

Price transmission and imperfect competition in the food industry

Tim Lloyd

AIEAA Conference, Rome 2021

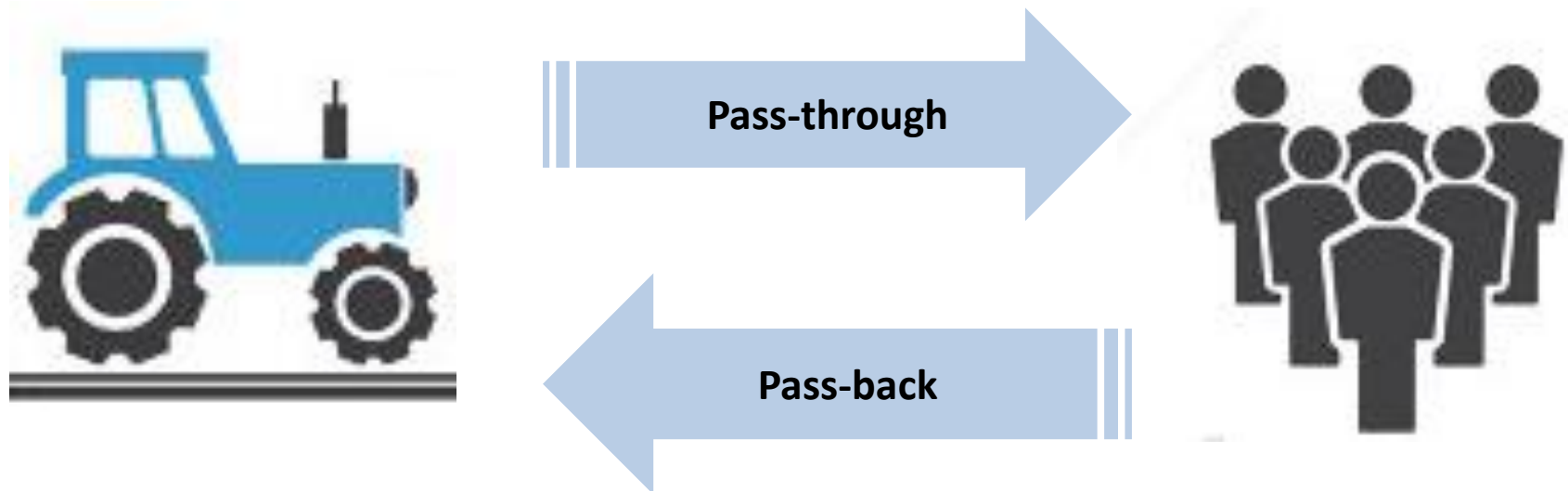
Price transmission

- The What
- The How
- The Why

What is price transmission?

In the food chain . . . “How quickly and to what extent changes in farm prices are transmitted to the retail level and *vice versa*”

Vavra and Goodwin (2005)



How is price transmission measured?

- Elasticity of price transmission

$$\tau = \frac{\text{percentage change in retail prices}}{\text{percentage change in farmgate prices}}$$

- 492 papers *AgEcon Search* (Kouyate and von Cramon-Taubadel, 2016)

Why study price transmission?

- Prices convey information
- Key indicator of the behaviour of participants in the chain and its overall functioning
- Concerns of market power motivates much analysis of price transmission

Price transmission a key concern

Countries	Food price increase	Food price volatility	Price transmission along the chain Unfair trading practices	Declining terms of trade for farmers	Other
Australia			+	+	
Belgium		+	+		+
Canada	+		+		
Chile			+	+	
Czech Republic	+				
Denmark	+		+		+
Estonia			+	+	+
European Union	+	+	+		
France	+	+		+	
Indonesia	+		+	+	
Israel	+		+		
Italy	+	+	+	+	
Latvia			+		
Lithuania	+				+
Netherland			+	+	+
New zealand			+		
Poland		+	+		+
Portugal			+	+	
Slovenia			+		
South africa	+		+		
Switzerland	+	+	+		
Turkey	+	+	+	+	
United Kingdom	+			+	+

Source: OECD (2015)

Why study price transmission?

- Prices convey information
- Key indicator of the behaviour of participants in the chain and its overall functioning
- Concerns of market power motivates much analysis of price transmission
- The food industry dominates modern food chains

The Food Dollar



Why study price transmission?

- Prices convey information
- Key indicator of the behaviour of participants in the chain and its overall functioning
- Concerns of market power motivates much analysis of price transmission
- Intermediate sectors dominates the food chain
- The principal mechanism for food inflation

Why Does Food Price Inflation Matter?

“If inflation is the most regressive of taxes. . .

. . . . food inflation is its most regressive component”

(Kenneth Rogoff, Harvard Professor and former IMF Chief Economist)



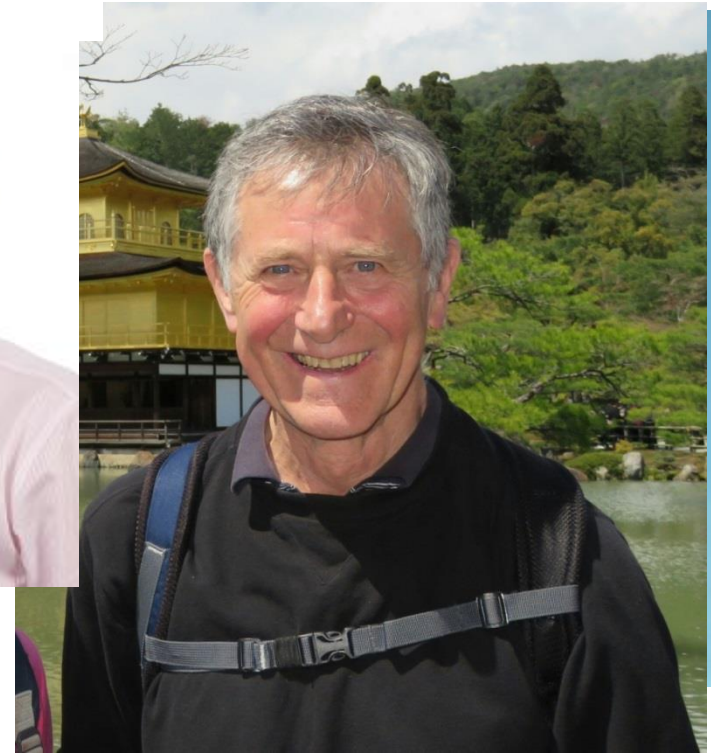
Plan

- Some basic insights from theory
- Detecting Market Power
- Supermarket Scanner data
- Price Transmission at the firm level

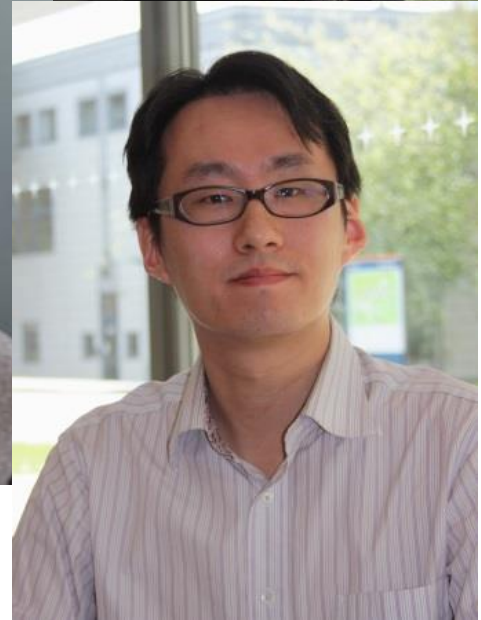
THE A-TEAM™



- Tony Rayner
- Wyn Morgan



- Tony Rayner
- Wyn Morgan
- Steve McCorriston
- Hao Lan
- Habtu Weldegebriel



Basic Insights from Theory

Price Transmission

- Despite its familiarity and importance, price transmission was (is) quite commonly misunderstood
- This reflects how the food industry has typically been treated in the textbook treatment of price transmission.
- It was assumed away.

When food industry is assumed away . . .

FARM



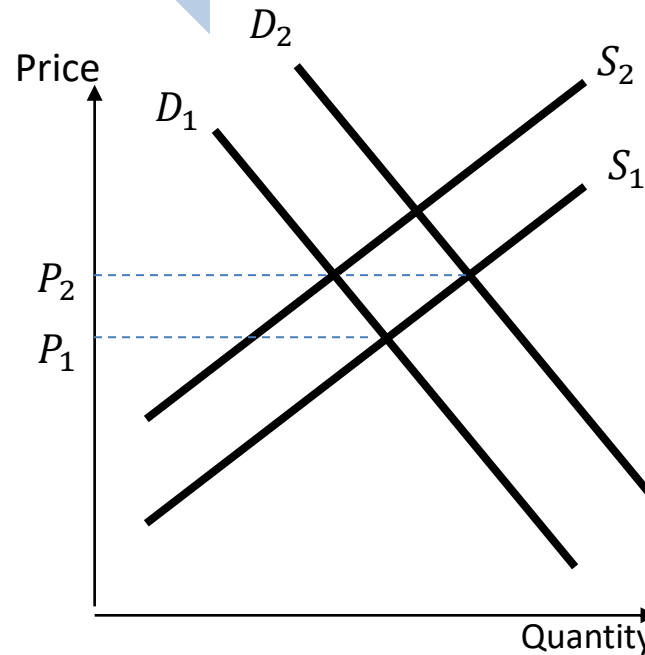
RETAIL



Pass-through

Transmission elasticity (τ) = 1

Pass-back



- Farm and retail prices co-move
- There is perfect (one-for-one) transmission of shocks.

