

Impact of Child-Directed TV Food Advertising Regulations on Pocket Money Allowance

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Abstract

Child advertising regulations, including both self-regulation and co-regulation, have been presented as possible interventions to improve the food environment at home, thus helping to curb the increasing occurrence of food-related diseases, especially those related to obesity. In this research, we explore the effect of TV advertising regulations on the interaction between household members, specifically, with regard to pocket money allocations. Using a time series approach, we have found that co-regulation, as opposed to self-regulation, leads to significant reductions in pocket money allocations in households with children up to 12 years old. Co-regulation shifts the trend to decreasing pocket money allowances for households that only have children under the age of 12. This way, we illustrate how a public policy can lead to changes in intra-household bargaining behaviour.

1 Introduction

Marketers view children as a lucrative target market. Children represent three markets in one (McNeal, 1992, 1998): not only do children have their own savings and allowances available for expenditure, but they also influence parental purchasing decisions and will become future adult consumers. Perhaps as a result of the appeal of this market segment and the subsequent marketing directed at children, public authorities are concerned about increasing childhood obesity rates. In the context of insufficient physical activity (NHS, 2010), and increasing sugar and fat consumption (MacInnis and Rausser, 2005), more people are becoming obese (Hill et al., 2003). The United Kingdom (UK), in particular, has one of the highest obesity levels in the world (Mazzocchi et al., 2009). In 2015, 27% of adults and 9% of children ages 4-5 living in the UK were considered obese (NHS, 2010). By the time children reach the age of 10, the obesity rate rises to 20%. Furthermore, the prevalence of obesity among children of all ages has risen steadily over the last ten years (NHS, 2017).

Given the rise in childhood obesity rates (Veerman et al., 2009), the role of food marketing aimed at children has gained public attention (Moore and Rideout, 2007). In response to evidence that suggests direct linkages between food advertising and childhood obesity (Halford et al., 2004), since the early 2000s the UK has moved through three distinct phases of TV advertising regulations for programmes directed at children: no regulation, self-regulation, and the current period of co-regulation. These regulations seek to reduce children’s exposure to food advertising and, consequently, improve the home food environment.

The home food environment is a product of, among other things, the continuous interaction between family members and external conditions. Parents can mitigate media exposure, and, as primary food shoppers, can limit access to products high in fat, salt, and sugar (HFSS). However, children also express their food preferences, often through the use of their own pocket money. To a certain extent, children consult and negotiate some food choices with their

parents. Parents are one of the largest influences on children’s food preferences both directly and indirectly (Atik and Ozdamar Ertekin, 2013). While the direct influence results from interactions in the decision-making process, the indirect influence relates to parents’ control of outside sources of influence, including mass media and advertising.

Considering households as a homogeneous agent is too limiting (You and Davis, 2010). Research supports the idea that children actively influence family purchasing decisions (Foxman and Tansuhaj, 1988). The intra-household decision-making process is not neutral, and the negotiation process that ends in a pocket money allowance can be complex. Most of these intra-household interactions are not observable and occur simultaneously. This may be one reason for the apparent lack of research on the impact of food advertising on pocket money allowances. Prior research has focused on the link between pocket money and obesity in children (Khader et al., 2009). Consumption of HFSS foods is also well documented as a factor that contributes to obesity and its related diseases (Veerman et al., 2009), and there is substantial evidence on the effect of advertising on children’s food choices (Galbraith-Emami and Lobstein, 2013; Boyland and Whalen, 2015; Marshall et al., 2007; Ng et al., 2015). It is likely that the relative lack of intra-household data and the challenge of linking food choices with a child-directed advertising event have been factors against more fruitful research.

The broad objective of this research is to provide empirical evidence of the impact of regulations on intra-household relations. We have specifically focused on the effect of child-directed food advertising on pocket money allowances. With this objective in mind, we have tested the hypothesis of whether changes in child-directed advertising regulations are linked to pocket money allocations. We have been able to test this hypothesis as (i) we have a unique dataset of nearly ten years of household data in the UK that includes a set of socio-demographic variables and pocket money allocations, and (ii) UK regulations explicitly regulate child-directed TV advertising. This way, we have been able to link changes in child-directed advertising regulations with changes in pocket money allowances.

