Investigation into payments administrative data to measure households

Wil Roberts, William Perks and John Houghton

Organisation	Office for National Statistics
Division	Productivity, Innovation, Engagement and Research
Team	Economic Micro-data Research

Payments project initial objective

Investigate use of Credit & Debit card data to replace/strengthen current data sources in Household Expenditure estimates in National Accounts

In this presentation

- Household Expenditure – what we want to measure
- UK Finance – new data source
- Advantages and limitations
- Comparisons of cards data with Household Expenditure series
- Possible future work

Household Expenditure

- Measures UK consumer spend
- 34 data sources – complex
- Living Costs and Food (LCF) Survey is not considered to be a strong source

Top-level COICOP	Primary Data Sources
01 Food and non-alcoholic beverages	**Living Costs and Food Survey**
02 Alcoholic beverages, tobacco and narcotics	HMRC admin data External market research survey for alcohol
03 Clothing and footwear	Retail Sales Inquiry
04 Housing, water, electricity, gas and other fuels	Local Authorities admin data Utility companies admin data
05 Furnishings, household equipment and routine household maintenance	Retail Sales Inquiry **Living Costs and Food Survey**
06 Health	NHS payments **Living Costs and Food Survey**
07 Transport	Transport Regulator Department for Transport International Passenger Survey
08 Communication	Large communication companies Sector regulator **Living Costs and Food Survey**
09 Recreation and culture	Retail Sales Inquiry **Living Costs and Food Survey**
10 Education	**Living Costs and Food Survey** Department for Education
11 Restaurants and hotels	**Living Costs and Food Survey** Armed Forces accommodation data HMRC data for alcohol External market research survey for alcohol
12 Miscellaneous goods and services	Bank of England Financial Inquiries Survey **Living Costs and Food Survey** Association of British Insurance

Identified Data sources

	Credit	Debit	Direct Debit	Cash	Import	Export	BACS	Regional	Other e.g. cheques
UK Finance	✓	✓	✗	✗	✗	✗	✗	✗	✗
UK Payments	✓	✓	✓	✓	✗	✗	✓	✗	✓
Vocalink	✗	✗	✓	✓	✗	✗	✓	✓	✗
World Pay	✓	✓	✗	✗	✗	?	✗	?	✗
Argus	✓	✗	✗	✗	✓	✓	✗	✓	✗
HMRC	✓	✓	✗	✗	?	?	✗	✓	✗
Card issuer	✓	✓	✗	✓	✓	✓	✗	✓	✗
BoE Link	?	?	?	✓	?	?	✓	?	?

UK Finance

Who are they? Trade body for firms providing finance, banking, markets and payments services in the UK

Cards Expenditure data (from card acquirers e.g World pay)

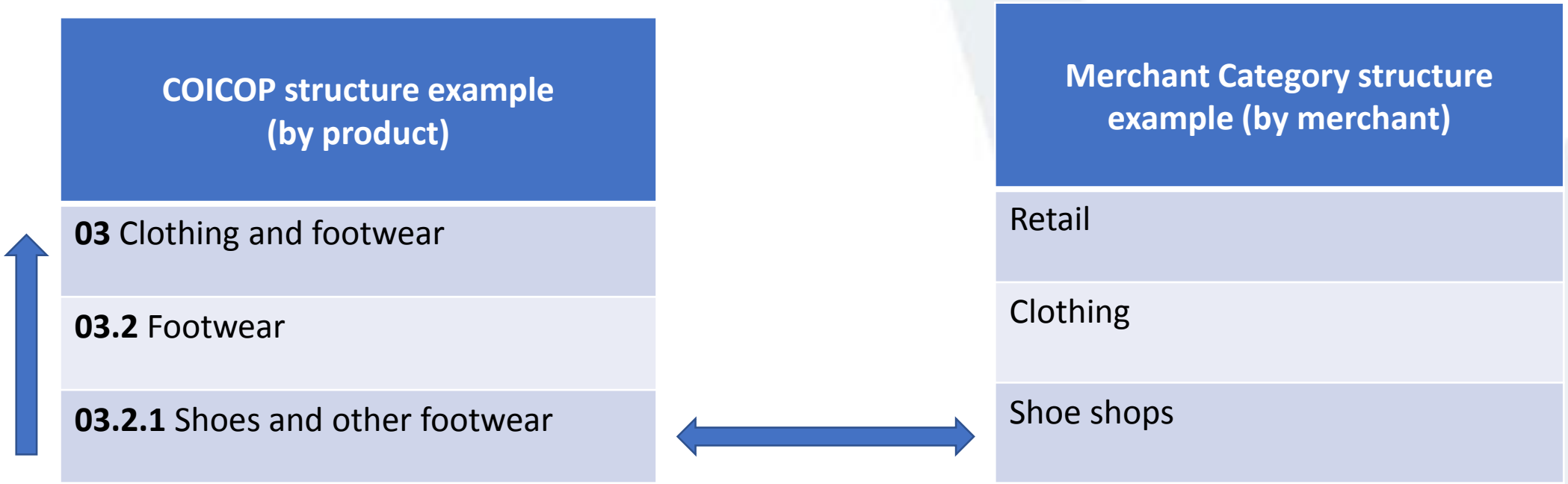
Does include	Does not include
Spend on all UK credit/debit cards	UK spend abroad
Value & volume of transactions	Business / Personal split
From Jan 2005	Before 2005
	Regional Individual transactions Spending using other than cards

Key similarities and differences

	Living Costs and Food (LCF)	UK Finance	HE Requirements
Type	Survey	Administration	-
Timeliness	Quarterly snapshot deliveries	Monthly, 50 days after reporting period	Quarterly. End of next quarter after reporting period
Classification	COICOP - **by product**	Merchant categories (MCs) – **by merchant**	COICOP groups **published by products**
Coverage	Diary kept by >16yr in household; Commodities and services over 2 weeks Cooperating households: **4,760** *	Credit and debit card transactions from acquirers in UK **13.7 bn** transactions *	As best as possible

* March 2015 – April 2016

Mapping


COICOP structure example (by product)
03 Clothing and footwear
03.2 Footwear
03.2.1 Shoes and other footwear
Merchant Category structure example (by merchant)
Retail
Clothing
Shoe shops

