# The Stimulus Effect of the 2008 UK Temporary VAT Cut

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The temporary VAT cut

- Standard rate of VAT cut from 17.5% to 15% from Dec 1st 2008 to Dec 31st 2009. Announced November 24, 2008.

- If passed on to consumers, this would lowers the current price of applicable goods by 2.5 percentage points.

- About 55% of gross consumer expenditure is on goods to which the standard rate of VAT applies; this implies that about 51% of net expenditure is subject to the standard rate of VAT.

- Assuming limited within-period substitution (and full-pass through), the VAT cut should reduce the price of current purchases by 1.275 percentage points or 1.2%

- This was intended to stimulate current consumer demand.

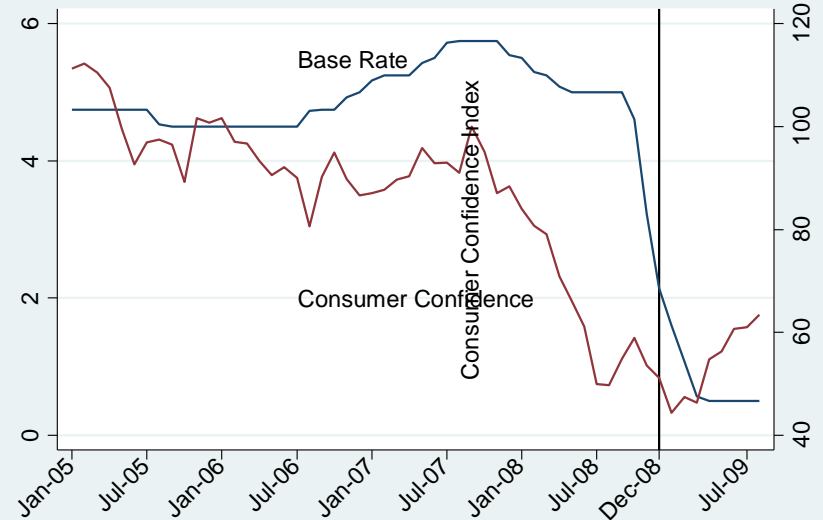- Estimated cost about £12.4 billion (about 2% of revenues).

The economic situation was rapidly worsening

Quarterly UK Real GDP Growth and Unemployment Rate
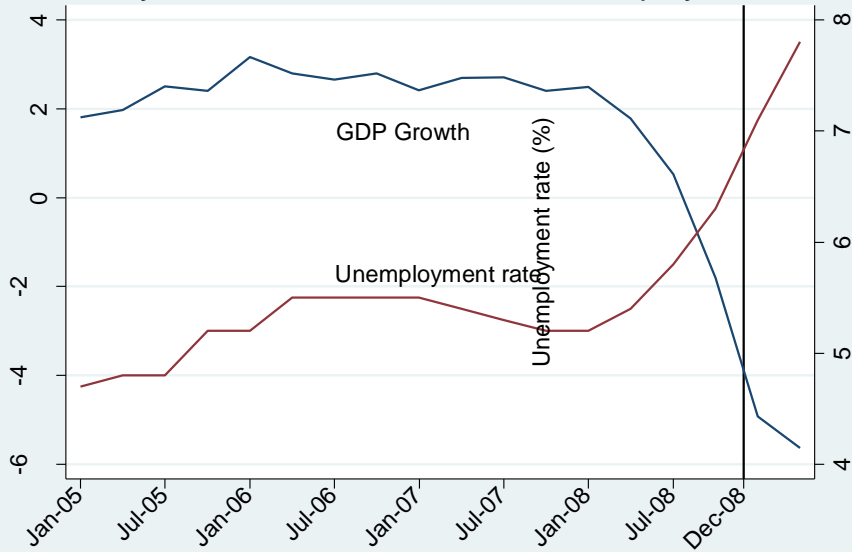
GDP Growth

Unemployment rate

Unemployment rate (%)

Source: Office of National Statistics

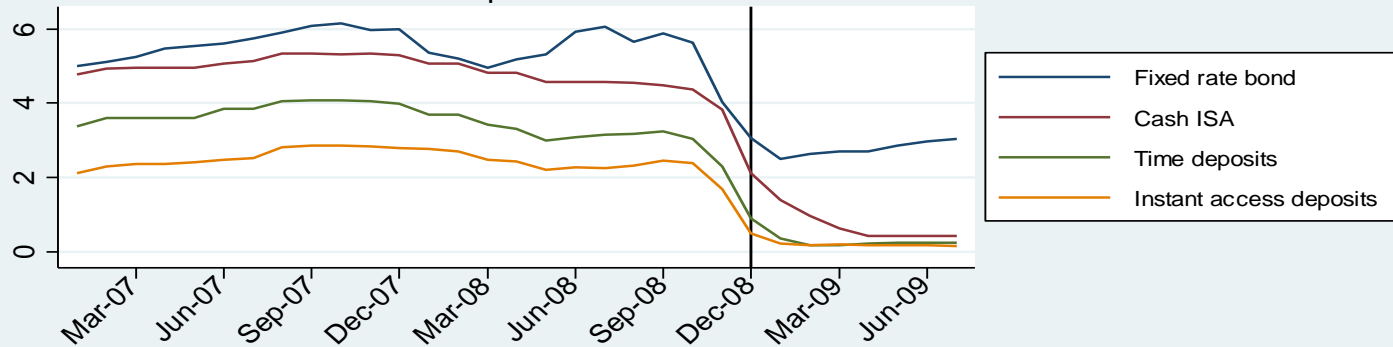Monthly Average of Official Bank of England Rate and Consumer Confidence Index

Base Rate

Consumer Confidence

Consumer Confidence Index

Source: Bank of England, Nationwide

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Base rate changes not reflected in borrowing rates

Nominal Monthly Interest rate of UK Resident Banks

Household Borrowing Interest Rate

- Sterling Overdraft
- Credit Card lending
- Personal Loan 5K
- Personal Loan 10K
- Variable Rate Mortgage
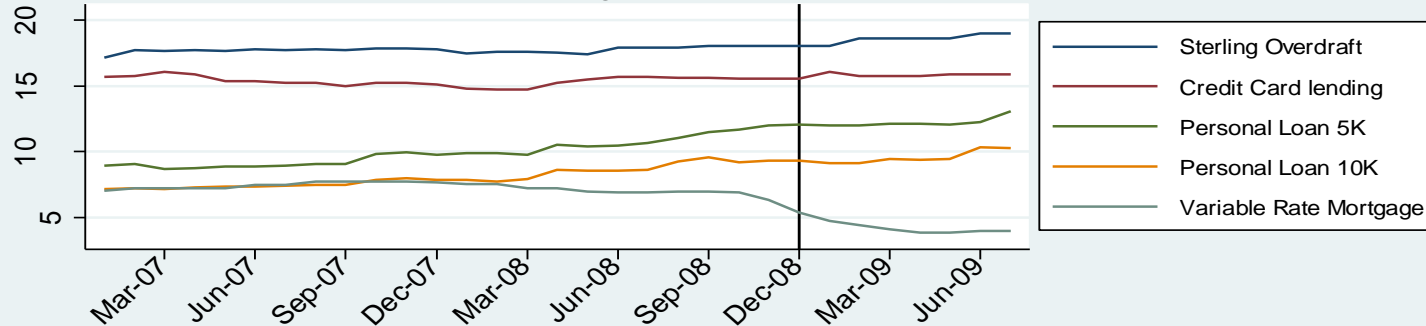
Household Deposit Interest Rate

- Fixed rate bond
- Cash ISA
- Time deposits
- Instant access deposits

Source: Bank of England

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Reactions were mixed….

