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Did the National Minimum Wage Affect UK Prices?*

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Abstract

One potential channel through which the effects of the minimum wage could be directed is that firms that employ minimum-wage workers could have passed on any higher labour costs resulting from the minimum wage in the form of higher prices. This study looks at the effects of the minimum wage on the prices of UK goods and services by comparing prices of goods and services produced by industries in which UK minimum-wage workers make up a substantial share of total costs with prices of goods and services that make less use of minimum-wage labour. Using sectoral-level price data matched to Labour Force Survey data on the share of minimum-wage workers in each sector, it is hard to find much evidence of significant price changes in the months that correspond immediately to the uprating of the national minimum wage. However, over the longer term, prices in several minimum-wage sectors – notably, take-away food, canteen meals, hotel services and domestic services – do appear to have risen significantly faster than prices in non-minimum-wage sectors. These effects were particularly significant in the four years immediately after the introduction of the minimum wage.

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I. Introduction

When the national minimum wage (NMW) was introduced in Britain in April 1999, 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 was that the overall effect on the level of employment in Britain was broadly neutral (see, for example, Stewart (2004)). Given the lack of an employment effect, research has shifted toward establishing whether the margin of adjustment was borne elsewhere. Stewart and Swaffield (2008) establish that there may have been a small fall in the number of hours worked by low-wage workers. Draca, Machin and Van Reenen (2005) 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 NMW introduction. There is also another potential channel through which the effects of the minimum wage could be directed. Firms that employ minimum-wage workers could have passed on any higher labour costs resulting from the minimum wage in the form of higher prices.

The existing, limited, empirical literature on the price effects of minimum wages, summarised in Lemos (2008), has focused on the effect of the minimum wage on aggregate retail price inflation. Lemos concludes that the accumulated, worldwide, evidence on the effects of the NMW on aggregate price inflation appears to be small.¹ There have been fewer attempts to focus on prices in sectors that make use of a large number of minimum-wage workers. A few notable studies make use of more disaggregated price data. Aaronson (2001) looks at fast-food sectoral price variation across US states subject to different minimum-wage levels and concludes that prices in this sector rise, with an elasticity of around 0.1, within one month of any minimum-wage rise. MacDonald and Aaronson (2006) show that most fast-food outlets only raised the prices of a subset of their products in response to a change in the minimum wage, which suggests that there may be item-specific fixed costs to changing price, or demand elasticities that vary across goods. Aaronson, French and MacDonald (2008) use US establishment-level price data for the fast-food sector and conclude that price rises were most common in stores more likely to pay the minimum wage and that ‘most’ of the higher costs faced by employers there are passed on to consumers almost immediately in the form of higher prices. Card and Krueger (1994 and 1995) also analyse several different samples of establishment-level fast-food price data but conclude that ‘it is difficult to reach firm conclusions’ about the relationship between minimum wages and prices. In the only existing UK estimates relating to prices, Draca, Machin and Van Reenen (2005) outline sectoral-level retail price changes in three low-paying UK industries – take-

¹With an elasticity of price inflation with respect to the NMW of around 0.04.

away food, restaurants and canteens. The authors conclude that there was not much evidence of price changes in these sectors at the time of the introduction of the NMW and the subsequent upratings to the end of 2002.

In what follows, we apply a difference-in-difference strategy to give a more comprehensive assessment of the effects of the minimum wage on retail prices in the UK. We first use the Labour Force Survey (LFS) and the Annual Survey of Hours and Earnings (ASHE) to estimate the NMW employee coverage and the wage bill share of minimum-wage workers in each three- or four-digit UK industry sector in order to identify minimum-wage goods and services. We then match these data to sectoral-level data on retail prices and look to see whether there is any evidence that prices in minimum-wage sectors – sectors that received the biggest shock to their wage bills – were changed more than elsewhere by the introduction of and subsequent changes in the minimum wage through to 2007. In particular, we examine whether prices in those minimum-wage industries spiked at the time of the NMW introduction and subsequent upgrades and also whether prices in those industries rose, relative to prices in other industries over the longer term.

Section II sets out the theoretical considerations that underlie the study and which guide the search for appropriate data and estimation strategies, while Section III outlines the data and estimation techniques used here. Section IV sets out the main results of the paper – namely, that prices appear to have risen faster in several minimum-wage sectors than elsewhere since the NMW was introduced, though not in the months surrounding the implementation and upratings of the NMW. Section V concludes.

II. Theoretical framework and institutional background

In May 1997, the UK government set up an independent Low Pay Commission (LPC) consisting of representatives from employers, unions and academia to take evidence and make recommendations on the initial level of the NMW and subsequently on the size of any increases, based on monitoring and evaluation of its impact. Aside from the introduction, each uprating has been in the October of every subsequent year. The LPC typically gives its recommendations in February of each year and the government decides whether to accept its recommendations on the new level, if any, by March. Consequently, employees and employers have around six months' notice of any impending changes. Since inception, there has been a separate adult rate for those aged 22 and over and a youth rate for those aged 18 to 21. From October 2004, there has also been a separate rate for 16- and 17-year-olds.

The Low Pay Commission (2001) estimated that workers in 1.3 million jobs, some 5 per cent of all jobs, were entitled to higher wages as a result of

the introduction of the NMW at £3.60 for adults and £3.00 for youths in 1999. The median wage increase was estimated at around 20 per cent for individuals entitled to the NMW, with the impact on the aggregate wage bill estimated at 0.35 per cent. This increase in costs varied widely across sectors with differing fractions of low-wage employees, ranging from 7 per cent in the hairdressing sector to less than 0.1 per cent in the IT sector. This variation across sectors is used in the analysis that follows. Since 1999, the subsequent increases in the NMW have been more modest. The average percentage rise in the nominal level of the adult NMW between 2000 and 2007 was 5.5 per cent. There were much larger increases in 2001 (10.4 per cent) and in 2003 and 2004 (7.1 per cent and 7.8 per cent respectively).²

1. Price changes

Microeconomic theories indicate that a firm's potential response to a cost increase depends on factors such as the extent of competition in the firm's product market, the firm's ability to make compensating productivity improvements, the presence of imports or close substitutes not subject to the same cost increase, and the price elasticity of demand for the good in question. In the case of a cost increase induced by the minimum wage, all domestic firms producing the same product will be subject to the same cost pressures, which will differ only by the share of minimum-wage labour in production. Firms that 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, putting upward pressure on wages further along the wage distribution, then the effect on costs will be magnified.

The prices of substitutes and complements for the good also matter for pricing decisions. These prices in turn depend on their respective input costs and the elasticity of each factor's supply. Competitive industries will not be able to pass on cost increases if substitute products do not face similar cost increases. 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 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 this is the case, then these sectors should face higher upward pressures on costs. The more substitutes there are 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

²See Low Pay Commission (2008) for more details on the levels and history of the NMW.

pass on cost increases, other things equal. In short, the less competitive the market and the fewer substitutes there are, the easier it is to pass on increases in the costs of production and maintain profit levels.

The demand for luxury goods is more price elastic than that for necessities. Price changes generate both substitution effects and income effects through their effects on real incomes. If a good is highly income elastic, demand will tend to be more responsive to price changes, other things equal. A given increase in price reduces real incomes, and demand for luxury goods falls more in response to a fall in real income than demand for necessities. A larger income effect for luxury goods then reinforces the substitution effect on the overall demand elasticity. The larger the budget share, the greater the effect on real incomes from any price change of that good. 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.

Card and Krueger (1995) and Aaronson and French (2007) argue that the extent of labour market competition also has implications for prices. Under perfect competition, wages equal the marginal cost of labour. Hence the minimum wage raises the marginal costs of production and ultimately prices. Under monopsony, the minimum wage can reduce marginal costs, since the firm no longer has to raise wages to attract marginal labour. Lower marginal costs will tend to raise the demand for labour and hence increase output. Higher output should act to lower prices, other things equal. However, this will not hold if either firms price according to average costs (since the minimum wage raises average costs under monopsony or perfect competition) or firms adjust the quality of output rather than quantity.

In summary, the less competitive the product market, the more able firms are to pass on increases in the costs of production and maintain profit levels. The more substitutes there are for a good, the more price elastic the demand and the harder it becomes for firms to raise prices. The more a good competes with a potential substitute produced abroad not affected by the NMW, the harder it will be for UK firms to pass on cost increases and maintain market share, other things equal.

In the absence of detailed information at the firm level on any of these factors in the UK, it is hard to isolate their respective effects. The price outcomes that we observe are thus the net result of all these influences and others.

2. Tracking the response to a price shock

The mechanics of price adjustment have been studied extensively in the macroeconomics literature concerning the existence of price rigidities.

Caballero and Engel (2003) argue that the microeconomic response of firms to price shocks is lumpy and invariant and that failure to allow for this possibility when modelling the adjustment process can lead to upward-biased estimates of the speed of adjustment.

Even though we are concerned with realised price movement and not with modelling the adjustment process, it is helpful to consider what different patterns of price adjustment imply about what to expect from realised movements in price data. If prices at a representative firm simply followed a random walk, then this month's price equals last month's price plus any shocks that cause a firm to adjust its prices in the intervening period. The price level series will exhibit periodic mean shifts around a rising trend. The monthly change in the price level is $\Delta P_t = P_t - P_{t-1} = e_t$, so the price level changes only when there is a new shock at time t , e_t , and otherwise remains the same. The one-monthly inflation rate has a single-period spike at the point where prices are raised and remains at zero in all periods where there is no price change. The height of the spike corresponds to the relative size of the price increase. By repeated substitution for lagged prices, the current price level equals the sum of all previous shocks occurring after the previous price level was set. Over a 12-month window, $P_t = \sum_{j=0}^{11} e_{t-j} + P_{t-12}$ and the annual inflation rate is

$$(1) \quad \frac{P_t - P_{t-12}}{P_{t-12}} = \frac{\sum_{j=0}^{11} e_{t-j}}{P_{t-12}}.$$

Hence the inflation rate will also only adjust whenever there is a new shock and the inflation rate also embodies the history of all previous shocks. So the annual inflation rate series will display a stepped pattern with periodic upward (or downward) mean shifts.³ However, (1) shows that the annual inflation rate is also influenced by the price level and hence previous shocks from 12 months earlier. So it is harder to use the inflation rate to pinpoint the timing of movements in the price level, since the inflation rate can be influenced by factors that affected prices in the past.

