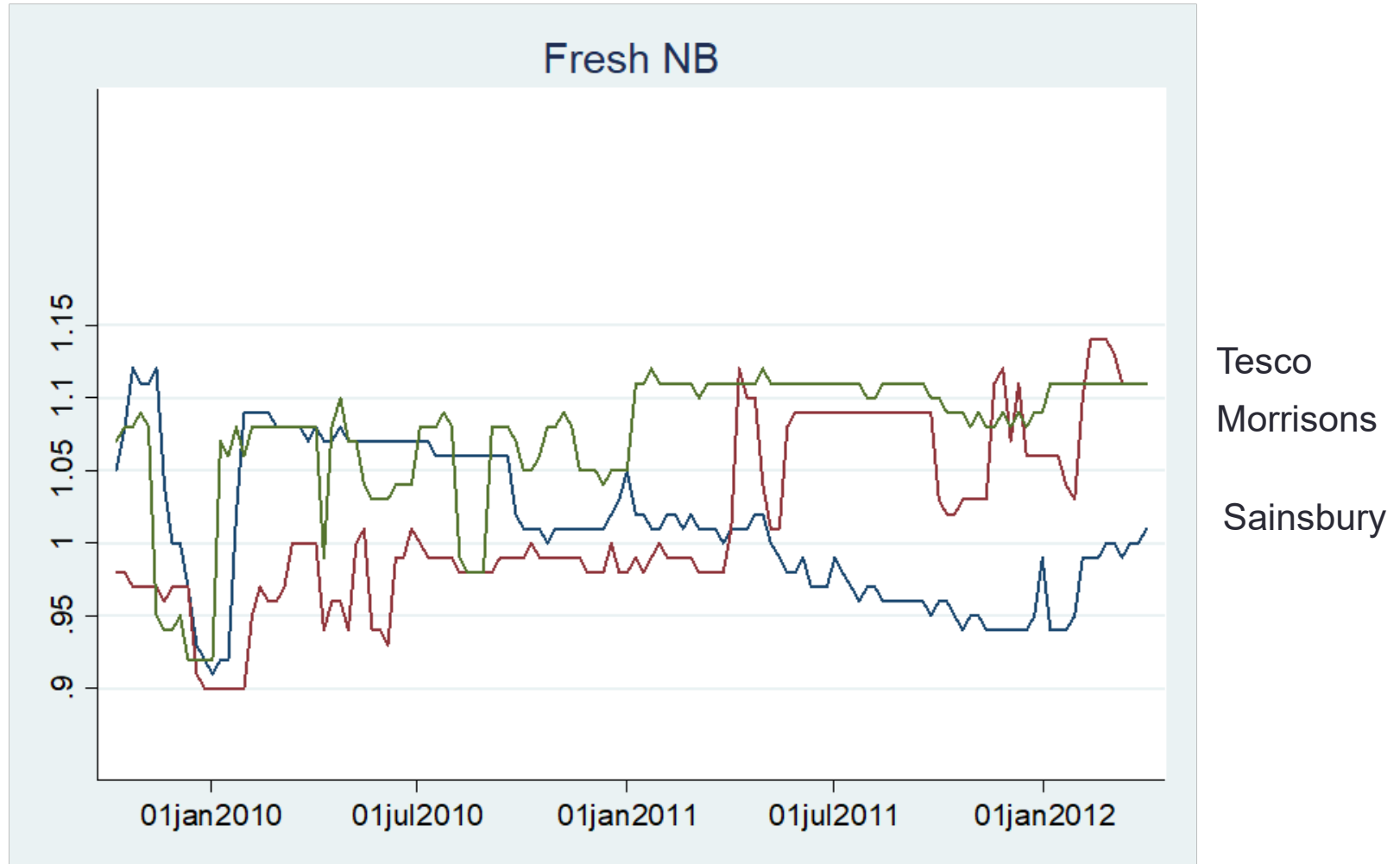
All this heterogeneity leads to . . .