- *"The VAT cut has been an unbelievable and expensive failure. This government, that lectured us about prudence, has spent £12.5bn of our money, and wasted it." - David Cameron, Leader of the Conservatives*

- *"Temporarily cutting VAT, a measure that was adopted in Great Britain, does not seem to me to be a good idea – 2% less is not perceived by consumers as a real incentive to spend." -Olivier Blanchard, Chief Economist at the IMF*

- *"I doubt if it is wise to put too much stress on devices for causing the volume of consumption to fluctuate. A remission of taxation on which people could only rely for an indefinitely short period might have very limited effects in stimulating their consumption." Keynes, 1943*

Outline

- The economics of a temporary VAT cut

- Issues: pass-through, salience, and spending responses

- The evaluation problem

- Some evidence

  – Pass-through

  – Salience

  – Sales, spending and tax receipts

- Conclusions and research agenda

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The economics of a temporary VAT cut

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How should it work?

- Like all price changes, a temporary VAT cut has income and substitution effects

- The income effect arises because, with unchanged purchasing, consumers have money left in their pockets

- Substitution effects of the anticipated increase in prices. Lower prices today relative to tomorrow give consumers an incentive to bring forward spending.

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How should it work? Cont'd.

- There are two kinds of substitution effects

- Consumers may bring forward consumption; this is the standard inter-temporal substitution of consumption

  - Applies throughout the period

- In addition, consumers may bring forward purchases of non-perishable (or storable) goods to be consumed later. These are "arbitrage effects".

  - May be occur mostly at the end of the period

- An important category of non-perishable goods is durables. Durables are about a third of spending to which the standard VAT rate applies.

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How should it work? Cont'd.

- The change in relative prices is analogous to a cut in the real interest rate (assuming full-pass θ through in both cases).

- However, the income effects can be different.

- Simple 2 period intuition: nondurable consumption, CRRA preferences, EIS $=\theta$:

$$u(c_t) = \frac{c_t^{1-1/\theta}}{1 - 1/\theta}$$

How should it work? Cont'd.

unconstrained/forward looking:

$$\left(1+t_1\right) c_1 + \frac{1+t_2}{1+r} c_2 \leq W_0 + y_1 + \frac{1}{1+r}y_2$$

$$\Delta \ln\left(1+t_1\right) \approx -1.2$$

$$\ln c_1 = -\theta \ln\left(1+t_1\right) - \theta \ln \lambda$$

$$\Delta \ln c = \theta \left[\ln\left(1+r\right) + \ln\left(1+t_1\right) - \ln(1+\delta) - \ln(1+t_2) \right]$$

liquidity constrained:

$$\left(1+t_1\right) c_1 = W_0 + y_1 \implies \frac{\partial \ln c_1}{\partial \ln(1+t_1)} = -1$$

How big is the income effect?

- For unconstrained consumers, the income effect should be small. The government faces an inter-temporal budget constraint.

- Thus for unconstrained consumers, the substitution effect dominates.

- Constrained households should increase purchases in proportion to the fall in current prices (an elasticity of 1). Thus an increase of about 1.2% in volume of purchases

How big is the substitution effect?

- A mid-point estimate of the elasticity of inter-temporal substitution for **nondurable** consumption is 0.75. (Attanasio and Wakefield, 2008).

- Luxuries are easier to postpone (Browning and Crossley, 2000). Goods not subject to the standard VAT rate are mostly necessities. This suggests a somewhat larger elasticity.

- Arbitrage effects in durable and other non-perishable goods could make the elasticity of inter-temporal substitution for *expenditure* larger still.

- An elasticity of one seems reasonable.

Summary

- Constrained households should increase purchases in proportion to the fall in current prices. Thus an increase of about 1.2% in volume of purchases.

- Assuming an inter-temporal substitution elasticity (for expenditure) of one, unconstrained households should do the same.

- The effect might be a bit smaller is there is less than full pass through; it might be a bit larger if there are significant arbitrage effects.

- On balance, an increase in the (counterfactual) growth rate of the volume of sales/purchases of about 1 percent point seems likely. Compares well with some other stimulus options (eg., tax refunds.)

- Slightly regressive.

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Issues

1) Pass through
2) Salience
3) Spending response

1) Pass-through

- There is a range of theoretical possibilities; imperfect competition does not necessarily imply less than full pass-through

- Crossley, Low and Wakefield (FS, 2009) take full pass-through as a working assumption. With rapidly collapsing demand, retailers may be strongly motivated to maintain sales.

source:
www.tesco.com

Dec. 3rd, 2008

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Pass through (Cont'd)

- Blundell (FS, 2009) reviews the literature on pass-through and suggests that 0.75 might be a reasonable estimate.

- The *timing* of pass-through is also critical: in a sticky-price model, a VAT cut can lead to deflationary expectations. (For example, Eggertsson and Woodfood, 2004).

- Thus if prices are sticky, there is risk of dampening current demand; in this case, a VAT increase stimulates demand.

2) Tax Salience

- Is a 2.5% cut in VAT is salient enough to induce consumers to bring forward purchases?

- Recent research (Chetty, Looney and Kroft, AER, 2009) found that consumers significantly under-react to taxes that are not included in posted prices.

- VAT is included in posted prices (for most goods), but…

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Price changes, pass-through and salience

Local shops' method of passing on the VAT reduction in December 2008	
Shelf price changed	14
Only till price changed	43
Mixed change – some shelf prices changed, for some products only changed till price	9
Not passing on	34

- Source: Pike, Lewis and Turner (ONS, 2009).

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3) Spending Response

- Although earlier micro (aggregate data) studies (eg., Hall, 1988) suggest a small elasticity of inter-temporal substitution (EIS), micro–estimates of the EIS for nondurable consumption centre around 0.75 (Attanasio and Wakefield, 2008).

- Stocking-up in response to super-market sales is well documented (e.g., Boizot et al., 2001, Hendel and Nevo, 2004).
    - Correlation between price and quantity is negative.
    - Correlation between inter-purchase time and past price is negative.

- Very large arbitrage effects bring a subsequent "hangover" (eg. Car-scrappage schemes); there is a risk that this dampens a nascent recovery.

Spending response, cont'd

- Constant elasticity case is special (Browning and Crossley, 2000) and rejected by data (Crossley and Low, 2009).

$$u(c_t) = \frac{c_t - \underline{c}^{1 - 1/\theta}}{1 - 1/\theta}$$

$$\Delta \ln c_{t+1} = \alpha + \left(\frac{c_t - \underline{c}}{c_t} \right) \theta \ln(1 + r_{t+1}) + u_{t+1}$$

- However, business cycle variation in "arbitrage effects" surely more important

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Spending response, cont'd

- Arbitrage effects moderated by storage costs, financing costs and by uncertainty. Uncertainty particularly important with irreversible purchases (option value).

- Bloom (2009) demonstrates the effect of uncertainty on the response of firm investment to interest rates.

- Same for households? Good evidence that household income uncertainty rises in recessions: Storesletten, Telmer and Yaron (2004); Blundell, Pistaferri and Preston (2008); Blundell, Low and Preston (2008).

