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Eating Out in the British Isles

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This paper presents a comparative analysis of the foodservice industries in both Ireland and the UK. Each industry is analysed separately using the most recently available Household Budget Survey datasets for Ireland and the most recent Expenditure and Food Datasets for the UK and is disaggregated into quick-service (fast food and takeaway) and full-service (hotel and restaurant meals), the two largest components of each industry. A double hurdle model, adjusted for misspecification, is used in this analysis. A number of variables affect both dependent variables in the same way, for example, income and age and the number of workers variable, but differences are apparent throughout the discussion. Perhaps the most interesting point to highlight is how similar the Irish and UK results for both quick-service and full-service expenditure have been despite the UK industry being at a more mature stage of growth. Health awareness significantly reduces the likelihood of participation and reduces the amount of expenditure on quick-service but no similar effect is observed for full-service in either Ireland or the UK, which in itself is significant as the UK industry is more developed than its Irish equivalent.

Keywords: Food-Away-From-Home, Quick-service, Full-service, Double Hurdle Model, Box-Cox Transformation**.**

JEL Classification: D12, D13, C34, R2.

1. Introduction

Over the last decade the Irish economy has experienced significant growth in incomes, household expenditure and labour force participation as the economy has converged toward the level of European neighbours such as Britain. As a result, food consumed away from home (FAFH) constitutes an increasingly important part of Irish food expenditure.[1] Between 1987 and 1999/2000 the proportion of total food expenditure allocated to FAFH increased from 14 per cent to 23 per cent as illustrated in Table 1. Previous studies analysing the determinants of FAFH in Europe have tended to focus on the entire market with little regard given for the diversity of the disaggregated sectors considered in this study, namely quick-service (fast-food and take-away) and full-service (hotel and restaurant meals).[2] Given the diversity of outlets within the foodservice sector, as shown in Table 2, a disaggregated approach is important in understanding the dynamics of the FAFH industry. In this paper a comparative analysis of FAFH expenditure in the UK will be undertaken and accordingly the factors determining expenditure on both quick-service and full-service meals by both Irish and UK households will be analysed separately.

INSERT TABLES 1 AND 2 ABOUT HERE

As illustrated in Tables 3 and 4 the UK market is at a more mature stage of development than its Irish equivalent and one of the chief rationales for this analysis is that it should assist in projecting growth in the Irish FAFH market into the future. Bord Bia (2004) valued the Irish foodservice industry at €3.7 billion, as against €3.5 billion in 2003 and the most recent valuation is €5.7 billion (Mintel, 2007). The UK foodservice industry was valued at €31.1 billion in 2004 making it the largest single employer in the UK food chain with some 1.5 million employees (DEFRA, 2007) and it has been estimated that the industry will reach a value of £51 billion by 2012 (Lewis, 2006).[3] In this study FAFH is further defined as meals prepared or obtained from commercial facilities solely. This is similar to the approach taken by McCracken and Brandt (1987) who argue, that including non-commercial sources of expenditure skewed the results. Losing the school meal sector does not diminish this study, although this sector has come under much recent media scrutiny in the UK, as it comprises less than 1 percent of total Irish FAFH expenditure and less than 3 percent of total UK FAFH expenditure. The work canteen sector is also excluded due to the subsidised nature of many work canteens and because this category is in itself quite diverse. Tea/coffee away from home and contract catering are only recorded in the Irish and UK studies respectively and are therefore excluded on the basis that no comparison could be made in either case.

INSERT TABLES 3 AND 4 ABOUT HERE

[1] In keeping with most other studies in this area this paper classifies foods 'at home' and 'away from home' based on where the food was prepared or obtained, not where it was consumed (Lin *et al.* 2001).

[2] See for example Manrique and Jensen (1998) and Mihalopoulos and Demoussis (2001). However, one study disaggregated the Greek market into expenditure on restaurant meals, expenditure in coffee houses and expenditure on takeaway meals and canteens (Lazaridis, 2002).

[3] This is based on a compound annual growth rate (CAGR) of 4.61% between 2004 and 2012.

The paper is structured into the following sections. Section 2 describes the methodology used in the analysis while Section 3 describes the data and assumptions. Section 4 compares the results for both quick-service and full-service expenditure in Ireland and the UK. The paper concludes with Section 5.

2. Methodology

FAFH can be defined as a special type of demand as it incorporates the demand for convenience from eating away from home and the demand for pleasure derived from the social occasion (Lund, 1998). The theory of household production underpins much of the literature on FAFH consumption (Becker, 1965). In this literature household time as well as market goods and services enter the utility maximisation process and the household as both a producing and consuming unit; small firms who maximise their utility subject to not only a budget constraint but also a time constraint. This approach has been used to analyse the outsourcing of expenditures by households in areas such as meal preparation and household cleaning (Cornelisse-Vermaat, 2005). Consumers demand the convenience of time-saving in food preparation as well as demanding FAFH in itself. Limited dependent variable models, such as the tobit and the double-hurdle model, have traditionally been used in the presence of cross-sectional data. The standard tobit model was originally developed to accommodate censoring in the dependent variable (Tobin, 1958). However, this model is considered very restrictive, as it assumes that the determinants of consumption are the same as the determinants of participation. Two-stage estimators such as the double hurdle model are typically used in analyses of this nature to overcome this restriction (Cragg, 1971). Previous research on quick-service expenditure in Ireland found that the double hurdle model outperformed the tobit (Keelan *et al.* (2007) and a similar result was found for an analysis of Irish quick-service and full-service (Keelan *et al.* 2008). These models are heavily reliant on the assumptions of heteroskedasticity and normality in the error terms. When these assumptions break down the maximum likelihood estimates will be inconsistent and the models must be adjusted. Tables 5 and 6 show the results of specification tests for the presence of heteroskedasticity and non-normality in both the Irish and UK results. The statistics show that both misspecification problems were detected. To correct for heteroskedasticity multiplicative heteroskedasticity was assumed with continuous variables assumed to be the cause and a Box-Cox transformation was used to correct for non-normality. In addition the results of likelihood ratio tests comparing a Box-Cox heteroskedastic double hurdle model with a corresponding tobit model show that the double hurdle model was found to be superior to the tobit in both survey years of both countries' results. This finding is in accordance with most recent studies of FAFH expenditure patterns (Mihalopoulos and Demoussis, 2001; Pan and Jensen, 2002; Mutlu and Gracia, 2004; 2006).

