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# The Labour Supply Effect of Education Maintenance Allowance and its Implications for Parental Altruism

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INSTITUTE FOR SOCIAL  
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## **Non-Technical Summary**

Education Maintenance Allowance (EMA) of up to £30 per week was paid to 16-18 year-olds in full-time education and from low income backgrounds (household income below £30,810 per year). The programme ran across the UK from 2004 until 2011, when it was withdrawn in England, but has been retained in Scotland, Wales and Northern Ireland. It was designed as an incentive to stay in education or training beyond the minimum school leaving age.

Government transfer programmes targeting children are usually made 'in-kind' (e.g. a Free School Meal, rather than the cash equivalent) or paid to their parents (e.g. Child Benefit). Past evidence shows that cash transfers paid to adults are rarely spent as intended: The 'winter fuel payment' scarcely increases spending on fuel, and 'Child Benefit' increases spending on children's items no more than an increase in income from any other source. This means that paying £30 per week to parents, even where explicitly framed as a reward for their child, can be expected to raise the child's welfare by the same amount as a £30 per week increase in the parent's general income. However, even with the money paid straight to the child, the parent may still (i) reduce the pocket money they give their child and (ii) make fewer purchases (in-kind transfers) on the child's behalf, potentially leaving the child no better off than without EMA.

This paper tests whether paying EMA directly to the child makes the child better off than if the equivalent transfer were paid to his parents. There is no data on pocket money or in-kind transfers, so we address this research question by testing for a change in the child's labour supply when he receives EMA. The idea is that if, for example, the government gives £30 EMA to the child and the parent's response is to take £30 away from the child, the child is left in the same financial position as had EMA never been given. He will therefore choose to carry on earning from part-time employment for the same hours as before. If the parent takes away less than £30 however, the child has more unearned income, so will reduce his labour supply to benefit from some extra leisure.

Using data from the Longitudinal Study of Young People in England, an EMA payment of £30 per week is found to reduce teenagers' labour supply by 3 hours per week and probability of employment by 8 percentage points from a base of 43%. We conclude that parents withdraw cash and in-kind transfers from their children to a value of between 26% and 67% of what the child receives in EMA, making the child significantly better off than if the same money had been given to his parents.

# **The Labour Supply Effect of Education Maintenance Allowance and its Implications for Parental Altruism**

Angus Holford<sup>^</sup>

October 6, 2014

## **Abstract**

Education Maintenance Allowance (EMA) was a UK government cash transfer paid directly to children aged 16-18 in post-compulsory full-time education. Using data from the Longitudinal Study of Young People in England, we find an EMA payment of £30 per week reduces teenagers' labour supply by 3 hours per week. We show this is consistent with parents withdrawing cash and in-kind transfers from their child to a value between £7.80 and £20.10 per week. We therefore argue that making this cash transfer directly to the child produces higher child welfare than if the equivalent transfer were made to parents.

**Keywords:** Education Maintenance Allowance, altruism, transfers, rotten kid.

**JEL classification:** I38, J22, H53

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## 1. Introduction

Publicly provided transfers targeted at children are usually made in-kind or as a hypothecated cash transfer paid to parents. There are two mechanisms which may mitigate the benefit from these transfers to the intended recipient. Firstly, if the transfer is paid to the parent, there is an agency problem: The parent is not compelled to spend the benefit on the child. For example, Blow et al (2012) find that unanticipated variation in the level of Child Benefit in the UK affects expenditure predominantly on adult-assignable goods. (The ‘labelling effect’ of this programme’s name is clearly minimal – see Beatty et al, 2014). It also matters *which* parent receives the welfare payment, with a switch from father to mother (‘wallet to purse’) being shown to raise expenditure on child care and children’s clothing, and reduce expenditure on alcohol and tobacco, for example (Lundberg et al., 1997; Phipps and Burton, 1998). Secondly, regardless of who receives the transfer, parental altruism may substantially offset the gain to the targeted household member, as an altruistic head-of-household may redistribute resources among household members so as to maximise household welfare (Becker, 1974, 1981). In this case, an in-kind transfer may still benefit the child if the household is induced to consume more of the good than it would voluntarily (Currie and Gahvari, 2008), or if the parent does not perceive the publicly provided good to be a close substitute for a privately provided good. For example, Bingley and Walker, (2013), show that day care milk or milk tokens in the UK crowd out private expenditure on milk (an essentially homogeneous product) to 80% of these transfers’ value, but Free School Meals (for which there is no close market substitute) only crowds out expenditure on food to 15% of its value. Nevertheless, von Hinke Kessler Scholder (2011) finds no effect of the withdrawal of Free School Meals from some groups on their bodyweight, suggesting that targeted children receive no better an overall diet than in the absence of the programme.

In this paper we consider the Education Maintenance Allowance (EMA) programme. EMA was a cash transfer paid by the UK government to students aged 16-18 from low income backgrounds and undertaking the first two years of full time post-compulsory education. Eligibility was determined by household income, according to the thresholds shown in Table 1.<sup>1</sup> At its peak in the 2009-10 school year the scheme cost £580m and served 643,000 recipients (see Bolton, 2011, p.2).

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<sup>1</sup> Income earned by the child through part-time work or their own welfare receipt was disregarded. These thresholds and entitlements were unchanged in nominal terms over the scheme’s life in England, 2004-2011.

**Table 1: Eligibility Thresholds for EMA**

Household Income, per year	EMA Entitlement, per week
<£20,818	£30
£20,818 - £25,521	£20
£25,522 - £30,810	£10
>£30,810	Zero

EMA was paid in cash, so it was a perfect substitute for cash transfers from parents. Barriers to participation were low (students needed a bank account in their name and a parental declaration of income once each academic year) and stigma unlikely to be a problem (the eligibility criteria were wide and take-up high - in our data 46% of students receive EMA), so conditional on participation in full-time education the direct non-pecuniary costs associated with receipt of the benefit should be negligible. As it was paid directly to the child, there is no agency problem. The intervention was also generous, worth up to £1170 per year. The parent's transfer response to EMA should therefore provide a clean test of whether the parent's behaviour is consistent with that of an effectively altruistic head-of-household.

We know of no data on cash transfers made by parents to children receiving EMA. Moreover, these may represent a poor measure of the overall value of parents' support for their children, given unobserved heterogeneity in in-kind transfers or the items that children are expected to purchase themselves. Our identification strategy instead stems from the insight, formalised in the theoretical model set out in section 2, that if parents respond to the child's receipt of EMA by withdrawing cash and in-kind transfers of an equal value (consistent with the parent 'fully insuring' the child's consumption), then the child's opportunity set is unchanged, and he should not alter his labour supply. Correspondingly, the larger the child's reduction in labour supply, the smaller the redistributive response made by parents, or equivalently, the greater the proportion of the EMA the child has been permitted to keep.