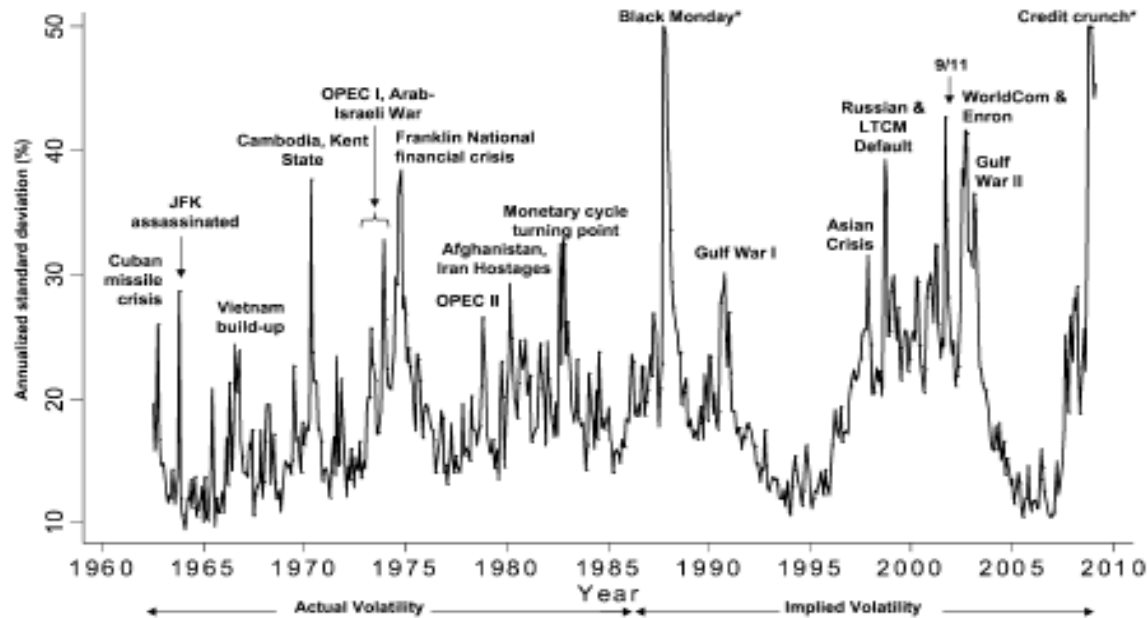- Financing costs may also be very different in a deep recession.

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FIGURE 1.—Monthly U.S. stock market volatility. *Notes*: Chicago Board of Options Exchange VXO index of percentage implied volatility, on a hypothetical at the money S&P100 option 30 days to expiration, from 1986 onward. Pre-1986 the VXO index is unavailable, so actual monthly returns volatilities are calculated as the monthly standard deviation of the daily S&P500 index normalized to the same mean and variance as the VXO index when they overlap from 1986 onward. Actual and VXO are correlated at 0.874 over this period. A brief description of the nature and exact timing of every shock is contained in Appendix A. The asterisks indicate that for scaling purposes the monthly VXO was capped at 50. Uncapped values for the Black Monday peak are 58.2 and for the credit crunch peak are 64.4. LTCM is Long Term Capital Management.
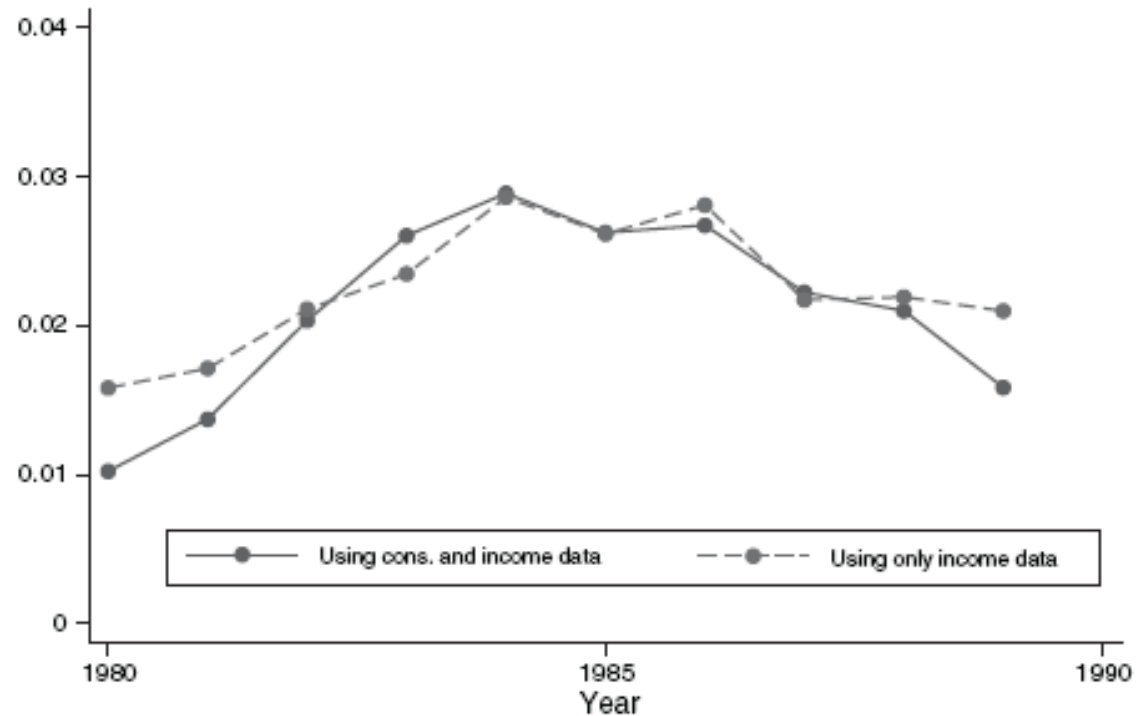
Source: Bloom, Econometrica, 2009

FIGURE 4. VARIANCE OF PERMANANT SHOCKS IN THE 1980s

- Source: Blundell, Pistaferri, and Preseton, AER, 2008

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Spending response, cont'd

- Not much evidence on response of durables and non-food non-perishables, and especially on how responses might vary with economic conditions.

- Barrell and Weale (2009) provide some evidence of inter-temporal substitution in response to previous VAT changes in Europe.

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The evaluation problem

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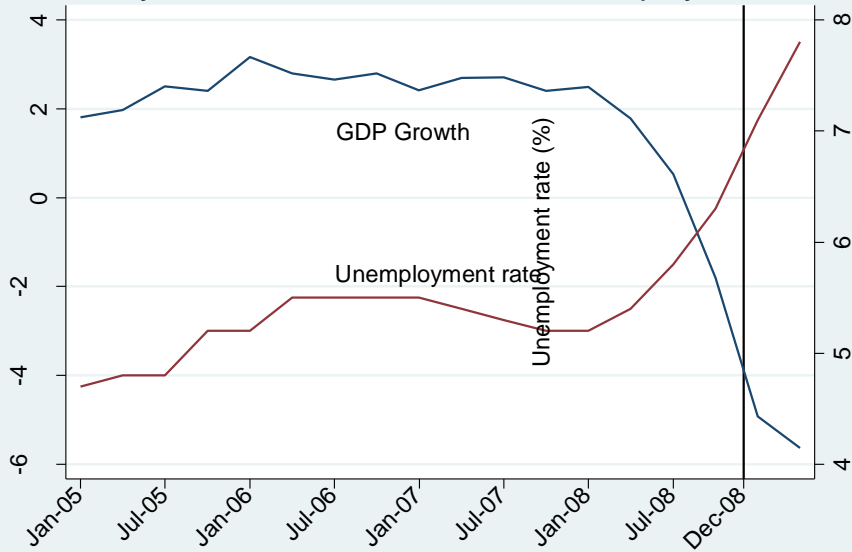
The evaluation problem

- To evaluate an intervention, we need to do two things:
    - Measure an outcome, and
    - Construct a counterfactual.
- Both are very difficult in this context.