- Source of shock is unimportant for transmission.
- Farm and retail prices equally volatile

Introducing the food industry

FARM



MARKETING



RETAIL



Farm
Supply
Shock

Marketing
Supply
Shock

Retail
Demand
Shock

Gardner (1975)



First to set out the theory of price transmission in a competitive food chain

Many insights

Highlights some misconceptions

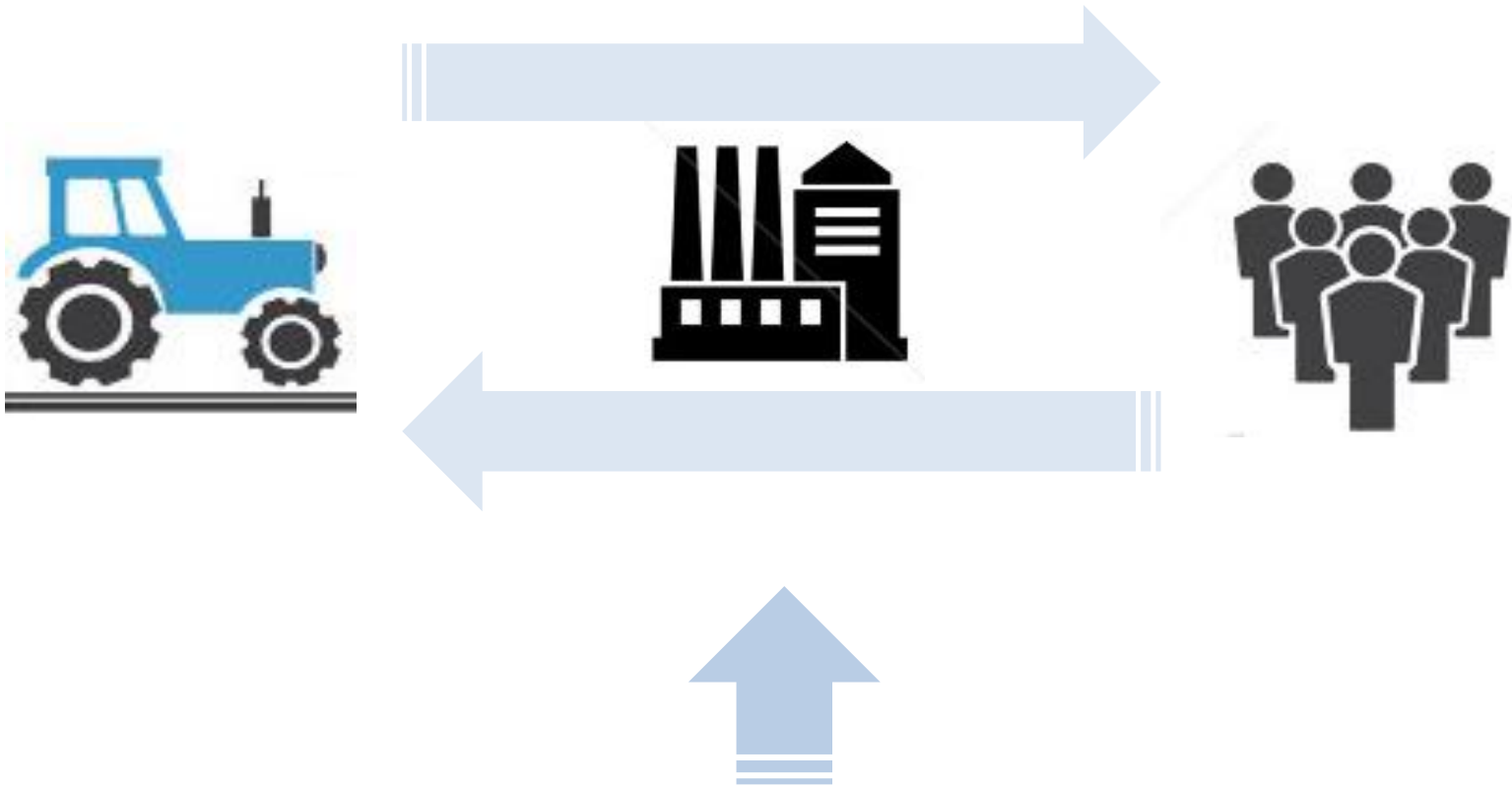
In a perfectly competitive chain



Farm Prices are more volatile than retail prices

‘Sticky’ retail prices

In a perfectly competitive chain



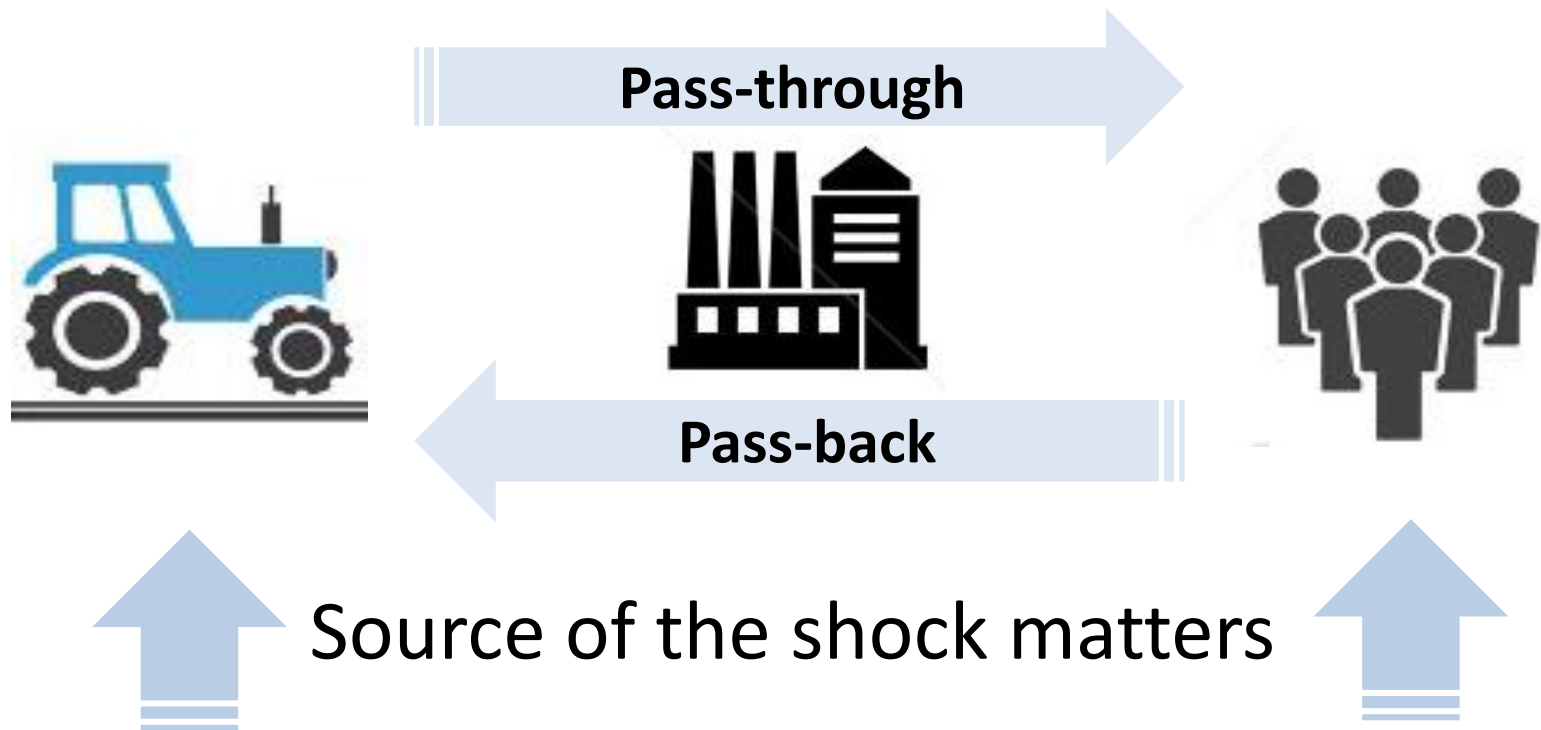
Farm and retail prices can move in opposite direction

UK Competition Commission Inquiry (2000) motivated by . . .

