

new EVALUATING CORE INFLATION MEASURES

Yiyi

2022-12-08

Contents

1	Sticky price measures	1
2	Stochastic models for forecasting inflation rate	13
2.1	Autoregressive process (AR)	13
2.2	Data used	14
2.3	The analysis of the series stationarity	14
2.4	Identification of the model's type	14
2.5	Parameters estimation of the econometric models	14
3	Criteria for evaluation : forecasting future inflation	16
4	Results	17
5	Conclusions	21

1 Sticky price measures

We examine the frequency of price changes for 570 categories of goods and services covering about 66.4% of consumer spending based on “Dixon and Tian items frequency data”. Then, I looked up the monthly CPI index and weights data for these 570 items based on their ID one by one for the years 2005 to 2021. This is used to construct CORE inflation measures of sticky and flexible CPI.

Dixon and Tian items frequency data provides the frequency (expressed as a %) of prices changing per month for 570 items that were contained in the VML data set for the whole period January 1996 to December 2007. In table 1, Column A is the COICOP item name. The frequency is in Colmn B. The rebase weight in column C are made to add up to 1000 (their total share in CPI is 664). Let λ = the monthly frequency of price changes. Mo = the mean duration between price changes implied by $[-1/\ln(1-\lambda)]$. If prices can change at any moment, not just at the monthly interval, the instantaneous probability of a price change is $-\ln(1-\lambda)$ and the mean time between price changes $-1/\ln(1-\lambda)$ months. We used this formula to calculate the Mo. column from the Freq. column in Table 1. If prices instead change at most once per month, then the mean duration is simply $1/\lambda$, about half a month longer.

In Table 1 we list, for each of the 570 categories, the 1996-2007 average monthly frequency of price changes. Table 1 also provides the weight and the mean duration between price changes. The monthly frequency of price changes averages 21.9%. The weighted median is 17.9%. For the median category the time between

price change averages 5 months. Thus, for items comprising one half of consumption, prices change less frequently than every 5 months.

Using this information, we break down the monthly CPI's published components into "sticky price" and "flexible price" aggregates. If price changes for a particular CPI component occur less often, on average, than every 5 months, we called that component a "sticky-price" good. Goods that change prices more frequently than this we labeled "flexible price" goods.

Next, I looked up the monthly CPI index and weight for sticky price items based on their ID one by one for the years 2005 to 2021. Since the monthly CPI data is calculated year-on-year, the CPI trend starts from February 2006.

Table 1: The Frequency of Price Changes by Category

item_des	Freq	Weight	MO
Automatic car wash, drive through basic charge	3.7	2.17	26.5
Contact lens, Soft pair (state type/condition)	4.1	1.63	23.9
BOTTLE OF CHAMPAGNE	4.5	1.55	21.7
PRINT OFF UPTO 50 DIGITAL PHOTOS	4.5	0.00	21.7
Car Park Charges	5.1	1.54	19.1
TEA -TAKE-AWAY	5.2	1.55	18.7
Daily film rental, new release (specify DVD/Video)	5.2	0.60	18.7
Prescription lenses (point focal, 70mm diameter)	5.5	1.63	17.7
Develop & print (135/24 colour film)	5.5	1.20	17.7
COFFEE -TAKE-AWAY	5.6	1.55	17.4
Daily disposable contact lenses	5.7	1.54	17.0
POTATO CRISPS-INDIVIDUAL PACK	5.8	1.55	16.7
CHINESE TAKEAWAY	5.9	3.10	16.4
KEBAB- TAKEAWAY	5.9	3.10	16.4
FLORIST - DELIVERY COST	5.9	2.15	16.4
TV repair (state hour/min/complete)	6.0	0.75	16.2
STAFF RESTAURANT FIZZY DRINK	6.1	3.52	15.9
Eyesight Test charge	6.1	0.60	15.9
BURGER IN BUN- TAKEAWAY	6.2	3.10	15.6
CHILD MINDER - HOURLY RATE	6.2	1.81	15.6
Restaurant - Main Course 1st	6.3	4.65	15.4
RESTAURANT CUP OF COFFEE	6.3	3.10	15.4
PASTY/SAVOURY PIE - TAKEAWAY	6.4	3.10	15.1
Woodscrew's - Steel/zinc plated specify length	6.4	1.32	15.1
INDIAN TAKEAWAY	6.5	3.10	14.9
Washing machine repair (state hour/min/complete)	6.5	0.75	14.9
Non-NHS Medicine (Physiotherapy per session)	6.6	1.20	14.6
Window cleaning, 3 bed semi (outside only)	6.7	0.09	14.4
Minicab fare for journey of 2 miles	6.7	3.61	14.4
Basic Manicure	6.8	1.57	14.2
RESTAURANT - SWEET COURSE	7.0	4.65	13.8
PIZZA TAKEAWAY OR DELIVERED	7.0	3.10	13.8
WATCH REPAIR-CLEAN AND SERVICE	7.0	1.05	13.8
Night-club entry, no flyer, (Saturday 11.30pm)	7.1	1.20	13.6
BASIC WILL FOR A SINGLE PERSON	7.2	2.35	13.4
PC repair (state hour/min/complete)	7.3	0.75	13.2
Man's Haircut	7.3	2.89	13.2
Full leg wax (both legs)	7.4	1.93	13.0

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Spectacle frames (basic without lenses)	7.5	1.63	12.8
Self Drive Van Hire transit type (24 hr charge inc. VAT)	7.5	1.99	12.8
Chewing Gum/Bubble Gum, single pack	7.6	0.50	12.7
Plumber (Daytime, hourly rate inc. call out & VAT)	7.7	2.29	12.5
BOTTLE OF WINE 70-75CL	7.8	4.65	12.3
Driving school, 1 hour lesson (after 5pm)	7.8	0.27	12.3
Non NHS Chiropractor	7.8	1.20	12.3
TAKEAWAY COFFEE LATTE	7.9	1.55	12.2
Gas service charge (state hourly or complete)	8.0	0.96	12.0
Basic private dental examination (no X-rays)	8.0	1.32	12.0
Car repairs - labour per hour - local garage	8.0	7.23	12.0
Decorator-daily rate (specify number of hours)	8.1	2.17	11.8
Dry Cleaning (Man's Suit)	8.1	1.51	11.8
Home office desk	8.3	1.51	11.5
Knitting wool, double knit, (acrylic/wool or mix), 100g	8.3	1.67	11.5
Dog kennel fees, boarding (daily charge)	8.4	1.58	11.4
Hourly rate for Domestic Help (paid by customer)	8.4	3.88	11.4
Catering 50 people, set menu, cost per head	8.4	1.55	11.4
Liquid Foundation specify size	8.4	1.45	11.4
Women's Hairdressing (Cut & Blow Dry)	8.4	3.73	11.4
Electrician (Daytime, hourly rate inc. call out & VAT)	8.5	2.17	11.3
Annual booster injection (medium size dog)	8.5	1.37	11.3
Women's highlighting	8.5	1.93	11.3
Windscreen wiper blade (state length/type)	8.5	1.17	11.3
Oil filter (specify car)	8.6	1.26	11.1
RESTAURANT MAIN COURSE 1	8.7	4.65	11.0
Vet fees, spay kitten 6 months (not Pedigree)	8.7	1.48	11.0
Ball Point (individual), disposable, (eg Bic)	8.8	0.98	10.9
Private health club/gym annual member (exc. Joining fee)	8.9	1.08	10.7
STAFF RESTAURANT PUDDING	9.0	3.52	10.6
Home Removal - 1 Van	9.0	3.16	10.6
MOT test fees, VAT EXEMPT	9.0	1.45	10.6
Pub, cold filled roll/sandwich, state filling	9.1	4.65	10.5
Bookcase, flatpack, self assembly (no drawers)	9.1	1.13	10.5
Spectacle frames, designer (without lenses)	9.2	1.54	10.4
Car repairs - labour per hour - main dealer	9.2	7.23	10.4
Power Point (double socket)	9.3	2.35	10.2
Greetings card (state code)	9.3	1.35	10.2
HOURLY RATE FOR SOLICITOR	9.4	2.15	10.1
Car Service - Local Garage	9.4	4.34	10.1
Paint Brush (2inch/5cm width)	9.5	0.83	10.0
Hire domestic steam wallpaper stripper	9.5	0.36	10.0
Leisure centre, charge for exercise class upto 1hr	9.5	0.60	10.0
BOTTLED MINERAL WATER	9.6	3.10	9.9
STAFF RESTAURNT HOT SNACK ITEM	9.6	3.72	9.9
Bottle of mixer, 113-180ml size (eg tonic water)	9.7	1.55	9.8
Weekly Nanny Fees	9.7	2.35	9.8
Pub, Hot meal (please specify)	9.8	6.20	9.7
LEMONADE/COLA DRAUGHT	9.8	3.10	9.7