The accumulated evidence suggests that: the average firm adjusts its prices around once or, perhaps, twice a year (Taylor, 1999; Hall, Walsh and Yates, 2000; Bils and Klenow, 2004; Nakamura and Steinsson, 2008); large firms tend to adjust prices more frequently than smaller firms (Apel, Friberg and Hallsten, 2005; Ball and Mankiw, 1994); firms in competitive sectors review and adjust prices more often than firms in less competitive sectors (Carlton, 1986; Hall, Walsh and Yates, 2000). Alvarez et al. (2005) suggest

³Any price index also follows a similar pattern to the inflation rate.

that the frequency of price adjustment in the euro area is around half that in the US and, interestingly, highest in the food sector and lowest in the rest of the service sector, in which most of the minimum-wage sectors in the UK are found.

The timing of price adjustments depends on the size of the shock relative to any costs of adjustment (state dependence) and on whether firms prefer to adjust prices on a set date irrespective of the size of the shock (time dependence). For example, if prices are adjusted before the minimum wage comes in, the upward mean shift in the price series will begin earlier and so the timing of any changes to price data patterns need not coincide with the minimum-wage uprating.

Since there are no available nationwide UK data on individual firm pricing behaviour, researchers only have access to aggregated data at the sectoral level comprised of the pricing behaviour of many different firms.⁴ If all firms behave the same and adjust prices at the same time, then the aggregate price data series will also follow the same pattern as that of the representative firm. This suggests that it may still be possible to use sectoral-level price data to test for breaks in the annual inflation rate series.⁵

Unfortunately, the accumulated evidence on pricing behaviour suggests that firms in the same sector do not always adjust their prices at the same time (see Lach and Tsiddon (1992) and Sheshinski and Weiss (1993)). Moreover, different firms often make different-sized price adjustments in response to the same shock. In the case of the NMW, each rise is signalled around six months in advance. This gives another potential source of variation in timing of any price changes if a subset of firms choose to adjust prices in anticipation of a forthcoming increase. Since each sector retail price is an average of the prices of different firms with different structures, the larger the level of aggregation the more likely it is that these firms will be operating in different markets. If firms adopt either a state- or time-dependent pricing policy, then prices at individual firms will also jump discretely at different time periods. As such, the range of price responses that might be expected will also vary, making it much less likely that a distinct crenulated pattern will be produced in aggregate price series data than at the level of the firm. Even though the minimum wage affects all firms at the same time, so the timing of the shock does not differ across firms, the size of the shock will differ, depending on the wage bill share of minimum-wage workers, the minimum-wage labour share of different firms and when the firm decides to adjust its prices.

⁴These data on individual firms exist in principle, since prices for a sample of firms form the basis of the retail price index (RPI) in the UK.

⁵The (mean shift) structural break techniques advocated by Bai and Perron (2003) are more suited to sustained breaks in the series rather than the analysis of single pulses in the series.

As a result, it is straightforward to show that the sectoral price level (and price index) moves toward the new level in a series of smaller, discrete jumps than in the uniform response model outlined above, since the price level at any point in time is a weighted average of those firms that have adjusted prices in that period and those that have not. Indeed, Caplin and Spulber (1987) show that it is possible that the timing of adjustment could be uniformly distributed, so that the same proportion of firms adjust their prices to a given shock in each subsequent time period. If so, price levels adjust continuously and there will be no discrete breaks in the price or inflation series. Nevertheless, if prices are adjusted infrequently, the price adjustment will be long-lasting and the impact of shocks on prices could only be measured in the long run. For this reason, we adopt a second approach in what follows by also looking at long-run differences in prices between minimum-wage sectors and other industries.

The pricing behaviour and cost structures of suppliers in the firm's production process also matter (Gordon, 1981). With the introduction of the suppliers to minimum-wage firms, Blanchard (1989) shows that prices respond more gradually as firms react to a change in their suppliers' prices.⁶ It is also possible then 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. With different products and hence different prices in the sector aggregate, any patterns in the data become less distinct.

In short, heterogeneity in both pricing behaviour and market structure across firms makes it difficult to follow a strategy of trying to identify structural breaks from sectoral-level price and inflation data. However, it remains true that retail prices in a sector subject to a larger wage shock might be expected, other things equal, to be higher than those in sectors not subject to as large a wage shock. The next section therefore pursues this idea further.

III. Data and estimation

We first use the earnings and industry affiliation information contained in each wave of the LFS and ASHE to obtain a ranking of industries at four-digit level by (a) the wage bill share of workers paid at or below the NMW in each year and (b) the share of this minimum-wage labour in total costs

⁶In the absence of disaggregated UK input-output data, it is not possible to track the minimum-wage content of supply chains.

(the labour share). For the LFS, we pool across four quarters to give around 50,000 wage observations in each calendar year. For ASHE, we use the single-point-in-time estimates in April of each year. Both data sets are not without measurement problems. In the LFS, prior to the summer of 1999, each adult was 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 by dividing gross weekly pay by usual normal hours plus usual paid overtime. While the ASHE sample is three times as large as the LFS sample, its sample frame (in the 1990s) was based on employees earning more than the National Insurance weekly earnings threshold and so undersampled many part-time, low-paid workers.

A separate database on a sample of firm company accounts – Financial Analysis Made Easy (FAME) – provides complementary data on the aggregate wage bill and value added (gross profits) of each firm. We can therefore calculate the labour share, defined as the wage bill divided by the sum of the wage bill and gross profits,⁷ for each four-digit industry in order to estimate the share of minimum-wage workers in total costs. (Aaronson and French (2007) argue that the appropriate measure in the denominator of total costs should be intermediate consumption rather than value added, but the latter is the only data available in FAME.) We can then rank each four-digit industry. If there were one-to-one pass-through of the minimum wage, we would expect industries with the highest minimum-wage share in total costs to raise prices more.

Table 1 lists the top 10 sectors by the NMW wage share in total costs for 1998–99 and for 2004–05. In the year prior to the introduction of the minimum wage, the retail sector employed around 25 per cent of all potential minimum-wage workers – those adults aged 22 and over and who were 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 their own employees. Take-away food shops, hairdressing, minicabs⁸ and pubs are notable and persistent low-paying sectors. It is perhaps here, where minimum-wage workers account for upwards of 20 per cent of total costs, that pressures on costs and potentially prices would be expected to be larger. Of the top 10 low-paying industries, all are services and only one – industrial cleaning – is not a consumer service. Together, these nine consumer services employed around 15 per cent of all NMW

⁷Table 1 uses the LFS to estimate the NMW wage bill share. A table based on the use of ASHE to estimate the wage bill share is available on request. See also Wadsworth (2009). The rankings do not change much.

⁸The minimum-wage recipients in minicab services are typically office workers rather than (self-employed) drivers.

TABLE 1
Top 10 low-paying sectors

Rank	Industry	1998-99			2004-05			(8) NMW worker wage share in total costs (%) (6)×(7)/100
		(1) Percentage ≤ adult NMW	(2) Wage bill share (%)	(3) Labour share (%)	(4) NMW worker wage share in total costs (%) (2)×(3)/100	(5) Percentage ≤ adult NMW	(6) Wage bill share (%)	
1	Take-away food	57.8 (4.4)	41	72	51.8 (5.4)	30	77	23
2	Minicabs	54.2 (5.4)	27	78	22.0 (5.8)	20	87	17
3	Hairdressing	39.3 (3.7)	23	93	25.0 (5.1)	18	79	14
4	Cleaners (firms)	39.7 (2.2)	23	91	22.3 (2.2)	13	93	12
5	Canteens	34.1 (4.1)	24	86	33.8 (2.9)	17	60	10
6	Pubs	52.8 (2.4)	30	59	19.8 (2.9)	11	81	9
7	Cleaners (homes)	36.6 (2.5)	23	74	25.6 (2.1)	11	77	8
8	Restaurants	41.1 (2.2)	21	72	23.7 (2.3)	11	67	7
9	Dry-cleaning	28.0 (3.3)	17	83	19.8 (2.4)	7	91	6
10	Hotels	28.7 (2.2)	15	64	18.0 (0.6)	8	73	6

Notes: Standard errors given in parentheses. Labour share defined as wage bill over valued added (profit before interest plus wage bill). Labour share numbers in column 7 are for 2001-02 (latest year available).

Source: Labour Force Survey. Sample is adult employees aged 22 and over.

workers.⁹ 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. Eight of the 10 low-paid sectors remained in the top 10 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 & nursery schools.¹⁰

Since most of these minimum-wage industries are consumer services, they can be matched to the basket of 120 or so goods and services used to calibrate the (weighted) index of retail prices produced by the Office for National Statistics (ONS). As such, monthly price indices for eight of the top 10 minimum-wage sectors are readily available. In addition, the ONS produces aggregated monthly price indices for the ‘items’ that comprise these main sectors.¹¹ While the minimum-wage shares cannot be calculated for these subcategories, it is possible to test whether the item-level price indices in each category move together or whether there is any evidence of variation within each sector. Items also move regularly into and out of the sectoral series according to consumer buying preferences. There are, however, 35 items with at least seven years of data that straddle the two-year period before the introduction of the NMW and the five years after. These goods and services are used in the item-level regressions in Section IV. There is no sectoral-level RPI for minicab services but there is an item-level series. The one producer service in the top 10 – industrial cleaning – can be matched to a separate quarterly producer price series produced by the ONS. Since it is difficult to obtain price data for the retail sector as a whole or for private primary & nursery schools, in the analysis that follows we focus on the nine low-paying consumer services identified in 1998–99. Note that the share of adult NMW workers in the sectoral workforces tends to fall over time. Net of any measurement error, we might expect that some of these workers in these sectors will have been swept up beyond the minimum wage over time, if growth or productivity changes lead to changes in the structure of the workforce or its compensation structure. Thus the impact of any given percentage change in the NMW on prices might be expected to decline over time.