‘ . . . [the] public perception of . . . an apparent disparity between farm-gate and retail prices . . . which is seen as evidence by some that grocery multiples were profiting from the crisis in the farming industry’.

CC (2000), vol.1, p.3

In a perfectly competitive chain



There are separate mechanisms governing passthrough and passback

Key Result

- Unitary price transmission elasticity ($\tau = 1$) is not the natural outcome of perfect competition.
 - τ depends on range of factors (elasticities of supply and demand, substitution and technological change)
 - $\tau = 1$ is in fact the most unlikely value in perfect competition (Kinnucan and Zhang, 2015)

Key Implications for market power

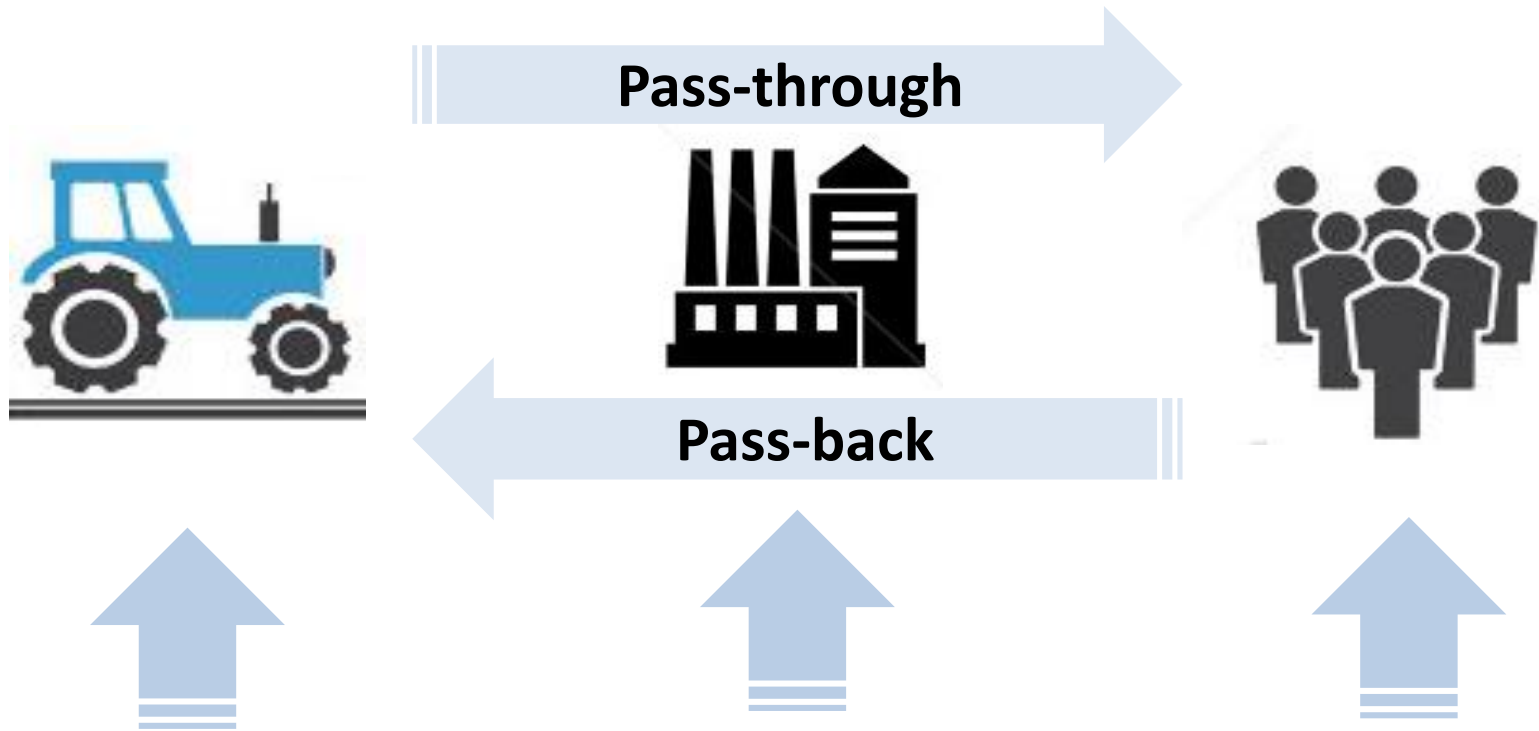
- Size of price transmission (τ) is a misleading indicator of competition.
 - $\tau \approx 0$ does not mean non-competitive pricing either
- Asymmetric price transmission (Frey and Manera 2007)
 - Often used indicator of imperfect competition
 - “. . . more useful in describing how markets look than how they work.” (Azzam 1999)
- Understanding the institutional setting is vital

Detecting Market Power

Detecting Market Power

- In recent decades market power a growing public policy concern, particularly in UK
 - 9 firms control 95% consumer food
 - Competition Inquiries (2000, 2008, 2015)
- Potential for reduced form bivariate regressions to inform about the competitive setting is slim
- Structural economic approaches are rigorous and informative but empirically and technically challenging (e.g. Sckokai *et al.* 2012)

Bridging the gap



"Buyer Power in U.K. Food Retailing: A 'First-Pass' Test"

Lloyd *et al.* (2009)



Bridging the gap

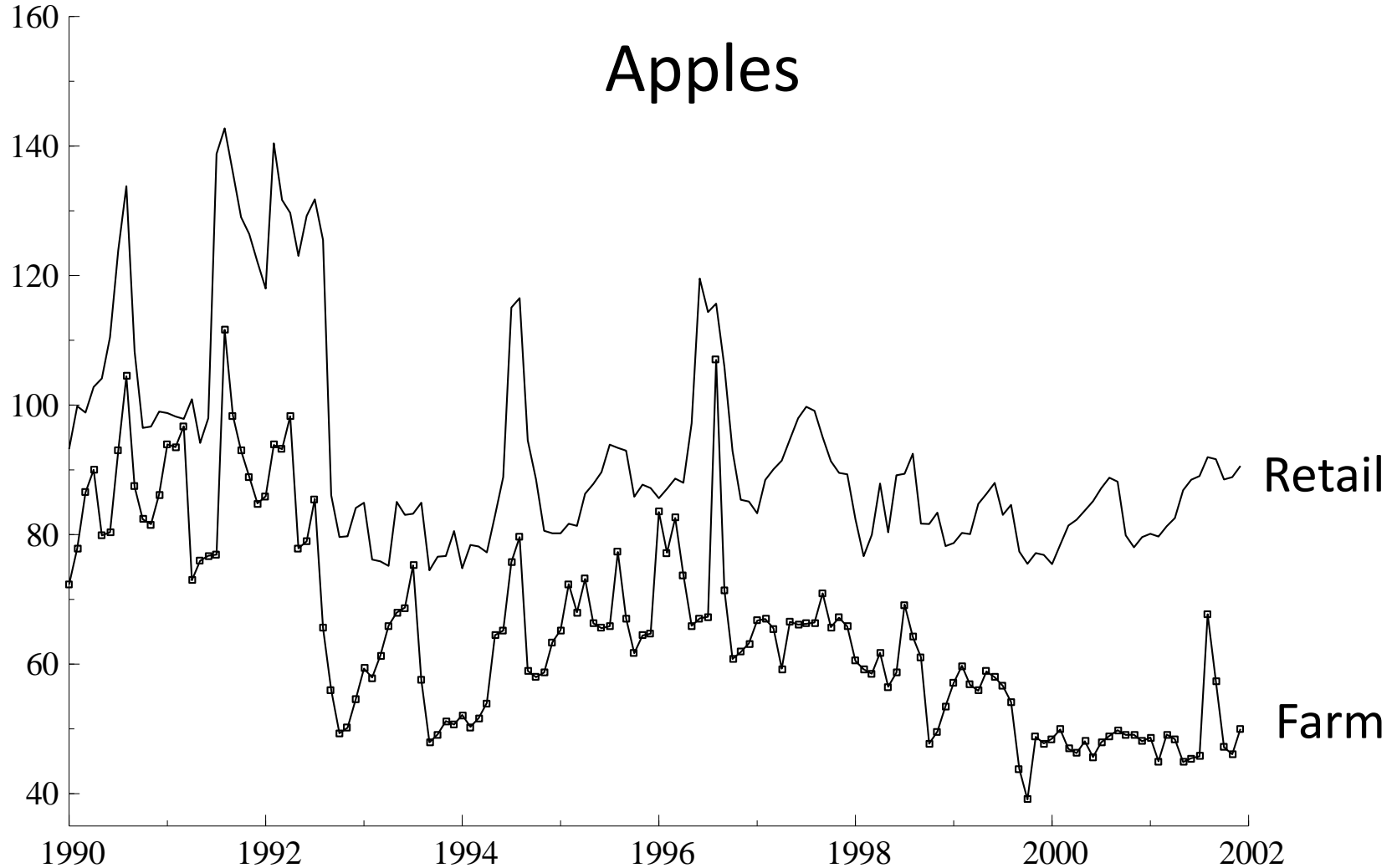
- Our approach exploits a useful theoretical result.
 - In a perfectly competitive food chain, if the supply of marketing inputs can be treated as exogenous ($\varepsilon_m = \infty$)
- Shocks to farm and retail are transmitted in accordance with farm share in retail cost function
 - $\tau = S_f$
 - Price spread is only affected by marketing costs
- These results do not apply under imperfect competition . . . and provide a basis for testing