Mapping MCs to COICOP

First iteration

1. Map MCs to COICOP at lowest level

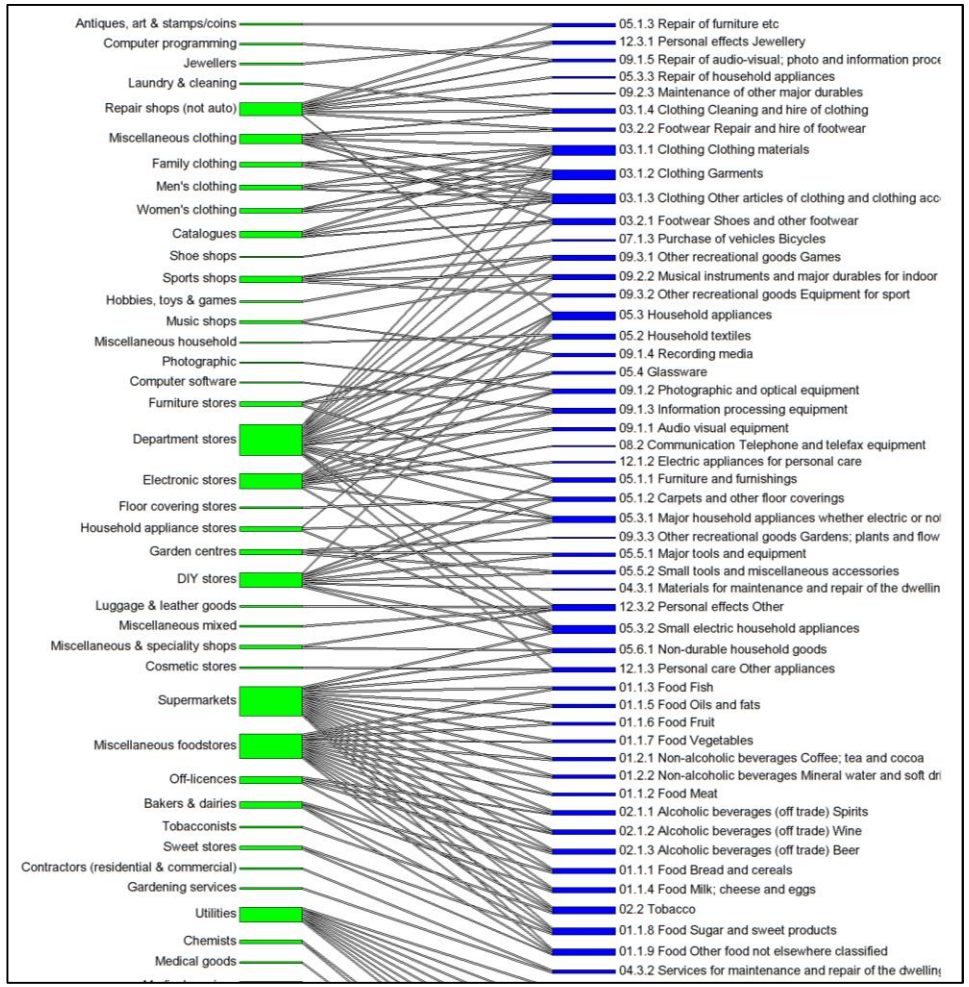
2. If we think you can buy a product/service from a merchant category we include it

