

# THE STIMULUS EFFECT OF THE 2008 U.K. TEMPORARY VAT CUT

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## INTRODUCTION

THE UNITED KINGDOM HAS A VALUE-ADDED TAX (VAT). In recent years the standard rate has been 17.5 percent. Some goods are exempt (notably food and books) while others have lower rates (for example, domestic fuel and power). In the Pre-Budget Report of November 24, 2008 the government announced a temporary reduction in the standard rate of VAT from 17.5 percent to 15 percent, to last from December 1, 2008 to December 31, 2009. If passed on to consumers, the temporary VAT cut would have lowered the current price of applicable goods by approximately 2.1 percent (which is calculated as 2.5 divided by 117.5). The standard rate of tax applies to about 55 percent of gross of tax consumer expenditures (Crossley et al., 2010). However, the excise duties on some of these good (alcohol, tobacco, and petrol) were increased to offset the VAT decrease, so the stimulus affected just under half of total consumer expenditure. Thus, assuming limited within-period substitution (and full pass through), the VAT cut should have reduced the price of current purchases by approximately 1 percent.

The intent was to stimulate current consumer demand, and thus it can be seen as an alternative to stimulus policies tried elsewhere, such as income tax rebates. At the time of announcement, the estimated cost of the temporary VAT cut was about £12.4 billion or about 2 percent of government revenue. The UK VAT is actually slightly progressive (because of the exemption or lower rating of some necessities) so that the cut was mildly regressive (see Crossley et al., 2010).

At the time of writing the cut has not yet expired and so a full evaluation of its effects must wait. Nevertheless, in the remainder of this note we discuss several aspects of the UK experience with using VAT as stimulus tool, and provide some early evidence on those questions.

## THE BASIC ECONOMICS OF A TEMPORARY VAT CUT

Like all price changes, a temporary VAT cut has income and substitution effects. In discussing those effects, it is helpful to distinguish between consumption, purchases, and spending. *Consumption* refers to the quantity of goods or services actually utilized over some period, for example the number of liters of wine a household drinks in that period. *Purchases* refers to the actual quantity of goods consumers buy, such as the number of liters of wine a household buys in a given period. *Spending* is gross nominal outlay – the amount of money consumers spend over some period, including taxes.

The income effect arises because, with unchanged purchasing, consumers have money left in their pockets. Inter-temporal substitution effects arise because the temporary nature of the tax cut means that consumers anticipate increases in prices. Lower prices today relative to tomorrow give consumers an incentive to bring forward purchases and consumption.

We can distinguish between two kinds of substitution effects. First, consumers will bring forward consumption; this is the standard inter-temporal substitution of consumption, and we would expect it to apply equally throughout the period of a tax cut. In addition, consumers may bring forward purchases of nonperishable (or storable) goods to be consumed later. This might be called a “stocking up effect” or an “arbitrage effect” (as in Barrell and Weale, 2009). An important category of nonperishable goods is durables. Durables account for about a third of spending to which the standard VAT rate applies. Arbitrage effects should operate most strongly towards the end of the period of the tax cuts due to the presence of storage costs, for example through foregone product innovations and quality improvements, and because there is an option value associated with delaying irreversible purchases in the presence of economic uncertainty.

We expect that the income effect of the temporary VAT cut was small, except in the case of households that are credit constrained. Constrained households would like to bring forward resources from the future but can't and so for these household we expect no change in expenditure. This in turn implies a percentage increase in consumption that exactly offsets the percentage decrease in prices; that is, purchases respond with an elasticity of one. There is no substitution effect for these households (they cannot increase expenditures to take advantage of temporarily lower prices).

For forward-looking, unconstrained households the temporary nature of the cut means it has a small impact on lifetime purchasing power. Moreover, even if the Ricardian equivalence does not hold exactly, forward-looking households may have anticipated some rise in future taxes associated with this tax cut, and that expectation would further diminish the income effect of the cut. There will, however, still be an inter-temporal substitution effect for forward-looking, unconstrained households.