⁹According to ASHE, the two largest minimum-wage sectors are bars (SIC 5540) and the primary education sector (SIC 8010), which each accounted for some 15 per cent of all minimum-wage workers in 1999. Retail superstores accounted for a further 6 per cent of the total, despite not featuring in the top 10 rankings in Table 1. The LFS does not disaggregate the retail sector below two-digit level.

¹⁰Around 20 per cent of all employees in the retail sector were paid at or below the NMW according to the 1998–99 LFS.

¹¹For example, the take-away food category in the RPI is currently based on weighted information of 15 different take-away items ranging from fish and chips to pizza to beefburgers, sandwiches, tea and coffee.

IV. Results

Who buys goods and services produced by minimum-wage workers matters for the ‘real income’ effects of a minimum wage. 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.¹² If minimum-wage households were the only consumers of minimum-wage goods and services, then any price effects of the NMW would be exclusive to NMW households. We now outline who buys these goods and services by noting, in Table 2, the share of total expenditure on each item consumed by different household types.¹³

In 1998–99, (potential) minimum-wage households comprised just under 12 per cent of all households. It is apparent from Table 2 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 and services is higher than the population share, but never larger than 18 per cent (for take-away food, canteen meals and alcohol bought in pubs). Thus any NMW price effects are not exclusive to minimum-wage households. For some minimum-wage goods and services (domestic cleaners, dry-cleaning and hotels), NMW households spend disproportionately less. So for these goods and services, any price effect on real incomes of minimum-wage households will be small. Even for goods and services with a 2–4 per cent share of the net-of-housing household budget (percentages shown in parentheses in the table),¹⁴ such as restaurants and alcohol in pubs, a 10 per cent rise in prices in one of these goods will reduce real incomes by around 0.2 per cent, other things equal.¹⁵

1. Incidence of price changes

Given an average labour share of around 72 per cent and 64 per cent respectively, and assuming no spillover effects, the results in Table 1 suggest that a 10 per cent rise in the minimum wage might be expected to raise total costs by around 3 per cent in the take-away food sector, other things equal, and by around 1 per cent in the hotel sector. The next task is to find out whether changes in costs of this magnitude result in commensurate changes in prices. Figure 1 plots the yearly inflation rate prevailing in each month for each of the minimum-wage goods, beginning in January 1997. The vertical

¹²This point was made almost 100 years ago in the debate surrounding the introduction of the UK Wages Councils; see Webb and Webb (1911, pp. 780–3).

¹³See Wadsworth (2007) for details on how to identify ‘minimum-wage households’.

¹⁴Housing accounts for around 15–20 per cent of total household spending over the sample period.

¹⁵If the prices of all nine NMW goods and services in the table rose by 10 per cent, then real incomes would fall by around 1 per cent.

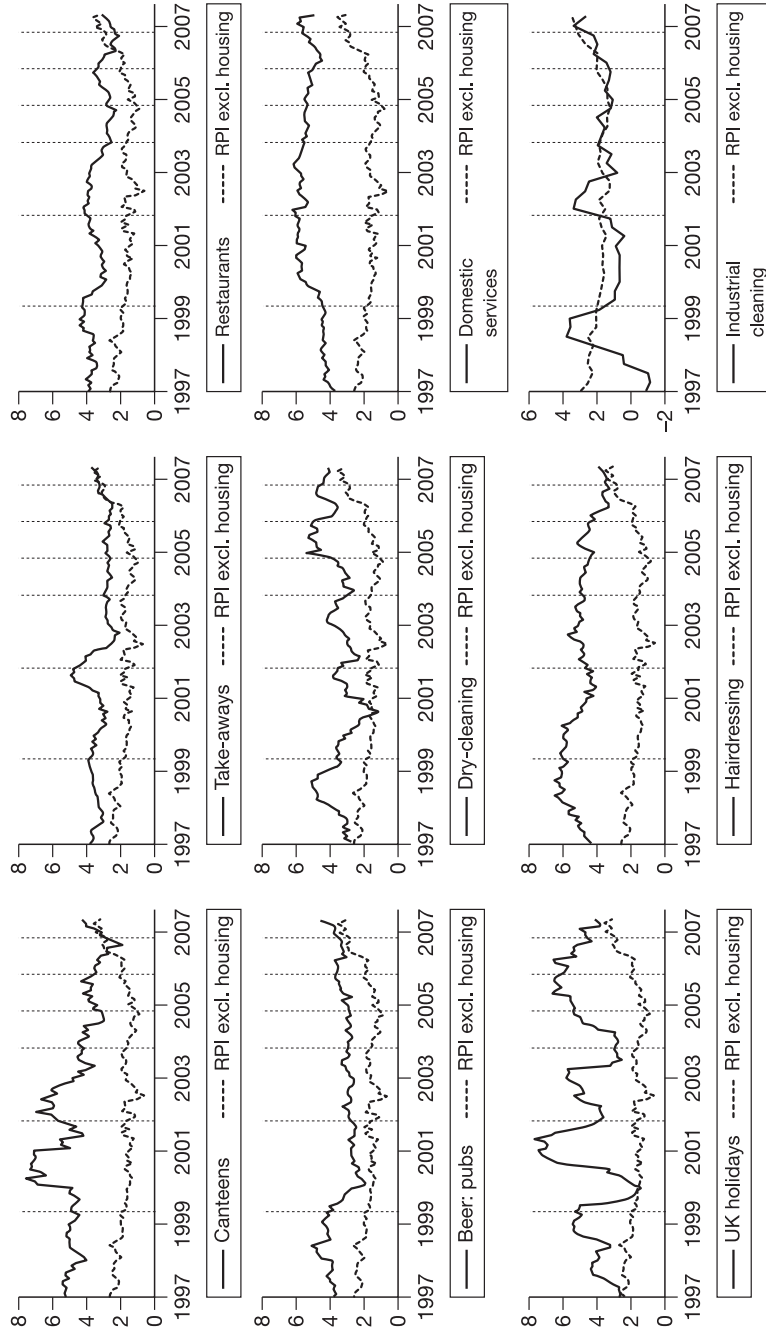
TABLE 2
Expenditure on top 10 low-paying sectors by all households and by minimum-wage households

1998 NMW rank	1998-99			2004-05			Percentage of total expenditure accounted for by adult NMW households	
	Industry	Weekly amount (% of budget): all households	Weekly amount (% of budget): adult NMW households	Percentage of total expenditure accounted for by adult NMW households	Industry	Weekly amount (% of budget): all households		Weekly amount (% of budget): adult 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
6	Pubs	4.10 (2.7)	5.00 (3.5)	17.7	Pubs	3.60 (2.3)	3.70 (2.7)	14.7
2	Mimicabs	0.60 (0.4)	0.70 (0.5)	16.0	Mimicabs	0.60 (0.4)	0.40 (0.4)	12.6
7	Cleaners (homes)	0.80 (0.5)	0.10 (0.05)	2.8	Cleaners (homes)	0.90 (0.5)	0.20 (0.1)	4.5
8	Restaurants	4.70 (2.9)	3.80 (2.6)	12.4	Restaurants	5.50 (3.3)	4.30 (2.8)	11.8
4	Cleaners (firms)	-	-	-	Cleaners (firms)	-	-	-
3	Hairdressing	1.25 (0.8)	0.70 (0.5)	9.2	Hairdressing	1.40 (0.9)	0.90 (0.6)	10.3
5	Canteens	0.70 (0.5)	0.90 (0.7)	17.4	Canteens	0.50 (0.3)	0.70 (0.6)	18.1
9	Dry-cleaning	0.20 (0.1)	0.10 (0.05)	7.0	Dry-cleaning	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

Notes: Minimum-wage households are 11.6 per cent (11.8 per cent) of all households sampled in 1998-99 (2004-05). Expenditure figures are per head in 2004 prices. Budget shares net of housing costs are given in parentheses.

Source: Family Expenditure Survey.

FIGURE 1
Yearly inflation rate movements in minimum-wage goods



lines on each graph correspond to the periods when the NMW was introduced and subsequently updated.¹⁶ The inflation rate series 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.

Figure 1 also tracks the change in the overall retail price index for each month. This indicates that the inflation rate for the 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 aggregate RPI does not rise at the time of the NMW changes, suggesting that, overall, the NMW had little impact on the economy-wide inflation rate in the months of implementation. Indeed, average retail price inflation seems to fall at the points when the NMW was adjusted.¹⁷

As a more formal summary of whether the price inflation for these goods was different in the periods after any minimum-wage changes, Table 3 reports the results of simple regressions of the monthly inflation rate – specifically, the monthly change in the log price index – for each sector over a 136-month period, beginning in January 1996, on a dummy variable that takes the value 1 if the minimum wage is ‘on’ (i.e. introduced or updated in that particular month) and a constant, which captures the average inflation rate in the ‘minimum wage off’ period:

$$(2) \quad \Delta \log P_t = \alpha + \sum_{t=T_1}^{T_2} \delta_t Min_t + \varepsilon_t$$

where $Min_t = 1$ if the minimum wage is adjusted in period t and 0 otherwise. The coefficient on the dummy variable then measures the average change in the inflation rate in the months when the minimum wage was adjusted relative to the ‘minimum wage off’ months. To allow for lagged or leading effects of the minimum wage, dummy variables for the two months before and after any wage hike are also included. Table 3 reports the results of the ordinary least squares (OLS) estimation of equation (2). With the exception of industrial cleaning, it is hard to find evidence of any significant effects on sector-level prices around the time of the minimum-wage upgrades in any of the sectors.