INSERT TABLES 5 AND 6 ABOUT HERE

3. Data

The Irish data used in this paper are variables extracted from the 1994/5 and 1999/2000 Household Budget Surveys (HBS) collected by the Central Statistics Office (CSO) of Ireland. The survey is a random representative sample of 7,877 and 7,644 Irish households in 1994 and 1999 respectively.[4] The UK data used in

[4] The 1994/5 and 1999/2000 HBS are hereafter referred to as 1994 and 1999 while the 2001/2 and 2002/3 EFS are referred to as 2001 and 2002.

this paper are variables extracted from the 2001/2 and 2002/3 annual Expenditure and Food Surveys (EFS) collected by the Office for National Statistics and the Department for Environment, Food and Rural Affairs in the UK. The sample contains 7,473 and 6,927 households in 2001 and 2002 respectively. After purging observations with incomplete information for household characteristics the reported samples for the Irish HBS are 7,721 and 7,526 households respectively for 1994 and 1999. The corresponding figures for the UK are 7,464 and 6,924 households in 2001 and 2002, respectively.

Recent Irish studies of food expenditure patterns have indicated that the demand for convenience and health awareness are two competing factors influencing expenditure decisions in this area (Newman *et al.* 2001; 2003) and both factors are modelled in this analysis. Health awareness is proxied by expenditure on tobacco, a product with known health risks, while the demand for convenience is proxied for by the number of workers in each household, a measure of the household s' opportunity cost of time, and by a dummy variable representing commuter households. It is expected that the demand for convenience is the primary factor driving quick-service expenditure while full-service expenditure is fuelled by the demand for pleasure or leisure, since full-service dining can use up considerable time, potentially as much as home meal preparation (De Boer *et al.* 2004). In general, FAFH has been found to have lower nutritional quality than food prepared at home across international studies (Burns *et al.* 2001; Guthrie *et al.* 2002) with much of the attention devoted to the quick-service sector rather than full-service (Binkley, 2005). A primary assumption of this paper is that there exists a health-convenience trade-off with regard to FAFH expenditure. Higher educated, higher social class, higher income households and households with higher levels of health awareness are assumed to favour full-service over quick-service. Due to data limitations the same set of variables could not be used in the Irish and UK analyses and in addition exclusion restrictions must be imposed on the double hurdle model to ensure that the model can identify the parameters correctly. Statistically significant variables in each step of the double hurdle model will be retained within the model. All the variables used in this paper together with summary statistics are described in Tables 7, 8 and 9.

INSERT TABLES 7-9 ABOUT HERE

4. Results

The results of the Box-Cox double hurdle models of quick and full-service expenditure respectively, are presented in tables 10-13. The Box-Cox parameter is significantly different from zero in each model supporting its inclusion. In the discussion below quick-service expenditure in Ireland is compared with quick-service expenditure in the UK and a similar approach is adopted for full-service expenditure in both states. Additionally the participation stage results are discussed before those of the expenditure stage.

Income

The income variable has a positive and significant effect on participation in the Irish quick-service sector in both survey years. A similar effect is observed in the UK in both 2001 and 2002. Income also has a positive effect on Irish quick-service expenditure in both 1994 and 1999 but at a decreasing rate in each year. Similarly, income also has a positive and significant effect in both survey years in the UK

results but at a decreasing rate in 2001. These results indicate that quick-service expenditure may be viewed as an inferior good by households with higher incomes.

Income also has a positive effect on participation in the Irish full-service sector in both 1994 and 1999. A similar effect is observed for UK households which is also as expected. The positive effect for income on participation in both sectors of the Irish and UK FAFH markets is in agreement with many previous studies (Byrne *et al.* 1996; Jensen and Yen, 1996; Manrique and Jensen, 1998; Mutlu and Gracia, 2004). A positive coefficient for income is observed in both the 1994 and 1999 Irish full-service expenditure results and in both years of the UK full-service expenditure results. These findings are also in line with previous results: as households earn more income they purchase more leisure activities, including dining amenities (McCracken and Brandt, 1987; Byrne *et al.* 1998).

Age

The age of the household manager has a significant and negative effect on the likelihood of participating in the Irish quick-service sector, in both 1994 and 1999, supporting the hypothesis that older household managers are less likely to eat away from home than younger households. This finding is in line with several US studies (Blaylock, 2003; Blisard *et al.*, 2003). The age of the household manager also has a negative and statistically significant effect on Irish quick-service expenditure and the age squared variable is significant in the 1994 results.[5] In the UK results the age of the household manager also has a negative and significant effect on participation in the quick-service sector in 2001. In the 2001 expenditure stage results the age variable has a positive effect on quick-service expenditure while the age squared variable is also significant.

While the age variable has no significance in determining participation in the Irish full-service sector the variable has a negative and statistically significant effect on Irish full-service expenditure in both 1994 and 1999. The age variable has a significantly negative effect on participation and expenditure in the UK full-service sector in both the UK survey years. The age squared variable has a significant effect in both years of the Irish and UK results. The overall trend in the results appears to indicate that quick-service and full-service expenditure declines with age in both Ireland and the UK.

Household Size

Household size has a significantly positive effect on participation in the Irish quick-service sector in both survey years, though at a decreasing rate, as indicated by the negative sign on the squared term in 1994 and 1999. In the UK results household size also has a significantly positive effect on quick-service expenditure at a decreasing rate in both the 2001 and 2002 results. These results give credence to the argument that very large households may benefit from economies of scale in home meal preparation as the probability of participation increases at a decreasing rate with household size. Household size has a negative effect on Irish quick-service expenditure in 1994. This could also be explained by an income effect: that is, for a given level of total household income, per-capita income will be lower in

[5] Both *age2* and *singleage* were used to attempt to capture non-linearities in the age variable. One or other was used in the regressions to capture this age effect, never both. Only the *age2* variable was significant in the results discussed in this paper.

larger households reducing the amount spent on FAFH. With regard to the UK results a negative coefficient is observed for quick-service expenditure in 2002 while the 2001 result is insignificant.

Household size also has a positive effect on participation in the Irish and UK full-service sectors across all surveys with the exception of the 2002 UK survey. These results support the hypothesis that the probability of observing a purchase rises with more persons in the household regardless of country. The household size squared term only had significance in determining participation in either the Irish or UK full-service sectors in the UK 2001 results. Household size has a negative affect on full-service expenditure in both countries across all surveys years. This result is also largely as expected. These findings could be explained by an income effect similar to that outlined for quick-service expenditure. Several US studies have found that larger households spend less on FAFH in all segments and concluded that this suggests that such households benefit from economies of scale in food preparation at home (McCracken and Brandt, 1987; Stewart and Yen, 2004). The Irish and UK results found here are also supportive of this hypothesis.

