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Did the Minimum Wage Change Consumption Patterns?

Report to Low Pay Commission

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This study looks at the effects of the minimum wage on 1) the consumption patterns of workers affected by the minimum wage and 2) the prices of goods and services produced by industries where minimum wage workers are concentrated. The economic theory of consumer behaviour suggests that individuals will change their spending behaviour when faced with either price or income changes. Since the minimum wage boosts the gross earned income of those covered, it might be expected to generate an "income effect" and so change a recipient's consumption patterns relative to those who did not benefit. Higher incomes are generally associated with a shift in consumption patterns away from economic necessities toward economic luxury items.[1] However it is also possible that firm who employ minimum wage workers could have passed on higher labour costs in the form of higher prices. The more inelastic the demand elasticity for the good in question other things equal, the easier it would be to increase prices.

In the first half of what follows we use Family Expenditure Survey data, (FES) and its successor the Expenditure and Food Survey, (EFS), to outline the characteristics of minimum wage households and document the change in consumption patterns of households in which minimum wage workers live over the period immediately before the minimum wage's inception in 1999 to the present. We contrast the consumption patterns with other households in which the changes to the minimum wage will have had little effect. We estimate Engel curves of budget shares against total expenditure for different consumer goods for different household types. This allows us to determine whether the Engel curves for different household types varied substantially both within goods and over time. In the second half of the paper, we identify the types of goods and services typically produced by minimum wage workers and then look to see whether there is any

[1] A luxury good has an income elasticity of demand greater than one so that demand rises more than proportionately than income, a necessary good has an income elasticity of the demand less than one

evidence of price changes in these goods around the time of the introduction of the minimum wage or around the times of the subsequent increases in the minimum.

Key Findings

Consumption Patterns

- Minimum wage households are generally poorer than non-minimum wage working households. The average disposable income is around 50% lower in adult minimum wage households than in other households with occupants in work.
- There is considerable heterogeneity of income among minimum wage households group (as among other working households). The 90/10 expenditure ratios are around 3.8 for both groups.
- Around 10% of working households relied on minimum wage workers as their main source of wage income. In around 7% of working households, NMW workers were the only source of wage income and in around 5% of all working age households NMW workers were the main source of any income.
- Only 1% of all households with working occupants have more than one minimum wage worker
- Around 30 per cent of minimum wage workers live in households with an aggregate income less than sixty per cent of the median household income for all households with at least one employee, (compared with a 10 per cent share among all other working households). Two thirds of minimum wage workers live in households with a total income below the median for all working (employee) households.

- The modal household type for a minimum wage worker is the couple with dependent children. Around 40% of minimum wage workers live in this arrangement, as do employees paid above the minimum. Around 4% of minimum wage workers are single parents and 7% are single adults without dependents.
- There are no significant differences in expenditure patterns across household types, although adult NMW households appear to spend a slightly larger fraction of their income on food, compared to other households with non-NMW workers.
- There are few significant differences in the shapes of the Engel curves – which measure the responsiveness of the proportion of the total household budget (the budget share) spent on a given item – between minimum wage households and other working households.
- The exception is alcohol consumption. Among non-minimum wage households the Engel curves indicate that alcohol expenditure first rises then falls as household disposable income increases. Among minimum wage households however, the share of expenditures spent on alcohol appears to rise continuously with income. The variation in alcohol budget shares with income within household types, however, is much less than the variation in expenditures by income for food.
- Difference-in-difference analysis estimated over data pooled over successive cross-sections suggests that in the period after the minimum wage was introduced, there appears to have been some fall tobacco shares of NMW households over and above that of other working households and a relative rise in the share of minimum wage household expenditure on fuel and household services.

Prices

- While the retail sector employs around 25% of all minimum wage workers, other service sectors employ proportionately more minimum wage workers as a share of all employees. Take-away food shops, pubs and restaurants are notable and persistent low paying sectors. Most minimum-wage sectors are consumer services.
- The average annual rate of price inflation for these minimum wage goods was around one percentage higher than the general retail price inflation rate in the period leading up to the minimum wage.
- Difference-indifference estimation suggests that in the period after the minimum wage was introduced, the inflation rate of the top 9 minimum wage goods and services that we identify, (restaurant meals, canteen meals, take-away food, public houses, hotels, hairdressing, domestic help, dry cleaning/laundry mini-cab services) rose, on average, by an additional 0.8 percentage points above the rate of aggregate retail price inflation.
- There is considerable variation in the inflation rate movements of the individual minimum wage good series. Hotel and domestic service price inflation averaged around 2 points above general retail price inflation in the period after the NMW. Take-away food price inflation rose by around half a point more than general price inflation in the period after the minimum wage was introduced, while the price of pub drinks, although rising at a significantly faster rate than general prices before the minimum wage, shows no additional change to this pattern after April 1999.
- However when compared against a basket of goods and services with a high domestic share in production but with a lower minimum wage share of the labour

force, then the relative price changes of minimum wage goods are more muted but remain significant for hotels and domestic services.

- Own and price elasticities of demands are very difficult to estimate for these minimum wage goods given the nature of the available data. However the data suggest that demand for minimum wage items such as, pub drinks dry cleaning/laundry and canteen meals are price elastic. Demand for these goods is probably also income elastic. For these goods it may be harder to pass on any cost rises in the form of higher prices, since demand will more readily shift away toward other substitutes if prices rise.
- In contrast demand for minimum wage services like hairdressing and take-away food seems to be less sensitive to price changes. For these services it may be easier to pass on any cost rises in the form of higher prices, since demand will not shift away substantially toward other goods or services if prices rise.
- Over the sample period, the demand for dry cleaners, canteen meals and pub drinks were the most sensitive to its own price and the demand for domestic services, take-away food and hotel services were the least sensitive to own price and the budget share of take-away food, restaurant meals and UK hotel services least sensitive. The results suggest that the demand for hotel services, restaurants meals and take-away food may be relatively price inelastic, and the demand for pub drinks, dry cleaning services and canteen meals more price elastic so that the scope for changing prices in response to a cost shock may be greater in the former goods and services and more limited among the latter group.
- These minimum wage goods are not consumed exclusively by minimum wage households. The share of total expenditure on these goods accounted for by NMW households is broadly in line with the share of minimum wage households

in the population (though there is some variation around this average according to the type of good). Minimum wage households spend disproportionately more on take-away food, (17% of all consumption but just 12% of all households in the sample), but spend disproportionately less on cleaners (4%) or hotels (8%).

- This suggests that any price rises resulting from the minimum wage will be experienced by most households, not just minimum wage households. As a result, the effect of any changes in prices on real incomes will be experienced across most households.

Introduction

When the national minimum wage was introduced in Britain, much effort focused on establishing the possible effects on the hours and employment prospects of those workers affected by its introduction. The consensus that emerged has been that the overall effect on the level of employment in Britain was broadly neutral, (see for example Stewart (2004a), (2004b). Given this lack of an employment effect research has shifted toward establishing whether the margin of adjustment was borne elsewhere. Stewart and Swaffield (2005) establish that there may have been a small fall in the number of hours worked by low wage workers. Draca, Machin and VanReenen (2006) produce evidence to suggest that productivity may have risen more in firms that employ more low wage workers and that profitability may have fallen in firms that were more affected by the minimum wage introduction. There is also another channel through which the effects of the minimum wage could be directed, namely adjustments in the consumption patterns of workers affected by the minimum wage. The economic theory of consumer behaviour suggests that individuals will change their spending behaviour when faced with either price or income changes. Since the minimum wage boosts the gross earned income of those covered, it might be expected to generate an “income effect” and so change a recipient’s consumption patterns relative to those who did not benefit.

It is also possible that firms who employ minimum wage workers could have passed on higher labour costs in the form of higher prices. A firm’s potential set of responses to a cost increase depends on factors like the extent of competition in the firm’s product market; the firm’s ability to make compensating productivity improvements, the presence of import-substitutes not subject to the same cost increase but also on the price elasticity of demand for the good in question. The more inelastic the demand elasticity, the easier it would be to increase prices and maintain profit levels following a rise in labour costs.

Little is known about the effects of the minimum wage on prices. In the absence of price discrimination by firms, any resulting price rises would have been the same for all consumers of a good. Faced then with above average nominal wage increases and subject to the same price effects, real incomes of minimum wage earners would have risen more than for the majority of non-minimum wage workers. Consumer theory then suggests that there would be differential changes in consumption patterns as a result.

As yet we also know next to nothing about the consumption patterns of low (minimum) wage workers, how these compare to other members of the population and how updates in (or the introduction of) the minimum wage changed consumption patterns of beneficiaries. Increases in real incomes could allow consumption patterns to move away from necessities, (like food staples), toward other items. If the minimum wage can influence the distribution of consumption in this way then it will also indirectly affect the labour market through any effect on the increased demand for certain goods – and the factors (e.g. labour) need to produce them - relative to others.

In what follows we use Family Expenditure Survey data, (FES) and its successor the Expenditure and Food Survey, (EFS), to outline the characteristics of minimum wage households and document the change in consumption patterns of households in which minimum wage workers live over the period immediately before the minimum wage's inception in 1999 to the present. We contrast the consumption patterns with other households in which the changes to the minimum wage will have had little effect. We estimate Engel curves of budget shares against total expenditure for different consumer goods for different household types. This allows us to determine whether the Engel curves for different household types varied substantially both within goods and over time. We then use the Labour Force Survey (LFS) to identify the share of employees in each 3 digit industry sector who are minimum wage workers. We then match these sectors to sectoral-level data on retail prices and look to see if there is any evidence that prices in these minimum wage sectors were affected by the introduction of and subsequent changes in the minimum wage.

2. Theoretical Framework

Demand and Income Changes

Simple consumer demand theory suggests that suggests that individuals will change their spending behaviour when faced with either price or income changes. Historically rising real incomes have been associated with a shift away from staples (housing, food and heating), toward items like personal goods and services where there is more discretion over what exactly to buy, (Blow 2003). Gregg, Waldfogel and Washbrook (2006) examine differential consumption patterns between low and high income households in Britain, concluding that there appears to have been some convergence in the spending patterns of low income households toward that of other households in the period after the set of welfare reforms initiated by the incoming 1997 Labour government. The UK welfare system means that not all households will benefit equally from an increase in the minimum wage. Those in receipt of Family Credit, or its successor the Working (Families) Tax Credit would receive less of an increase in net household income for a given gross increase in the NMW because of the marginal tax rates embedded in in-work benefit supplements.[2] Similarly those in receipt of housing benefit will not experience the full benefit of the minimum wage, since their housing benefit will be reduced accordingly, (see Sutherland (2001)). Indeed the main beneficiaries appear to be those in the middle of the household income distribution, who

[2] In practice, just 4% of working age households were claiming Family Credit in the 1998 FES. Some 10% of minimum wage households in the data set receive Family Credit. HM Treasury (2006) estimates the net average household nominal gain from a 25p increase in the minimum wage to be around £4.50 a week.

typically will be working full-time but not claiming welfare benefits, Metcalf (2007). Moreover, the effect of an increase in the NMW will be mitigated somewhat in the presence of other household members in work.

The usual way of classifying the relationship between goods and income is based on the income elasticity of demand which measures the percentage change in demand for good i, x_i, following a given percentage change in income, X, ? = $(X/x_i)dx_i/dX$

A luxury good has an income elasticity of demand greater than one, so that demand for the good rises more than proportionately for a given change in income. Similarly, a necessary good has an income elasticity of demand less than one and an inferior good has an income elasticity of demand less than zero – so that demand for inferior goods falls as income rises. Income elasticities are typically determined in the literature by estimating "Engel curves", which relate the share of household expenditure given to good i, (the budget share), s_i, to the log of total household expenditure.

$$s_i = a_i + b_i*\log(x)+u \qquad (1)$$

The coefficient b_i is a semi-elasticity and gives the percentage point change in the budget share of each item following a 1% change in total household expenditure, multiplied by 100.[3] If the budget share is unchanged following an income change then b=0. Downward sloping Engel curves result when the good in question is expenditure inelastic: as total expenditure rises, the expenditure share of the good falls, (b_i <0). Any good with a negative elasticity is therefore classed as an economic necessity. The larger the absolute value of b the more elastic is the responsiveness of the consumption of good to a given income change. Upward-sloping Engel curves define luxury goods, (b_i >0). Spending on luxuries will rise as total expenditure rises; spending on necessities will fall as total expenditure rises. Food, for example, is often considered a typical necessity.

[3] $dw_i/dLog(x) = b_i = dw_i/(dx/x)$ = unit change in w with respect to a 1 percentage change in x * 100

So we would expect the budget share on food to fall as living standards increase. The expenditure elasticity of budget share is defined as

$$e = \frac{\partial \log s_i}{\partial \log X} = \frac{\partial s_i}{\partial X} * \frac{X}{s_i} = \frac{\partial s_i X}{\partial X} * \frac{1}{s_i} = b_1 * \frac{1}{s_i} \qquad (2)$$

(since $ß_1 = ds_i/d\log(X)$)

Using the quotient rule to differentiate (2)[4], the income elasticity of demand satisfies:

? = $(X/x_i)dx_i/dX = e + 1$ (0<?<1 = necessity, ?>1 = luxury, ?<0 = inferior) (3)

The shape of Engel curves also varies with household characteristics like age and region (see Browning and Meghir (1991) and Blundell, Pasharedes and Weber. (1993)). It is now common to present non-parametric estimates of Engel curves in graphical form which effectively portray how the budget share varies with household expenditure by weighting all household budgets within a given range of expenditures. If the slope of the graph is not constant, then neither are the budget share and income elasticities. Sometimes these graphs indicate that the relationship between budget shares and expenditure may be modelled better by a quadratic in log expenditure in which case:

$$s_i = a_i + b_i*\log(x) + d_i*\log(x)^2 + u \qquad (4)$$

and the budget share elasticity e is now $\frac{b_i + 2d_i \log(x)}{s_i}$ with the income elasticity, again given by ? = $e + 1$, becoming $h = 1 + \frac{b_i + 2d_i \log(x)}{s_i}$. Now the income elasticity varies with the level of expenditure, x.

Price Changes

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$$e = \frac{\partial s_i}{\partial X} * \frac{X}{s_i} = \partial\left(p_i x_i \big/ X \right) / dX * \frac{X}{\left(p_i x_i \big/ X \right)} = \left[\frac{X p_i dx_i / dX - p_i x_i dx_i / dX}{X^2} \right] * \frac{X^2}{p_i x_i} = \frac{X}{x_i} \frac{dx_i}{dX} - 1 = h - 1$$

Microeconomic consumer and labour demand theories tell us that the ability of firms to pass on higher prices following a rise in labour costs as generated by the minimum wage depends on several factors.

1) In the case of a cost increase induced by the minimum wage then all domestic firms producing the same product will be subject to the same cost pressures, which will differ only by the share of labour in production. Firms which use a higher share of minimum wage labour in their production process will be subject to the highest cost pressures, other things equal. In addition if there are any wage spillovers from the minimum wage, increasing wages further up the wage distribution, then the effect on costs will be magnified.

2) The prices of substitutes and complements for the good also matter for pricing decisions. These prices in turn depend on the input costs of these substitutes and complements. If labour is a substitute for capital then firms can react to a rise in labour costs through capital substitution, reducing the number of employees, cutting hours, or by making productivity improvements. In many services the scope for capital substitution is limited and the labour share typically higher than for many manufactured goods. If so then these sectors should face higher upward pressures on costs. The more substitutes for a good, the more price elastic the demand. Moreover, the more a good competes with a potential substitute produced abroad not affected by the UK minimum wage, the harder it will be for UK firms to pass on cost increases and so maintain market share, other things equal. In this regard, we might expect many services, which are typically not traded abroad, to be able to pass on cost increases, other things equal. In short, the less competitive the market, the easier it is to pass on increases in the costs of production and maintain profit levels.

3) Demand for luxury goods, as defined by the size of the good's income elasticity, is thought to be more price elastic than the demand for necessities. This is because, in addition to substitution effects, price changes generate income effects through their effects on real incomes. So if the good is highly income elastic, demand will tend to be more responsive to price changes, other things equal because a given change in price generates a larger income effect which then reinforces the substitution effect.

4) The larger the budget share of the good, the greater the change in real incomes from any price change. However this does not guarantee that the proportionate change in demand will be greater, since this will only happen if the good is a luxury. So goods that comprise a high fraction of the budget share are not automatically price elastic goods.

One benchmark measure that will summarise the ability of the firms to pass on prices following a rise in labour costs is the own price elasticity of demand. $\frac{\partial q_i}{\partial P_i} * \frac{P_i}{q_i} = \eta_{ii}$. Own price elasticities are generally negative, since an increase in the price of a good usually leads to a fall in demand for that good. Goods with an own price elasticity between zero and (minus) one, $-1 < \eta_{ij} < 0$, are said to be price inelastic, (demand changes less than proportionately with price). Goods with an own price elasticity below (minus) one, $\eta_{ij} < -1$, are said to be price elastic, (demand changes more than proportionately with price). Producers of elastic price goods may find it harder to pass on price increases following from the NMW since demand for these goods and services would fall away quicker than demand for price inelastic goods.[5] Similarly total expenditure on price inelastic goods will tend to increase if prices rise – since the increase in revenue generated by a rise in price

[5] Cross price elasticities can be negative, positive or zero, depending on whether an increase in the price of one good generates: a fall in the quantity demanded of another good (the goods are complements); an increase in the quantity demanded of another good (the goods are substitutes); no effect on the quantity demanded of another good (the goods are unrelated).

more than offsets the fall generated by the (small) fall in demand - while total expenditure on price elastic goods will tend to fall.

It is also possible that there will be a difference between the short-run and long-run response of firms to an increase in their production costs and of consumers to changes in prices. It is easier for firms to switch production techniques in the long-run and this will tend to reduce upward pressure on prices. It is also easier for consumers to change their consumption patterns over time away from more expensive goods, making demand more price elastic in the long run, which should also act to maintain downward pressure on prices.

Incidence of Price Changes

Who buys goods and services produced by minimum wage workers also matters for the "real income" effects of a minimum wage. Since any given nominal rise in wage income could theoretically be offset by a rise in prices, then if the prices of goods and services consumed by minimum wage workers increased proportionately in response to the minimum wage, recipients of the minimum wage would be no better off in real terms.[6] If consumption of minimum wage goods and services were distributed evenly across the population, we would expect these households to account for a similar share of total consumption. However, if minimum wage households were the only consumers of minimum wage goods then any price effects of the NMW would be exclusive to NMW households. This then is a matter for empirical verification.

The existing, limited, empirical literature on the price effects of minimum wages, summarised in Lemos (2006), has tended to focus on the effect of the minimum wage on

[6] This point was made almost 100 years ago in the debate surrounding the introduction of the Wages Councils , see Webb and Webb (1911), pp. 780-83.

aggregate retail price inflation, with fewer attempts to focus on the prices of sectors which employ minimum wage workers. Lemos concludes that the accumulated evidence on the effects of the NMW on aggregate price inflation appears to be small[7]. Aaronson (2001) looks at price variation across US states subject to different minimum wage levels in one sector, fast foods, and concludes that prices there rise, with an elasticity of around 0.1, within one month of any minimum wage rise. In the study that most closely resembles this present one, Draca, Machin and Van Reenen (2005), follow retail price changes in three low-paying UK sectors and conclude that there was not much evidence of the NMW being passed on in terms of higher prices in these sectors.[8]

3. Data

The main source of data on consumption is the Family Expenditure Survey, (FES) and its successor the Expenditure and Food Survey, (EFS) which began in 2001. The FES is a sample of around 6700 households and contains detailed information on household level expenditures, based on a diary of expenditure patterns over two week, alongside the individual characteristics of each household occupant. We restrict our estimates throughout to “working age” households, where the head is below statutory retirement age, since the minimum wage’s principal impact will be among working age households. This restricts the sample to around 5000 households each year.

Each adult is asked to provide information on their employment circumstances and, if in work, their gross weekly wage. As such, the hourly wage has to be derived for all employees currently in work by dividing gross weekly pay by usual normal hours plus usual paid overtime. This generates a degree of measurement error and any measurement error in continuous or dummy variables will generate attenuation bias in a

[7] With an elasticity of price inflation with respect to the NMW of around 0.04

[8] The three sectors are take-away food, canteen meals and restaurant meals.

regression analysis, (Aigner (1973)). However, unlike with data sets like the LFS it is impossible to assess the extent of measurement error since the FES does not have "true" measures of hourly pay with which to benchmark the hourly pay estimates.[9] This hourly wage is calculated for around 6000 employees, (5700 adults, 300 youths aged 18 to 21), in each year of the FES. Since there are separate minimum wages for youths, adults and agricultural workers we separate the sample accordingly into each category.[10]

Around 5 percent of employees in the sample also hold second jobs, a fraction of which could presumably also be paid at or below the minimum wage. However while there is data on weekly wages in second jobs, there is no information on hours so minimum wage indicator in second jobs can not be calculated. The effect of this is will be to bias down the estimate of the number of minimum wage households.

The FES only identifies household-level expenditure, so we examine expenditure patterns of "minimum wage households", comparing expenditure patterns of households affected by the minimum wage and those not. As a result any effects of minimum wage on consumption will be blurred somewhat by presence of and changes in other household incomes over the period of study. Some households will contain one adult, others more than one so we can also examine how expenditure patterns vary with the number of occupants in the household. Similarly, some minimum wage households contain only workers subject to the youth NMW, others only adults subject to the adult NMW. In order to provide a benchmark, control household whose consumption patterns will not have been affected much by the NMW, in the main we compare the consumption

[9] Figure A1 indicates that the derived FES hourly wage data for 1999 does not appear to have a spike at £3.60. Instead the spike appears a little further up the distribution.

[10] The Agricultural Wages Board sets the youth and adult minima for agricultural workers. These rates have tended to be a little above the minima imposed for other employees, (see http://www.defra.gov.uk for more details). Currently the agricultural adult standard rate is around 50p an hour above the national adult rate.

patterns of minimum wage households against households with at least one resident employee. We drop all households with any measured total expenditure zero or less and concentrate our analysis on the population of households with a head below pension age.