To pre-empt our results, estimates from OLS, Tobit, probit and quantile regression methods using data from the Longitudinal Study of Young People in England (LSYPE) firmly reject a model of effectively altruistic parents. An EMA payment of £30 per week reduces teenage labour supply by around 3 hours per week, and the probability of working by positive hours by 8.3%. These results are robust to estimation on the sub-sample of non-credit-constrained households, for whom we argue participation in post-compulsory education is unlikely to be affected by eligibility for EMA. Using estimates of teenagers' labour supply response to

unearned income obtained from elsewhere in the literature (Dustmann et al, 2009, Wulff Pabilonia, 2001), we calculate this to be consistent with parents withdrawing cash and in-kind transfers from the child to between 26% and 67% of the value of EMA.

While the (non-) altruistic behaviour of parents has implications for the targeting of transfers – our results indicate that the child’s welfare benefit from EMA is higher than had an equivalent transfer been made to parents - the labour supply effect of EMA has implications for the efficacy of conditional cash transfers in raising educational performance. In-school employment is widespread. In our data, 43% of 17 year-olds in the first year of post-compulsory education are in employment. For the US, Hotz et al (2002) show that 92% of the National Longitudinal Study of Youth Cohort worked at some point during High School. In-school employment may improve teenagers’ stock of cognitive and non-cognitive human capital (for example, financial literacy, communication skills and lower discount rates – Oettinger, 1999; Light, 2001) or preference for education as a route to higher-skilled work in future (Dustmann and van Soest, 2007). However, by crowding out time and effort devoted to study (e.g. Kalenkoski and Wulff Pabilonia, 2013) it reduces the child’s educational performance, particularly above a moderate number of hours per week or in close proximity to high-stakes examinations (Lillydahl, 1990, Ruhm, 1997; Payne, 2004). Hence, to the extent that EMA reduces labour supply at least at the higher end of the working hours distribution, this should feed through to an improvement in their academic and future labour market outcomes. While there are indications from hypothetical questions that EMA reduced recipients’ labour supply (RCU Market Research, 2007), to our knowledge we are the first to quantify this labour supply effect using observational data. Although EMA closed to new applicants in England in January 2011, it was replaced by the ‘16-19 bursary’ programme, with a smaller budget of £180m, and automatic entitlement reduced in scope to approximately 12,000 of the “most vulnerable” students. EMA has been retained in the rest of the UK. It will be important for policymakers to account for the labour supply effect of this scheme in considering any future reforms.

The remainder of this study is structured as follows: Part 2 sets out a model showing how the labour supply response to EMA provides a test for the presence of an effectively altruistic head-of-household. Part 3 discusses the data and estimation strategy, Part 4 presents the results and Part 5 sets out the conclusions and recommendations.

## 2. Theoretical and Empirical Model

In this section we develop a theoretical model for the joint determination of parental transfers and the child's labour supply. We follow closely the structure of Dustmann et al (2009) and Kalenkoski and Wulff Pabilonia (2010) but extend their analysis to account for (i) the introduction of EMA – an exogenous cash transfer paid to the child – and (ii) endogenous selection into post-compulsory education as a function of EMA, parental transfers and labour supply.

Our structural parameter of interest is the amount,  $\lambda$ , by which parental transfers are reduced for every pound the child receives in EMA. We face the challenge that, for the relevant age group, there exists no data on transfers in the LSYPE. More broadly, even where information on cash transfers is elicited, researchers still lack data on in-kind transfers and the items which children are expected to pay for themselves, which are required for complete identification of models of parental altruism.<sup>2</sup> Our model shows how the child's labour supply response to EMA can be used for inference about parents' withdrawal of both cash and in-kind transfers.

We assume two agents; a selfish child and altruistic parent. Each holds full information about the preferences of the other. Both wish to maximise the present value of their expected lifetime utility. The parent's altruism may be impure, in that she values the child's academic performance more highly than does the child. Each agent may discount future utility at different rates, or hold distinct beliefs about how current behaviour will impact upon future opportunities.

The parent announces a contingent rule specifying the baseline transfer she will make if the child works zero hours,  $T$ , and the amount by which this will be reduced for every pound the child earns in the labour market,  $t$ . It is costless to set and revise the transfer level.

The child is assumed to have no bargaining power. Taking this parental strategy as given, the child then chooses his labour supply  $l \in [0,1]$  at a constant wage  $w$  (and effective wage  $w \cdot (1 - t)$ ), to maximise his utility function  $U(C, L)$  defined over consumption ( $C$ ) and Leisure ( $L$ ), which comprises all non-labour market activities. Normalising the total time available to unity imposes  $L = 1 - l$ .  $U(C, L)$  is assumed to be strictly increasing, twice

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<sup>2</sup> The age 16 sweep of the UK's National Child Development Study of a cohort born in 1958 and studied by Dustmann et al, 2009, is an honourable exception.



differentiable and strictly quasiconcave in its arguments. The child's concerns regarding future consumption or academic performance are nested within his utility from leisure.

The child's only source of unearned income,  $\omega$ , is the transfer from parents. Rewriting  $U$  in terms of labour supply, the child's problem can be defined as:

$$\max_{c,l} U(C, 1 - l) \text{ subject to } C \leq T + w \cdot (1 - t) \cdot l \quad (1)$$

Assuming that leisure is a normal good over the relevant domain ensures that the child's optimal labour supply  $l^*$  is non-increasing in unearned income,  $\omega$ , and strictly decreasing for  $l^* > 0$ :

$$\left. \begin{aligned} \frac{\partial l^*}{\partial \omega} &\leq 0 \text{ if } l^* \geq 0 \\ \frac{\partial l^*}{\partial \omega} &< 0 \text{ if } l^* > 0 \end{aligned} \right\} (2)$$

We also assume that optimal labour supply is non-decreasing in the effective wage,  $w \cdot (1 - t)$ , and strictly increasing for  $l^* > 0$ :

$$\left. \begin{aligned} \frac{\partial l^*}{\partial (w \cdot (1 - t))} &\geq 0 \text{ if } l^* \geq 0 \\ \frac{\partial l^*}{\partial (w \cdot (1 - t))} &> 0 \text{ if } l^* > 0 \end{aligned} \right\} (3)$$

The child will undertake paid employment if and only if the effective wage exceeds the marginal rate of substitution of leisure for consumption at the initial endowment point. Formally this may be expressed as:

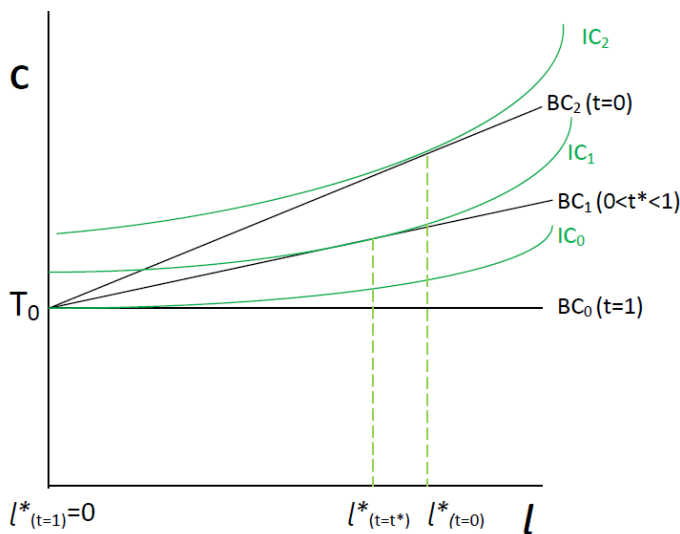
$$\left. \begin{aligned} l^* > 0 \text{ iff } w \cdot (1 - t) &> \frac{\partial U(T,1)/\partial L}{\partial U(T,1)/\partial C} \\ l^* = 0 \text{ iff } w \cdot (1 - t) &\leq \frac{\partial U(T,1)/\partial L}{\partial U(T,1)/\partial C} \end{aligned} \right\} (4)$$

Finally, define for each child a reservation utility, equal to that which could be obtained by leaving full-time education. If this is not attainable at the optimum position, the child will not participate in post-compulsory full-time education.

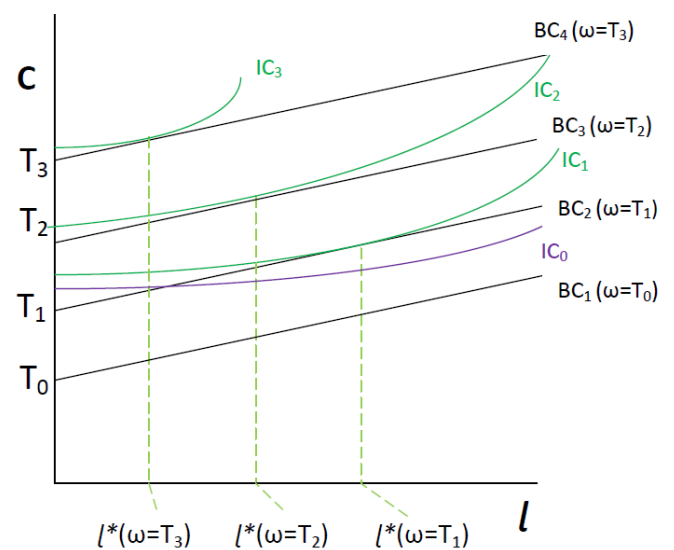
This model formalizes the stylized facts from the literature (Dustmann et al, 2009; Kalenkoski and Wulff Pabilonia, 2010; Wolff, 2006; Gong, 2009) that (i) parents provide smaller transfers, or are less likely to provide positive transfers, the more the child works, other things equal, and (ii) children undertake less employment, the greater the transfer

received from parents, other things equal. Equations (1-4) also accommodate a discrete choice framework wherein the probability of working positive hours is non-increasing in unearned income and non-decreasing in the effective wage. A discrete framework may be more appropriate if employers are unwilling to hire individuals for less than a minimum number of hours each week.

**Fig. 1: Labour Supply with  $\omega=T_0$  and  $t$  varying**



**Fig. 2: Labour Supply with  $t=t^*$  and  $\omega$  varying**



Retaining the notation developed above, the model is summarised in Figures 1 and 2. Reservation utility (that which the child would gain by leaving compulsory education) is represented by indifference curve  $IC_0$ . Higher indifference curves represent higher utility. The budget constraint (BC) represents the upper bound of the child's opportunity set for  $l > 0$ . Interior optima are defined by the tangency of budget constraint and indifference curve. In Figure 1, the transfer  $T_0$  is just sufficient to ensure that the child does not need to take employment in order to meet his education participation constraint. The parent can then induce zero hours of work by 'taxing' the child's income at a rate of 100% (setting  $t = 1$ ), while still ensuring the child stays in education. Reducing  $t$  raises the effective wage and induces longer hours of work. The child's welfare is improved, as higher indifference curves become attainable. In Figure 2, with  $t = t^*$  throughout, a child offered  $T_1$  does not meet his reservation utility at zero hours of work. However, at his optimum labour supply  $l^*(\omega=T_1)$  he is strictly better off than had he left full-time education. A child in this situation will continue

in full time education without additional financial support. His welfare can be further improved by raising the initial transfer to  $T_2$  and in turn  $T_3$ . On the other hand, a child offered  $T_0$ , for example, cannot attain his reservation utility at *any* level of employment. Without additional financial support, he will leave full time education.

## 2.1. Introducing EMA

Let us then introduce an additional source of unearned income paid straight to the child; EMA. We first consider the situation of an individual whose education-participation constraint is satisfied without EMA. For this group, EMA can be treated as exogenous, conditional on the parent's income. (The maximum annual difference in EMA payments from moving into a lower income bracket - £390 - is too small for parents profitably to 'fine-tune' their true income).<sup>3</sup>

In Figure 3, EMA initially induces a vertical upward shift in the child's budget constraint. However, in response, the parent may choose to reduce the transfer  $T$  by some proportion  $\lambda \in [0, 1]$  of the value of EMA received by the child. (Reducing  $\lambda$  permits the child to 'keep' an increasing proportion of his EMA). The parent's attitude to *earned* income, defined by  $t$ , is assumed not to change. The child's problem can now be written:

$$\max_{C, l} U(C, 1 - l) \text{ subject to } C \leq T + (1 - \lambda) \cdot \text{EMA} + w \cdot (1 - t) \cdot l \quad (5)$$

If  $\lambda = 1$ , the child's EMA is entirely offset by an equivalent reduction in the transfer from the parent. This leaves the child's budget constraint unchanged compared with the initial situation. With the same opportunity set, the child's working hours should also remain unchanged. Hence, if we observe a negative labour supply response to EMA, this implies  $\lambda < 1$ , and we can reject the null hypothesis of 'full insurance', or parents isolating their children from any income variation.<sup>4</sup> However, as EMA is an exogenous payment to the child, it does not constitute a zero-sum redistribution of household resources. This means that to reject a null hypothesis of an effectively altruistic parent (who redistributes resources so as to maximise household welfare) we must reject  $\lambda \geq (1 - \theta)$ , where  $\theta$  is the parent's marginal propensity to transfer to the child out of her own income. We do not have the data to test this