Bridging the gap

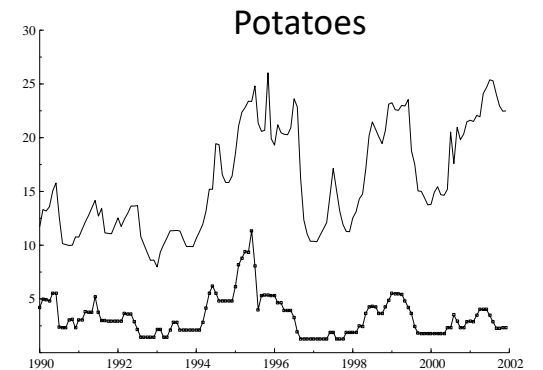
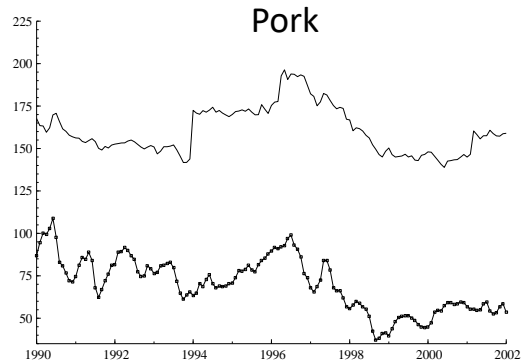
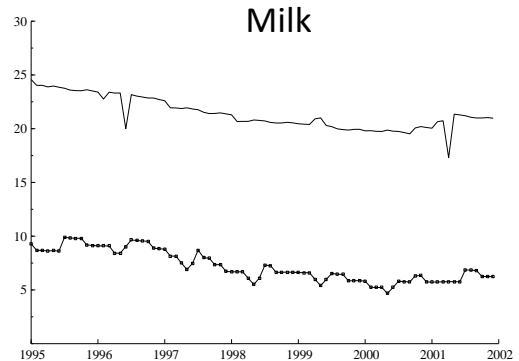
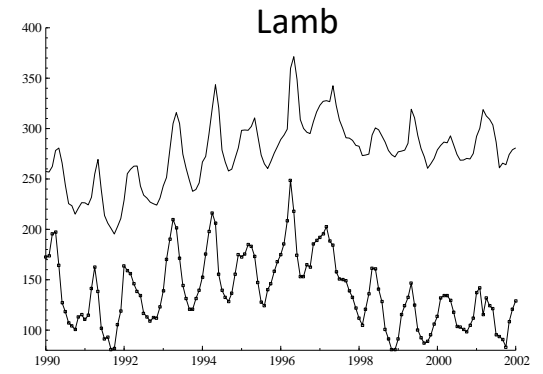
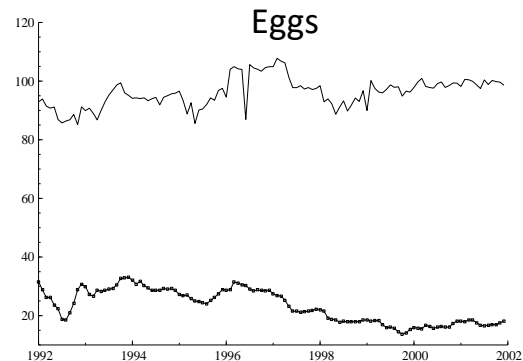
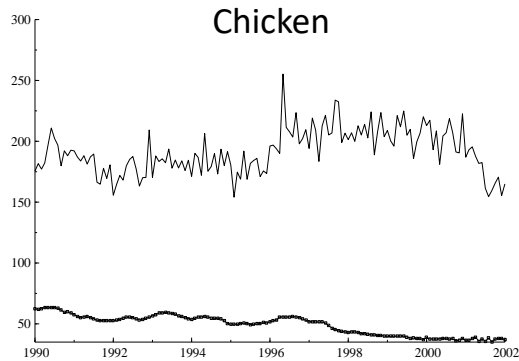
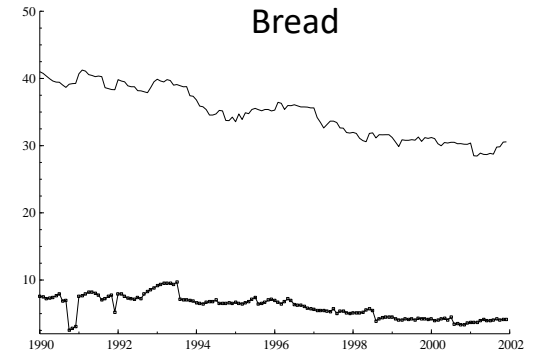
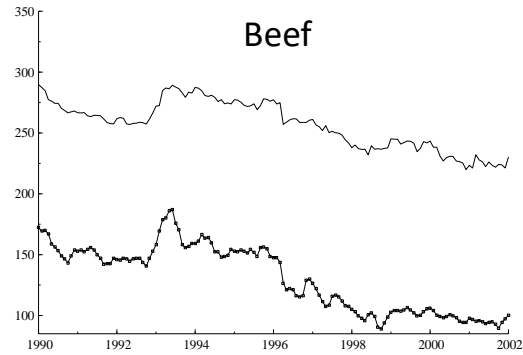
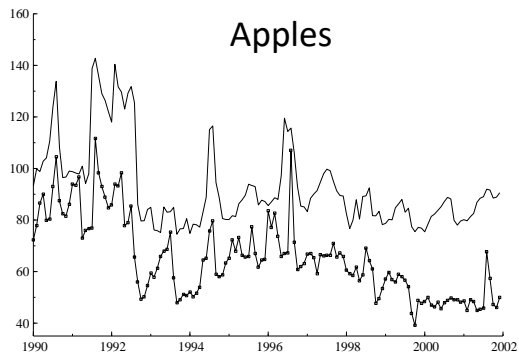
- Empirically, augment farm and retail prices in the price transmission equation with specific shocks (shifters) to
 - farm supply
 - marketing costs
 - consumer demand
- Theory-consistent empirical test for imperfectly competitive pricing
- Theory signs the effects of shocks
- Operationalised using standard methods of modern time series analysis (VECM)

But that's it.

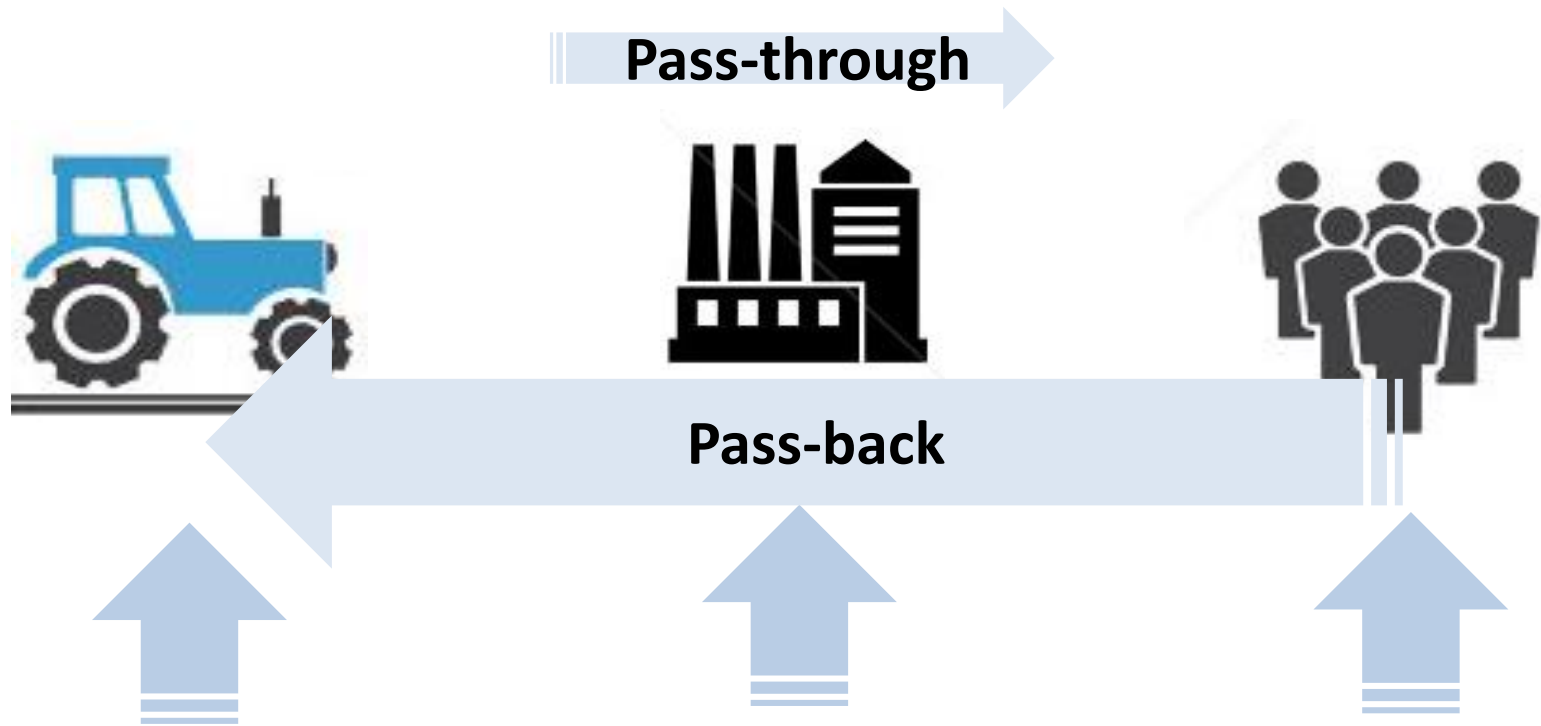
Time series data of Retail and Farm Prices