There are, typically more people living in a minimum wage households than elsewhere. The average working age household occupancy in 1998/99 was 2.8 individuals, (Table 1). The mean number of occupants in a minimum wage household was 3.1. This makes it important to "equivalise" household income and expenditure patterns to take account of differential household size. Since there is no agreement in the literature regarding the appropriate equivalising weighting, we simply divide household expenditure and incomes by the square root of the number of occupants. This should help control for economies of scale in household consumption, two individuals do not need twice as much as one individual to be equally well off, but takes no account of differential consumption needs by age.[11]

Income in the FES is calculated at the household level, based on an aggregation of all income sources reported by the household. Again these incomes are equivalised by dividing the net household weekly income totals in the data set by the square root of the number of occupants in the household.

To calculate the demand elasticities and price movements for goods produced by minimum wage workers, we first use the earnings and industry affiliation information contained in each wave of the Labour Force Survey (LFS) to obtain a ranking of

[11] The McClements scale attempts to deal with this second issue in a somewhat arbitrary way. Blow, Leicester and Oldfield (2003) show that different equivalising methods affect the level but not the trend in expenditure patterns.

industries by the share of workers paid at or below the minimum in each year. We pool across 4 quarters to give around 50,000 wage observations in each calendar year. Most of these minimum wage industries are consumer services and so belong to the basket of goods used to calibrate the (weighted) index of retail prices produced by the Office of National Statistics (ONS). As such prices indices for eight of these consumer services are readily available. The exception is mini-cab services for which a separate RPI does not exist. We have therefore used the RPI for road travel costs as the nearest proxy.

4. Estimation

The estimation methodology is quite simple. We take the household's (equivalised) expenditure on a given item and divide it by total (equivalised) household spending to give the share of the good in total expenditure, the "budget share", ($s_i = p_i q_i/x$ where p_i is the price of good i, q_i is the quantity bought and x is total expenditure).[12] Given this, we can graph or tabulate the level of, and changes in, average budget shares for different goods for different household groups or estimate a simple regression of the budget share as a function of the log of household expenditure according to (1)

Using this framework, we can therefore examine whether the budget share of any good, or group of goods, fell among minimum wage households as a result of changes in the minimum wage. Blow (2003) applies a similar methodology to compare expenditure patterns across different household types. (For more complex analysis that requires a much longer time series of data than afforded by the period in which the minimum wage has been in existence see for example Banks, Blundell and Lewbel (1997)).

[12] We use the square root of the number of household occupants to equivalise.

We also estimate Engel curves across different household types for different baskets of goods based on equations (1) and (4). The non-parametric estimates of the Engel curves graphed below are based on weighted averages of the budget share around each level of expenditure, with the weights based on Epanechnikov kernel density smoothing. The level of aggregation across goods affects Engel curve estimates. Demand for a narrowly defined good tends to vary erratically across consumers and over time, while Engel curves based on broad aggregates, like food, are affected more by variation in the mix of goods purchased. The aggregate necessity food, for example, could include both inferior goods and luxuries, which may have very different Engel curve shapes.

The strategy outlined above assumes that, at any point in time, all individuals face the same price for a given good. To identify both income and substitution effects of the minimum wage we would ideally combine data on real incomes with data on relative prices. One way to do this, (Deaton and Muelbauer (1980)) is to pool observations over time and estimate a model of the form

$$s_{it} = a_i + b_i * \log(x_t/P_t) + \sum_{j=1}^{J} g_{ij} \log P_{jt} \qquad (5)$$

where there are J (categories of) goods with price levels Pj and P_t is an index of general prices at time t, often measured as a weighted average of the prices of the J goods where the weights are the budget shares, $P_t = \sum_{j=1}^{J} s_{jt} \log P_{jt}$. The J-1 other goods can be thought of as substitutes or complements for the ith good under consideration. The $?_{ij}$ coefficients can then be manipulated to give estimates of the own and cross-price elasticities, η_{ij} . Since the own price elasticity[13] of the budget share, $\frac{\partial s_i}{\partial P_i} * \frac{P_i}{s_i}$ = 1 + η_{ii} it

follows that $\eta_{ii} = -1 + \frac{\partial s_i}{\partial P_i} * \frac{P_i}{s_i} = -1 + \frac{\partial s_i}{\partial Log(P_i)} * \frac{1}{s_i} = -1 + \frac{g_{ii}}{s_i} - b_i$

Similarly for the cross-price elasticities:

$\eta_{ij} = ?_{ij} / w_i - ?_i(w_j/w_i)$

where η_{ij} is the price elasticity for good i with respect to changes in the price of good j

While consistent with the established tenets of consumer demand theory, the practical problem with estimating such a model is that the prices of many goods are collinear, particularly over the small time dimensions allowed by most data sets, (see Lewbel (1997), Honderlein and Lewbel (2006) for some discussion of this issue). Since disaggregate price data that vary across regions or local areas are not readily available, most researchers are obliged to work with national, aggregate monthly price data. The result of this is that many of the time series of the different prices are highly collinear. Moreover, the richer the model the smaller the number of goods – or equivalently the higher the degree of aggregation of goods – that can be practically dealt with by the estimation process. One way of circumventing the problem is to appeal to the notion of separability to define the set of J goods. In this way consumers are thought to allocate expenditures over a broad category of goods and then allocate expenditures within each category. This strategy then either restricts the set of goods analysed in (2) to those in the immediate sub-group or allows aggregation of goods into broad categories.

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[13] This follows from the fact that a) $\frac{d(p_i q_i)}{dp_i} = p_i \frac{dq_i}{dp_i} + q_i \frac{dp_i}{dp_i} = \left[\frac{p_i}{q_i}\frac{dq_i}{dp_i} + \frac{q_i}{q_i}\right] q_i = [h_{ii} + 1] q_i$ and b) if the price of one good rises then expenditures on all goods are rearranged such that total expenditure, X, still equals total income, hence $dX/dp_i = 0$. Then apply the quotient rule to differentiate the budget share elasticity $\frac{d(p_i q_i)/X}{dp_i} * \frac{p_i}{(p_i q_i)/X} = \left(\frac{X[h_{ii}+1]q_i - 0}{X^2}\right) * \frac{X}{q_i} = [h_{ii} + 1]$

Since the minimum wage goods that we examine generally comprise a small fraction of the total household budget and are spread across the set of services it is difficult to appeal to separability to aggregate the goods. Equally, restricting the set of comparator products of the various minimum wage goods we are concerned with does not reduce the problem of multicolinearity notably. We are obliged then to estimate a variant of (5) for each of the minimum wage goods that we identify in the data with the set of alternative prices replaced with a single measure of the retail price index.

5. Results

PART 1

What is a Minimum Wage Household?

Table 2 outlines the distribution of minimum wage workers identified by the FES across households. One in seven working age households contained an adult NMW worker in 1998/99 and one in five of all working households. Youth NMW workers are found in just two (three) percent of working age (working) households. Around 17% of all working age households had at least one worker below the NMW in 1998/99, (23% of working households), and around 14.5% of households contained at least 1 NMW worker just after its introduction, (18% of working households). [14]

Table 1. Minimum Wage Households and Their Occupants

	1998/99			2004/05		
	Adult NMW household	Other working households	Other non-working household	Adult NMW household	Other working households	Other non-working household
Number of occupants	3.1 (1.3)	2.8 (1.3)	2.5 (1.4)	2.9 (1.2)	2.8 (1.3)	2.3 (1.3)
No. adults	2.1 (0.8)	1.9 (0.7)	1.6 (0.6)	2.2 (0.8)	1.9 (0.7)	1.4 (0.6)
No. dep. Children	0.9 (1.1)	0.8 (1.1)	0.9 (1.3)	0.7 (1.0)	0.8 (1.1)	0.8 (1.2)

[14] Any measurement error in the construction of the hourly wage will affect these estimates. The equivalent 1998 and 2004 LFS estimates for adult minimum wage households using the same variables to calculate the hourly wage are 9% and 9% respectively.

% single no dep. children	8.6	10.0	31.1	10.5	9.8	12.1
% single parents	5.4	2.9	29.8	2.9	3.7	29.2
% couple no dep. children	27.7	32.0	20.7	29.6	32.1	17.3
% couple with children	35.2	36.8	13.2	31.1	34.7	31.7
Other	23.1	18.3	5.1	26.0	19.7	9.7

Source: FES. Note: standard errors in brackets

Table 2. Minimum Wage Workers and their Distribution Across Working Age Households

	% adult employees <=NMW	% youth employees <=NMW	% household with at least 1 adult NMW	% household with at least 1 youth NMW	% household with at least 1 NMW worker	% household with 2 NMW workers	% household with > 2 NMW workers
1998/99	15.1	29.3	15.6 (20.7)	2.2 (3.0)	15.8 (20.9)	1.6 (2.1)	0.1 (0.1)
1999/2000	11.8	18.2	12.2 (16.3)	1.5 (2.0)	13.4 (16.4)	1.1 (1.5)	0.1 (0.1)
2004/05	15.5	31.3	16.6 (21.1)	2.5 (3.1)	18.6 (23.6)	1.9 (2.2)	0.2 (0.2)

Source: FES. Note: figures in brackets are percentages among households with at least 1 individual in work.

Most households contain at most only 1 NMW worker, (Table 2). However around 10% of working households relied on minimum wage workers as their main source of wage income, (Table 3). In around 7% of working households NMW workers were the only source of wage income and in around 5% of all working age households NMW workers were the main source of any income.. This implies that the minimum wage is highest income source in around a third of all minimum wage households and the highest wage source in around half of all minimum wage households.

Table 3. Minimum Wage Workers and Sources of Income Across Working Age Households

	% working households where NMW worker is only earner		% working households where NMW worker is highest wage source		% working households where NMW worker is highest income source
1998/99	5.6	(6.9)	8.0	(10.4)	5.2
1999/2000	4.6	(5.7)	6.0	(7.9)	4.0
2004/05	5.6	(6.6)	8.5	(10.0)	6.2

Source: FES. Note figures in brackets are percentages among households with at least 1 individual in work

Minimum wage households are generally poorer than non-minimum wage working households. In 1998/99, the nominal mean (median) weekly equivalised disposable income of a minimum wage household was around £219 (£197) compared to £310 (£261) for a non-minimum wage working household, (Table 4 and Figure 1). So the average disposable income is around 50% lower in adult minimum wage households than in other working households. Disposable income for minimum wage households containing only youth minimum wage workers is somewhat higher, at around £256 (£237) and hence household income for adult minimum wage households correspondingly lower at around £212 (£192). There is also considerable heterogeneity of income within the minimum wage household group as among other working households. The 90/10 expenditure ratios are around 3.8 for both groups, although the 90th percentile income of the adult minimum wage household is only equivalent to the 67th percentile of the income distribution for other working households in 1998/99.

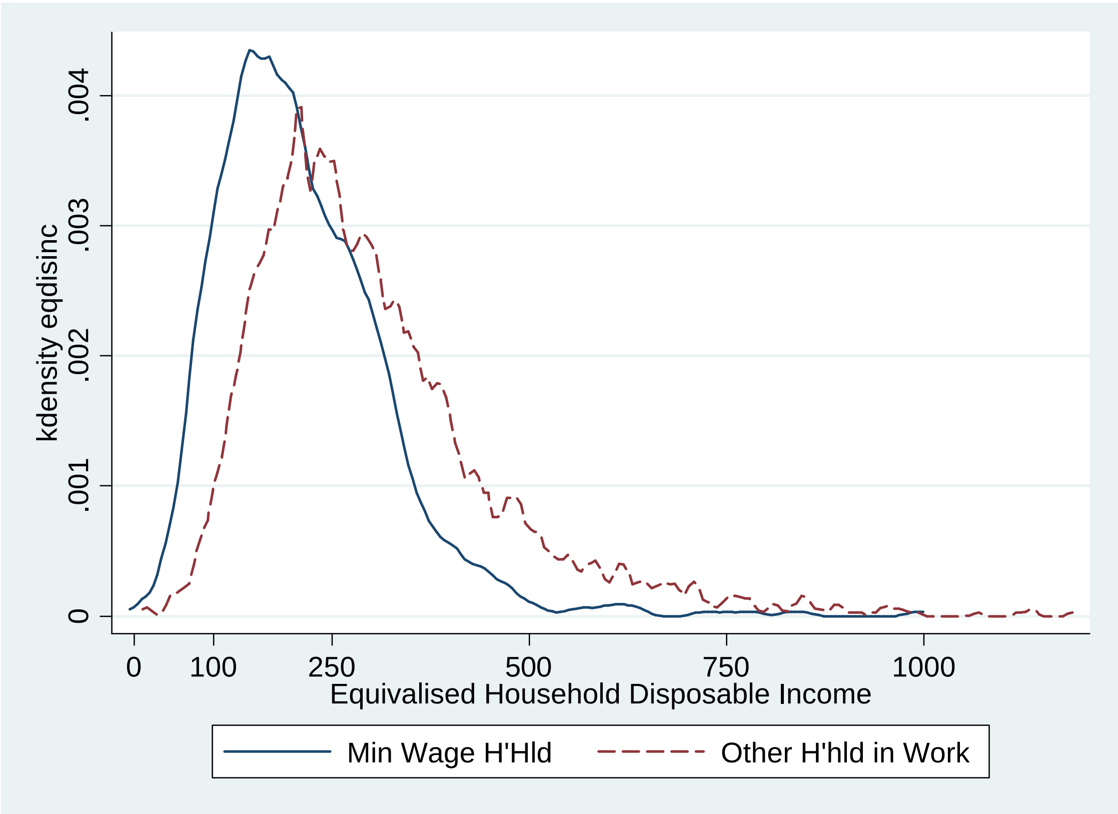
Table 4. Per Capita Equivalised Gross Nominal Weekly Disposable Income Across Households

	Adult NMW households	Other households with at least 1 individual in work	Other working age households
1998/99			
Mean	236	352	139
Median	214	304	112
10th percentile	102	166	67
90th percentile	378	564	233
Standard dev.	136	236	108
Coef var.	0.36	0.42	0.46
1999/2000			
Mean	245	352	168
Median	227	307	121
10th percentile	111	157	64
90th percentile	390	571	301
Standard Dev.	126	248	156
Coef var.	0.32	0.43	0.52
2004/05			
Mean	294	395	159
Median	257	334	137
10th percentile	143	176	73
90th percentile	458	650	255
Standard dev.	251	392	108
Coef var.	0.55	0.60	0.42

Source: FES.

Table A2 outlines the distribution of expenditure per head across household types. The expenditure patterns follow the distribution of incomes closely, though the range of expenditures is smaller than the range of incomes for household all types. The share of total spending accounted for by each household type is broadly in line with the share of each household type in the population. As a result, minimum wage households comprise around 11% of all households and account for around 10% of all expenditures.[15]

Figure 1. Distribution of Equivalised Disposable Income (1998)



Minimum wage households are concentrated outside the capital in the low paying regions of the county (Table A4). In part, this concentration outside the capital helps explains the lower share of ethnic minority individuals among minimum wage households compared to other households.

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15 Non-minimum wage working households consume proportionately more than warranted by their population share; 44% of households and 54% of all expenditure in 1998/99.

Table 5. Minimum Wage Households by Age, Region & Ethnicity

	1998/99			2004/05		
	Adult NMW household	Other working households	Other non-working household	Adult NMW household	Other working households	Other non-working household
Age of head	42 (11.4)	41 (10.7)	44 (14.0)	44.2 (11.2)	42.8 (10.5)	44.4 (13.3)
% London	5.3 (0.8)	10.8 (0.5)	10.5 (1.0)	5.0 (0.8)	10.0 (0.5)	11.8 (1.0)
% North-West	13.3 (1.2)	9.6 (0.5)	12.4 (1.1)	12.2 (1.1)	10.3 (0.6)	11.0 (1.0)
% Yorks.	11.4 (1.1)	7.1 (0.4)	7.3 (0.9)	10.1 (1.1)	8.7 (0.5)	6.5 (0.8)
% non-white head	3.8 (0.7)	4.5 (0.4)	8.7 (0.9)	14.2 (1.2)	13.4 (0.6)	80.6 (1.2)

Source: FES.

The modal household type for a minimum wage worker is the couple with dependent children, (Table 6). Around 35% of minimum wage workers live in this arrangement, as do employees paid above the minimum, though the shares have fallen back somewhat over time. The share of single parents among minimum wage workers has fallen from around 6 to 3% over the sample period and the share of single adults without dependents has risen over the same period to around 11.5%. There are now relatively more (fewer) single parents (single adults) in the population of other employees.

Table 6. Minimum Wage and Other Working Age Households by Family Type

	1998/99			2004/05		
	Adult NMW household	Other working households	Other non-working household	Adult NMW household	Other working households	Other non-working household
% single parents	5.8	5.0	29.5	3.2	6.3	26.7
% single adults no children	9.2	16.0	31.4	11.6	16.0	32.7
% couple no dep. children	28.2	29.6	20.7	30.2	30.1	20.9
% couple with children	35.2	35.1	13.2	31.8	33.4	13.9
Other	21.7	13.8	5.1	23.2	20.4	5.8

Source: FES. Note sample is households with at least 1 working age occupant.

Using net equivalised household income as the benchmark for defining a poverty line then Table 7 shows that around 30 per cent of minimum wage workers live in households with an aggregate income less than sixty per cent of the median household income for all households with at least one employee, (compared with a 10 per cent share among all other working households). Two thirds of minimum wage workers live in households with a total income below the median for all working (employee) households.

Table 7. Minimum Wage Households by Income Thresholds

	1998/99			2004/05		
	Adult NMW household	Other working household	Other non-working household	Adult NMW household	Other working household	Other non-working household
% living in h'hld <60% of median net working h'hold equiv. income	40.4	20.4	82.4	26.4	9.6	52.3
% living in h'hld <median net working h'hold equiv. income	77.6	56.0	95.4	69.6	44.0	78.4

Source: FES.

Since the weekly change to household income from the NMW depends on how many hours each NMW occupant works, then it may be the NMW treatment effect is different across households. The more hours worked the larger the income boost from the NMW and hence the more likely a change in consumption behaviour would be observed. Since the FES is not a panel, it is not possible to track households over time. It is possible however to look at consumption patterns of NMW households working similar hours over time.

What do Minimum Wage Households Consume?

Table 8 outlines the budget shares for nine broad expenditure categories for different household types, (see Data Appendix for a description of the categories).[16] Figure 2 tracks the changes in the budget shares of these items over the sample period for different household types. As shown in many previous studies, around one half of household spending is taken up by the basics of food, clothing, housing and fuel. There are few significant differences in expenditure patterns across household types, although adult NMW households do appear to spend a slightly larger fraction of their income on food, compared to other households with non-NMW workers.[17] Over the sample period, the proportion of disposable income spent on food and fuel appears to have fallen and that on housing risen, trends which are apparent across all household types.[18] The average weekly amounts spent per head on each category are around 50% lower for minimum wage households than among other households with someone in work, with the exception of travel and alcohol and tobacco, where the weekly amounts are broadly similar. Figure A3 also shows that there is considerable variation in expenditure around the average. The 90th percentile in each household type spends between four to five times more per head than the 10th percentile. There is no clear trend in either the 90-10 ratio of expenditure or in the 90-10 absolute difference in expenditure for the minimum wage household group over time.

We can summarise any relative change in minimum wage household budget share or expenditure patterns more formally using the following difference-in-difference analysis estimated over data pooled over successive cross-sections:

$$s_{it}=b_0+b_1MIN_i+b_2TIME_i+b_3MIN_i*TIME_i+u_{it} \qquad (6)$$

$i=1..$ H households $\qquad t=1,..T$ time periods

[16] Table A3 gives the corresponding amounts spent per head.
[17] The standard errors around these shares are in the range of 4 to 12 percentage points
[18] The sample period ends before the recent rise in fuel prices.

where MIN is a dummy variable that takes the value 1 if for NMW households and zero otherwise and TIME is a dummy variable that indicates whether the observation is from the second period. The coefficient b_1 indicates the baseline difference in the budget share of minimum wage households relative to other households in the base year, the coefficient b_2 is the change in the budget shares for non-NMW households between the base and second time periods and b_3 measures any additional change in the budget share specific to NMW households in the second period. We estimate (6) with and without a set of socio-demographic controls that may proxy differences in consumer tastes.[19]

Table 9 summarises these expenditure changes for different commodities and Table 10 gives the relative change in the budget share of minimum wage households relative to other working households. Table 9 indicates that there has been little significant change in the average relative amounts spent by minimum wage households on any of these broad categories, with the possible exception of tobacco, for which minimum wage households appear to have been spending significantly relatively less than other working households in recent years. Consistent with the trends outlined in Figure 2, the estimates in Table 10 suggest that there appears to be some fall in the relative fuel budget share of NMW households over the period over and above that of other working households and a relative rise in the share of expenditure on household services.

[19] The controls are age, gender, ethnicity, marital status, years of education and number of children of the head of household along with a set of 11 regional dummy variables.