¹⁶The smaller October 2000 and 2002 NMW increases (2.8 per cent and 2.4 per cent respectively) are not shown in Figure 1.

¹⁷The price series were tested for stationarity with a deterministic trend against a non-stationary series with drift for each of the minimum-wage goods that we identify. In each case, the null of a random walk with drift cannot be rejected. Results available on request.

TABLE 3
Minimum-wage changes and monthly log price changes of minimum-wage sectors

Dependent variable: Monthly change in log retail price index of sector	<i>Canteens</i>	<i>Take-away food</i>	<i>Restaurants</i>	<i>Beer: pubs</i>	<i>Dry-cleaning</i>	<i>Domestic services</i>	<i>UK holidays</i>	<i>Hairdressing</i>	<i>Industrial cleaning</i>
Min. wage _t	0.0009 (0.0013)	0.0001 (0.0005)	0.0004 (0.0005)	-0.0008 (0.0010)	0.0005 (0.0009)	0.0001 (0.0010)	-0.0003 (0.0014)	0.0010 (0.0007)	0.0041 (0.0022)*
Min. wage _{t+1}	-0.0005 (0.0013)	-0.0010 (0.0005)*	0.0003 (0.0005)	-0.0009 (0.0010)	0.0001 (0.0009)	-0.0007 (0.0010)	-0.0017 (0.0014)	-0.0005 (0.0007)	
Min. wage _{t+2}	-0.0033 (0.0013)*	0.0001 (0.0005)	-0.0004 (0.0005)	-0.0015 (0.0010)	0.0003 (0.0009)	-0.0005 (0.0010)	-0.0004 (0.0014)	-0.0003 (0.0007)	
Min. wage _{t-1}	0.0042 (0.0013)*	-0.0004 (0.0005)	-0.0016 (0.0005)*	-0.0026 (0.0010)*	0.0010 (0.0009)	0.0001 (0.0010)	-0.0007 (0.0014)	-0.0011 (0.0007)	
Min. wage _{t-2}	-0.0010 (0.0013)	-0.0007 (0.0005)	-0.0002 (0.0005)	-0.0016 (0.0010)	-0.0014 (0.0009)	-0.0001 (0.0010)	0.0025 (0.0014)	-0.0010 (0.0007)	
Constant	0.0038 (0.0004)*	0.0027 (0.0001)*	0.0028 (0.0002)*	0.0032 (0.0003)*	0.0003 (0.0028)	0.0042 (0.0003)*	0.0036 (0.0004)*	0.0041 (0.0002)*	0.0034 (0.0009)*
N	136	136	136	136	135	136	136	135	45
Adjusted R ²	0.10	0.01	0.04	0.05	0.01	0.01	0.01	0.02	0.06

Notes: All regressions include year and month dummies. Newey–West standard errors robust to one lag given in parentheses. * significant at 5 per cent level. Industrial cleaning data based on quarterly producer price series.

The results for the 35 minimum-wage items are given in Table A1 of the appendix.¹⁸ There are significant positive price effects on the adjustment dummy in the month of implementation only for take-away tea, take-away coffee and a glass of wine in a pub. This is weakly consistent with MacDonald and Aaronson's (2006) findings in the US that low-wage sectors often only change the prices of a subset of their products in response to a minimum-wage increase.

Interrogation of the individual sector price series may put excessive demands on the data, as there are at most eight data points that the 'minimum wage on' dummy represents. Table 4 reports the results of a pooled estimator, estimated at both sector and item level, that combines sectors/items together allowing for the presence of sector/item fixed effects, α_i , that net out any tendency for certain sector prices to be typically higher (or lower) than average. The estimation also nets out any month and year effects common to all price series (β_t and γ_y respectively).¹⁹

$$(3) \quad \Delta \log P_{it} = \sum_{t=T_1}^{T_2} \delta_t \text{Min}_t + \alpha_i + \beta_t + \gamma_y + \varepsilon_{it}$$

The pooled results at sector level (column 2 of Table 4) indicate a positive but insignificant effect on the prices of minimum-wage goods in the month in which the minimum wage is introduced or upgraded. The pooled item-level estimates (column 4) suggest that there is an average significant positive effect, in the order of 0.2 per cent, on prices in the month of any adjustment.²⁰ No such effect is observed among the non-minimum-wage goods (column 3). There are also smaller, but statistically significant, price effects for minimum-wage items in the two months after any minimum-wage adjustment, and for non-minimum-wage items there are positive effects two months after and two months before any adjustment.²¹

If, however, firms have preferences for adjusting prices on specific dates, then it may be that they are willing to absorb (small) cost shocks in the short

¹⁸Not all the sectors are represented here in the item-level estimates because there is no consecutive seven-year monthly price series for certain items spanning the requisite time periods. The hotel sector is notably absent from these item-level regressions.

¹⁹To allow for autocorrelation, the standard errors in the individual series regressions are adjusted using a Newey–West correction factor of order 1. The standard errors in the pooled regressions are adjusted using the fixed effects robust correction suggested by Wooldridge (2002).

²⁰These results do not change significantly if we add another five minimum-wage items with at least seven years of continuous data but not covering the period before the NMW was introduced. If retail food items – a potential minimum-wage sector – are dropped from the list of non-minimum-wage goods in column 3, the 'minimum wage on' dummy becomes significantly negative: -0.0017 (0.0007).

²¹We also used month of announcement rather than month of introduction of the NMW level to centre the dummy variables in order to test whether there is any evidence of anticipation effects. The results, available on request, show little sign of any price hikes in the month the NMW level is announced.

TABLE 4
Minimum-wage changes and monthly log price changes

	Dependent variable: Monthly change in log RPI of sector		Dependent variable: Monthly change in log RPI of item	
	(1) <i>Non-minimum- wage goods</i>	(2) <i>Minimum-wage goods</i>	(3) <i>Non-minimum- wage goods</i>	(4) <i>Minimum-wage goods</i>
Min. adjust. _{<i>t</i>}	0.0001 (0.0009)	0.0006 (0.0005)	-0.0002 (0.0010)	0.0020 (0.0006)*
Min. adjust. _{<i>t+1</i>}	-0.0009 (0.0009)	-0.0001 (0.0004)	-0.0001 (0.0006)	0.0005 (0.0002)*
Min. adjust. _{<i>t+2</i>}	-0.0011 (0.0007)	-0.0001 (0.0004)	0.0027 (0.0009)*	0.0006 (0.0002)*
Min. adjust. _{<i>t-1</i>}	0.0023 (0.0012)*	0.0001 (0.0005)	-0.0009 (0.0008)	-0.0009 (0.0005)
Min. adjust. _{<i>t-2</i>}	-0.0004 (0.0009)	-0.0001 (0.0004)	0.0014 (0.0007)*	0.0002 (0.0003)
Year dummies	Yes	Yes	Yes	Yes
Month dummies	Yes	Yes	Yes	Yes
Item dummies	Yes	Yes	Yes	Yes
No. of items	78	8	370	35
<i>N</i>	9,133	960	51,432	4,594

Notes: Robust standard errors given in parentheses. * significant at 5 per cent level.

run and then adjust prices at a given date in the future. This warrants an investigation of when prices typically adjust in the sectors central to this study. Hendry, Johansen and Santos (2006) show that it is possible to find and produce unbiased estimates of any spikes in a time series despite having to saturate the model with ‘pulse dummy variables’. Their suggested approach is to create N period-specific dummy variables and then to regress the first $N/2$ dummies on a sample of N , saving any significant variables. This strategy is then repeated for the second $N/2$ dummies. The set of significant dummies from the two regressions are then combined in a single regression.

Figure 2 graphs the monthly change in each sector-level price series in order to help identify any significant pulses in the data. Table 5 presents the results of the ‘pulse dummy’ approach to estimate the periods in which prices changed significantly for each of the sectors. The data confirm that there are periods for each sector in which prices are raised (or lowered) significantly and that often these changes occur at the same time each year for each sector, but not always at the time of any minimum-wage upgrade. The domestic service sector, for example, typically adjusts its prices in January; and the price of alcohol in pubs is typically adjusted in March or