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
PRIMARY SCHOOL- FIXED CHARGE	9.8	0.39	9.7
FRUIT JUICE	9.9	3.10	9.6
NURSERY FEES: CHILD 0-4	9.9	1.81	9.6
Brake pads, two pairs (state car make/model)	9.9	1.26	9.6
RESTAURANT MAIN COURSE 2	10.0	4.65	9.5
IN STORE CAFETERIA MEAL	10.1	4.65	9.4
TAKEAWAY SOFT DRINK	10.1	1.55	9.4
Door Handle, (pack for one door)	10.1	2.35	9.4
Gardener Hourly Rate	10.1	2.71	9.4
SECONDARY SCHOOL- CAFETERIA	10.3	0.59	9.2
Liqueur per nip (see help screen) specify ml	10.3	1.55	9.2
Private Rented Furnished property (see note)	10.3	15.56	9.2
Sheet Of Wrapping Paper	10.3	1.43	9.2
Private Rented Unfurnished property (see note)	10.4	14.86	9.1
Swim Pool Admission, standard adult (off-peak)	10.4	0.60	9.1
Ten-pin bowling, eve. session (per game)	10.4	0.60	9.1
STAFF RESTAURANT SANDWICH	10.6	3.91	8.9
WHISKY (PER NIP) SPECIFY ML	10.6	3.10	8.9
VODKA (PER NIP) SPECIFY ML	10.6	4.65	8.9
Hardboard, specify sheet size, (e.g. 2440x1220mm/8x4ft)	10.6	1.32	8.9
Car battery	10.8	1.26	8.7
Self Drive Car Hire (24 hour basic charge inc. VAT)	10.8	2.08	8.7
FISH & CHIPS TAKEAWAY	10.9	3.10	8.7
WINE (175ML GLASS)	10.9	4.65	8.7
Light Bulb, each (specify wattage)	10.9	0.90	8.7
Lipstick	10.9	1.45	8.7
Coarse Fishing Rod	10.9	0.96	8.7
NEWSPAPER AD NON TRADE 20 WORD	11.0	2.35	8.6
BOTTLE OF LAGER IN NIGHTCLUB	11.1	4.65	8.5
Chicken Kiew 2 Pack 250g (chilled not frozen)	11.2	0.63	8.4
SPIRIT BASED DRINK 275ML	11.3	1.55	8.3
Squash court, evening session (specify length)	11.3	0.60	8.3
Pair of basin taps (not mixer)	11.4	4.14	8.3
Sink, single drainer (specify material)	11.4	3.39	8.3
Lady's Umbrella (Folding)	11.5	0.60	8.2
Original Polo Mints	11.6	0.50	8.1
Mascara	11.6	1.81	8.1
Child's swing	11.6	0.69	8.1
Canned Sweetcorn, (198g-340g)	11.7	0.84	8.0
Carpenter Hourly Rate	11.7	2.17	8.0
Screwdriver (specify size and type)	11.7	0.45	8.0
Drycell Battery, pack of 4, state size (eg AA)	11.8	0.90	8.0
IN CARE HOME ASSISTANT RATE	11.8	2.89	8.0
Potting compost (specify size)	11.8	0.98	8.0
Residential Home	11.9	5.78	7.9
Potato Crisps, 25g/40g	12.0	1.26	7.8
MONTHLY SELF STORAGE FEE	12.0	2.15	7.8
Annual leisure centre membership (not private)	12.0	1.08	7.8
Envelopes (specify size and number in packet)	12.1	0.98	7.8

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Softwood, 1.6m-2.4m length	12.2	1.49	7.7
Women's Tights	12.3	1.57	7.6
Bar of Toilet Soap (100-125G)	12.3	0.72	7.6
CIDER-1/2PT OR 275-340ML BOT	12.4	3.10	7.6
35mm colour film (24 exposures)	12.4	0.45	7.6
Clear sticky tape, eg cellotape (specify size)	12.5	0.98	7.5
Nursing Home	12.5	5.55	7.5
Oil Per Litre (multigrade)	12.5	0.53	7.5
CINEMA POPCORN	12.7	1.55	7.4
Multi-vitamins capsules/tablets (eg Sanatogen)	12.7	1.51	7.4
Child's Wellington Boots	12.8	0.27	7.3
Peanuts, 100g (roasted or salted) specify	12.9	1.08	7.2
DRAUGHT STOUT PER PINT	12.9	3.10	7.2
Wallpaper Paste, specify coverage (5-20 rolls)	12.9	0.83	7.2
Metal Model Toy, Diecast car (eg Matchbox)	12.9	2.42	7.2
Mars Bar (approx 62.5g)	13.0	2.48	7.2
BOTTLED PREMIUM LAGER 4.3-7.5%	13.0	3.10	7.2
Ceramic tile plain 15x15 - 25x20cm, (box of 6-44)	13.0	0.83	7.2
Ready mixed Filler, interior use (430gm-1.8kg)	13.1	0.83	7.1
STAFF RESTAURANT MAIN COURSE	13.2	3.91	7.1
PLAYGROUP FEES - PER SESSION	13.2	2.53	7.1
Solid gold ring, no stones, 9ct	13.2	1.48	7.1
Beginner's Acoustic Guitar	13.3	0.54	7.0
Golf Balls	13.3	0.96	7.0
SANDWICH-TAKE-AWAY	13.4	4.65	7.0
Men's Socks	13.4	0.78	7.0
Indigestion Tablets, pack of 24, (eg Rennies)	13.4	1.51	7.0
Chocolate covered Ice Cream bar (e.g. Magnum)	13.5	0.83	6.9
PREMIUM LAGER - PINT 4.3-7.5%	13.5	9.30	6.9
18 ct Gold Gemstone Ring	13.5	2.63	6.9
Sterling silver earrings, plain (per pair)	13.6	0.84	6.8
Condoms (pack of 3 to 5)	13.6	0.54	6.8
Garden Spade	13.6	0.72	6.8
DRAUGHT BITTER (PER PINT)	13.7	15.50	6.8
Brake fitting in fast fit centre for Ford Focus	13.8	4.34	6.7
Small Caged Mammal	13.9	0.53	6.7
Rowntrees Fruit Pastilles- tube	14.0	1.49	6.6
Dustbin Liners (pack of 10)	14.0	0.68	6.6
LAGER - PINT 3.4-4.2%	14.1	9.30	6.6
Dog food, can (390-400gm)	14.2	1.16	6.5
Men's Tie	14.3	1.22	6.5
Disposable camera with flash (24-27 exp)	14.3	0.60	6.5
Gloss paint, white (750ml - 2.5 litres)	14.4	1.32	6.4
Animal cage (e.g for gerbil/mouse)	14.4	0.63	6.4
Tomato Ketchup (340-345g) bottle	14.5	0.36	6.4
Steering lock device	14.5	1.54	6.4
Seeds, packet of vegetable (specify variety)	14.5	0.68	6.4
Scissors (Kitchen)	14.6	1.26	6.3
Doughnut, each	14.7	0.68	6.3