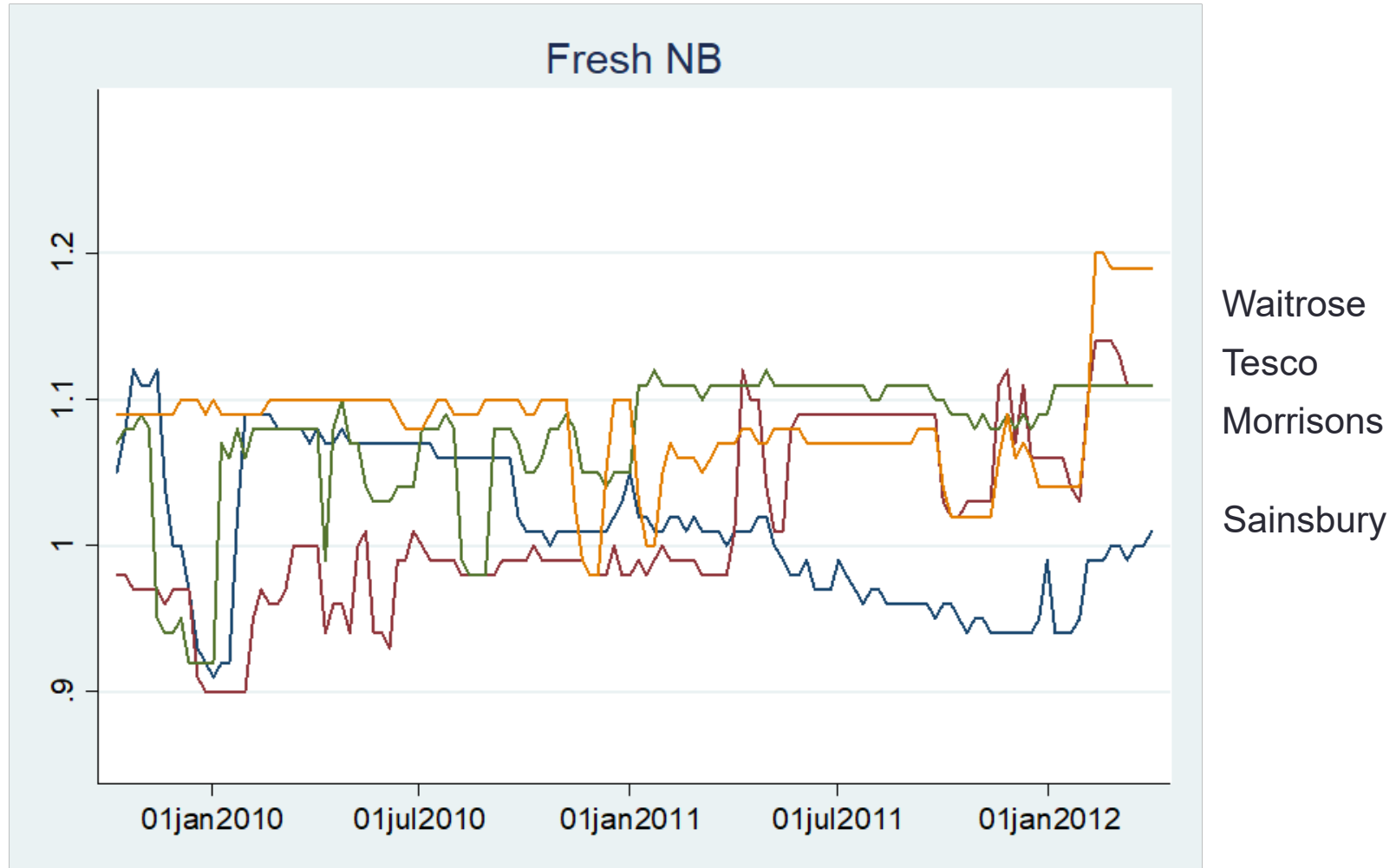
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