If child-directed TV advertising leads children to exert a significant and relevant influence on pocket money allocations, it will open the door to a new set of policies to influence household food choices. For instance, it may be effective to target children to inform them of the benefits of consuming fruits and vegetables or the risks of unhealthy eating behaviours. Moreover, evidence of the impact of food advertising on the use of pocket money could help to design campaigns that inform parents of its ultimate consequences. For example, it may be more appropriate for a parent to prepare a snack at home than to provide pocket money to their child.

The remainder of this article is organised in the following manner. First, we present background information on pocket money allowances. Second, we describe interrupted time series as an approach to identifying the effect of child advertising regulations on pocket money allocation, and characterise the

selected dataset. Third, we present the estimation results for households with only children under 12 years old and then for households that only have children between 13 and 17 years of age. Fourth, we discuss the determinants of pocket money allocation and how they are affected by advertising regulation changes and finally, we conclude with policy recommendations.

2 Background

2.1 Pocket money allowances

Pocket money allowance is the inter-generational transfer of money within a household. According to Furnham (2001), 88.4% of parents favour the use of pocket money allowances, beginning around six years of age. Considering that Barnet-Verzat and Wolff (2002) have found that 74% of a large sample of parents give pocket money, it is likely to be a generalised practice in most parenting styles. Pocket money is seen as a way for children to develop their autonomy as a consumer—a form of economic socialisation (Palan et al., 2010; Furnham, 2001). Children, however, are often unprepared to make wise economic decisions with money, as they have poorly developed consumer decision-making skills (Kraak and Pelletier, 1998). Consumer behaviour is learned during childhood and continues to develop into adulthood; experience with pocket money helps to shape that consumer behaviour (Doss et al., 1995; Swinyard and Sim, 1987).

Children recognise their role in negotiating their allowance money (Lee et al., 2012; Fiates et al., 2008; Marshall et al., 2007; Otto and Webley, 2015). Yet, to some extent, the determinants of pocket money are consistent. Barnet-Verzat and Wolff (2002) has found that marital status, type of employment, household income, number of children, and age of the children affect the probability of receiving pocket money allowances. Single (or divorced), white collar, and high-income parents are more likely to provide pocket money than married, blue collar, and low-income parents. Older children with few siblings are also more likely to receive pocket money than younger children with more than two siblings. With regard to the amount of pocket money, parents express that allowances should increase linearly with age (Furnham, 2001); however, in practice, empirical evidence shows that pocket allowances increase at an increasing rate with respect to age (Barnet-Verzat and Wolff, 2002).

Even without significant differences in allocation, boys and girls use pocket money in different ways. Boys tend to spend more on video games, hobbies and sports gear, while girls tend to spend more on clothes (Brusdal and Berg, 2010). With regard to candy purchases, there does not seem to be a significant difference by gender (Brusdal and Berg, 2010); however, younger children are more likely to spend their pocket money on sweets and toys, while older children are likely to spend more of their money on drinks and food/snacks (Farrell and Shields, 2007). Television watching time and pocket money have a strong positive correlation with a child's body mass index (Khader et al., 2009). Comparing male teenagers, Mohan et al. (2005) found that the preva-

lence of tobacco use was four times higher among those that received pocket money. The empirical evidence therefore suggests that pocket money may induce undesirable behaviours in children.

Children often choose to spend their allowances on consumables. Doss et al. (1995) have found that more than 80% of the children in their study used pocket money for food purchases. In a study of pocket allowance spending among Chinese children, snacks were one of the most common spending categories among children under 12 (McNeal and Yeh, 1996). Children in McNeal and Yeh (1996) study received pocket money as early as four years of age, and spending on snacks was even more common among children between the ages of four and eight. Pocket money is linked to the consumption of food away from home (and, thus, higher body mass indexes), as well as increased consumption of sweet snacks (Lachat et al., 2009; Punitha et al., 2014; Roberts et al., 2003). Alhabeeb (1996) has found that receiving an allowance had a direct impact on teenagers' spending on foods, drinks, and snacks; however, teenagers' spending on food decreases as they grow older and as incomes (allowance or otherwise) increase. Adult efforts to limit foods deemed unhealthy are furthermore eroded through the autonomy children gain by being in control of their own allowances. Blinkhorn et al. (2003) has demonstrated this to be true, particularly in the case of sweet snacks. In summary, the empirical evidence links pocket money with, among other products, unhealthy food purchases. In contrast, we could not find any evidence that determines that pocket money leads to healthy food purchases such as fruit and vegetables.