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Gent's Watch - Analogue Face	14.7	2.11	6.3
Bag of sweets, boiled/jellies, not choc (200-250g)	14.8	1.82	6.2
Car Service - Main Dealer	14.9	4.34	6.2
Varnish, clear gloss, 750ml - 1 litre	15.0	0.83	6.2
Wallpaper Per Roll	15.0	1.32	6.2
Book, illustrated for under 5's	15.0	1.28	6.2
Dry Spaghetti or pasta 500g	15.1	0.23	6.1
Car tyre, Tubeless Radial (state size)	15.2	1.26	6.1
Individual meat pie (eg steak and kidney)	15.3	1.90	6.0
Smarties, small tube	15.3	0.83	6.0
Cadburys dairy milk (49g bar)	15.3	3.64	6.0
Paint, Emulsion, white (2.5 to 5 litres)	15.3	1.49	6.0
Cat food, can (390-400gm)	15.3	1.90	6.0
9ct Gold Chain (16-18"/ 40-46cm)	15.3	1.48	6.0
Pain Killer Tablets (pack of 16 or 24)	15.3	1.51	6.0
Plain Biscuits (e.g. Digestive Biscuits) 200-300g	15.4	1.81	6.0
Shop Milk, pasteurised, 4pt or 2ltr carton (specify)	15.4	2.54	6.0
Shop milk, semi-skimmed, per 2 pints/1.136 litres	15.4	4.31	6.0
Baby Food Can/Jar (state main meal/dessert, size)	15.4	0.12	6.0
Gas fire (state make & model)	15.4	1.69	6.0
Men's Pants/Boxer shorts	15.4	0.78	6.0
Tampons, pack of 10-16 (specify pack size)	15.4	1.81	6.0
Aluminium cooking Foil, 300mm wide, state length	15.5	0.45	5.9
Toothpaste (specify size)	15.6	2.53	5.9
Women's Pants	15.7	1.57	5.9
Canned Fruit, 400-450g, (specify type)	15.9	0.84	5.8
Fabric roller blind	15.9	2.29	5.8
Basmati rice (500g)	16.0	0.68	5.7
Cheese Edam, per kg	16.0	0.59	5.7
Perfume/eau de toilette (men or women)	16.0	1.81	5.7
CD Single (Top 40)	16.0	0.30	5.7
FUNERAL-CREMATION	16.3	2.54	5.6
Girl's Knickers (one pair)	16.3	0.78	5.6
Book, Reference, specify title/type (eg Atlas/Dictionary)	16.4	0.23	5.6
Decorative plant pot not plastic (10-20" diameter)	16.4	0.30	5.6
Child's Socks	16.5	0.78	5.5
Cooking Oil - Vegetable 1 Litre	16.6	0.78	5.5
Aluminium step ladder (specify number of steps)	16.6	0.45	5.5
Pack of Plasters (20-24 assorted)	16.6	0.54	5.5
Sleeping Bag	16.6	0.96	5.5
Crunchie	16.7	0.66	5.5
Pork Pie, individual, (not buffet)	16.8	1.58	5.4
Football, stitched, size 5 (specify material)	17.0	0.96	5.4
Kitkat (4 Finger Bar)	17.1	0.90	5.3
Jar of jam, 340-454g, specify flavour	17.1	0.50	5.3
Squash/tennis racquet	17.2	0.96	5.3
Cooked ham, loose, spec type (per 100g)	17.3	1.90	5.3
Sugar - Granulated, white, per kg	17.3	0.33	5.3
Black Inkjet Cartridge (single pack)	17.3	0.90	5.3

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Adults Bicycle	17.4	1.40	5.2
Canned Tomatoes, approx. 390-400g	17.5	0.42	5.2
Men's Shoe, Leather uppers (1)	17.5	0.54	5.2
Baked Beans, (415-420g tin)	17.6	0.84	5.2
HAIR DRYER	17.6	1.45	5.2
Brassiere	17.6	1.57	5.2
Floor rug, state size and material	17.7	1.79	5.1
Men's Shoe	17.7	0.68	5.1
Camera 35mm, Compact (not disposable)	17.7	0.60	5.1
Rosebush Floribunda/Hybrid Tea not full/half stnd	17.8	1.20	5.1
Canned Meat Stewed Steak approx. 400-425g	18.0	0.95	5.0
Apple Juice, 1 litre carton	18.0	0.95	5.0
Vending Machine Cigarettes	18.0	1.96	5.0
Plain Glass Tumbler	18.0	0.84	5.0
Babygro or sleepsuit (each)	18.0	0.78	5.0
Child's trike for under 5's	18.0	2.42	5.0
Frozen chicken breasts 500g-1.5kg	18.1	0.32	5.0
Household Cleaner Cream/Liquid (450-500ml)	18.1	1.58	5.0
Cream Crackers, packed, 200g	18.2	0.45	5.0
Cold/flu drink powder packet of 10 sachets	18.2	1.51	5.0
Blank Video Cassette (VHS/E180)	18.2	0.15	5.0
Mineral water, still, 2 litre bottle	18.3	1.08	4.9
Women's swimwear	18.3	0.78	4.9
Stainless steel cutlery set specify no of settings	18.4	0.53	4.9
Washing Up Liquid (400-600ml)	18.4	0.68	4.9
AFTER SCHOOL CLUB CHARGES	18.4	1.63	4.9
Outdoor adventure boot (eg Timberland)	18.4	0.95	4.9
Childs Bicycle	18.4	1.35	4.9
Energy drink, 250-500ml (eg Red Bull, Lucozade)	18.5	1.08	4.9
Sausages-pork-per kg	18.7	2.53	4.8
Butter, Home produced, 250g	18.7	0.24	4.8
Vegetable Pickle, 280-310g (e.g. Branston)	18.7	0.21	4.8
Large Loaf, White unsliced, 800g	18.8	0.68	4.8
Flour, self raising 1.5kg	18.8	0.23	4.8
Boy's Shoes	19.0	0.54	4.7
Exhaust fitting in fast fit centre for Ford Focus	19.0	4.34	4.7
6 Bread Rolls White/Brown	19.2	0.90	4.7
Fizzy Canned Drink 330ml	19.2	1.63	4.7
MENS JEANS	19.2	2.35	4.7
Yoghurt/fromage frais (small individual)	19.3	1.76	4.7
Fresh single cream 284ml	19.3	0.39	4.7
Electric Convector Heater	19.4	1.32	4.6
Single plastic food storage container with lid	19.6	1.26	4.6
Fabric Conditioner (1 Litre)	19.6	0.68	4.6
Men's Leather Boot	19.6	0.27	4.6
Picture/Photo Frame (silver plated)	19.6	1.99	4.6
Shampoo (250-400ml)	19.6	1.08	4.6
Laminate flooring (eg tongue & groove) per sq.m	19.7	1.37	4.6
Saucepan (milk - non-stick)	19.7	1.37	4.6

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Pure Orange Juice, 1 litre carton	19.9	1.49	4.5
Home Killed beef, Braising steak per kg	20.0	0.63	4.5
Cook-in sauce jar/can, 350-520g (eg bolognese)	20.0	0.45	4.5
Child's soft toy/teddy bear	20.0	1.38	4.5
Mens training shoe-footwear	20.1	1.08	4.5
Red Wine - European	20.2	3.39	4.4
Washable Carpet, (e.g. Kitchen/Bathroom) per sq. metre	20.2	1.79	4.4
Fruit drink carton with straw, 3 pack (200-290ml)	20.3	0.81	4.4
Potted shrub	20.3	1.20	4.4
Power Drill, Hammer Action	20.4	0.36	4.4
Margarine/Low Fat Spread, 500g	20.5	1.45	4.4
Girl's Shoes (School)	20.5	0.54	4.4
Womens' Shoes - Flat	20.5	1.63	4.4
Cereal snack eg. Wotsits, Skips, single packet	20.7	1.35	4.3
Cider, (1-2 litre bottle)	20.7	0.68	4.3
Earrings, fashion, not solid gold or silver (state type)	20.7	0.95	4.3
Chilled pot dessert (non yoghurt) 50-200g	20.8	1.37	4.3
MEN'S FORMAL SHIRT-LONG SLEEVE	20.8	2.35	4.3
Boxed board game, not travel type (specify)	20.8	2.42	4.3
Spirit based drink 275ml (see help screen)	20.9	0.68	4.3
Table lamp, with shade	20.9	1.13	4.3
Trousers, suitable for school (5-15 years)	20.9	1.57	4.3
Child's trainers-footwear	20.9	0.54	4.3
Plastic Doll, child's (eg Barbie/Action Man)	20.9	2.42	4.3
Fizzy Bottled Drink 500ml	21.0	1.35	4.2
Canned Soup (390-425g)	21.0	0.27	4.2
Butter, Imported, 250g	21.1	0.54	4.2
MEN'S FORMAL RDY-MADE TROUSERS	21.1	0.78	4.2
Construction toy, specify kit no. (eg Lego)	21.1	4.15	4.2
Tissues (large size box)	21.2	2.53	4.2
Cooked meat, turkey sliced (100-113g)	21.3	0.95	4.2
Lemonade, 2 litre bottle	21.3	0.41	4.2
Flower vase	21.3	2.42	4.2
Pitta bread (state type, number in pack and weight)	21.5	0.90	4.1
Chilled Ready-meal, serve one, (specify weight)	21.5	1.05	4.1
Mayonnaise (400g-500g)	21.5	0.30	4.1
Hair gel (150-200ml)	21.6	1.08	4.1
Smokeless Fuel, boiler/heater 50kg (specify brand)	21.7	0.27	4.1
Deodorant, specify eg spray/roll-on (50-150ml)	21.7	1.45	4.1
Breakfast cereal 1 sweetened/chocolate coated	21.8	2.26	4.1
Frozen Beefburgers, Pack of 4, specify weight	21.9	0.63	4.0
Frozen Garden Peas (900-910g bag)	21.9	1.05	4.0
White Wine - European	21.9	2.57	4.0
Frozen vegetarian ready meal	22.0	0.21	4.0
Coal - Household best quality (Group A) 50kg	22.0	1.23	4.0
Dishwasher Tablets	22.0	0.68	4.0
Complete dry dog food (2-2.5kg)	22.0	1.90	4.0
MEN'S TRACKSUIT/JOGGIN BOTTOMS	22.0	0.78	4.0
Wall hanging mirror	22.0	1.51	4.0