Time series data of Retail and Farm Prices



Testing buyer power in UK food retailing



Results consistent with buyer power in 7 out of 9 agricultural product markets

Where buyer power found, coefficients correctly signed in almost all cases.

A First Pass test

- Confirmed the conclusions of the Statutory Inquiry
 - 27 practices involving supermarket buyer power.
- ‘First Pass Test’ acknowledges
 - Simplifying assumptions required to test for market power in price transmission regressions
 - Does not indicate extent, merely presence of non-competitive pricing
- Tractable complement to the structural approach

Scanner Data

Scanner data

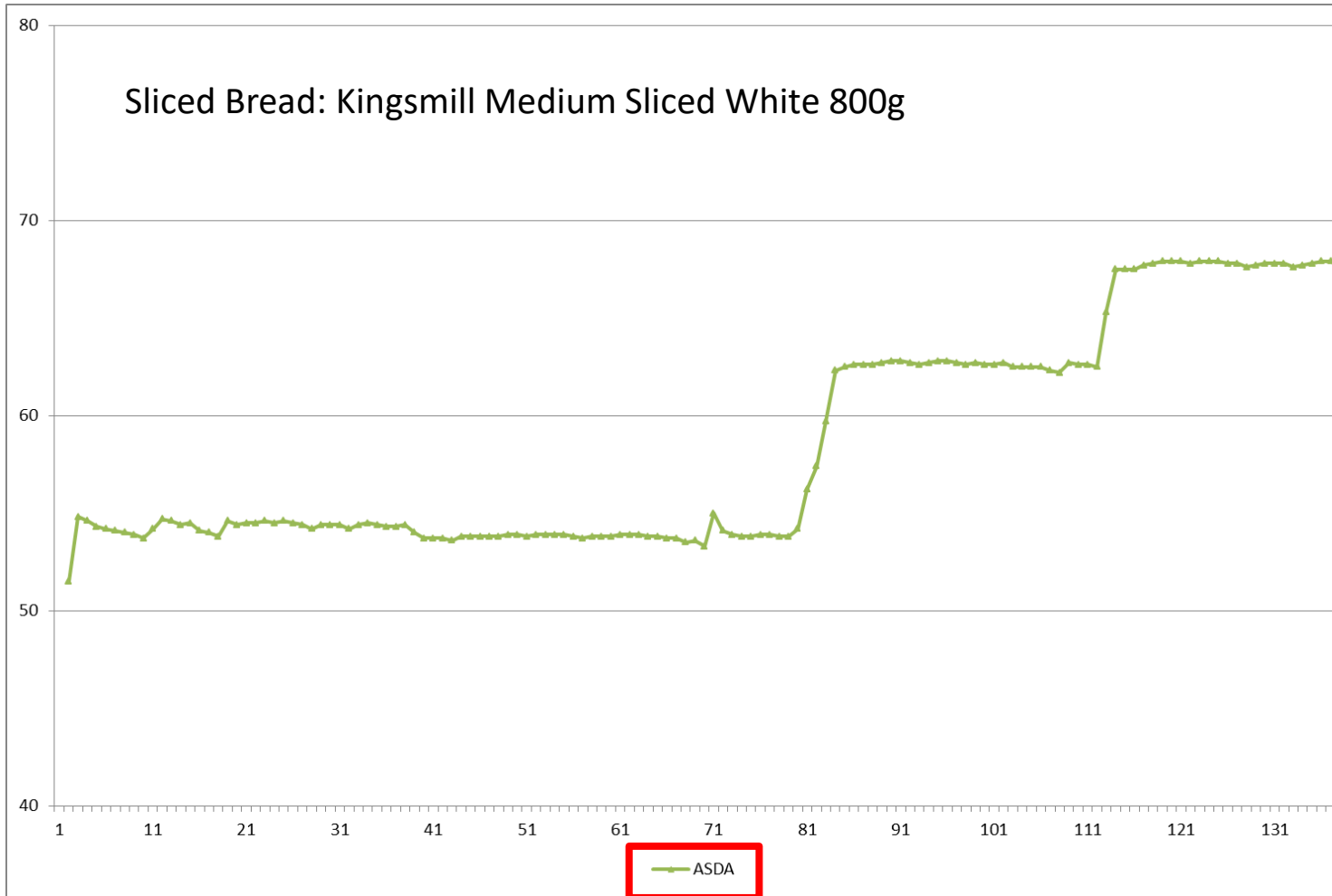
- Revolutionised stock control and pricing
- But also how we think about price transmission
- A new kind of data
- Captures the highly differentiated products that we actually buy rather than broad aggregates used previously (milk, beef)