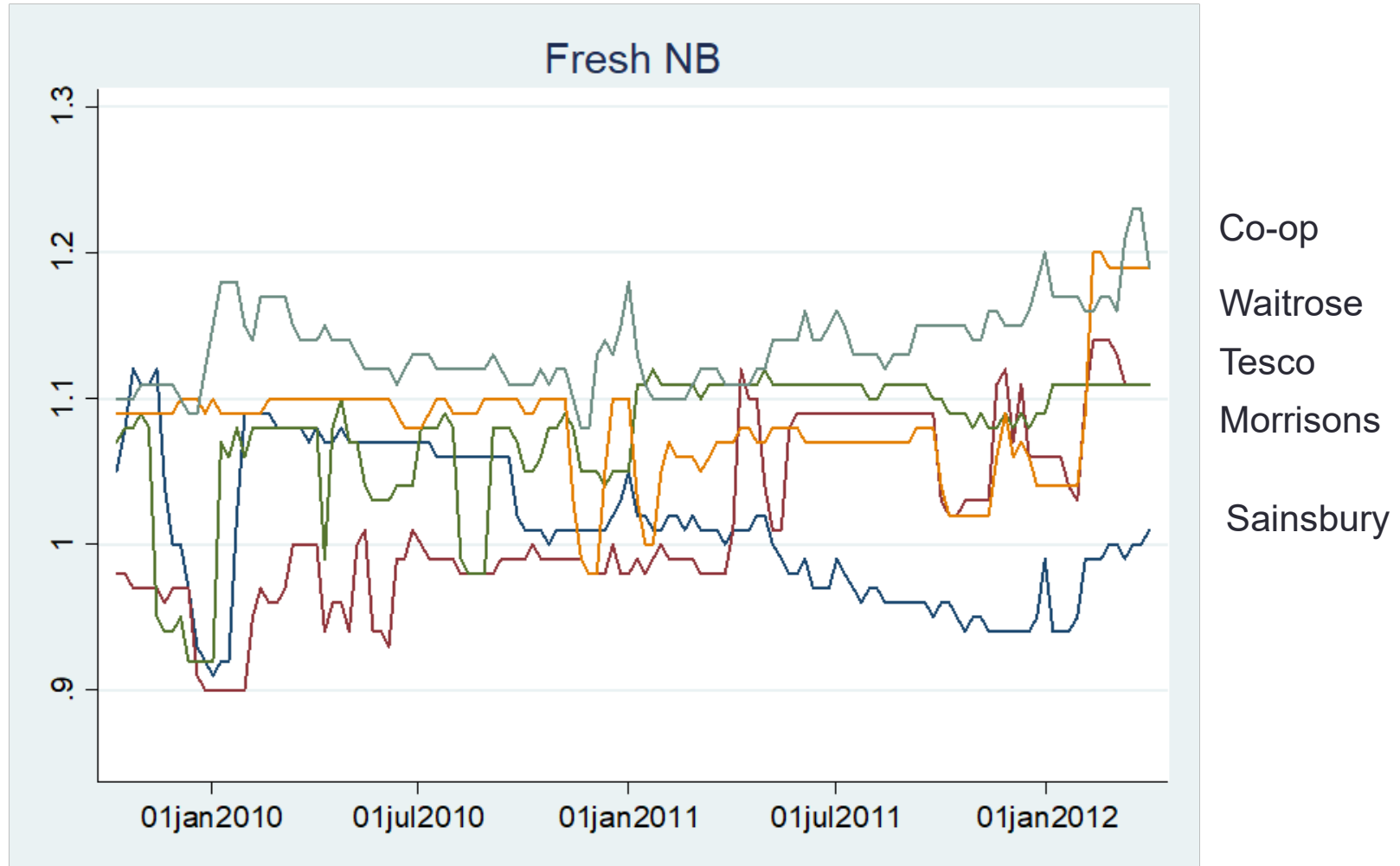
All this heterogeneity leads to . . .