Workers

As expected the number of workers variable, the proxy for the household's opportunity cost of time, is positively related to participation in both the quick-service sectors of Ireland and the UK in each survey year. The results suggest that household managers highly pressured by time are more likely to frequent FAFH outlets than other households. Most studies differ in their quantification of, and results reported for, the value of household time but it has been seen to exhibit a consistently positive effect (Mihalopoulos and Demoussis, 2001; Lazaridis, 2002). The variable also has a positive effect on participation in the Irish and UK full-service sectors. Since full-service facilities may approach or indeed surpass the time requirements for preparing food at home, it could be expected that these facilities would be not as attractive to time starved households. Up-scale dining can be viewed as a form of leisure and of energy saving, however. Accordingly, households with a number of workers present may be more likely to frequent such establishments as this activity represents a transfer from time spent on household production to leisure time (Byrne *et al.* 1998).

Education

Secondary

Being a household manager with second level education significantly reduces the likelihood of participation in the 1999 Irish quick-service study. The 1999 expenditure stage results also indicate that higher educated households spend less on quick-service than other households. In contrast, household managers with secondary education have an increased likelihood of participation in the Irish full-service sector according to the 1994 full-service results. These findings are as expected and may be an indication that higher educated households, with associated higher levels of health awareness, are more aware of the negative health effects associated with certain quick-service food products.

Tertiary

The 1994 and 1999 Irish quick-service results indicate that households with tertiary education have a reduced likelihood of participating in the quick-service market. Similarly the 1994 and 1999 expenditure stage results also indicate that higher

educated households spend less on quick-service than other households. Regarding the full-service results a positive and significant result with regard to participation in full-service expenditure is observed for household managers with tertiary level education in 1994. A higher probability of participation in the full-service sector by more educated households may suggest that full service options are perceived favourably from a health perspective (Lee and Tan, 2007).

Education

Only one education variable is used in the UK analysis. The variable has a significantly negative effect on participation in the quick-service sector in both the 2001 and 2002 survey years. This result indicates that higher educated UK households are less likely than other households to participate in the quick-service sector. The negative effect on quick-service expenditure in both the 2001 and 2002 expenditure estimates also indicates that while these households are less likely to participate they also spend less than other households. A positive effect is observed for full-service expenditure in the 2001 expenditure estimates. Overall the results here are similar to those of the Irish analysis as they suggest that higher educated households are more likely to favour full-service over quick-service which is in accordance with pre-established hypotheses.

Social Class

The *social1* dummy variable, comprised of higher professional household managers, has a significant and negative effect in both the participation and expenditure stage in the 1994 Irish quick-service sector results. Households headed by household managers of a higher social class appear less likely than other households to consume quick-service products. Neither the *social1* or *social2* variables have an effect on participation in the quick-service sector in either the 2001 or 2002 UK results.

The *social1* dummy variable has a significant and positive effect on participation in the full-service sector in both years of the Irish results. The *social2* variable, comprised of lower professional household managers, also has a positive and significant effect on full-service in the 1994 study. In the 1994 results the results of the *social1* variable indicate that households with managers of a high social class spend significantly more on full-service than other households. Similarly, the *social2* variable also has a positive and significant effect on full-service expenditure in 1994. Both the *social1* and *social2* variables have significant and positive effects on full-service expenditure in both years of the UK study. The results for Ireland and the UK discussed here are very similar. Full-service dining can be viewed as a form of leisure activity and in this analysis higher social class households appear to substitute time spent on household production for leisure time.

Ethnicity

Due to data limitations the ethnic origin of the household manager is used as a variable in the UK analysis solely. The *non-white* variable, comprised of household managers of an ethnic background i.e. Black or Asian, has a negative effect on participation in the quick-service sector but a positive effect on quick-service expenditure in the 2001 results. This result indicates that non-white household managers are less likely than others to buy quick-service products but, when they do, they spend more than other households. While the non-white variable is insignificant in the 2002 quick-service participation results a positive effect is

observed for quick-service expenditure in 2002. By contrast the *non-white* variable has a negative and significant effect on participation in the full-service sector in both the 2001 and 2002 surveys. The results appear to indicate that non-white household managers are more likely to favour quick-service over full-service once the decision is made to purchase some form of FAFH. Byrne *et al.* (1998) found that black households in the US were more likely to visit quick-service facilities than white households but that they were less likely to eat at full-service facilities. Stewart and Yen (2004), projecting future trends in the US FAFH market, determined that increases in the non-white population were more likely to benefit the quick-service sector relative to full-service.

Urban and Regional Variables

The urban variable has a significant and positive effect on determining participation in the Irish quick-service sector in both 1994 and 1999. It can be assumed that towns will have a higher number of quick-service outlets than rural areas due to their larger populations and that associated higher outlet density in an area will increase the household's eating out choices and their likelihood of participation (Jekanowski,1999; Jekanowski, Binkley and Eales, 2001). Urban households may also have a faster pace of life than rural households and thus favour convenient meals on a more regular basis. In this context, it appears that urban households are more likely to substitute time on household production for leisure time, such as eating out at a FAFH outlet. The variable also has a positive and significant coefficient on quick-service expenditure in both survey years. These findings are supportive of those of an American study that found that increasing urbanisation translated into higher household FAFH expenditure, particularly on quick-service (Byrne *et al.* 1996). Being an urban household has a negative effect on full-service expenditure in 1994 and 1999, suggesting that urban households spend less than rural households on full-service. This may be a result of competition between outlets in urban centres making prices lower than in rural areas and the fact that full-service outlets are likely to be the sole FAFH outlet in many rural areas. A similar result was found in a Greek FAFH total market analysis (Mihalopoulos and Demoussis, 2001).

The UK EFS does not provide data on whether a household is resident in an urban or rural area, possibly because of the greater level of urbanisation in the UK. Accordingly regional dummy variables were derived to control for some of the regional variations in expenditure patterns resulting from regional price differences across households. In the UK quick-service results only the Scottish and Northern Irish variables are significant. Only the Northern Irish dummy variable is significant in the 2001 and 2002 full-service expenditure results.

Marital Status

Single-adult

Being a single adult household has a negative effect on participation in the Irish quick-service sector in both survey years. As the benefits of home meal preparation diminish in single households a positive effect was anticipated but the results do not bear this out. By contrast the variable has a positive effect on participation in the UK market in both 2001 and 2002. Being a single adult household in Ireland has a positive effect on quick-service expenditure in both 1994 and 1999, however. While single Irish households are less likely to participate than other households, when they do they spend more. In the UK results a positive effect is observed in

the 2001 quick-service expenditure stage results. The age squared variable is significant in the Irish 1994 and the UK 2001 quick-service expenditure results.

