

Price and volume effects of VAT increase on 1 January 2007

On 1 January 2007, the standard rates of value added tax (VAT) and insurance tax were raised from 16% to 19%. Despite simultaneous reductions in social security contributions, significantly stronger price effects were expected than with earlier tax increases, which were limited to just 1 percentage point. In addition, the higher tax rates had been announced well in advance this time, giving companies plenty of time to adjust pricing and allowing consumers to accelerate their purchases.

In retrospect, it is clear that the higher tax rates have now largely been passed through to prices. However, only a small percentage of companies raised their prices on the exact date and by the full amount of the tax increase. Some suppliers did not make any price changes at all. Anticipatory effects occurred in both private consumption and housing construction. The weakness of consumer expenditures in 2007 reflects not only the temporary effects of the forward shift in spending to 2006 but also the sustained loss of purchasing power as a result of the increase in VAT. Although the tax hike had no more than a moderate impact on aggregate value added, it placed a noticeable damper on the pick-up in domestic economic activity.

Background

*Fiscal policy
motives*

On 1 January 2007, the standard rates of VAT and insurance tax were raised from 16% to 19%. The governing parties had agreed on this measure in their coalition negotiations following the German general election in the autumn of 2005. Previously, a VAT increase had either been ruled out or a smaller increase had been proposed. There were essentially two motives behind this decision. Given the extremely tight situation of public finances, higher tax revenues were considered necessary. In addition, the aim was to reduce, as far as possible, the very heavy burden of social security contributions on labour. As indirect taxes are relatively low in Germany by international standards and direct taxes and social security contributions are comparatively high, an increase in the standard rates of VAT and insurance tax of 3 percentage points was combined with a (disproportionately small) reduction in the rate of contributions to the statutory unemployment insurance scheme.¹ Raising the reduced rate of VAT or a further scaling-back of tax-exempt expenditure categories was not contemplated.

*Additional tax
revenues have
implications for
economy as a
whole*

In fiscal terms, the expectations in connection with the hike in the tax rate have largely been realised. In 2007, revenues from VAT and insurance tax were €24½ billion, or 16%, higher than in 2006. Alongside the cyclical increase in revenues, they made a major contribution to balancing the general government budget in 2007. A year earlier, the deficit ratio according to the Maastricht criteria had amounted to 1.6% of gross domestic product (GDP). However, fiscal success came at a

macroeconomic cost. Consumer price inflation rose, and private consumption remained weak. Nevertheless, this fundamentally welcome consolidation took place in a favourable economic setting, which meant that overall economic growth was well above its trend rate despite these dampening effects.

The increase in the standard rate of VAT on 1 January 2007 was not only sharper than in all earlier cases, at 3 percentage points, it was also agreed further in advance. In the past, there had been only a few months between such an agreement and its implementation. Firstly, this time the longer period of advance notification widened the options for a strategic pricing policy, which companies exploited. In the fourth quarter of 2006, individual retail chains announced that they would leave prices on hold for an indefinite period, although it remained unclear whether prices had been raised beforehand. In a coordinated move, tobacco producers and importers had already raised consumer prices by an average of 5% on 1 October 2006. Secondly, the early announcement gave households time to bring purchases forward to 2006.

*Impact of early
announcement*

¹ The lowering of the rate of contributions to the unemployment insurance scheme from 6.5% to 4.2% initially in 2007 was financed inter alia by a new Federal subsidy to the Federal Employment Agency (Bundesagentur für Arbeit) which is linked to the revenue from approximately 1 percentage point of the standard rate of VAT.

Consumer price effects²

*Overall effect
with notional
full pass-
through*

If the 3 percentage point increase in the rates of VAT and insurance tax had been passed through to prices fully on the exact date on which it came into effect, the consumer prices of the affected goods and services would necessarily have risen by 2.6% as of 1 January 2007.³ Since not all goods and services are subject to the standard rate of VAT, the nominal impact on the national consumer price index (CPI) would have been somewhat more than 1.4 percentage points, with a corresponding figure of more than 1.6 percentage points for the Harmonised Index of Consumer Prices (HICP), which is calculated for Eurosystem monetary policy purposes.⁴ In this context, it should be borne in mind that input goods used to produce tax-exempt goods and services may be subject to VAT. As input tax deduction is not always possible, they are *de facto* only partially exempt from tax. This is likely to be particularly relevant to housing rents. Though rents themselves are exempt from VAT, the value added tax payable on construction and maintenance services cannot be deducted. It may therefore be expected that the sharp rise in construction prices, partly as a result of the VAT increase, will be followed by rents rising more sharply over the longer term.

*Actual prices
in January
2007 ...*

In many cases, the 0.2% month-on-month fall in the consumer price index originally reported for January 2007 was interpreted to mean that the price effects of the higher tax rates remained extremely limited.⁵ However, this overlooked the fact that consumer prices rose considerably in seasonally adjusted

terms. After seasonal adjustment, there was an increase of no less than 0.4%, even though the rise in energy prices was comparatively moderate owing to temporarily lower crude oil prices – in euro terms, the price for a barrel of Brent crude oil fell by more than 11% between December 2006 and January 2007. In fact, the price of heating oil dropped more than 5% on the month despite the higher rate of VAT. A number of goods and services underwent marked non-seasonal price (index) increases over the New Year period of 2006-07, which drove up the annual rate. For example, the year-on-year rate for motor vehicles increased by more than 2½ percentage points, while the rate for hairdressers' services rose 1½ percentage points. For telecommunications services, the decline on the year was reduced by almost 2 percentage points.

The comparatively sharp increase in prices initially continued in the following months. In the first half of the year, this was reinforced by a further rise in crude oil prices and the

*... and in the
remainder of
the year*

² For a more detailed analysis of the price effects of the increase in tax rates, see A Snir, D Levy und J Hoffmann, Price effects of VAT changes: macro and micro, Deutsche Bundesbank Research Centre, Discussion Paper, Series 1, (forthcoming).

³ The nominal percentage effect of a full pass-through is calculated using the quotient $100 \cdot ((1+0.19) / (1+0.16)) - 100$.

⁴ The HICP takes no account of owner-occupied housing, which is approximated by rent equivalents in the national consumer price index. As housing rents are not subject to VAT, the VAT effect is more pronounced in the HICP than in the CPI. For a breakdown of the nominal VAT effect by household and income group, see S Linz et al, Belastung der Haushalte durch die Mehrwertsteuererhöhung 2007, Wirtschaft und Statistik 11/2006, pp 1124-1129.

⁵ Following rebasing to 2005=100, the CPI remained unchanged on the month in January 2007. For details of the changes made in connection with the rebasing, see the box "Impact of the 2008 index recalculation on the national price index and the Harmonised Index of Consumer Prices" on pp 34-35.