All this heterogeneity leads to . . .



All this heterogeneity leads to . . .



Potential Implications

- Law of one price is a myth. Price dispersion is the norm at the micro level.
- Price transmission may not be uniform, even for identical products
- Suggests competition may play a role in determining price transmission
- Standard methods of price transmission in vertical markets potentially mis-specified where market power suspected

Explaining Price Transmission

- Amiti *et al.*, (2017) provide theoretical underpinning
- In principle, $PT = f(\text{Costs}; \text{Markup})$
- Mark-up over marginal costs reflects extent of imperfect competition

$$\bar{p}_{it}^r = mc_t + \mathcal{M}^r (\bar{p}_{it}^r, p_{-it}^{-r}) \quad (1)$$

- \bar{p}_{it}^r profit maximising price for product i in retailer r ;
- mc_t marginal costs;
- \mathcal{M}^r mark-up of retailer r ;
- p_{-it}^{-r} price of product i in rival retailers.

The estimating equation

$$\bar{p}_{it}^r = \varphi_1 mc_t^r + \varphi_2 p_{-it}^{-r} \quad (2)$$

- φ_1 measures the price transmission
- φ_2 is the strategic complementarity effect,
- With imperfect competition, omitting rival prices from the price transmission equation mis-specifies the price transmission equation and overstates price transmission

Data

- Nielsen scantrack: prices by retail chain
 - 35 orange juice products
 - 7 retail chains
 - 106 retailer x product time series (NB=27; PL=79)
 - 130 weeks
 - 11,303 price observations
- To identify the strategically complementarity effect, we derive the p_{-it}^{-r} as a price index rival retailers for each product in each retailer
- Marginal costs approximated by weekly sterling price of frozen orange juice on spot market (Bloomberg).

Econometric Approach

- Exploiting non-stationary of costs and prices we employ a large (N,T) panel cointegration analysis
- Mean Group (Pesaran and Smith 1995) and Pooled Mean Group (Pesaran *et al.* (1999) estimators
- Long run relationship

$$\bar{p}_{it}^r = \varphi_1 mc_t^r + \varphi_2 p_{-it}^{-r} \quad (2)$$

embedded in error correction representation of dynamic ADL model augmented by controls for sale prices and seasonals.

Price Transmission and Strategic Complementarities

$$\bar{p}_{it}^r = \hat{\varphi}_1 mc_t^r + \hat{\varphi}_2 \bar{p}_{-it}^{-r}$$

| | Full Sample | |
|---------------------------------------|-------------|----------|
| Costs ($\hat{\varphi}_1$) | | 0.138*** |
| Rival prices ($\hat{\varphi}_2$) | | 0.427*** |

Key Result

- A significant complementarity effect

Price Transmission and Strategic Complementarities

$$\bar{p}_{it}^r = \hat{\varphi}_1 mc_t^r + \hat{\varphi}_2 \bar{p}_{-it}^-$$

| | Full Sample | |
|---------------------------------------|-------------|----------|
| Costs ($\hat{\varphi}_1$) | 0.393*** | 0.138*** |
| Rival prices ($\hat{\varphi}_2$) | | 0.427*** |

Key Result

- A significant complementarity effect
- PT over-stated (a lot) in absence of rival prices
- Price transmission contingent on response to prices in rivals

Further insights: Retailer Models

- Drilling down into the data we estimate separate models for each for brands and private labels
- For all retailers, price transmission lower for private labels than national brands, suggesting that where they exploit their power most
- Strategic complementarity significant among all retailers except Tesco (the market leader) underlying its dominant role in the UK market

Summary

- Price transmission with scanner data reveals important differences in price transmission, hidden in aggregate analysis, even for identically barcoded products
- Underscores important role for private labels in exercising retailer power
- We show how to incorporate market power as a determinant of price transmission in a reduced form (tractable) framework.
- Underlies potential bias in estimates of price transmission in imperfectly competitive retail markets

Sensitivity Analysis

- Key findings robust to a number of alternative specifications:
 - Models with and without controls for sales
 - Alternative definitions of rival prices
 - Testing endogeneity of rival prices
 - Inclusion of other costs (energy prices)

Next steps

- Attempt to explain the differences in magnitude and pattern exhibited by each retailer in terms of market power and strategic complementarity across the national brands and private label they sell
- Roll out in to other categories of food