3. Aggregate MCs up to top level COICOP

Mapping MCs to COICOP

Merchant Category

COICOP



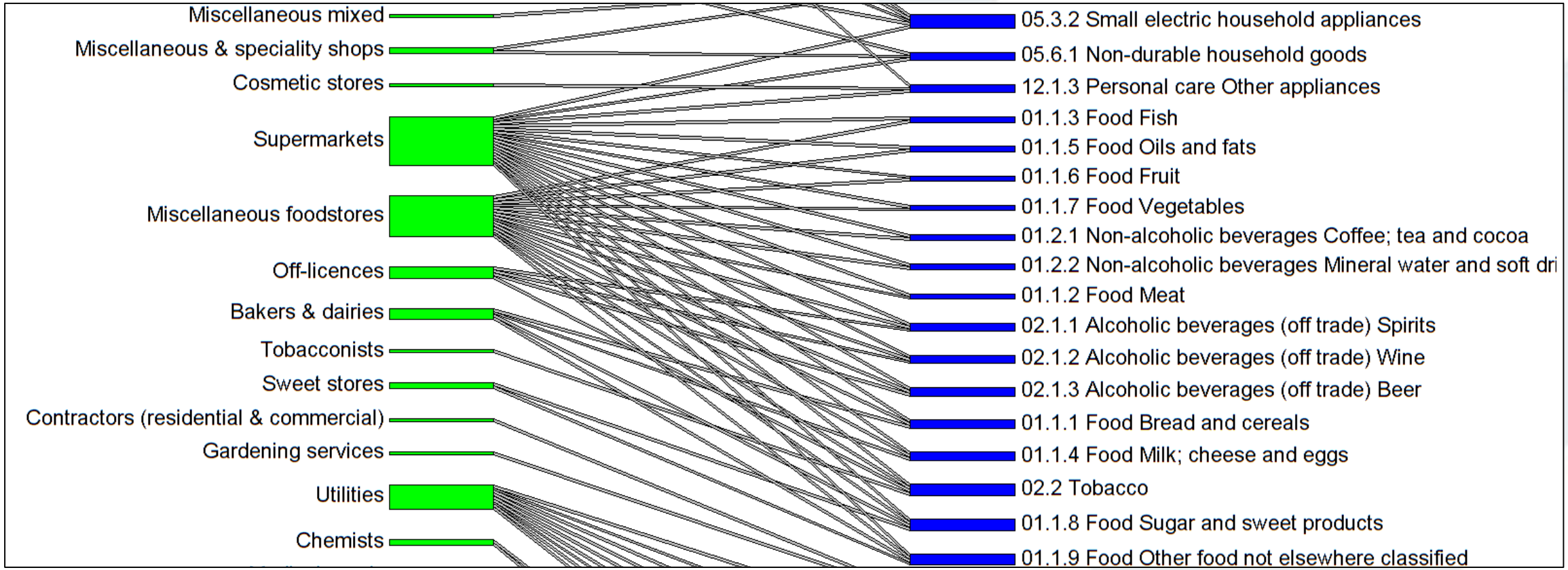
Merchant Category

COICOP

Mapping MCs to COICOP - complex

Merchant Category