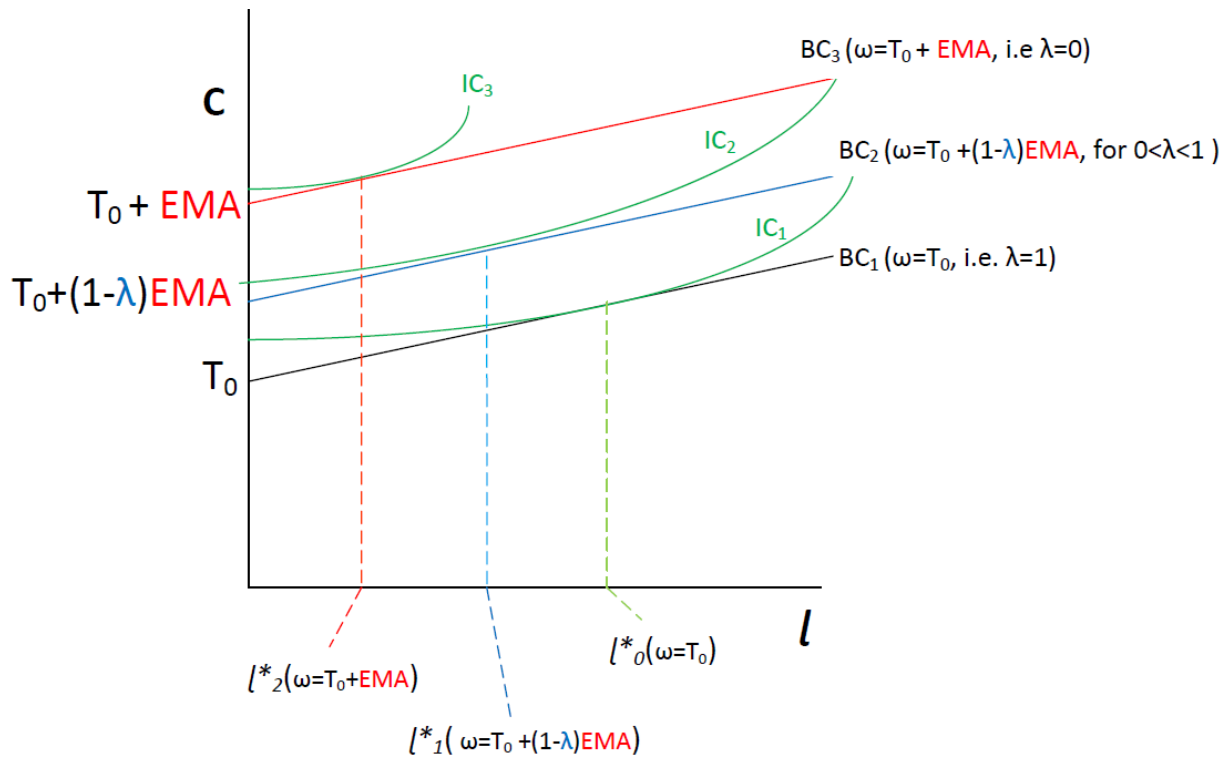
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<sup>3</sup> £10 per week, 39 weeks per year.

<sup>4</sup> Failure to reject a labour supply response of zero is not sufficient to conclude that parents are fully insuring their children. This could result from an income-elasticity of labour supply of zero. However, a negative labour supply response is sufficient to reject both an income elasticity of zero and full insurance.

directly, but present back-of-the-envelope calculations appealing to results elsewhere in the literature.

**Fig. 3: Introducing EMA to the labour supply model.**



## 2.2. Endogenous selection into full-time education

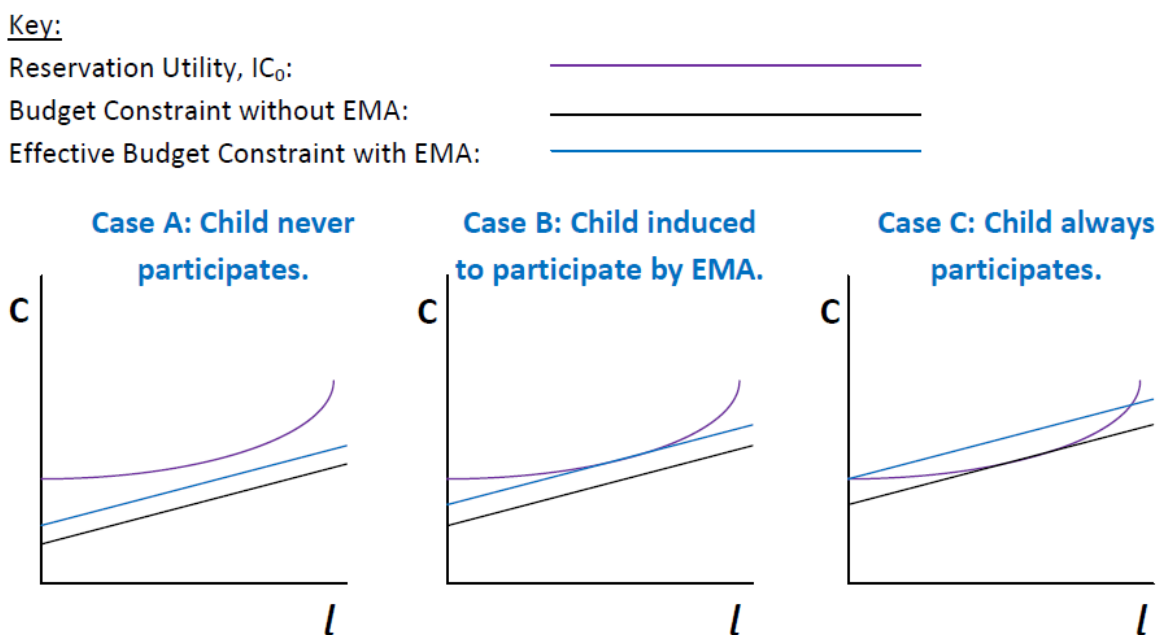
The policy objective of EMA was to increase participation in post-compulsory education. Dearden et al (2009) provide an evaluation based on a pilot scheme in matched areas of England, and concluded that EMA raised participation by eligible young people in the first year of post-compulsory schooling by 4.5 percentage points, from a base of 65%. The effect was larger among children living in rented accommodation or social care. The authors suggest this provides evidence that the principal mechanism by which EMA increases participation is by easing credit or liquidity constraints rather than simply reducing the opportunity cost of education.

In our model, the condition for EMA to induce a child to stay in full-time education is illustrated in case B of Figure 4. Net of the parent's response, adding EMA to the child's effective budget constraint must make the reservation utility newly attainable. If the initial parental transfer were any smaller than in case B, the child would still be worse-off in full-time education *and* receiving EMA than if he dropped out (case A). On the other hand, if the

initial parental transfer were sufficiently larger the child would continue in full-time education even without EMA (case C). EMA is therefore a binding consideration in the education participation decision of only a narrow group of people.

Nevertheless, it is clear that the treated group (receiving EMA) is fundamentally different to the non-treated group in that it contains some individuals ('inducees') who are only present in full time education *because* they receive EMA. The non-treated group (non-recipients in full-time education) only contains individuals who would have continued in full time education without EMA.