Scanner Data



Scanner prices



AC Nielsen

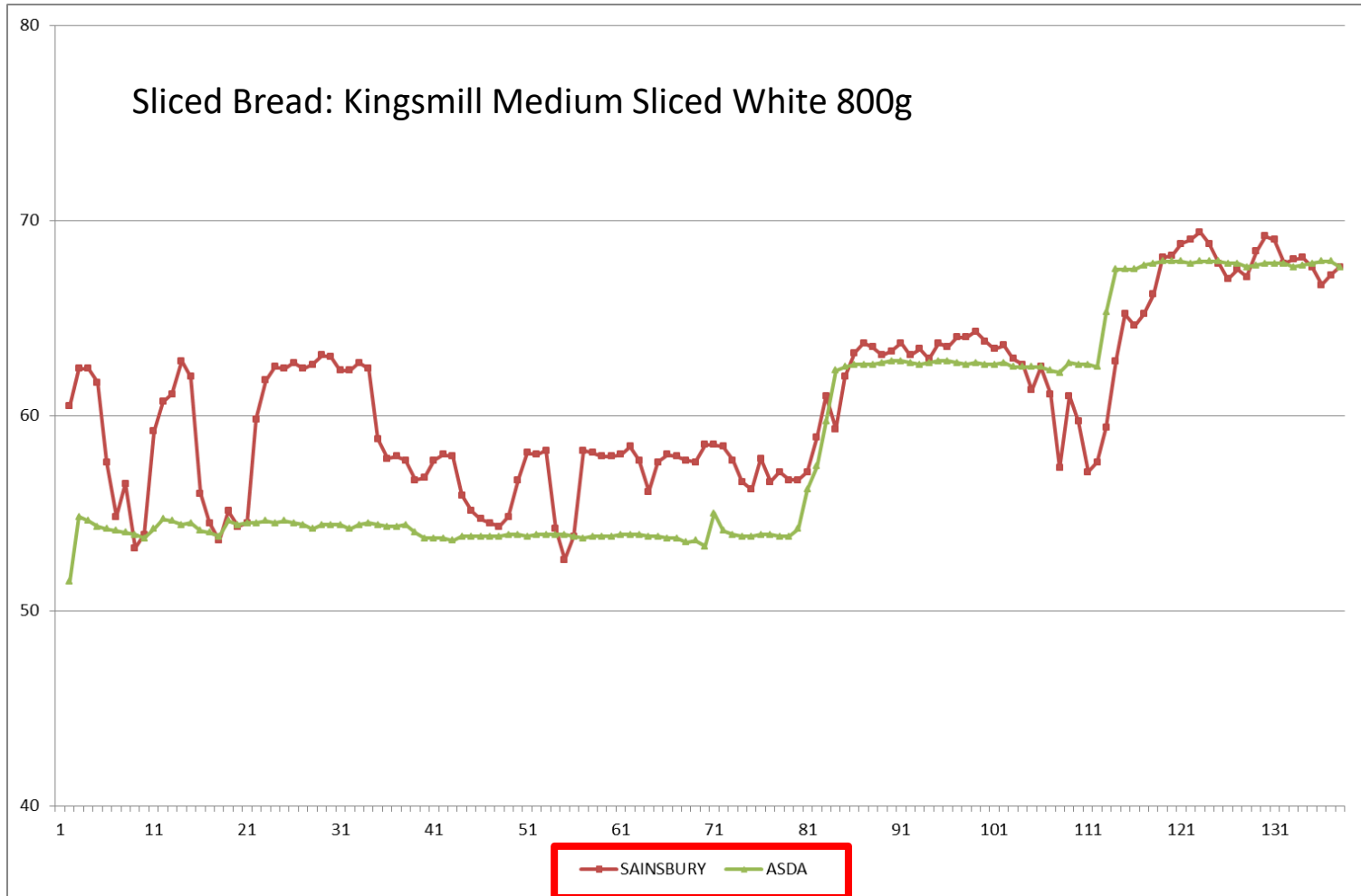
Average unit
price

Weekly

2.5 Years

ASDA

Scanner prices



AC Nielsen

Average unit
price

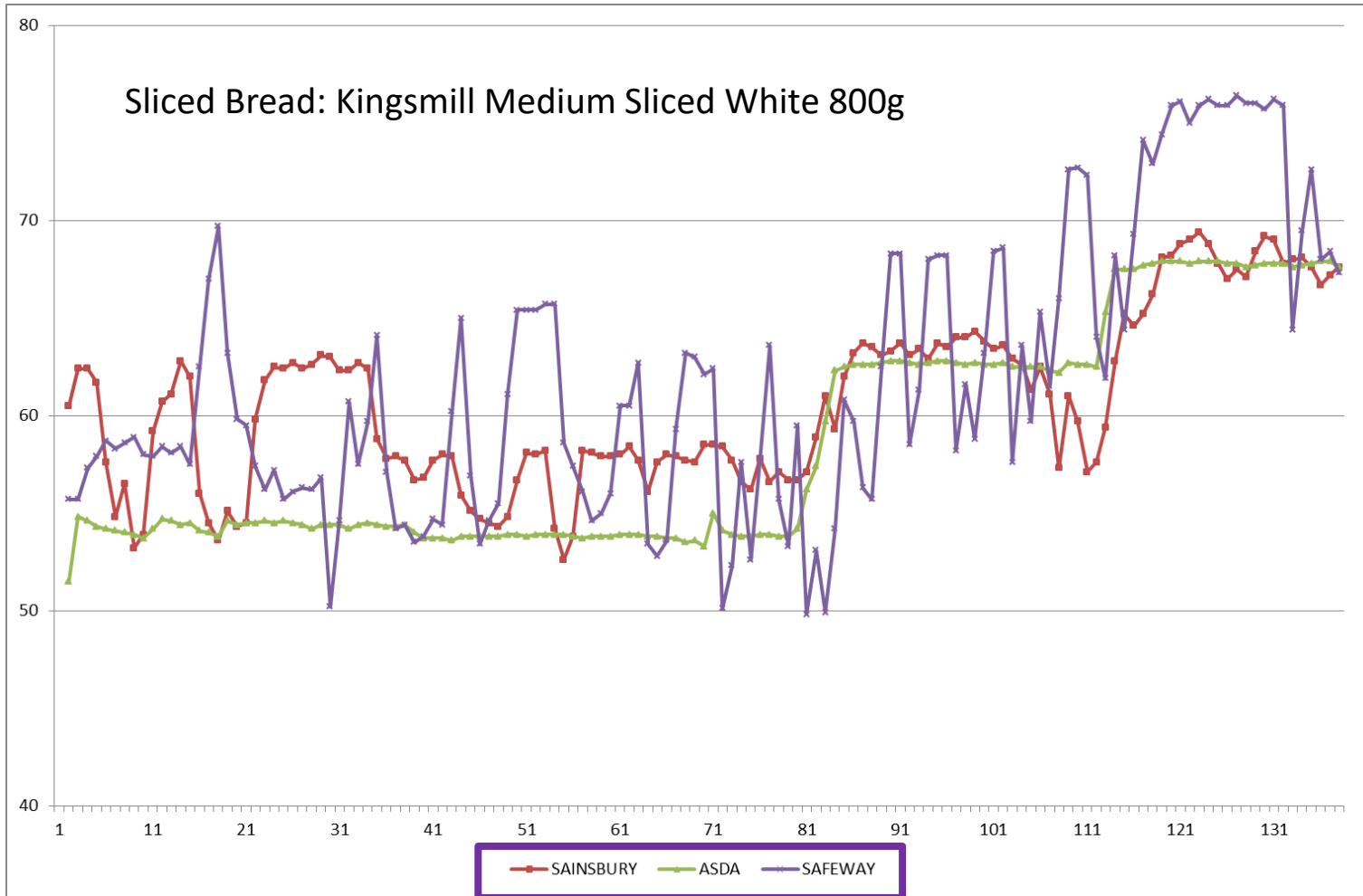
Weekly

2.5 Years

2 Retail
Chains

Price Matching?