COICOP

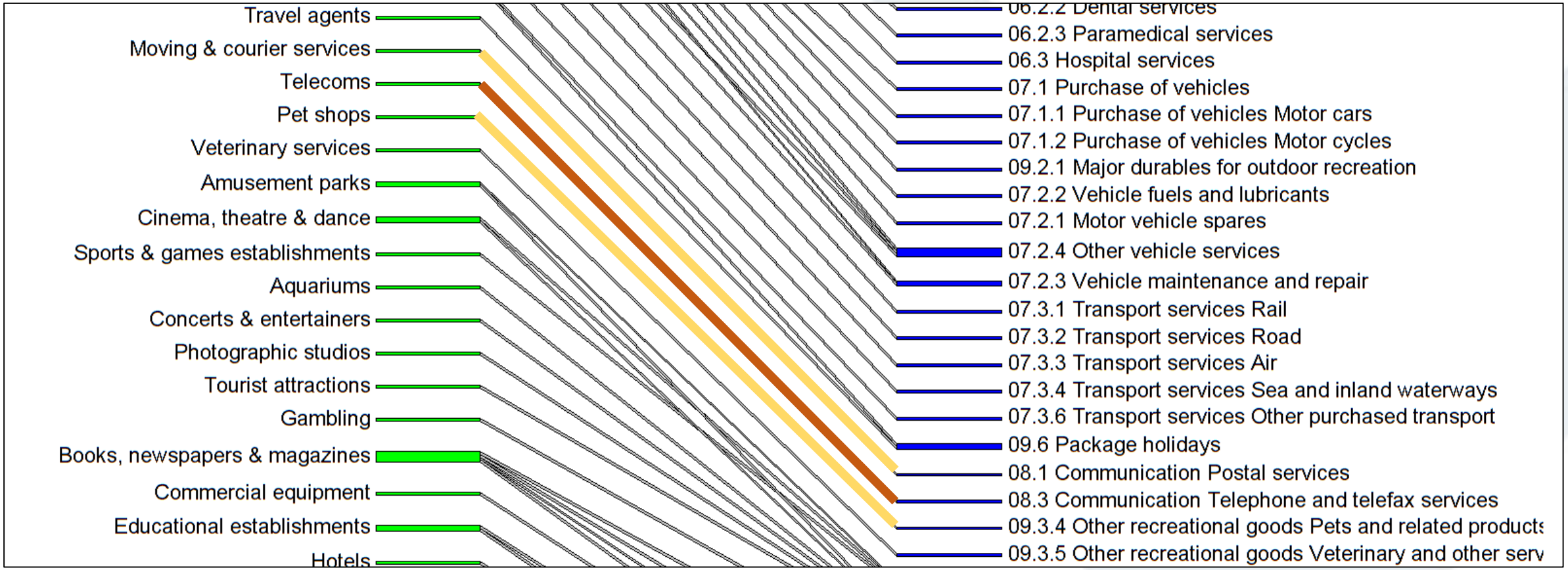


many to one / one to many

Mapping MCs to COICOP - simple

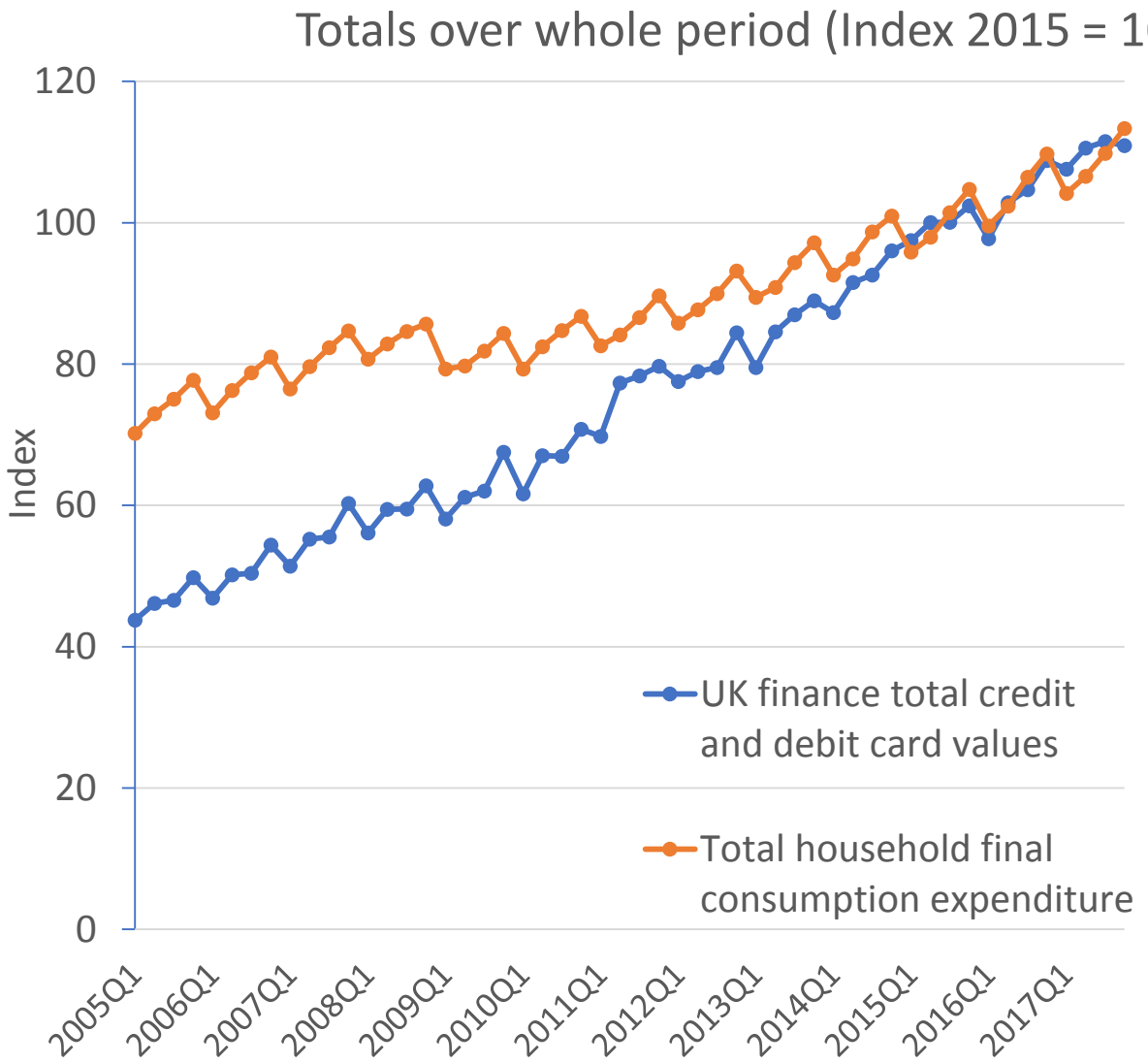
Merchant Category

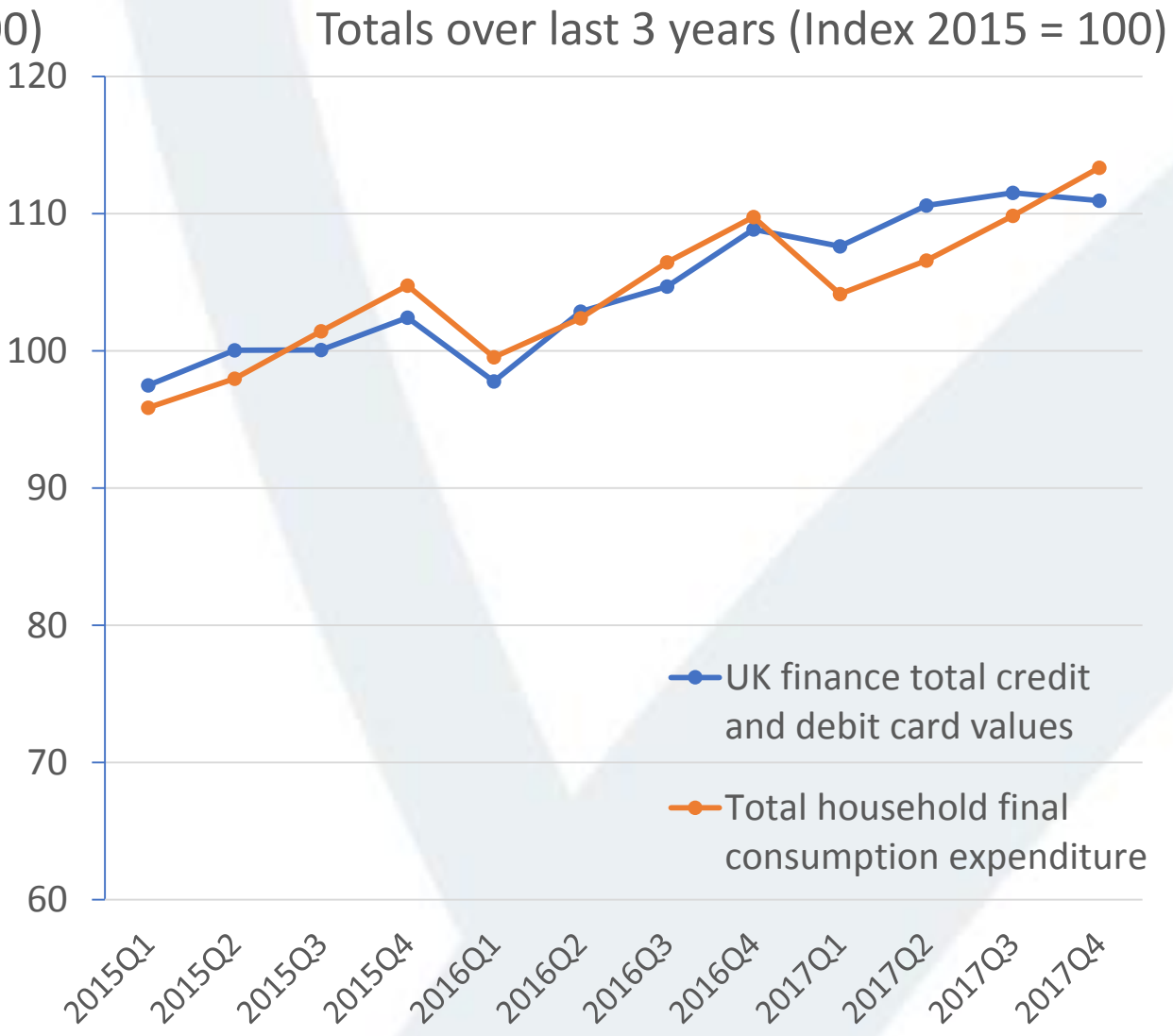