Impact of the 2008 index recalculation on the national price index and the Harmonised Index of Consumer Prices

With the final results for the reporting month of January 2008, the national consumer price index (CPI) and the Harmonised Index of Consumer Prices (HICP) have been rebased. The weighting system now relates to the consumption habits of 2005 and no longer to those of 2000. Moreover, an explicit weighting by outlet type has been

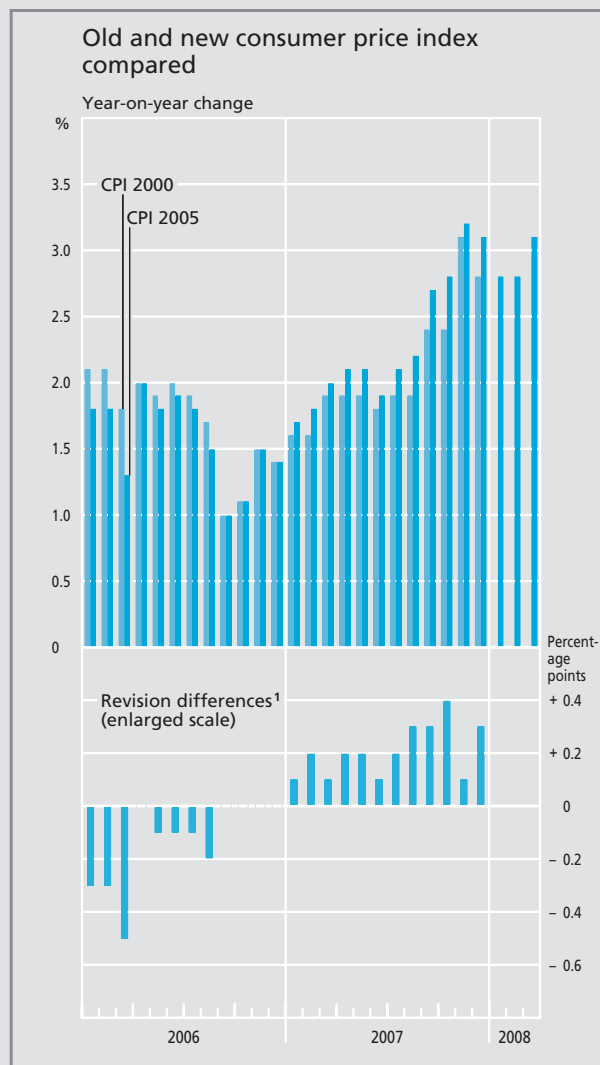
introduced and the survey period within each observation month has been extended.

The explicit weighting by type of retail outlet replaces an implied weighting, where the composition of the reporting population was chosen according to the economic significance of the reporting units in the reporting areas.² In line with structural change in the retail trade, greater importance is now attached to price observations at food discounters, for example. The survey period has been extended to at least one week, or three weeks in the case of goods with volatile prices, in order to comply with an EU regulation on the HICP. Previously, prices in Germany were surveyed as closely as possible to the middle of the month.

The German Federal Statistical Office (*Statistisches Bundesamt*) has back-calculated the index results for the national consumer price index up to the new base year of 2005 in order to ensure that the year-on-year comparison in the current year is not impaired by methodical innovations, thus ensuring an undistorted temporal comparison for prices. In addition, a revision analysis can be used to analyse the effects of the various changes. A comparison of the year-on-year rates using the old and new methods shows somewhat weaker inflation than before for 2006 and somewhat stronger inflation for 2007. The differences are very pronounced in the first half of 2006 and the second half of 2007.

According to analyses conducted by the Federal Statistical Office, these differences cannot be fully explained either by the more up-to-date basket of goods or by the fact that the survey period has been extended.³ What does appear to be making the greatest impact is the adjusted weighting by outlet type. According to studies by the market research institution Gesellschaft für Konsumforschung (GfK), prices at food discounters,

also Federal Statistical Office, Ergebnisse der Indexneuberechnung auf Basis 2005, press release 29 February 2008. — 4 See Gesellschaft für Konsumforschung, Verbraucher sollen den Aufschwung schultern, GfK



1 New CPI rate compared with old CPI rate. — 2 See also S Linz and V Dexheimer, Weiterentwicklung der Stichprobe der Verbraucherpreisstatistik, Wirtschaft und Statistik, Heft 6/2005, pp 582 – 586. — 3 See

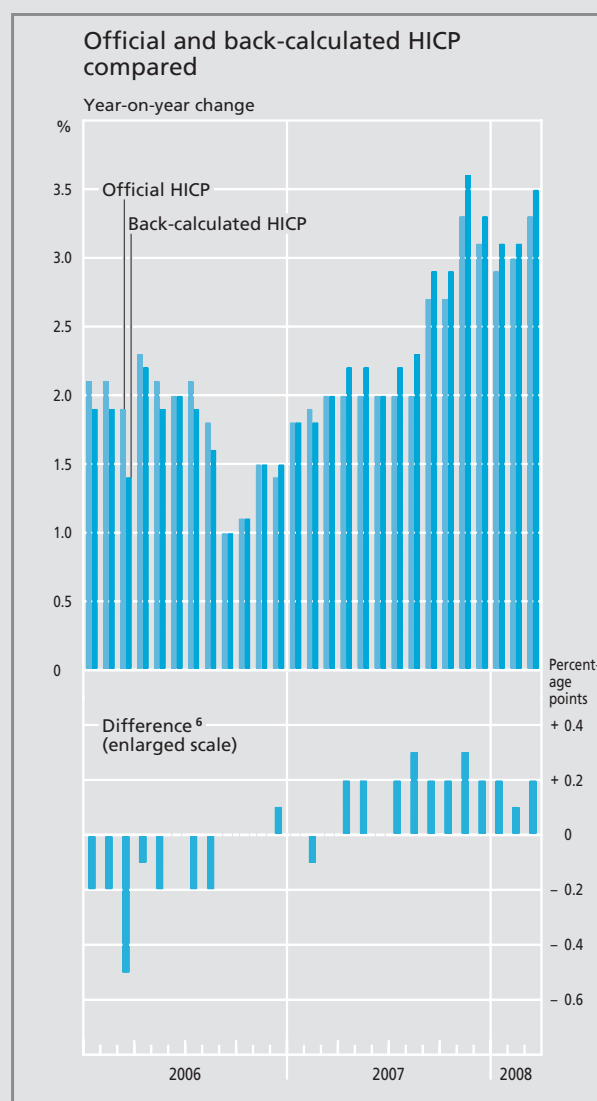
which now have a higher index weighting, increased very sharply in percentage terms in the second half of 2007.⁴ This can probably be explained in part by the fact that this outlet type typically has low distribution costs, which means that final consumer prices rise more sharply in percentage terms after price shocks in upstream stages of the economy than is the case for outlets with a different cost structure.⁵

In the HICP – which is of relevance to Eurosystem monetary policy – index results have, in line with European requirements, not been back-calculated. Instead, the new figures have been chain-linked with the existing data as from December 2007. As a result, the year-on-year comparison, which is central to monetary policy analysis, is impaired by differences in the baskets of goods and in the way the index is calculated.