Although earlier aggregate data studies (e.g., Hall, 1988) suggest a small elasticity of inter-temporal substitution (EIS), micro-estimates of the EIS for nondurable consumption center around 0.75 (Attanasio and Wakefield, 2010). There are a number of reasons to treat this as a lower bound in the current context. First, luxuries are easier to postpone (Browning and Crossley, 2000), and hence also to bring forward. Goods not subject to the standard VAT rate are mostly necessities, and thus goods whose prices are affected by the cut are disproportionately luxuries. This suggests a somewhat larger elasticity of inter-temporal substitution for the basket of goods whose prices are affected. Second, arbitrage effects in durable and other nonperishable goods could make the elasticity of inter-temporal substitution for *expenditure* (as opposed to purchases or consumption) larger still.

In light of these considerations, an elasticity of one seems reasonable, which means, conveniently, that we expect similar responses from constrained and unconstrained households (obviating the need to know the fraction of each in the U.K. population in December 2008).

On balance, an increase in the (counterfactual) growth rate of the volume of sales/purchases of about 1 percentage point seems likely. The effect

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

### ISSUES REGARDING EFFECTIVENESS OF VAT CUT AS STIMULUS

There are a number of issues regarding the potential effectiveness of the temporary VAT cut in stimulating purchases. The three key issues are: the extent to which a temporary tax cut is passed on to consumers; whether the tax cut is salient (large enough for consumers to notice and react); and the extent to which arbitrage effects increase the short run impact of the policy.

#### Pass Through

The effects described in the previous section would only operate if the VAT cut was passed on to consumers. Crossley et al. (2009) take full pass through as a working assumption, arguing that with rapidly collapsing demand, retailers may be strongly motivated to maintain sales. Nevertheless, there are a range of theoretical possibilities. On the basis of a review of the literature, Blundell (2009) estimated that 75 percent pass through might be expected.

The timing of pass through is also critical: in a sticky-price model, a VAT cut can lead to deflationary expectations. Thus if prices are sticky, there is risk of dampening current demand; in this case, a VAT *increase* stimulates demand by inducing inflationary expectations (Eggertsson and Woodford, 2004).

Pike et al. (2009) have estimated that the CPI 12-month rate to December 2008, published as 3.1 percent, would have been around 0.5 percent higher had there been no reduction in VAT. The authors' estimate of pass through was just under 50 percent. They estimate this by identifying price changes which are of a magnitude that could plausibly be explained by the VAT cut and happened in outlets that reported that they responded to the cut by reducing prices.

#### Salience

One criticism of the VAT cut at the time of introduction was that a 2.13 percent cut in the price of some goods is not sufficiently salient to induce consumers to bring forward purchases. Recent research on salience (Chetty et al., 2009)

has found that consumers significantly underreact to taxes that are not included in posted prices. While the VAT is normally included in posted prices (for most goods), for temporary changes this may not be the case. In fact, Pike et al. (2009) report that 43 percent of retailers only changed prices at the till in the month after the cut. Note however that this is 43 percent of establishments, and not 43 percent of the volume of sales, and the proportion was likely to have increased over time.

#### **Arbitrage or “Stocking-up” Responses**

Stocking up in response to supermarket sales is well documented (e.g., Boizot et al., 2001; Hendel and Nevo, 2004). Very large stocking-up effects bring a subsequent “hangover” of reduced purchases; there is a risk that this dampens a nascent recovery. However, the literature provides very little guidance on how large stocking-up or arbitrage effects might be. Such effects are moderated by storage costs, financing costs, and by uncertainty. Uncertainty is particularly important with irreversible purchases, because of the option value of delay, and there is accumulating evidence that household income uncertainty rises in recessions (Storesletten et al., 2004; Blundell, Pistaferri, and Preston, 2008; Blundell, Low, and Preston, 2008). Financing costs may also be very different in a deep recession. The implication is that even if we had historical evidence on the magnitudes of stocking up or arbitrage effects, it might be a poor guide to what might be expected in the current environment. A close analogy is recent work by Bloom et al. (2007), who demonstrate an important effect of uncertainty (measured by the standard deviation of daily stock returns) on the responses of firms’ investment decisions to inter-temporal prices (the interest rate).

#### **SOME PRELIMINARY EVIDENCE**

We now provide some early evidence on two issues, pass through, and salience. It is too early to document any evidence on arbitrage – such effects are unlikely to manifest themselves until shortly before the expiration of the VAT cut.

