Consumer boycott, household heterogeneity and child labour

M. Di Maio and G. Fabbri

Discussion Paper 2010-36

Institut de Recherches Économiques et Sociales
de l'Université catholique de Louvain

IRES

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M. Di Maio[*], G. Fabbri[†]

October 14, 2010

Abstract

Consumer boycott campaigns against goods produced using child labour are becoming increasingly popular. Notwithstanding, there is no consensus on which are the effects of such type of activism on child labour. If some agreement is to be found in the recent economic literature, it is that the boycott does not reduce child labour. We contribute to this debate presenting a simple model which shows, instead, that there are conditions under which a consumer product boycott does reduce child labour. We consider a small country two-factor economy populated by heterogeneous households. The boycott affects both the adult and the child labour markets. The income distribution determines how these changes affect child labour at the household level. We derive the conditions under which the consumer boycott reduces child labour also for some of the households whose' income is - before the boycott - under the subsistence level.

Keywords: Consumer product boycott, child labour, household heterogeneity, income distribution.

JEL Classification: J13, C35

[*]Department of Economic Studies, University of Naples *Parthenope* (Italy) and HiCN. E-mail: `michele.dimaio@uniparthenope.it`.

[†]Corresponding author. Department of Economic Studies, University of Naples *Parthenope* (Italy.) E-mail: `giorgio.fabbri@uniparthenope.it`.

1 Introduction

In June 1996, *Life Magazine* published a story on Pakistanian children stitching Nike's soccer balls.[1] That started what is considered the first worldwide boycott campaign against a multinational company because of its use of child labour.[2] Since then, several other consumer boycott campaigns have been organized and their number has been increasing with the consumers' awareness of the conditions of working children.

Consumer boycott is a particularly attractive forms of intervention since it is based on consumers preferences. Yet, it is only one of the several possible measures to reduce the incidence of child labour. At the national level, other possible measures are child labour prohibition laws,[3] compulsory education laws and food-for-education programs. At the international level, international consumer boycott are sided by the imposition of trade sanction,[4] core labour standards and the ban on child labour tainted products.

Recently the effects of these different measures against child labour have started to be analyzed from a theoretical point of view.[5] Albeit the objective of all these measures is to reduce child labour, they sometimes turn out to be in contrast with each other (Doepke and Zilibotti (2005)) and may even end up doing more bad than good. If children are working because of poverty they may end up to get hurt by the very sanctions meant to help them (Basu and Van (1998); Edmonds (2003); Dessy and Pallage (2005)). For instance, a labeling program against child labour tainted goods may reduce the overall country welfare (Baland and Duprez (2009)); similarly, Basu and Zarghamee (2009) show that the consumer boycott may end up increasing rather than decreasing child labour.

But not always good intentions pave the road to hell. In this paper we present a model to describe the effects of a consumer boycott on child labour when households are heterogeneous and there is more than one factor of production. We show that a consumer boycott campaign reduces child labour also for poor households to the extent to which the latter are positively affected by the boycott-induced changes that took place in the adult labour market.

Three are the novel elements of our model. First, our model allows the change in the child wage to have - depending on household income - either an income effect or a substitution effect on child labour. In the former case, an increase in the child wage reduces the child labour supply. In the latter case, the higher the child wage the higher child labour. This makes our model more general than previous contributions in which only the income effect (Basu and Zarghamee (2009)) or only the substitution effect (see e.g. Basu et al.

[1]Schanberg, S.H. (1996) "On the playgrounds of America, Every Kid's Goal is to Score: In Pakistan, Where children stitch soccer balls for Six Cents an hour, the goals is to Survive.", Life Magazine, pp. 38-48.

[2]For an account of the story and effects of the boycott see Naseem (2009).

[3]Political economy model of child labour laws are Dessy and Knowles (2008), Doepke and Zilibotti (2005) and Doepke and Zilibotti (2010).

[4]See for instance Jafarey and Lahiri (2002), Gupta (2002), Grossman and Michaelis (2002).

[5]To the best of our knowledge, the only empirical analysis of the effect of social labeling on child labour is the one provided in Chakrabarty and Grote (2009).

(2006), Dessy and Pallage (2005); Doepke and Zilibotti (2005)) have been considered. The reason for allowing for both the effects is that poverty is only one of the possible factors influencing child labour. Although child labour is likely to be positively correlated with household poverty, other socio-economic factors may play a relevant role, such as access to school, intergenerational expectations, type of parents' job, inequality and employment opportunities (Edmonds (2008)). In particular, recent research has focused on the effect of labour market opportunities on the probability of child labour (see for instance Edmonds et al. (2009)). Empirical evidence from developing countries suggests that the substitution effect dominates the income effect.[6] The fact that poverty is not the only cause of child labour is crucial when one considers that all measures against child labour tend to decrease child wage. We emphasize that the effect of a reduction in child wage on child labour really depends on why children work and on the local labour market conditions.

The second novel element of the model is that it studies the behavior of a heterogeneous population. Few previous contributions have considered the role of household income heterogeneity in evaluating measures against child labour, yet never in relation to consumers boycott.[7] This is an important element to be taken into account since we find that the effects of a boycott campaign strongly depend on household income distribution.

The third novelty of the model is the presence of a two factor production function. This choice makes our model more general than previous ones and make consumer boycott to generate some additional effects on child labour and income distribution which are absent when only one factor of production is considered.

A first result of the model is that for all households living above the poverty line the consumer boycott always reduces child labour. This is not surprising since the result follows from the substitution effect being larger than the income effect for rich households. Still, it is important since it shows a possible positive effect of the consumer boycott which is hidden when one focuses on the - important but not exhaustive - case of child labour caused by poverty. Yet, our main contribution is to derive the conditions under which a consumer boycott reduces child labour also for some of the households that before the boycott were below the subsistence level. Crucially, this result depends on the

[6]Barros et al. (1994) find that child labour in Brazil is higher in high income cities with thriving labour markets than in cities with higher poverty rates. Duryea and Arends-Kuenning (2003) show that an increase in the labour market opportunities has a significant positive effect on child labour in Brazil. Wahba (2006) finds that in Egypt child wages are negatively correlated with child labour. Finally, Kruger (2007) documents an increase in child labour and a decline in schooling in coffee-growing regions of Brazil during a temporary boom in coffee exports.