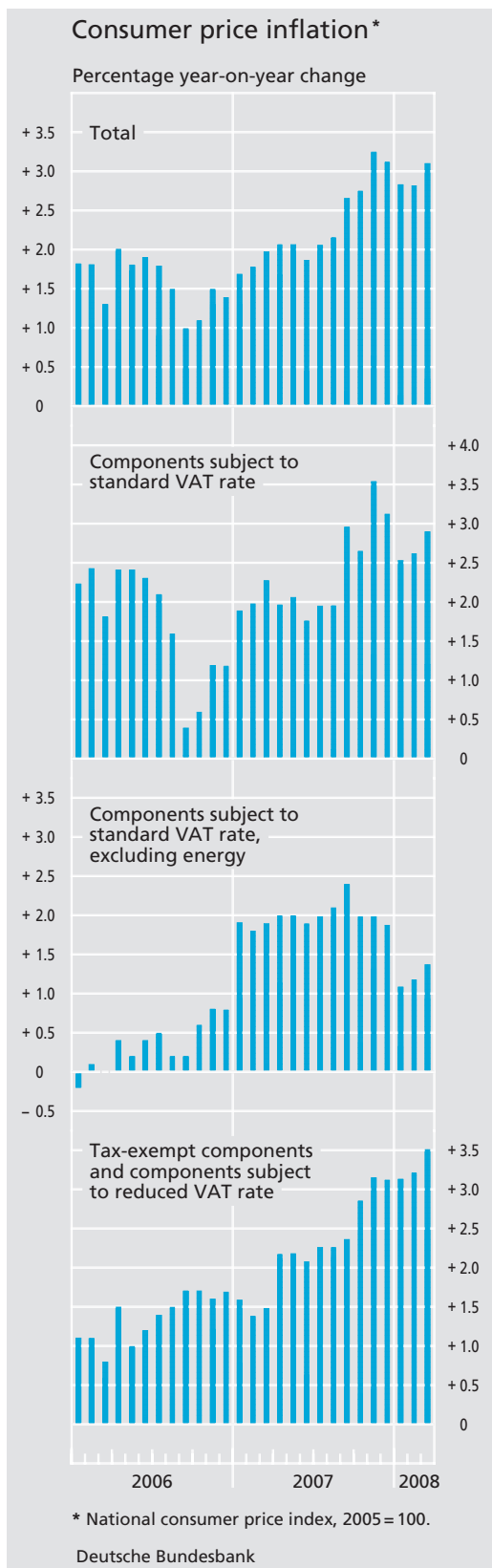
On a basis that is methodically comparable to the new CPI, but calculated using the HICP definition of the basket of goods (ie mainly excluding owner-occupied housing), somewhat higher rates of inflation are shown for the HICP at the current end. These result from the fact that the less favourable price trend in the second half of 2007 according to the new figures is not included in the annual rate of the official HICP because no back-calculation is made. In the case of unprocessed food, the back-calculated annual increase in January 2008 was 3.7%. According to the official HICP, the figure was just 2.3%. In the case of processed food, the annual rate of inflation was 6.3%, compared with 5.5%. This was partly offset by the longer survey period, which meant that the December peak in prices for package holidays, and thus the price decline from December to January, was less pronounced. In the case of the official HICP, the lack of back-calculation meant that a sharp increase in the sub-index for package holidays in December 2007 was followed by a relatively weak decline in January 2008.

Consumer Index 12/2007. — 5 GfK also reports that the absolute price differential between discounters and full-line retailers has remained roughly the same and that the sharp rise in food prices has led to an

expansion in lower-cost discounters' market share despite their prices having gone up more sharply in relative terms. — 6 Back-calculated HICP rate compared with official HICP.



expansion in lower-cost discounters' market share despite their prices having gone up more sharply in relative terms. — 6 Back-calculated HICP rate compared with official HICP.



introduction of tuition fees for tertiary education in a number of Germany's Federal states in April 2007. In the second half of the year, the higher prices of food, beverages and tobacco stemming from the global markets as a result of changed conditions in worldwide supply and demand increasingly made themselves felt at the consumer level.⁶ This drove up the rate of inflation to more than 3% towards the end of the year. On average, the CPI rose by a total of 2.3% in 2007, compared with 1.6% in 2006,⁷ although the crude oil price as measured in euro remained unchanged on an annual average (following an increase of more than 18% in the previous year).

There were marked differences in the price dynamics of products directly affected by the higher tax rates and those of other goods. Year-on-year inflation for goods and services subject to the higher rate of VAT (excluding energy) went up from 0.2% in the first half of 2006 to 0.5% in the second half and from 1.9% in the first half of 2007 to 2.1% in the second half of the year. It then fell back to 1.2% in the first quarter of 2008. Including energy, to which the standard rate of VAT also applies, the picture is modified somewhat by fluctuations in the price of crude oil. By contrast, the rate of price increase for tax-exempt or tax-reduced goods and services initially increased slightly from a significantly higher level at the beginning of 2006; in the second half of 2007, however, it went up much more sharply owing to the marked in-

Differences between products subject and not subject to higher VAT rate

⁶ For details, see Deutsche Bundesbank Monthly Report, November 2007, p 52-57.

⁷ Originally, 2.2% and 1.7% respectively were reported.

crease in the cost of food products – most of which are subject to the unchanged, reduced rate of VAT. At the beginning of 2008, the rate of price increase for items not directly affected by the higher tax rate remained at a high level.

Intervention analysis method

For a more precise analysis of the price effects of the VAT increase, the tax-related changes are separated from the general price trend using what is known as intervention analysis.⁸ A “pulse” dummy structure is adjusted to an estimated multivariate time series model. This analysis is conducted for the monthly rate of change of the overall HICP and for its main subcomponents. Unlike the CPI, the HICP was not back-calculated following the switch to the 2005 basket of goods, which means that the estimates are not impaired by methodological changes.⁹ The calculations are based on data for the period January 1991 to December 2007 (the index figures from January 2008 onwards are not fully comparable with data for previous periods in the case of the HICP either). When separating VAT-related price movements, additional government measures, seasonal effects, the medium-term price trend, effects due to crude oil and the exchange rate, and so on are eliminated. In addition, a control is performed for special price developments at the import and producer levels.

Results of intervention analysis

This approach reveals that the increase in VAT and insurance tax appears largely to have been passed through to consumer prices in both the overall HICP and its main subcomponents. Thus, just under 30% of the overall effect was due to a higher rate of price in-

Price effects of increase in rate of standard value added tax

Item	Hypothetical price effect 1	Estimated price effect 2
Unprocessed food	0.0 ³	0.0
Processed food	1.2	1.6–1.7
Energy	2.6	2.0–2.1
Industrial goods	2.2	1.4–2.2
Services	1.3	0.7–2.8
Weighted average	1.6	1.2–2.4
Overall HICP	1.6	0.9–2.5

¹ Price effect with full pass-through. — ² Result of intervention analysis, 95% confidence interval. — ³ Statistically not significantly different from zero.

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crease back in 2006, roughly one-third was the result of price effects at the beginning of 2007, and the remainder is accounted for by lagged adjustments in 2007.¹⁰ On an annual average, the higher tax rate therefore contributed just under 1.4 percentage points to the annual HICP inflation rate of 2.3% in 2007. Including the contribution made by the introduction of tuition fees in a number of

⁸ On intervention analysis, see G Box and G Tiao (1975), Intervention analysis with applications to economic and environmental problems, *Journal of the American Statistical Association*, pp 70-79. For an application to a change in value added tax, see A Valadkhani (2005), Goods and services tax effects on goods and services included in the consumer price index basket, *The Economic Record* 81, pp 104-114.

⁹ On this point, see the box “Impact of the 2008 index recalculation on the national price index and the Harmonised Index of Consumer Prices” on pp 34-35.