**Fig. 4: How EMA may affect the decision to participate in post-compulsory education.**



Dearden et al (2009, p.837) argue that most inducees were drawn from “financially unproductive activities” rather than paid work. This suggests that the type of individual for whom EMA makes a difference to continued education is poorly motivated with respect to labour market activities, or more likely to live in deprived areas where there are fewest *opportunities* to work. We proxy for local labour market opportunities using regional dummies and the Index of Multiple Deprivation for the child’s area of residence. However, if, conditional on a rich set of individual and household characteristics, the child’s motivation is positively correlated with hours of work and negatively correlated with EMA, the estimated labour supply effect of EMA will be downward biased.

Household income in the LSYPE is recorded only in bands, the threshold of which do not accord with those for EMA eligibility, and the period which income is recorded does not

correspond to that over which eligibility is determined. This makes it impractical to assign a counterfactual EMA status for those who did not continue in education and thus model the role of EMA in the selection process empirically. Instead, we shall re-estimate our model using non-credit-constrained households who we argue will not have been influenced by EMA when making their participation decision, and show that any bias is negligible.

### 3. Data

We use data from the Longitudinal Study of Young People in England (LSYPE), which tracked a cohort of individuals born between 1<sup>st</sup> September 1989 and 31<sup>st</sup> August 1990, and so in the same academic year at school. We focus on the fourth wave, conducted from June-October 2007. Respondents were 16 or 17 years old, and those in education were at the end of their first or start of their second year of post-compulsory education. Of the 11,801 respondents, 8971 were in full time education, of which 4359 received EMA and 3795 reported positive hours of paid employment.

**Table 2: Take-up of EMA in estimation sample, by household income band and entitlement bracket**

Annual Household Income Band	Conditional on participation in full-time education			
	Sub-Sample Size	EMA recipients	EMA take-up	Weekly EMA entitlement
<£2600	79	60	75.95%	£30
£2,600 - £5,199	236	192	81.36%	
£5200 - £10,399	661	576	87.14%	
£10,400 - £15,599	872	744	85.32%	
£15,600- £20,799	740	614	82.97%	
£20,800 - £25,999	700	505	72.14%	£10, £20 or £30
£26,000 - £31,199	690	375	54.35%	Zero or £10
£31,200 - £36,399	536	137	25.56%	Zero
£36,400 - £41,599	473	69	14.59%	
£41,600 - £46,799	428	37	8.64%	
£46,800 - £51,999	418	23	5.50%	
≥£52,000	1419	41	2.89%	
<b>All</b>	<b>7252</b>	<b>3373</b>	<b>46.51%</b>	

Contains all observations for which neither household income nor EMA receipt entries are missing.

There are no data documenting cash or in-kind transfers from parents, and what the child is required to pay for himself. We do observe the level of EMA received and their usual weekly hours of paid employment.<sup>5</sup>

Our data show substantial numbers of apparently eligible students who do not receive EMA and ineligible students who do receive EMA (see Table 2). The second group will partly result from those experiencing a rise in family income after having applied for EMA. They retain their entitlement until the end of the academic year. Only then must they reapply. We also note that the application process provides an incentive for false reporting of household income, while survey respondents lack an incentive for accurate reporting.

Non-take-up will partly depend on observed characteristics. For example, the informational demands when applying for EMA are greatest for those with self-employed parents, and the opportunity cost of parents' time (to help with the application) is likely to be related to their income and occupation. An omitted variables bias will occur if receipt of EMA is partially correlated with omitted variables that also help determine working hours. For example, more highly motivated teenagers are likely to pursue the application process most ardently, while also being likely to work longer hours, other things equal. This will positively bias the labour supply effect of EMA.

Hourly wages are not directly elicited. Instead of introducing measurement error by dividing weekly earnings by weekly hours, and necessitating a selection model (since the counterfactual wage of those not in employment is not observed), we omit wages from our model and assume they are partially uncorrelated with receipt of EMA. This assumption seems plausible. As argued by Wolff (2006), the teenagers considered here are likely to work predominantly at fixed hourly rates of pay close to the legal minimum wage. Motivation or any other unobserved personality traits, which may also affect receipt of EMA, are unlikely to be rewarded with higher wages.

We do control for a full range of covariates that might be expected to influence the child's and/or parent's attitudes to the child's employment and study, the parents' attitudes to transfers, and local labour market conditions. These include household income, housing tenure, a measure of local deprivation, and the employment status and qualifications of the

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<sup>5</sup> Some interviews took place in the school holidays, when EMA is not paid. The survey question is ambiguous, but I assume that interviewees respond according to what they receive during term time. I also assume that the survey question regarding employment, emphasising hours "usually" worked, is interpreted to refer to term time.

parents. As the survey is linked to the National Pupil Database, we can also control for prior educational performance up to age 16. Sample descriptive statistics for selected explanatory variables are set out in Table 3.

**Table 3: Sample descriptive statistics by covariate sub-group.**

Covariate Sub-group	Proportion of Sub-group In Full-time Education	Conditional on participating in full-time education		
		Unconditional Mean Hours of Work (Standard Deviation)	Proportion reporting Positive Hours of Work	Conditional on Positive Hours Mean Hours of Work (Standard Deviation)
<u>All</u>	77.05%	5.28 (7.85)	43.10%	12.26 (7.59)
<u>EMA Weekly Payment</u>				
Zero	N/A	6.22 (7.99)	52.17%	11.92 (7.37)
£10	N/A	6.22 (7.71)	52.67%	11.81 (6.85)
£20	N/A	5.83 (7.82)	47.29%	12.33 (6.97)
£30	N/A	3.86 (7.45)	29.53%	13.05 (8.22)
<u>Household Income Band</u>				
<£2600	76.77%	3.59 (9.39)	21.05%	17.06 (14.00)
£2,600 - £5,199	72.35%	3.13 (6.68)	26.22%	11.95 (8.08)
£5200 - £10,399	68.91%	3.49 (7.00)	26.81%	13.02 (7.66)
£10,400 - £15,599	74.20%	3.73 (7.17)	29.75%	12.55 (7.89)
£15,600- £20,799	74.63%	4.95 (7.98)	38.39%	12.90 (7.96)
£20,800 - £25,999	75.50%	6.11 (8.77)	45.76%	13.36 (8.45)
£26,000 - £31,199	77.36%	6.61 (8.49)	52.30%	12.65 (7.84)
£31,200 - £36,399	73.74%	6.28 (8.10)	51.70%	12.15 (7.45)
£36,400 - £41,599	76.49%	6.33 (7.31)	56.28%	11.26 (6.29)
£41,600 - £46,799	81.08%	6.68 (7.79)	56.90%	11.74 (6.87)
£46,800 - £51,999	85.63%	7.07 (8.31)	58.64%	12.05 (7.59)
≥£52,000	88.74%	6.10 (7.77)	53.62%	11.38 (7.25)
<u>Parent's Highest Qualification</u>				
Degree	92.52%	4.71 (7.03)	43.65%	10.79 (6.90)
A-Levels	79.18%	6.37 (7.99)	52.42%	12.15 (7.17)
GCSEs	70.94%	6.17 (8.54)	47.77%	12.92 (13.94)
No Qualifications	71.22%	3.28 (7.17)	23.51%	13.94 (8.38)
<u>Index of Multiple Deprivation:</u>				
First Quintile: Most deprived	73.13%	2.90 (6.79)	21.73%	13.35 (8.54)
Second Quintile	72.98%	4.37 (7.90)	31.46%	13.88 (8.14)
Third Quintile	75.57%	5.97 (8.44)	45.70%	13.06 (7.97)
Fourth Quintile	79.31%	6.66 (8.31)	54.92%	12.13 (7.71)
Fifth Quintile: Least deprived	84.28%	6.25 (7.12)	38.44%	10.73 (6.23)
<u>Credit Constraint Proxies</u>				
Live in owned home	80.87%	5.66 (7.83)	47.23%	11.97 (7.37)
Rented Accommodation/Social Care	69.05%	3.81 (7.61)	27.50%	13.85 (8.47)
<u>Sex</u>				
Male	73.15%	5.09 (8.34)	38.58%	13.17 (8.59)
Female	81.51%	5.30 (7.35)	45.49%	11.64 (6.70)