[7]Dessy (2000) and Doepke (2004) introduce heterogeneity as differences in human capital at the household level but they only consider a bi-modal distribution. Krueger and Donohue (2005) models heterogeneity in a dynamic model through an un-insurable labour income shock. The relation between income distribution and child labour is considered in Swinnerton and Rogers (1999*b*) where the role of the capital ownership is studied in a luxury-axiom context. Dessy and Vencatachellum (2003) find a positive relation of child labour incidence and the log of the Gini index of inequality. Swinnerton and Rogers (1999*a*) show that the impact of economy-wide inequality on child labour is, in general, ambiguous.

fact that a two-factor of production function and a heterogeneous population are considered. To the best of our knowledge, this is the first paper that takes into consideration these two elements in the analysis of the effect of the consumer boycott on child labour. Our results show that they are both crucial in assessing the effect of any measure aiming at reducing child labour.

The paper is organized as follows. In the next section, we present the basic of the model. In section 3, we discuss the main results and we present some extension of the model. Section 4 concludes.

2 The model

2.1 Households

Consider a heterogeneous population $\mathcal{I}$ of L households. Each household i has two members: a mother and a child. Households are different as for the endowment of efficiency units f_i, with $i \in \mathcal{I}$.[8] The mother i supplies work inelastically and her wage is proportional to f_i. Without any loss of generality we assume that the average endowment of efficiency unit is 1, so, called w^A the (adult) wage per-efficiency unit and $\overline{w^A}$ the average adult wage, we have $\overline{w^A} = w^A$. Finally, we have $w_i^A = f_i w^A$ where w_i^A is the mother i's wage. Every child is endowed with $\gamma < 1$ efficiency units and earn a (full time) child wage w^C.

Following Basu and Van (1998), we assume that the mother is altruistic[9] and chooses the child effort e_i in order to maximizes the following utility function (for the household i):

$$U(c_i, e_i) := \begin{cases} (c_i - s)(1 - e_i) & c > s \\ (c_i - s) & c \leq s \end{cases} \tag{1}$$

where c_i is the household total consumption, $e_i \in [0, 1]$ is the child's effort (i.e. the amount of working time) and $s > 0$ is a fixed threshold which represents the consumption subsistence level. Total household consumption is:

$$c_i = w_i^A + e_i w^C. \tag{2}$$

The optimal child's effort is given by $e_i = e(w_i^A, w^C) = \text{argmax}_{e \in [0,1]} U(w_i^A + ew^C, e)$ so

$$e(w_i^A, w^C) = \begin{cases} 0 & \text{if } w_i^A \geq w^C + s \\ \frac{-w_i^A + s + w^C}{2w^C} & \text{if } w_i^A \in (s - w^C, s + w^C) \\ 1 & \text{if } w_i^A \leq s - w^C \end{cases} \tag{3}$$

We begin describing the effect of a change in child wage on the child's effort. This is summarized in the following:

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[8]For instance, these differences may be due to different endowments of human capital as in Benabou (1996).

[9]In our analysis, we exclude both the case in which the household's interest diverges from the child's best interest and the case in which the household is not as well informed as the consumers about the child's best interest. Note that in both these cases, the consumer boycott is always beneficial to the child.

Proposition 2.1 *If $w_i^A < s$ then the function*

$$\begin{cases} [0,+\infty) \to [0,1] \\ w^C \mapsto e(w_i^A, w^C) \end{cases}$$

is decreasing (strictly for $w^C > s - w_i^A$,). If $w_i^A > s$, the function is increasing (strictly in the interval $w^C > w_i^A - s$).

Proof. The result follows from computing the partial derivative of $e(w_i^A, w^C)$ in the second variable. □

Proposition 2.1 states that the utility function (1) differentiates the household's response to a change in the child wage according to the level of the mother's wage. If the mother wage is higher (lower) than the subsistence level s, an increase in the child wage increases (reduces) child labour. This utility function is thus able to account for both the substitution effect (positive relation between child wage and child labour supply) and the income effect (negative relation between child wage and child labour supply).

The whole population can thus be thought to be divided into three groups. The households whose income is much lower than the subsistence level s (*poor*), the households whose income is much higher than the subsistence level s (*rich*) and the households in between these two groups. Since the function $e(w_i^A, w^C)$ is locally constant if we choose $w_i^A \notin [s - w^C, s + w^C]$, in the following we consider an economy in which the income distribution is such that all w_i^A are contained in the interval $[s - w^C, s + w^C]$.

Define the total supply of child labour as:

$$E\left(\{w_i^A\}_{i\in\mathcal{I}}, w^C\right) := \sum_{i\in\mathcal{I}} e(w_i^A, w^C). \tag{4}$$

We have the following aggregation result:

Proposition 2.2 *For all set of household income levels $\{w_i^A\}_{i\in\mathcal{I}}$ with $w_i^A \in [s - w^C, s + w^C]$ for all $i \in \mathcal{I}$, the aggregate supply of child labour $E\left(\{w_i^A\}_{i\in\mathcal{I}}, w^C\right)$ is given by*

$$E\left(\{w_i^A\}_{i\in\mathcal{I}}, w^C\right) = Le(\overline{w^A}, w^C)$$

where $\overline{w^A} := \frac{1}{L}\sum_{i\in\mathcal{I}} w_i^A$

Proof. See the Mathematical Appendix. □

The previous proposition states an useful result we will use several times in the following analysis: all households whose mother's wage belongs to the interval $[s - w^C, s + w^C]$ can be described by a representative household whose income is the households' average income. Finally, the proposition also implies that aggregate children's non-working time (schooling, leisure, etc.) is given by $L(1 - e(\overline{w^A}, w^C))$ and aggregate household consumption is given by $L(\overline{w^A} + e(\overline{w^A}, w^C)w^C)$.