FIGURE 2
One-month log price changes for minimum-wage goods

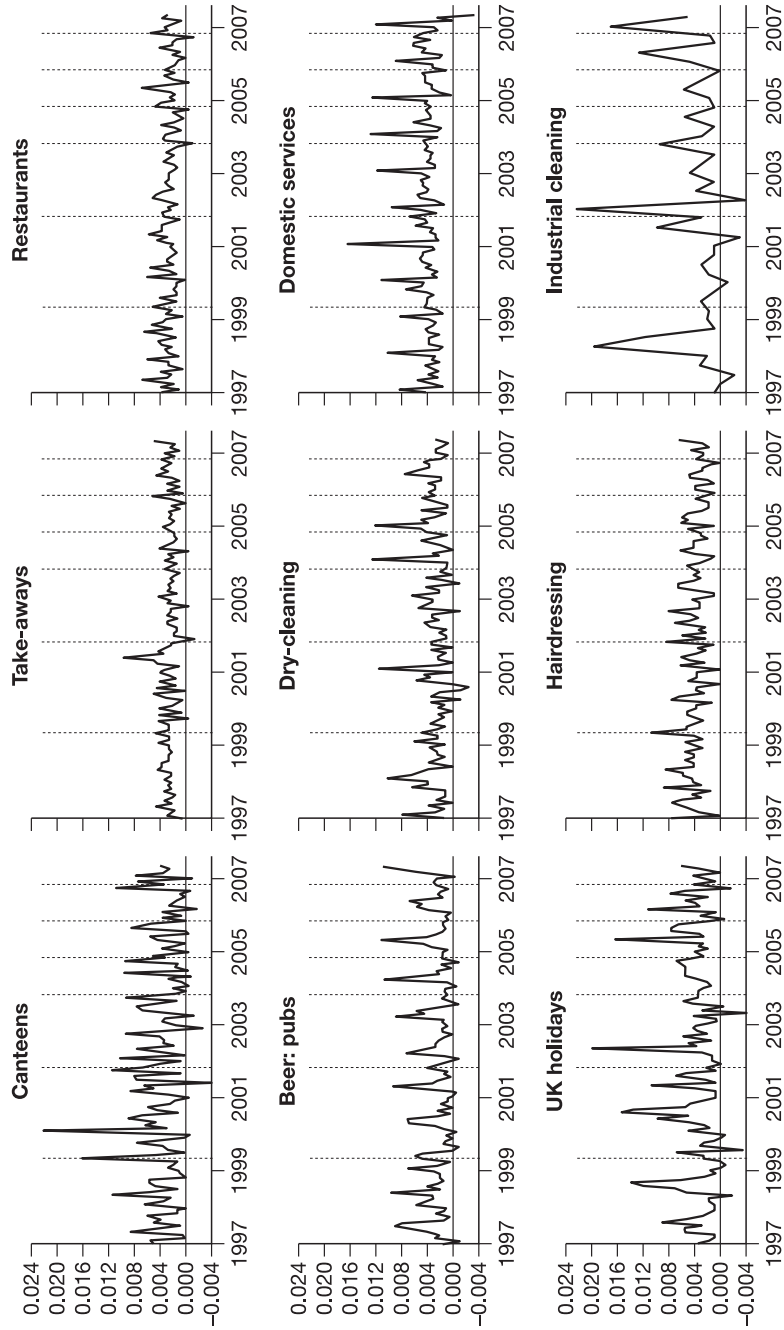


TABLE 5
Pulse dummy estimates of significant changes in log monthly retail prices: minimum-wage goods, 1996–2007

	<i>Canteens</i>	<i>Restaurants</i>	<i>Take-away food</i>	<i>Beer: pubs</i>	<i>Dry-cleaning</i>
Aug. 1996	0.008 (0.003)*	April 1997	0.004 (0.001)*	June 1996	0.003 (0.001)*
April 1998	0.008 (0.003)*	Nov. 1997	0.003 (0.001)*	June 1997	0.007 (0.001)*
April 1999	0.013 (0.003)*	Aug. 1998	0.004 (0.001)*	July 1997	0.006 (0.001)*
Jan. 2000	0.019 (0.003)*	Oct. 1998	0.003 (0.001)*	May 1998	0.008 (0.001)*
May 2001	-0.008 (0.003)*	April 1999	0.003 (0.001)*	April 2001	0.007 (0.002)*
Sept. 2001	0.008 (0.003)*	Feb. 2000	0.003 (0.001)*	March 2002	0.005 (0.002)*
Sept. 2006	0.008 (0.003)*	May 2000	0.003 (0.001)*	March 2003	0.007 (0.002)*
		April 2001	0.002 (0.001)*	March 2004	0.008 (0.002)*
		Oct. 2003	-0.004 (0.001)*	April 2004	0.005 (0.002)*
		Sept. 2004	-0.003 (0.001)*	April 2005	0.009 (0.002)*
		April 2005	0.004 (0.001)*	May 2006	0.005 (0.002)*
		June 2005	-0.003 (0.001)*	March 2007	0.006 (0.002)*
		Feb. 2006	-0.003 (0.001)*	April 2007	0.009 (0.002)*
		Sept. 2006	-0.004 (0.001)*	Constant	0.002 (0.001)*
Constant	0.003 (0.001)*	Constant	0.003 (0.001)*	Adjusted R ²	0.55
Adjusted R ²	0.39	Adjusted R ²	0.46	Adjusted R ²	0.55

Table continues

TABLE 5 continued

<i>Domestic services</i>		<i>UK holidays</i>		<i>Hairdressing</i>		<i>Wine and spirits: pubs</i>		<i>Industrial cleaning</i>	
Jan. 1997	0.005 (0.001)*	July 1998	0.009 (0.001)*	Dec. 1996	0.004 (0.001)*	May 1998	0.003 (0.001)*	1996 Q3	-0.014 (0.003)*
Jan. 1998	0.007 (0.001)*	Aug. 1998	0.011 (0.001)*	Jan. 1997	-0.004 (0.001)*	April 2001	0.003 (0.001)*	1998 Q1	0.018 (0.003)*
Jan. 2000	0.008 (0.001)*	July 1999	-0.006 (0.001)*	May 1997	0.004 (0.001)*	April 2002	0.003 (0.001)*	2001 Q1	0.020 (0.003)*
Jan. 2001	0.013 (0.001)*	May 2000	0.007 (0.001)*	Oct. 1997	0.005 (0.001)*	June 2002	0.004 (0.001)*	2006 Q1	0.011 (0.003)*
Jan. 2002	0.006 (0.001)*	July 2000	0.013 (0.001)*	April 1998	0.005 (0.001)*	Jan. 2003	-0.003 (0.001)*	2006 Q4	0.015 (0.003)*
Jan. 2003	0.008 (0.001)*	Aug. 2000	0.011 (0.001)*	April 1999	0.007 (0.001)*	March 2004	0.003 (0.001)*		
Jan. 2004	0.009 (0.001)*	April 2001	0.008 (0.001)*	March 2000	0.004 (0.001)*	Jan. 2005	-0.004 (0.001)*		
Jan. 2005	0.009 (0.001)*	April 2002	0.017 (0.001)*	Aug. 2000	-0.004 (0.001)*	Jan. 2006	-0.003 (0.001)*		
Jan. 2006	0.005 (0.001)*	April 2003	-0.007 (0.001)*	Jan. 2001	-0.004 (0.001)*	May 2006	0.003 (0.001)*		
Jan. 2007	0.008 (0.001)*	April 2005	0.013 (0.001)*	Oct. 2001	0.005 (0.001)*	April 2007	0.006 (0.001)*		
April 2007	-0.007 (0.001)*	Feb. 2006	0.008 (0.001)*	Sept. 2006	-0.004 (0.001)*	Constant	0.002 (0.002)	Constant	0.002 (0.001)*
Constant	0.004 (0.001)*	Constant	0.003 (0.001)*	Constant	0.004 (0.001)*	Adjusted R ²	0.48	Adjusted R ²	0.70
Adjusted R ²	0.71	Adjusted R ²	0.62	Adjusted R ²	0.42	Adjusted R ²		Adjusted R ²	

Notes: Standard errors given in parentheses. * significant at 5 per cent level. See Table 3 for sample sizes.

April, around the time of the Budget. The introduction of the NMW in April 1999 certainly generated the largest cost increase compared with any of the subsequent upratings. However, there is no evidence in the monthly pulse dummy estimates in Table 5 that price rises were any higher during this period.

The 'pulse dummy' exercise was repeated for each of the 35 minimum-wage items. The results are available on request, but it is apparent that for several items, prices did appear to rise significantly in the month in which the minimum wage was introduced, the period that also generated the largest rise in labour costs compared with subsequent increases. For some items (for example, pub meals, school meals and take-away drinks), these price increases were similar in size to those observed in the months and years prior to the introduction of the NMW; for others (notably secondary-school dinners), the April 1999 price increase was significantly higher. For other items, notably pub drinks, there is no significant April 1999 effect, consistent with the more aggregated results in Table 4. Again this gives some support to the idea that certain items may have larger fixed costs of changing or may have different demand elasticities from others. However, it is harder to detect any clustering of price rises in the months in which the NMW was subsequently upgraded. For example, April or May continues to be the month in which the prices of many pub drinks and haircuts are raised.

In summary, the evidence of significant price changes in the periods that correspond immediately to the uprating of the NMW is mixed. There is perhaps more evidence, however, to suggest that the introduction of the NMW in April 1999, and the larger cost shock associated with this compared with subsequent NMW upratings, coincided with significant price increases for some industries.

This does not necessarily mean that prices did not change as a result, only that there is less evidence of single coordinated price hikes. We therefore now examine whether the relative prices of minimum-wage goods changed over a longer period. If prices are changed infrequently, the inflation adjustment process would be slow and we would not necessarily expect spikes in inflation but rather a very slow increase in inflation. As such, using monthly price indices, this impact would not be visible. Any price adjustment would be long-lasting and the total impact of shocks on prices could only be measured in the long run.

2. Difference-in-difference estimates

In order to measure the rate of inflation of minimum-wage goods over a longer period of time relative to other goods, we estimate a simple difference-in-difference regression model pooled over the monthly observations on the *annual* inflation rate prevailing in each month of both

minimum-wage and non-minimum-wage goods over the period January 1997 to (a) December 2003 and (b) December 2007.

$$(4) \quad \begin{aligned} \text{Inflation}_{it} = & b_0 + b_1 \text{MinWageGood} + b_2 \text{April99} \\ & + b_3 \text{MinWageGood} \times \text{April99} + u_{it} \end{aligned}$$

where *MinWageGood* is a dummy variable to indicate whether good *i* is a minimum-wage good, belonging to the 10 industries with the highest shares of minimum-wage expenses in total costs highlighted in Table 1 (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 *MinWageGood*, b_1 , gives the difference between the average yearly inflation rate for non-minimum-wage goods and minimum-wage goods in the period before the minimum wage was introduced. The coefficient on *April99*, 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 – for example, aggregate retail prices are influenced in part by the prices of imports, which are not subject to the same labour-input cost pressures – we compare prices 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 that do not employ as large a fraction of minimum-wage workers as the other goods set out in Table 1.²²

Table 6 confirms the impression of Figure 1, that price inflation of these minimum-wage sectors was significantly higher than the aggregate inflation rate in the period leading up to the introduction of the NMW. On average, the annual inflation rate for minimum-wage goods was around 1 percentage point higher than general RPI inflation over the period (panel i, Min. wage, column 1), some 2 points higher than RPI inflation excluding housing (panel ii, Min. wage, column 1) and little different from inflation for a basket of non-minimum-wage goods (panel iii, Min. wage, column 1). If there were complete pass-through of costs over this period, prices might be expected to rise by around 8 per cent among minimum-wage sectors, some 1.6

²²These goods are soft drinks, alcohol off-sales, sweets, tobacco, books, furniture and gardening products. These are not free of minimum-wage influences since many of them will be sold in shops whose staff are covered by the NMW. A graph of their respective inflation rates is available on request.