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Economic situation changing rapidly

Quarterly UK Real GDP Growth and Unemployment Rate

GDP Growth

Unemployment rate

Source: Office of National Statistics

Monthly Average of Official Bank of England Rate and Consumer Confidence Index

Base Rate

Consumer Confidence

Source: Bank of England, Nationwide

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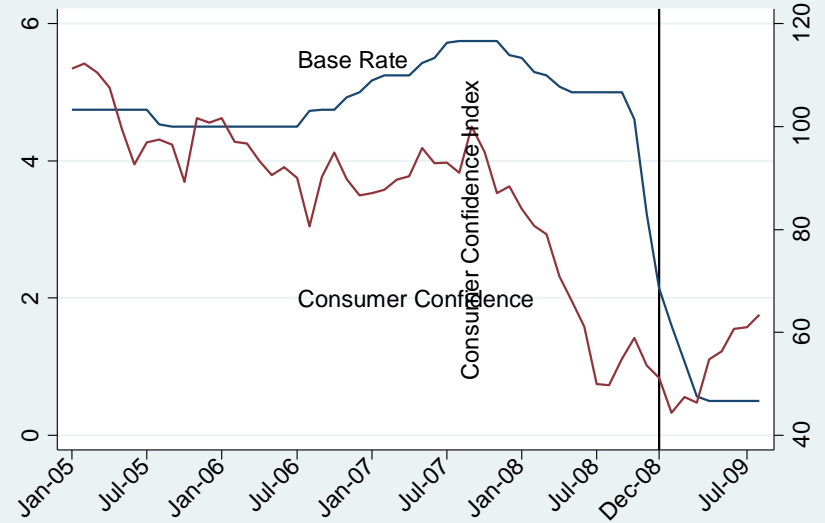
Outcome measures – summary statistics

	Mean	SD	Source	Period covered		Note
Consumer Confidence Index			Nationwide by TNS	May-04	Aug-09	
Spending Questions						
Retail sales Volume:			ONS			
Month on same month a year ago %change						
All Retailing	2.8	2.3		Jan-89	Jul-09	
Predominantly food stores	2.1	1.4		Jan-89	Jul-09	
Predominantly non- food stores	3.6	3.4		Jan-89	Jul-09	
VAT receipts:			HMRC			
Month on same month a year ago %change						
Cash VAT receipts	3.5	9.9		Jan-98	Jul-09	
Accrued VAT receipts	4.2	8.8		Jan-99	Jul-09	
Implied Sales Volume:			HMRC (VAT receipts)			Calculated using VAT receipts,
Month on same month a year ago %change			ONS (RPIY)			VAT rate and RPIY price index
Implied Sales Volume using Cash VAT receipts	1.9	8.2		Jan-98	Jul-09	
Implied Sales Volume using Accrued VAT receipts	2.5	6.9		Jan-99	Jul-09	
Household aggregate final consumption:			ONS			
Quarter on same quarter a year ago %change						
Total domestic	2.6	2.4		Q1-65	Q1-09	
Total durable	5.4	9.0		Q1-65	Q1-09	
Total non-durable	1.2	1.9		Q1-65	Q1-09	
Food and non-alcoholic drinks	1.0	2.4		Q1-65	Q1-09	
Clothing and footwear	4.2	3.9		Q1-65	Q1-09	

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Some early evidence

1) Pass-through

2) Salience

3) volumes of sales and expenditure, tax receipts

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1) Pass-through

- Pike, Lewis and Turner (ONS, 2009): estimate that the CPI 12-month rate to December 08, published as 3.1%, would have been around 0.5% higher, had there been no reduction in VAT

- Implies pass-through of a bit less than 50%

- Essentially a "difference" estimate.

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New evidence on VAT cut pass-through

- We adopt the approach in Carare and Danninger, (2008 IMF working paper)

- We evaluate whether the inflation dynamics of the RPI items subject to the standard VAT rate is different from that of the non-VAT items across the VAT cut, having controlled for time trends and seasonal effects.

- 64 RPI 2-digit items, Jan 05- Jun 09

- Sample consists of

  - 28 treated items (standard vat rate)

  - 36 control items (Non-VAT items + 5 standard rate items with an offsetting excise change)

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Pass-through results

Weighted, Fixed -Effects Estimation of the Effect of VAT Cut on Prices
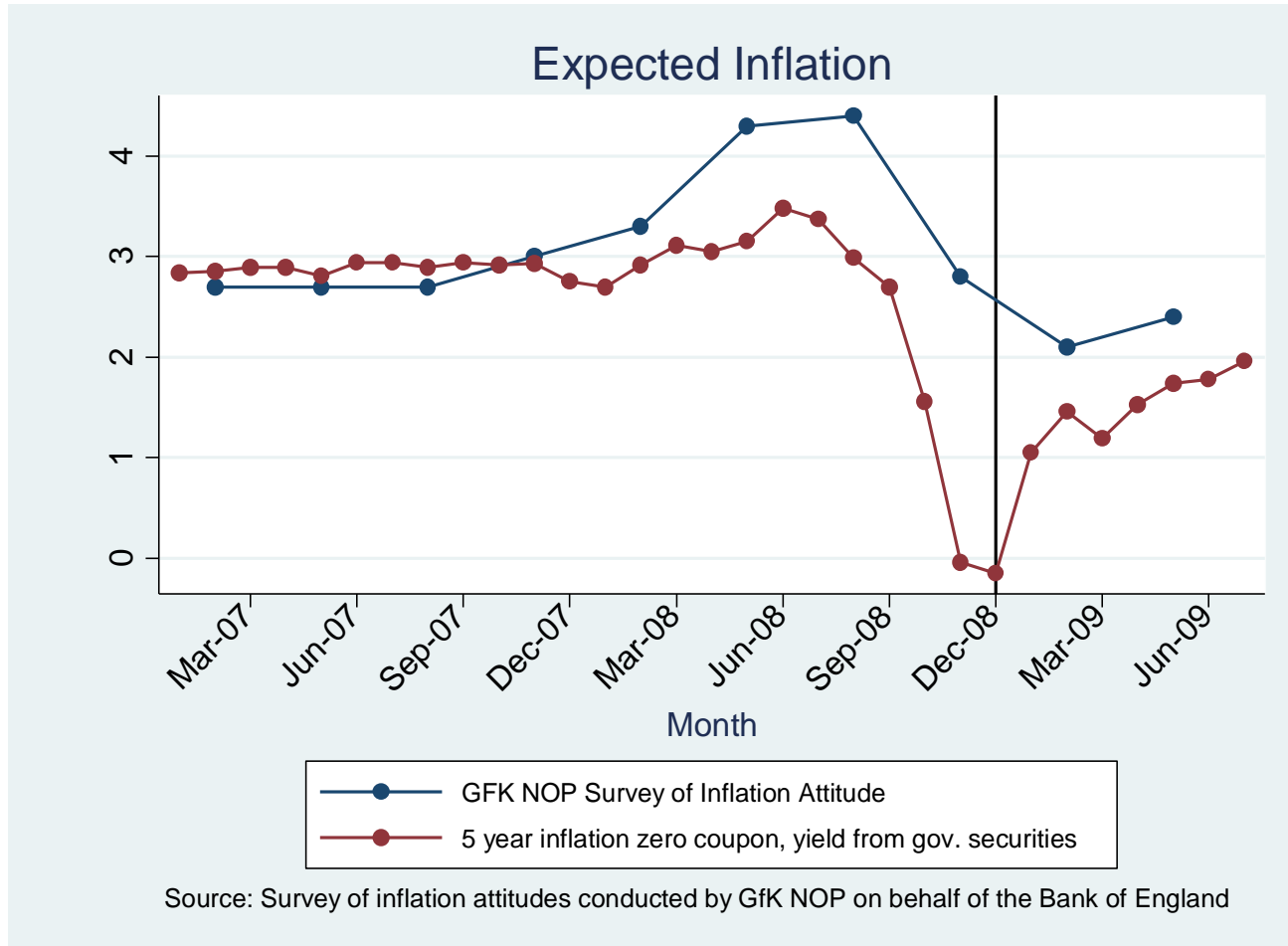Dependent variable: Monthly RPI-weighted inflation rate of 2-digit items; Jan 2005- Jun 2009