In the 1994 Irish full-service participation stage results the single variable has a negative effect. A positive effect is observed for single-adult households on full-service expenditure in both survey years in the Irish study. Households that do not benefit from economies of scale with regard to household production are more likely to spend more on FAFH compared to other households. The age squared variable is also significant in each of the expenditure stage regressions for full-service. Here this variable controls for a possible age effect within single adult houses (i.e. single pensioners). In the UK results the single variable has no significance in determining participation in the full-service sector or the amount of expenditure.

Married Couples

Being a married couple has a significantly negative effect on participation in the Irish quick-service sector in both survey years. The married variable has no significance in the Irish expenditure stage results. Being a married couple also has a negative effect on participation in the UK quick-service sector in the 2002 results. In both 2001 and 2002 being a married couple has a negative effect on quick-service expenditure. These findings are as expected. It was hypothesised that married households may value the importance of the family meal more than other households and accordingly be more likely to engage in household production and eat food-at-home.

Being a married couple also has a negative effect on participation in the Irish full-service sector in both 1994 and 1999 but the variable has no significance in the full-service expenditure stage results, however. Being a married couple also has a negative effect on participation in the UK full-service sector in the 2001 results and the variable also has a negative effect on full-service expenditure in both the 2001 and 2002 UK results. The results for both countries are broadly similar and indicate that married couples are much less likely than other households to consume FAFH as a whole.

***Children*[6]**

Oldkids

The presence of older children in the household increases the likelihood of participation in the Irish quick-service sector. This variable, *Oldkids*, is significant and positive in the both the 1994 and 1999 results. A similar effect is observed for the *Oldkids* variable in both years of the UK quick-service results. As children become more independent and have access to independent disposable income, they are more likely to consume quick-service food products. The variable has no effect in the quick-service expenditure stage results, however, in either the Irish or UK results. The *Oldkids* variable also has a significantly negative effect on participation in the UK full-service sector in both the 2001 and 2002 surveys but

[6] Two dummy variables, *Youngkids* and *Oldkids*, are used in both the Irish and UK analyses. Due to a different approach in collecting data the variables are derived in a different manner. In the Irish analysis *Oldkids* are defined as children aged between 14-18 years while in the UK *Oldkids* are defined as children aged 5-18. *Youngkids* are defined as between 1-14 years in the Irish analysis and between 1-5 years in the UK analysis.

has no effect on the corresponding expenditure stage results. The variable has no significance in either the participation or expenditure stage results for Irish full-service expenditure.

Youngkids

The *Youngkids* variable has no significance in determining participation in the Irish quick-service sector or on expenditure in either survey year. In the UK results however, in both years, this variable has a significantly negative effect on determining both participation in the market and on influencing quick-service expenditure. The *Youngkids* variable has no effect on either the participation or expenditure stage results for full-service. While the results for full-service expenditure for both children variables, are as expected the findings for quick-service expenditure are somewhat contrary to expectations. These results may reflect the likely importance of the family meal for married couples.

Homeownership

In the Irish results in both survey years homeownership has a negative influence on participation in the quick-service sector. There is no significance in the UK quick-service sector in either survey, however. The act of owning a home is indicative of a commitment to engage in household production. Renters, without having the same commitment to their residence as homeowners, are accordingly less likely to engage in household production, such as cooking meals. This variable has no significance in the quick-service expenditure stage results in either Ireland or the UK. Homeownership also has a positive influence on participation in the Irish full-service sector in the 1999 study and a similar result is found for the 2002 survey of the UK results. A number of recent Spanish studies have found that homeowners had a positive influence on participation in the FAFH market (Manrique and Jensen, 1998; Mutlu and Gracia, 2004, 2006). These results may be evidence of a wealth affect and indicate how the social aspect of full-service dining is a significant attraction to homeowners. Yen (1993), in a US study, and Manrique and Jensen (1998), in a Spanish study, found that homeowners spend less than renters on FAFH at all types of FAFH. Homeownership has no effect for either variable in the expenditure stage regressions in either the Irish or UK analyses.

Commuter

The commuter variable has a positive and significant effect on participation in the quick-service sector in the UK in both 2001 and 2002. This can be interpreted as a further demand for convenience by commuters as they are a group who are more likely to be affected by time constraints. This result also provides further evidence for the opportunity cost of time playing a role in household production decisions. Surprisingly the commuter variable has no significance in the Irish quick-service results. In addition this variable has no effect in the expenditure stage regressions in either the Irish or UK analyses.

The commuter variable has a positive and significant effect on participation in the full-service sector in both survey years of the Irish and UK analyses. The 1994 Irish full-service expenditure stage results indicate that commuters spend more than other households on quick-service though the variable is insignificant in 1999. A similar finding is observed in both years of the UK full-service expenditure stage

results. Households with a number of commuters present may be more likely to frequent full-service establishments as this activity represents a transfer from time spent on household production to leisure time as full-service dining can be viewed as a form of leisure.[7]

Nosmoke

The *nosmoke* variable, no expenditure on tobacco, has a significantly negative effect in the Irish quick-service participation results in both survey years. The variable also has a significantly negative effect on participation in the UK quick-service sector in the 2002 study. Once time constraints are controlled for households with higher levels of health awareness appear less likely to participate in the quick-service sector than other households. This variable also has a significantly negative effect on Irish quick-service expenditure in both survey years and in both years of the UK quick-service expenditure stage results. Overall this finding may also reflect the linking of quick-service consumption with obesity and other health issues whereas the full-service sector has not received the same level of negative attention. While the UK quick-service sector is at a more mature stage of development than its Irish equivalent it appears that households with high levels of health awareness are still less likely to participate in the sector.

While the *nosmoke* variable has no significance in the full-service participation results in either Ireland or the UK, a positive effect is observed for full-service expenditure in both years of the Irish and UK analyses. This result again gives credence to the hypothesis that quick-service expenditure is perceived in a poor light from a health and nutritional perspective, by households who have high levels of health awareness. Most of the negative media attention with regard to obesity and other health issues has been largely confined to the quick-service sector to date while the full-service sector has not received comparable attention. This may help explain this result.

Credit

Ownership of credit cards has a negative and significant effect on participation in the quick-service sector in the Irish 1999 study but there is no significance in the corresponding UK results. The credit card variable has a significant and positive effect on full-service in both the Irish 1994 and 1999 participation and expenditure stage results. This may indicate that credit card usage is not as common at quick-service facilities compared to full-service facilities. In the UK results possession of credit cards has a positive and significant effect on participation in both years of the full-service sector and has a positive effect on full-service expenditure in the 2002 results. The results are supportive of a previous US study which found that possession of credit cards increased the likelihood of purchase of some form of FAFH (Hiemstra and Kim, 1995). These results also may also indicate the presence of a wealth effect.