COICOP



one to one

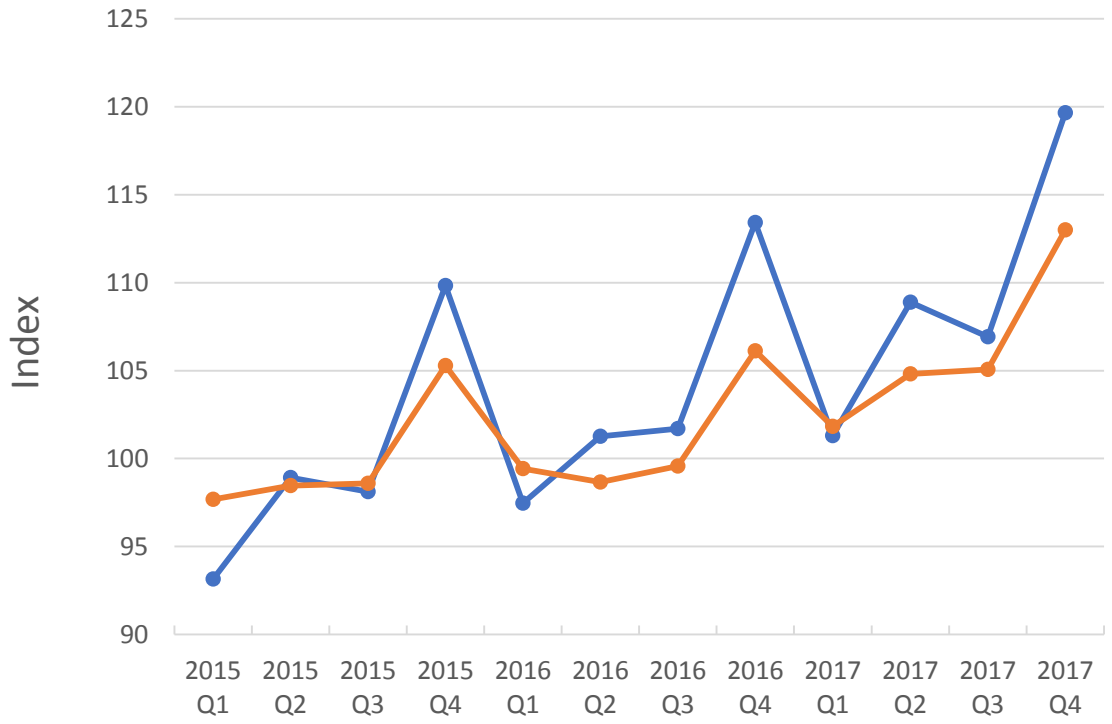
Increase in use of cards over time - drift



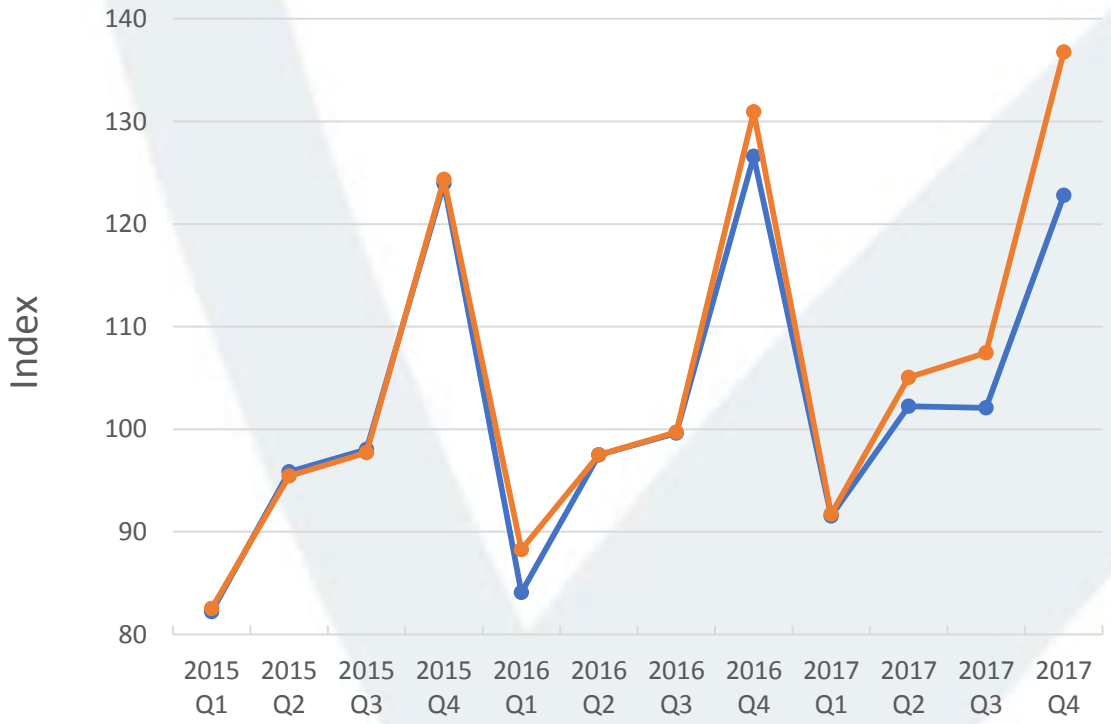


Top level HE vs UK Finance: CP NSA (index 2015 = 100)