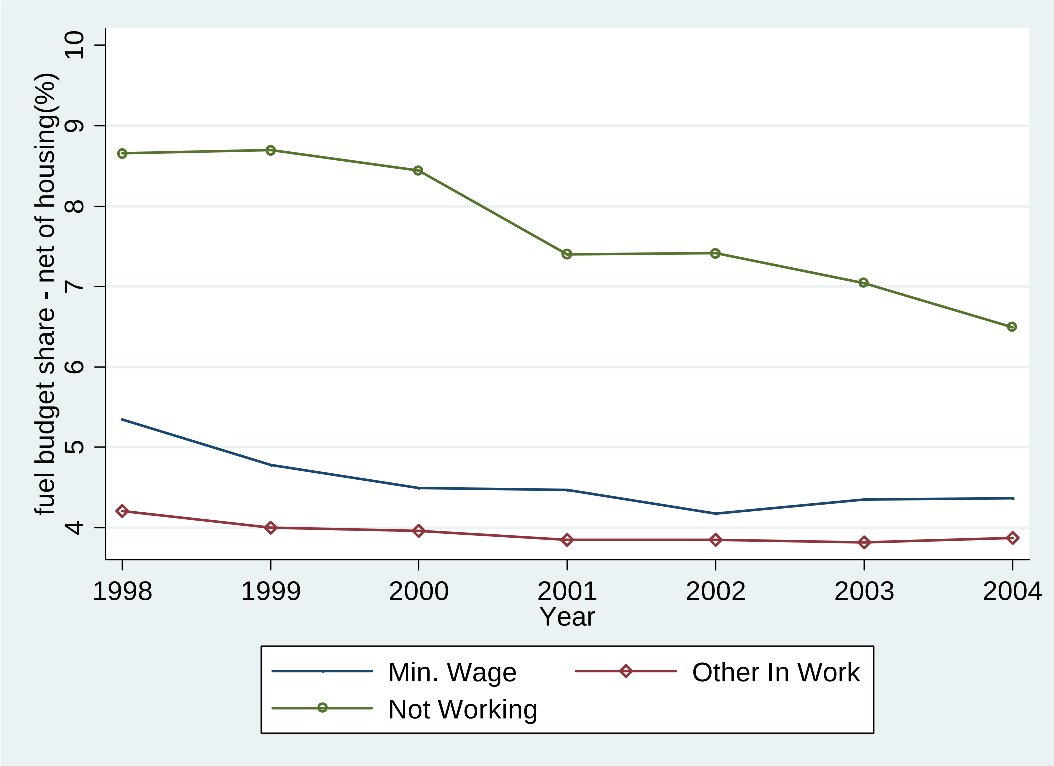
Table 8. Minimum Wage Workers and Household Budget Shares

	Adult NMW households				Other Working households: at least 1 individual works				Non-Working households			
	1998/99	1999/00	2003/04	2004/05	1998/99	1999/00	2003/04	2004/05	1998/99	1999/00	2003/04	2004/05
Housing &	19.6	21.4	20.3	20.6	21.1	22.3	20.1	21.2	18.9	19.9	26.1	26.5
Fuel	(0.4)	(0.5)	(0.4)	(0.4)	(0.2)	(0.2)	(0.2)	(0.2)	(0.4)	(0.4)	(0.5)	(0.5)
Food	20.2	19.2	18.8	17.7	17.3	17.0	16.7	16.3	25.0	23.9	19.9	20.2
	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.1)	(0.1)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)
Alcohol &	7.8	7.3	6.7	5.7	5.5	5.9	5.1	4.8	8.5	9.2	6.8	6.7
Tobacco	(0.3)	(0.3)	(0.3)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.3)	(0.3)	(0.3)	(0.3)
Clothing	6.4	6.2	5.6	6.4	6.1	6.1	5.4	5.2	5.6	5.2	4.7	5.1
	(0.2)	(0.3)	(0.2)	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)
Household	12.2	12.5	13.1	13.4	13.3	13.1	14.2	14.2	14.5	13.9	13.4	13.5
goods	(0.3)	(0.4)	(0.3)	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)
Leisure	14.3	14.2	15.1	16.1	15.5	15.2	17.0	17.0	12.7	13.2	13.9	13.6
goods	(0.3)	(0.5)	(0.4)	(0.5)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)
Travel	16.0	15.4	16.6	16.3	16.9	17.0	17.3	17.2	11.4	10.9	11.7	11.2
	(0.4)	(0.5)	(0.5)	(0.4)	(0.3)	(0.2)	(0.2)	(0.3)	(0.4)	(0.3)	(0.4)	(0.4)
Personal	3.4	3.3	3.3	3.3	3.7	3.6	3.6	3.6	3.6	3.4	3.2	3.2
goods	(0.2)	(0.2)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	(0.2)	(0.2)
Other	0.3	0.3	0.6	0.6	0.4	0.4	0.6	0.5	0.2	0.4	0.5	0.4
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)

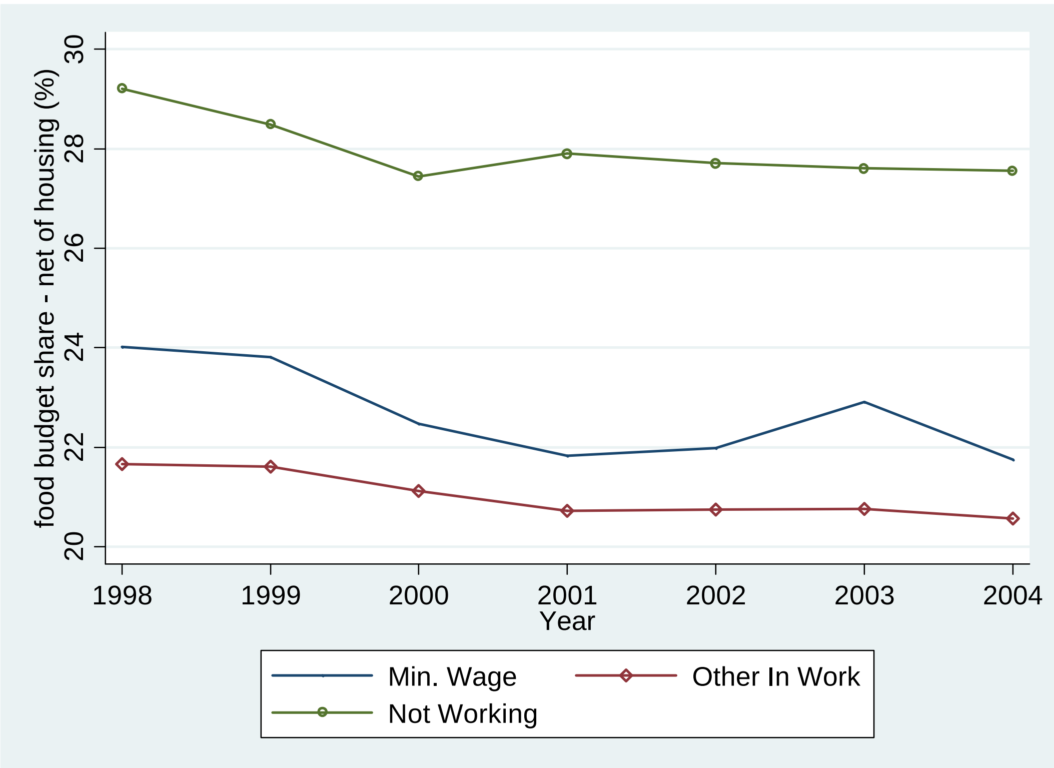
Note: Initial figures are shares of each item in total equivalised household expenditure. Figures in brackets are standard errors. Sample: households with head below pension age.

Figure 2. Changes in Budget Shares (Net of Housing) by Household Type

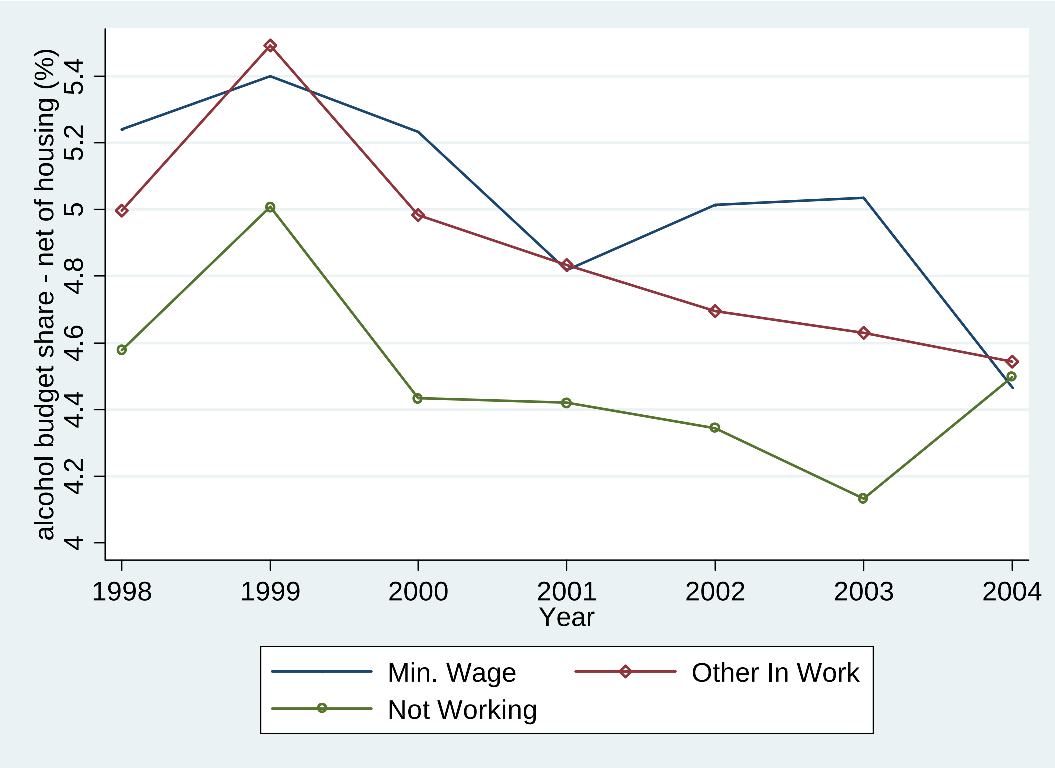
a) Food



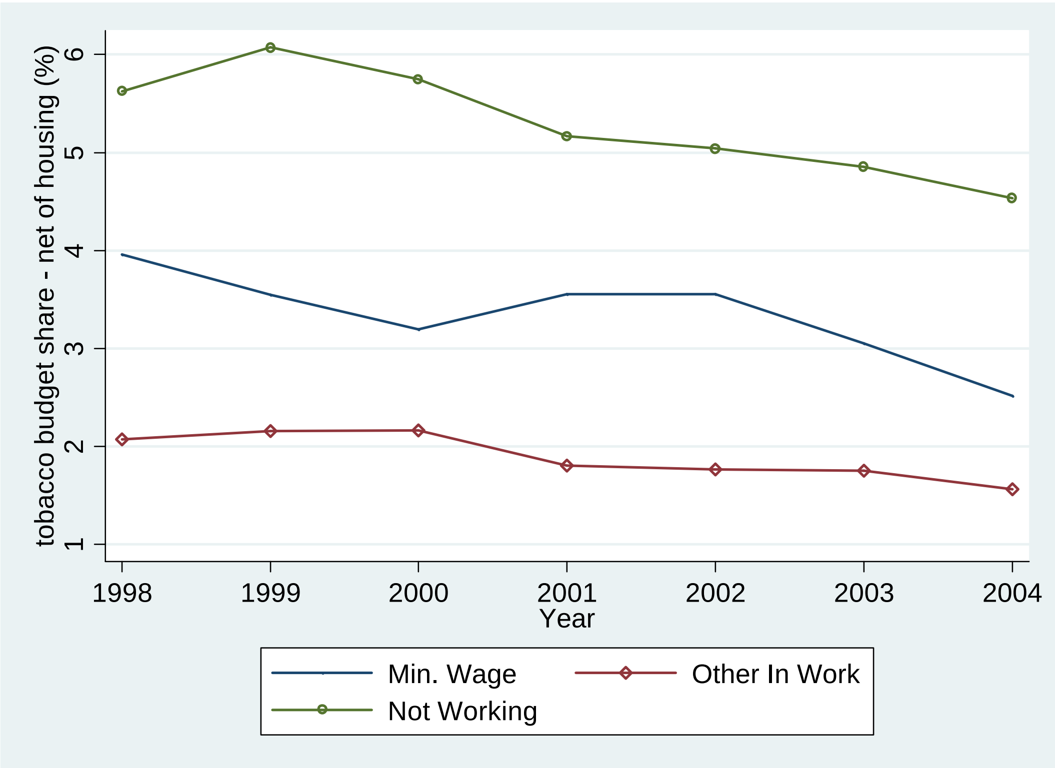
b) Fuel



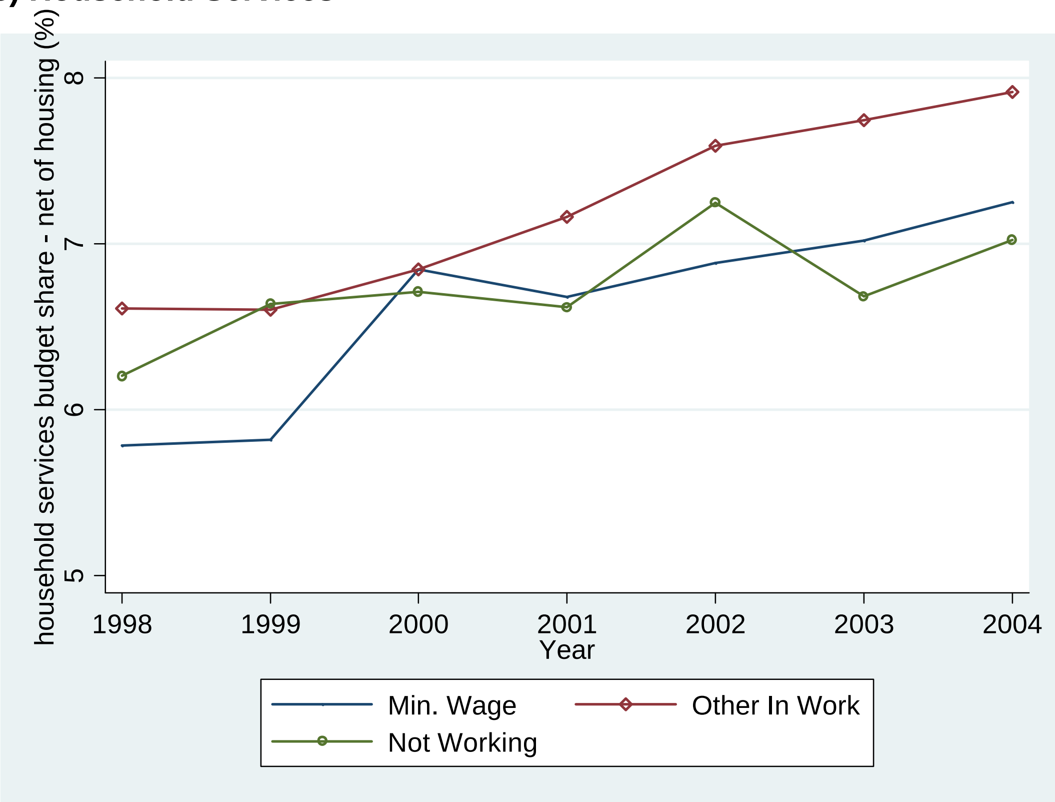
c) Alcohol



d) Tobacco



e) Household Services



f) Leisure Services

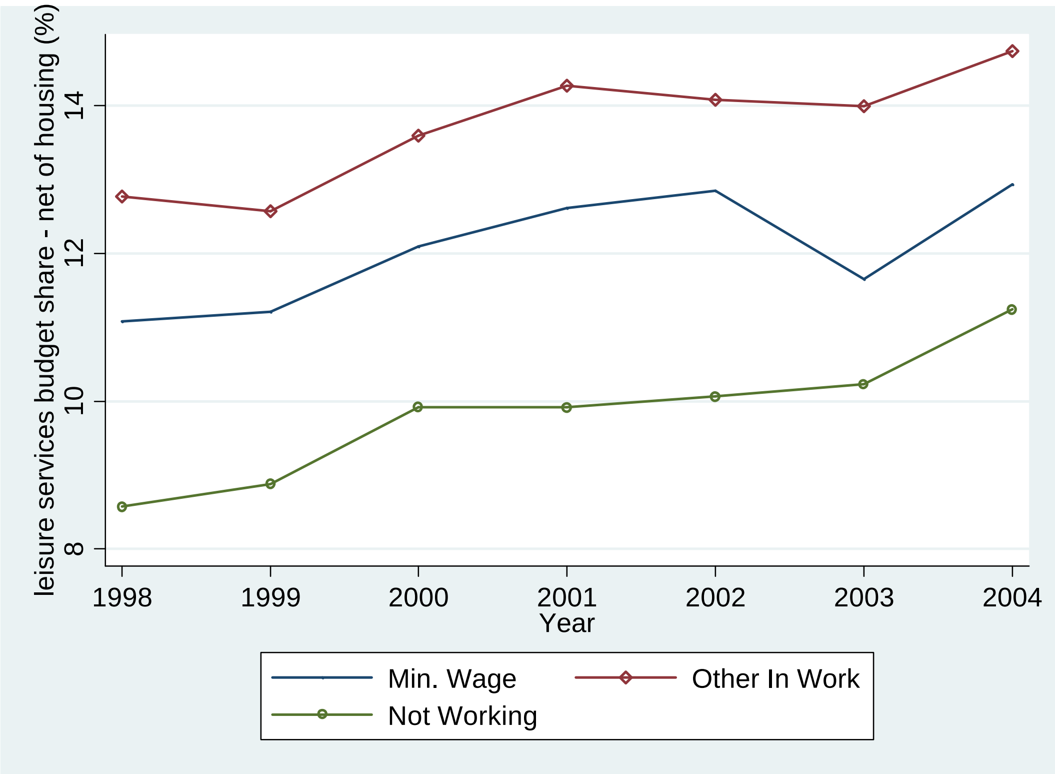


Table 9. Difference-in Difference Estimates of Changes in Real Equivalised Expenditures by Household Type

	Total	Fuel	Food	Alcohol	Tobacc	Clothing	H'hold goods	H'hold services	Person goods & services	Motor	Fares	Leisure goods	Leisure services
No Controls													
1999/00	-2.43	-0.26	-0.91	-1.09	-1.07	1.30	0.91	-0.90	-0.51	-1.35	-0.19	0.29	1.19
	(7.52)	(0.27)	(1.23)	(0.92)	(0.60)	(1.44)	(2.09)	(1.41)	(0.89)	(3.08)	(0.91)	(1.53)	(2.64)
2000/01	7.38	0.03	1.21	0.20	-1.54	0.60	1.16	0.88	0.10	2.77	-0.39	0.18	1.85
	(7.94)	(0.52)	(1.37)	(0.96)	(0.61)*	(1.47)	(2.07)	(1.57)	(0.93)	(3.00)	(0.85)	(1.30)	(2.87)
2001/02	1.44	-0.22	-1.27	-0.84	-0.19	0.91	5.65	-0.97	0.73	-2.59	0.61	-1.14	0.87
	(7.71)	(0.30)	(1.25)	(0.86)	(0.61)	(1.38)	(2.34)*	(1.42)	(0.96)	(2.81)	(1.00)	(1.25)	(2.99)
2002/03	4.30	-0.44	0.30	0.44	-0.88	2.44	0.93	-1.13	1.52	-1.56	2.03	-0.26	0.73
	(7.67)	(0.35)	(1.27)	(0.92)	(0.59)	(1.41)	(2.05)	(1.45)	(0.98)	(3.11)	(0.97)*	(1.31)	(2.65)
2003/04	-13.07	-0.54	-1.25	-0.40	-1.61	0.67	-0.51	-2.49	-1.19	-3.59	1.55	1.06	-5.03
	(7.25)	(0.29)	(1.21)	(0.86)	(0.56)**	(1.42)	(1.92)	(1.43)	(0.87)	(2.89)	(1.01)	(1.57)	(2.41)*
2004/05	5.33	-0.37	-0.38	-0.98	-1.46	3.87	1.29	-1.44	-0.26	0.52	1.16	2.24	0.80
	(7.55)	(0.29)	(1.26)	(0.83)	(0.55)**	(1.39)**	(2.07)	(1.48)	(0.87)	(2.93)	(0.87)	(1.44)	(2.97)
Controls													
1999/00	-6.07	-0.42	-1.77	-1.32	-1.15	0.87	0.44	-0.78	-0.80	-2.39	-0.18	0.17	1.10
	(7.02)	(0.27)	(1.13)	(0.89)	(0.59)	(1.43)	(2.08)	(1.42)	(0.88)	(3.03)	(0.89)	(1.53)	(2.57)
2000/01	4.89	0.04	0.74	0.20	-1.39	0.77	0.79	0.86	-0.01	2.33	-0.43	0.01	0.63
	(7.29)	(0.52)	(1.27)	(0.91)	(0.60)*	(1.45)	(2.07)	(1.58)	(0.92)	(2.91)	(0.83)	(1.29)	(2.77)
2001/02	-6.17	-0.51	-2.34	-1.31	-0.22	0.84	4.81	-0.97	0.47	-4.61	0.54	-1.35	-1.41
	(7.13)	(0.29)	(1.14)*	(0.82)	(0.61)	(1.36)	(2.33)*	(1.42)	(0.96)	(2.74)	(0.99)	(1.24)	(2.92)
2002/03	-4.23	-0.54	-1.00	0.34	-0.72	2.02	0.11	-1.57	1.01	-3.26	1.40	-0.73	-1.47
	(7.11)	(0.35)	(1.18)	(0.87)	(0.59)	(1.38)	(2.04)	(1.47)	(0.97)	(3.03)	(0.96)	(1.30)	(2.61)
2003/04	-22.13	-0.66	-2.18	-0.90	-1.45	0.35	-1.25	-3.11	-1.78	-5.22	0.41	0.57	-7.14
	(6.75)**	(0.28)*	(1.12)	(0.82)	(0.55)**	(1.41)	(1.93)	(1.43)*	(0.86)*	(2.84)	(0.88)	(1.57)	(2.39)**
2004/05	-0.74	-0.55	-1.11	-1.55	-1.49	3.86	0.47	-1.40	-0.66	-1.26	0.94	2.14	-0.43
	(7.07)	(0.28)	(1.17)	(0.80)	(0.54)**	(1.38)**	(2.07)	(1.48)	(0.86)	(2.86)	(0.86)	(1.43)	(2.93)

Source: FES. Note: ** indicates significance at 95% level

Table 10. Difference-in Difference Estimates of NMW Household Budget Share Changes