Seasonality

[7] It is important to note there are likely to be substantial differences between Irish and UK commuters. Due to the expansion of the commuter belt on the east coast of Ireland commuter distances are likely to be of a longer distance than in the UK. In the UK commuters a greater proportion of urban commuters are expected to commute within urban areas whereas in Ireland many Irish commuters travel from rural areas to their place of work.

There is some evidence of seasonality in the results supporting the inclusion of seasonal dummies. The autumn variable is significant for both quick-service and full-service expenditure in the Irish 1994 results and for Irish full-service expenditure in the 1999 expenditure results. In the UK results the autumn variable is significant in both the 2001 and 2002 full-service regressions but there is no significance in the equivalent quick-service results. The summer variable is significant in the 2002 full-service expenditure results. The main rationale for including seasonal dummy variables is to account for potential variations in price due to the absence of price data.

INSERT TABLES 10-13 ABOUT HERE

5. Conclusion

This paper compares the factors influencing FAFH expenditure in both Ireland and the UK. FAFH is disaggregated into its two main components: quick-service and full-service, and each is analysed separately. The rationale for conducting a comparative between Irish and UK quick-service and full-service expenditure is that the UK foodservice industry is at a more mature stage of development than its Irish equivalent and thus analysing the UK industry may give an indication as to what factors may influence growth in the Irish industry into the future. The results vindicate the use of a disaggregated approach in the analysis and the use of the double hurdle model. A number of variables also affect both dependent variables in the same way, for example, income and age and the number of workers variable, Despite the education, age and children variables being defined in a different manner, due to data constraints, each variable has a similar effect on the dependent variables analysed. Indeed one interesting feature of this analysis has been how broadly similar the Irish and UK results for both sectors are despite the UK industry being at a more mature stage of growth.

Health awareness significantly reduces both the likelihood of participation and the amount of expenditure on quick-service but no similar effect is observed for full-service in either Ireland or the UK. Potentially healthier and convenient sectors of the Irish quick-service sector, such as juice and sandwich bars and coffee shops, are not included in the definition of quick-service in the Irish analysis due to data constraints though they are present in the UK definition. The results indicate that the most likely consumers of quick-service products in both countries are younger households with lower levels of education, social class and health knowledge. The more likely consumers of full-service products are younger households with higher levels of education, health awareness and social class as well as homeowners, and commuter households in Ireland. Households with a high opportunity cost of time are more likely to participate in either sector of the FAFH market than other households and certain households appear to substitute time spent on household production for leisure time, i.e. full-service dining, again consistent with economic theory. The results for the ethnicity variable indicate that *non-white* households are less likely to frequent any FAFH outlet than other households. As such growing immigration into Ireland may negate the expansion of the FAFH industry into the future.

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Table 1: The Market for FAFH in Ireland

Years	1987	1994	1999
FAFH as % of total food expenditure	13%	18%	23%

Source: Derived from the HBS of 1994 and 1999 (Author's Calculations).

Table 2: The Distribution of FAFH Expenditure in Ireland

FAFH	1994	1999
School meals	0.67%	0.2%
Quick-service	17.63%	19.06%
Work Canteens	21.14%	25.99%
Full-service	60.56%	53.16%
Tea/Coffee away from home	-	1.58%

Source: Derived from the HBS of 1994 and 1999 (Author's Calculations).

Table 3: The Market for FAFH in the UK

Years	2001	2002
FAFH as % of total food expenditure	32%	33%

Source: Derived from the EFS of 2001 and 2002 (Author's Calculations).

Table 4: The Distribution of FAFH Expenditure in the UK

FAFH	2001	2002
School meals	2.88%	2.86%
Quick-service	29.11%	27.52%
Work Canteens	6.28%	5.93%
Full-service	61.06%	60.57%
Contract Catering	0.67%	3.12%

Source: Derived from the EFS of 2001 and 2002 (Author's Calculations).

Table 5: Specification Tests of the Irish Adjusted and Unadjusted Double Hurdle Model

	1994 Quick		1994 Full	
	Test Statistic	*P-value*	*Test Statistic*	*P-value*
Lagrange Multiplier Test for Heteroscedasticity Ho: Homoscedasticity	5232.29	0.0000	2747.26	0.0000
Conditional Moments Test for Non-normality Ho: Normality	342.39	0.0000	374.39	0.0000
Likelihood Ratio Test for Box-Cox Het. Double Hurdle Model Ho: Box-Cox Het. Tobit Model	1195.406	0.0000	1967.46	0.0000

	1999 Quick		1999 Full	
	Test Statistic	*P-value*	*Test Statistic*	*P-value*
Lagrange Multiplier Test for Heteroscedasticity Ho: Homoscedasticity	2486.62	0.0000	1575.47	0.0000
Conditional Moments Test for Non-normality Ho: Normality	212.12	0.0000	266.52	0.0000
Likelihood Ratio Test for Box-Cox Het. Double Hurdle Model Ho: Box-Cox Het. Tobit Model	2965.88	0.0000	1460.98	0.0000

Table 6: Specification Tests of the UK Adjusted and Unadjusted Double Hurdle Model

	2001 Quick		2001 Full	
	Test Statistic	*P-value*	*Test Statistic*	*P-value*
Lagrange Multiplier Test for Heteroscedasticity Ho: Homoscedasticity	1497.33	0.0000	2045.21	0.0000
Conditional Moments Test for Non-normality Ho: Normality	621.17	0.0000	910.00	0.0000
Likelihood Ratio Test for Box-Cox Het. Double Hurdle Model Ho: Box-Cox Het. Tobit Model	1831.45	0.0000	4345.65	0.0000

	2002 Quick		2002 Full	
	Test Statistic	*P-value*	*Test Statistic*	*P-value*

Lagrange Multiplier Test for Heteroscedasticity Ho: Homoscedasticity	2623.16	0.0000	576.48	0.0000
Conditional Moments Test for Non-normality Ho: Normality	557.40	0.0000	785.00	0.0000
Likelihood Ratio Test for Box-Cox Het. Double Hurdle Model Ho: Box-Cox Het. Tobit Model	1787.795	0.0000	5017.42	0.0000