01 Food and non-alcoholic beverages



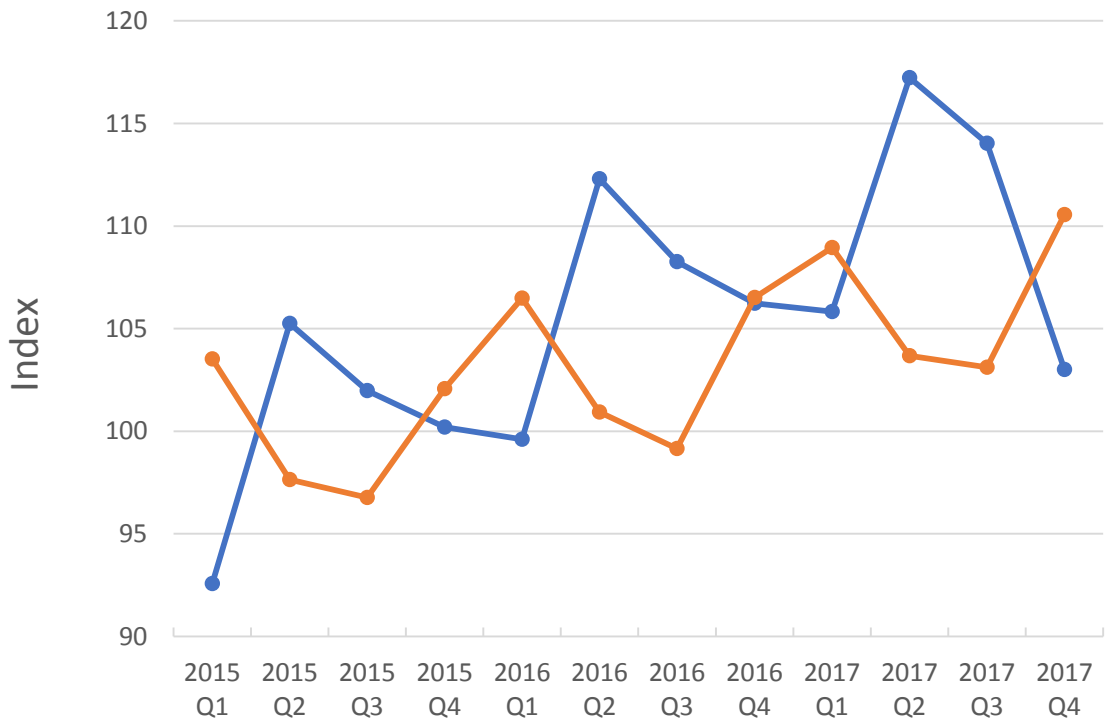
03 Clothing and footwear



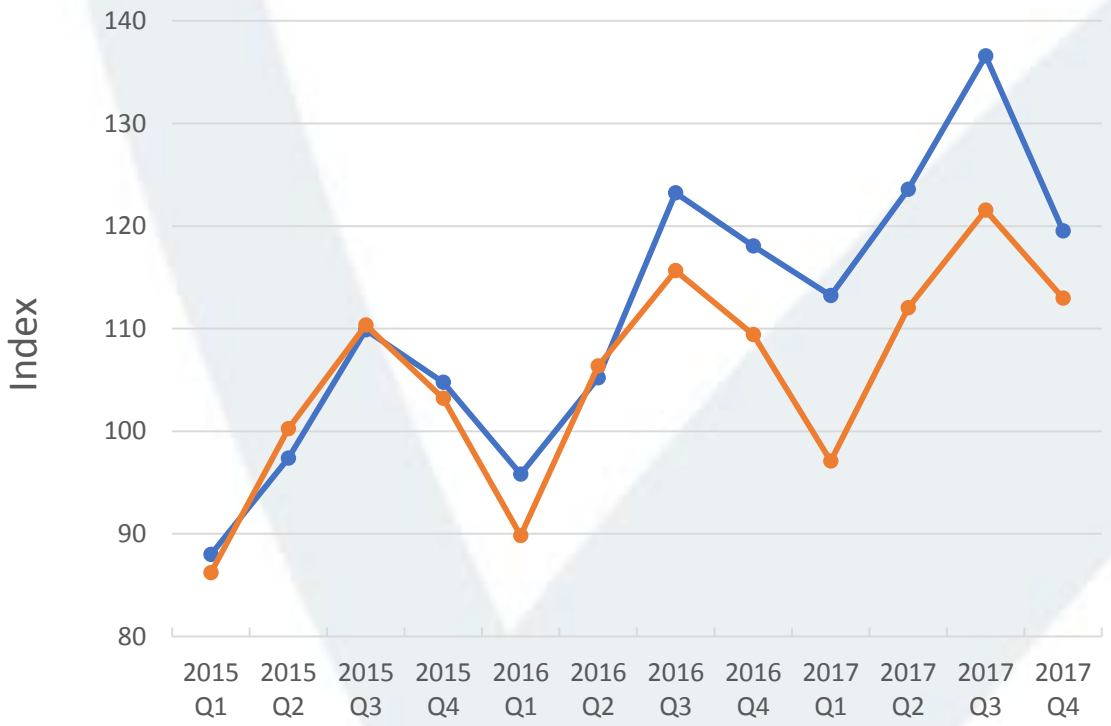
UK Finance Household Expenditure

Top level HE vs UK Finance: CP NSA (index 2015 = 100)

04 Housing; water, electricity, gas and other fuels



11 Restaurants and hotels



UK Finance Household Expenditure

Mapping MCs to COICOP

Second iteration

1. Apply basic seasonal adjustment to cards and HE data

2. Calculate correlation coefficient between (SA) cards data and (SA) HE data

3. Try every possible combination of MCs originally mapped to COICOP to get the highest correlation score

Seasonal Adjustment

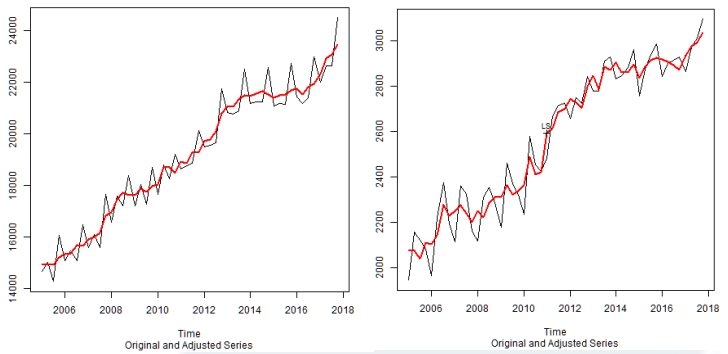
- Use ARIMA X-13 package in R, default settings
- Direct (aggregate then SA) or indirect (SA then aggregate)

Indirect SA

01 Food and non-alcoholic beverages

01.1 Food

01.2 Non-alcoholic beverages



Optimised mapping

First iteration: Include all mapped MCs associated with COICOP

Second iteration : Calculate correlation between every possible MC combination and HHFCE series. Choose combination that gives highest correlation score.