	(1)	(2)	(3)
VAT	-0.014	-0.015	-0.016
	(-2.29)	(-1.74)	(-1.79)
VATtrend	0.000	0.001	0.001
	(0.26)	(0.59)	(0.56)
durable*VAT			0.009
			(0.59)
durable*VATtrend			0.000
			(0.02)
Time trend	0.001	0.001	0.001
	(6.14)	(5.92)	(5.92)
Month dummies	N	Y	Y
Observations	3456	3456	3456
No. of time periods	174	174	174
No. of groups	64	64	64
Test of null hypothesis of no pass through (p)	0.022	0.081	0.073
Test of null hypothesis of 100% pass through (p)	0.276	0.454	0.596
Pass through	66%	70%	75%

Note: Standard errors are bootstrapped; 999 replications.

Pass through rate calculated by dividing the coefficient on VAT by -0.0213

Test of full pass through is a test of whether the coefficient on the VAT dummy is equal to -.0213

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Pass-through and inflation expectations

Expected Inflation

Source: Survey of inflation attitudes conducted by GfK NOP on behalf of the Bank of England

Legend:
- GFK NOP Survey of Inflation Attitude
- 5 year inflation zero coupon, yield from gov. securities

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2) Salience: evidence from a consumer confidence survey?

- Nationwide Consumer Confidence Index conducted for Nationwide by TNS

- Started in May 2004

- 1,000 adults interviewed each month, with the sample structured to be nationally representative of all adults in term of age, sex and socio-economic group.

- The Consumer Confidence Index is based on responses to 5 questions

  1. respondents' appraisal of current economic conditions

  2. respondents' expectations regarding economic conditions six months hence

  3. respondents' appraisal of the current employment conditions

  4. respondents' expectations regarding employment conditions six months hence

  5. respondents' expectations regarding their total family income six months hence

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The questions in detail:

Present Situation Index: How would you describe your country's…

- current economic situation?

- current employment situation?

Expectations Index: What do you think…

- will be your country's economic situation in the next 6 months?

- will be your country's employment situation in the next 6 months?

- your income will be in 6 months time?

Buy Index:

Taking into consideration the cost of things today and the financial situation in general, to what extent would you say that now is a good or bad time to buy products such as: a house or apartment, a car, household appliances such as a washing machine, a refrigerator, a TV set etc.?

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Consumer Confidence Index – further details

- 3 response options for each question: POSITIVE, NEGATIVE and NEUTRAL.

- For each question, the POSITIVE figure is divided by the sum of the POSITIVE and NEGATIVE to yield a "RELATIVE" value.

- The RELATIVE for May 2004 is then used as a benchmark to yield the INDEX value for that question.

- Consumer Confidence Index is the average of all 5 Indexes.

- Present Situation Index is the average of Indexes for question 1 and 3

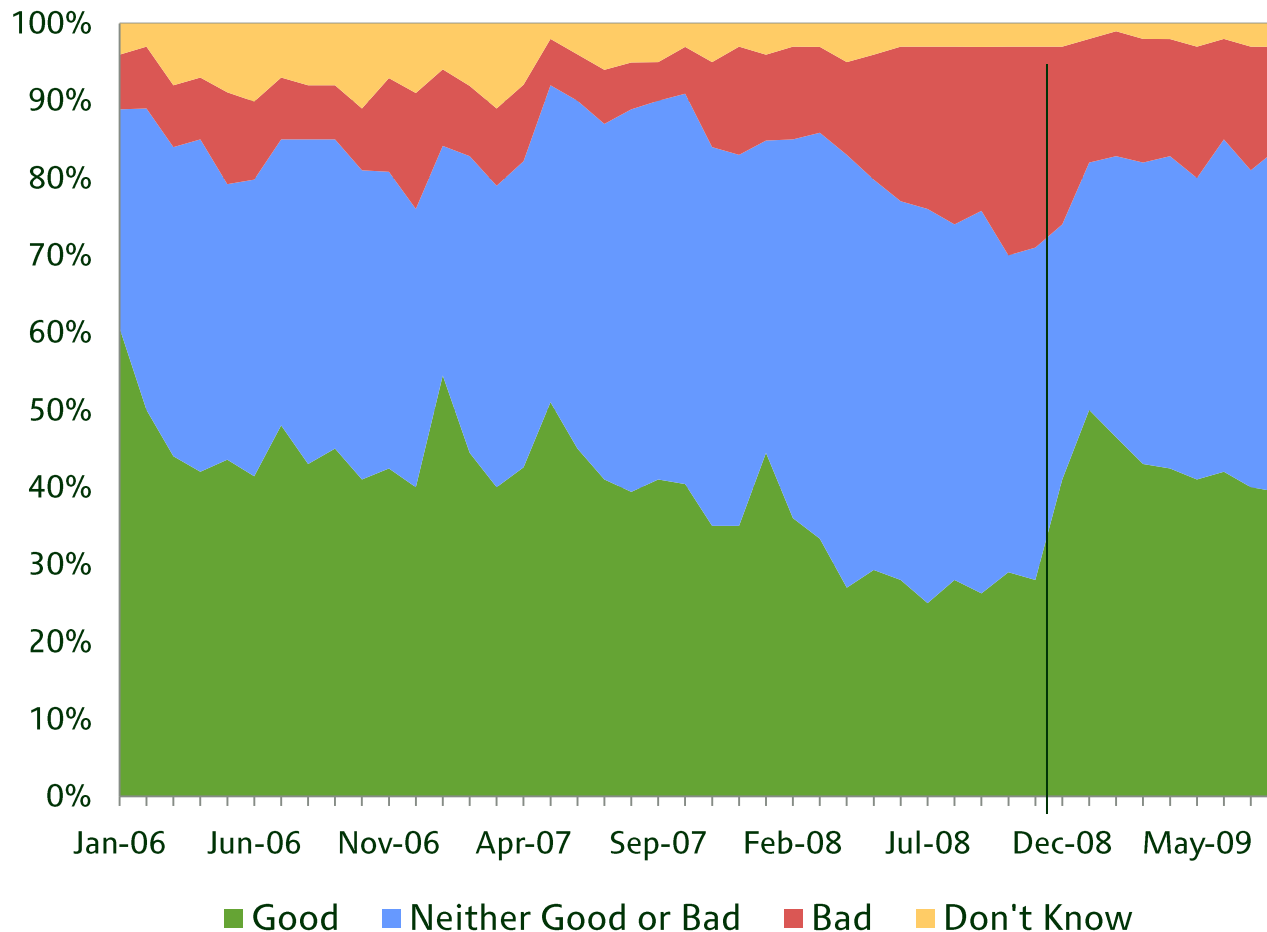- Expectation Index is the average of Indexes for question 2, 4, and 5

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Spending questions

- The survey also asks two questions about spending:

- Q1 **Major Purchases**: Taking into consideration the cost of things today and the financial situation in general, to what extent would you say that now is a good or bad time to make a big purchase such as a house or flat, or a car?