¹⁰ Both the overall result and the estimated temporal distribution of the tax effects on consumer prices vary depending on the chosen statistical modelling. Overall, however, the result is remarkably robust.

Federal states, the influence of government (as defined here) on the increase in consumer prices amounted to more than 1½ percentage points.¹¹ The effect was somewhat smaller for the national CPI.

Microeconomic price adjustment strategies

Infrequent but sharp price adjustments

For a supplementary detailed analysis of the price effects of the tax rate changes, individual data for 40 goods and services subject to the standard rate of VAT were evaluated with the support of the Federal Statistical Office (*Statistisches Bundesamt*) for the period March 2000 to December 2007 (for details, see the explanatory notes on “Selection and preparation of individual price reports from the consumer price statistics for the detailed analysis of VAT pass-through” on page 39).¹² As in earlier studies on individual prices, it was again evident that consumer prices are changed relatively infrequently, but fairly sharply in individual cases and that price reductions are hardly less common than price increases. Over the period as a whole, 7.9% of the prices of the products included in the study were changed on a monthly average, with 4.7% going up and 3.2% going down. The size of the individual price changes averaged 11.8% (10.6% for upward changes, 13.5% for downward changes).¹³

Variations over time

Over time, there were only a few systematic changes in the frequency and mean size of the price changes. Prices are typically changed somewhat more frequently in the first few months of the year than in later

months. If anything, the frequency of price changes has increased, mainly owing to the fact that special sales campaigns occur more often. This also explains the increase in the mean size of price adjustments. The change-over from D-Mark prices to euro prices in January 2002 brought a large number of price increases as well as price reductions, with the size of the individual adjustments being smaller overall.

To determine the VAT effect on the selected goods and services, statistical correlations between the frequency and mean size of price increases and price cuts were estimated, taking into consideration seasonal effects and medium-term trends up until the second

Size of the overall effect

¹¹ According to estimates based on data now available for 2007 and the first three months of 2008, the compulsory blending of biofuels with conventional fuels from January 2007 onwards had a positive, but not statistically significant effect on fuel prices and the CPI (HICP). Initial estimates based on a smaller number of observations following the introduction of compulsory blending had indicated a more significant impact. The fact that the sharp increase in crude oil prices during 2007 noticeably reduced biofuels’ price disadvantage is likely to have played a part in the waning of this effect.

¹² Initial results were reported in “Price effects of the recent increase in VAT – initial results of an individual price analysis”, Deutsche Bundesbank Monthly Report, May 2007, pp 52-53.

¹³ For the selection of products under consideration here, the mean frequency of price changes is significantly lower than in an earlier study (see also Deutsche Bundesbank, Price-setting behaviour in Germany, Monthly Report, December 2005, pp 15-27, and J Hoffmann und R Kurz-Kim, Consumer price adjustment under the microscope: Germany in a period of low inflation, Deutsche Bundesbank Research Centre, Discussion Paper, Series 1 No 16/2006), which aimed to be representative of the entire basket of goods and therefore also included products with frequently changing prices such as fresh food and crude oil products. In this study, the product-specific frequencies were weighted according to the respective item’s importance in the CPI basket of goods. By contrast, the mean size of price adjustments is greater for the current selection of products, firstly because more low-priced products are included and secondly as no weighting is made.

Selection and preparation of individual price reports from the consumer price statistics for the detailed analysis of VAT pass-through

As in the past for studies in connection with the euro cash changeover as well as studies for the Eurosystem Inflation Persistence Network, the Federal Statistical Office and the regional statistical offices have granted the Deutsche Bundesbank limited access to individual price data from the consumer price statistics. Individual data were previously prepared for analysis by experts of the Federal Statistical Office and the Bundesbank. The price reports had originally been filed separately for each month, and the focus here was on linking them over time in an automated procedure and then on deleting information relevant to data protection (for example, all information on the location of the reporting unit and the level of prices was removed). When linking the data, product changes and variations were incorporated wherever possible.¹ The closure of a reporting unit led to the exclusion of its observations, however.

The regular revision of the selection of products and reporting units, which is necessary to ensure that the consumer price statistics are representative, as well as changes in the way data is prepared technically for the price reports considerably restricted the options for linking the individual data over time. Such changes occurred at the start of both 2000 and 2008. The dataset analysed here therefore does not start until April 2000 and ends as early as December 2007. As the preparation was still input-intensive despite the automation aimed for, the analysis concentrated on 40 products subject to the standard rate of VAT.²

When selecting the products for this analysis, it was important to include both goods and services as well as low and higher-priced products. The products were selected in such a way that it was possible to have a continuous observation over time for a sufficient number of reporting units. On average, there were ultimately 267 price observations for each product per month. This meant that a total of 10,670 of the approximately 350,000 prices surveyed each month for the consumer price index were included in the study.

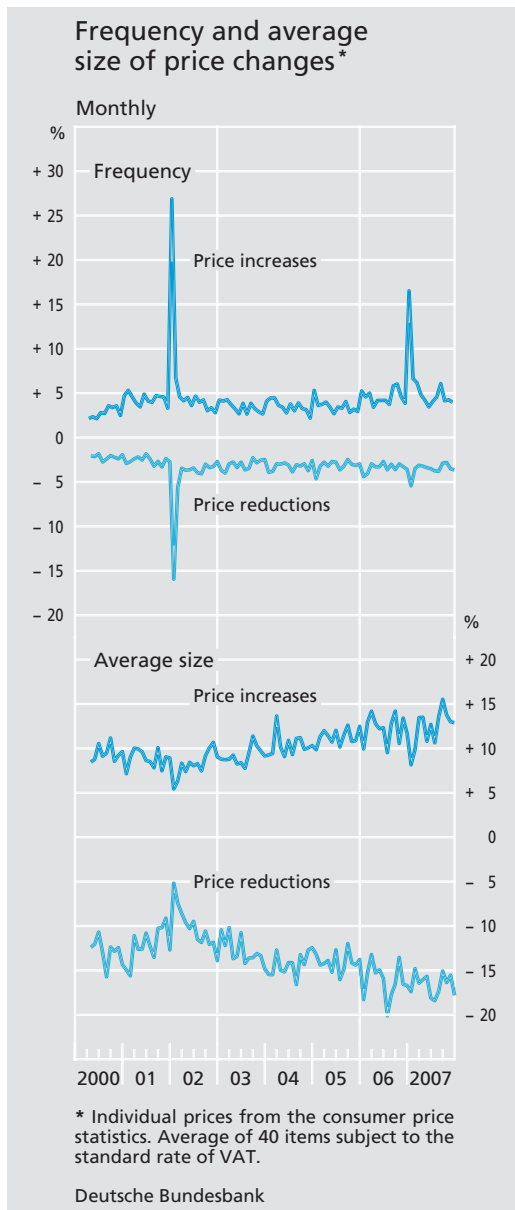
Unlike in earlier studies,³ we chose not to mimic the entire consumer price index with a limited selection of products. Therefore, price observations for energy sources and housing rents, for example, have been omitted. Moreover, the results for the various products have not been weighted in forming the averages. The results of this study may thus be seen as typical, but not as representative of the HICP/CPI basket of goods as a whole.