On the one hand, children are influenced by food advertising, which promotes largely energy-dense and nutrient-poor food (Boyland and Whalen, 2015). The influence of that advertising depends on, at least, a child's age, gender, and TV habits (Ng et al., 2015). On the other hand, parents also shape children's food habits and teach their children about diet and nutrition while setting food-related practices (Marshall et al., 2007). Pocket money is the result of a parent-child bargaining process and leads to food purchasing decisions by children. This bargaining process is influenced by the pressure a child experiences in terms of personal spending (Sato, 2011). As pressure (including advertising) increases, the child has more incentives to ask for additional monies and pocket money allowances may increase. Research has shown that mothers restricting television viewing are less likely to succumb to children's purchasing requests, suggesting a possible relationship between a child's negotiating "power" within the household and television viewing (Aktacs Arnas, 2006; McDermott et al., 2006).

Perhaps due to the lack of data, pocket money allocation is a topic that has been under-considered by food behavioural research. With this research, we aim to add child-directed advertising regulations as an additional determinant to explain pocket money allocations. Moreover, in our empirical analysis, we have been able to assess the results of the influence that children may have on their parents with regard to pocket money allowances.

3 Methods

3.1 Identification strategy

We have used an interrupted time series analysis to identify the impact of child-directed advertising self-regulation and co-regulation on pocket money allowance. The interrupted time series approach has been previously used for policy evaluation (Wagner et al., 2002; Penfold and Zhang, 2013; Law et al., 2008). The underlying assumption is that there would be no intercept or slope shifts in pocket money allocations (the dependent variable) if child-directed advertising regulations had not taken place. We explain the variations in the dependent variable as a function of a set of socio-demographic variables and an intercept and slope shift per regulation event. The change in TV advertising regulations therefore needs to be interpreted as a treatment, in which all people have been exposed. We have consequently relied on a before-after identification procedure.

Food advertising can influence intra-household bargaining for pocket money though parents and children. In our case, the change in advertising regulation affected child-directed food advertising in specific media (TV channels specifically targeting children) or specific schedules (half an hour before and after the TV broadcast of a child-directed programme). We believe that it is more likely for children to watch TV programmes for adults than the other way around. Therefore, in our case, we truly have shocks that only impact children, so we can identify the food advertising effect on children with regard to intra-household bargaining for pocket money allowances.

Unobserved heterogeneity, reverse causality, and measurement errors are the three sources of potential endogeneity following the analysis presented by Bellemare and Novak (2016). In our case, unobserved heterogeneity refers to omitted variables that affect pocket money allocation and food advertising. Unobserved heterogeneity can be caused by omitted variables that can lead to a change in the allocation of pocket money and advertising expenditure. After reviewing the literature, socio-economic determinants (income, gender, age, and education) are the main determinants of pocket money (Furnham, 2001). Regarding advertising, macroeconomic conditions (Picard, 2001) and market structure (Campbell et al., 2015) are some of the most mentioned advertising determinants. Macroeconomic conditions and their effect on household income are therefore the only determinants that can lead to changes in pocket money and advertising. We have included these variables in the empirical specification.

The second source of endogeneity between food advertising and pocket money allocation is reverse causality. Reverse causality would happen if we had evidence that pocket money allocation causes advertising. While we cannot deny this possibility in all circumstances, it is not straightforward that children’s expenditure through pocket money would lead food companies to change their advertising expenditures. Taking into account our large sample size, we do not believe that reverse causality is likely to affect the results.

Since we work with observational data, we have recognised possible endogeneity sources and discuss how we have tried to control them. We cannot, however, be sure that we have controlled all possible endogeneity. For robustness purposes, we have also repeated our analysis using different cut-off values. Specifically, we have repeated the analysis using a period of twelve and six months before the policy intervention.

Finally, measurement errors could occur in pocket money allocations if households were able to misrepresent their true pocket money allocation due to the manner in which the data was obtained. For instance, parents may aim to seem especially open-minded by allocating a larger amount of pocket money. Alternatively, a parent may want to hide the fact of providing pocket money to a young child. Nevertheless, pocket money questions are not likely to be seen as strategic responses that can lead to public policies, as is the case in some welfare questionnaires for low-income households; thus, measurement errors are likely to be minimal.