2.2 Consumer boycott

Firms supply a homogeneous good that can be produced with or without employing children. In modeling consumer boycott we follow Basu and Zarghamee (2009). They show that, in the context of a standard utility maximization problem, an increase in consumers' preference for the child-free good reduces the price of the child-tainted good.[10] So, if we assume p to be the price of the good free of child labour then, when a consumer boycott starts, the price of the good produced using child labour becomes αp, where $\alpha \in [0, 1)$. In this setting an increase in consumers' preference for the child-free good is described by a reduction in α that represents the intensity of the boycott of the product containing child labour (the lower is α the stronger is the boycott intensity). Without any loss of generality, we assume the price p to be equal to 1.

2.3 Production

The economy is populated by J firms. Every firm j has access to the same Cobb-Douglas production function defined as follows:

$$Y_j = \theta l_j^{\beta} K_j^{1-\beta}$$

where l_j is the labour (in efficiency units) employed in firm j, $\beta \in [0, 1]$ and K_j is the amount of capital used in the production by firm j and θ a positive constant. labour and capital are perfectly mobile across firms.

Following Basu and Zarghamee (2009), it is easy to demonstrate that for any $\alpha < 1$ a separation lemma holds: a firm only employs children or only adults. The adult firms maximize $\theta l_A^{\beta} K_A^{1-\beta} - w^A l_A - RK_A$ (where R is the rental rate of the capital, K_A and l_A the capital and adult labour used in the adult firms) while the child firms maximize

$$\alpha\theta(l_C\gamma)^{\beta} K_C^{1-\beta} - w^C l_C - RK_C \tag{5}$$

where K_C is the capital employed in the child firms and $K = K_C + K_A$, the total amount of total capital in economy, is assumed to be fixed. We assume that K is entirely provided by foreign investors. Under perfect competition, the per-unit adult wage is

$$w^A = \theta\beta K_A^{1-\beta} l_A^{\beta-1} \tag{6}$$

and the per-capita (full time) child wage is $w^C = \alpha\beta\theta\gamma^{\beta} K_C^{1-\beta} l_C^{\beta-1}$. The equilibrium capital rental rate R satisfies

$$\theta(1-\beta) l_A^{\beta} K_A^{-\beta} = R = \theta\alpha(1-\beta) K_C^{-\beta} (\gamma l_C)^{\beta}. \tag{7}$$

Using the previous relations, we have that at the equilibrium $w^C = \gamma\alpha^{1/\beta} w^A$. The adult labour demand is given by $\left(\frac{w^A}{\theta\beta K_A^{1-\beta}}\right)^{1/(\beta-1)}$ and child labour demand is given by $\left(\frac{w^C}{\theta\alpha\beta\gamma^{\beta} K_C^{1-\beta}}\right)^{1/(\beta-1)}$. Because adult labour is inelastically

[10] Note that we are assuming that consumers do not belong to $\mathcal{I}$ - e.g. they could be resident in another (developed) country - and thus their preferences are not described by (1).

supplied and the average value of f_i is 1, the equilibrium in adult labour market is given by:

$$L = \left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} K_A, \tag{8}$$

Using Proposition 2.2, the equilibrium in the child labour market is described by:

$$E\left(\{w^A f_i\}_{i\in\mathcal{I}}, \gamma\alpha^{1/\beta} w^A\right) = Le(w^A, w^C) = \frac{1}{\gamma\alpha^{1/\beta}}\left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} K_C. \tag{9}$$

3 The effect of a consumer boycott on child labour

3.1 Product boycott and wages

We begin describing the effect of a boycott on adult and child wages. Consider an initial equilibrium $(\{w_i^A\}, w^C, \{e_i\})$ for $\alpha = 1$ satisfying the Hypotheses of Proposition 2.2. Define $\bar{\alpha}$ the highest admissible intensity for the boycott. The range $[\bar{\alpha}, 1]$ represents the values of α that does not cause the household to change the group it belongs to (see Section 2.1).[11] The relation between the intensity of the boycott and child wage is described in the following:

Proposition 3.1 *As long as $\alpha > \bar{\alpha}$, the consumer boycott reduces child wage.*

Proof. See the Mathematical Appendix. □

Proposition 3.1 shows that in our model, similarly to what most of previous models also predict, a boycott - or an increase in its intensity - reduces child wage. As in Basu and Zarghamee (2009), the reason is that the reduction in the price for the child-tainted good reduces the wage that firms employing children can pay to remain competitive.

But in our model the consumer boycott has also another effect described in the following:

Proposition 3.2 *As long as $\alpha > \bar{\alpha}$, the consumer boycott increases adult wages.*

Proof. See the Mathematical Appendix. □

The intuition behind this result is the following. The profitability of firms employing child labour decreases with the intensity of the boycott (see (5)) making the rental rate of capital to decrease (see (7)). Since the total amount of capital is constant in the economy, the increase in the intensity of the boycott implies that the capital moves from the child firms to the adult firms making K_A to increase. Since the adult labour supply L is constant, the increase in amount of capital in the adult firms makes adult wages to increase (see (6)) with the intensity of the boycott.

[11] Proposition 3.3 gives the sufficient condition for α to be admissible.

Before proceeding, we should briefly discuss the range of validity of our results. As we said, we can derive analytical results for our model as long as Proposition 2.2 holds and the value of α is admissible. Indeed the results stated in Propositions 3.1, 3.2 and the following Proposition 3.4 are valid as long as the support of the income distribution resulting after the boycott belongs to the interval $[s - w^C, s + w^C]$. To derive a sufficient condition for an admissible value of α, we use the following:

Proposition 3.3 *Consider an initial non-boycott ($\alpha = 1$) equilibrium, satisfying the hypotheses of Proposition 2.2. Define per-production-unit adult wage, child i's wage and effort respectively as $\{w^A\}, w^C, \{e_i\}$. Call $\underline{f} := \min_i \{f_i\}$, $\overline{f} := \max_i \{f_i\}$ $\underline{e} := \min_i \{e_i\}$, $\overline{e} := \max_i \{e_i\}$ and $D := \frac{s}{w^A}\left(\frac{\beta s + w^A + \beta\gamma w^A}{\beta s + w^A + \gamma w^A}\right)$. A sufficient condition for a reduction in α to be admissible is that $\alpha \geq \hat{\alpha}$, where:*

$$\hat{\alpha} := \begin{cases} \max\left\{\left(\frac{\underline{e}2\gamma(1+\beta)}{D-\overline{f}} + 1\right)^{-\beta}, \left(\frac{(1-\overline{e})2\gamma(1+\beta)}{\overline{f}} + 1\right)^{-\beta}\right\} & \text{if } D > \underline{f} \\ \left(\frac{(1-\overline{e})2\gamma(1+\beta)}{\overline{f}} + 1\right)^{-\beta} & \text{if } D \leq \underline{f}. \end{cases} \tag{10}$$

Proof. See the Mathematical Appendix. □

While the Proposition does not give a closed form solution for $\bar{\alpha}$, it insures that $\bar{\alpha} < \hat{\alpha}$ and thus all values of α for which $\hat{\alpha} < \alpha < 1$ are admissible values for the boycott intensity.