Table 3 shows that education participation tends to be lower among those living in deprived areas or lower income households, or those with parents from lower educational backgrounds. Participation is also substantially lower among males than females, and among those whose parents are ‘credit-constrained’; defined in accordance with Dearden et al (2009), as those living in rented accommodation or social care; than those who are not.

Among those participating in full-time education, those in employment are positively selected by socio-economic background. Children from progressively higher income households have higher unconditional mean hours of work and a greater probability of working positive hours, except at the very highest income band. A similar pattern is observed in relation to local deprivation (children from more affluent areas work more, until reaching the least deprived quintile) and parental qualifications (the tendency to work is lowest for the children of parents with no qualifications, rising for those of parents with GCSEs and A-Levels in turn, but falling again for those of parents with degrees).

Those receiving EMA of £30 per week work substantially less than those receiving lower payments or none, but this seems to be accounted for by a lower propensity to work at all, rather than a reduction in hours, conditional on working. Though not an ‘other things equal’ observation, this supports our decision to estimate treating labour supply as a discrete choice, as well as a continuous choice with corner solution.

## **4. Results**

### **4.1. Principal Specifications**

To estimate the effect of EMA on hours of employment, we use ordinary least squares and Tobit specifications. OLS is the best linear predictor of hours worked, but since hours worked cannot fall below zero – the level chosen by a majority of the population of interest – the true conditional expectation function is clearly non-linear. The Tobit specification recognises that labour supply is a continuous choice only over positive hours, conditional on the decision to participate in employment. This imposes the assumption of normality of residuals in a latent model of ‘desired working hours’. For the discrete choice to work positive hours, estimation is conducted by a probit model, with results presented as average marginal effects. Our regressors of interest are dummy variables for receipt of £10, £20, or £30 payments of EMA each week. Our standard errors account for clustered sampling at the school level.

The principal results are presented in Table 4. Tobit estimates are of the same sign as OLS, but substantially larger in magnitude. In the preferred Tobit and probit estimation methods, an EMA payment of £30 per week reduces a teenager’s in-school labour supply by three hours per week, and the probability of working positive hours by approximately 8.3%. Payments of £10 and £20 have smaller effects, which are not statistically significant at the 5% level. We control for a full set of covariates, shown alongside their Tobit coefficients in Table 5.

**Table 4: Marginal effects on hours worked and probability of working positive hours.**

<u>EMA</u>	<u>Marginal Effects</u> <i>on</i> <u>Hours Worked</u>		<u>Average Marginal Effects</u> <i>on probability of</i> <u>Working Positive Hours</u>
	<u>OLS</u>	<u>Tobit</u>	<u>Probit</u>
£10	-0.7036* (0.4179)	-1.0019 (0.8047)	-0.0131 (0.0242)
£20	-0.8171* (0.4336)	-1.6919* (0.8753)	-0.0427* (0.0246)
£30	-1.2851*** (0.3066)	-3.0386*** (0.6748)	-0.0830*** (0.0181)
Additional Controls: household income band, socio-economic class, parent’s highest qualification, local deprivation index, region, type of school attended, academic ability, academic performance, quarter of birth, race, parental employment, household composition, sex, free school meal eligibility.			
Clustered standard errors in parentheses. *, **, ***: Significantly different from zero at 10%, 5%, and 1% levels respectively.			

This negative labour supply response is sufficient to reject that  $\lambda=1$ , representing ‘full insurance’ by parents. However, these estimates do not recover structural parameters regarding the magnitude of the parental response. For inference towards these, we appeal to results elsewhere in the literature. For the UK in 1974, Dustmann et al (2009) indicate that 16-year-olds work 0.307 hours less each week for each additional £1 transferred from parents. For the US in 1997, Wulff Pabilonia (2001), indicates that the earnings of 16-year-olds fell by \$0.654 per \$1 of parental transfer. If children in the UK reduce their earnings by the same proportion per pound of parental transfer, then at the median wage of those working positive hours in our estimation sample (£4.77) this equates to children working 0.137 hours per week less for every pound received in additional transfers.

**Table 5: Tobit coefficients and clustered standard errors for full list of covariates used in principal specification**