3.2 Empirical Model

We have controlled for confounding factors using socio-demographic data. More importantly, however, we have divided the dataset into households only with children up to 12 years old, households only with children between 13 and 17 years old and households with children in both age groups. Children up to 12 years old are less sceptical about food advertising messages (Mills and Keil, 2005; Carter et al., 2011). This way, we were able to better isolate the regulation effect on each of these household groups.

We have also distinguished three periods with regard to child-directed advertising regulations in the UK. In the first, until March 2005, food companies were subject to no regulation. In the second, from April 2005 to December 2008, food companies claimed that they had made an effort to regulate child-directed advertising without following any specific code, referred to as self-regulation. In the third, beginning in January 2009, food companies were required to follow a specific code of practice, in the form of a co-regulation framework between public and private agencies. Thus, we have the ability to work with three distinct regulation periods in our dataset, a pre-intervention period (April 2001 to March 2005) and two post-intervention periods: self-regulation (April 2005 to December 2008) and co-regulation (January 2009 onwards). The changes in advertising regulations have already been assessed with regard to changes in advertising expenditure and HFSS food expenditure (Silva et al., 2015). In our study, however, we have pursued a more subtle and unstudied effect. For the first time, changes in regulations with regard to pocket money allocations can be assessed.

$$Y_t = \alpha_0 + \beta_1 T_{Self} + \beta_2 Self + \beta_3 T_{Self} * Self + \beta_4 T_{Co} + \beta_5 Co + \beta_6 T_{Co} * Co + \beta_7 X + \epsilon_t \quad (1)$$

Equation 1 shows the expression used to isolate the child-directed advertis-

ing policy effects. Y_t is the average pocket money allowance in month t (from April 2001 to December 2010), T_{Self} is a linear trend starting in April 2001, $Self$ is a variable that takes the value of 0 until March 2005 and 1 onward, $Self * T_{Self}$ is the interaction variable between the two variables mentioned above. Likewise, T_{Co} is a linear trend starting in January 2009, Co is variable that takes the value of 0 until December 2008 and 1 onward and $Co * T_{Co}$ is the interaction variable between the last two variables. The trend variables (T_{Self} and T_{Co}) illustrate pre-intervention trends and the dummy variables ($Self$ and Co) reveal the change in pocket money allowance in the month in which the interventions took place. The interaction terms show the change of slope after the interventions took places. The variable X is a set of socio-economic confounding determinants including lagged gross domestic product (GDP), household income, number of girls/boys in the household, as well as the gender and age of the reference member. In this way, we expect to isolate the policy effect from other confounding determinants that may change during the period of study.

3.3 Dataset

We used the Living Costs and Food Survey, a continuous survey of household expenditures that includes food and non-food items, income sources, and demographics. The survey is commissioned by the Social Survey Division of the Office for National Statistics and by the UK Department for Environmental and Rural Affairs. This survey is collected as a stratified random sample of around 6,000 households selected annually across the UK. By regularly changing the surveyed households, information is obtained continuously throughout the year, except for a break at Christmas.

The dataset contains general expenditures, food quantities, and food expenditures. The general expenditure data distinguishes between pocket money that was transferred to a child without any specific purpose (e.g. money as weekly allowance), pocket money that was transferred to a child with a specific purpose (e.g. money for lunch), and money transferred to a child as a gift. We have focused on the first, since we believe that it can better illustrate the repeated intra-household bargaining process between children and their parents. In a broad sense, parents provide pocket money to their children to help them learn responsibility with money and as a way to cover their day-to-day expenses. The ultimate motivation behind pocket money conditions its effect (Barnet-Verzat and Wolff, 2002). Pocket money allocation may have several motives behind it. It can be a reward (Barnet-Verzat and Wolff, 2002), provide financial freedom (Feather, 1991), be payment for a home service, or altruism (Barnet-Verzat and Wolff, 2002). Before analysing pocket money behaviours, it is consequently recommended to distinguish between regular (e.g. every week) and irregular (one-time only) money transfers (Barnet-Verzat and Wolff, 2002). Using the Living Costs and Food Survey, we are able to make such a distinction.