¹ This means that the reported price changes also include those after a product change, with the quality-adjusted change being reported here. See also J Hoffmann and R Kurz-Kim, Consumer price adjustment under the microscope, Germany in a period of low inflation, Deutsche Bundesbank Discussion Paper Series 1, No 16/2006. — ² Micro price data for ten further products without additional VAT

Description of dataset

Product	COICOP code ⁴	Observations
Goods		
Mineral water	1221001	479
Whisky	2110901	544
Bottled beer	2130101	498
Men's shirt	3121911	167
Men's socks	3121961	435
Women's jeans	3122261	150
Tennis, training or jogging shoes	3212501	143
Shoelaces	3219001	477
Wallpaper	4310101	108
Three-piece suite	5110391	217
Terry towel, cotton	5200611	375
Dishwasher	5312701	114
Microwave oven	5313201	128
Toaster	5320101	169
Light bulbs (excluding energy-saving bulbs)	5520322	195
All-in-one washing powder/liquid	5611101	694
Candles	5612351	151
Car tyres	7210111	116
HiFi system	9111211	127
Loudspeakers	9111921	91
CD, light music	9140211	115
Plastic building blocks	9310141	105
Eau de toilette	12130201	131
Toothpaste	12130511	199
Paper tissues	12130921	190
Services		
Dry-cleaning	3142101	398
Shoe repairs	3220002	406
Polishing and sealing of parquet floors	5130501	72
Washing machine repair	5330701	65
Car MOT	7230151	130
Brake pad replacement	7230172	132
Car wash	7230181	140
Rental fee for a video/DVD	9423701	70
Developing miniature colour film or digital photographs	9424301	141
Consumption of meat dishes	11110110	478
Consumption of other non-alcoholic drinks (excluding non-alcoholic beer)	11110540	379
Consumption of beer (including non-alcoholic beer)	11110560	382
Bed and breakfast	11200100	270
Men's hair cut	12110111	745
Hairdressing for women – wash, cut, blow-dry	12110151	743

have also been analysed. The results are not reported in detail here. — ³ See also Deutsche Bundesbank, Price-setting behaviour in Germany, Monthly Report, December 2005, pp 15-27, and J Hoffmann and R Kurz-Kim, (2006), op cit. — ⁴ Classification of Individual Consumption by Purpose.



quarter of 2006.^{14,15} These estimates were then used to produce *ex post* forecasts of a path without a VAT increase in 2006 (from April) and in 2007. On the one hand, data for six full 12-month periods (from April 2000 to March 2006) were used to support the estimate. On the other, scope (from April 2006) was left for accelerated price increases due to the VAT increase. According to these calculations, the prices of the selected goods

and services, which are all subject to the standard rate of VAT, rose by an average of some 2.6 percentage points more strongly in the period from April 2006 to December 2007 than in the baseline scenario without a tax increase.¹⁶ This likewise suggests that the pass-through of the higher rate of VAT has now largely been concluded.

The pass-through of the higher VAT was effected solely by a higher frequency of price increases.¹⁷ Significantly more prices were raised than in previous years, primarily in January 2007, but also in February and March, as well as later in August-September and back in September-October 2006. Contrary to what might perhaps be expected, variations of the other adjustment parameters

Breakdown of the overall effect

¹⁴ For a similar approach, see P Gábríel and Á Reiff, The effect of the change in VAT rates on the consumer price index, MNB (Magyar Nemzeti Bank) Bulletin December 2006, pp 14-20, and P Karádi and Á Reiff, Menu costs and inflation asymmetries: some micro data evidence, Institute of Economics, Hungarian Academy of Sciences, Discussion Paper 2007/6.

¹⁵ No account is taken of cost and demand variables. Firstly, the short time period for which the individual data are available makes it extremely difficult to determine the appropriate correlations. Secondly, there are no indications that fundamental price determinants for the products studied here were markedly different in 2006-07 from those in the preceding years (except for the tax increase).

¹⁶ Again, the estimated tax effects on consumer prices vary depending on the statistical model chosen. Overall, however, this outcome too is remarkably robust. The estimates include a euro dummy for January 2002, which regularly proves to be statistically highly significant. However, it cannot really be assumed that the changeover to euro cash would have generated permanent price effects. Rather, these are likely to have been predominantly deferred or accelerated price changes. However, this cannot be adequately captured using a simple statistical model. On average, estimates without a euro dummy do not yield results significantly different from those with this control variable, although they are more widely dispersed.

¹⁷ E Gagnon (2007), Price setting during low and high inflation: Evidence from Mexico, Board of Governors of the Federal Reserve System International Finance Discussion Papers No 896, finds the same effect in Mexico in a period of markedly higher inflation rates.

tended to counteract the effect the more frequent price increases had on raising the price level. On average, the price increases were no larger than usual. In fact, the scale on which enterprises adjusted their prices upward in January and February 2007 was smaller than is otherwise customary. The chart on page 40 shows that price reductions were slightly more frequent,¹⁸ not rarer, in January 2007 and were slightly larger than in previous years. Eye-catching price reductions motivated by the higher tax rate are likely to be one of the reasons for this striking finding.

Differences between goods and services

While the price effect of the change in the tax rate was concentrated, in the case of services, largely on the first few months of 2007 (in particular, January), the effect was spread over a longer period for goods. Seasonal product changes, which provide an opportunity for adjusting prices, and strategic market considerations probably played a fairly major role here. In addition, in terms of household demand, anticipatory effects are, naturally enough, likely to have been more significant for goods than services and thus to have motivated more anticipatory price adjustments.¹⁹ While around half of the price effect for the services examined here occurred in January 2007, the corresponding figure for goods was just one-tenth.

Pronounced heterogeneity in price adjustment behaviour

In terms of size, only a small part of the additional price increases precisely matched the pure VAT effect. The majority of the individual price adjustments were very much larger. Conversely, by no means all enterprises raised their prices in the period under study. For men's hairdressing, for example, 745 price

Breakdown of the value added tax effect *

April 2006 to December 2007

Item	Without value added tax increase (notional)	With value added tax increase (actual)	Value added tax effect (difference)
	As a percentage		In percentage points
Price increases			
– Average monthly frequency	3.9	5.4	1.5
– Mean size	12.6	12.0	– 0.6
Price reductions			
– Average monthly frequency	3.2	3.2	0.0
– Mean size	15.5	16.6	1.1
Mean monthly rate of inflation	– 0.01	0.11	0.12
Overall price increase	– 0.2	2.4	2.6

* Individual prices from consumer price statistics. Average of 40 goods subject to standard rate of value added tax.

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observations per month were included in the study. In the period from April 2006 to December 2007, 715 price changes were regis-

¹⁸ L. Álvarez and I. Hernando (2006), Price setting behaviour in Spain: Evidence from consumer price micro data, *Economic Modelling* 23, pp 699-716, and D. Fougère, H. LeBihan (2006), and P. Sevestre (2007), Heterogeneity in consumer price stickiness: A microeconomic investigation, *Journal of Business & Economic Statistics* 25, pp 247-264, also contain indications that VAT hikes slightly increase the likelihood of price reductions in the month in which the tax change takes effect (and in the following month). However, this effect is not statistically significant for France.