3.2 The boycott, child labour and the role of household heterogeneity

We now consider the effect of a consumer boycott on child labour. The main result of the paper is stated in the following:

Proposition 3.4 *Under the assumption of Proposition 3.3, there exists $\underline{w} < s$ such that each household i with $w_i^A > \underline{w}$ reduces e_i for any admissible reduction in α. More precisely $\underline{w} = \lambda s$ with:*

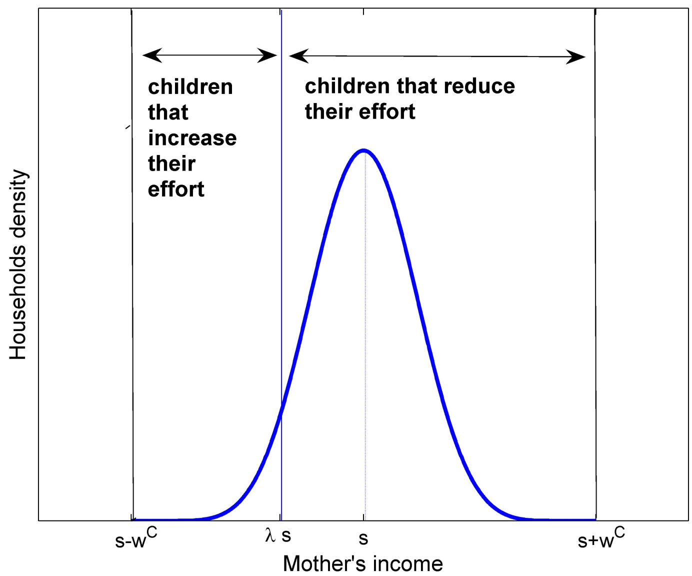
$$\lambda = \left(\frac{\beta s + w^A + \beta\gamma w^A}{\beta s + w^A + \gamma w^A}\right) < 1. \tag{11}$$

Proof. See the Mathematical Appendix. □

In other words, Proposition 3.4 states that the introduction of a boycott makes some of the working children to work less. It is important to notice that two different types of children reduce their labour supply. On the one hand, the reduction in the child wage induces children of households whose income is above the subsistence level to decrease child labour because of the substitution effect. But, most importantly, Proposition 3.4 ensures that also children from households who are below the subsistence level s now reduce child labour: these households are all the ones that before the boycott had an income higher than λs. The intuition for this result is that, for the marginal household, the increase in income induced by the rise in the adult wage caused by the boycott is sufficient to make the household to reduce child labour. It follows that an important element to determine the aggregate effect of a consumer boycott is the level of heterogeneity across households. The larger the number of households which are around a sufficiently small neighborhood of the subsistence level, the stronger would be the reduction in child labour for a given level of α.

To illustrate the effect of a boycott on child labour we consider as an example a population whose household income is distributed with mean s (as in Figure 1). The blue vertical line identify the winners and the looser from the boycott. The households on the right of the blue vertical line (λs) are the ones that decrease child labour due to the boycott. For those households, the increase in the household income due to the rise in the adult wage more than compensates the reduction of the household income due to the reduction in the child wage. The result from our experiment shows that the boycott has a large effect on child labour: a relatively small increase in the intensity of the boycott (5%) reduces the amount of child labour for the vast majority of the households.

Figure 1: **The effect of the increase in the boycott intensity on child labour: An example**



Note - Parameter values: $\beta = 0.5$, $K/L = 1$, $\theta = 0.63$, $s = 1.26$ $\gamma = 0.5$. The initial value of α is 1. The average of the f_i distribution is 1. Parameters values were chosen to ensure that the average adult wage is s and the child wage is $s/2$. The resulting λ is $\frac{7}{8}$.

3.2.1 Discussion of the results

It is useful to compare our results with the ones in Basu and Zarghamee (2009). Their model predicts that a sufficiently large increase in the boycott intensity (in the basic version of the model large enough to have $\alpha = 0$) reduces child labour. This result follows from the assumption that if child wage drops below a certain level then children do not work, even if this means that the household's consumption remains below the subsistence level s. Thus, while in both models an increase of the boycott may reduce child labour, the reason for this result is very different. In their model, the boycott reduces child labour because it reduces child wage to the point in which the wage is too low to compensate for the physical effort and the child stops working. Instead, in our model the boycott reduces child's working hours when the increase in the household's income due to the rise in the adult wages more than compensate the reduction in the child wage. The existence of this mechanism in our model is due the presence of (at least) two factors of production. Indeed it is the movement of capital towards the adult firms that causes the increases in the adult wages. To better appreciate the relevance of this different modeling choice, let consider what happens in the case of a single factor of production. From (11), we have $\lambda = s$. According to Proposition 3.4, this implies that the boycott would make *all* households below the subsistence level s to increase the supply of child labour. This result clearly shows the central role played by the number of factors of production in determining the effect of an increase in the intensity of the boycott. Indeed the case of a single factor of production, far from being without implication for the model's results, always predict a much worse effect of the boycott on child labour.