TABLE 6
Difference-in-difference estimates of relative price responsiveness of minimum-wage goods (yearly inflation rate), 1997–2003

	(1) All NMW goods	(2) Take-away food	(3) Hair services	(4) Canteen meals	(5) Beer: pubs	(6) Wine and spirits: pubs	(7) Domestic services	(8) Restaurant meals	(9) Dry- cleaning	(10) Hotels (UK)	(11) Industry cleaning
Constant	3.03 (0.19)*	3.09 (0.19)*	3.05 (0.20)*	3.04 (0.25)*	3.05 (0.18)*	3.05 (0.18)*	3.10 (0.18)*	3.08 (0.18)*	3.05 (0.20)*	3.01 (0.31)*	3.00 (0.17)*
Min. wage	1.12 (0.17)*	0.33 (0.18)	2.60 (0.20)*	1.80 (0.19)*	1.07 (0.18)*	0.48 (0.17)*	1.24 (0.17)*	0.73 (0.18)*	0.80 (0.26)*	1.05 (0.28)*	-2.27 (0.59)*
April 99+	-0.91 (0.21)*	-0.92 (0.21)*	-0.93 (0.21)*	-0.92 (0.22)*	-0.92 (0.21)*	-0.92 (0.21)*	-0.91 (0.21)*	-0.92 (0.22)*	-0.93 (0.21)*	-0.92 (0.21)*	-0.62 (0.22)*
Min. wage × April 99+	0.71 (0.24)*	0.70 (0.26)*	0.32 (0.28)	1.43 (0.31)*	-0.44 (0.25)	0.50 (0.24)*	2.21 (0.24)*	0.52 (0.25)*	0.05 (0.33)	1.11 (0.46)*	1.19 (0.64)*
i. Relative to RPI											
Constant	2.10 (0.13)*	2.16 (0.10)*	2.13 (0.13)*	2.11 (0.19)*	2.12 (0.09)*	2.12 (0.11)*	2.17 (0.09)*	2.15 (0.10)*	2.13 (0.13)*	2.08 (0.28)*	2.40 (0.08)*
Min. wage	2.06 (0.09)*	1.27 (0.09)*	3.54 (0.17)*	2.74 (0.11)*	2.00 (0.11)*	1.41 (0.09)*	2.17 (0.07)*	1.66 (0.09)*	1.74 (0.22)*	1.98 (0.25)*	-1.68 (0.58)*
April 99+	-0.64 (0.07)*	-0.64 (0.08)*	-0.65 (0.08)*	-0.64 (0.08)*	-0.65 (0.07)*	-0.64 (0.07)*	-0.63 (0.08)*	-0.64 (0.07)*	-0.65 (0.08)*	-0.64 (0.08)*	-0.87 (0.10)*
Min. wage × April 99+	0.44 (0.13)*	0.43 (0.16)*	0.05 (0.20)	1.16 (0.24)*	-0.71 (0.14)*	0.23 (0.12)	1.93 (0.11)*	0.25 (0.13)	-0.22 (0.26)	0.84 (0.41)*	1.45 (0.60)*
ii. Relative to RPI excluding housing											

Table continues

TABLE 6 continued

	(1) <i>All NMW goods</i>	(2) <i>Take-away food</i>	(3) <i>Hair services</i>	(4) <i>Canteen meals</i>	(5) <i>Beer: pubs</i>	(6) <i>Wine and spirits: pubs</i>	(7) <i>Domestic services</i>	(8) <i>Restaurant meals</i>	(9) <i>Dry-cleaning</i>	(10) <i>Hotels (UK)</i>	(11) <i>Industry cleaning</i>
1997–2003											
	iii. Relative to non-minimum-wage goods										
Constant	4.48 (0.31)*	4.48 (0.38)*	4.47 (0.38)*	4.47 (0.38)*	4.47 (0.38)*	4.47 (0.38)*	4.48 (0.38)*	4.48 (0.38)*	4.47 (0.38)*	4.47 (0.38)*	1.23 (0.23)*
Min. wage	-0.34 (0.29)	-1.14 (0.29)*	1.14 (0.32)*	0.34 (0.29)	-0.40 (0.30)	-0.99 (0.29)*	-0.23 (0.28)	-0.74 (0.29)*	-0.66 (0.35)	-0.42 (0.36)	-0.51 (0.62)
April 99+	-1.06 (0.33)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	-1.07 (0.34)*	0.19 (0.38)
Min. wage × April 99+	0.85 (0.35)*	0.85 (0.37)*	0.47 (0.38)	1.57 (0.40)*	-0.30 (0.35)	0.64 (0.35)	2.35 (0.35)*	0.66 (0.35)	0.20 (0.41)	1.26 (0.52)*	0.38 (0.71)

Notes: All regressions include monthly dummies. Newey–West standard errors robust to one lag given in parentheses. * significant at 5 per cent level.

percentage points a year.²³ If we take the growth in the RPI as the counterfactual comparison, then Table 6 indicates that this is more than twice the observed differential rise in prices over the same period (panel i, Constant, column 1). As such, the results do not seem to conform to what might be expected if there were complete pass-through.

The difference-in-difference estimates suggest that in the period after the minimum wage was introduced, relative retail price inflation of these minimum-wage goods was, on average, an *additional* 0.7 points higher (panel i, interaction term, column 1). So not only were prices of minimum-wage goods rising faster in the period before the minimum wage, but also they rose by an even greater rate relative to other goods in the period after its introduction.²⁴ When benchmarked against retail prices excluding housing, the central estimate of the relative increase is around 0.4 points (panel ii, interaction term, column 1); and when benchmarked against the basket of other goods, the relative increase is around 0.9 points (panel iii, interaction term, column 1).

Again these average estimates disguise differences in the individual price series. However, the extent of the price rises is not correlated strongly with the NMW cost share rankings outlined in Table 1. If we use the estimated NMW share in total costs rather than a simple dummy variable (not shown but available on request), the interaction term is insignificantly different from zero. Table 1 suggested that take-away food might be expected to face the largest upward pressure on prices from the NMW. However, it seems that the prices of domestic services rose most sharply in the period after April 1999, by more than 2 percentage points above the benchmark inflation rate (panel i, interaction term, column 7). In contrast, the relative price of hairdressing services, with a higher NMW share, changed little after April 1999 (panel i, interaction term, column 3).²⁵ Together these results suggest that a simple pass-through model of price changes may not hold.

When benchmarked against the RPI excluding housing, the sector rankings are unchanged but any differential price effects in the period after April 1999 are smaller, with the exception of industrial cleaning services. Nevertheless, the inflation rates for take-away food, canteen meals, hotel services and domestic services all grew significantly faster in the period after April 1999. When compared with the basket of non-minimum-wage goods, it is apparent that while inflation rates between the minimum-wage and non-

²³Assuming an average NMW share in total costs of 20 per cent, then the 17 per cent rise in the NMW observed between 1998 and 2003 on top of the estimated 20 per cent rise in wages generated by the introduction of the NMW equates to an 8 per cent rise in total costs.

²⁴The set of estimated coefficients in column 1 indicate that the inflation rate for minimum-wage goods was 3.9 per cent in the period after April 1999 compared with the retail price index average of 2.2 per cent for the same period.

²⁵So prices of hairdressing services continued to rise faster than general prices (Min. wage, column 3), but this price differential did not change significantly in the period after April 1999.

minimum-wage sectors were not significantly different in the period before April 1999, they became significantly higher after April 1999 for the same four sectors of take-away food, canteen meals, hotel services and domestic services.

The equivalent regressions for the individual item inflation series relative to the RPI all-items series are given in Table A2 of the appendix. The estimates of the minimum-wage effect are rather varied. Inflation after April 1999 is faster than average for some items and slower than average for others. However, the inflation rate for some items – notably, burgers, (evening) restaurant meals, canteen meals, fish and chips, domestic services and hairdressing services – increased relative to the average inflation rate in the four years after the NMW was introduced. Since most of these items, with the exception of haircuts, belong to the sectors that show significant subsequent rises in the inflation rate in Table 6, this seems to be consistent with the pattern of price behaviour already observed. This is also again suggestive of the idea that a subset of items may change more in response to a cost shock.

In summary, it seems that there is some evidence to suggest that the prices of domestic services, hotel services, canteen meals, restaurant meals and take-away food all rose significantly more – in the order of 0.5 to 2 percentage points – than the prices of other goods in the period after the minimum wage was introduced.

3. Robustness checks

Table 7 extends the window of observation by four years to cover the end of 2007. It seems that the inflation effects of minimum-wage goods are smaller when compared with the aggregate inflation rate but little changed when benchmarked against the inflation rate for the basket of non-minimum-wage goods.²⁶ While the 2004 rise in the NMW, of 7.8 per cent, was relatively large, the average annual increase over 2004–07 is lower than in the period 1999–2003. Allied to the apparent falls in the share of NMW workers in each sector observed in Table 1 and any (unobserved) productivity improvements, this may explain the smaller response over the longer period. As such, the impact of a given percentage change in the NMW on prices might be expected to decline over time. The item-level equivalent regressions over the extended period are available on request. Again the prices of certain items within a sector appear to respond more than others.

²⁶The aggregate inflation rate was some 0.5 points higher in the period 2003–07 than between 1999 and 2003. The inflation rate among the basket of non-minimum-wage goods was little changed over the same two time periods, which explains the general result. If we include seven interaction dummies (one for each NMW period) rather than one, the estimated coefficients – available on request – confirm the idea of a stronger price response in the earlier period, though larger price responses do not always follow larger percentage rises in the NMW.