Table 7: Description of the Variables used in the analysis

Dependent Variable	Description
Quick-service	Per capita average weekly expenditure on quick-service (€)
Full-service	Per capita average weekly expenditure on full-service (€)
Independent Variables	
Income	Proxied by per capita average total weekly household expenditure (€)
Income2	Income squared (€)
Age	Age of household manager (1-8)
Age2	Age squared
Hhold	Number of persons in the household
Hhold2	Household size squared
Workers	Number of persons in gainful employment outside the home
Singleage	Single * Age
Discrete Variables	
Education[a]	Secondary = 1 if highest level of education completed was Leaving Certificate education. Tertiary = 1 if highest level of education completed was Third Level education. Base category = highest level of education completed was less than Leaving Certificate.
Education[b]	1 = Household manager left school at age 17 or over. 0 = Household manager left school before the age of 17
Social Class	Social1 = 1 for household manager categorised as higher professional, lower professional, employer or manager, 0 otherwise Social2 = 1 for household manager categorised as salaried employee and non-manual workers, 0 otherwise Base category = household manager categorised as manual worker, farmer, other agricultural worker or fishermen
Ethnicity[b]	Black = 1 if household is Black Asian = 1 if household is Asian Mixed = 1 if household is of mixed race Base category = household is white
Single, married	Single=1 for single adult household with or without children, 0 otherwise Married=1 for married couple with or without children, 0 otherwise Base category = households with 2 or more adults with or without children
Female	1=Female household manager 0=Male household manager
Oldkids[a]	1 = Children aged 14-18 present 0 = No children aged 14-18 present
Oldkids[b]	1 = Children aged 5-18 present 0 = No children aged 5-18 present
Youngkids[a]	1 = Children aged less than 14 present 0 = No children aged less than 14 present.
Youngkids[b]	1 = Children aged less than 5 present 0 = No children aged less than 5 present.
Commuter	1 = A Household member is employed outside the home and incurs higher than the mean level of travelling expenses 0 = Household members are not in employment or do not incur higher than the mean level of travelling expenses

Homeowner	1 = Household owns their own home. 0 = Household does not own their own home
Urban[a]	1 = Urban household 0 = Rural household
Regional dummies[b]	Northern = Household is located in the North of England including Yorkshire, Merseyside and the North East. Mideast = Household is located in the East and West Midlands and Eastern counties of England Welsh = Household is located in Wales Scot = Household is located in Scotland NI = Household is located in Northern Ireland Base category = Household is located in the South of England including London.
Nosmoke	1 = Household spends nothing on tobacco during the survey period 0 = Household spends a positive amount on tobacco during the survey period
Credit	1 = Household possesses at least one credit card 0 = Household possesses no credit cards
Seasonal dummies	Spring = 1 if consumption occurred in Spring, 0 otherwise Summer = 1 if consumption occurred in Summer, 0 otherwise Autumn = 1 if consumption occurred in Autumn, 0 otherwise Base category = consumption occurred in Winter

[a] Used in Irish dataset solely. [b] Used in UK dataset solely

Table 8: Summary Statistics for the Irish Variables

	Mean (€)		***Standard Deviation***		***Maximum(€)***		***% Zeros***	
Dependent	*1994*	*1999*	*1994*	*1999*	*1994*	*1999*	*1994*	*1999*
Quick-service	1.072	1.947	2.126	3.433	35.56	84.65	56%	50%
Full-service	4.473	6.513	9.417	12.391	165.89	166.02	48%	47%
Independent - Continuous								
Income (ln)	4.923	5.274	0.601	0.679	7.041	8.401		
Income^2 (ln)	24.598	28.271	5.965	7.119	49.577	70.569		
Age	5.083	5.274	1.654	1.657	8	8		
Age^2	28.572	29.094	17.665	17.272	64	64		
Hhold	3.182	2.904	1.877	1.535	15	12		
Hhold2	13.647	10.789	15.405	10.676	225	144		
Workers	1.130	1.246	0.943	0.988	7	7		
Singleage	1.582	1.404	2.755	2.643	8	8		
Independent – Discrete								
Secondary	0.464	0.493						
Tertiary	0.120	0.191						
Social1	0.218	0.242						
Social2	0.221	0.276						
Single	0.241	0.273						
Married	0.471	0.446						
Female	0.500	0.529						
Oldkids	0.211	0.186						
Youngkids	0.403	0.381						
Homeowner	0.807	0.842						
Urban	0.543	0.637						
Commuter	0.223	0.362						
Nosmoke	0.519	0.560						
Credit	0.265	0.419						
Spring	0.234	0.201						

Summer	0.263	0.295
Autumn	0.247	0.303

Table 9: Summary Statistics for the UK variables

	Mean (€)		*Standard Deviation*		*Maximum(€)*		*% Zeros*	
Dependent	*2001*	*2002*	*2001*	*2002*	*2001*	*2002*	*2001*	*2002*
Quick-service	4.461	4.632	6.114	6.343	62.316	64.017	37%	36%
Full-service	10.735	10.882	15.469	15.895	171.493	223.288	30%	29%
Independent – Continuous								
Income (ln)	5.482	5.483	0.626	0.629	8.090	8.511		
Income^2 (ln)	30.442	30.455	6.874	6.891	65.447	72.432		
Age	3.850	3.869	0.365	0.360	4.585	4.585		
Age^2	14.957	15.101	2.773	2.754	21.022	21.022		
Singleage	1.490	1.328	1.914	1.872	4.585	4.585		
Hhold	2.427	2.395	1.324	1.281	12	11		
Hhold2	7.642	7.375	8.707	8.091	144	121		
Workers	1.353	1.357	1.004	1.001	6	6		
Independent – Discrete								
Education	0.352	0.359	0.478	0.480				
Social1	0.285	0.288	0.446	0.445				
Social2	0.293	0.297	0.385	0.388				
Non-white	0.042	0.050	0.218	0.201				
Single	0.381	0.383	0.486	0.473				
Married	0.458	0.447	0.498	0.497				
Female	0.617	0.562	0.486	0.496				
Oldkids	0.266	0.260	0.442	0.439				
Youngkids	0.132	0.128	0.339	0.334				
Homeowner	0.714	0.719	0.452	0.449				
Commuter	0.325	0.321	0.468	0.467				
Nosmoke	0.692	0.699	0.462	0.459				
Credit	0.594	0.610	0.491	0.488				
Northern	0.156	0.154	0.363	0.361				
Mid-East	0.244	0.236	0.429	0.425				
Scot	0.083	0.085	0.276	0.278				
Welsh	0.047	0.052	0.213	0.221				
NI	0.071	0.084	0.257	0.278				
Spring	0.250	0.253	0.433	0.435				
Summer	0.242	0.243	0.428	0.429				
Autumn	0.252	0.256	0.434	0.436				

Table 10: Maximum Likelihood Estimates of the Irish and UK Box-Cox Heteroskedastic Double Hurdle Participation Stage Results for Quick-service