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
20 Berkeley mentholated cigarettes	22.1	1.57	4.0
Moisturising (100-150ml)	22.2	1.45	4.0
Concentrated fruit drink eg orange (1 litre)	22.3	1.35	4.0
Wine box - 3 litres min abv 11%	22.3	0.81	4.0
Glass Ovenware Casserole dish	22.3	0.84	4.0
Disposable Nappies (specify type/pack size)	22.3	3.61	4.0
Hard Regional Cheese	22.4	0.59	3.9
Men's training shoe-sportswear	22.4	1.35	3.9
Womens' Shoes High - Sensible	22.4	0.81	3.9
Box/carton of chocolates, 450-500gm	22.5	1.99	3.9
Shower gel (150-250ml)	22.5	0.72	3.9
Potato Crisps, Multi-pack	22.6	1.69	3.9
Coffee, Instant (100g jar)	22.7	2.26	3.9
Recordable CD	22.7	0.60	3.9
Cheese spread, tub, 200g	22.8	0.98	3.9
Frying Pan 20-24cm	22.9	1.16	3.8
Car CD/radio autochanger (exclude fitting cost)	23.1	0.18	3.8
Canned Fish, Tuna, specify oil/brine/water (180-200g)	23.2	0.72	3.8
Tea bags 1, packet of 80 (250g)	23.2	1.40	3.8
Washing powder, automatic, 1 to 2kg (specify size)	23.2	0.68	3.8
Frozen ready-cooked meal, to serve one	23.3	0.45	3.8
Hand Rolling Tobacco 25g	23.3	1.57	3.8
Women's Jeans - Own Brand	23.3	1.57	3.8
Cheese Cheddar, Imported, per kg	23.6	0.78	3.7
Whole sponge cake, not frozen, eg Victoria sponge (specify)	23.7	1.13	3.7
Women's permanent hair colourant (60-120ml)	23.7	1.08	3.7
Cut flowers, carnations (price per stem)	23.7	1.28	3.7
Cooked Ham Prepacked Sliced (100-125g)	23.9	3.48	3.7
Eggs, Large, per dozen or 2 x 6	23.9	0.78	3.7
Womens shorts	24.0	0.78	3.6
Bath sheet	24.1	2.29	3.6
Women's Training Shoe	24.1	1.49	3.6
Frozen Prawns	24.2	0.54	3.6
Frozen Veg Burger/grills, pack of 4, (200-400g)	24.2	0.63	3.6
Electric Shower Unit	24.2	1.32	3.6
Coffee, ground, filter fine (227-250g)	24.3	0.41	3.6
Preschool Activity Toy	24.3	3.81	3.6
ADULT OFFICIAL FOOTBALL SHIRT	24.4	0.78	3.6
MEN'S BRANDED SPORT SWEATSHIRT	24.4	0.78	3.6
Fresh Veg-mushrooms-per kg	24.5	1.05	3.6
Bacon, Back, per kg	24.7	3.79	3.5
Pre-packed salad	24.7	0.21	3.5
Girl's skirt, suitable for school (5-15 years)	24.8	0.78	3.5
Frozen Fish Fingers	25.0	1.08	3.5
Carpet, Axminster or traditional Wilton (eg per sq. m)	25.0	1.79	3.5
Crockery set (specify contents/no place settings)	25.1	0.84	3.5
Home Killed Beef, Best Mince, per kg	25.2	0.95	3.4
Mattress, 3ft/90cm (interior sprung)	25.2	1.51	3.4
House plant (eg African Violet)	25.2	0.60	3.4

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
5 cigars, specify brand (eg Hamlet, Café Crème)	25.3	2.35	3.4
Bleach (750ml bottle)	25.3	1.58	3.4
Cordless phone (specify digital/analogue)	25.4	1.81	3.4
Razor Cartridge Blades	25.4	2.53	3.4
Portable CD radio cassette	25.4	0.54	3.4
Kitchen Base Unit, self assembly, width 1000mm	25.7	3.39	3.4
Frozen Chicken Nuggets (250-500g)	25.9	0.63	3.3
Frozen Chips (908g approx.)	25.9	1.26	3.3
DRIED POTTED SNACK 50-120G	25.9	0.68	3.3
Womens' Shoes - High - Stiletto	25.9	0.95	3.3
Push Chair	26.0	0.48	3.3
20 Lambert & Butler kingsize	26.1	8.22	3.3
Fitted bed sheet, specify size	26.2	1.69	3.3
Bacon, Gammon, per kg	26.3	1.26	3.3
Cheese Cheddar, Home produced, per kg	26.3	1.76	3.3
Individual Fruit Pies, 6 Pack	26.4	1.13	3.3
Eggs, Medium, per dozen or 2 x 6	26.4	0.78	3.3
Apples, cooking (per kg)	26.4	0.48	3.3
Breakfast Cereal 1 unsweetened	26.5	3.61	3.2
Fortified wine eg Sherry/Port (70-75cl)	26.5	0.41	3.2
Lady's leather handbag/ shoulder bag	26.5	1.38	3.2
HIFI - 2006	26.5	1.08	3.2
Carpet, Tufted, per square metre	26.6	1.79	3.2
Women's Jeans - Branded	26.6	1.57	3.2
Fresh boneless chicken breast per kg	26.7	1.90	3.2
MEN'S CASUAL TROUSERS	26.7	2.35	3.2
Womens short sleeve sports top	26.7	0.78	3.2
Cola flavoured drink, 2 litre bottle	26.8	2.17	3.2
Childs trainers-sportswear	26.8	0.54	3.2
Duvet cover, specify size and if pillow cases incl.	26.9	1.69	3.2
Cheese Brie, per kg	27.0	0.39	3.2
Carpet, Tufted - 2 (per sq.metre)	27.0	2.00	3.2
Men's Football Boots	27.0	0.90	3.2
20 Superkings	27.2	5.48	3.2
Brandy (68-70cl bottle)	27.3	0.68	3.1
POTATOES- BAKING PR KG	27.4	0.21	3.1
Lager 4 Cans - Premium	27.4	1.20	3.1
Lager 4 Bottles - Premium	27.4	1.69	3.1
20 Benson & Hedges King Size	27.4	4.31	3.1
Women's nightdress/pyjamas (specify)	27.4	1.57	3.1
Lady's Scarf (State material and type)	27.4	1.63	3.1
Premium Potato Crisps/Chips	27.5	0.84	3.1
Bananas, (per kg)	27.5	2.17	3.1
Frozen imp lamb loin chops with bone (per kg)	27.6	0.32	3.1
Gas cookers (specify make & model)	27.6	0.48	3.1
Curtains, Ready Made, approx. 66x72inch/168x183cm	27.8	2.41	3.1
Vodka, (70cl bottle)	28.0	2.56	3.0
MENS BRANDED T-SHIRT	28.0	0.78	3.0
MENS SUIT-READY MADE	28.1	2.35	3.0