Explanatory Variable	Tobit coefficient for hours worked.		Explanatory Variable	Tobit coefficient for hours worked.	
<u>EMA weekly payment</u>			<u>Region</u>		
£10	-1.0019	(-0.8047)	<i>Omitted: London</i>		
£20	-1.6919*	(-0.8753)	North East	2.6213**	(1.3082)
£30	-3.0386***	(-0.6748)	North West	4.6345***	(0.9325)
<u>Household Income Band</u>			Yorkshire & Humber	5.8624***	(0.9396)
<i>Omitted: &lt;£2,600</i>			East Midlands	5.5736***	(0.9323)
£2,600 - £5,199	-1.1384	(1.6413)	West Midlands	3.5818***	(0.8606)
£5200 - £10,399	-1.0167	(1.0592)	East	5.9252***	(0.8991)
£10,400 - £15,599	-1.8911**	(0.9051)	South East	6.0437***	(0.8150)
£15,600 - £20,799	-1.2811	(0.9180)	South West	7.5300***	(0.9938)
£20,800 - £25,999	0.1824	(0.8638)	<u>Type of School</u>		
£26,000 - £31,199	1.1254	(0.8156)	<i>Omitted: Further Education College/ Other</i>		
£31,200 - £36,399	0.0959	(0.8711)	State	-2.2261***	(0.8413)
£36,400 - £41,599	0.1926	(0.8844)	Private	-4.5347	(3.3037)
£41,600 - £46,799	-0.1989	(0.9069)	Sixth-form College	0.2508	(0.5543)
£46,800 - £51,999	1.2479	(0.8957)	<u>Academic Ability and Performance</u>		
≥£52,000	1.1145	(0.7239)	Key Stage 2 (age 11) average points	0.1603*	(0.0914)
<u>Socio-Economic Classification</u>			GCSE (age 16) total points	0.0024	(0.0027)
<i>Omitted: Never worked/Long-term unemployed</i>			CVA ks2-ks4 <sup>a</sup>	-0.0048	(0.0041)
Higher Professional	-1.8900**	(0.8140)	<u>Quarter of Birth</u>		
Lower Professional /Higher Supervisory	0.7602	(0.7192)	<i>Omitted: Youngest, Jun-Aug</i>		
Intermediate	1.0325	(0.9262)	Oldest: Sept-Nov	2.2660***	(0.5550)
Lower Supervisory or Technical	1.3649	(0.8781)	Dec-Feb	1.8995***	(0.5272)
Routine/ Semi-Routine	0.404	(0.7977)	Mar-May	1.2220**	(0.5097)
Small employer / Own account	1.5193*	(0.8199)	<u>Race</u>		
<u>Parents' Highest Qualification</u>			<i>Omitted: White</i>		
<i>Omitted: No qualifications</i>			Indian/Pakistani/Bangladeshi	-6.3632***	(0.7232)
Degree	-2.3838***	(0.7924)	Black	-1.9178*	(1.1000)
A-Levels	1.3149*	(0.6797)	Other	-1.8776**	(0.8111)
GCSEs	1.6353**	(0.7204)	<u>Other</u>		
<u>Index of Multiple Deprivation: Quintiles</u>			No Parent in Work	-3.0772***	(0.8698)
<i>Omitted: Fifth/Least deprived</i>			Lone Parent	0.9755*	(0.5586)
First: Most deprived	-3.4061***	(0.7970)	Male	-2.0095***	(0.4110)
Second	-1.0424	(0.6724)	Has Older Siblings	0.2848	(0.4300)
Third	0.3357	(0.5660)	Has Younger Siblings	0.7700*	(0.4174)
Fourth	0.8793*	(0.5073)	Free School Meals in Year 11	-0.9617	(0.9590)
			Live in owned home	-0.3860	(0.6187)
Clustered Standard Errors in Parentheses. *, **, ***: Significantly different from zero at 10%, 5%, and 1% levels respectively.					
<sup>a</sup> Contextual Value Added: Measure of improvement in academic performance from age 11 to age 16, taking into account other characteristics.					

Our results show that the net labour supply response, taking into account the reduction in transfers made by the parents, to an EMA payment of £30 per week, is 3.04 hours per week. Assuming that the child's labour supply response to unearned income is equal to -0.307 hours per pound per week (as in Dustmann et al, 2009), the ratio of these figures (-3.04/-0.307) gives an estimate for the net increase in the child's unearned income, the amount of EMA is allowed to 'keep' of £9.90 per week. Repeating this exercise using the income-responsiveness of 0.137 hours per pound per week obtained from Wulff Pabilonia (2001) gives a figure of \$22.18. Alternatively stated, in response to a weekly EMA payment of £30, the parent withdraws cash transfers, extracts cash contributions or compels the child directly to purchase goods previously provided in kind, to a combined value of £20.10 (in the theoretical framework set out here implying  $\lambda = 0.67$ ) or £7.82 ( $\lambda = 0.26$ ) respectively.

The condition for parental behaviour to be consistent with an effective altruist redistributing income to maximise household welfare is  $\lambda = (1 - \theta)$ , where  $\theta$  is the parent's marginal propensity to transfer cash to the child out of their own income. Dustmann et al (2009) estimate  $\theta = 0.005$ , and at the mean parental income for each sample subgroup, Kalenkoski and Wulff Pabilonia (2010) estimate  $\theta = 0.015$  for two-year and 0.032 for four-year college students. These figures correspond to  $(1 - \theta) = 0.995$ , 0.985, and 0.968 respectively. The estimates of  $\lambda$  calculated above are both considerably smaller than this. Though ours is a rough calculation using parameters obtained from different institutional backgrounds, the net effect of EMA has clearly been to raise the child's unearned income by substantially more than had the equivalent transfer been made by parents. Thus, we reject both the 'full insurance' and 'effective altruist' hypotheses.

#### 4.2. Quantile Regression

Reducing hours of work is likely to be more effective in raising academic and future labour market outcomes for those at the higher end of working-hours distribution. Quantile regression enables us to evaluate the relative effects of EMA at different points in this distribution. Coefficients will not be identified at lower quantiles, where everybody reports zero hours. At points in the distribution with small numbers of hours worked in the absence of EMA, the magnitude of the coefficients will naturally be compressed by the non-negativity constraint. At longer working hours, the corner solution should not be a consideration.

Results from quantile regression at the 65<sup>th</sup>, 75<sup>th</sup> and 85<sup>th</sup> percentiles are presented in Table 6. In common with the OLS, Tobit and probit estimates, the coefficients for £30 payments are

significant at all conventional levels, and are greater in magnitude than for the smaller payments, the effects of which are statistically insignificant. £30 of EMA reduces working hours at the 85<sup>th</sup> percentile by approximately two-and-a-quarter hours, compared to a little over 2 hours at the 75<sup>th</sup> percentile, and 90 minutes at the 65<sup>th</sup>. Equality of the coefficients in the bottom line of Table 6 cannot be rejected (p-value is 0.1587). Altogether, this gives only a tentative indication that EMA reduces working hours by more among those working the longest hours. Nevertheless, this corroborates our earlier finding that the highest category of EMA, at least, causes a significant reduction in in-school labour supply, which can only derive from a significant change in the child’s opportunity set.

**Table 6: Quantile regression coefficients on EMA for hours worked.**

EMA:	<u>Quantile of hours worked distribution</u>		
	<u>0.65</u>	<u>0.75</u>	<u>0.85</u>
£10	-0.1136 (0.3850)	-0.6182 (0.5868)	-0.7276 (0.8827)
£20	-0.4667 (0.3751)	-0.3575 (0.5708)	-1.2238 (0.8851)
£30	-1.5270 *** (0.2345)	-2.0544 *** (0.3571)	-2.2559 *** (0.5671)

Full set of additional controls (as table 4). Standard errors in parentheses.  
\*, \*\*, \*\*\*: Significantly different from zero at 10%, 5%, and 1% levels respectively.

### 4.3. Robustness checks

#### 4.3.1. Partial Take-up

If there are omitted variables helping determine receipt of EMA that also help determine working hours, then partial take-up will bias the causal effect of EMA on hours worked. To ascertain the likely importance of this consideration, the level of EMA received was regressed on all individual and household characteristics, to provide a crude prediction of what each individual is expected to receive. If the residuals from this regression are uncorrelated with the residuals from the ‘causal effect’ regressions estimated above, there is no evidence that an omitted variables bias is present.