The aggregated dataset (April 2001- December 2010) contains data from

62,642 households. Of these, 19,971 households (31.88%) have at least one child 17 or younger living at home; we have used these to build three sub-samples for treated groups: (i) 11,943 households only with children under 12 years old, (ii) 4,251 households only with children between 13 and 17 years old and (iii) 3,777 households with children in both age groups. In this way, each of the households with children is in one, and only one, sub-sample. Then, we have converted the cross sectional dataset into time series data. A data point corresponds to the average household monthly pocket money allowance in a particular month (including those households that do not provide pocket money). All reported monetary values are English pounds that have been adjusted to December 2010 values.

4 Results and discussion

For households with only children under 12 years of age, Table 1 reveals that, on average, there are 0.88 boys and 0.82 girls in the household and a reference member 36.60 years old. Furthermore, each household in this sample distributes an average of 1.11 pounds per month in pocket money. In the next age group, Table 1 exhibits that there are close to 0.67 boys and 0.66 girls per household and a reference member 46.82 years old., while the monthly pocket money allowances are 4.28 pounds per household. In this sense, the older the child, the larger the expected pocket money allocation. Furthermore, as we would expect, the summary statistics reveal that older children tend to have older parents. The last group, households with a combination of child ages, presents results in between both age groups.

Table 1: Basic statistics of households with children

	Mean	Std. Dev.	Min	Max
Households only with children under 12 years old				
number of boys 17 years old or younger	.884	.78	0	7
number of girls 17 years old or younger	.823	.751	0	5
household monthly income	3,061.098	3,176.188	0	225,397.4
gender reference member: 0=male, 1=female	.372	.483	0	1
age of reference member, limit 80 or more	36.608	8.365	18	80
pocket money	1.112	4.64	0	82.244
Households only with children aged between 13-17				
number of boys 17 years old or younger	.673	.639	0	3
number of girls 17 years old or younger	.657	.624	0	3
household monthly income	3,384.393	2,064.774	0	22,367.43
gender reference member: 0=male, 1=female	.389	.487	0	1
age of reference member, limit 80 or more	46.819	7.371	18	80
pocket money	4.28	11.626	0	82.244
Households with children in both age groups				
number of boys 17 years old or younger	1.358	.936	0	6
number of girls 17 years old or younger	1.322	.947	0	6
household monthly income	3,182.283	2,035.29	0	47,043.65
gender reference member: 0=male, 1=female	.373	.484	0	1
age of reference member, limit 80 or more	41.769	6.47	18	80
pocket money	3.891	10.29	0	82.244

Note: Income and pocket money in real terms to December 2010. These descriptive statistics only consider households with children (19,971 households).

On average, households allocate between 1.11 and 4.28 pounds per month in pocket money to their children, which corresponds to less than 1% of total household income. Even though this is a relatively small expenditure compared to other household expenses, the allowances are not trivial from the child's income perspective.

For households with children up to 12 years old, Table 2 illustrates that self-regulation has not led to significant changes in pocket money. After self-regulation, households did not vary their pocket money allocations through either intercept or trend shifts. In contrast to self-regulation, co-regulation was gradually implemented until December 2008. We therefore expect that the industry began adapting their child-directed advertising prior to the implementation deadline. To take this into account, we have repeated the estimation using three break points: Model 1 uses July 2008 as the break point (six months before the co-regulation deadline), Model 2 uses October 2008 as the break point (three months before the co-regulation deadline), and Model 3 uses January 2009 as the break point (the first month of co-regulation's full implementation).

Table 2 displays that co-regulation leads to a decrease in pocket money both three months in advance of its full implementation and by the beginning of the full co-regulation period. In other words, co-regulation, and not self-regulation, has led to a decrease in the amount of pocket money distributed to children in households with children up to 12 years old. However, this decrease

does not have an immediate effect (no intercept change), but rather has an effect over time (slope change). As a result, the overall slope has shifted from increasing to decreasing. For instance, in Model 3, the pre-intervention slope is 0.136 while the post-intervention slope is -0.004 ($=0.00757-0.0482$). Co-regulation, therefore, has a significant and relevant effect on pocket money allocation, which is able to shift the trend of increasing pocket money allowances to decreasing in households that have children up to the age of 12.