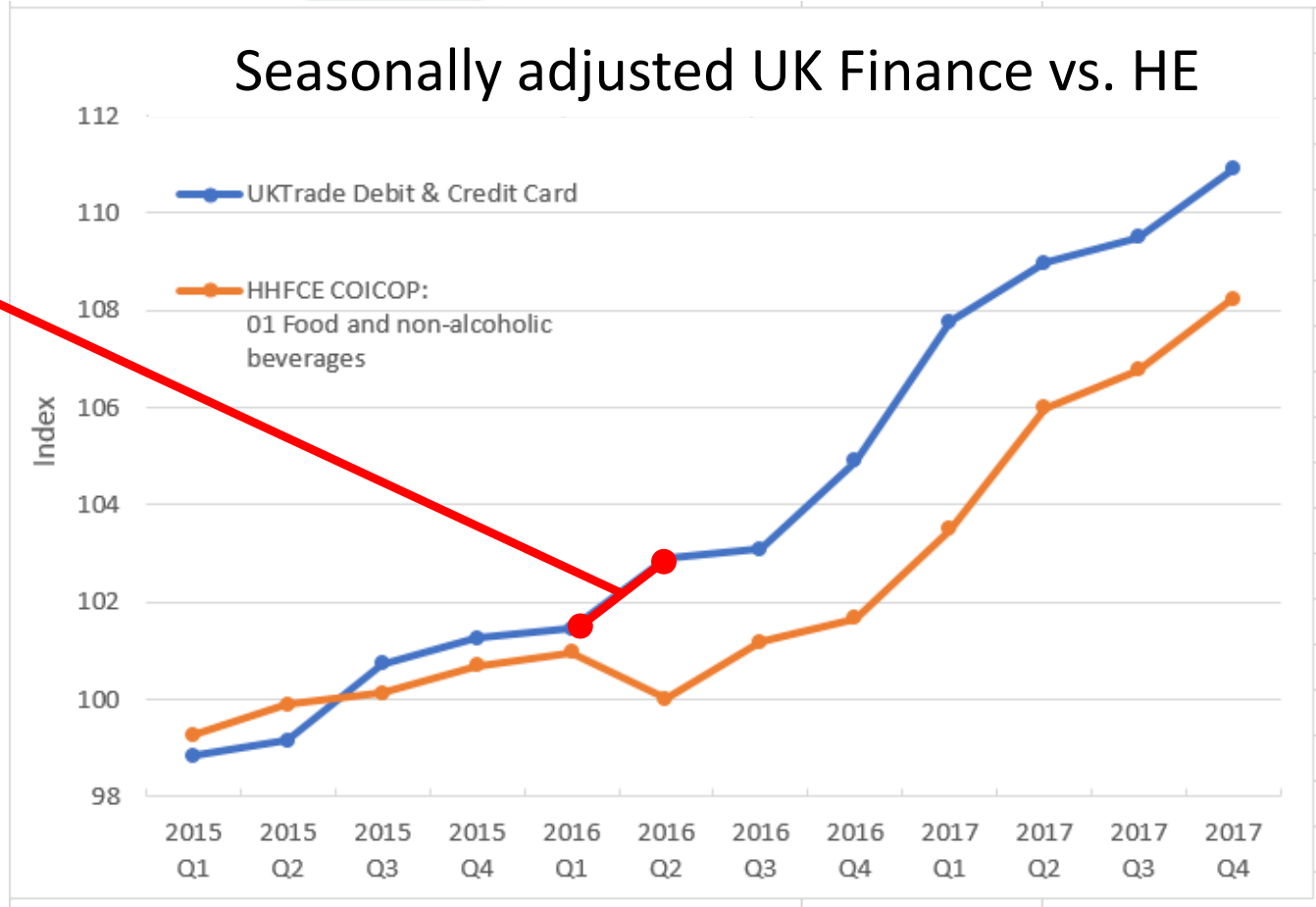
e.g. Combinations for COICOP **01.2 Non-alcoholic beverages**

Choose	Merchant Categories					
4	Supermarkets Miscellaneous foodstores Off-licences Discount stores					
3	Miscellaneous foodstores Off-licences Discount stores	Supermarkets Off-licences Discount stores	Supermarkets Miscellaneous foodstores Discount stores	Supermarkets Miscellaneous foodstores Off-licences		
2	Off-licences Discount stores	Miscellaneous foodstores Discount stores	Miscellaneous foodstores Off-licences	Supermarkets Discount stores	Supermarkets Off-licences	Supermarkets Miscellaneous foodstores
1	Supermarkets	Miscellaneous foodstores	Off-licences	Discount stores		

Top level COICOP: CP SA (index 2015 = 100)

01 Food and non-alcoholic beverages:

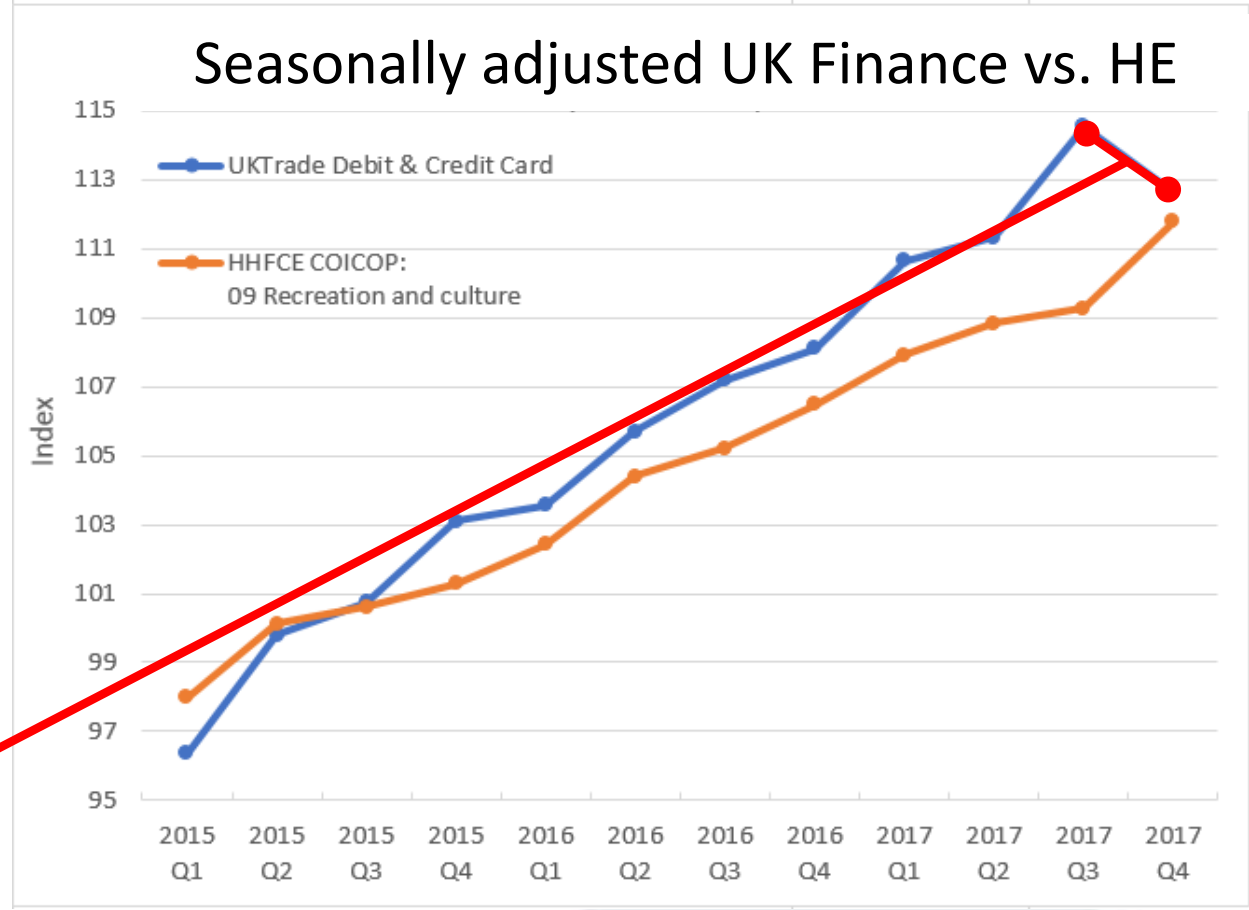
Supermarkets	**92%**
Bakers & dairies	**1%**
Discount stores	**7%**