3.3 The effect of changes in boycott intensity and household heterogeneity

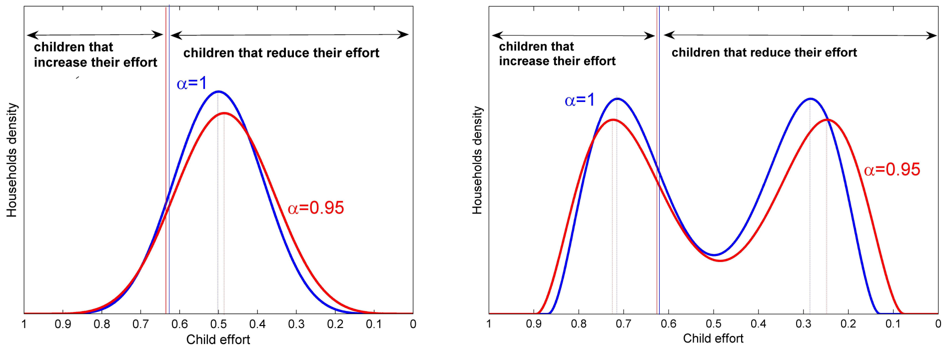
We now consider the effect of subsequent increases in the level of boycott intensity on the share of affected households and study how this effect depends on household income distribution. Unfortunately, the numerous non-linearities of the problem made not possible to derive closed form results. Thus we turn to a numerical solution of the model and we report the results of our exercise in Figure 2.[12]

We begin from the right panel. The blue graph reproduces the same economy as the one represented in Figure 1. The only difference between the two graphs is that now on the horizontal axis we report the child's effort.[13] The red graph represents the household income distribution resulting from the 5% reduction in α (the parameter measuring boycott intensity). As in Figure 1, the area to the left (right) of the vertical lines determines the set of households which increase (reduces) child labour for a given reduction in α. Noting that the red vertical line is the resul of a 5% reduction in α when its value is 0.95 and that it is to the left of the blue one, it follows that an increase in the

[12] The ad-hoc written MATLAB code is available upon request from the Authors.

[13] Note that given w^C the effort of the child is a linear function of the mother's wage w_i^A.

Figure 2: **The effect of increasing boycott intensity for different child effort distribution.**



Note - Parameter values: $\beta = 0.5$, $K/L = 1$, $\theta = 0.63$, $s = 1.26$ $\gamma = 0.5$, initial α is equal to 1. The average of the f_i distribution is 1. Parameters values were chosen to ensure that the average adult wage is s. The resulting λ is $\frac{7}{8}$.

boycott level increases the share of households whose child reduces his labour supply. This result is stated in the following:

Proposition 3.5 *For any admissible value of α, the share of children reducing their labour supply increases with the intensity of the boycott.*

Proof. See the Mathematical Appendix. □

The comparison between the right and the left panel of Figure 2 shows that the effect of a consumer boycott depends on the income distribution of the population. The right panel depicts an income distribution that is characterized by a higher level of inequality, whatever the index used to measure it, with respect to the one in the left panel. Two things should be noticed. First, the effect of the boycott changes along the distribution. For small levels of child effort, a reduction in α reduces child labour while the opposite happens for high level of child's effort. Interestingly, the two opposite effects do not net out. Indeed, Figure 2 shows that the boycott reduces the hours worked more than it increases them. Second, it results that the higher income inequality the stronger the impact of a boycott. Indeed, the comparison between the blue and the red graphs in each panel indicates that the effect are larger in the right panel. Since the boycott has (independently from the actual income distribution) always a positive effect on the right tail of the distribution and a negative one on the left tail, it follows that when income inequality is higher these effects are magnified. In particular, the boycott seems to reinforce the situation of income inequality as the one depicted in the right panel of Figure 2. Note, however, that also in this case the total reduction in child effort is larger than the total increase.[14] Nonetheless one has to consider that, while the boycott may reduce child labour for the majority of the population, it always has adverse effect on the poorer households too. The understanding

[14]The right-wing movement of the right tail is larger than the left-wing movement of the left tail of the distribution.

of the economic context is a necessary pre-condition to evaluate the possible effects of any boycott campaign.

3.4 Comparative static results

In the following, we discuss how changes in the model's parameters affect our main result. These static comparative exercises are very important because they provide novel insights on the relation between child labour and the production side of the economy. In fact, these results could not be derived in previous models where only one factor of production was considered.

Figure 3 shows how the effect of the boycott on child effort changes as a function of the relative endowment of capital and labour (K/L) and of the share of labour and capital in total income (β). Numerical results indicates that the larger K/L the larger the effect of the boycott on child labour reduction. The reason is that, *ceteris paribus*, the more capital abundant the country the larger the increase in adult wages caused by the boycott. At the same time, the smaller β, i.e. the labour income share, the stronger the effect of the boycott on child labour.[15] If we fix $\beta = 1$, we obtain the result in Basu and Zarghamee (2009) where the boycott has no effect on adult wages and the mechanism we have emphasized in our analysis simply disappears. Finally, our results indicate that the larger the technological content in production (measured by θ) the more likely is that the boycott reduces child labour. While we did not analyzed such element in the present model, this result suggests that inducing technological change could be a good pair with consumer boycott.

3.5 One special case: a homogeneous population

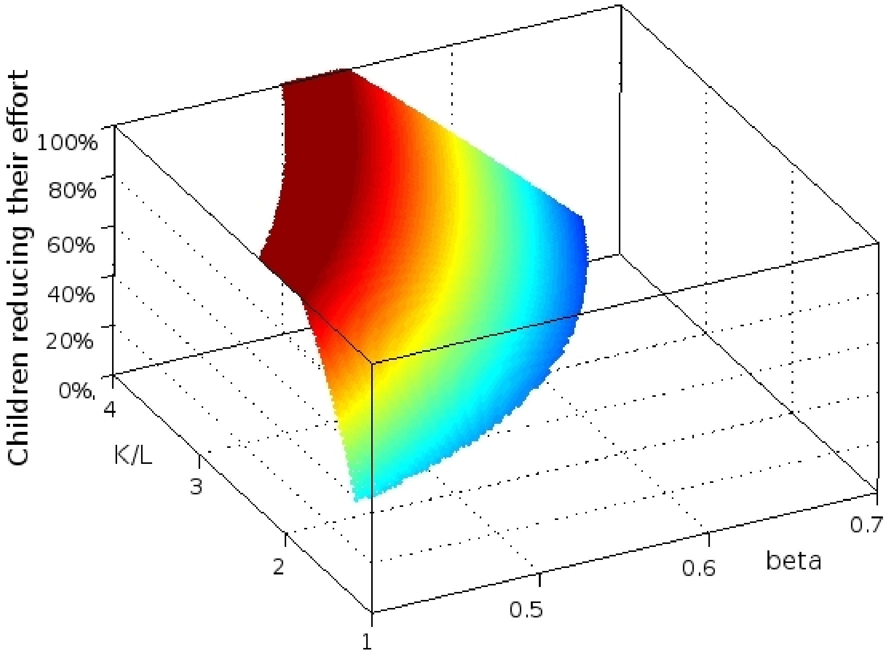
We now restrict our attention to a special but interesting case. As in Basu and Zarghamee (2009), we consider a population in which each household is endowed with the same number of efficiency units and whose income is below the subsistence level. These assumptions have two consequences. First, we don't need to satisfy any condition to ensure a nice aggregation result - as Proposition 2.2 - because all households are now identical. In particular, we do not need a lower bound for α. Second, all children are now working. Under these conditions, we can derive two interesting results. The first is a corollary of Proposition 3.4 and it is stated in the following:

Proposition 3.6 *Consider a population for which the adult wage w^A is below the subsistence level but it is greater than λs (where $\lambda < 1$ is defined in (11)). In this case, every increase in the boycott intensity reduces the (total and of every child) effort.*

This Proposition illustrate the possibility that a boycott may make all households to reduce their labour supply even if - before the boycott begins - they are below the subsistence level. In the case of a *not-too-poor* homogeneous

[15] Note that in developing countries the labour income share is often smaller than the capital income share. Empirical evidence also show that the capital income share in developing countries is larger than in developed ones (Gollin (2002)).

Figure 3: **Percentage of children reducing working hours for a 5% reduction in α as a function of the parameters K/L and β.**



Note - Parameters values: $\theta = 0.63$, $\gamma = 0.5$ and $s = 1.26$. The distribution of the endowment of f_i is uniform in the symmetric neighborhood of 1 given by $(0.75, 1.25)$ and zero otherwise.

population, Proposition 3.6 guarantees that a boycott induces each household to decrease the supply of child labour.

The second result is that the following:

Proposition 3.7 *If* $\frac{\theta\beta}{s} \geq \left(\frac{L}{K}\right)^{1-\beta}$ *then a sufficiently high level of the boycott eliminates child labour in the economy. The zero child labour boycott intensity is given by* $\alpha_L = \left(\frac{1-\frac{s}{\theta\beta}(L/K)^{1-\beta}}{\gamma}\right)^{\beta} > 0$.

Proof. See the Mathematical Appendix □

This Proposition shows that in the homogeneous case it is possible to analytically derive the optimal level of α, i.e. α_L. This is the optimal level of boycott because when $\alpha = \alpha_L$ child labour disappears and no further increase in the boycott intensity is needed.

4 Conclusions

Good intentions do not necessarily pave the road to hell. As a case in point, we derive the conditions under which a consumer boycott reduces child labour.

The relation between consumer boycott and child labour is complex and depends on a number of elements. In this paper we provided a simple model able to consider the different simultaneous mechanisms at work. Three main elements differentiate our model from previous ones: (i) it allows for the possibility that poverty is not the only cause of child labour and thus that both the income and the substitution effects are relevant; (ii) it considers an heterogeneous population characterized by a non-uniform income distribution; (iii) it employs a two factor production function.

The combination of these elements provides a number of interesting results. The presence of two factors of production is *per se* sufficient to have situations in which the boycott reduces child labour without necessarily damage all poor households. Household heterogeneity turned out to be a crucial element in the determination of how the boycott affect households. This is not surprising since households may greatly differ in the motivations they have their child working. We find that if child labour is not due to poverty the consumer boycott always induce children to reduce their labour supply. Further, if children are working because of poverty the consumer boycott can yet create the conditions for some of them to reduce the time spend away from school.[16]

One of the advantages of our model is that it fits well the characteristics of most of the international boycott campaigns. Consumer boycott campaigns usually target products manufactured by multinational enterprises in developing countries. Indeed, MNCs are more easily monitored by activists than small or micro domestic firms from developing countries. It is also known that MNCs choose to locate where the best combination in terms of economic, social, educational and security conditions is offered. Admittedly, for any developing country, it is unlikely that the optimal combination is offered in the poorest region. The more this is true, the more, *ceteris paribus*, the boycott is likely to reduce child labour for a larger share of the population. If we have to believe our model, consumer boycott is most effective in areas where child labour is due to the lack of better opportunities rather than the need to escape extreme poverty.

While the model is quite general it obviously has some limitations. In our view, two are the most important. First, it is a one period model and thus it abstracts from the influence that credit imperfection may have on how consumer boycott impacts on child labour.[17] Second, being a small country model it cannot account for possible trade balance effects of the boycott.[18] Future research will be devote to extend the model in order to consider the long-run effects of consumer boycott on aggregate growth and how different levels of trade openness impact on the relation between consumer boycott and

[16]Interestingly, our results are compatible with the empirical evidence presented in Chakrabarty and Grote (2009) on the effect of social labeling in the carpet industry in India and Nepal. They find that the labeling status of the households leads to a decrease in child labour. However, the statistical significance of the labeling coefficient is different in the below and above-subsistence regressions: while in the latter it is significant, in the former it is not.

[17]Dynamic models studying the effect of measures against child labour are, among others Jafarey and Lahiri (2002), Krueger and Donohue (2005).

[18]For an analysis of this aspect see Basu et al. (2006).

child labour.