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
Women's Sandals (1)	28.1	0.68	3.0
WOMEN'S TROUSERS-FORMAL	28.2	2.35	3.0
Ice cream specify flavour (500ml - 1 litre)	28.5	0.99	3.0
Boy's branded sports top (5-15 years)	28.5	1.57	3.0
20 Silk Cut, Ultra Low Tar	28.6	2.74	3.0
MEN'S CASUAL S/SLEEVE SHIRT	28.6	0.78	3.0
Mower electric (flymo, cylinder)	28.6	0.54	3.0
Pack of 5-6 individually wrapped cakes	28.7	0.90	3.0
Television, Colour (14inch/34cm Portable)	28.7	1.08	3.0
Boy's jeans (5-15 years)	28.8	1.57	2.9
Duvet, double, polyester filled TOG 10-13.5	28.9	1.69	2.9
TOILET ROLLS	28.9	3.61	2.9
Tea bags 2, packet of 240 (approx 750g)	29.0	0.45	2.9
Home Killed Pork, Loin Chops with bone, per kg	29.1	0.95	2.9
Yoghurt/fromage frais, 4pk (50-125g each)	29.1	1.37	2.9
Fresh Veg-onions-per kg	29.6	1.26	2.8
20 King size filter, other Brand (eg Marlboro Lights)	29.6	5.09	2.8
Electric Kettle (jug-type) 3 pint/ 1.5-1.7 litre	29.6	0.60	2.8
FROZEN PIZZA-MED SIZE-300-450G	29.7	1.58	2.8
Kitchen Roll	29.7	0.53	2.8
Hotel 1 Night Price	30.1	9.48	2.8
Sunglasses, non-designer, UV lenses	30.2	0.18	2.8
Compact Disc Album (top 40)	30.4	5.42	2.8
Pre-Packed Veg Eg Baby Corn	30.5	0.21	2.7
Red Wine - New World	30.5	2.30	2.7
MEN'S JUMPER OR SWEATSHIRT	30.5	1.57	2.7
Fresh/chilled orange juice eg: tropicana (1l)	30.7	0.81	2.7
WOMEN'S T-SHIRT	30.7	0.78	2.7
MEN'S CASUAL SHIRT-LONG SLEEVE	30.8	0.78	2.7
Book, non-fiction, paperback (top 10 best seller)	30.8	1.35	2.7
Microwave oven (state if combined)	30.9	0.12	2.7
Child's Pyjamas	31.0	0.78	2.7
Child's Baby Doll	31.1	2.42	2.7
Electric iron	31.2	0.36	2.7
Fresh Veg-cabbage-whole-per kg	31.3	0.63	2.7
Electric Cooker, 4 rings, grill and oven	31.3	1.20	2.7
Kiwi Fruit, (each)	31.6	0.60	2.6
Lager Stubbies 4.3-7.5(ABV) [24 L	31.6	0.78	2.6
Sunscreen cream/lotion (specify size/SPF)	31.6	2.17	2.6
Fresh fish -salmon fillets (per kg)	31.7	1.26	2.6
Whisky (70cl bottle)	31.7	3.61	2.6
MEN'S JUMPER-KNITTED	31.7	1.57	2.6
Women's casual trousers 2	31.7	1.57	2.6
Home Killed Pork, boneless shoulder, per kg	31.8	0.95	2.6
Single bed (width approx. 3ft/90cm)	31.8	2.26	2.6
Large Wholemeal Sliced Loaf	31.9	0.90	2.6
Chest of Drawers	31.9	2.26	2.6
Coffee Table	32.0	1.88	2.6
White Wine - New World	32.1	2.03	2.6

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
White Sliced Loaf	32.2	1.58	2.6
Home Killed Beef, Rump Steak/Popes eye steak, per kg	32.5	1.26	2.5
WOMEN'S SKIRT: WORK/FORMAL	32.6	2.35	2.5
Draught flow bitter, 4 cans (440-500ml)	32.8	1.08	2.5
Double Wardrobe	32.8	2.26	2.5
Book, Fiction, paperback, top 10 best seller)	33.0	2.63	2.5
Childs Trousers eg Jeans	33.1	0.78	2.5
Girl's trousers not denim (5-15 years)	33.1	0.78	2.5
Fresh/Chilled Chicken, per kg, state size (eg small)	33.5	0.63	2.5
MEN'S CASUAL JACKET/FLEECE	33.6	2.35	2.4
WOMEN'S TROUSERS-CASUAL	33.6	1.57	2.4
VHS Video Recorder	33.8	0.72	2.4
Double Bed (width approx. 4ft 6inch/135cm)	33.9	2.26	2.4
Luggage Trolley Case	33.9	1.38	2.4
Sofa Bed	34.5	1.88	2.4
Fresh white fish fillets, per kg (eg cod)	34.7	2.41	2.3
Apples-dessert-(per kg)	35.0	1.20	2.3
WOMEN'S FORMAL JACKET	35.0	1.57	2.3
Home Killed, Beef Topside, 1st Quality, no bone, per kg	35.1	0.95	2.3
Bottle of champagne 70-75cl	35.2	1.35	2.3
Cola flav/other fizzy drink 330ml, pack of 6/8	35.3	0.41	2.3
Armchair (upholstered)	35.3	2.26	2.3
Fresh Turkey Steaks	35.4	0.63	2.3
Dining room table & 4-6 chairs (specify no. chairs)	35.5	1.13	2.3
WOMEN'S CARDIGAN	35.9	0.78	2.2
ELECTRIC RAZOR	36.0	1.81	2.2
POTATOES- OLD WHITE PER KG	36.2	1.48	2.2
Women's vest/strappy top	36.4	0.78	2.2
DVD player	36.5	1.08	2.2
Dishwasher (12 Place Setting)- 2005	36.6	0.72	2.2
Fresh veg, lettuce, round (each)	36.9	0.42	2.2
WOMEN'S BLOUSE LONG/SHORT SLV	36.9	2.35	2.2
MP3 Player	37.2	0.72	2.1
Women's premium branded dress	37.3	0.78	2.1
WOMEN'S JUMPER	37.4	0.78	2.1
Home Killed Lamb, Loin Chops with bone, per kg	37.8	0.63	2.1
Vaccum cleaner - 2006	38.0	0.84	2.1
Girls's summer jacket (5-15 years)	38.3	0.78	2.1
Women's Ankle Boot	38.4	0.68	2.1
Oranges, class 1, (each)	38.5	0.84	2.1
Fridge/freezer - 2006	38.5	1.32	2.1
Women's showerproof Jacket	38.6	0.78	2.1
Frozen imported lamb, leg (per kg)	38.7	0.63	2.0
Grapefruit, (each)	38.7	1.20	2.0
Lager - Pack of 12 Cans	39.0	1.26	2.0
WOMEN'S CASUAL OUTER JACKET	39.4	1.57	2.0
MEN'S 3/4 LENGTH CASUAL COAT	39.7	1.57	2.0
WOMEN'S SKIRT: CASUAL	40.1	2.35	2.0
WOMEN'S CAS OUTER JKT-FLEECE	40.3	1.57	1.9

Table 1: The Frequency of Price Changes by Category (*continued*)

item_des	Freq	Weight	MO
DVD RECORDER	40.3	0.00	1.9
MEN'S SHORTS	40.4	0.78	1.9
Fresh Veg-carrots-per kg	40.6	0.63	1.9
Bag of organic dessert apples (state number)	40.7	0.60	1.9
Home Killed Lamb, Shoulder with bone, per kg	40.8	0.63	1.9
Widescreen TV - 2006	40.9	1.90	1.9
3 Piece Non-Leather Suite	41.0	2.26	1.9
Girl's winter jacket (5-15 years)	41.1	0.78	1.9
Leather Settee	41.2	4.89	1.9
Girl's Fashion Top (12-15Y)	41.4	0.78	1.9
WOMEN'S LONG SLV TOP-NT BLOUSE	41.8	0.78	1.8
Cut Flowers Lillies	41.9	1.28	1.8
Pre-Recorded Video	42.7	0.60	1.8
Potatoes-new-loose-per kg	42.9	0.63	1.8
Women's 3/4 length casual coat	43.3	0.78	1.8
Fresh Veg-organic carrots,kg	43.4	0.21	1.8
Gas BBQ	43.5	0.30	1.8
Washing Machine - 2006	44.1	2.05	1.7
Avocado pear, (each)	44.7	0.96	1.7
20 Richmond King Size	44.7	5.87	1.7
Wooden Patio Set	45.2	0.75	1.7
Womens dress (casual/formal)	45.6	3.13	1.6
Child's jumper (18 months - 4 years)	46.6	0.78	1.6
Pears, dessert (per kg)	47.1	0.60	1.6
Book, non-fiction, hard cover (top 10 best seller)	47.2	1.35	1.6
WOMENS SHORT SLEEVE TOP	48.6	2.35	1.5
Flat panel TV	50.5	1.72	1.4
Pre-Recorded DVD	51.4	4.06	1.4
Theatre Admission Eves, Front Stalls (adult)	55.4	2.11	1.2
Fresh Veg-tomatoes-per kg	59.0	1.90	1.1
Fresh Veg, Cucumber (whole)	61.5	0.63	1.0
Fresh Veg-sprouts-per kg	62.5	0.21	1.0
Digital Camcorders	62.9	2.56	1.0
Ultra low sulphur diesel (per 10 litres)	63.5	8.96	1.0
Ultra low sulphur/unleaded petrol (per 10 litres)	67.7	43.20	0.9
Peaches, (each)	68.4	0.00	0.9
Grapes, (per kg)	69.6	1.45	0.8
Fresh Veg, Lettuce - Iceberg	71.6	0.63	0.8
Fresh Veg, Cauliflower, each	76.1	1.48	0.7
Strawberries, (per kg)	81.2	0.00	0.6
Kerosene per litre (1000 litres local bulk delivery)	93.8	3.01	0.4

Mo = the mean duration between price changes implied by $\lambda = -1/\ln(1 - \lambda)$.

Weight = Share of the Level Item in the VML data set for the whole period January 1996 to December 2007 (these sum to 1000).

Freq = the estimated average monthly frequency of price changes (λ in the text).