	Fuel	Food	Alcohol	Tobacco	Clothing	Household goods	Household services	Personal goods	Motoring	Fares	Leisure goods	Leisure services
No Controls												
1999/00	-0.36	-0.15	-0.34	-0.49	0.72	0.78	0.04	0.05	-0.18	-0.31	-0.11	0.33
	(0.22)	(0.59)	(0.37)	(0.34)	(0.50)	(0.58)	(0.34)	(0.29)	(0.86)	(0.30)	(0.42)	(0.70)
2000/01	-0.60	-0.99	0.00	-0.86	0.21	0.58	0.82	0.09	0.59	0.01	-0.15	0.19
	(0.26)*	(0.58)	(0.38)	(0.34)*	(0.50)	(0.57)	(0.40)*	(0.30)	(0.86)	(0.34)	(0.41)	(0.72)
2001/02	-0.51	-1.26	-0.26	-0.14	0.18	1.63	0.34	0.64	-0.42	0.16	-0.38	0.04
	(0.24)*	(0.57)*	(0.35)	(0.35)	(0.46)	(0.61)**	(0.36)	(0.32)*	(0.84)	(0.33)	(0.40)	(0.71)
2002/03	-0.81	-1.12	0.07	-0.10	0.65	0.16	0.12	0.45	-0.57	0.59	-0.11	0.46
	(0.22)**	(0.57)	(0.36)	(0.37)	(0.47)	(0.56)	(0.36)	(0.30)	(0.88)	(0.34)	(0.41)	(0.72)
2003/04	-0.60	-0.20	0.16	-0.59	0.41	0.42	0.10	-0.20	-0.34	0.76	0.59	-0.65
	(0.21)**	(0.55)	(0.34)	(0.33)	(0.46)	(0.56)	(0.36)	(0.27)	(0.82)	(0.35)*	(0.44)	(0.67)
2004/05	-0.64	-1.17	-0.32	-0.93	1.38	0.60	0.16	0.02	-0.05	0.18	0.71	-0.11
	(0.22)**	(0.55)*	(0.33)	(0.31)**	(0.47)**	(0.57)	(0.37)	(0.27)	(0.82)	(0.30)	(0.42)	(0.72)
Controls												
1999/00	-0.38	-0.17	-0.37	-0.48	0.68	0.73	0.18	0.01	-0.33	-0.27	-0.05	0.41
	(0.21)	(0.57)	(0.36)	(0.34)	(0.49)	(0.58)	(0.34)	(0.29)	(0.85)	(0.30)	(0.42)	(0.69)
2000/01	-0.56	-0.99	0.03	-0.77	0.33	0.56	0.89	0.08	0.55	0.03	-0.16	-0.08
	(0.25)*	(0.56)	(0.37)	(0.34)*	(0.50)	(0.58)	(0.40)*	(0.30)	(0.84)	(0.33)	(0.41)	(0.71)
2001/02	-0.52	-1.06	-0.35	-0.09	0.39	1.60	0.54	0.68	-0.73	0.22	-0.29	-0.37
	(0.23)*	(0.55)	(0.34)	(0.34)	(0.45)	(0.61)**	(0.35)	(0.32)*	(0.83)	(0.32)	(0.41)	(0.70)
2002/03	-0.72	-0.99	0.18	0.06	0.74	0.16	0.15	0.40	-0.64	0.42	-0.09	0.14
	(0.22)**	(0.56)	(0.35)	(0.37)	(0.46)	(0.56)	(0.36)	(0.30)	(0.86)	(0.34)	(0.41)	(0.72)
2003/04	-0.52	0.11	0.10	-0.44	0.52	0.47	0.10	-0.27	-0.44	0.48	0.61	-0.88
	(0.20)**	(0.54)	(0.33)	(0.32)	(0.45)	(0.56)	(0.36)	(0.27)	(0.81)	(0.32)	(0.44)	(0.67)
2004/05	-0.64	-0.96	-0.47	-0.90	1.57	0.55	0.30	-0.02	-0.32	0.15	0.82	-0.27
	(0.21)**	(0.54)	(0.32)	(0.30)**	(0.46)**	(0.57)	(0.37)	(0.27)	(0.80)	(0.30)	(0.42)	(0.71)

Source: FES. Note: coefficients give percentage point change in budget share relative to other working households; ** indicates significance at 95% level

Income Elasticities

Table 11 outlines the basic Engel curve estimates for different expenditure categories based on equation (1). We follow the literature in excluding housing costs from expenditure totals henceforward because of concerns over how to compare housing expenditures over different household tenures.[20] If the analysis suggests that the relationship between the commodity and expenditure may be modelled better by a quadratic we report the results based on this specification. The estimated semi-elasticities for food are all negative confirming the findings of many previous studies, namely that the share of the household budget spent on food falls as households become wealthier. Household goods, personal goods and motoring expenditures are all luxury items. Spending on these goods rises with income.

The estimated semi-elasticities for minimum wage households are not significantly different from households with other workers, (compare columns 1 and 4), though they are somewhat lower than for other households without employees. The non-parametric estimates of the food share Engel curves are graphed for three different household types in Figure 3.[21] Consistent with Table 11, the slopes of these curves are similar for the working household types, but steeper for the non-working households.

In contrast, the Engel curves for alcohol consumption are rather different across household types. Among non-minimum wage households the Engel curves in Figure 1b are not monotonic, instead indicating that alcohol expenditure first rises then falls as

[20] See Blow et. al (2005) for a discussion of this issue. Housing costs include mortgage or rental payments along with expenditures on repairs, insurance and rates.

[21] Based on a weighting kernel, with the weight declining with the distance of each observation x_i from the central observation x according to the function $\frac{1}{Nw}\sum_{i=1}^{N} K(\frac{x-x_i}{w})$ within a (log) income band width, w, of 0.5 and a sample size of N. The Epanichekov kernel is $K(z)=\frac{3}{4}\left(1-\frac{1}{5}z^2\right)\Big/\sqrt{5}$

household disposable income increases. Among minimum wage households however, the share of expenditures spent on alcohol appears to rise across most of the range of income suggesting that alcohol is an economic luxury good for minimum wage households. These different patterns are reflected in significantly different estimates of the semi-elasticities outlined in Table 11. The difference in the size of the alcohol budget shares with income within household types, however, is much less than the variation in expenditures by income for food.

For most other commodities the Engel curve estimates are similar across household types.

Table 11. Engel Curve Estimates of Household Expenditure Shares (net of housing costs) by Minimum Wage Status (1998/99)

	Adult NMW households	Other households with at least 1 in work	Other working age households
Food			
1998/99	-9.611	-10.229	-10.312
	(0.593)**	(0.319)**	(0.460)**
1999/2000	-10.480	-10.245	-10.087
	(0.768)**	(0.313)**	(0.490)**
2001/02	-8.990	-9.881	-9.614
	(0.703)**	(0.265)**	(0.453)**
2004/05	-8.707	-9.042	-9.662
	(0.690)**	(0.331)**	(0.557)**
Fuel			
1998/99			
Ln(Expenditure)	-18.541	-23.706	-29.117
	(4.790)**	(3.337)**	(3.690)**
Ln(Expenditure)^2	1.335	1.863	2.318
	(0.441)**	(0.301)**	(0.355)**
1999/2000			
Ln(Expenditure)	-15.609	-17.938	-26.267
	(3.918)**	(2.110)**	(3.771)**
Ln(Expenditure)^2	1.111	1.334	2.043
	(0.356)**	(0.186)**	(0.364)**
2004/05			
Ln(Expenditure)	-26.787	-17.029	-21.939
	(6.990)**	(3.474)**	(3.644)**
Ln(Expenditure)^2	2.136	1.259	1.677
	(0.632)**	(0.310)**	(0.345)**
Alcohol			

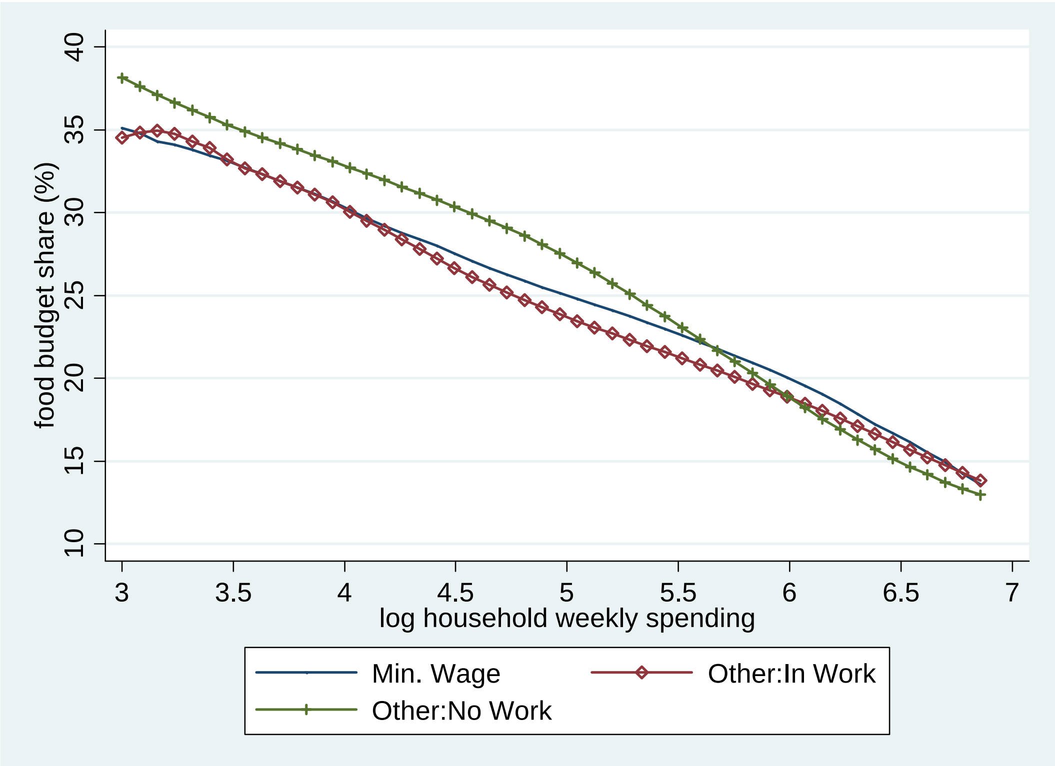
1998/99			
Ln(Expenditure)	6.426	9.501	10.742
	(4.827)	(2.938)**	(3.519)**
Ln(Expenditure)^2	-0.512	-0.899	-1.069
	(0.457)	(0.264)**	(0.349)**
1999/2000			
Ln(Expenditure)	23.090	13.565	11.865
	(4.304)**	(2.967)**	(3.041)**
Ln(Expenditure)^2	-2.114	-1.291	-1.156
	(0.406)**	(0.268)**	(0.303)**
2001/02	0.280	-0.334	0.230
	(0.460)	(0.167)*	(0.282)
2004/05	-0.401	-0.662	-0.310
	(0.479)	(0.249)**	(0.329)
Tobacco			
1998/99	-1.913	-1.777	-2.815
	(0.411)**	(0.171)**	(0.317)**
1999/2000	-1.882	-1.748	-2.434
	(0.503)**	(0.167)**	(0.303)**
2001/02	-1.615	-1.275	-2.320
	(0.488)**	(0.138)**	(0.287)**
2004/05	-1.533	-1.360	-1.999
	(0.366)**	(0.161)**	(0.351)**
Clothing			
1998/99	2.218	1.949	2.591
	(0.528)**	(0.276)**	(0.391)**
1999/2000	2.480	2.256	1.539
	(0.600)**	(0.267)**	(0.321)**
2001/02	1.819	1.165	1.047
	(0.510)**	(0.234)**	(0.339)**
2004/05	1.648	0.986	0.862
	(0.492)**	(0.247)**	(0.336)*
H'hold goods			
1998/99	2.899	2.689	1.877
	(0.630)**	(0.396)**	(0.515)**
1999/2000	3.120	3.179	1.605
	(0.761)**	(0.416)**	(0.478)**
2001/02	3.571	1.914	2.002
	(1.016)**	(0.311)**	(0.540)**
2004/05	1.927	3.216	1.953
	(0.945)*	(0.378)**	(0.529)**
H'hold services			
1998/99	-0.816	-0.995	-0.893
	(0.729)	(0.273)**	(0.353)*
1999/2000	-1.741	-1.635	-0.716
	(0.449)**	(0.225)**	(0.343)*
2001/02	-1.763	-1.328	-0.842
	(0.370)**	(0.231)**	(0.481)
2004/05	-1.865	-1.337	-0.818
	(0.475)**	(0.291)**	(0.448)
Personal goods			
1998/99	0.539	0.419	0.321
	(0.435)	(0.192)*	(0.234)
1999/2000	0.082	0.481	0.434
	(0.383)	(0.161)**	(0.237)
2001/02	-0.495	0.450	0.512

	(0.466)	(0.165)**	(0.200)*
2004/05	0.633	0.646	1.001
	(0.257)*	(0.185)**	(0.262)**
Motoring			
1998/99	5.886	4.209	7.404
	(0.981)**	(0.537)**	(0.736)**
1999/2000	4.171	4.286	7.739
	(1.305)**	(0.520)**	(0.556)**
2001/02	4.799	4.224	7.750
	(0.957)**	(0.493)**	(0.607)**
2004/05	4.845	3.189	6.895
	(0.903)**	(0.509)**	(0.673)**
Fares			
1998/99	-0.519	0.540	0.364
	(0.378)	(0.248)*	(0.367)
1999/2000	-0.012	0.153	0.133
	(0.459)	(0.224)	(0.282)
2001/02	-0.170	0.282	0.180
	(0.474)	(0.211)	(0.232)
2004/05	-0.446	-0.250	-0.223
	(0.470)	(0.209)	(0.272)

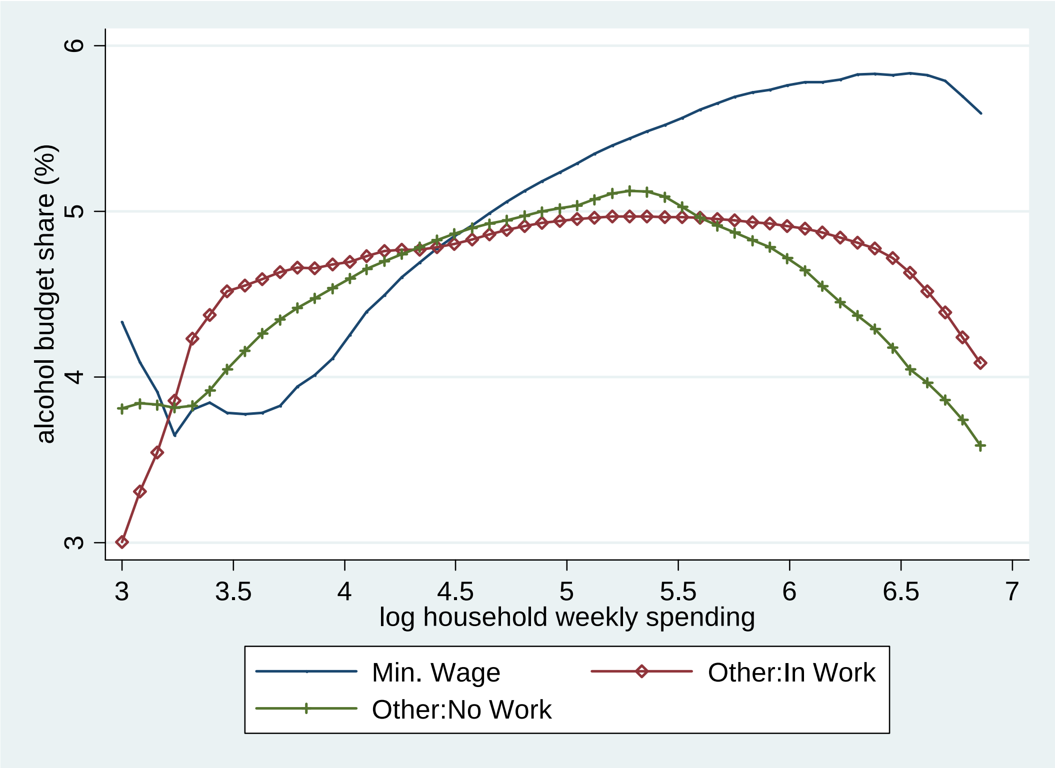
Source: FES

Figure 3. Engel Curves by Commodity by Household Type (1998/99)

a) Food

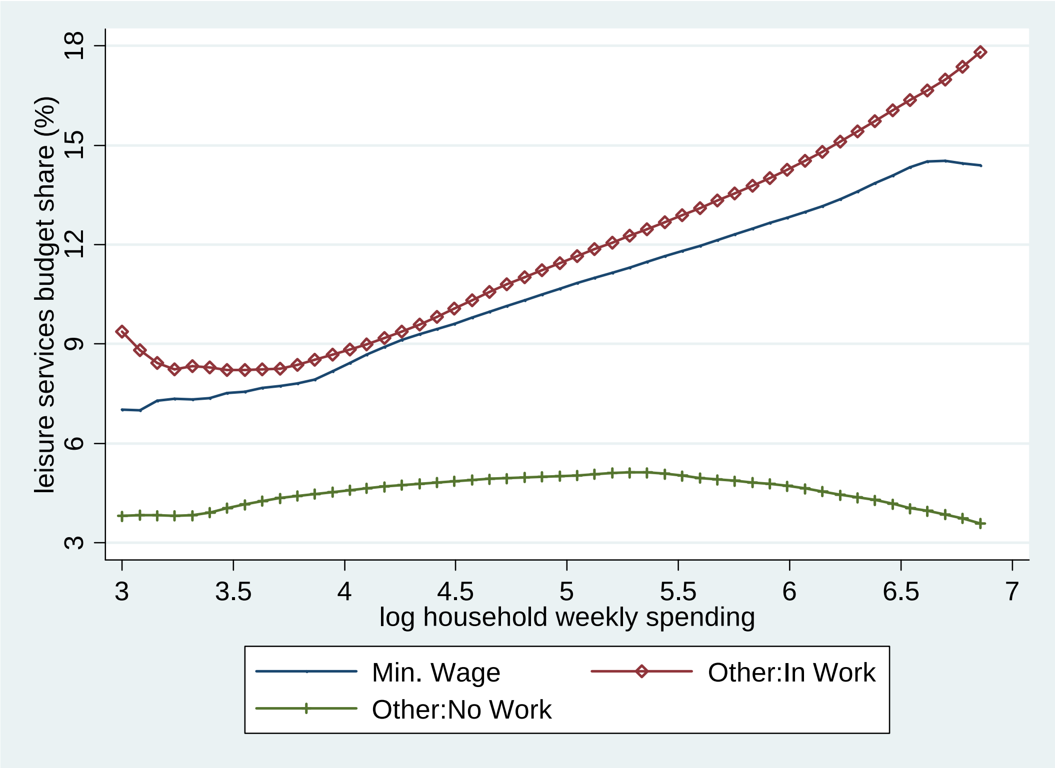


b) Alcohol

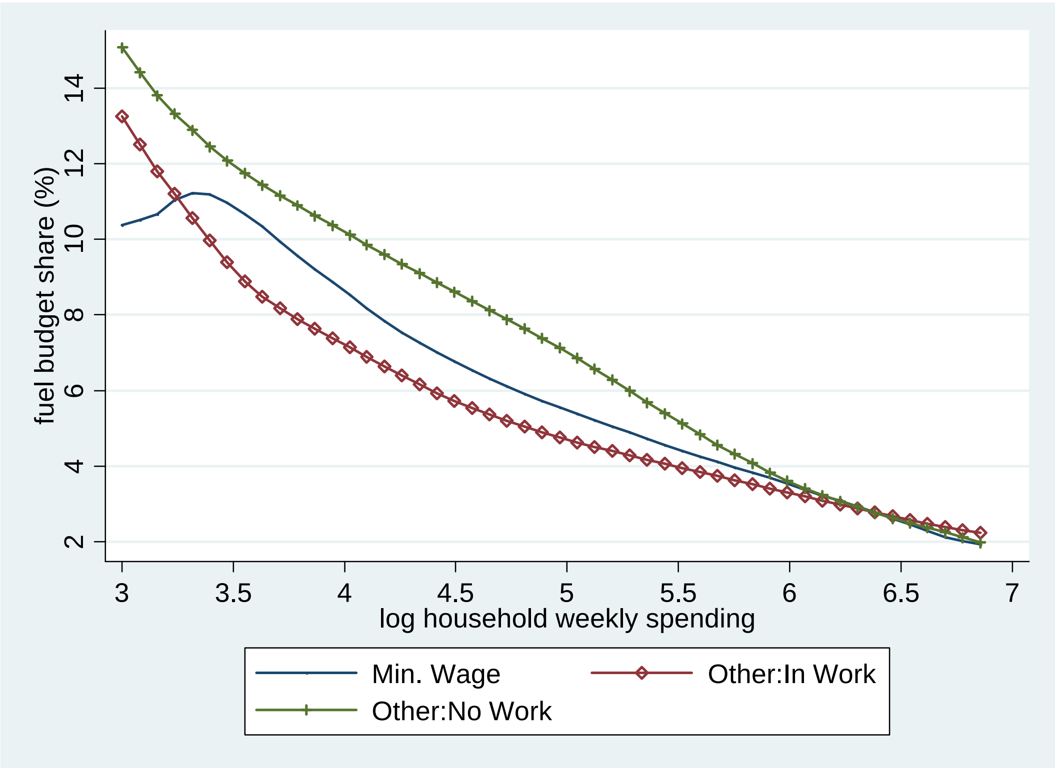


alcohol budget share (%)
6
5
4
3
3
3.5
4
4.5
5
5.5
6
6.5
7
log household weekly spending
Min. Wage
Other:In Work
Other:No Work