Top level COICOP: CP SA (index 2015 = 100)

09 Recreation and culture:

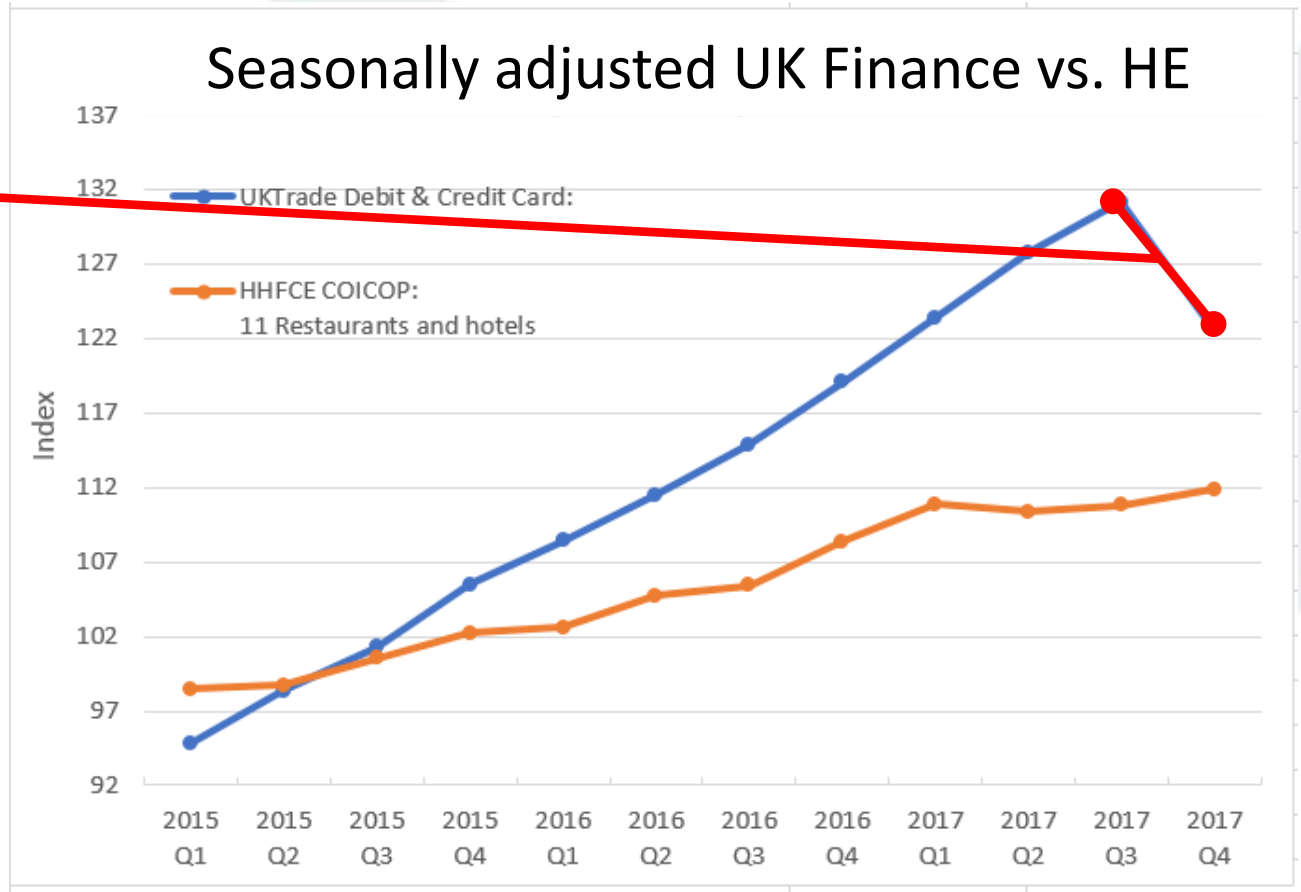
Cinema, theatre & dance	21%
Miscellaneous travel	12%
Computer programming	11%
Pet shops	9%
Veterinary services	12%
Tourist attractions	5%
Electronic stores	30%



Top level COICOP: CP SA (index 2015 = 100)

11 Restaurants and Hotels:

Restaurants	**78%**
Catering services	**5%**
Public houses	**16%**



Summary

- Identified cards data from UK Finance as a potential data source to estimate Household Expenditure
- Applied basic mapping between merchant and product
- Initial comparisons look very promising

Future work

- Third iteration on mapping - weighted mapping between merchant and product
- Eliminate drift from cards data attributed to increase in card use
- Look more closely at which data source to believe
- Continue to search for more data sources.