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A Mathematical Appendix

Proof of Proposition 2.2. Call e_i the child labour supply of household $i \in \mathcal{I}$. Since $w_i^A \in [s - w^C, s + w^C]$, we have

$$\begin{aligned} E\left(\{w_i^A\}_{i\in\mathcal{I}}, w^C\right) &:= \sum_{i\in\mathcal{I}} e_i(w_i^A, w^C) \\ &= \sum_{i\in\mathcal{I}} \frac{w^C - w_i^A + s}{2w^C} = L\left(\frac{1}{2} + \frac{s}{2w^C}\right) - \frac{1}{2w^C} L \frac{\sum_{i\in\mathcal{I}} w_i^A}{L} \\ &= L\left[\frac{1}{2} - \frac{s}{2w^C} - \frac{\overline{w_i^A}}{2w^C}\right] = Le(\overline{w^A}, w^C). \end{aligned} \tag{12}$$

□

Proof of Propositions 3.1 and 3.2. For any admissible variation in α, we can re-write the equilibrium in the child labour market as

$$Le(w^A, (\gamma\alpha^{1/\beta})w^A) = \frac{1}{\gamma\alpha^{1/\beta}} \left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} K_C \tag{13}$$

Using $K = K_A + K_C$ and (8), we can rewrite the total amount of capital in children firms as: $K_C = K - L\left(\frac{\theta\beta}{w^A}\right)^{1/(\beta-1)}$. Substituting this last expression into (13), we have

$$Le(w^A, (\gamma\alpha^{1/\beta})w^A) = \frac{1}{\gamma\alpha^{1/\beta}} \left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} \left(K - L\left(\frac{\theta\beta}{w^A}\right)^{1/(\beta-1)}\right)$$

Using the explicit the expression for $e(\cdot,\cdot)$, we finally get:

$$-\frac{1}{2\gamma\alpha^{\frac{1}{\beta}}} + \frac{1}{2} + \frac{s}{2w^A(\gamma\alpha^{1/\beta})} = \frac{1}{\gamma\alpha^{1/\beta}} \left(\left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} \frac{K}{L} - 1\right).$$

In equilibrium we have

$$0 = F(\alpha, w^A) := \frac{1}{2\gamma\alpha^{\frac{1}{\beta}}} - \frac{1}{2} - \frac{s}{2w^A(\gamma\alpha^{1/\beta})} + \frac{1}{\gamma\alpha^{1/\beta}} \left(\left(\frac{w^A}{\theta\beta}\right)^{1/(\beta-1)} \frac{K}{L} - 1\right). \tag{14}$$

We want to use now the implict function theorem that gives

$$\frac{dw^A}{d\alpha} = -\left(\frac{\partial F}{\partial w^A}\right)^{-1} \left(\frac{\partial F}{\partial \alpha}\right).$$

Using (14), we compute

$$\left(\frac{\partial F}{\partial w^A}\right) = \frac{s}{2\gamma\alpha^{1/\beta}{w^A}^2} - \frac{1}{\gamma\alpha^{1/\beta}(\theta\beta)^{1/(1-\beta)}}\frac{1}{1-\beta}{w^A}^{\frac{1}{\beta-1}-1}\frac{K}{L}$$
$$= \frac{s}{2\gamma\alpha^{1/\beta}{w^A}^2} - \frac{1}{1-\beta}\frac{1}{w^A}\left[\frac{1}{\gamma\alpha^{\frac{1}{\beta}}} + \frac{s}{2w^A(\gamma\alpha^{1/\beta})} - \frac{1}{2\gamma\alpha^{\frac{1}{\beta}}} + \frac{1}{2}\right]$$
$$= -\left(\frac{1}{1-\beta} - 1\right)\frac{s}{2\gamma\alpha^{1/\beta}{w^A}^2} - \frac{1}{1-\beta}\frac{1}{w^A}\left[\frac{1}{2\gamma\alpha^{\frac{1}{\beta}}} + \frac{1}{2}\right] < 0 \quad (15)$$

and

$$\left(\frac{\partial F}{\partial \alpha}\right) = -\frac{1}{2\gamma\beta}\alpha^{-\frac{1}{\beta}-1} + \frac{s}{2w_a\gamma}\frac{1}{\beta}\alpha^{-\frac{1}{\beta}-1} - \frac{1}{\gamma}\frac{1}{\beta}\alpha^{-\frac{1}{\beta}-1}\left(\left(\frac{w^A}{\theta\beta}\right)^{\frac{1}{\beta-1}}\frac{K}{L} - 1\right)$$
$$= -\frac{1}{2\gamma\beta}\alpha^{-\frac{1}{\beta}-1} + \frac{s}{2w_a\gamma}\frac{1}{\beta}\alpha^{-\frac{1}{\beta}-1} + \frac{1}{\beta}\alpha^{-1}\left[\frac{1}{2\gamma\alpha^{\frac{1}{\beta}}} - \frac{1}{2} - \frac{s}{2w^A(\gamma\alpha^{1/\beta})}\right]$$
$$= -\frac{1}{2}\frac{1}{\alpha\beta} < 0 \quad (16)$$

so

$$\frac{dw^A}{d\alpha} = -\frac{(1-\beta)\gamma\alpha^{\frac{1}{\beta}-1}{w^A}^2}{\beta\left(\beta s + w^A + \gamma\alpha^{\frac{1}{\beta}}w^A\right)} < 0 \quad (17)$$

and this proves the claim of Proposition 3.2. Finally, we have

$$\frac{dw^C}{d\alpha} = \frac{d\gamma\alpha^{\frac{1}{\beta}}w^A}{d\alpha} = \gamma\frac{1}{\beta}\alpha^{\frac{1}{\beta}-1}w^A + \gamma\alpha^{\frac{1}{\beta}}\frac{dw^A}{d\alpha}$$
$$= \frac{\gamma}{\beta}\alpha^{\frac{1}{\beta}-1}w^A\left(\frac{\beta s + w^A + \beta\gamma\alpha^{\frac{1}{\beta}}w^A}{\beta s + w^A + \gamma\alpha^{\frac{1}{\beta}}w^A}\right) > 0 \quad (18)$$

(using (17) and some algebra), this proves the claim of Proposition 3.1. □

Proof of Propositions 3.4 and 3.5. Using $w^C = \gamma\alpha^{1/\beta}w^A$, (18) and the expression of e_i as function of mother and child wages given in (3), we compute:

$$\frac{de_i}{d\alpha} = \frac{d\left(\frac{1}{2} - \frac{f_i}{2}\frac{1}{\gamma\alpha^{\frac{1}{\beta}}} + \frac{s}{2w^C}\right)}{d\alpha} = \frac{f_i}{2}\left(\frac{1}{\beta\gamma}\alpha^{-\frac{1}{\beta}-1}\right) - \frac{s}{2}\left(\frac{1}{{w^C}^2}\frac{dw^C}{d\alpha}\right)$$
$$= \frac{\alpha^{-\frac{1}{\beta}-1}}{2\beta\gamma}\left[f_i - \frac{s}{w^A}\left(\frac{\beta s + w^A + \beta\gamma\alpha^{\frac{1}{\beta}}w^A}{\beta s + w^A + \gamma\alpha^{\frac{1}{\beta}}w^A}\right)\right]. \quad (19)$$