¹⁹ This issue is discussed in the IMF background paper "The modest effect of the German VAT hike: The role of inflation smoothing" prepared for the Article IV consultations in 2007, which was published at the beginning of 2008 (see <http://www.imf.org/external/pubs/ft/scr/2008/cr0881.pdf>). However, anticipatory effects in household expenditure are likely to have had less of an impact on the prices captured in the official statistics (as displayed in the shops) than in the discounts granted, which are not recorded in the statistics. Moreover, in contrast to the estimates presented here, the authors of the study do not find any additional price effects of the VAT increase after January 2007.



tered for this reporting population, of which 623 were upwards. The mean size of the individual price increases was 6.4%. Prices were most frequently raised by 4.9%, which is almost double the pure tax effect. Almost two-fifths of the service providers upped their prices in January 2007, but roughly only one in 20 did so on the precise date and, at the same time, by exactly the additional amount of VAT. On the other hand, despite the VAT

increase, one-third of the providers left their prices unchanged over the entire period from April 2006 to December 2007. One-fifth of providers changed their prices several times.

In other words, the full pass-through of the higher value added tax determined for the average was the result of a greater number of providers than usual – but far from all – raising their prices, with the size of the individual price adjustments generally exceeding the additional cost due to the VAT increase. At first glance, this outcome is surprising, but can be explained by what are known as menu costs, which prevent prices from being continuously adjusted on a near-time basis to changes in market conditions. Such costs are incurred, for example, because prices have to be recalculated and displayed.²⁰ Menu costs imply that prices will not be changed until certain thresholds have been overstepped. Seen in this light, the increase in the rate of VAT was strong enough for a relatively large number of enterprises to overstep this threshold, but too weak for this to apply to all companies. If the relevant threshold value was exceeded, companies not only adjusted prices for the additional tax burden, but also took into consideration accumulated and expected need for adjustment. Price hikes which would otherwise not have been made until later were thus anticipated and offset the short-

Menu costs as a determinant of price trends

²⁰ D Levy et al (1987), The magnitude of menu costs: Direct evidence from large U.S. supermarket chains, *The Quarterly Journal of Economics* 112, pp 791-825, and S Dutta et al (1999), Menu costs, posted prices, and multiproduct retailers, *Journal of Money, Credit, and Banking* 31, pp 684-703, have shown that such costs can be considerable.

fall from providers who left their prices unchanged.²¹

Alternative price adjustment strategies

However, such considerations cannot explain why price hikes were, on average, significantly smaller than in the past.²² Similar effects have been observed in an earlier VAT increase in Germany²³ and in connection with changes to the tax rate in other countries.²⁴ Why price increases in the order of 2.5% to 3.5% were significantly more common also requires explanation. The fact that consumers react angrily to price increases they consider to be unjustified is likely to have played a role here, as it is a factor which enterprises take into consideration.²⁵ From this point of view, a price hike roughly in line with the higher rate of VAT was easier to explain to consumers than a larger price increase. However, many service providers, in particular, had not adjusted their prices for some time (some since the changeover to the euro), which meant they were able to justify sharper increases.

Anticipatory and withdrawal effects in private consumption

Temporary and permanent effects

The higher standard rates for value added and insurance tax from 1 January 2007 onwards also had a significant impact on consumer expenditure. For one thing, the higher prices triggered by the increase in indirect taxes permanently reduce the purchasing power of money and, thus, also of incomes. This dampened real household consumer demand. For another, the early announcement of the tax increase meant that consumers could bring forward certain purchases to

avoid paying the higher tax rate. This initially strengthened demand, particularly for consumer durables (and private housing investment), in the second half of 2006, but weakened it in the course of 2007.

The propensity to purchase, which the market research institution Gesellschaft für Konsumforschung (GfK) determines using surveys, indicates how sensitively consumers responded to the scheduled higher tax rate. The propensity to purchase started to rise as soon as the tax plans were made known at the end of 2005. This increase continued into the first half of 2006, but then weakened somewhat. Once the tax hike became effective at the beginning of 2007, the propensity to purchase plummeted. Actual consumer behaviour followed changes in the propensity to purchase with a marked time lag. Spending on con-

Propensity to purchase and actual purchasing behaviour

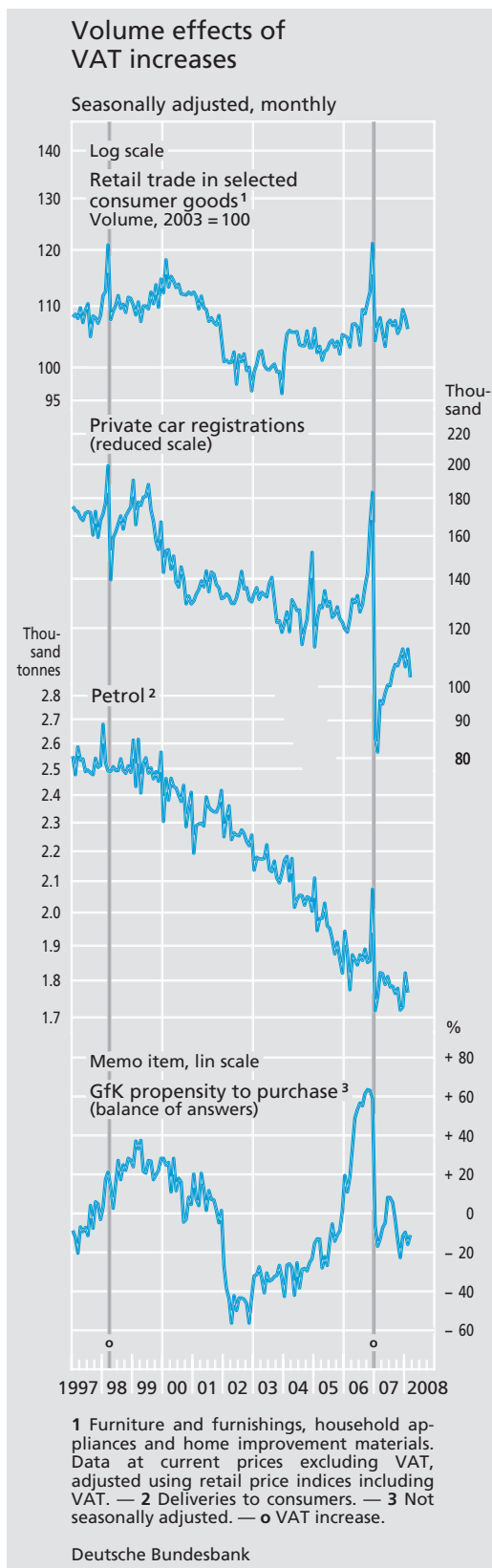
21 A Caplin and D Spulber (1987), Menu costs and the neutrality of money, *The Quarterly Journal of Economics* 102, pp 703-725, demonstrate, for example, that, in models with menu costs, monetary shocks are, under certain conditions, also fully passed through to prices through more frequent price changes, without all the individual prices being adjusted immediately. See also R Caballero and E Engel (2007), Price stickiness in Ss models: New interpretations of old results, *Journal of Monetary Economics* 54, pp 100-121.

22 In the customary "menu cost models", one would, in fact, even expect a cost shock to increase the average size of price changes. However, it has also been observed in other contexts that it is, above all, the frequency of price adjustments that reacts to changes in the environment. See also L Götte, R Minsch and J Tyran (2005), Micro-evidence on the adjustment of sticky-price goods: It's how often, not how much, CEPR Discussion Paper No 5364, and A Rátfai (2006), Linking individual and aggregate price changes, *Journal of Money, Credit, and Banking* 38, pp 2199-2224, and E Gagnon (2007), op cit.