TABLE 7
Difference-in-difference estimates of relative price responsiveness of minimum-wage goods (yearly inflation rate), 1997–2007

1997–2007	All NMW goods	Take-away food	Hair services	Canteen meals	Beer: pubs	Wine and spirits: pubs	Domestic services	Restaurant meals	Dry-cleaning	Hotels (UK)	Industry cleaning
Constant	3.06 (0.19)*	3.05 (0.18)*	3.05 (0.19)*	3.10 (0.24)*	3.01 (0.17)*	3.00 (0.18)*	3.04 (0.18)*	3.08 (0.17)*	2.98 (0.19)*	2.98 (0.19)*	3.00 (0.30)*
Min. wage	1.12 (0.17)*	0.33 (0.17)	2.60 (0.22)*	1.80 (0.19)*	1.07 (0.18)*	0.48 (0.17)*	1.24 (0.16)*	0.73 (0.17)*	0.80 (0.25)*	1.05 (0.27)*	-2.27 (0.43)*
April 99+	-0.61 (0.21)*	-0.61 (0.19)*	-0.61 (0.19)*	-0.61 (0.19)*	-0.62 (0.19)*	-0.62 (0.18)*	-0.61 (0.19)*	-0.61 (0.19)*	-0.62 (0.19)*	-0.62 (0.19)*	-0.45 (0.36)
Min. wage × April 99+	0.29 (0.21)	0.19 (0.23)	-0.30 (0.27)	0.33 (0.30)	-0.59 (0.22)*	-0.01 (0.21)	1.73 (0.20)*	-0.06 (0.22)	0.18 (0.30)	1.17 (0.37)*	1.19 (0.50)*
i. Relative to RPI											
Constant	2.13 (0.11)*	2.13 (0.10)*	2.13 (0.12)*	2.18 (0.19)*	2.09 (0.10)*	2.09 (0.11)*	2.17 (0.10)*	2.15 (0.10)*	2.06 (0.13)*	2.06 (0.23)*	2.41 (0.28)*
Min. wage	2.06 (0.09)*	1.27 (0.09)*	3.54 (0.17)*	2.74 (0.11)*	2.00 (0.11)*	1.41 (0.09)*	2.17 (0.07)*	1.66 (0.09)*	1.74 (0.21)*	1.98 (0.24)*	-1.69 (0.39)*
April 99+	-0.54 (0.09)*	-0.55 (0.09)*	-0.55 (0.09)*	-0.54 (0.09)*	-0.55 (0.09)*	-0.55 (0.09)*	-0.55 (0.09)*	-0.54 (0.09)*	-0.54 (0.09)*	-0.55 (0.09)*	-0.68 (0.32)*
Min. wage × April 99+	0.23 (0.13)	0.13 (0.15)	-0.36 (0.21)	0.27 (0.24)	-0.66 (0.14)*	-0.07 (0.13)	1.66 (0.12)*	-0.13 (0.14)	0.12 (0.26)	1.10 (0.33)*	1.42 (0.46)*
ii. Relative to RPI excluding housing											

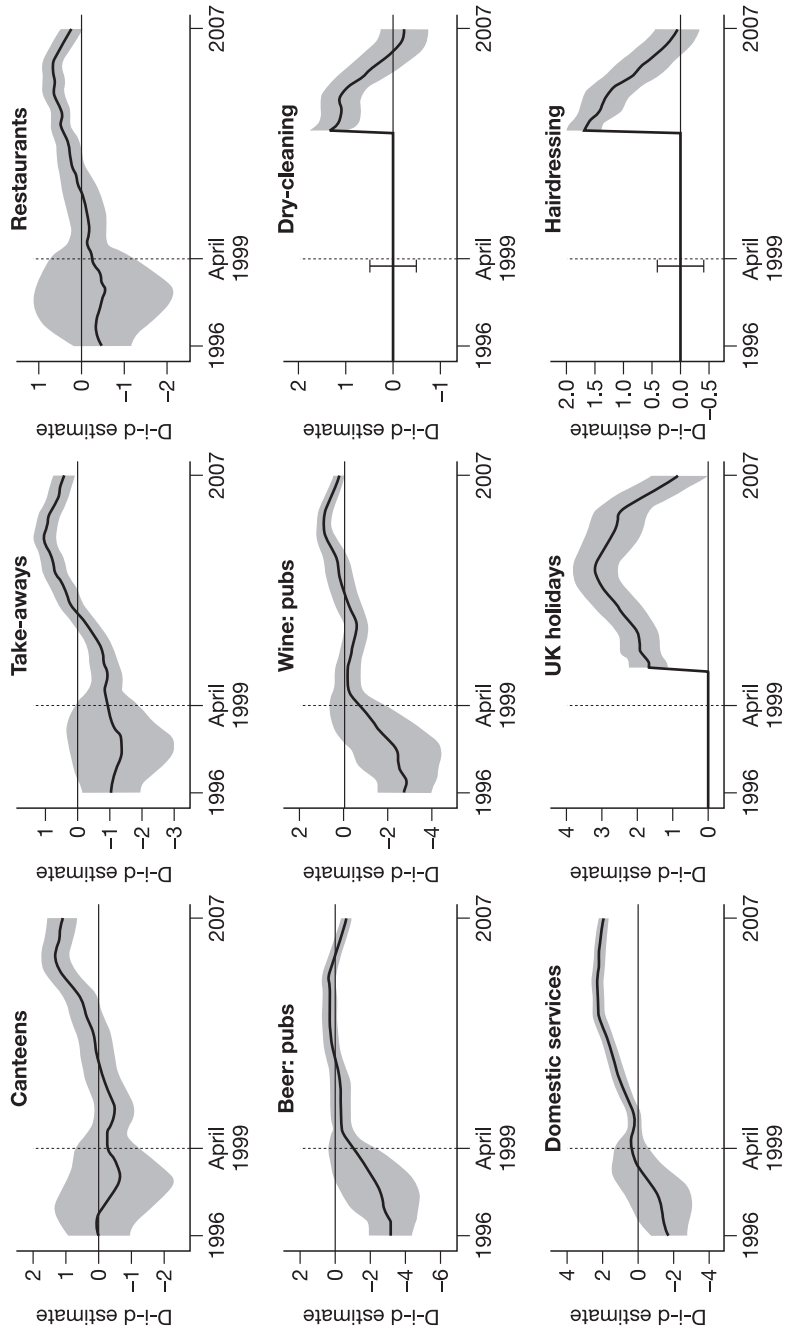
Table continues

TABLE 7 continued

1997–2007	All NMW goods	Take-away food	Hair services	Canteen meals	Beer: pubs	Wine and spirits: pubs	Domestic services	Restaurant meals	Dry-cleaning	Hotels (UK)	Industry cleaning
Constant	4.54 (0.31)*	4.54 (0.31)*	4.54 (0.37)*	4.56 (0.36)*	4.53 (0.37)*	4.53 (0.37)*	4.54 (0.37)*	4.55 (0.36)*	4.53 (0.37)*	4.53 (0.37)*	1.23 (0.23)*
Min. wage	-0.34 (0.29)	-1.13 (0.29)*	1.14 (0.32)*	0.34 (0.30)	-0.40 (0.30)	-0.99 (0.29)*	-0.23 (0.29)	-0.74 (0.29)*	-0.66 (0.35)	-0.42 (0.36)	-0.51 (0.62)
April 99+	-1.20 (0.32)*	-1.20 (0.32)*	-1.21 (0.33)*	-1.20 (0.33)*	-1.21 (0.33)*	-1.21 (0.33)*	-1.21 (0.32)*	-1.21 (0.33)*	-1.21 (0.33)*	-1.21 (0.33)*	0.19 (0.38)
Min. wage × April 99+	0.89 (0.33)*	0.89 (0.34)*	0.29 (0.37)	0.93 (0.39)*	-0.01 (0.34)	0.59 (0.33)	2.32 (0.33)*	0.53 (0.34)	0.77 (0.40)	1.76 (0.45)*	0.38 (0.71)

Notes: All regressions include monthly dummies. Newey–West standard errors robust to one lag given in parentheses. * significant at 5 per cent level.

FIGURE 3
Difference-in-difference robustness checks (moving intervention threshold)



Finally, to test whether these relative price movements were also present before the NMW was introduced, Figure 3 graphs the results of a set of difference-in-difference estimates where the treatment intervention period is allowed to vary. The left-most estimates are based on data using a sample window in which the NMW was not in existence. Then the window is moved one month forward, keeping the sample size and the number of before- and after-treatment periods fixed. The vertical line in the graphs indicates the first estimation period in which a time period relating to a month after the NMW was introduced appears in the treatment dummy. Thereafter, the treatment window includes successively more NMW periods, culminating in the final set of estimates where all periods in the treatment window correspond to periods after the NMW. This is the same period as the one on which the estimates in Table 6 are based. A necessary condition for the existence of an NMW effect on prices would therefore be that the difference-in-difference estimates should become larger as more NMW periods enter the treatment window. This is exactly what is seen for six of the nine minimum-wage price series we observe. The exceptions are the hairdressing, dry-cleaning and UK hotel sectors, where the difference-in-difference effect falls over the period.²⁷ This suggests that prices in these three sectors were rising faster than aggregate inflation before the NMW arrived, consistent with the patterns observed in Figure 1.

V. Conclusion

There may be some evidence to suggest that firms that employ minimum-wage workers could have passed on some of the higher labour costs resulting from the minimum wage in the form of higher prices. The prices of several minimum-wage sectors (notably, domestic services, hotel services, canteen meals, restaurant meals and take-away food) rose by a significantly greater rate – in the order of 0.5 to 2 percentage points a year – than the prices of other goods in the period after the minimum wage was introduced. There is also some evidence that low-wage sectors may change the prices of a subset of their products in response to an NMW increase, though more work needs to be done here on more disaggregated data when available.