2 Stochastic models for forecasting inflation rate

Beside the core inflation measures, we also includes stochastic model in our comparison. The main purpose of modeling time series using stochastic processes is to explain how the phenomenon evolves and to make predictions based on the estimated model. The main idea of this method is to predict the future through inflation historical data, which is used as the baseline in comparison.

2.1 Autoregressive process (AR)

A stationary series, Y_t , follows a process $AR(p)$ if the condition is fulfilled:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \varepsilon_t$$

where $\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$ stationary time series, $E(\varepsilon_t) = 0, E(\varepsilon_t^2) = \sigma^2, E(\varepsilon_t, \varepsilon_s) = 0$, if $t \neq s; \beta_0, \beta_1, \dots, \beta_p$ parameters.

The autoregressive models are characterized by the fact that the value of variable Y at time t depends on the previous values of the variable.

One of AR models used to explain the unpredictability nature of financial asset price evolution is Random Walk model, where $p = 1, \beta_0 = 0, \beta_1 = 1$.

The representation of the model is $Y_t = Y_{t-1} + \varepsilon_t$.

As a result, the value of a series in a given period depends on the value of the series in the previous period and a random term whose value is expected to be zero.

2.2 Data used

The data used are represented by the monthly data series from January 2005 to December 2019 for the inflation rate in UK.

2.3 The analysis of the series stationarity

Hypothesis: H_0 :the time series has a unit root H_1 :the time series is stationary

According to Augmented Dickey-Fuller test, for a significance apron of 0.05, the test's value is -2.6532 and P-value is 0.3013. Since the p-value is not less than .05, we fail to reject the null hypothesis. This means the time series is non-stationary. In other words, it has some time-dependent structure and does not have constant variance over time. However, after applying on the series a logarithmic transformation to remove the negative effect induced by non-stationarity in variance, test statistic is -3.5831 and P-value is 0.03473. As the test value is lower than the critical value for any level of relevance, we can say that at 5% level of relevance, the null hypothesis is rejected or it is stationary, so the basis series is integrated by the first order. After this transformation, we will get a series with approximately the same trend but with milder amplitudes of the variance.

2.4 Identification of the model's type

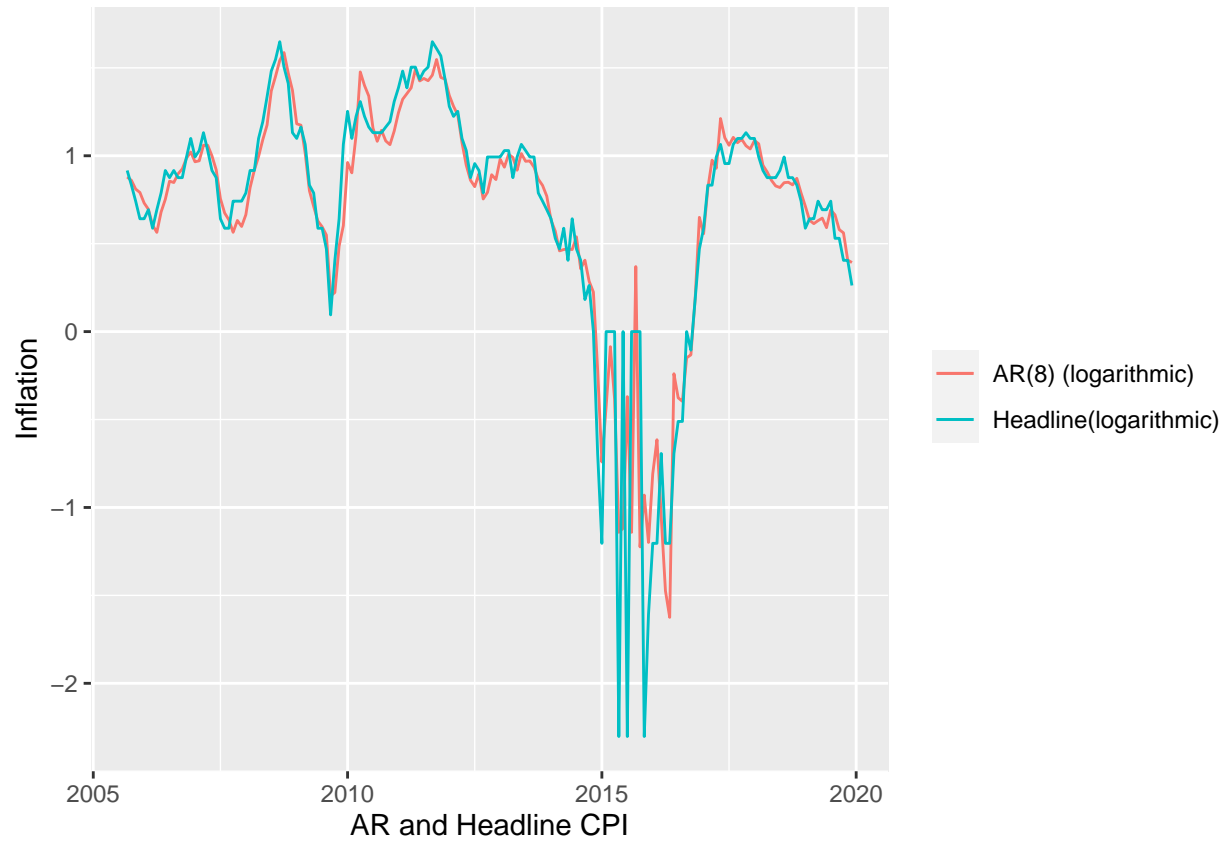
Using the data series with a monthly frequency of the inflation rate for the period January 2005 - December 2019 there were estimated AR model to describe the inflation rate.

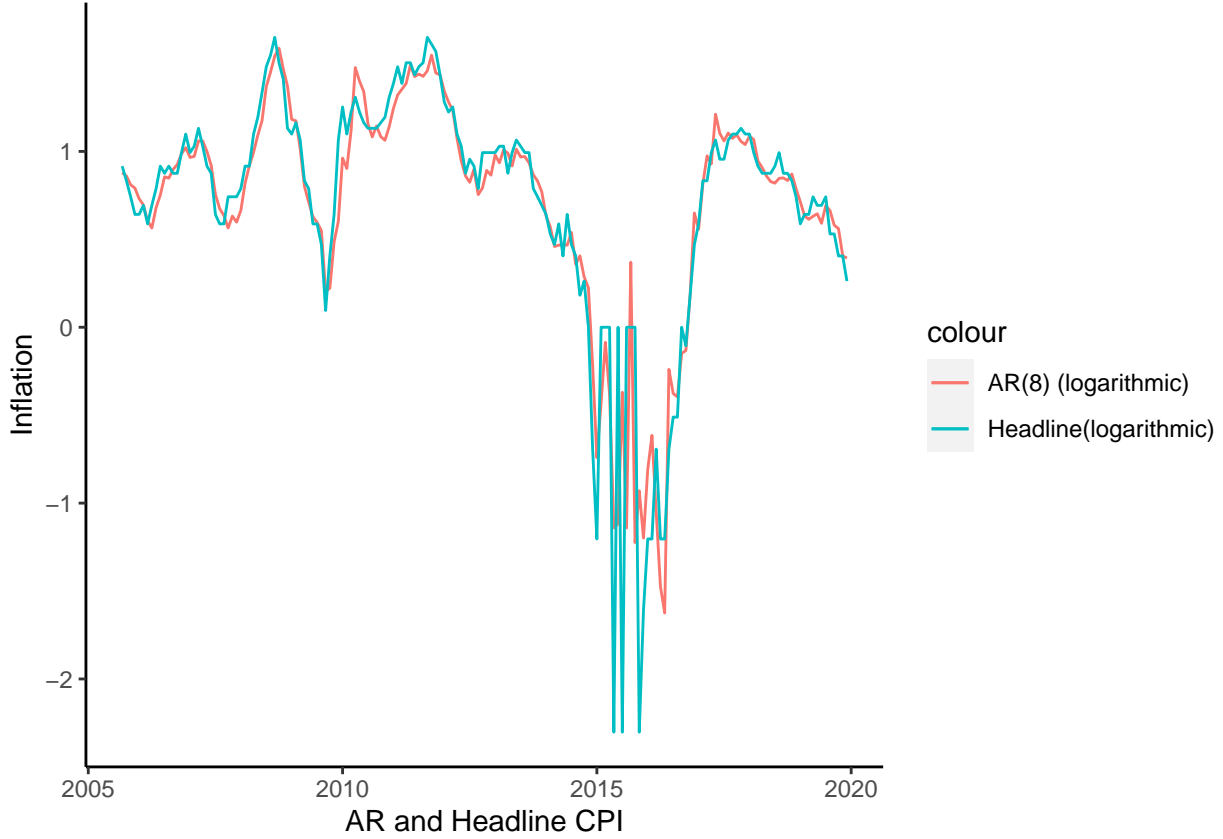
The Akaike Information Criterion is used to choose the order of the autoregressive model. The results recommended an AR process (8).