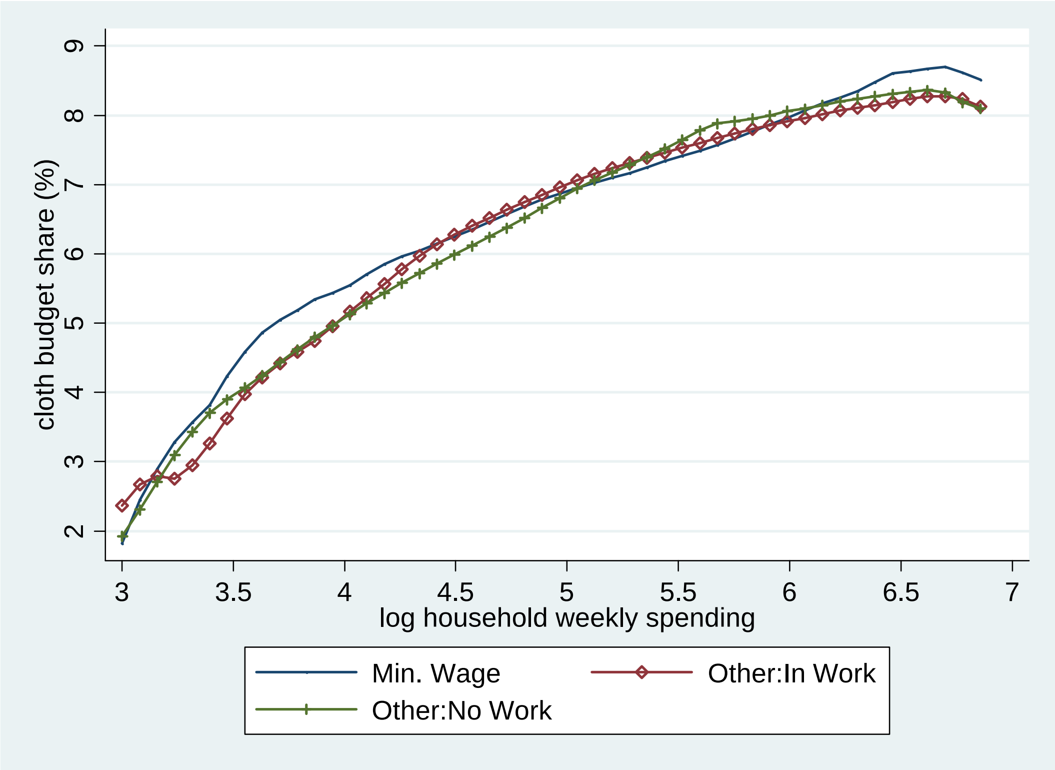
c) Leisure Services



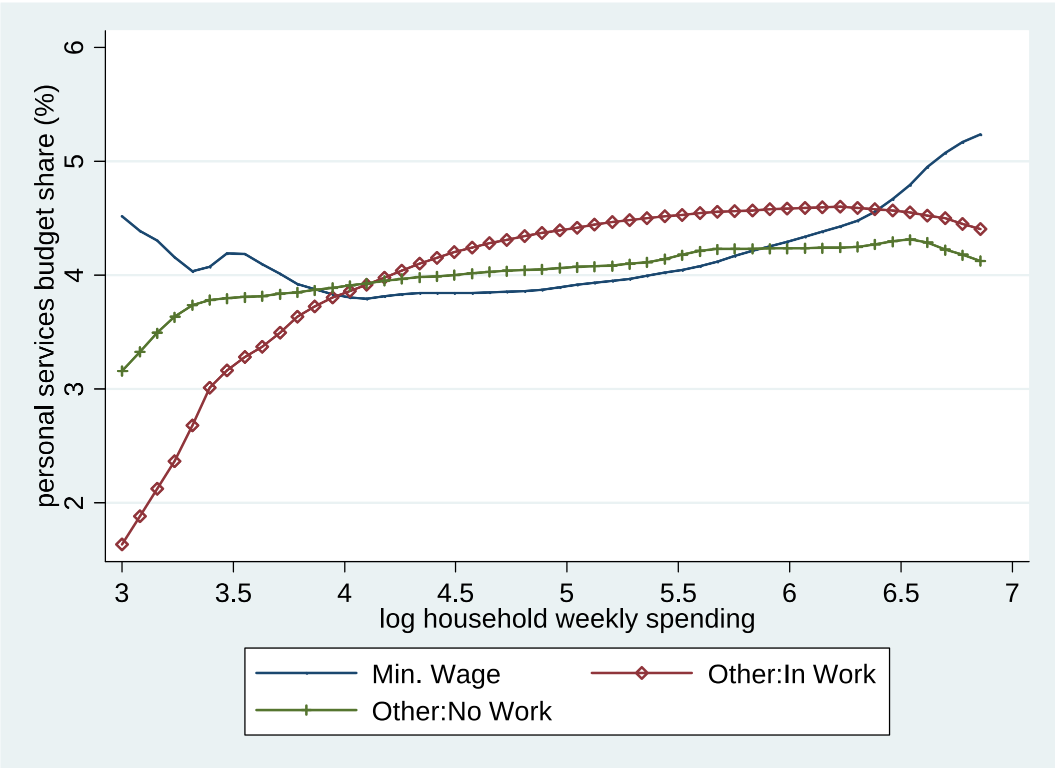
d) Fuel



e) Clothing



f) Personal Services



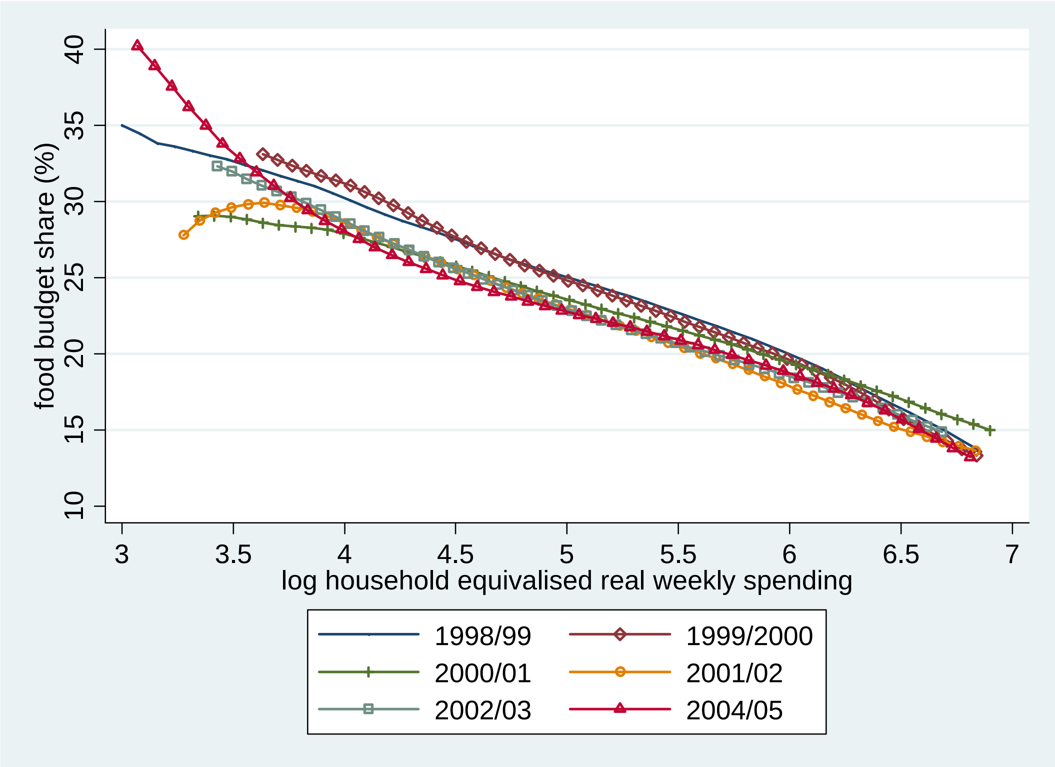
Changes in Engel Curves Over Time

Figure 4 and Table 12 outline the changes in these estimated Engel coefficients over time. If a commodity were becoming more of a luxury item, then we would expect the estimate coefficient to become less negative over time. Some evidence of this can be seen among fuel and alcohol and food, expenditures for all households between 1998 and 1999. However there are no significant differences in the direction or magnitude of these changes between different household types.

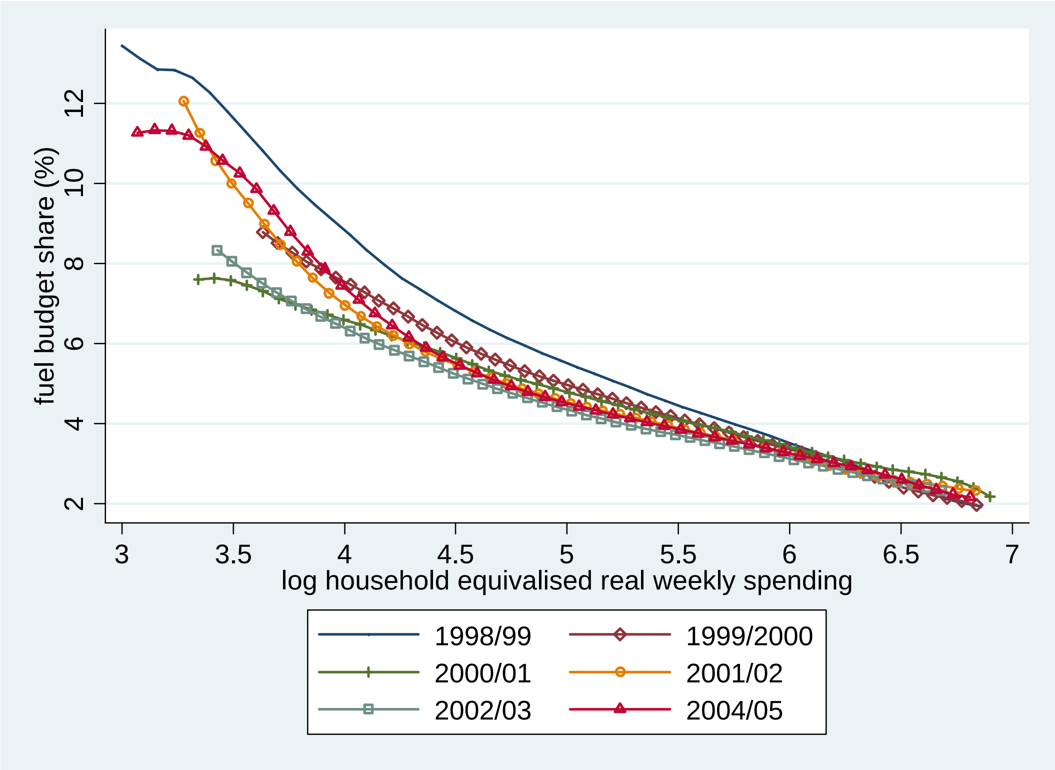
In short, there is little evidence of any major changes in aggregate consumption patterns of minimum wage households relative to others associated with the introduction and subsequent uprating of the minimum wage

Figure 4. Changes in Engel Curves Over Time (Minimum Wage Households)

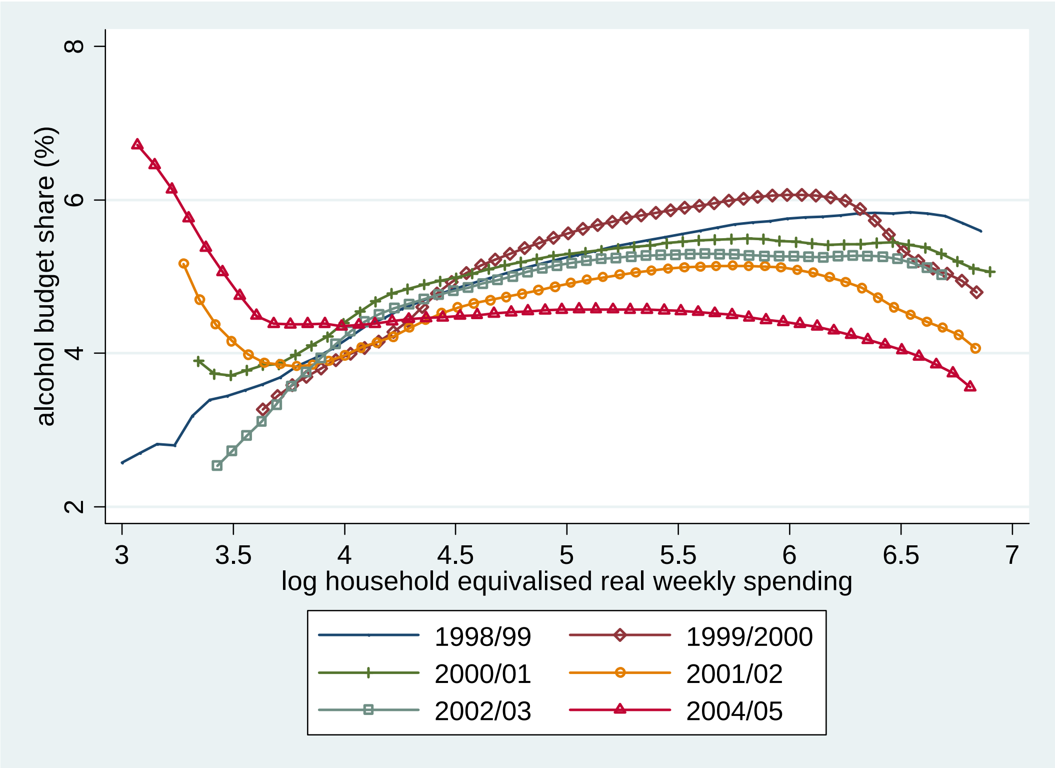
a) Food



b) Fuel



c) Alcohol



d) Household Services

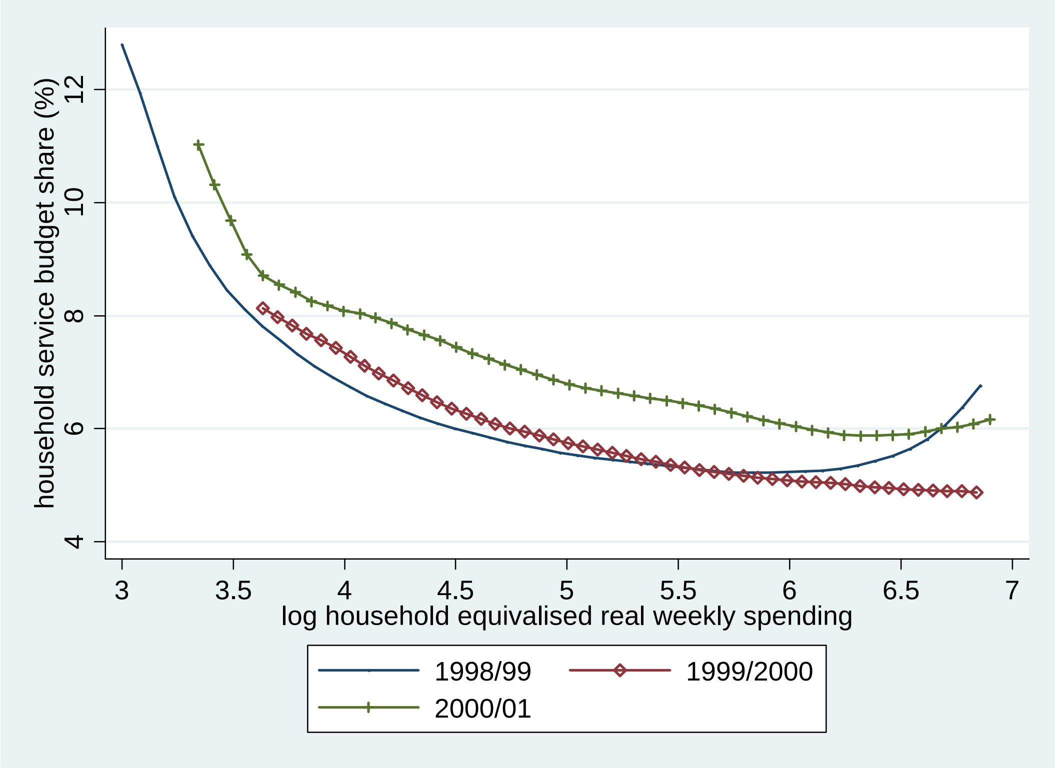


Table 12. Engel Curve Estimates of Household Expenditure Shares (net of housing costs) by Minimum Wage Status Over Time

	Adult NMW households	Other households with at least 1 in work	Other working age households
Food			
1998/99	-9.611	-10.229	-10.312
	(0.593)**	(0.319)**	(0.460)**
1999/2000	-10.480	-10.245	-10.087
	(0.768)**	(0.313)**	(0.490)**
2001/02	-8.990	-9.881	-9.614
	(0.703)**	(0.265)**	(0.453)**
2004/05	-8.707	-9.042	-9.662
	(0.690)**	(0.331)**	(0.557)**
Fuel			
1998/99			
Ln(Expenditure)	-18.541	-23.706	-29.117
	(4.790)**	(3.337)**	(3.690)**
Ln(Expenditure)^2	1.335	1.863	2.318
	(0.441)**	(0.301)**	(0.355)**
1999/2000			
Ln(Expenditure)	-15.609	-17.938	-26.267
	(3.918)**	(2.110)**	(3.771)**
Ln(Expenditure)^2	1.111	1.334	2.043
	(0.356)**	(0.186)**	(0.364)**
2004/05			
Ln(Expenditure)	-26.787	-17.029	-21.939
	(6.990)**	(3.474)**	(3.644)**
Ln(Expenditure)^2	2.136	1.259	1.677
	(0.632)**	(0.310)**	(0.345)**
Alcohol			
1998/99			
Ln(Expenditure)	6.426	9.501	10.742
	(4.827)	(2.938)**	(3.519)**
Ln(Expenditure)^2	-0.512	-0.899	-1.069
	(0.457)	(0.264)**	(0.349)**
1999/2000			
Ln(Expenditure)	23.090	13.565	11.865
	(4.304)**	(2.967)**	(3.041)**
Ln(Expenditure)^2	-2.114	-1.291	-1.156
	(0.406)**	(0.268)**	(0.303)**
2001/02	0.280	-0.334	0.230
	(0.460)	(0.167)*	(0.282)
2004/05	-0.401	-0.662	-0.310
	(0.479)	(0.249)**	(0.329)
Tobacco			
1998/99	-1.913	-1.777	-2.815
	(0.411)**	(0.171)**	(0.317)**
1999/2000	-1.882	-1.748	-2.434
	(0.503)**	(0.167)**	(0.303)**
2001/02	-1.615	-1.275	-2.320
	(0.488)**	(0.138)**	(0.287)**
2004/05	-1.533	-1.360	-1.999
	(0.366)**	(0.161)**	(0.351)**

Clothing			
1998/99	2.218	1.949	2.591
	(0.528)**	(0.276)**	(0.391)**
1999/2000	2.480	2.256	1.539
	(0.600)**	(0.267)**	(0.321)**
2001/02	1.819	1.165	1.047
	(0.510)**	(0.234)**	(0.339)**
2004/05	1.648	0.986	0.862
	(0.492)**	(0.247)**	(0.336)*
H'hold goods			
1998/99	2.899	2.689	1.877
	(0.630)**	(0.396)**	(0.515)**
1999/2000	3.120	3.179	1.605
	(0.761)**	(0.416)**	(0.478)**
2001/02	3.571	1.914	2.002
	(1.016)**	(0.311)**	(0.540)**
2004/05	1.927	3.216	1.953
	(0.945)*	(0.378)**	(0.529)**
H'hold services			
1998/99	-0.816	-0.995	-0.893
	(0.729)	(0.273)**	(0.353)*
1999/2000	-1.741	-1.635	-0.716
	(0.449)**	(0.225)**	(0.343)*
2001/02	-1.763	-1.328	-0.842
	(0.370)**	(0.231)**	(0.481)
2004/05	-1.865	-1.337	-0.818
	(0.475)**	(0.291)**	(0.448)
Personal goods			
1998/99	0.539	0.419	0.321
	(0.435)	(0.192)*	(0.234)
1999/2000	0.082	0.481	0.434
	(0.383)	(0.161)**	(0.237)
2001/02	-0.495	0.450	0.512
	(0.466)	(0.165)**	(0.200)*
2004/05	0.633	0.646	1.001
	(0.257)*	(0.185)**	(0.262)**
Motoring			
1998/99	5.886	4.209	7.404
	(0.981)**	(0.537)**	(0.736)**
1999/2000	4.171	4.286	7.739
	(1.305)**	(0.520)**	(0.556)**
2001/02	4.799	4.224	7.750
	(0.957)**	(0.493)**	(0.607)**
2004/05	4.845	3.189	6.895
	(0.903)**	(0.509)**	(0.673)**
Fares			
1998/99	-0.519	0.540	0.364
	(0.378)	(0.248)*	(0.367)
1999/2000	-0.012	0.153	0.133
	(0.459)	(0.224)	(0.282)
2001/02	-0.170	0.282	0.180
	(0.474)	(0.211)	(0.232)
2004/05	-0.446	-0.250	-0.223
	(0.470)	(0.209)	(0.272)

Leisure goods			
1998/99	0.595	0.927	1.728
	(0.436)	(0.312)**	(0.423)**
1999/2000	1.531	1.053	1.387
	(0.700)*	(0.280)**	(0.264)**
2001/02	0.197	1.235	0.765
	(0.474)	(0.251)**	(0.292)**
2004/05	1.122	1.199	1.334
	(0.520)*	(0.265)**	(0.353)**
Leisure services			
1998/99	3.828	5.488	4.679
	(0.735)**	(0.464)**	(0.625)**
1999/2000	4.934	5.630	4.629
	(1.001)**	(0.470)**	(0.590)**
2001/02	5.774	6.393	4.132
	(1.088)**	(0.450)**	(0.525)**
2004/05	5.989	6.208	3.740
	(0.945)**	(0.533)**	(0.726)**
Other			
1998/99	0.038	0.093	0.109
	(0.070)	(0.056)	(0.043)*
1999/2000	0.193	0.072	0.078
	(0.074)**	(0.052)	(0.066)
2001/02	-0.082	-0.036	0.060
	(0.090)	(0.051)	(0.041)
2004/05	-0.103	-0.019	0.081
	(0.137)	(0.062)	(0.069)

Source: FES. Note; ** indicates significance at 95% level

PART 2

Minimum Wage Goods and Services

We next examine whether there is any evidence to suggest that prices of goods and services produced by minimum wage workers has changed over the period.