##### **Evidence on Pass Through Using Price Data**

To add to the evidence on pass through, we adopted the approach in Carare and Danninger

(2008). In particular, we evaluate, in a regression framework, 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.

Our analysis is based on year-on-year monthly inflation rates for 64 items from the Retail Prices Index. We have data from January 2005 through June 2009. There are 28 “treated items” (subject to the standard VAT rate) and 36 “control” items. The latter are comprised of non-VAT items and five standard rate items for which there was an offsetting change in excise tax announced at the same time. We include item fixed effects in our models, and we weight each item by its share in aggregate expenditure. In all specifications we allow for an implementation effect (variable *VAT* in Table 1) and for a change that takes effect over time (variable *VATtrend* in Table 1). The latter is intended to pickup delayed pass through. As noted above, if pass through is delayed and if this delay is anticipated, then the VAT cut could actually have the perverse effect of lowering current demand.

The results are presented in Table 1. We find evidence of pass through that is statistically different from zero, and not statistically different from full pass through. Moreover, we find no evidence of delayed pass through: all of the effect is at the time of implementation. Interestingly, we find no differential effect on durables relative to non-durables.

The stimulus effect of the VAT cut operates through expected inflation: consumers bring forward consumption and purchases in anticipation of a price increase when the temporary cut expires. As a second check on whether this was happening (and whether delayed pass through may have generated deflationary expectations), we have also examined data on inflation expectations directly. Two sources of data on inflation expectations are available, and both are presented in Figure 1. First, there are quarterly surveys, commissioned by the Bank of England, of households’ inflationary expectations (the dashed black line). Second, there are inflation expectations implied by the difference in yields between real (or inflation-indexed) and nominal (non-indexed) government bonds. We examined monthly data on five-year zero-coupon bonds and this series is plotted in grey. Both series indicate that inflation expectations rose after implementa-

*Table 1*  
**Pass Through**  
**Weighted, Fixed-Effects Estimation of the Effect of VAT Cut on Prices**

*Dependent variable: Monthly RPI-weighted inflation rate of 2-digit items; January 2005- June 2009*

	(1)	(2)	(3)
VAT	-0.014 (-2.29)	-0.015 (-1.74)	-0.016 (-1.79)
VATtrend	0.000 (0.26)	0.001 (0.59)	0.001 (0.56)
durable*VAT			0.009 (0.59)
durable*VATtrend			0.000 (0.02)
Time trend	0.001 (6.14)	0.001 (5.92)	0.001 (5.92)
Month dummies	N	Y	Y
Observations	3,456	3,456	3,456
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%

Notes:

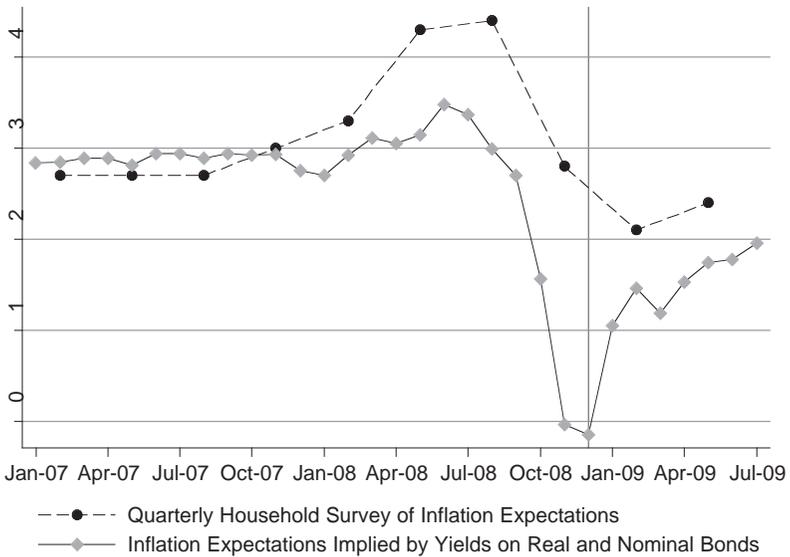
1. Standard errors are bootstrapped; 999 replications; t-statistics are reported in parentheses.
2. Pass through rate calculated by dividing the coefficient on VAT by -0.0213.
3. Test of full pass through is a test of whether the coefficient on the VAT dummy is equal to -0.0213.

tion of the tax cut (which is indicated in the figure with the vertical black line). This is consistent with the policy operating as intended. Increased inflationary expectations should induce households to bring forward purchases.