2.5 Parameters estimation of the econometric models

The estimated model is:

$$\pi_t = 0.06865 + 0.4156\pi_{t-1} + 0.3868\pi_{t-2} - 0.1276\pi_{t-3} + 0.3274\pi_{t-4} - 0.0032\pi_{t-5} + 0.2341\pi_{t-6} + 0.0212\pi_{t-7} - 0.3609\pi_{t-8}$$





3 Criteria for evaluation : forecasting future inflation

This work uses Cogley’s model to test the forecasting ability of core inflation rate, and it also compares the forecasting ability of various core inflation measures, including excluding food and energy(FE), sticky price(SP) and trimmed mean(TR). We also include the ability of current inflation to predict future inflation as a baseline in comparison(AR(8)). Cogley’s model is based on Bryan and Cecchetti’s definition of core inflation: “Core inflation is changes in the price level that are expected to persist over a long period of time.”

According to Bryan and Cecchetti’s definition, a valid core inflation is one that is “pure” after removing temporary factors from measured real inflation. On this basis, Cogley developed the following model to evaluate the predictive power of core inflation:

$$\pi_{t+h} - \pi_t = \alpha_h + \beta_h (\pi_t - \pi_t^c) + u_{t+h}$$

Here, π represents the headline inflation rate and core π^c represents some core inflation indicator, both year-on-year data. Parameter h is N (month) ahead. For sufficiently large h , the core deviation, $(\pi_t - \pi_t^c)$, should be inversely related to subsequent changes in inflation, $\pi_{t+h} - \pi_t$. Moreover, in order for the candidate to satisfy equation (1), the coefficients in the regression, should satisfy $\alpha = 0$ and $\beta = -1$.

Of importance to the forecasting model is the estimated coefficient of β , which indicates whether core inflation has sufficiently purified the transitory component. Because if the absolute value of the estimated coefficient is equal to 1, it indicates that the model is a random walk process, and the components removed from the core inflation do not contain any information that predicts future overall inflation. If $\beta = -1$, the forecasting capacity for core inflation is the best. This proves that core inflation has fully captured the trend components of overall inflation and has a complete forecasting ability for future inflation.

1. If the $|\beta| < 1$, it indicates that subsequent changes in inflation are overestimated;
2. If the $|\beta| > 1$, it shows that underestimation of the current temporary movement in headline inflation.

Therefore, the closer the absolute value of the estimated regression coefficient β is to 1, the better the predictive power of core inflation is. In addition, the root mean square error $RMSE = \sqrt{\frac{1}{T} \sum_{t=1}^T (\pi_t - \hat{\pi}_t)^2}$ obtained by Cogley regression represents the deviation between the predicted value and the actual value. $\hat{\pi}_t$ is the forecast value of the inflation rate. The smaller the RMSE, the more accurate the forecast. and the better the forecast of core inflation.

4 Results

From the above discussion, I used my own data to re-simulate the values of the parameters. The results please see Table ??,2 and Figure 1.

Table 2: Headline CPI Forecast Accuracy: Root Mean Squared Errors

	Core Inflation			
	FE	TR	SP	AR(8)
1 months ahead	0.2875491	0.2866793	0.2861292	0.2870158
2 months ahead	0.4433265	0.4430588	0.4416071	0.4452810
3 months ahead	0.5778391	0.5791695	0.5759107	0.5862859
4 months ahead	0.6936614	0.7019321	0.6945009	0.7126221
5 months ahead	0.7942037	0.8085734	0.7973872	0.8240045
6 months ahead	0.8797910	0.8997629	0.8850286	0.9231945
7 months ahead	0.9466686	0.9683200	0.9526523	1.0043084
8 months ahead	1.0048770	1.0338213	1.0106950	1.0783709
9 months ahead	1.0531805	1.0921331	1.0597119	1.1418823
10 months ahead	1.0900066	1.1417008	1.0989023	1.1976084
11 months ahead	1.1239888	1.1962377	1.1383689	1.2518211
12 months ahead	1.1554869	1.2412841	1.1683490	1.2982620

```
##
## <table style="text-align:center"><tr><td colspan="5" style="border-bottom: 1px solid black"></td></tr>
## <tr><td colspan="5" style="border-bottom: 1px solid black"></td></tr><tr><td>1 months ahead</td><td>
## <tr><td>2 months ahead</td><td>0.44</td><td>0.44</td><td>0.44</td><td>0.45</td></tr>
## <tr><td>3 months ahead</td><td>0.58</td><td>0.58</td><td>0.58</td><td>0.59</td></tr>
## <tr><td>4 months ahead</td><td>0.69</td><td>0.70</td><td>0.69</td><td>0.71</td></tr>
## <tr><td>5 months ahead</td><td>0.79</td><td>0.81</td><td>0.80</td><td>0.82</td></tr>
## <tr><td>6 months ahead</td><td>0.88</td><td>0.90</td><td>0.89</td><td>0.92</td></tr>
## <tr><td>7 months ahead</td><td>0.95</td><td>0.97</td><td>0.95</td><td>1.00</td></tr>
## <tr><td>8 months ahead</td><td>1.00</td><td>1.03</td><td>1.01</td><td>1.08</td></tr>
## <tr><td>9 months ahead</td><td>1.05</td><td>1.09</td><td>1.06</td><td>1.14</td></tr>
```

```
## <tr><td>10 months ahead</td><td>1.09</td><td>1.14</td><td>1.10</td><td>1.20</td></tr>
## <tr><td>11 months ahead</td><td>1.12</td><td>1.20</td><td>1.14</td><td>1.25</td></tr>
## <tr><td>12 months ahead</td><td>1.16</td><td>1.24</td><td>1.17</td><td>1.30</td></tr>
## <tr><td colspan="5" style="border-bottom: 1px solid black"></td></tr></table>
```