- Q2 **Household Appliances**: To what extent would you say that now is a good or bad time to buy household appliances such as a washing machine, a refrigerator, a TV set and such like?

- We focus on Q2

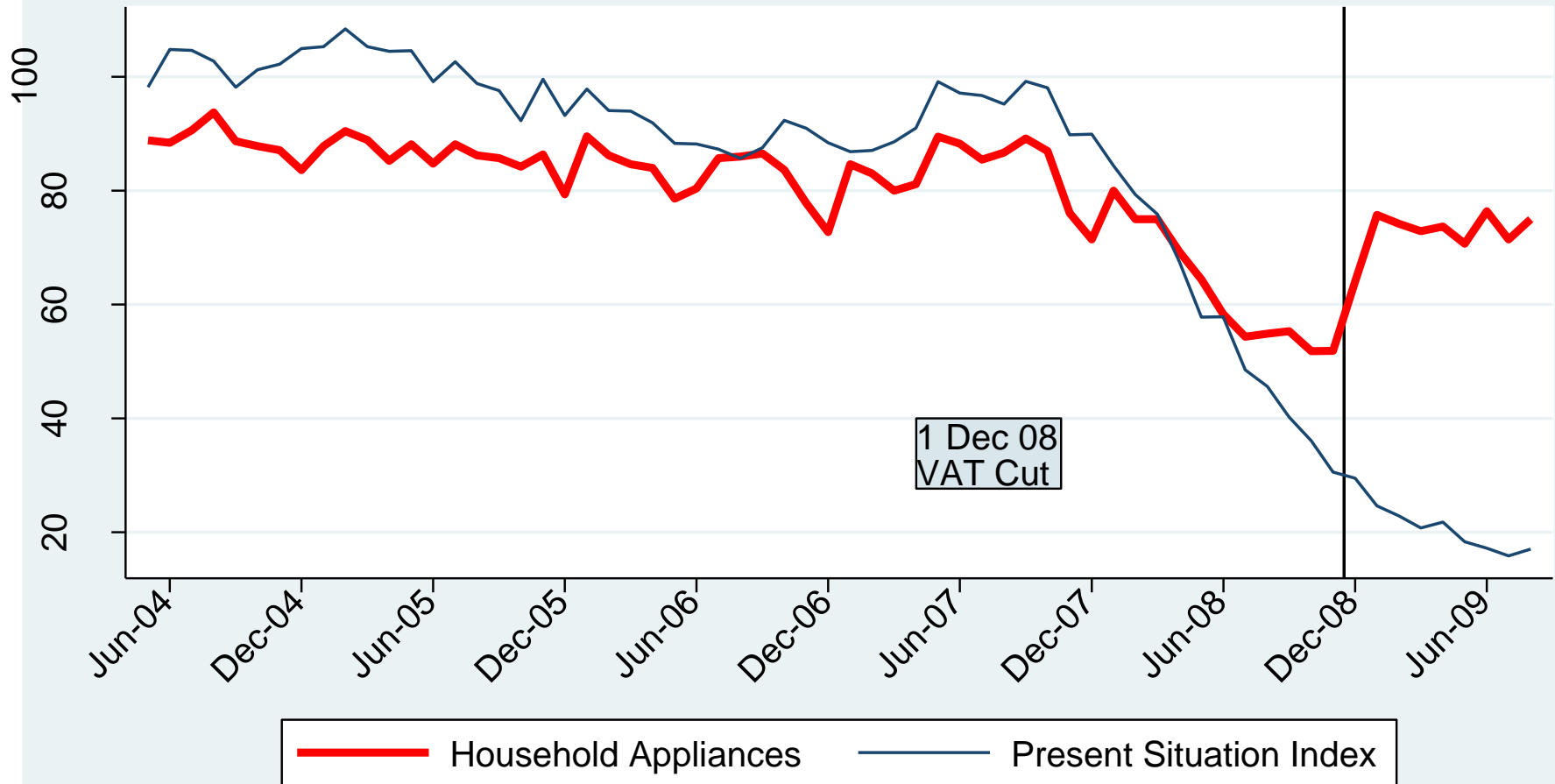# Spending questions – further details

- Would you say now is
  - A very good time to buy
  - A fairly good time to buy
  - Not good and not bad - about average
  - A fairly bad time to buy
  - A very bad time to buy
  - Don't Know (DO NOT READ OUT)

Responses to Household Appliances Question

Good — Neither Good or Bad — Bad — Don't Know

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Household Appliances Relative Value and Present Situation Index

1 Dec 08
VAT Cut

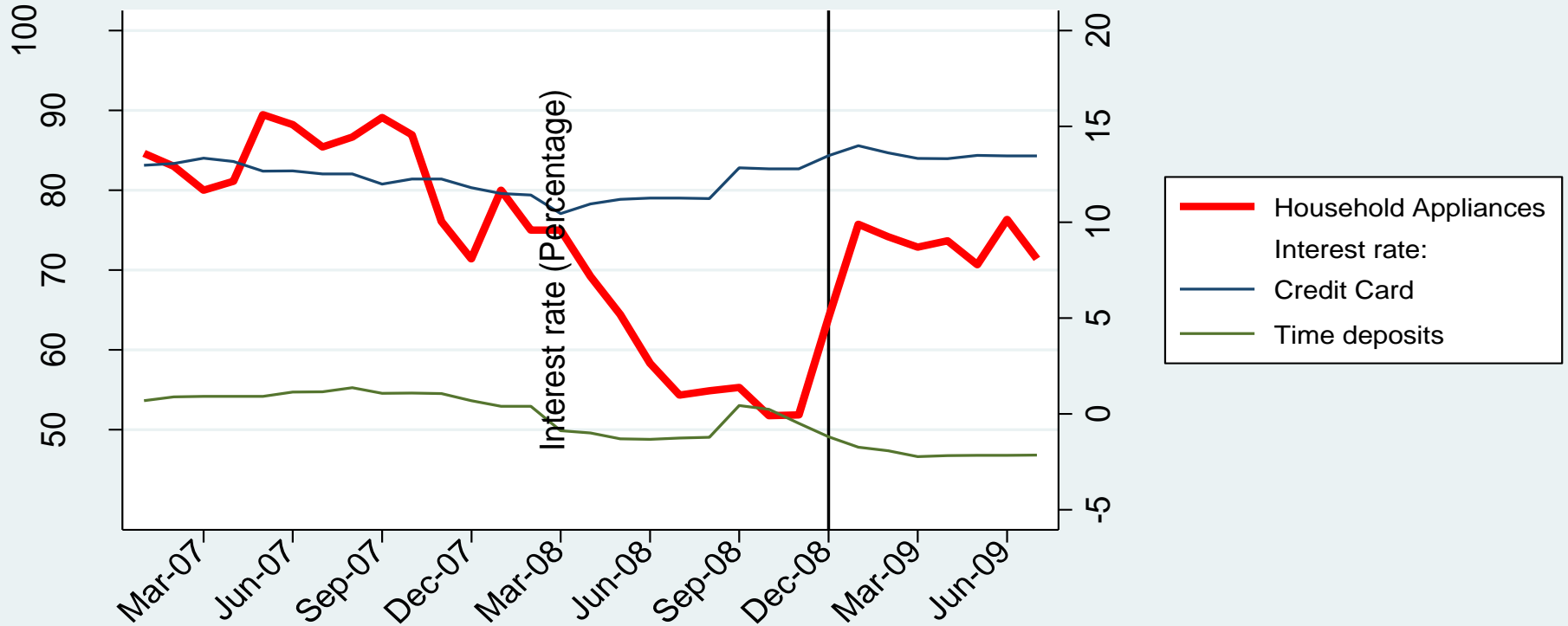Legend: Household Appliances — Present Situation Index

Source: Nationwide Consumer Confidence Index conducted by TNS

Relative Value : Proportion of Positive figure divided by Positive plus Negative figures times 100

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Is this an interest rate effect?