The extent of any observed relative price increases in minimum-wage sectors does not appear to rise in line with the share of minimum-wage workers in total costs, suggesting that a simple pass-through model of price changes may not hold. There is less evidence that prices of minimum-wage goods rise in the month of any minimum-wage upgrade – with the possible exception of April 1999, when the minimum was introduced and the magnitude of the wage cost shock was greater than in any subsequent

²⁷The price data for these series begin in 1995 (hotels) and 1997 (hairdressing and dry-cleaning), so estimates do not exist before these periods.

upgrade. Nor does there appear to be much evidence of anticipation effects in specific months. Firms do not appear to change prices when the new level of the NMW is announced six months prior to its introduction. Rather, any effects on prices appear to accumulate gradually over time.

Appendix

See next page

TABLE A1
Minimum-wage changes and monthly log price changes of minimum-wage items

	Restaurant: coffee	Pub: sandwich	Pub: hot meal	Eat-in: burger	Restaurant: main course	Restaurant: sweet	Restaurant: lunch	Dinner: primary school	Cafeteria: primary school	Dinner: secondary school
Min. wage adjusted _t	0.002 (0.002)	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.003)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.004 (0.003)	0.004 (0.008)	0.021 (0.012)
Min. wage adjusted _{t+1}	0.002 (0.001)	-0.001 (0.002)	0.004 (0.001)*	0.000 (0.001)	-0.001 (0.001)	0.000 (0.001)	-0.003 (0.002)	0.001 (0.003)	0.000 (0.004)	0.002 (0.004)
Min. wage adjusted _{t+2}	-0.000 (0.001)	0.001 (0.002)	0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	0.004 (0.002)	-0.002 (0.001)	0.001 (0.001)	0.001 (0.003)	0.004 (0.002)
Min. wage adjusted _{t-1}	0.002 (0.001)*	0.001 (0.002)	-0.001 (0.001)	-0.003 (0.002)	-0.001 (0.002)	0.001 (0.001)	-0.003 (0.001)*	-0.001 (0.002)	0.001 (0.008)	-0.000 (0.007)
Min. wage adjusted _{t-2}	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.004 (0.004)	0.002 (0.001)*	0.002 (0.001)	0.002 (0.002)	-0.001 (0.003)	-0.000 (0.003)	0.002 (0.004)
Constant	0.004 (0.001)*	0.005 (0.001)*	0.003 (0.001)*	0.002 (0.003)	0.001 (0.001)*	0.001 (0.001)	0.006 (0.000)*	0.006 (0.003)*	0.003 (0.006)	0.013 (0.007)
N	132	151	151	139	107	107	107	96	96	96

Table continues

TABLE A1 continued

	<i>Cafeteria: secondary school</i>	<i>Staff canteen: main course</i>	<i>Staff canteen: sweet</i>	<i>Take-away: fish and chips</i>	<i>Take-away: sandwich</i>	<i>Take-away: coffee</i>	<i>Take-away: tea</i>	<i>Pub: bitter (pint)</i>	<i>Pub: lager (pint)</i>	<i>Pub: stout (pint)</i>
Min. wage adjusted _t	0.003 (0.008)	0.003 (0.002)	0.005 (0.004)	-0.001 (0.001)	0.002 (0.002)	0.005 (0.002)*	0.006 (0.003)*	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)
Min. wage adjusted _{t+1}	0.002 (0.003)	-0.001 (0.002)	-0.000 (0.002)	0.002 (0.001)*	-0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)*	0.001 (0.001)
Min. wage adjusted _{t+2}	0.001 (0.002)	-0.002 (0.001)	-0.001 (0.003)	0.000 (0.001)	0.002 (0.002)	0.002 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)
Min. wage adjusted _{t-1}	0.008 (0.006)	-0.000 (0.002)	-0.001 (0.002)	0.002 (0.002)	0.000 (0.001)	0.002 (0.001)	0.002 (0.002)	-0.002 (0.001)	-0.000 (0.001)	-0.001 (0.001)
Min. wage adjusted _{t-2}	-0.000 (0.004)	-0.001 (0.002)	-0.001 (0.002)	0.000 (0.001)	-0.002 (0.002)	0.001 (0.001)	0.003 (0.003)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)
Constant	0.005 (0.004)	0.007 (0.002)*	0.012 (0.006)*	0.006 (0.002)*	0.003 (0.002)	0.002 (0.001)*	0.002 (0.001)	0.001 (0.001)	0.002 (0.001)	0.001 (0.001)
<i>N</i>	96	151	120	151	151	151	151	151	96	151

Table continues

TABLE A1 continued

	Pub: cider (bottle)	Pub: lager (bottle)	Pub: whisky	Pub: vodka	Pub: wine (glass)	Pub: wine (bottle)	Pub: mixer	Pub: liqueur	Domestic cleaner	Laundrette: wash
Min. wage adjusted _t	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.003 (0.001)*	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.003 (0.002)
Min. wage adjusted _{t+1}	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)
Min. wage adjusted _{t+2}	0.001 (0.001)	0.001 (0.001)	0.000 (0.000)	0.001 (0.000)	-0.001 (0.002)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.002)
Min. wage adjusted _{t-1}	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.002)	0.000 (0.001)	-0.001 (0.001)	0.002 (0.001)
Min. wage adjusted _{t-2}	0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.002 (0.002)
Constant	0.002 (0.002)	0.003 (0.002)	0.002 (0.001)	0.002 (0.001)*	0.003 (0.001)*	0.001 (0.001)	0.002 (0.001)*	0.003 (0.001)*	0.010 (0.002)*	0.004 (0.001)*
N	151	108	151	151	96	132	126	126	151	96

Table continues

TABLE A1 continued

	<i>Dry-cleaning: suit</i>	<i>Haircut: men</i>	<i>Haircut: women</i>	<i>Highlights: women</i>	<i>Minicab fare</i>
Min. wage adjusted _{<i>t</i>}	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.001 (0.002)	0.001 (0.002)
Min. wage adjusted _{<i>t+1</i>}	-0.000 (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)
Min. wage adjusted _{<i>t+2</i>}	0.001 (0.001)	-0.001 (0.001)	0.002 (0.001)	-0.000 (0.002)	0.002 (0.002)
Min. wage adjusted _{<i>t-1</i>}	0.003 (0.001)*	-0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.001 (0.002)
Min. wage adjusted _{<i>t-2</i>}	-0.000 (0.001)	-0.002 (0.001)	-0.000 (0.001)	0.001 (0.002)	0.002 (0.002)
Constant	0.006 (0.001)*	0.004 (0.001)*	0.003 (0.001)*	0.003 (0.001)*	0.015 (0.003)*
<i>N</i>	151	151	151	151	151

Notes: All regressions include year and month dummies. Newey–West standard errors robust to one lag given in parentheses. * significant at 5 per cent level.

TABLE A2

Difference-in-difference estimates of relative price responsiveness of minimum-wage goods (yearly RPI inflation rate): item level

1997–2003	Restaurant: coffee	Pub: sandwich	Pub: hot meal	Eat-in: burger	Restaurant: main course	Restaurant: sweet	Restaurant: lunch	Dinner: primary school	Cafeteria: primary school	Dinner: secondary school
Constant	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*
Min. wage	1.58 (0.25)*	1.98 (0.16)*	0.67 (0.21)*	-1.00 (0.43)*	-0.55 (0.21)*	0.66 (0.24)*	0.75 (0.30)*	1.72 (0.21)*	2.19 (0.34)*	6.33 (0.81)*
April 99+	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*
Min. wage × April 99+	0.77 (0.32)*	-0.04 (0.27)	0.51 (0.31)	1.71 (0.50)*	1.20 (0.27)*	0.76 (0.30)*	0.03 (0.35)	-0.31 (0.36)	-0.47 (0.58)	-4.56 (0.96)*

1997–2003	Cafeteria: secondary school	Staff canteen: main course	Staff canteen: sweet	Take-away: fish and chips	Take-away: sandwich	Take-away: coffee	Take-away: tea	Pub: bitter (pint)	Pub: lager (pint)	Pub: stout (pint)
Constant	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*
Min. wage	2.04 (0.27)*	0.95 (0.23)*	2.12 (0.20)*	0.50 (0.41)	1.07 (0.19)*	1.41 (0.25)*	1.63 (0.31)*	1.05 (0.17)*	0.87 (0.18)*	0.55 (0.20)*
April 99+	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*
Min. wage × April 99+	0.52 (0.42)	2.32 (0.33)*	2.80 (0.55)*	1.95 (0.48)*	0.55 (0.28)	0.33 (0.36)	0.80 (0.45)	-0.31 (0.25)	-0.30 (0.24)	-0.03 (0.25)

Table continues

TABLE A2 continued

	Pub: cider (bottle)	Pub: lager (bottle)	Pub: whisky	Pub: vodka	Pub: wine (glass)	Pub: wine (bottle)	Pub: mixer	Pub: liqueur	Domestic cleaner	Laundrette: wash
1997-2003										
Constant	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*
Min. wage	0.81 (0.23)*	1.93 (0.17)*	0.58 (0.18)*	0.57 (0.18)*	0.77 (0.23)*	-0.55 (0.17)*	1.04 (0.28)*	0.27 (0.18)	1.48 (0.23)*	2.45 (0.43)*
April 99+	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*
Min. wage × April 99+	-0.24 (0.29)	-1.04 (0.25)*	0.53 (0.24)*	0.47 (0.25)	0.21 (0.29)	1.29 (0.23)*	0.43 (0.33)	0.60 (0.25)*	2.59 (0.32)*	-0.74 (0.48)
1997-2003										
Constant	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*	3.16 (0.15)*
Min. wage	0.54 (0.22)*	2.72 (0.30)*	2.88 (0.28)*	2.88 (0.28)*	2.88 (0.28)*	2.88 (0.28)*	3.03 (0.21)*	3.03 (0.21)*	2.91 (0.34)*	2.91 (0.34)*
April 99+	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*	-0.99 (0.21)*
Min. wage × April 99+	0.41 (0.30)	0.62 (0.37)	0.62 (0.37)	0.62 (0.37)	0.90 (0.35)*	0.90 (0.35)*	-0.16 (0.27)	-0.16 (0.27)	1.43 (0.43)*	1.43 (0.43)*

Notes: See Table 6.

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