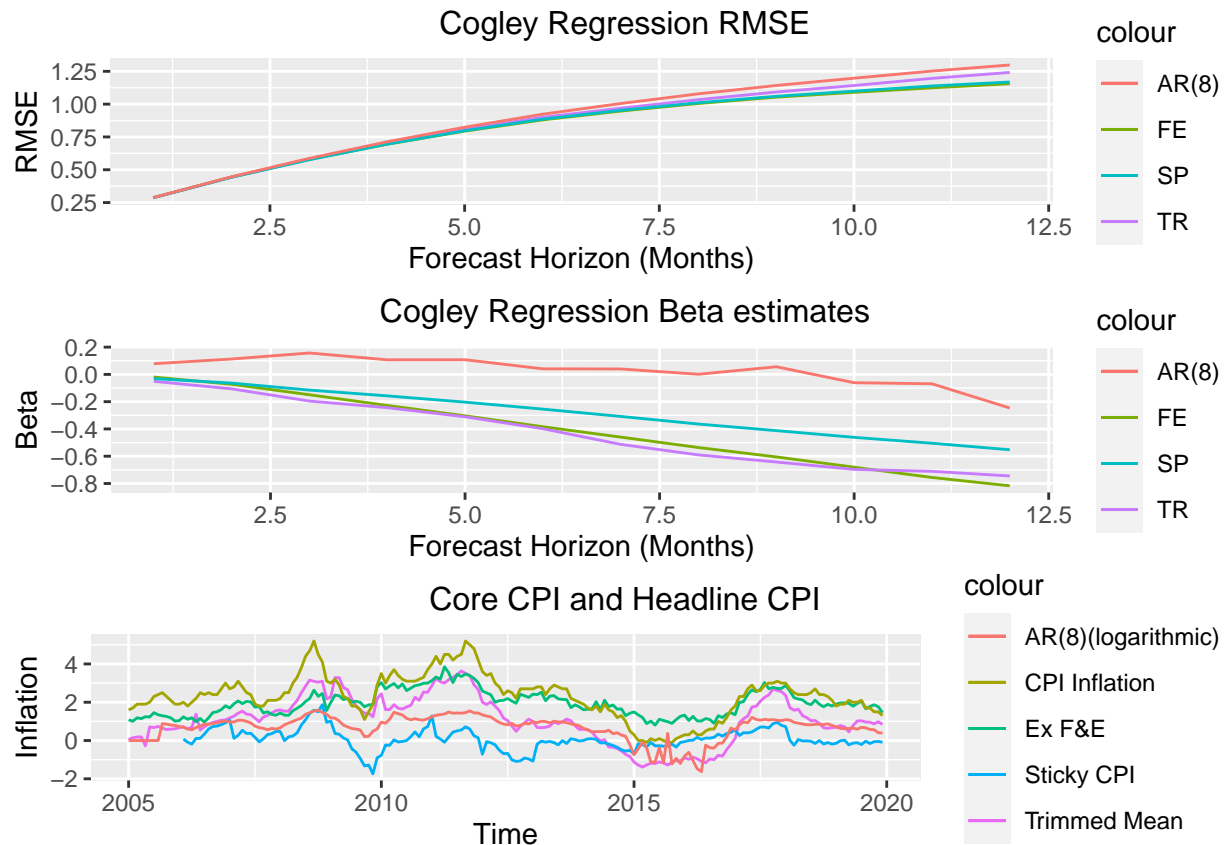
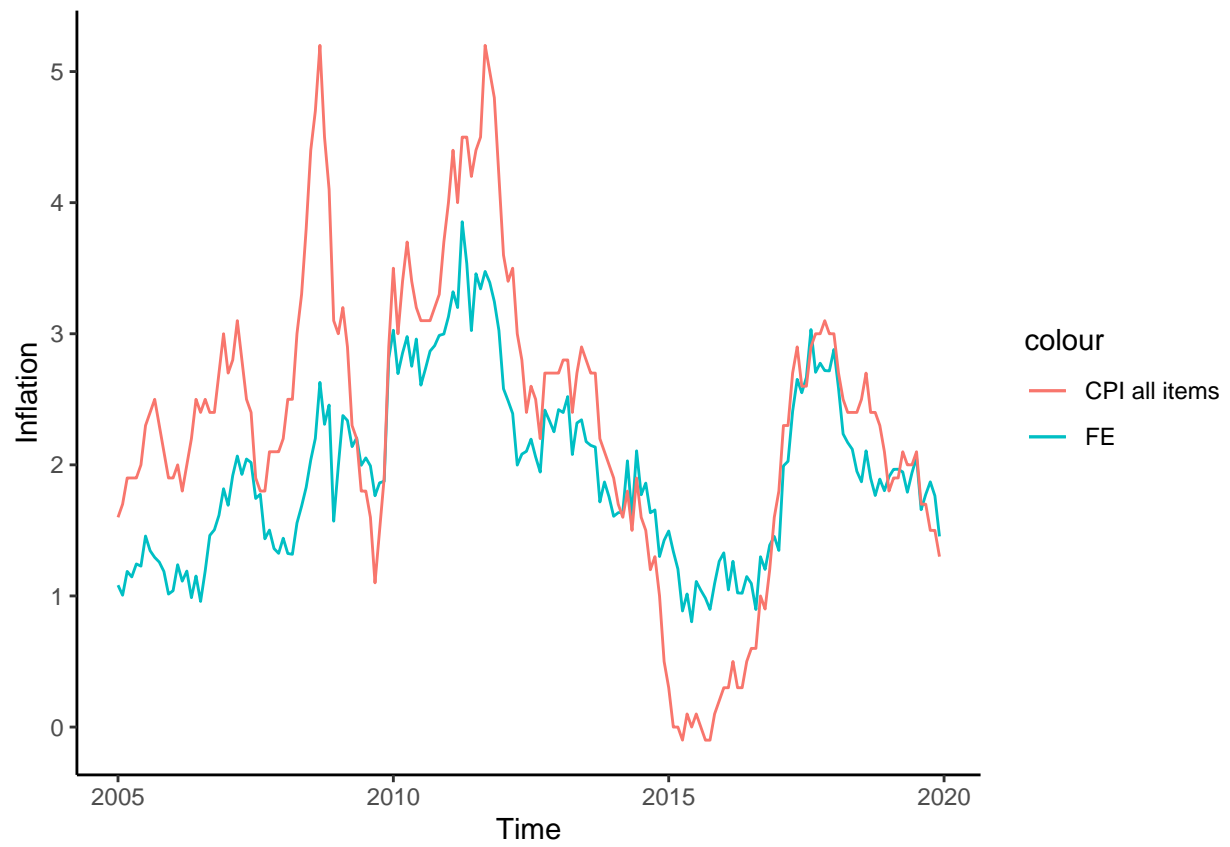
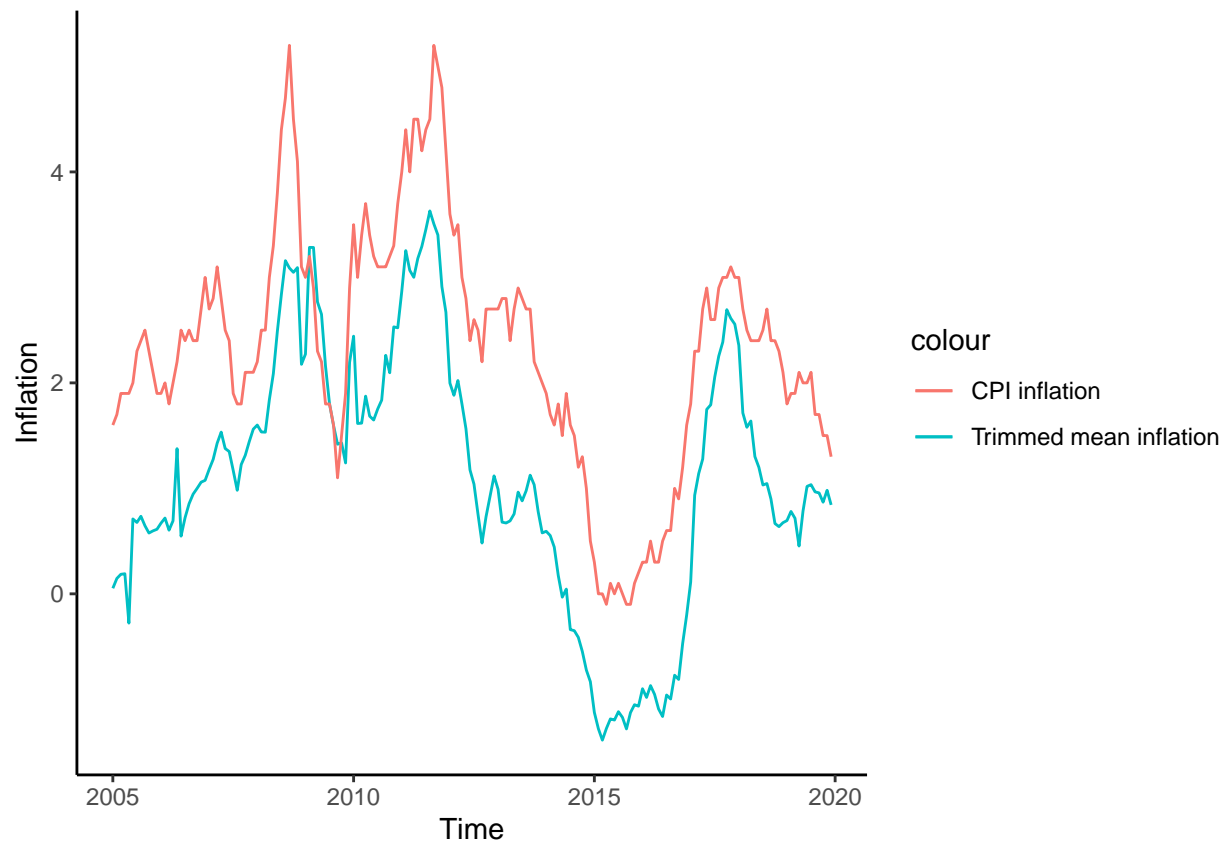


Figure 1: overall





5 Conclusions

As expected, all Cogley regressions of the core inflation rate with β estimates are all negative. The beta keeps falling as the number of forecast periods rises; The forecast RMSE for core inflation rates increases as the number of forecast periods increases continuously. This suggests that the longer the forecast period, the more inaccurate the forecast.

Figure 1 shows that the predictive power of the core inflation of AR(8) is the worst. The coefficient estimates of the Cogley regression deviate the furthest from - 1 and the predicted root mean square error (RMSE) was the largest except 1 month head. The Cogley regression β estimate of the core inflation rate of Trimmed Mean is closet to 1 when the forecast period is less than 10 months. The β of the Ex FE and SP are between Trimmed mean and AR(8) in this period. So from β estimates, TR has the best prediction effect of core inflation rate when forecast horizon less 10 months. The FE core inflation rate is predicted to work best after 10 months periods.

From the root mean square error criteria, for months 1 the ranking is SP>TR>AR(8)>FE; month 2 is SP>TR>FE>AR(8); month 3 SP>FE>TR>AR(8); months 4-12 FE>SP>TR>AR(8). All four similar.