Household Appliances Relative Value
and Real Interest Rates

Real interest rate calculated using expected inflation figures from NOP survey
Relative value: POSITIVE figure divided by the sum of the POSITIVE and
NEGATIVE to yield a proportion
Source: Nationwide, Bank of England

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What else changed?

Household Appliances Relative Value,
Present Situation and Expectation Indices

1 Dec 08
VAT Cut

Legend:
- Household Appliances
- Present Situation Index
- Expectation Index

Source: Nationwide Consumer Confidence Index conducted by TNS
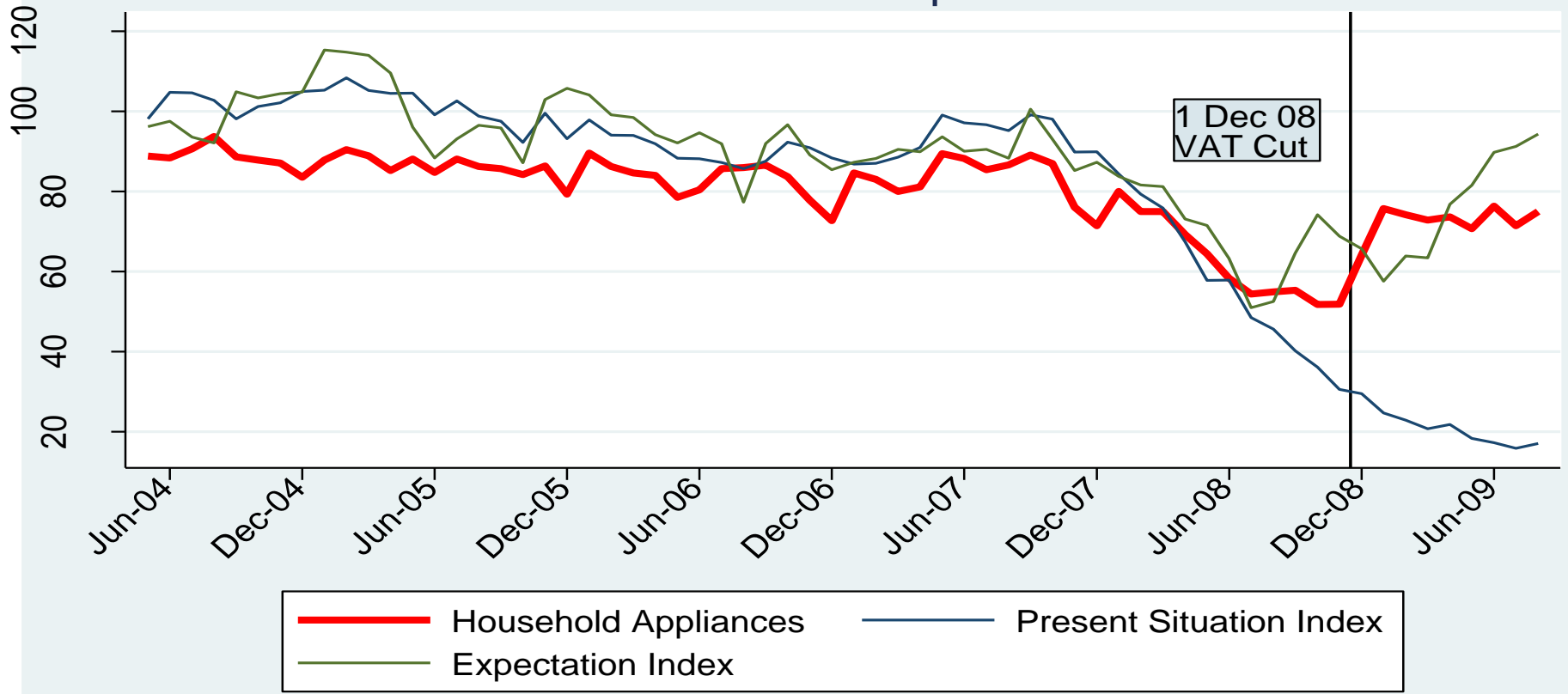
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3) Effects on sales and expenditure volumes and on tax receipts

- Retail sales

- Vat receipts

- Aggregate consumption

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Retail sales

Retail Sales Volume %Change on Year Earlier: Moving average
All Retailing, Predominantly Food Stores and Predominantly Non-food Stores

1 Dec 08
VAT Cut

All Retailing — Predominantly Food
Predominantly Non-food

Source: Office of National Statistics

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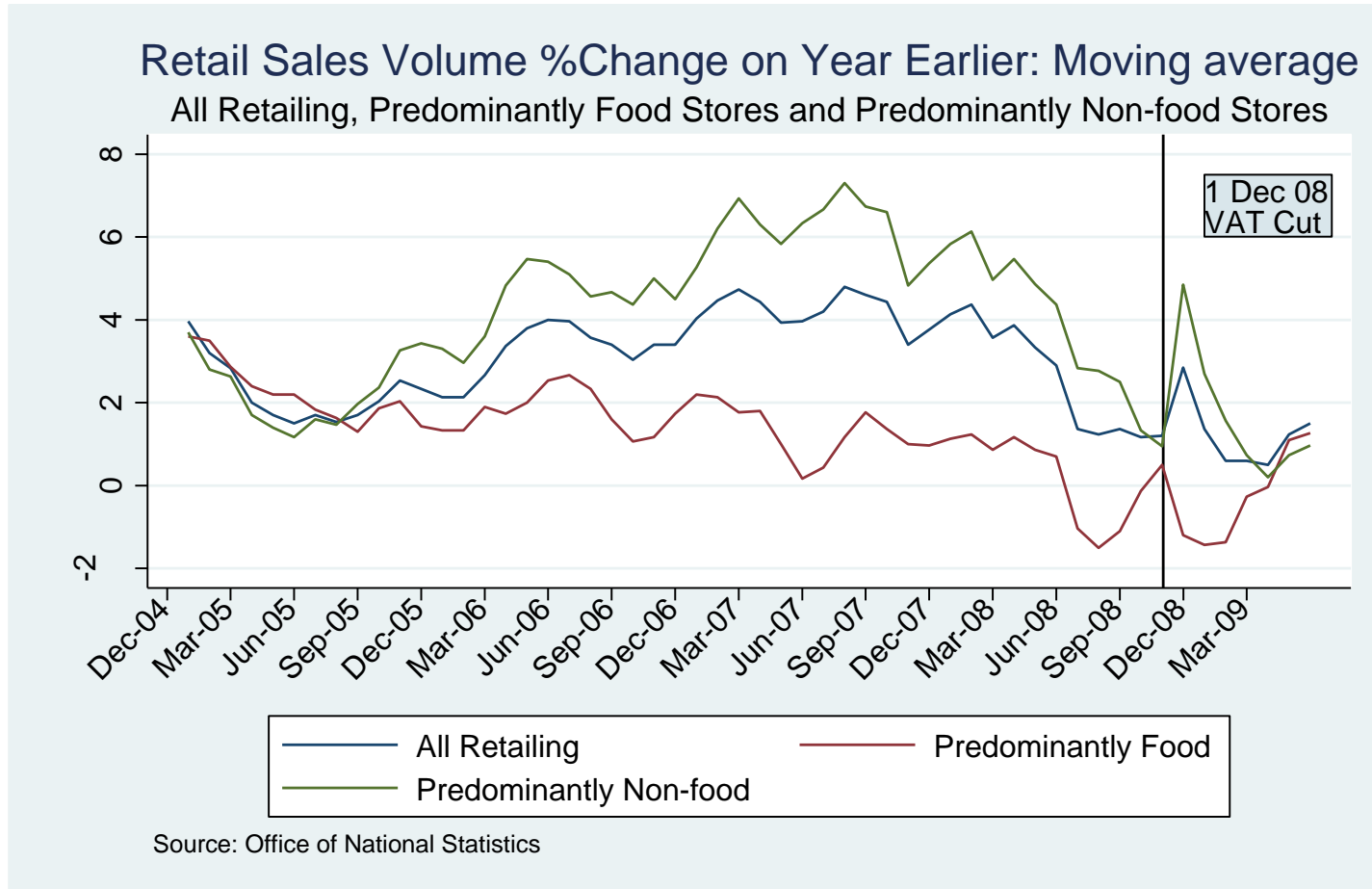
Retail Sales (Diff-in-Diff)