	1994 Quick	**1999 Quick**	**2001 Quick**	**2002 Quick**
Constant	-2.5704***	4.7951***	1.4475***	1.4734***
	(0.2471)	(1.8369)	(0.3574)	(0.3609)
Income	0.4817***	0.4569***	0.3380***	0.3200***
	(0.0392)	(0.0374)	(0.0333)	(0.0346)
Age	-0.1696***	-0.2139***	-1.0282***	-0.9994***
	(0.0151)	(0.0164)	(0.0679)	(0.0693)
Workers	0.2184***	0.1426***	0.1145***	0.1519***
	(0.0256)	(0.0267)	(0.0299)	(0.0300)
Household Size	0.3147***	0.4476***	0.6343***	0.5837***
	(0.0493)	(0.0597)	(0.0881)	(0.0879)
Household Size^2	-0.0230***	-0.0305***	-0.0332***	-0.0337***
	(0.0043)	(0.0058)	(0.0116)	(0.0127)
Secondary	-0.0576	-0.0981**	-	-

	(0.0421)	(0.0463)		
Tertiary	-0.1575**	-0.1679***	-	-
	(0.0673)	(0.0628)		
Education	-	-	-0.1771***	-0.2115***
			(0.0426)	(0.0434)
Non-white	-	-	-0.2193***	0.0139
			(0.0820)	(0.0926)
Social1	-0.0958**	-0.0462	-0.0700	-0.0319
	(0.0470)	(0.0444)	(0.0504)	(0.0505)
Urban	0.3604***	0.4043***	-	-
	(0.0362)	(0.0361)		
Single	-0.2583***	-0.3324***	0.3319***	0.1615**
	(0.0770)	(0.0832)	(0.0841)	(0.0700)
Married	-0.4744***	-0.3990***	-0.0764	-0.1726***
	(0.0483)	(0.0496)	(0.0596)	(0.0518)
Oldkids	0.5812***	0.5109***	0.3154***	0.4569***
	(0.0484)	(0.0523)	(0.0786)	(0.0731)
Youngkids	0.0504	-0.0797	-0.5241***	-0.4243***
	(0.0625)	(0.0651)	(0.0782)	(0.0778)
Homeowner	-0.0969**	-0.1290**	-0.0288	-0.0583
	(0.0477)	(0.0513)	(0.0443)	(0.0458)
Commuter	0.0579	0.0365	0.0895*	0.1583***
	(0.0417)	(0.0397)	(0.0480)	(0.0489)
Nosmoke	-0.1220***	-0.0617*	-0.0661	-0.1918***
	(0.0343)	(0.0353)	(0.0406)	(0.0416)
Credit	-0.0427	-0.0768*	-0.0358	-0.0264
	(0.0435)	(0.0410)	(0.0402)	(0.0416)

Standard errors are given in parenthesis.
**** indicates significance at the 1% level, ** indicates significance at the 5% level, * indicates significance at the 10% level*

Table 11a: Maximum Likelihood Estimates of the Irish and UK Box-Cox Heteroskedastic Double Hurdle Model Expenditure Stage Results for Quick-service

	1994 Quick	**1999 Quick**	**2001 Quick**	**2002 Quick**
Constant	-4.5113***	-5.3384***	-7.2420***	-2.6913
	(1.1991)	(1.1488)	(2.0431)	(2.6154)
Income	2.0838***	2.1902***	1.6908***	1.0076**
	(0.4663)	(0.0416)	(0.4164)	(0.4135)
$Income^2$	-0.1475***	-0.1528***	-0.0951**	-0.0367
	(0.0457)	(0.0380)	(0.0372)	(0.0369)
Age	-0.5627***	-0.2287***	2.5216***	1.1877
	(0.0815)	(0.0826)	(0.9582)	(1.2868)
Age^2	0.0533***	0.0111	-0.4681***	-0.2737
	(0.0084)	(0.0084)	(0.1289)	(0.1720)
Household Size	-0.1844***	-0.0490	0.0592	-0.1701**
	(0.0449)	(0.0493)	(0.0590)	(0.0661)
Household $Size^2$	0.0138***	0.0051	0.0035	0.0317***
	(0.0040)	(0.0047)	(0.0076)	(0.0089)
Secondary	-0.0540	-0.1145**	-	-
	(0.0432)	(0.0480)		
Tertiary	-0.1356**	-0.2211***	-	-
	(0.0684)	(0.0619)		
Education	-	-	-0.2427***	-0.2435***
			(0.0469)	(0.0464)
Social1	-0.0781*	-0.0161	-0.0406	-0.0283
	(0.0459)	(0.0419)	(0.0501)	(0.0492)
Non-white	-	-	0.2826***	0.1666*
			(0.0915)	(0.0948)
Urban	0.2830***	0.3183***	-	-
	(0.0389)	(0.0363)		

Single	0.2123***	0.2052**	0.1775**	0.1011
	(0.0789)	(0.0804)	(0.0678)	(0.0650)
Married	-0.0613	-0.0749	-0.2152***	-0.1746***
	(0.0466)	(0.0463)	(0.0544)	(0.0491)
Youngkids	-0.0171	-0.0609	-0.3280***	-0.2938***
	(0.0536)	(0.0529)	(0.0627)	(0.0622)
Nosmoke	-0.0975***	-0.1010***	-0.2462***	-0.1824***
	(0.0356)	(0.0348)	(0.0439)	(0.0432)
Scot	-	-	0.1708**	0.2538***
			(0.0743)	(0.0730)
NI	-	-	0.3244***	0.3121***
			(0.0762)	(0.0688)
Autumn	0.0814**	0.0167	0.0044	-0.0042
	(0.0342)	(0.0361)	(0.0452)	(0.0455)
λ	0.1227***	0.1374***	0.2486***	0.2059***
	(0.0144)	(0.0137)	(0.0115)	(0.0124)
σ	0.9777***	1.0201***	1.4286***	1.3115***
	(0.0134)	(0.0176)	(0.0272)	(0.0281)
LL	-9925.9363	-12161.32	-18180.719	-15924.201

Standard errors are given in parenthesis.
**** indicates significance at the 1% level, ** indicates significance at the 5% level, * indicates significance at the 10% level*

Table 11b: Heteroskedastic Terms (Used in Quick-service Expenditure Stage)

	1994 Quick	**1999 Quick**	**2001 Quick**	**2002 Quick**
Income	0.0256**	**-**	0.0357***	-
	(0.0453)		(0.0210)	
Age	-0.0120*	**-**	-	-0.0356*
	(0.0125)			(0.0411)
Household Size	**-**	-0.2122**	-0.3106*	-0.0253**
		(0.0317)	(0.0541)	(0.0129)