Table 13 outlines the top 10 minimum wage rankings based on LFS data. In the year prior to the introduction of the minimum wage, the retail sector employed around 25% of all potential minimum wage workers, those adults age 22 and above paid below the nominal introductory rate of £3.60 an hour. However other service sectors employed proportionately more minimum wage workers as a share of all employees. Take-away food shops and pubs are notable and persistent low paying sectors. It is perhaps here, where minimum wage workers account for upwards of forty per cent of the wage bill that pressures on costs and potentially prices would be expected to be larger. The next eight sectors are all services and only one, industrial cleaning, is not a consumer service. Together these 9 consumer services employed around 15% of all NMW workers. Columns 4 and 8 give estimates of the wage bill, based on a summation of the weekly wage of all minimum wage workers in any industry relative to the total weekly wage bill for that sector. While somewhat noisy, because of the measurement error implicit in the calculation of the hourly minimum wage in the LFS data, the sector ordering does not change much if the share of the minimum wage worker wage bill in the total wage bill for that sector is used to rank industries. Given an average labour share of around 0.7, and assuming no spillover effects, these wage bill estimates indicate that a 10% rise in the minimum wage might be expected to raise prices by around 2-3% in the take-away food sector, other things equal, and by around 1% in the hotel sector.[22]

[22] For take-away foods, 10*0.4*0.7 =2.8

Eight of the ten low paid sectors remained in the top ten in 2004/05, though the shares of all employees paid the minimum had fallen in each of these sectors. The new low paying sectors in 2004/05 are retail and private primary schools. [23] Since it is difficult to obtain price data for the retail sector as a whole or for private primary schools, in the analysis that follows we restrict the sample to the nine low paying consumer services identified in 1998/99.

Table 13. Top Ten Low Paying Sectors

	1998/99				2004/05			
Rank	**Industry**	**% <= adult NMW**	**Wage bill share (%)**	**% of all adult NMW workers**	**Industry**	**% <= adult NMW**	**Wage bill share (%)**	**% of all adult NMW workers**
1	Take Away Food Shops	57.8 (4.4)	41	1.2	Take Away Food Shops	51.8 (5.4)	30	1.3
2	Mini Cabs	54.2 (5.4)	27	0.8	Pubs	33.8 (2.9)	17	2.6
3	Pubs	52.8 (2.4)	30	3.8	Restaurants	25.6 (2.1)	11	3.1
4	Restaurants	41.1 (2.2)	21	3.5	Canteens	25.0 (5.1)	18	0.5
5	Cleaners (firms)	39.7 (2.2)	23	3.2	Hotels	23.7 (2.3)	11	2.3
6	Hairdressing	39.3 (3.7)	23	1.1	Cleaners (firms)	22.3 (2.2)	13	2.2
7	Cleaners (homes)	36.6 (2.5)	23	1.3	Mini Cabs	22.0 (5.8)	20	0.3
8	Canteens	34.1 (4.1)	24	0.8	Primary Schools (private)	19.8 (2.4)	7	1.6
9	Hotels	28.7 (2.2)	15	2.1	Hairdressing	19.8 (2.9)	11	1.0
10	Dry Cleaners	28.0 (3.3)	17	0.5	Retail	18.0 (0.6)	8	24.0

Source: LFS. Sample adult employees aged 22 and over. Standard errors in brackets.

[23] Around 20% of all employees in the retail sector were paid at or below the NMW according to the 1998/99 LFS. The majority of private primary school workers at the NMW are classified as being in "childcare service" occupations, typically nursery school workers. Another notable low paying sector is "religious organisations". For this group accommodation may well be provided in-kind with the job and so we exclude them from the list. The minimum wage recipients in mini-cab services are typically office workers rather than the (self-employed) drivers.

We next outline who buys these goods and services in Table 14 by noting the share of total expenditure of each item consumed by the different household types featured in part 1 of this study. In 1998/99 (potential) minimum wage households comprised just under 12% of all households. It is apparent from Table 14 then that minimum wage households do not account for the majority of total consumption of these minimum wage goods and services. The share of total consumption of some goods is higher than the population share, but never larger than 18%, (for take-away food, canteen meals and alcohol bought in pubs). As such, any NMW price effects will not be exclusive to minimum wage households. For some minimum wage goods ,(domestic cleaners, dry cleaning and laundry and hotels), NMW households spend disproportionately less. So for these goods any price effect on real incomes of minimum wage households will be small. With the exception of restaurant meals, alcohol bought in pubs and take-away food, these minimum wage goods and services generally account for a small fraction of the total consumer budget (net of housing costs). For these goods, any change in total real income from any price change will also be small. Even for goods with a 2 to 4% share of the net of housing household budget, such as alcohol in pubs and restaurants, then a 10% rise in prices in one of these goods, will reduce real incomes by around 0.2%, other things equal.[24]

Figure 6 plots the yearly inflation rate prevailing in each month for each of the minimum wage goods. The vertical lines on each graph correspond to the periods when the NMW was introduced and subsequently uprated. The issue of what type of pattern to expect in the price data is open to debate. If all firms affected by the minimum wage increased their prices by the same amount at the same time, then the inflation rate should jump up

[24] Housing accounts for around 15 to 20% of total household spending over the sample period. If the prices of all the 9 NMW goods and services used in the Table rose by 10% then real incomes would fall by around 1%.

at that point and remain at that rate until the next time prices are adjusted, when it will jump again to the new inflation rate and remain at this new value[25]. If however firms do not adjust their prices at the same time, or make different sized price adjustments, then this pattern of adjustment will be much less discrete. If prices are adjusted before the minimum wage comes in then the inflation rate should jump up in the months leading up to any uprating.

The inflation rate series in Figure 6 display few obvious signs of discrete jumps. When they do, as for example with restaurant meals, the jumps do not appear to occur at the same time as the NMW changes. As a more formal summary of whether the price inflation for these goods was different in the periods after any minimum wage changes, Table 15 reports the results of simple regressions of the inflation rate for each good over a 24 month period on a dummy variable that takes the value one if the minimum wage is "on" (ie introduced or uprated depending on the 24 month period studied) and a constant, which captures the inflation rate in the "minimum wage off" period.

$$\text{Inflation}_t = b_0 + b_1\text{Minimum Wage Off} + u_t$$

The coefficient on the dummy variable then measures the average change in the inflation rate relative to the "minimum wage off" period. The data suggest that during the period from April 1998- April 2000 the inflation rate was higher in the 12 months preceding the minimum wage than in the 12 months after for each minimum wage good, with the exception of road travel.[26] For the period from October 2000 to October 2002,

[25] For example given a random walk $P_t = P_{t-1} + e_t$ then the monthly change in price is just $\Delta P_t = P_t - P_{t-1} = e_t$ So the price level changes only when there is a new shock at time t, e_t, and otherwise remains at the same. Similarly the annual inflation rate $(P_t - P_{t-12})/P_{t-12} = \sum_{j=0}^{11} e_{t-j} / P_{t-12}$ will only adjust whenever there is a new shock (or shocks). This produces a crenellated pattern in the inflation rate series.

[26] As already noted the road travel series is perhaps rather too broad to correspond to mini-cab prices and so any results for this series need to be considered accordingly.

then the inflation rate for three minimum wage goods, alcohol in pubs, restaurant meals and hairdressing, was significantly higher in the 12 months after the 2001 uprating.

Table 14. Expenditure on Top Ten Low Paying Sectors by Minimum Wage Households

	1998				2004			
Rank	Industry	Weekly Amount (% of budget) All households	Weekly Amount (% of budget): Adult NMW households	% of total expenditure Accounted for by NMW households	Industry	Weekly Amount (% of budget) all households	Amount (% of budget): Adult NMW households	% of total expenditure Accounted for by NMW households
1	Take Away Food	2.80 (2.2)	3.50 (2.9)	17.2	Take Away Food	2.90 (2.3)	3.40 (2.9)	16.3
2	Pubs	4.10 (2.7)	5.00 (3.5)	17.7	Pubs	3.60 (2.3)	3.70 (2.7)	14.7
3	Mini Cabs	0.60 (0.4)	0.70 (0.5)	16.0	Mini Cabs	0.60 (0.4)	0.40 (0.4)	12.6
4	Cleaners (homes)	0.80 (0.5)	0.10 (0.05)	2.8	Cleaners (homes)	0.90 (0.5)	0.20 (0.1)	4.5
5	Restaurants	4.70 (2.9)	3.80 (2.6)	12.4	Restaurants	5.50 (3.3)	4.30 (2.8)	11.8
6	Cleaners (firms)	----	----	----	Cleaners (firms)	----	----	----
7	Hairdressing	1.25 (0.8)	0.70 (0.5)	9.2	Hairdressing	1.40 (0.9)	0.90 (0.6)	10.3
8	Canteens	0.70 (0.5)	0.90 (0.7)	17.4	Canteens	0.50 (0.3)	0.70 (0.6)	18.1
9	Dry Cleaners	0.20 (0.1)	0.10 (0.05)	7.0	Dry Cleaners	0.10 (0.1)	0.10 (0.03)	8.1
10	Hotels	1.00 (0.6)	0.50 (0.3)	8.2	Hotels	1.00 (0.7)	0.50 (0.4)	8.5

Source: FES. Note minimum wage households are 11.6% (11.8%) of all households sampled in 1998/99 (2004/05). Expenditure figures are per head in 2004 prices. Budget shares net of housing costs in brackets

Figure 6. Yearly Inflation Rate Movements in Minimum Wage Goods

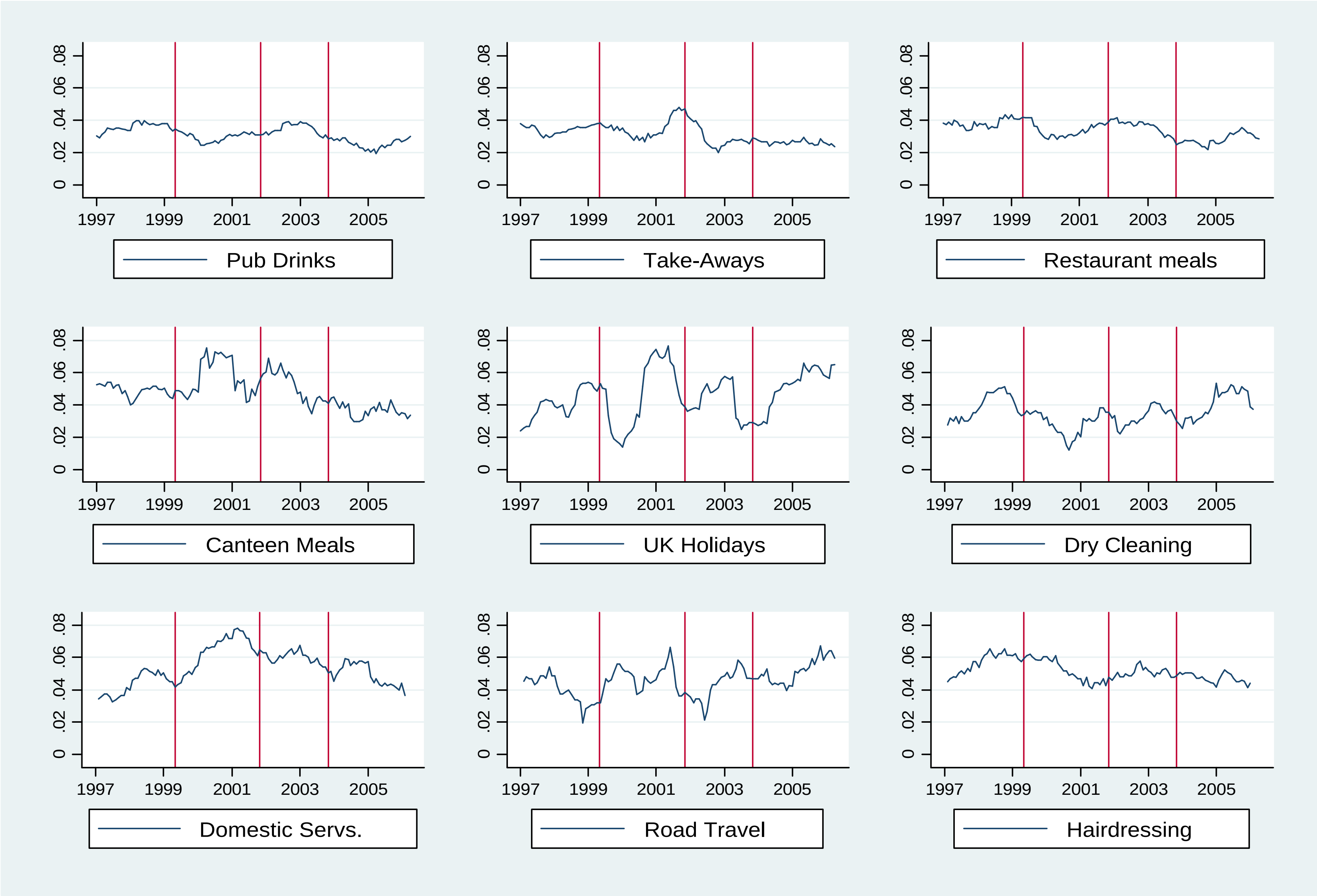


Table 15. Estimated Inflation Rate Changes for Minimum Wage Goods Over Time

	Takeaway	Pubs	Road	Cleaners	Rest'rant	Hairdress	Canteens	Dry Clean/ Laundry	Hotels (UK)
April 1998 – 00									
Min. Wage On	-0.001	-0.008	0.016	0.003	-0.004	-0.002	0.004	-0.013	-0.018
	(0.001)	(0.001)**	(0.003)**	(0.002)	(0.002)*	(0.001)*	(0.003)	(0.002)**	(0.005)**
Min. Wage Off	0.036	0.037	0.032	0.050	0.040	0.062	0.049	0.045	0.046
	(0.001)**	(0.001)**	(0.002)**	(0.002)**	(0.001)**	(0.001)**	(0.002)**	(0.001)**	(0.003)**
Oct. 00-02									
Min, Wage On	-0.006	0.003	-0.013	-0.011	0.004	0.005	0.005	-0.001	-0.021
	(0.003)	(0.001)**	(0.003)**	(0.002)**	(0.001)**	(0.001)**	(0.003)	(0.002)	(0.004)**
Min. Wage Off	0.038	0.031	0.049	0.072	0.035	0.045	0.055	0.030	0.065
	(0.002)**	(0.001)**	(0.002)**	(0.001)**	(0.001)**	(0.001)**	(0.002)**	(0.002)**	(0.003)**

Source: FES.

Since some firms may have increased prices in anticipation of the NMW then it could be that the inflation rate will move in the months before the NMW. Figure 7 therefore reports the values of the F-statistics tests from Chow tests for a break in the series at any point between April 1998 and April 2000. In practice these F values are obtained from a 1st order auto-regression of each series on its own one period lag, a constant, (the model is said to be a "random walk with drift"), and a dummy variable to determine whether the level of the intercept changes at the break point and thereafter. The break point is then moved ahead by 1 month each time and a new Chow test (and F-statistic) obtained. Figure 8 does a similar exercise for the period October 2000 to October 2002. If the F values are large and above a critical value this indicates that the intercept of the estimated regression series changes in this particular month and therefore suggests that a structural break in the series, in this case a significant change in the rate of price inflation for the good, occurs around this point. [27]

Figure 7 suggests that there were significant changes in the intercept for price inflation in seven of the nine minimum wage goods. However only domestic service price inflation appears to change in the period immediately covering the introduction of the NMW. Figure 6 shows that price inflation did indeed start to rise gain around this time. The inflation series for pub drinks breaks some six months before the NMW, though as Figure 6 shows, price inflation for these goods fell rather than increased at this time. The same pattern applies to restaurant meals and canteen meals.

For the second period, 2000-2002, Figure 8 indicates that the rate of price inflation of takeaway foods changed significantly around the time of the October 2001 uprating,

[27] In practice these F values do not indicate whether the constant moved up or down, only that it was a significant change or not. The largest of these F-statistics is called the QLR statistic which has its own set of critical values.

though again inspection of Figure 6 indicates that the inflation rate came down after this date after rising in the four months prior to the uprating.

In summary then it is difficult to find much evidence of significant price changes in the periods that correspond immediately to the introduction and uprating of the NMW. However this does not necessarily mean that prices did not change as a result, only that there is little evidence of a single coordinated price hike. We therefore now examine whether the relative prices of minimum wage goods changed over a longer period.

Figure 9 tracks the yearly change in the retail price index (the inflation rate) of each of the minimum wage goods identified relative to the change in the overall retail price index for each month beginning in 1996. A positive value in the y axis of each graph indicates that prices in this sector grew more than the growth in the overall retail price index, a negative value indicates that prices in this sector grew by less than the overall retail price index. The units of measurement are percentage point differences. The vertical lines on each graph again represent the months in which the NMW was introduced and subsequent notable upratings. The relative price series for each minimum wage good is generally greater than zero. This indicates that the inflation rate for these minimum wage goods was generally higher than retail price inflation as a whole over the full sample period. This is perhaps not too surprising given the labour-intensive nature of many of these services. The overall RPI does not rise at the time of the NMW changes, indicating that overall the NMW had little impact on prices. Indeed as the bottom right hand side panel of Figure 9 shows, average retail price inflation seems to fall at the periods when the NMW was adjusted. This explains why some of these relative price series display peaks around the time of NMW changes. As Figure A4 in the appendix shows if the retail price index excluding housing is used as a benchmark, no such peaks are observed in the relative price inflation data.

In order to measure the overall rate of inflation of minimum wage goods relative to other goods, we estimate a simple difference-in-difference regression model pooled over the monthly observations on the annual inflation rate of both minimum wage and non-minimum wage goods over the period January 1997 to December 2005:

$$Inflation_t = b_0 + b_1 MinWageGood + b_2 April99 + b_3 MinWageGood * April99 + u_t$$

where "MinWageGood" is a dummy variable to indicate whether the good in question is a minimum wage good (1 = yes, 0 = No); "April99" is a dummy variable to indicate whether the inflation observation is before or after April 99, (1 = yes, 0 = No) and the third term is the interaction of the two dummy variables. The estimated coefficient on the constant, b_0, gives the average inflation rate for non-minimum wage goods over the period before the minimum wage was introduced; the estimated coefficient on the "MinWageGood" dummy, b_1, gives the difference between the average inflation rate for non-minimum wage goods and that for minimum wage goods over the period before the minimum wage was introduced; the estimated coefficient on the "the estimated coefficient on the "MinWageGood" dummy, b_1, gives the difference between the average inflation rate for non-minimum wage goods and that for minimum wage goods over the period before the minimum wage was introduced; April 99" dummy, b_2, gives the change in the average inflation rate for non-minimum wage goods after the minimum wage was introduced and the coefficient on the interaction term, b_3, is the change in the inflation rate for minimum wage goods relative to the RPI in the period after the minimum wage was introduced – the difference-in-difference estimator.

Since the choice of appropriate counterfactual is not obvious – aggregate prices are influenced by import prices which are not subject to the same labour-input cost pressures for example – we compare inflation rates against the all items inflation rate, the inflation rate excluding housing and the inflation rate for a basket of goods with a high domestic share of production but which do not employ as large a fraction of minimum wage workers as the other goods set out in Table 14.[28]

Table 16 confirms the impression given by Figure 9 that price inflation of minimum wage goods was significantly higher in the period leading up to the introduction of the NMW. On average, the inflation rate for minimum wage goods was around 1 percentage point higher than the general retail price inflation over the period, (row 2 column 1); some two points higher than retail price inflation excluding housing, (row 6 column 1) and some one point higher than a basket of non-minimum wage goods , (row 10, column 1). This average conceals significant differences in the inflation rates for the individual minimum wage goods. Price inflation for canteen meals and hairdressing was between one and two points higher than that of take away food or pub drinks before April 1999.

The difference-in-difference estimates suggest that in the period after the minimum wage was introduced, retail price inflation of these minimum wage goods as a whole was an *additional* 0.8 points higher, (row 4 column 1). So not only were prices of minimum wage goods rising faster in the period before the minimum wage, they rose by an even greater rate relative to other goods in the period after. When benchmarked against retail prices excluding housing, the central estimate of the relative increase is around 0.7 points, (row 8 column 1) and when benchmarked against the basket of other goods the relative increase is around 1.1 points, (row 12 column 1). Again these average estimates disguise sharp differences in the movements of the individual price series. The prices of domestic services rose most sharply in the period after April 1999,

[28] These goods are: soft drinks, alcohol off sales, sweets, tobacco, books, furniture, gardening products. These are not free of minimum wage influences since many of them will be sold in shops whose staff are covered by NMW. A graph of their respective inflation rates is given in Figure A5.