Correlation of errors from OLS are 0.0023 (p-value: 0.8421) and from Tobit are 0.0035 (p-value: 0.7597). This suggests that any association between the unobservable determinants of

receipt of EMA and the unobservable determinants of working hours is extremely weak and almost certainly entirely by chance.

#### 4.3.2. Non-credit-constrained sub-group

Following the reasoning of Dearden et al (2009), EMA is less likely to be a binding consideration in the child’s education participation decision for the children of non-credit-constrained parents, here defined as those living in owner-occupied accommodation. Any bias due to endogenous selection into post-compulsory education should not be present for this reduced sub-sample. The marginal effects of interest for this group, and the results separated by gender and number of siblings are presented in Tables 7 and 8.

For the non-credit-constrained group, like the whole sample estimates, the magnitude of the labour supply effect is greater for EMA payments of £30 than of £20 and in turn £10. Only the estimates for £30 are statistically significant at the 5% or 1% levels. This payment is estimated to reduce the labour supply of children in non-credit-constrained households by around 36 minutes more per week than estimated for the overall population of interest, though the difference in coefficients is not statistically significant.

This finding adds robustness to our rejection of the effective altruist model: Parents in credit constrained households are more likely than those from non-credit-constrained households to lack the ability to redistribute resources to maximise household welfare. However, the estimates suggest that altruistic redistributions are the same size or smaller in magnitude for the group most able to make them.

**Table 7: Tobit coefficients for hours worked, by sub-group.**

	<u>Sub-group</u>				
	<u>All</u>	<u>Non-credit-constrained</u>	<u>Male</u>	<u>Female</u>	<u>Only Children</u>
<u>Sub-sample size:</u>	7179	5540	3387	3792	625
<u>EMA</u>					
£10	-1.0019 (0.8047)	-1.1696 (0.8226)	-2.2822 (1.4734)	-0.4300 (0.9578)	0.8214 (2.9102)
£20	-1.6919* (0.8753)	-1.5001* (0.8984)	-1.7527 (1.5701)	-1.4287 (0.9905)	-4.4552 (3.8009)
£30	-3.0386*** (0.6748)	-3.6467*** (0.7325)	-2.8281** (1.1078)	-3.1526*** (0.7902)	-3.6530 (2.3447)
Full set of additional controls (as table 4)					
Clustered standard errors in parentheses. *, **, ***: Significantly different from zero at 10%, 5%, and 1% levels respectively.					

**Table 8: Probit average marginal effects for probability of working positive hours, by sub-group.**

	<u>Sub-group</u>				
	<u>All</u>	<u>Non-credit-constrained</u>	<u>Male</u>	<u>Female</u>	<u>Only Children</u>
<u>Sub-sample size:</u>	7179	5540	3387	3792	625
<u>EMA</u>					
£10	-0.0131 (0.0242)	-0.0250 (0.0260)	-0.0408 (0.0476)	0.0036 (0.0346)	0.0210 (0.0749)
£20	-0.0427* (0.0246)	-0.0432 (0.0277)	-0.0476 (0.0375)	-0.0346 (0.0325)	-0.0624 (0.0876)
£30	-0.0830*** (0.0181)	-0.1025*** (0.0212)	-0.0719*** (0.0262)	-0.0949*** (0.0244)	-0.0615 (0.0605)
Full set of additional controls (as table 4)					
Clustered standard errors in parentheses. *, **, ***: Significantly different from zero at 10%, 5%, and 1% levels respectively.					

### 1.1.1. *Gender differences*

Tables 7 and 8 show that the effect of £30 of EMA is to reduce hours of work by about 20 minutes more for females than males, and to reduce the probability of working positive hours by around 9.5% for females, compared with 7.2% for males, though again these differences are not statistically significant. The estimated effects of the smaller payments are larger for males than females, but in each case very imprecise.

Distinct coefficients could result from a greater responsiveness of labour supply to unearned income among female teenagers than males, but could also be due one of the following explanations. Firstly, a larger proportion of males than females are induced by EMA to participate in post-compulsory education (Dearden et al, 2009, p.830), so other things equal, this selection bias will be stronger among males than females. Secondly, the partial correlation of EMA take-up with unobservable characteristics determining labour supply may be stronger for one gender than the other. Thirdly, parents may be letting daughters ‘keep’ a larger proportion of their unearned EMA income than sons.

### 1.1.1. *Only children*

The sub-group of ‘only children’, with no siblings, have fewer competing demands for parental resources. Parents with an only child, having foregone investment in a large quantity of children, may be more altruistic towards their child, and more risk averse with respect to that child’s outcomes. The small sample size for this group contributes to very imprecise estimates: standard errors are substantially larger than for any of the other models in Tables 7 and 8. Accordingly, no coefficients or average marginal effects are statistically different from zero. The anomalous result that the labour supply effect of a £20 payment is greater than for £30 suggests that inference about distinct behaviour among parents in this group is ill-advised.

## 5. Conclusion and Recommendations

We have shown that an EMA cash transfer of £30 per week causes a statistically and economically significant reduction in the labour supply of teenagers in full-time education at both the intensive and extensive margin. The effects of £10 and £20 payments are smaller in magnitude and less precisely estimated. This labour supply response is one mechanism by which EMA is likely to have improved educational and labour market outcomes for recipients, especially among those working the longest hours.

The main focus of this paper has been to use the labour supply effect of EMA for inference regarding the altruistic behaviour of parents. We developed a theoretical model in which parents specify a transfer rule contingent on the child’s labour supply, which children take as given when choosing their utility maximising hours of work. In this framework, EMA acts as an exogenous income shock received by the child as a cash transfer from the state. This contrasts with most existing empirical applications of Becker’s (1974, 1981) ‘effectively altruistic head of household’ model, which consider the effects of in-kind transfers to children or hypothecated cash payments to parents. Data deficiencies prevent structural identification of this model, but the overall labour supply effect of EMA is shown to depend on the degree to which parents redistribute household resources in response to EMA.

The results obtained here reject the hypotheses that parents are ‘effective altruists’ or provide ‘full insurance’ for their child’s consumption. This inference relies on reasonable assumptions about the responsiveness of in-school labour supply to unearned income or resource endowments. Data pertaining to the cash and in-kind transfers made by parents to



children receiving EMA would be required to identify the structural parameters and make inference regarding the magnitude of the parental response to EMA with greater robustness.

Teenagers in post-compulsory full-time education represent a unique component of the family for whom existing theories of parental altruism or provision are clearly insufficient. Exploration of the bargaining process undertaken by parents and teenagers in this situation would certainly be merited. It would also be interesting to learn whether this dynamic is affected by the current extension of compulsory education or training to the age of 18 in the UK. Data on a second cohort of young people in England ('LSYPE2' or 'Our Futures') is currently being collected (they will reach post-compulsory education in 2015-16). This will provide an excellent resource to pursue both these questions.

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