Table 2: Pocket money of households with children up to 12 years old

variables	Model 1	Model 2	Model 3
trend	-0.00433 (0.0140)	0.00292 (0.0133)	0.00757 (0.0123)
self-regulation	-0.223 (0.179)	-0.260 (0.190)	-0.244 (0.189)
self-reg*trend	0.00500 (0.00615)	0.00869 (0.00705)	0.00828 (0.00726)
co-regulation (six month before)	0.595 (0.425)		
co-reg (six month before)*trend	-0.0346 (0.0176)		
co-regulation (three month before)		0.206 (0.392)	
co-reg (three month before)*trend		-0.0484** (0.0206)	
co-regulation			-0.150 (0.464)
co-reg*trend			-0.0482** (0.0190)
Observations	117	117	117

Note: Standard errors in parentheses, ** $p < 0.05$. We have controlled for auto-correlation and for the set of confounding factors of Table 1 and seasonality using a set of monthly dummy variables. Model 1 uses July 2008 as a break point (six months before co-regulation). Model 2 uses October 2008 as a break point (three months before co-regulation). Model 3 uses January 2009 as a break point (co-regulation month).

We have repeated the analysis for households consisting of children between the ages of 13 and 17 only (no younger siblings). Table 3 displays that the effects of self-regulation and co-regulation on this age group are softer than those found on younger children and are not significant. Self-regulation, whose mechanisms were designed to limit advertising for children under 16 years old, led to no effect on pocket money allowances. Since older children are not explicitly targeted by the regulation, we found, as expected, less of an impact in households with older children. Moreover, older children are less susceptible to child-directed advertising compared to younger ones.

The lack of a policy effect on households with children between 13 and 17 years old is also informative. Older children are expected to be influenced by a wider variety of sources; therefore, TV advertising regulations would have less of an influence on them than on younger children. In addition, older children are better able to discern the marketing messages being communicated and,

thus, be less naive about the persuasive intent behind TV advertising. Older adolescents are furthermore more likely to have developed consumer skills and possibly negative associations with advertising (Moore and Stephens, 1975). Nevertheless, we want to be cautious with these results. We are not testing the effect of TV advertising on children; we are testing the effect of child-directed advertising regulations on pocket money allocations.

Table 3: Pocket money of households with children between 13-17 years old

variables	Model 1	Model 2	Model 3
trend	-0.0146 (0.0388)	-0.0930 (0.0560)	-0.0318 (0.0507)
self-regulation	0.898 (1.127)	0.694 (1.126)	0.834 (1.176)
self-reg*trend	0.00922 (0.0446)	0.00927 (0.0434)	0.00955 (0.0430)
co-regulation (six months before)	-0.372 (1.264)		
co-reg (six months before)*trend	0.00629 (0.0655)		
co-regulation (three months before)		2.836** (1.198)	
co-reg (three months before)*trend		0.0462 (0.0496)	
co-regulation			0.561 (1.095)
co-reg*trend			0.00208 (0.0473)
Observations	117	117	117

Note: Standard errors in parentheses, ** $p < 0.05$. We have controlled for auto-correlation and for the set of confounding factors in Table 1 and seasonality using a set of monthly dummy variables. Model 1 uses July 2008 as the break point (six months before co-regulation). Model 2 uses October 2008 as the break point (three months before co-regulation). Model 3 uses January 2009 as the break point (co-regulation month).

Table 4: Pocket money of households with children under 12 and between 13-17 years old

variables	Model 1	Model 2	Model 3
trend	0.00944 (0.0435)	0.0228 (0.0529)	0.0382 (0.0382)
self-regulation	0.538 (0.572)	0.473 (0.573)	0.529 (0.584)
self-reg*trend	0.0270 (0.0230)	0.0333 (0.0235)	0.0312 (0.0233)
co-regulation (six months before)	1.098 (0.870)		
co-reg (six months before)*trend	-0.0462 (0.0774)		
co-regulation (three months before)		0.406 (1.178)	
co-reg (three months before)*trend		-0.0692 (0.0680)	
co-regulation			-0.531 (1.071)
co-reg*trend			-0.0663 (0.0620)
Observations	117	117	117

Note: Standard errors in parentheses, ** $p < 0.05$. We have controlled for auto-correlation and for the set of confounding factors in Table 1 and seasonality using a set of monthly dummy variables. Model 1 uses July 2008 as the break point (six months before co-regulation). Model 2 uses October 2008 as the break point (three months before co-regulation). Model 3 uses January 2009 as the break point (co-regulation month).