It follows that the effort decrease as long as $\Theta := \left[f_i - \frac{s}{w^A}\left(\frac{\beta s + w^A + \beta\gamma\alpha^{\frac{1}{\beta}}w^A}{\beta s + w^A + \gamma\alpha^{\frac{1}{\beta}}w^A}\right)\right] > 0$. Using (17), we compute the derivative of this expression with respect to α obtaining:

$$\frac{d\Theta}{d\alpha} = \left(\frac{1}{\Gamma}\right)^2 \Bigg(-\frac{1}{\beta}\gamma\alpha^{1/\beta-1}R - \frac{1-\beta}{\beta}\gamma\alpha^{1/\beta-1}\left(1-R/\Gamma\right) \\ - \frac{\gamma}{\beta}\alpha^{1/\beta-1}R^2/\Gamma\Bigg) < 0 \quad (20)$$

where $\Gamma := \beta s + w^A + \gamma\alpha^{1/\beta}w^A$ and $R := \beta s + w^A + \beta\gamma\alpha^{1/\beta}w^A$ (observe that $0 < R/\Gamma < 1$). If Θ is grater than 0 when the boycott begins, it will remain positive for any the further reduction in α. This implies that child i always reduces his effort as the intensity of the boycott increases. This proves Proposition 3.5.

Finally, the claim of Proposition 3.4 follows by defining $\lambda = \left(\frac{\beta s + w_I^A + \beta\gamma\alpha^{\frac{1}{\beta}} w_I^A}{\beta s + w_I^A + \gamma\alpha^{\frac{1}{\beta}} w_I^A}\right)$ where w_I^A and w_I^C are the values of the wages "before" the change in α and choosing initial α equal to 1. □

Proof of Proposition 3.3. The reason we postponed the proof of Proposition 3.3 is that it uses some of the results derived in the proof of Propositions 3.4 and 3.5. While in the main text the sufficient condition for determining the admissible values for α is presented before, its derivation follows the results of Propositions 3.4 and 3.5.

To determine a sufficient condition for an admissible α we use (19) and we begin considering an equilibrium with $\alpha = 1$. Call $\underline{f} := \min_i \{f_i\}$ and $\overline{f} := \max_i \{f_i\}$. Denote by $D(\alpha) = \frac{s}{w^A(\alpha)}\left(\frac{\beta s + w^A(\alpha) + \beta\gamma w^A(\alpha)}{\beta s + w^A(\alpha) + \gamma w^A(\alpha)}\right) > 0$. Using the same argument used in (20) (note that $\frac{\mathrm{d}D(\alpha)}{\mathrm{d}\alpha} = -\frac{\mathrm{d}\Theta}{\mathrm{d}\alpha}$), we have that $0 < D(\alpha) \leq D(1) = \frac{s}{w_I^A}\left(\frac{\beta s + w_I^A + \beta\gamma w_I^A}{\beta s + w_I^A + \gamma w_I^A}\right)$ (where w_I^A is the adult wage when $\alpha = 1$). Now we decrease α until some final α_F. Using (19), we have that $\frac{de_i}{d\alpha} \in \frac{\alpha^{-1-1/\beta}}{2\beta\gamma}\left[\underline{f} - D(1), \overline{f}\right]$. It follows that the distribution remains admissible if α_F satisfies both the following conditions:

$$-\frac{\int_{\alpha_F}^1 \alpha^{-1-1/\beta} d\alpha}{2\gamma\beta}(\underline{f} - D(1)) = -\frac{1-\alpha_F^{-1/\beta}}{2\gamma(1+\beta)}(\underline{f} - D(1)) \leq \underline{e}_I$$

and

$$\frac{1-\alpha_F^{-1/\beta}}{2\gamma(1+\beta)}\overline{f} \leq 1 - \overline{e}_I$$

where $\underline{e}_I := \min_i \{e_{iI}\}$ and $\overline{e}_I := \max_i \{e_{iI}\}$ and e_{iI} is the effort of the child of the family i when $\alpha = 1$. The two conditions above are equivalent to (10) and this proves the claim. □

Proof of Proposition 3.7. We begin observing that $w^C(\alpha) \xrightarrow{\alpha\to 0} 0$ because $w^C(\alpha) = \gamma\alpha^{1/\beta}w^A(\alpha)$ and $w^A(\alpha)$ is bounded since $w^A(\alpha) \leq \theta\beta(K/L)^{1-\beta}$. This implies that, when $\alpha \to 0$ all the capital moves to the adult production and the adult wage converges to $\theta\beta(K/L)^{1-\beta}$. It follows that, if $\theta\beta(K/L)^{1-\beta} >$

s, then for some α_L (and all the smaller ones), we have $w^A(\alpha_L) \geq s + w^C(\alpha_L)$ which implies that the child effort becomes 0. Because only adults work for $\alpha \leq \alpha_L$ and $w^C(\alpha) = \gamma\alpha^{1/\beta}w^A(\alpha)$, we have $w^A(\alpha_L) = \theta\beta(K/L)^{1-\beta}$. It follows that the value of α_L solves: $0 = \lim_{\alpha \downarrow \alpha_L} \left(w^A(\alpha) - s - \gamma\alpha^{1/\beta}w^A(\alpha)\right) = (1 - \gamma\alpha_L^{1/\beta})\theta\beta(K/L)^{1-\beta} - s$. Then α_L is given by: $\alpha_L = \left(\frac{1 - \frac{s}{\theta\beta}(L/K)^{1-\beta}}{\gamma}\right)^{\beta}$ and we have the claim. $\square$

Institut de Recherches Économiques et Sociales
Université catholique de Louvain

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique

ISSN 1379-244X D/2010/3082/036