Table 12: Maximum Likelihood Estimates of the Irish and UK Box-Cox Heteroskedastic Double Hurdle Participation Stage Results for Full-service

	1994 Full	**1999 Full**	**2001 Full**	**2002 Full**
Constant	-4.9720***	-5.1748***	-2.1846***	3.9105***
	(0.2526)	(0.2557)	(0.3586)	(17.4260)
Income	0.9178***	0.8461***	0.7097***	0.3125***
	(0.0397)	(0.0369)	(0.0380)	(0.0721)
Age	-0.0182	0.0183	-0.4609***	-0.8705***
	(0.0142)	(0.0150)	(0.0687)	(0.1382)
Workers	0.1306***	0.0904***	0.0874***	0.1677*
	(0.0253)	(0.0252)	(0.0318)	(0.0952)
Household Size	0.0768*	0.1157**	0.5423***	-3.0769
	(0.0438)	(0.0473)	(0.0672)	(26.1124)
Household Size^2	0.0013	-0.0028	-0.0383***	1.3184
	(0.0044)	(0.0051)	(0.0086)	(8.7036)
Secondary	0.1294***	0.0464	-	-
	(0.0405)	(0.0431)		
Tertiary	0.2759***	0.0657	-	-
	(0.0699)	(0.0599)		
Education	-	-	0.0466	0.0608
			(0.0483)	(0.0911)
Non-white	-	-	-0.5631***	-0.4409**
			(0.0824)	(0.1795)
Social1	0.1392**	0.1028**	0.0663	-0.1317
	(0.0527)	(0.0479)	(0.0618)	(0.1255)
Social2	0.1363***	0.0528	-	-
	(0.0436)	(0.0410)		
Urban	0.1081***	0.0294	-	-
	(0.0351)	(0.0341)		
Single	-0.1889***	-0.0899	-	-

	(0.0693)	(0.0704)		
Married	-0.2316***	-0.1596***	-0.1195**	-
	(0.0450)	(0.0443)	(0.0517)	
Oldkids	-0.0689	-0.0111	-0.2468***	-0.4439*
	(0.0480)	(0.0481)	(0.0731)	(0.2341)
Homeowner	0.0733	0.1143**	0.0664	0.3504***
	(0.0466)	(0.0493)	(0.0462)	(0.0777)
Commuter	0.1889***	0.2041***	0.1164**	0.2660*
	(0.0438)	(0.0388)	(0.0577)	(0.1371)
Credit	0.1915***	0.1450***	0.1400***	0.1863**
	(0.0445)	(0.2557)	(0.0427)	(0.0808)

Standard errors are given in parenthesis.
**** indicates significance at the 1% level, ** indicates significance at the 5% level, * indicates significance at the 10% level*

Table 13a: Maximum Likelihood Estimates of the Irish and UK Box-Cox Heteroskedastic Double Hurdle Model Expenditure Stage Results for Full-service

	1994 Full	**1999 Full**	**2001 Full**	**2002 Full**
Constant	-3.9257***	-2.3647***	1.4761	2.3388
	(0.3471)	(0.3533)	(1.8104)	(5.6826)
Income	1.2311***	0.9850***	1.3249***	3.5416***
	(0.0523)	(0.0523)	(0.0486)	(0.1163)
Age	-0.2025**	-0.2258***	-3.6811***	-10.0952***
	(0.0903)	(0.0868)	(0.9875)	(3.0922)
Age^2	0.0243***	0.0281***	0.5215***	1.3418***
	(0.0089)	(0.0086)	(0.1328)	(0.4122)
Household Size	-0.2740***	-0.2791***	-0.1213**	-0.5070***
	(0.0471)	(0.0541)	(0.0558)	(0.1562)
Household $Size^2$	0.0167	0.0198***	0.0059	0.0741***
	(0.0046)	(0.0059)	(0.0077)	(0.02235)
Secondary	0.0562	0.0218	-	-
	(0.0532)	(0.0551)		
Tertiary	-0.0145	0.0928	-	-
	(0.0755)	(0.0700)		
Education	-	-	0.1184**	0.1569
			(0.0460)	(0.1104)
Social1	0.1824***	0.0824	0.3587***	0.6994***
	(0.0591)	(0.0546)	(0.0585)	(0.1425)
Social2	0.1117**	0.0367	0.1737***	0.3282**
	(0.0528)	(0.0497)	(0.0585)	(0.1398)
Urban	-0.1290***	-0.0681*	-	-
	(0.0441)	(0.0409)		
Single	0.2534***	0.1761**	-	-
	(0.0852)	(0.0835)		
Married	-0.0598	-0.0169	-0.1254***	-0.6653**
	(0.0499)	(0.0470)	(0.0456)	(0.1071)
Scot	-	-	0.0178	0.1180
			(0.0795)	(0.1736)
NI	-	-	0.3524***	0.2994*
			(0.0795)	(0.1738)
Commuter	0.1469***	0.0613	0.1451***	0.4471***
	(0.0456)	(0.0424)	(0.0470)	(0.1151)
Nosmoke	0.0708*	0.0669*	0.0831*	0.3758***
	(0.0417)	(0.0403)	(0.0447)	(0.1077)
Credit	0.1900***	0.0764*	-0.0113	0.3509***
	(0.0474)	(0.0455)	(0.0461)	(0.1125)
Summer	0.0332	0.0736	0.0623	0.4381***
	(0.0472)	(0.0461)	(0.0487)	(0.1172)
Autumn	0.1146***	0.0924**	0.1731***	0.6420***
	(0.0419)	(0.0455)	(0.0482)	(0.1148)

λ	0.1205***	0.1145**	0.1863***	0.4926***
	(0.0100)	(0.0118)	(0.0085)	(0.0065)
σ	1.2556***	1.1818***	1.5290***	3.6010***
	(0.0226)	(0.0307)	(0.0290)	(0.0652)
LL	-15867.183	-17247.344	-23423.045	-22164.174

Standard errors are given in parenthesis.
**** indicates significance at the 1% level, ** indicates significance at the 5% level, * indicates significance at the 10% level*

Table 13b: Heteroskedastic Terms (Used in Full-service Expenditure Stage)

	1994 Full	**1999 Full**	**2001 Full**	**2002 Full**
Income	0.3511**	**-**	0.0468***	-
	(0.0652)		(0.0562)	
Age	-0.0452*	-0.0554**	-	-0.0513*
	(0.0435)	(0.0263)		(0.0612)
Household Size	**-**	-0.0173**	-0.4185*	-0.0302**
		(0.0235)	(0.0716)	(0.0102)
Workers	**-**	**-**	0.1214*	-
			(0.0356)	