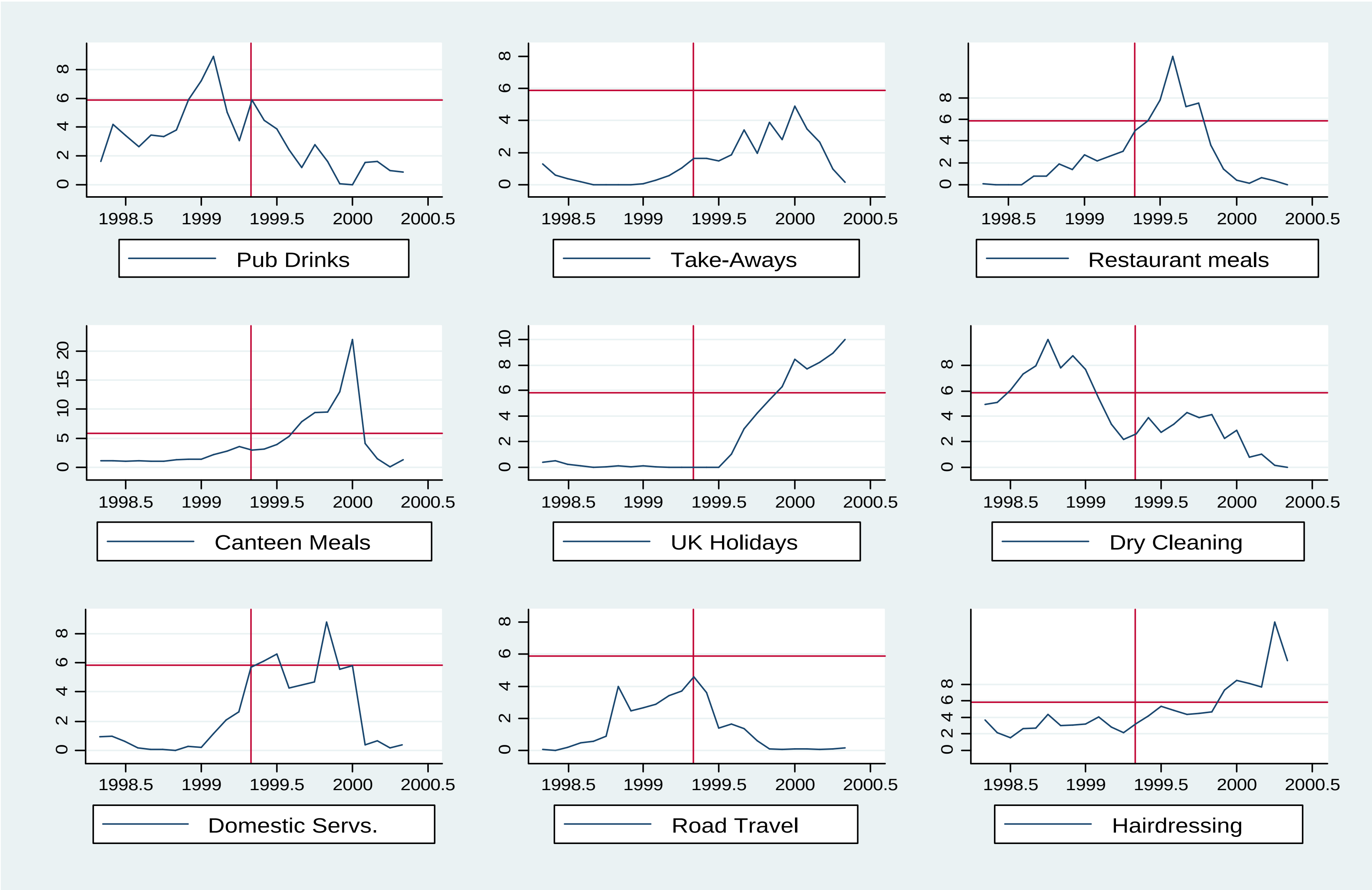
by more than 2 percentage points over and above the benchmark inflation rate.[29] In contrast the relative price of pub drinks changed little in the period after April 1999.[30]

In summary then it seems that there is evidence to suggest that the prices of domestic services, hotel services, canteen meals and take-away food all rose by a significantly greater rate – in the order of 0.5 to two percentage points - than the prices of other goods in the period after the minimum wage was introduced.

[29] The difference-in-difference estimates are the relative inflation rate differences. To obtain the actual inflation rates for the goods in period 2 then add all four coefficients for the minimum wage goods and add the coefficient on the constant and the April 1999 dummy for the other goods.

[30] In other words prices of pub drinks continued to rise faster than the prices of other goods, (row 2 column 2), but this price differential did not accelerate in the period after April 1999.

Figure 7. F-Tests for a Break in the Inflation rate – Minimum Wage Goods (1998-2000)



Note: Graphs report F-test for structural break in the intercept in a simple autoregression of each good in each month. Horizontal line is 95% significant value for 2 restrictions

Figure 8. F-Tests for a Break in the Inflation rate – Minimum Wage Goods (2000-2002)

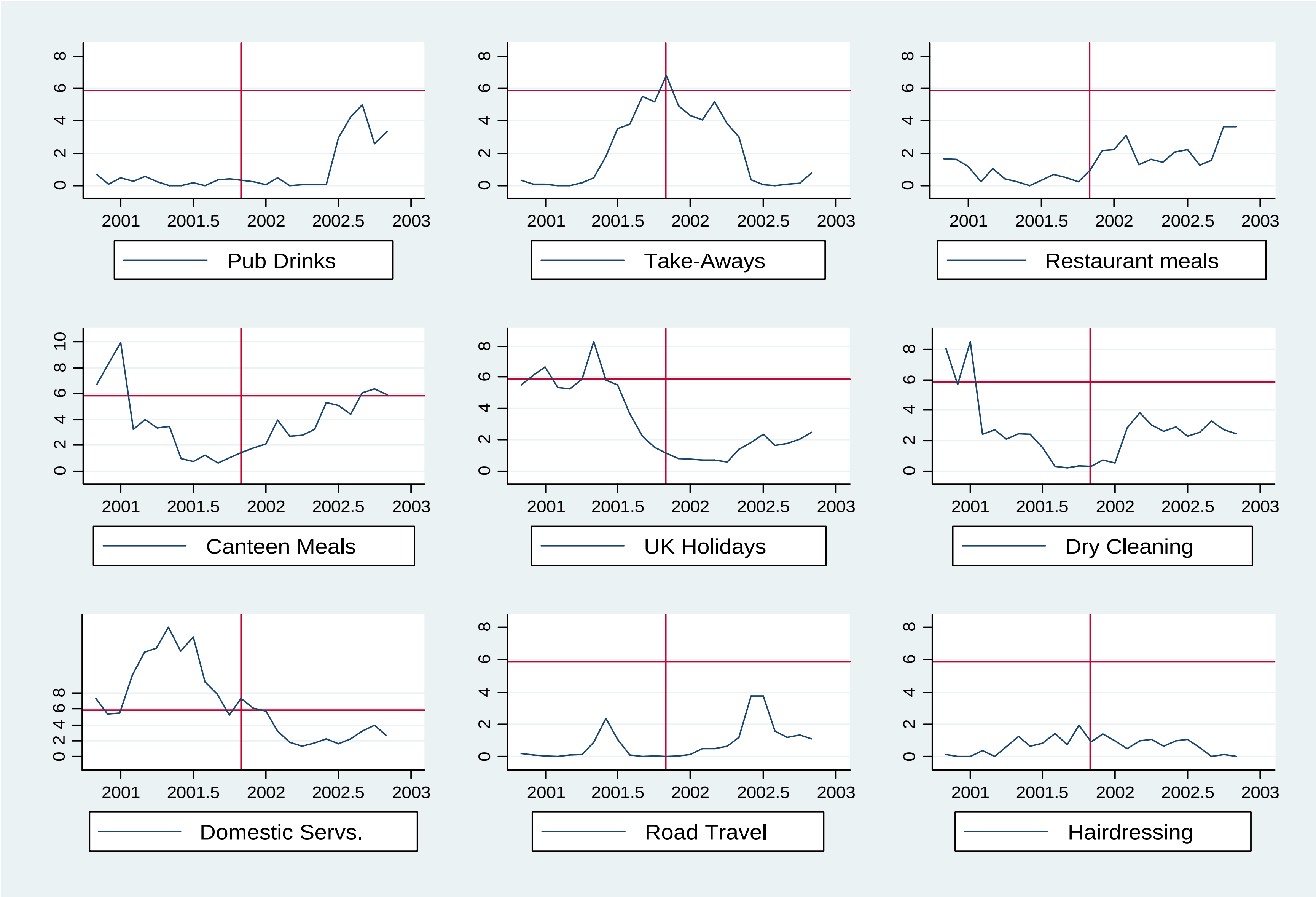


Figure 9. Price Changes of Minimum Wage Goods Relative to Retail Price Index, 1996-2006

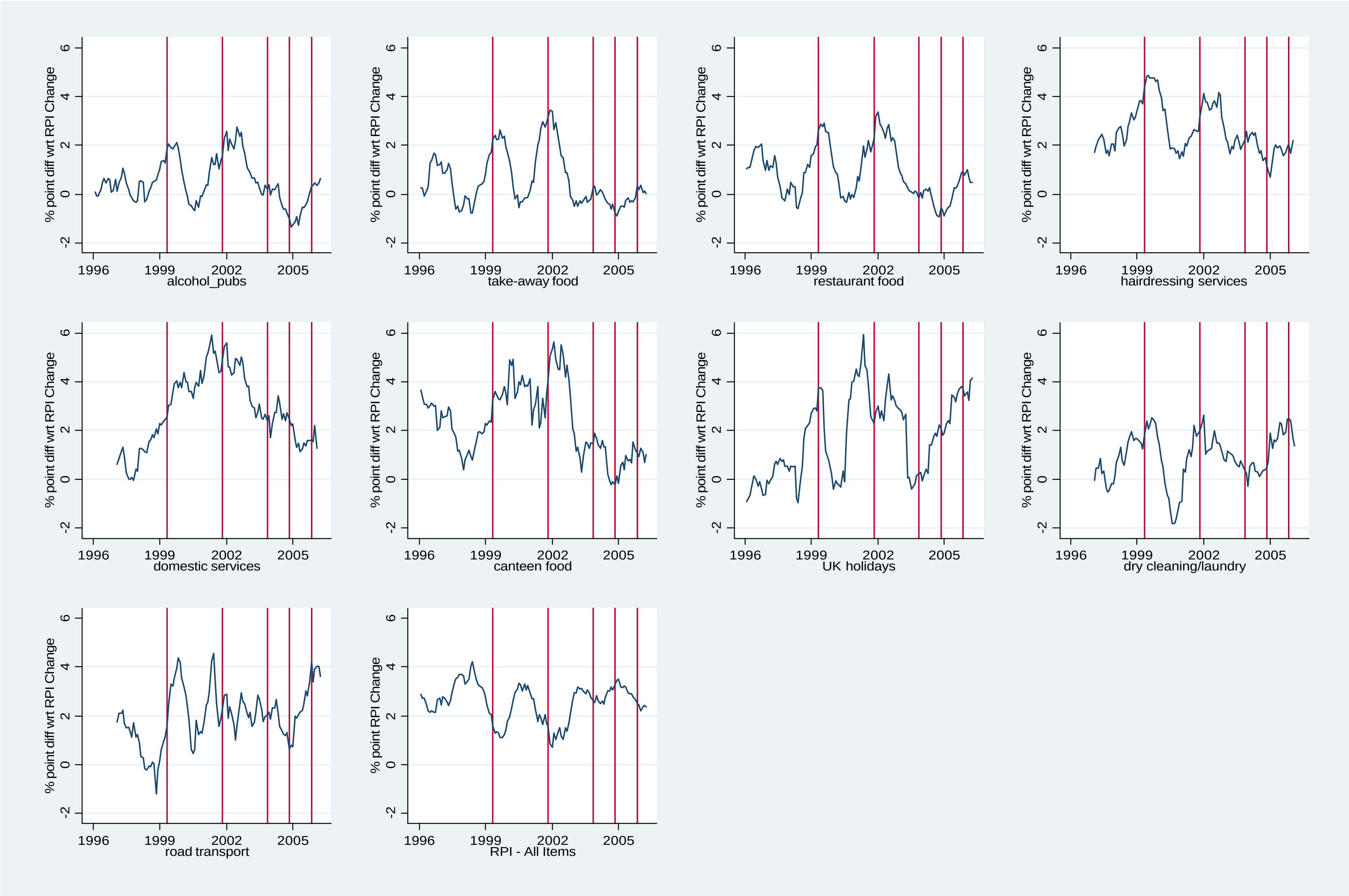


Table 16. Difference-in Difference Estimates of Relative Price Responsiveness of Minimum Wage Goods

	All NMW Goods	Pub Drinks	Take-Away food	Restaurant Meals	Canteen Meals	Hotels (UK)	Dry Cleaning	Home Cleaners	Road travel	Hairdressing Services
1997-2005										
Relative to RPI										
Constant	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**
Min. Wage	0.010	0.004	0.003	0.007	0.017	0.009	0.008	0.012	0.008	0.025
	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.003)**	(0.003)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**
April 99+	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**
Min. Wage* April 99+	0.008	0.002	0.004	0.002	0.007	0.014	0.002	0.022	0.015	0.001
	(0.003)**	(0.002)	(0.002)**	(0.002)	(0.003)**	(0.004)**	(0.002)	(0.003)**	(0.003)**	(0.002)
Relative to RPI ex. Housing										
Constant	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
	(0.003)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Min. Wage	0.020	0.014	0.012	0.016	0.027	0.019	0.017	0.021	0.018	0.035
	(0.002)**	(0.002)**	(0.001)**	(0.001)**	(0.002)**	(0.003)**	(0.002)**	(0.002)**	(0.002)**	(0.001)**
April 99+	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
	(0.003)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Min. Wage* April 99+	0.007	0.001	0.003	0.001	0.006	0.013	0.002	0.021	0.015	0.001
	(0.003)**	(0.001)	(0.001)**	(0.001)	(0.003)**	(0.003)**	(0.002)	(0.002)**	(0.002)**	(0.001)
Relative to non-min wage goods										
Constant	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031
	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**
Min. Wage	0.011	0.005	0.003	0.007	0.018	0.010	0.008	0.012	0.009	0.026
	(0.002)**	(0.005)	(0.005)	(0.005)	(0.005)**	(0.005)**	(0.005)	(0.005)	(0.005)**	(0.005)**
April 99+	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011
	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**	(0.002)**
Min. Wage* April 99+	0.011	0.005	0.008	0.006	0.011	0.017	0.006	0.026	0.019	0.005
	(0.002)**	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)**	(0.006)	(0.006)**	(0.006)**	(0.006)

This ability to affect price changes suggests that the demand for these services may be more price inelastic than for other services. Since consumption will also respond to changes in real incomes we begin with an investigation of the income elasticities for these NMW goods. The more responsive consumption is to changes in incomes the more likely consumption patterns will shift if the minimum wage boosts net household income. We do this both for NMW households and for all households. Figure 10 graphs the related Engel curves and Table 16 gives details of the Engel curve estimation for each good. The Figures and Tables indicate that for some goods, notably take-away food, pub drinks and restaurants, the budget share responses to the level of income (expenditure) are quite similar for NMW households and other households. For other minimum wage goods, notably domestic cleaners, hotels and dry cleaners, the Engel curves for minimum wage households are rather different to those estimated for all households. However this is partly because, as the graphs show, minimum wage households spend so little on these goods and services that it is difficult to obtain precise estimates of the associated income elasticities, as shown by the larger standard errors for the Engel curve estimates for minimum wage households.

Although the Engel curves in Figure 5 indicate that the income elasticity is not constant across the range of expenditures, Table 18 summarises the central estimate of the elasticities of the goods in question evaluated at the mean level of expenditure in the data. Most of the estimated income elasticities are close to one, suggesting that average consumption for these minimum wage goods responds proportionately to any change in income. Over time the income elasticities for restaurants expenditures and take-away food have become smaller, suggesting that the pattern of consumption of these items is becoming more like that of an economic necessity. As incomes rise we would expect households to spend a smaller share of their incomes on these minimum wage goods.

Figure 10. Engel Curves for Minimum Wage Goods and Services (1998/99)

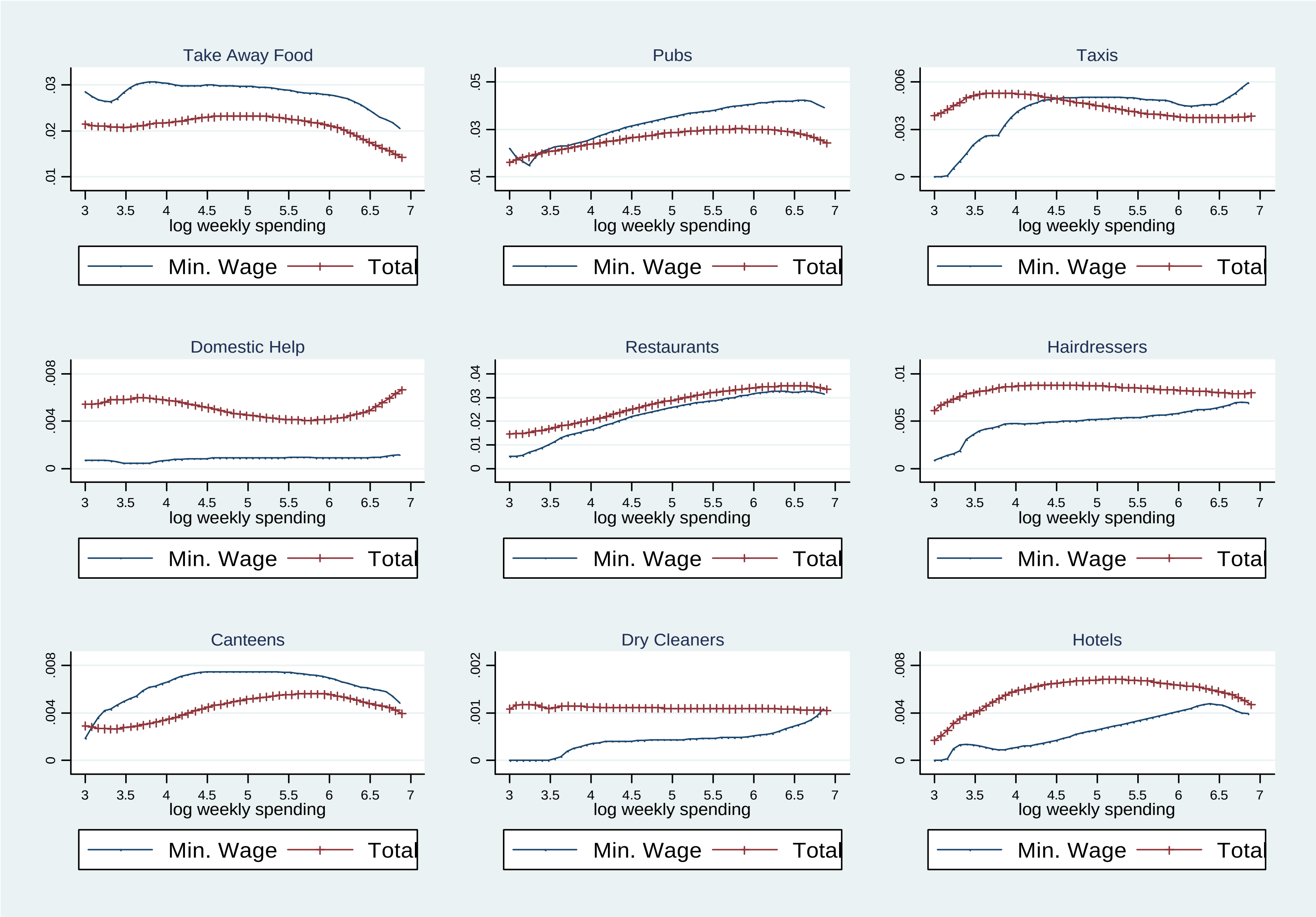


Table 17. Estimated Engel Curves for Minimum Wage Goods, 1998/99

	Takeaway	Pubs	Road	Cleaners	Rest'rant	Hairdress	Canteens	Dry Clean/ Laundry	Hotels (UK)
Total									
Ln(Expenditure)	0.042	0.047	0.002	-0.011	0.029	0.009	0.015	0.001	0.021
	(0.007)**	(0.013)**	(0.004)	(0.005)*	(0.010)**	(0.005)	(0.003)**	(0.001)	(0.004)**
Ln(Expenditure)^2	-0.004	-0.004	-0.0001	0.001	-0.002	-0.001	-0.001	-0.001	-0.002
	(0.001)**	(0.001)**	(0.0003)	(0.0005)	(0.001)*	(0.001)	(0.000)**	(0.001)	(0.000)**
Min. Wage Households									
Ln(Expenditure)	0.036	0.052	0.007	0.002	0.049	0.003	0.024	-0.001	0.005
	(0.030)	(0.043)	(0.016)	(0.003)	(0.027)	(0.008)	(0.007)**	(0.002)	(0.007)
Ln(Expenditure)^2	-0.004	-0.004	-0.001	-0.000	-0.004	-0.000	-0.002	0.000	-0.000
	(0.003)	(0.004)	(0.002)	(0.000)	(0.003)	(0.001)	(0.001)**	(0.000)	(0.001)

Source: FES

Table 18. Estimated Elasticities for Minimum Wage Goods and Services

Industry	Income Elasticity (1998)	Income Elasticity (2005)	Budget Share Price Elasticity	Own Price Demand Elasticity
Take Away Food	0.90	0.77	0.37 (0.15)	-0.95 (0.21)
Pubs	1.11	1.09	-1.12 (0.14)	-2.61 (0.18)
Mini Cabs	0.82	0.73	0.14 (0.14)	-0.83 (0.19)
Cleaners (homes)	0.92	0.77	-0.07 (0.27)	0.36 (0.29)
Restaurants	1.31	1.17	0.67 (0.10)	-0.34 (0.14)
Hairdressing	0.98	1.00	0.23 (0.12)	-0.19 (0.14)
Canteens	1.19	1.09	-1.47 (0.17)	-2.77 (0.23)
Dry Cleaners	0.97	0.98	-2.10 (0.40)	-2.67 (0.54)
Hotels	1.05	0.93	0.56 (0.41)	0.75 (0.53)

Standard errors in brackets. Income elasticities evaluated at the means of log household expenditure and respective budget shares.

In order to try and establish this, columns 3 and 4 in Table 18 report the estimates for the budget share own price elasticity and the resulting derived estimate of the own price elasticity of demand based on a simple regression of the budget share on the log of its own price index for each month between January 1996 and December 2005.[31] The estimates suggest that, over the sample period, the demand for dry cleaners, canteen meals and pub drinks were the most sensitive to its own price and the demand for domestic services, take-away food and hotel services were the least sensitive to own price. So demand fell more than proportionately over a period when the prices of these goods was rising. In contrast the budget share of take-away food, restaurant meals and UK hotel services rose when the price of these goods was rising, though less than proportionately. These results do therefore tend to support the earlier suggestions that the demand for hotel services, restaurants meals and take-away food may be relatively price inelastic, and the demand for pub drinks, dry cleaning services and canteen meals more price elastic so that the scope for changing prices in response to a cost shock may be greater in the former goods and services and more limited among the latter group.

[31] For reasons outlined earlier these estimates should be taken simply to be measures of association.