Scanner prices



AC Nielsen

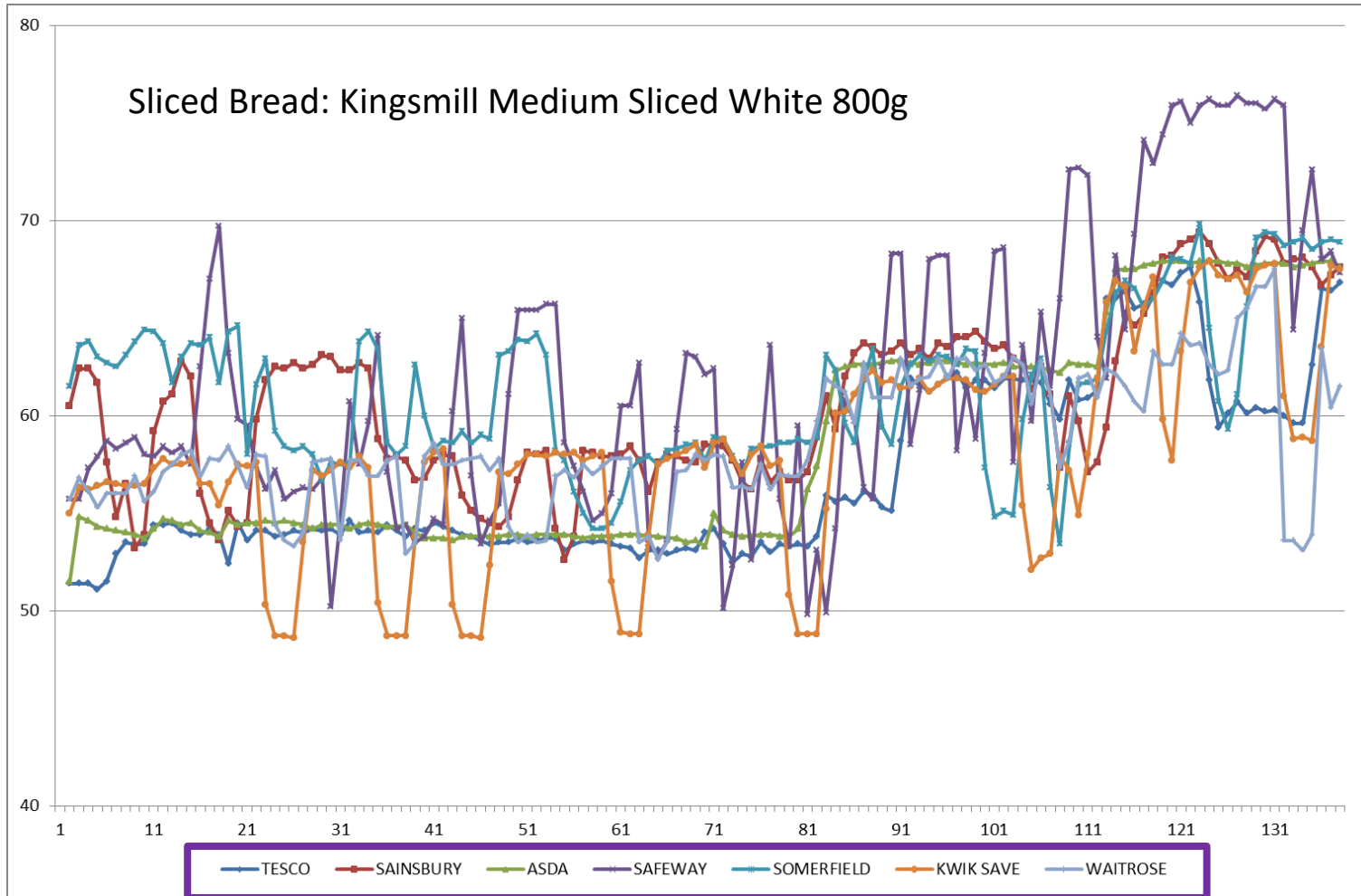
Average unit
price

Weekly

2.5 Years

3 Retail
chains

Scanner prices



AC Nielsen

Average unit
price

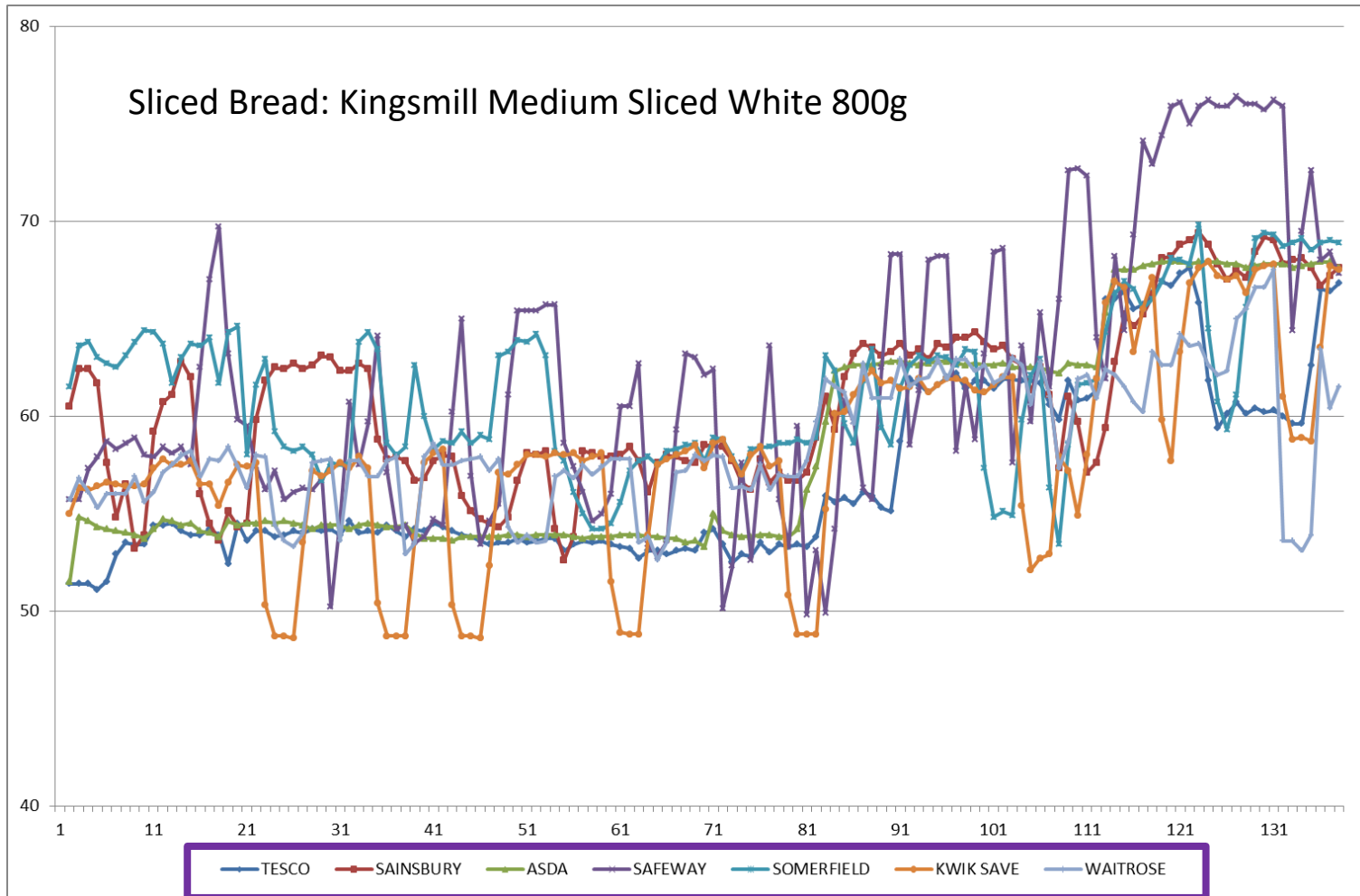
Weekly

2.5 Years

Top 7 UK
chains

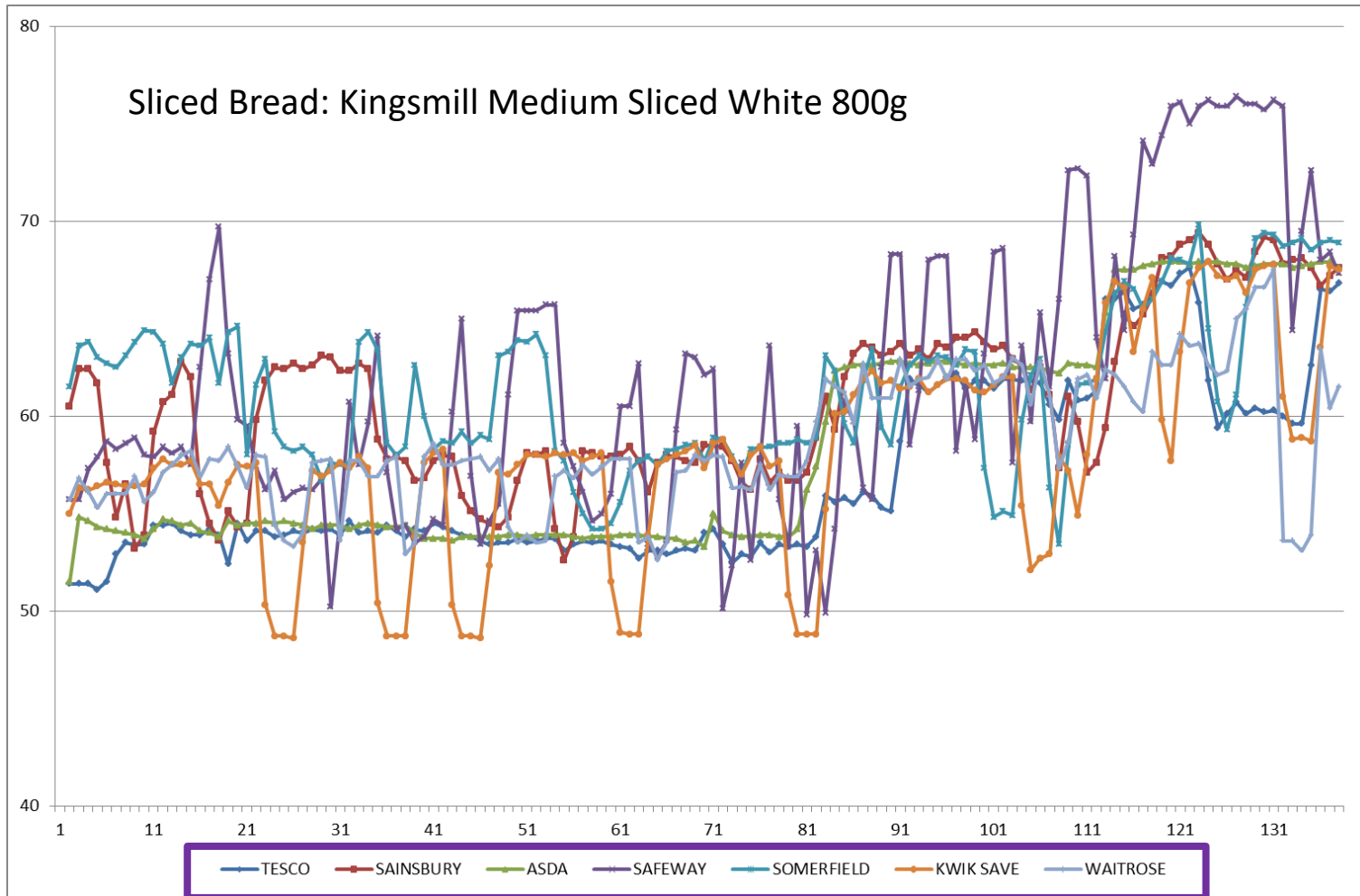
But price dispersion is the norm

Scanner prices



The Law of one Price?

Scanner prices



The representative firm?