#### **Evidence on Salience from a Consumer Sentiment Survey**

To get a sense of whether the temporary VAT cut was salient to consumers' spending plans, we examined data from a monthly consumer sentiment survey: The Nationwide Consumer Confidence Index conducted for Nationwide by TNS. From

May 2004, 1,000 adults have been interviewed each month, with the sample structured to be nationally representative of all adults in term of age, sex, and socioeconomic group. The Consumer Confidence Index is based on responses to five questions about present situation (economic conditions and employment conditions) and expectations (economic conditions, employment and family income six months hence). The survey also asks two questions about spending: one about "Major Purchases" such as a house or flat, or a car, and one about household appliances. As the first may largely reflect respondents' assessments of

Figure 1: **Expected Inflation (in percent)**

developments in the housing market, which was characterized by substantial volatility at the time of interest, we focus on the second. The exact wording of the question is:

**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?*

*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*

For each month, we calculate the ratio of those who consider it a good time to buy to the sum of those who consider it either a good or a bad time to buy. We generate an index by dividing this value in each month by the value in the first. Figure 2 plots this index against time alongside the present situation index derived from other questions in the survey. As before, the date of the temporary VAT

cut is indicated by the vertical line. The fraction of people reporting that it is a good time to buy a major appliance rises sharply at the time of the temporary VAT cut, while the present situation index deteriorates throughout the period as would be expected for an economy heading into recession.

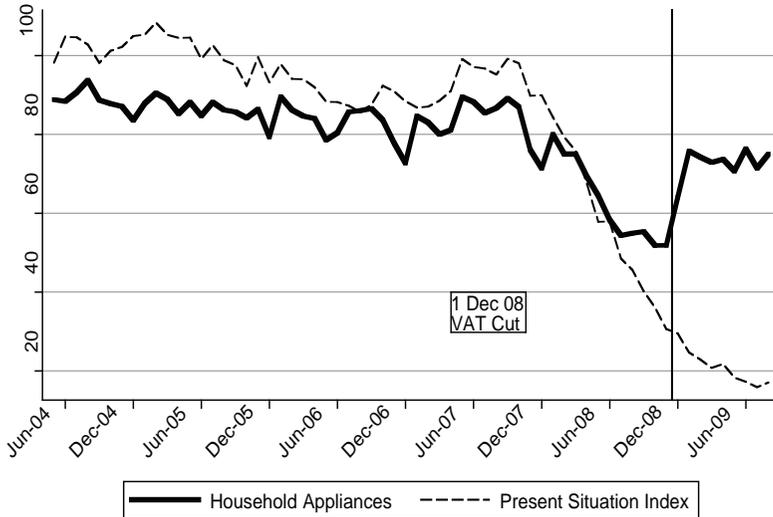
We take the increase in the household appliances index compared to the present situation index at the time of the VAT cut as suggestive, albeit not conclusive, evidence that the tax cut was salient for consumers.

#### DISCUSSION AND DIRECTIONS FUTURE RESEARCH

To summarize our very early assessment, the price data are consistent with substantial and rapid pass-through; our point estimate is 75 percent, though the confidence interval is large. There is no evidence of a negative effect on expectations over inflation. Salience may be an issue but the VAT cut was widely publicized, and the sharp increase in consumers' spending sentiment with respect to major purchases immediately after the VAT cut indicates that the tax changes were registered by the public.

There will be a tax increase in December 2009 as the temporary cut expires, and additional

Figure 2: Household Appliances Index and Present Value Index



Source: Nationwide Consumer Confidence Index conducted by TNS

data will accumulate and become available to researchers throughout 2010. This will provide a greater opportunity for research on tax salience, pass through, and inter-temporal substitution. With respect to pass through, firm behavior will clearly vary with demand conditions in different markets. With respect to inter-temporal substitution, we face particular knowledge gaps over the substitution elasticity of durables and other nonperishable goods. It is important to understand how large stock-up effects might be, and how they are moderated by uncertainty. It seems likely that more structural modeling will be required to make significant progress on both pass through and stocking-up effects. Recent events underline the importance of undertaking such work.

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