Conclusion

Since the minimum wage boosts the gross earned income of those covered, it might be expected to generate an “income effect” and so change a recipient’s consumption patterns relative to those who did not benefit. However the evidence assembled here suggests that there is little evidence of any significant change in the spending patterns of households in receipt of a minimum wage income relative to other working households. Whether this is because the net increase in household incomes as a result of the minimum wage is so small- whether because the amounts induced by the minimum wage were so small as to be unable to make much difference to household spending patterns or because it is either clawed back by high marginal tax rates operating elsewhere in the welfare regime, or simply because measurement error in the available data precludes precise estimation of its effects remains a matter for future research.

There is a little more evidence however to suggest that there may have been some, small, effect of the minimum wage on the prices of the goods and services produced by minimum wage workers. Again while more work is needed on refining the estimates produced in this report, it seems that the relative rate of inflation of minimum wage goods did increase in the period after the minimum wage was introduced and that prices rose faster for those goods and services whose demand is relatively more price inelastic.

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Data Appendix. FES Expenditure Categories

The FES divides expenditure into 14 major categories and 77 subcategories.

Food
includes all food prepared and consumed in the home and all food purchased and consumed on premises outside the home, and takeaway foods eaten at home.
Alcohol
includes both alcoholic drink bought at off-licences and alcoholic drink consumed on licensed
premises.
Tobacco
includes cigarettes, pipe tobacco and cigars.
Domestic Fuel
domestic fuel and lighting costs such as gas bills, electricity bills, coal and bottled gas.
Household Durables
includes goods such as furniture and soft furnishings, electrical appliances, gardening equipment and furniture, and kitchen utensils.
Household Services
covers telephone calls (the cost of the calls themselves rather than the costs of purchasing the phones) including mobile telephone calls and domestic services such as childcare costs, laundry services and repairs.
Clothing
includes men's, women's and children's clothing and footwear.
Personal Goods
The category 'private health care' includes private medical insurance, over-the counter medicines, membership of health clubs, spectacles and contact lenses, and toiletries (such as cotton wool and toothpaste used in personal care).
Motoring
This covers the private costs of motoring other than the purchase of the vehicles themselves. It includes petrol, tax, insurance, repairs and accessories, the purchase of new and second-hand cars, motorbikes, vans.
Fares
includes rail and bus fares and season tickets and the costs of air travel where these are easily distinguished from air travel costs included as part of a package holiday deal. Where these costs cannot be distinguished, the air travel is included in our holidays variable (see below).
Leisure Goods
This category includes audio-visual equipment and smaller leisure goods such as CDs, books, newspapers and garden plants.
Leisure Services
Includes entertainment expenditures on TV licences, cinema and theatre admissions, entry fees to sporting events and subscriptions to sports and social clubs and the costs of UK and foreign holidays, including air travel where the individual costs cannot be distinguished. It also includes money spent abroad and costs of currency conversion and traveller's cheques, school fees, costs of school trips and payments made for university education.

Figure A1. Distribution of Individual Hourly Wages 1999

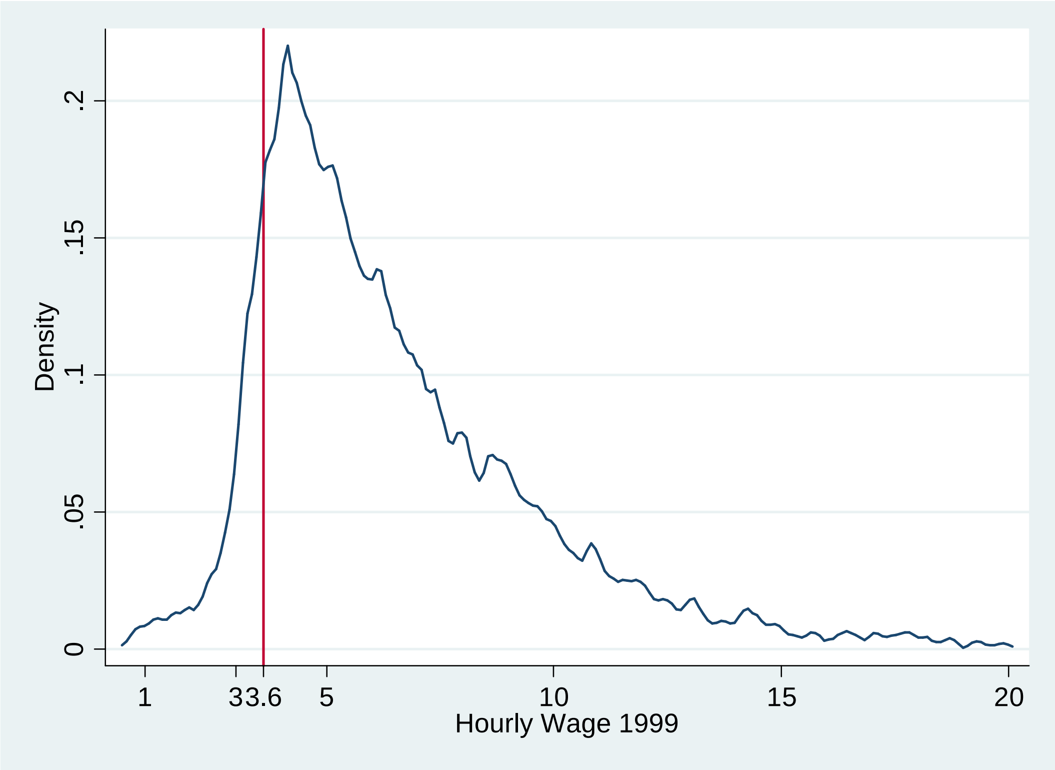
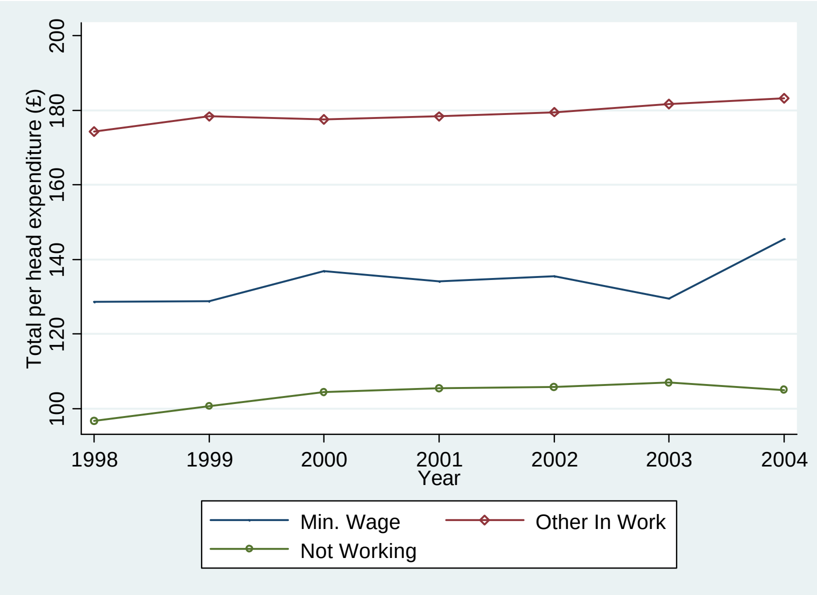
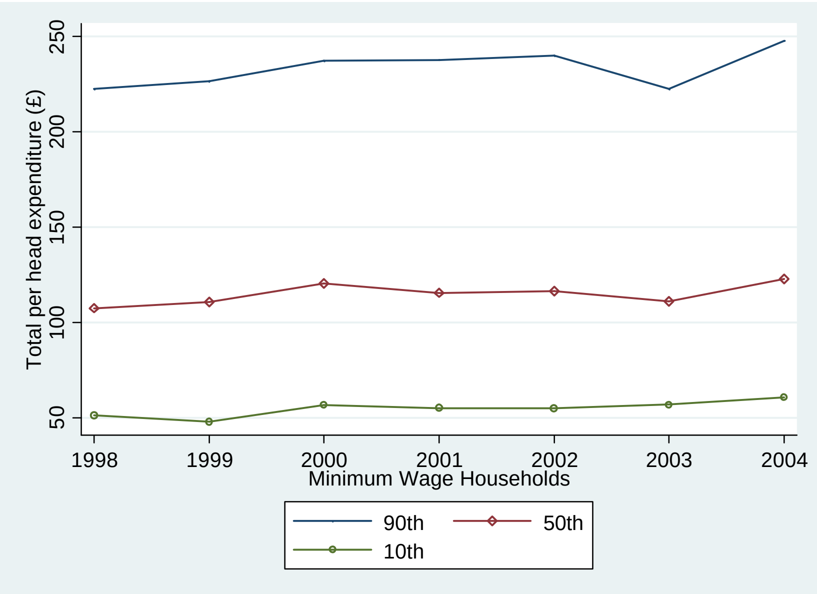


Figure A2. Household Expenditure (per head) by Household Type





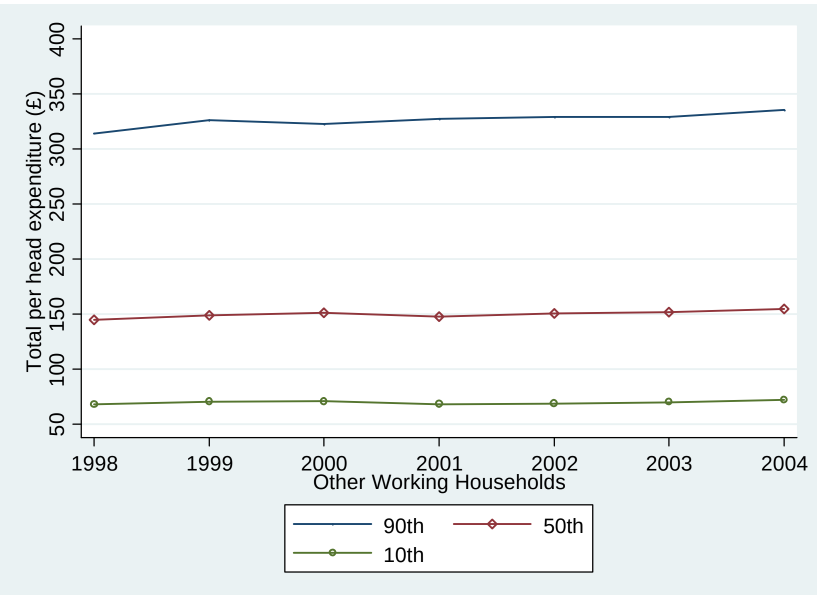


Figure A3. Distribution of Household Expenditure (per head) by Household Type

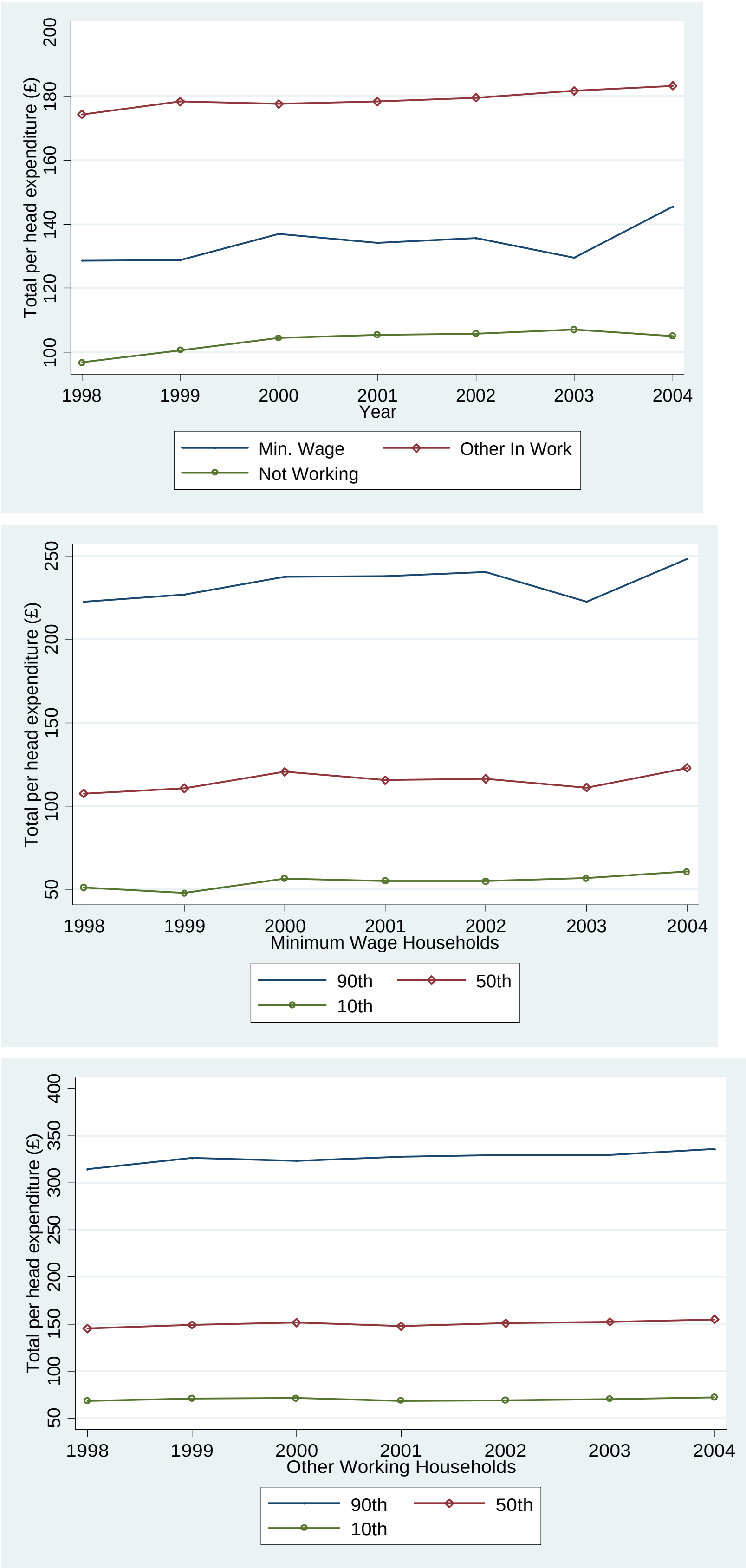


Table A2. Per Capita Expenditure (net of housing) Across Household Type

	Adult NMW households	Other households with at least 1 individual in work	Other working age households
1998/99			
Mean	128	173	96
Median	107	145	68
10th percentile	51	68	31
90th percentile	222	307	188
Standard dev.	82	112	88
Coef var.	0.64	0.65	0.92
% of total expenditure (% in pop.)	10 (12)	54 (44)	9 (14)
1999/2000			
Mean	129	178	101
Median	110	149	71
10th percentile	48	71	32
90th percentile	225	318	201
Standard Dev.	81	115	92
Coef var.	0.63	0.65	0.91
2004/05			
Mean	147	185	107
Median	122	155	80
10th percentile	61	72	33
90th percentile	248	334	200
Standard dev.	98	124	99
Coef var.	0.67	0.67	0.92
% of total expenditure	11 (12)	52 (44)	8 (11)

Source:FES

Table A3. Minimum Wage Workers and Mean Equivalised Household Expenditures

	Adult NMW households				Other Working households: at least 1 individual works				Non-Working households			
	1998/99	1999/00	2003/04	2004/05	1998/99	1999/00	2003/04	2004/05	1998/99	1999/00	2003/04	2004/05
Housing &	42.7	48.1	45.7	50.9	62.2	67.3	60.7	66.7	30.3	35.2	46.4	48.1
Fuel	(26.8)	(28.5)	(30.3)	(37.9)	(42.3)	(44.1)	(47.4)	(50.3)	(33.4)	(41.0)	(40.2)	(40.9)
Food	44.1	43.5	42.4	44.2	49.0	49.9	48.6	49.6	35.2	34.6	35.0	36.2
	(21.9)	(19.7)	(19.2)	(22.0)	(22.6)	(22.9)	(23.4)	(25.9)	(21.3)	(22.4)	(22.7)	(23.0)
Alcohol &	18.6	17.9	15.6	14.5	16.6	18.2	15.7	14.5	11.9	13.5	12.5	12.0
Tobacco	(20.5)	(19.4)	(17.0)	(16.7)	(19.5)	(20.8)	(18.5)	(16.7)	(15.1)	(17.4)	(17.1)	(16.4)
Clothing	15.9	16.6	15.2	18.4	20.3	19.6	18.7	18.3	12.2	9.9	11.2	11.2
	(22.9)	(23.3)	(24.4)	(25.1)	(29.9)	(31.0)	(27.3)	(26.5)	(34.2)	(20.6)	(27.2)	(18.7)
Household	32.3	33.5	33.8	39.1	46.0	46.6	49.6	51.0	25.6	26.8	33.1	35.4
goods/serv.	(47.7)	(41.5)	(34.7)	(48.9)	(65.6)	(69.3)	(63.8)	(62.9)	(36.2)	(44.4)	(76.2)	(78.1)
Leisure	38.0	39.5	40.7	51.5	54.7	55.7	63.3	64.9	27.1	31.7	37.7	33.9
goods/serv.	(44.1)	(52.6)	(46.7)	(71.2)	(71.7)	(73.7)	(82.7)	(86.7)	(50.9)	(64.4)	(77.1)	(66.6)
Travel	42.4	42.8	45.4	48.8	59.2	61.5	62.1	61.6	28.0	27.9	30.9	30.4
	(50.1)	(56.9)	(58.4)	(56.7)	(82.9)	(88.0)	(80.9)	(70.9)	(81.0)	(64.6)	(60.6)	(63.4)
Personal	8.9	8.5	8.1	9.5	12.8	12.1	12.8	12.7	6.3	6.9	8.6	7.7
goods	(16.0)	(12.3)	(11.2)	(12.2)	(37.5)	(17.5)	(32.8)	(20.4)	(10.6)	(23.7)	(34.2)	(17.4)
Other	0.8	0.9	1.5	1.6	1.4	1.4	1.8	1.9	0.4	0.8	1.0	1.0
	(3.0)	(3.2)	(3.4)	(4.0)	(5.4)	(7.5)	(4.4)	(6.1)	(2.1)	(4.6)	(3.7)	(4.4)

Notes: see Table 1. Expenditures in January 2004 prices.

Figure A4. Price Changes of Minimum Wage Goods Relative to Retail Price Excluding Housing Index, 1996-2006

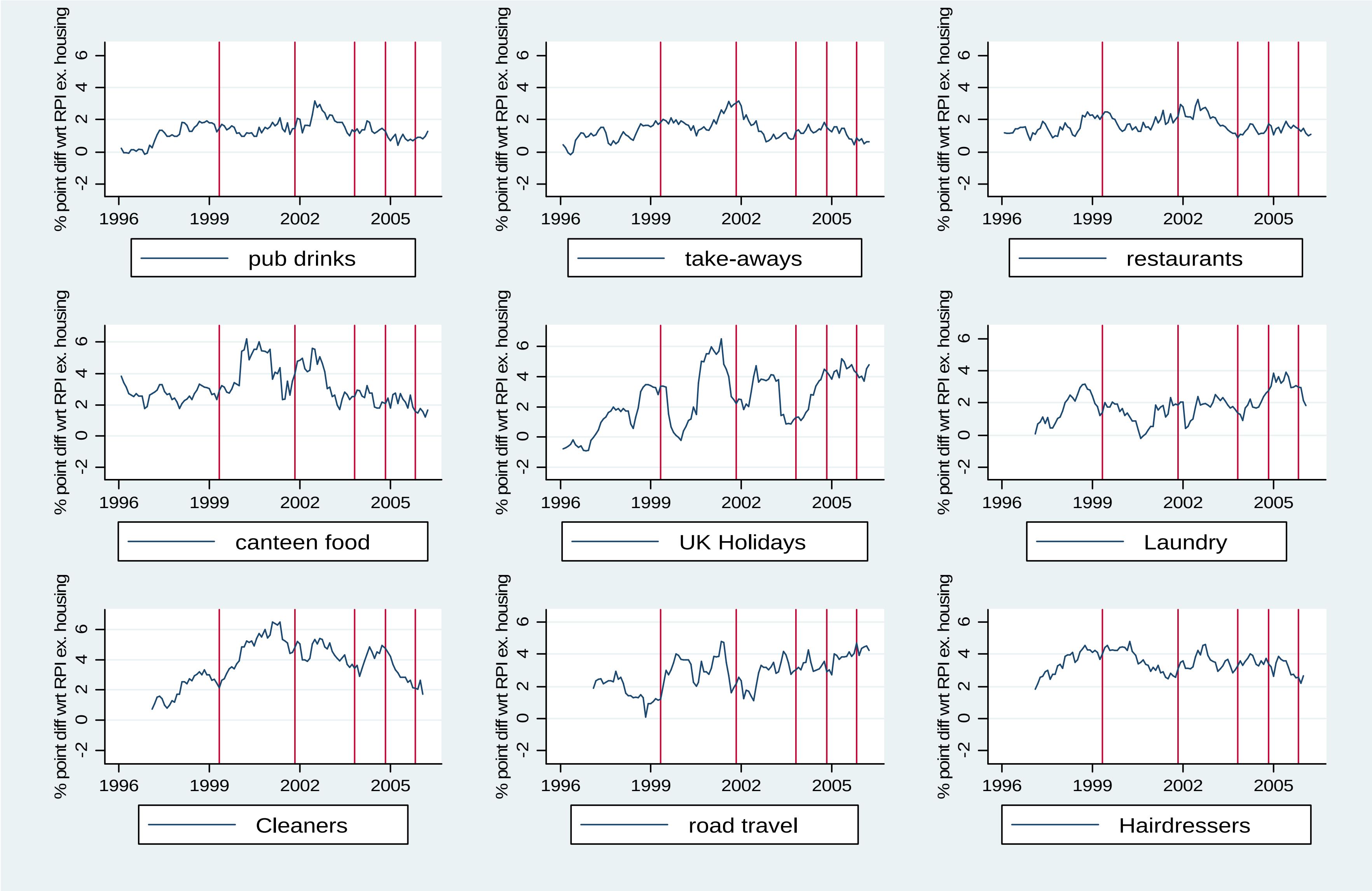


Figure A5. Inflation Rates of Selected Non-Minimum Wage Goods, 1996-2005