23 See also J Hoffmann and R Kurz-Kim (2006), op cit, p 38.

24 See, for example, P Karádi and Á Reiff (2007), op cit.

25 See also J Rotemberg (2005), Customer anger at price increases, changes in the frequency of price adjustment and monetary policy, *Journal of Monetary Economics* 52, pp 829-852. In Germany, considerations of this type are likely to have gained in relevance since experience of the changeover of prices into euro, if not earlier.



consumer durables did not rise noticeably until the fourth quarter of 2006. Seasonally adjusted new passenger car registrations for households went up by around 25% in the fourth quarter of 2006 compared with the third quarter.²⁶ In price-adjusted terms and after adjustment for seasonal variations, retail sales of furniture and furnishings, household appliances and home improvement materials were up 7% in the final quarter of 2006. Overall, households spent 5% more in real terms on consumer durables in 2006 than a year earlier. However, anticipatory effects were observable not only for consumer durables, but also for some non-durables. At the end of 2006, for instance, many motorists took the opportunity to fill the tanks of their cars with fuel subject to the lower rate of tax.

When assessing the overall volume of the anticipatory effects, it has to be borne in mind that additional spending for certain purposes may be offset by lower expenditure in another area. In actual fact, it is apparent that households were more thrifty in their spending on non-durables overall in the second half of 2006 than would have been expected without the VAT increase. Demand for semi-durable consumer goods was also fairly weak. Similar behaviour was also observed for earlier VAT increases.²⁷

Offsetting effects in other categories of goods

Looking at all households and all areas of expenditure, anticipatory effects initially imply

²⁶ Taking a monthly view, the anticipatory effect for motor vehicle purchases set in as early as September 2006.

²⁷ See also Deutsche Bundesbank, Increase in VAT and possible anticipatory effects, Monthly Report, May 2006, p 48-49.

*Assessing the
net anticipatory
effect*

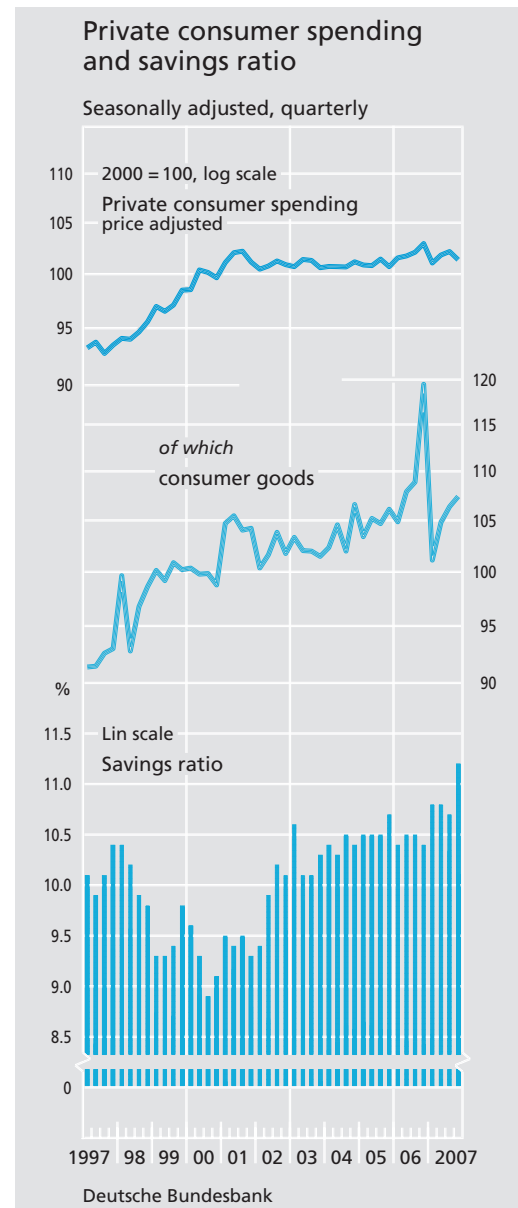
lower savings. Accordingly, the net volume of anticipatory effects can be calculated by comparing the actually observed savings ratio with a hypothetical savings ratio excluding the tax rate increase.²⁸ In the period 2000 to 2005, households' savings ratio rose steadily from 9.2% to 10.5%.²⁹ In 2006, this trend was interrupted and the figure remained at the prior-year level. In 2007, there was a further sharp increase to 10.9%. Had private consumption not been brought forward, the savings ratio would probably have been higher in 2006 but lower in 2007. Smoothing the path of the savings ratio from the second quarter of 2006 to the third quarter of 2007 indicates that these effects could have amounted to just under 0.1 percentage point in each case. Accordingly, the overall anticipatory effect for 2006 would be 0.1% of private (nominal) consumer spending. In real terms, the anticipatory price adjustments have to be subtracted. These amounted to just over 0.1 percentage point in 2006 on an annual average. According to this calculation, therefore the net effect on aggregate real consumer spending is virtually neutral.

*Pronounced
consumer
weakness
in 2007*

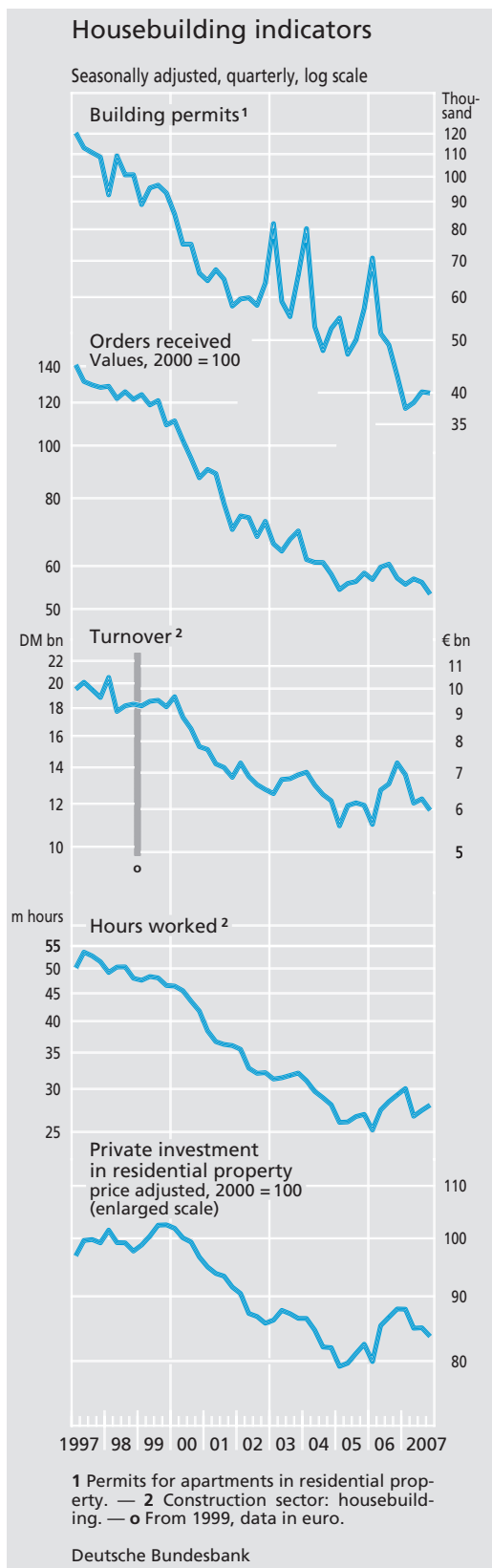
In 2007, sales of consumer durables, in particular, declined strongly, as was to be expected. The real decline, as defined in the national accounts, was, in fact, somewhat stronger than the increase of the previous year. In price-adjusted terms, domestic private consumption was 0.5% down overall on the

²⁸ When examining these ratios, a control is also performed for changes in households' nominal disposable income, which expanded by 1.6% in 2005, 2.3% in 2006 and 1.7% in 2007.