Scanner Data

- Surprising heterogeneity in prices - even for identical products, let alone private labels and branded products
- All of which are obscured by traditional market level data.
- Notions of the 'representative firm' and the 'law of one price' break down at the micro level in food retailing

Price transmission at the firm level

Price transmission at the firm level

- Scanner data has inspired growing body of research
 - agricultural economics and more broadly in macroeconomics, (Loy and Weiss 2019; Klenow and Malin 2011)
- Literature emphasises heterogeneity
 - sectors; products; private labels
- In addition, we aim to highlight the retailer dimension

Price transmission at the firm level

- Central to the theory (Amiti *et al.* 2019) is the notion that price transmission determined by

- Firm's market power

Mark-up over marginal cost (“mark-up elasticity”)

- Strategic complementarity

Prices in rival retailers matter

- As with macro data, our aim is to develop quasi reduced form approach based on theoretical underpinnings

Approach and data

- Similar empirical methods (ECM) in panel setting exploiting cointegration
- Empirically, augment price transmission regression with competitors prices
- Scanner prices for identical products sold in 7 largest UK national chains
- Orange juice and Coffee
 - High raw material content
 - Private labels and national brands
 - $n=38,000$

Key Results

- Startling differences in price transmission by firm
 - More important than other dimensions of heterogeneity
- Strategic complementarity (rival prices) matters
- Ignoring strategic complementarity severely biases price transmission
 - Doubling transmission estimates
 - Overstating responsiveness of price adjustment to costs
- Market power key determinant of price transmission in imperfectly competitive markets

To Conclude

- Price transmission is commonplace and occasionally misunderstood.
 - Theory provides the vital clarification
- The food industry affects transmission of shocks
 - micro and macroeconomic implications
- Knowledge of the institutional setting as well as theory is essential if . . .
 - Results to be interpreted correctly
 - Limitations recognised
 - Over-reach avoided

And finally

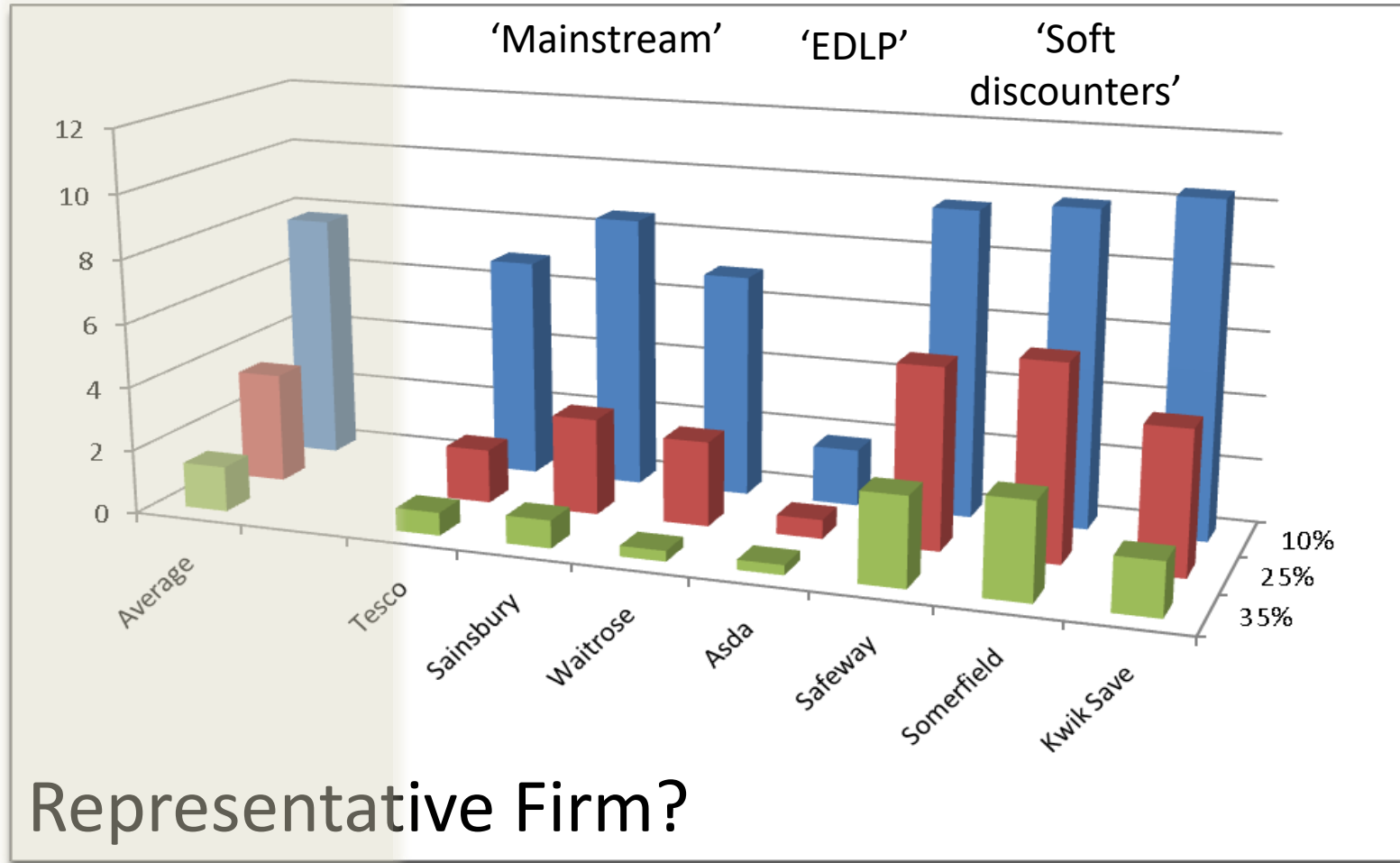
...

Thank you
for watching!

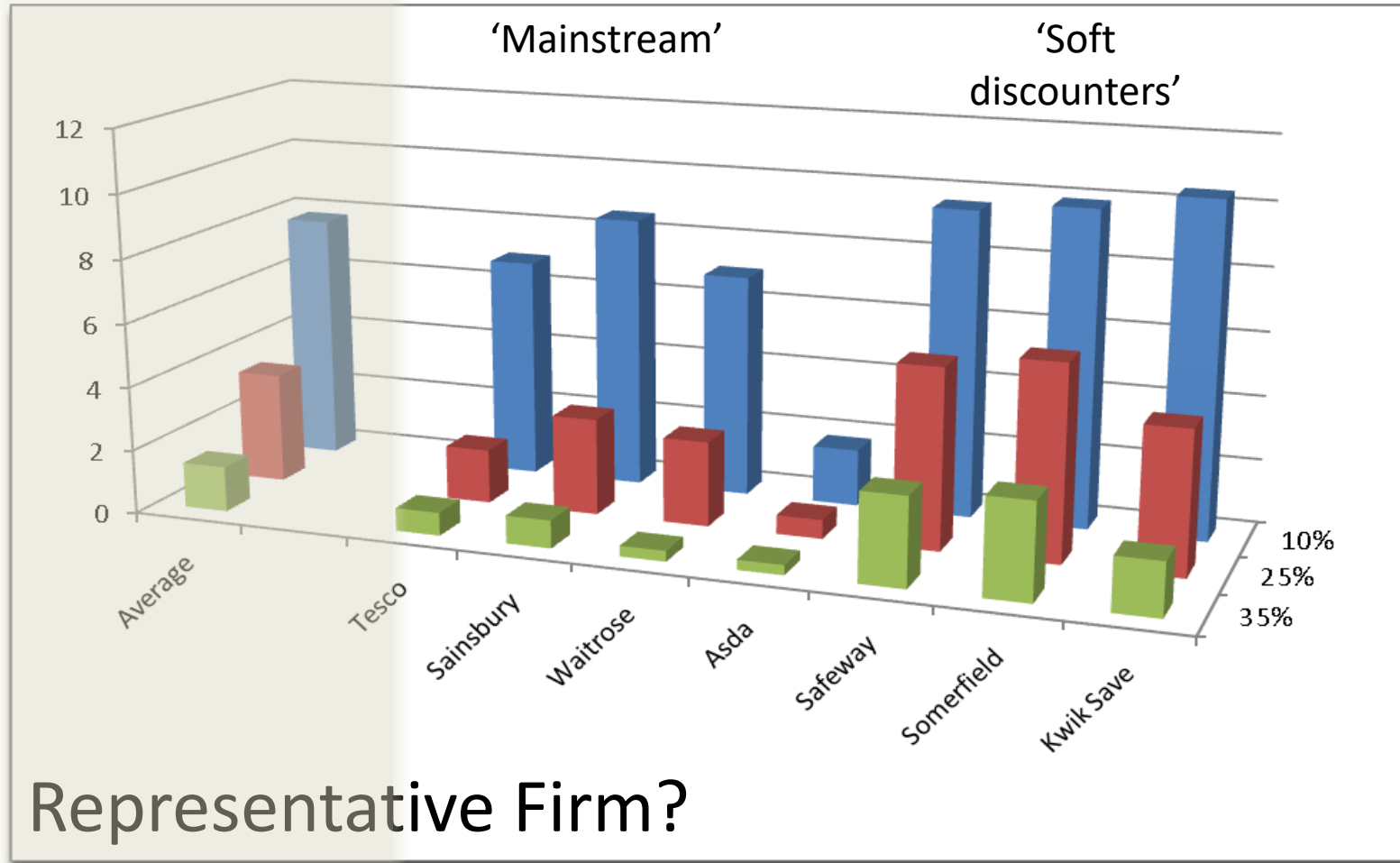
As price setting in food markets becomes concentrated in fewer and fewer hands, understanding the mechanisms and effects has never been more pressing.



Promotional prices



Promotional prices



Representative Firm?

Promotional prices