Dependent variable: Growth rate in volume of non-food sales less growth Rate in the volume of food sales

	(1)
VAT	3.837
	(3.28)
VATtrend	-1.189
	(-5.68)
Constant	2.749
	(5.95)
Number of Observations	54

Note: Standard errors are Newey-West

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Retail sales, cont'd

- In April, the Centre for Economic and Business Research (CEBR) argued the retail sales figures from the ONS clearly indicated the VAT cut was working.

- They examined a trailing moving average of the %change in monthly retail sales volume, and estimated that the VAT cut boosted retailers' turnover by £2.1 billion over December-January-February.

- However, it is now apparent that the growth rate of retail sales volume fell again at the beginning of 2009.

- Difficult to rationalize the time pattern with a model.

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VAT receipts

- Two measures- Cash and Accrued VAT receipts

- Cash receipts: actual VAT receipts by HM revenue

- Accrued receipts: measure of VAT receipts at time of purchases, "calculated by extrapolating accrued quarterly data in national accounts to reflect recent trends in the corresponding cash transactions" (ONS).

- Differences between the two measures are due to time delay between the actual sale and the payment of VAT

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VAT receipts, cont'd

- Had sales volume and underlying prices been unchanged, the VAT cut from 17.5% to 15% would have lowered the government's VAT receipts by (17.5-15)/17.5 = 14.3%

- If sales volume increased after the VAT cut, then VAT receipts should fall by less than 14.3%

- Cash VAT receipts and Accrued VAT receipts fell by 17.8% and 11.3% between Nov and Dec 2008.

- VAT receipts, however, have been highly volatile for the past decade. The standard error for the cash VAT receipt is 9.9 for the period Jan 1998-Jul 2009.

Household Final Consumption Expenditure

Household expenditure %change on previous year
Total durable goods and Food and non - alcoholic beverages

Total durable goods — Food and non-alcoholic beverages
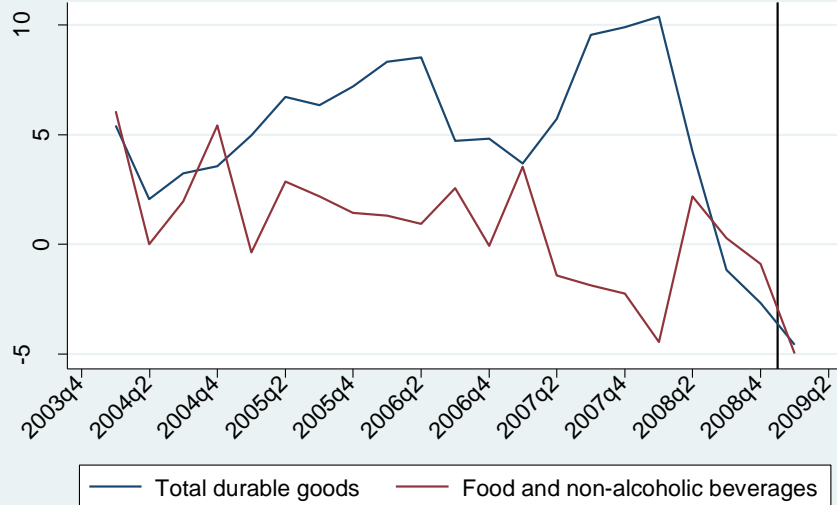
Source: Office of National Statistics

Household expenditure %change on previous year
Total durable goods and Total non - durable goods

Total durable goods — Total non-durabl goods

Source: Office of National Statistics

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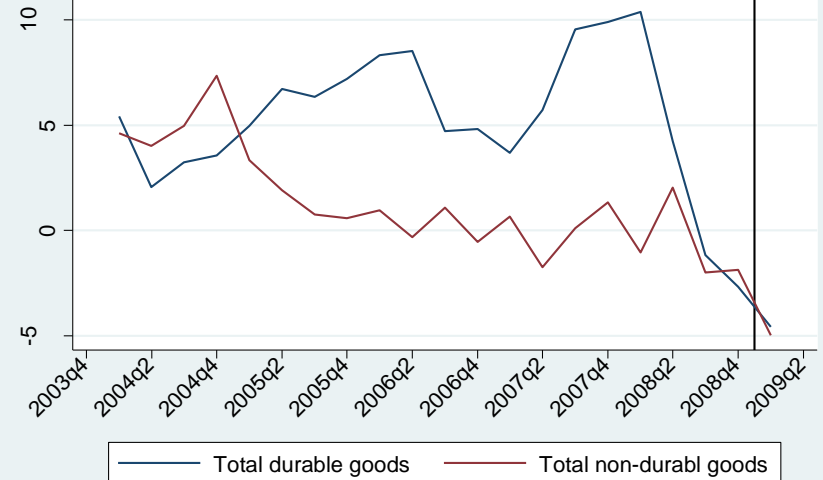
Conclusions and research agenda

Conclusions

- Price data are consistent with substantial and rapid **pass-through**; our point estimate is 75%, though the confidence interval is large. No evidence of deflationary effect on expectation.

- **Salience** may be an issue, particularly as many prices were changed at the till.

- Survey data indicate a sharp change in consumer's spending sentiment immediately after the VAT cut. This *may* indicate that the policy was salient.

- Strong retail **sales** growth immediately after introduction, but difficult to draw strong conclusions.

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Research agenda

- More data, and tax increase in December 2009 (but evaluation still difficult).

- Tax salience

- Pass-through

  – Pass-through will clearly vary with demand conditions in different markets

  – More structural approach required. Dynamics important.

- Inter-temporal substitution, particularly durables and other non-perishable goods.

  – Important to understand how large "arbitrage effects" might be, and how they are moderated by uncertainty.

  – More evidence, and structural modelling required – Blundell, Crossley, Low and Meghir (2010).

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