For robustness purposes, we have repeated the interrupted time series analysis using households without children as a control group. Consistent with our previous findings, we have found that households with only children 12 years old or younger are the only ones significantly impacted by advertising co-regulation, while self-regulation has not led to any significant effect on pocket money allocation.

Therefore, using data from 2001 to 2010, we have tested whether child-directed advertising regulation events have led to changes in pocket money allocations. Specifically, we have found that co-regulation (not self-regulation) leads to changes in a household's pocket money allocations. However, the age of the children in a household does play a significant role. Co-regulation affects the pocket money allocation of households with children up to 12 years old. We have provided evidence that suggests that food policy may lead to changes in the intra-household bargaining process.

4.1 Policy Implications

The increasing obesity rate in many countries has led to considerable interest in explaining obesity determinants and in implementing cost-effective interventions to curb the obesity trend. Most of the related research has been conducted at a household level, treating the whole household as a black box. We

argue that a household is a heterogeneous unit that contains different individuals in terms of gender, age, and education levels (to name a few differences). It can therefore be informative to look at the effect of policy regulations on the relationships among household members. Taking into account this heterogeneous nature can help to improve policy design and avoid unintended consequences.

The purpose of this research is to show how obesity-related interventions may affect the relationship between members of a household. In particular, we have focused on the effect of child-directed advertising regulations on pocket money. Pocket money is the result of the parent-child money bargaining process. Child advertising regulations have limited advertising broadcasts close to TV programmes aimed at children; therefore, we were able to identify how advertising has led to a change in children’s bargaining power to obtain pocket money. We argue that the difference stems from the child’s influence, since the advertising regulations restrict child-directed food advertising. In this sense, this research helps to add a new dimension to consider when evaluating child-related interventions.

5 Conclusions

Our results reveal that co-regulation, as opposed to self-regulation, has led to a significant decrease in pocket money allocations. Co-regulation, specifically affects the trend (trend shift) more than resulting in an immediate change in magnitude (intercept shift). In this sense, co-regulation leads to a change over time in pocket money allocation in households that have children only up to the age of 12.

The actual causal link between child advertising regulations, pocket money allocation, and HFSS expenditure/obesity is a topic that has unfolded little by little. In this article, we help provide evidence to link child advertising regulations and pocket money allocation. Punitha et al. (2014) argues that pocket money is positively correlated with the number of visits to fast-food restaurants and to body mass index (BMI), which suggests a possible path that explains the link between pocket money and obesity. Evidence also suggests that advertising can increase overall consumption of unhealthy food categories (Andreyeva et al., 2011).

Further, previous research has also revealed that pocket money expenditure patterns depend on, at least, a child’s age and gender. It is likely that more than one path exists, which will depend on the characteristics of the child and the household, as well as on environmental conditions. For instance, we found that boys tend to receive more pocket money from their parents than girls. Previous research, however, has found that girls tend to be more obese than boys. The link between pocket money, consumption of unhealthy foods, and obesity continues to be an area of fruitful research.

Measuring parenting styles is a complex task (Vollmer and Mobley, 2013), since there are continuous interactions between household members and their environment. We argue that pocket money allowance is one parenting style that can be measured with relative accuracy through household expenditure surveys. Overall, pocket money allowances are increasing over time (Halifax, 2017). We believe that there is a need to understand the drivers and the possible unintended consequences associated with pocket money. With this research, we argue that it is informative to take a look at this black box at home and gain a more complete picture of the actual effect of advertising regulations on household behaviour.

6 Appendix

We have split the sample into three sub-samples (treated groups). For robustness purposes, we have repeated the analysis using a control group that correspond to the average monthly pocket money of households without children. Table 5 presents the basic statistics of households without children (42,671 households):

Table 5: Basic statistics of households without children

variable	Mean	Std. Dev.	Min	Max
number of boys 17 years or younger	0	0	0	0
number of girls 17 years or younger	0	0	0	0
household monthly income	2,346.663	2,149.404	0	134,405.1
gender reference member: 0=male, 1=female	.381	.486	0	1
age of reference member, limit 80 or more	57.255	16.356	18	80
pocket money	.005	.283	0	27.283

Note: Income and pocket money in real terms to December 2010. These descriptive statistics only consider households without children (42,671 households).

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