²⁹ For more details, see Deutsche Bundesbank, Private consumption in Germany since reunification, Monthly Report, September 2007, pp 41-55.



year. The price hike resulting from the VAT increase, in particular, had a dampening effect on demand. According to simulations carried out using the Bundesbank's econometric model, changes in the real value of disposable income are transferred relatively quickly, and very largely in terms of size, to the demand for consumer goods. The price effect of roughly 1.4 percentage points on the HICP in 2007 corresponds to somewhat more than



1 percentage point for the private consumption deflator. Real private consumption was therefore depressed by a good 1%. The shortfall in demand as a result of the purchases of consumer durables brought forward to 2006 has to be added to this. Overall, the higher rate of VAT is likely to have reduced the growth rate of private consumption by approximately 1¼ percentage points in 2007.

Impact on private housebuilding

The VAT increase at the beginning of 2007 had a perceptible impact not only on consumer spending but also on households' housing investment. The abolition, at the beginning of 2006, of grants to homeowners and of the option to apply the geometric method of fiscal depreciation to the construction costs of non-owner-occupied housing were contributory factors. As the legislative arrangements in force during the year in which the application for a building permit is submitted apply, investors who had submitted their application by the end of 2005 could still benefit from the more favourable underlying terms. The VAT increase at the beginning of 2007 therefore further reinforced the incentives to start building projects quickly and bring them to a speedy conclusion. The same applies to measures to make buildings more energy-efficient, which, in January 2006, the Federal government had taken a decision to promote.

Changed conditions for private housebuilding ...

In contrast to earlier VAT hikes, the interaction of the various measures this time resulted in strong anticipatory effects in the

... resulted in a sharp increase in building permits ...

construction sector. The number of building permits granted, mainly for one-family and two-family houses, thus rose noticeably around the New Year period of 2005-06. However, it still fell short of the peak figures around the turn of 2002-03 and 2003-04, when the future of the grant to homeowners had already been called into question. If it is assumed that it takes around three months for a building permit to be granted after an application has been made, the number of applications for building permits for apartments in 2005 was almost 8% up on the year. A year later, it was down by one-fifth.

... and additional orders and sales in 2006

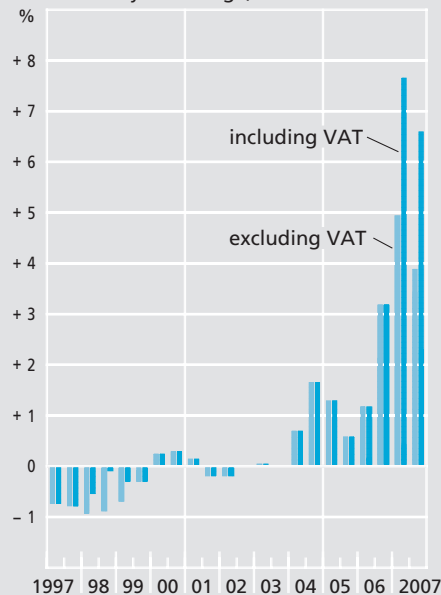
Some of the additional building permits were reflected in order books without any major time lag. Thus, in 2006, the construction sector recorded growth in housing construction orders, of 4½% in nominal and 2% in real terms, for the first time in ten years. After this interim peak, demand resumed its downward trend at a rapid pace. Sales in this construction subsector also displayed a sharp decline in 2007 following a rapid rise. The fact that rising material costs drove up building prices also contributed to the 10¼% increase in turnover in 2006.

Impact on private housebuilding as a whole

It was not only the construction industry but also the finishing trades which benefited from this temporary increase in demand. Handicraft enterprises in this subsector recorded an increase in turnover of no less than 6¾% in 2006. Overall, private housing investment was up 4.3% in price-adjusted terms, having dropped by a total of one-fifth over the previous six years. Despite the pronounced anticipatory effects, there was no

Price effects of increase in VAT in housebuilding*

Year-on-year change, semi-annual



* Overall construction price index for residential property.

Deutsche Bundesbank

slump in 2007 – at least not when looking at the average. In fact, a further increase of 0.6% was recorded, mainly as many of the building projects started earlier were not completed until 2007. The “return to normal” will therefore continue to be reflected negatively in the growth rate of housebuilding investment in 2008 after anticipatory effects have run their course.

Impact on aggregate value added

While the shift in the timing of private consumption is unlikely to have had a significant impact on real GDP growth in 2006, anticipatory effects in housebuilding activities may have contributed between 0.1% and 0.2% to GDP. Overall, anticipatory effects are there-

Adding up of sectoral effects ...

fore likely to have boosted economic growth by 0.2 percentage point at most in 2006. In 2007, the dampening effect of lower real consumer spending on economic growth, which includes the shortfall in demand as a result of anticipatory purchases as well as the actual impact of the higher VAT rate, probably amounted to just over ½ percentage point, assuming a 20% import share of private consumption.³⁰ In housing construction, the lingering positive effects and the subsequent “withdrawal effects” may have largely counterbalanced each other. According to this calculation, in a reference scenario without a value added tax increase, economic growth for 2007 would have been at least ½ percentage point stronger.

... probably exaggerates overall impact

When determining the overall impact of higher tax rates, due account has to be taken of the fact that export activity and inventories have also adapted flexibly to the changed conditions. The strong increase in demand for passenger cars in the second half of 2006, for example, was partly met by deferring exports

and liquidating inventories. The deferred exports were effected in the first quarter of 2007. Inventories were then restocked in the second quarter. In the following quarters, too, the German car industry was able to offset the tax-induced weaker demand by exporting more. Much the same applies to other sectors. Simply adding up the partial effects therefore exaggerates the strength of the overall effect. In sum, economic growth was significantly above its trend rate in the favourable economic climate of 2007 despite the dampening effect of the higher tax rates.³¹

³⁰ In the case of products affected by the VAT hike, the import content may have been somewhat greater and the impact on GDP therefore somewhat smaller.

³¹ Taking a longer-term view, supply effects alone determine the macroeconomic impact of the VAT increase, not the demand effects on which we have focused in this article. The higher tax burden increases the price and tax wedge between real producer and consumer wages. Lower contribution rates to the statutory unemployment insurance scheme can only mitigate this effect. The larger price and tax wedge reduces the willingness to provide services in the taxed economy with matching losses in value added. These constitute the true costs of the higher tax rates.