FONDAZIONE ENI ENRICO MATTEI

NOTA DI LAVORO

56.2012

The Effect of Fair Trade Affiliation on Child Schooling: Evidence from a Sample of Chilean Honey Producers

By **Leonardo Becchetti**, Università degli Studi di Roma Tor Vergata, Italy
Stefano Castriota, Università degli Studi di Roma Tor Vergata, Italy
Melania Michetti, Fondazione Eni Enrico Mattei and Centro-Euro Mediterraneo sui Cambiamenti Climatici, Italy

Climate Change and Sustainable Development Series
Editor: Carlo Carraro

The Effect of Fair Trade Affiliation on Child Schooling: Evidence from a Sample of Chilean Honey Producers

By Leonardo Becchetti, Università degli Studi di Roma Tor Vergata, Italy
Stefano Castriota, Università degli Studi di Roma Tor Vergata, Italy
Melania Michetti, Fondazione Eni Enrico Mattei and Centro-Euro Mediterraneo sui Cambiamenti Climatici, Italy

Summary

We evaluate the impact of fair trade (FT) affiliation on child schooling within a sample of Chilean honey producers with a retrospective panel data approach. From a theoretical point of view we argue that FT should have a positive effect on child schooling since it generates a short run pure income effect together with a medium run productivity effect on both adult and child wages. On the other hand, because of the higher productivity generated by the medium run effect, the opportunity cost of child education increases if they work with their parents. The direction of the impact of FT affiliation on child schooling is therefore uncertain and requires empirical testing. Our econometric findings document a positive and significant impact of affiliation years on child schooling after controlling for endogeneity and heterogeneity between the treatment and control sample.

Keywords: Fair Trade, Child Schooling, Impact Study

JEL Classification: O19, O22, D64, J22

Address for correspondence:

Leonardo Becchetti
Facoltà di Economia
Dipartimento di Economia e Istituzioni
Via Columbia 2
00133, Roma
Italy
E-mail: Becchetti@economia.uniroma2.it

The Effect of Fair Trade Affiliation on Child Schooling: Evidence from a Sample of Chilean Honey Producers

Becchetti Leonardo [1,*]
Castriota Stefano [1]
Michetti Melania [2]

Abstract

We evaluate the impact of fair trade (FT) affiliation on child schooling within a sample of Chilean honey producers with a retrospective panel data approach. From a theoretical point of view we argue that FT should have a positive effect on child schooling since it generates a short run pure income effect together with a medium run productivity effect on both adult and child wages. On the other hand, because of the higher productivity generated by the medium run effect, the opportunity cost of child education increases if they work with their parents. The direction of the impact of FT affiliation on child schooling is therefore uncertain and requires empirical testing. Our econometric findings document a positive and significant impact of affiliation years on child schooling after controlling for endogeneity and heterogeneity between the treatment and control sample.

Keywords: Fair Trade, child schooling, impact study
JEL Numbers: O19, O22, D64, J22.

[1] Università degli Studi di Roma Tor Vergata.
[2] Fondazione Eni Enrico Mattei & Centro-Euro Mediterraneo sui Cambiamenti Climatici.
* **Address for correspondence:** Facoltà di Economia, Dipartimento di Economia e Istituzioni, Via Columbia 2, 00133, Roma. E-Mail : Becchetti@economia.uniroma2.it

1. Introduction

The interest of researchers in child schooling and child labor has proliferated in recent years due to an increase in data availability, the relevance of the child labour problem,[1] and its rise as one of the most politically sensitive issues in our globalised society and in the North-South economic relationships. Even though there are mixed cases of part time work and school participation of children, in many circumstances the two choices are alternative and, in any case, an increase in hours worked has been shown to have negative effects on child schooling performance (Edmonds, 2007). Within this scenario, opinions regarding policy measures needed to tackle child labor and foster child education are mixed. On the one side, "abolitionists" argue that the best solution is to ban child labour altogether. On the other side, "realists" affirm that its abolition may even be harmful in some contexts and that the ultimate solution to the problem depends on the removal of economic conditions leading to the child labour choice: poor parents are forced to make their children work and would be happy to switch to school as soon as their economic conditions make this choice feasible. If economic conditions remain the same the abolition of child labor does not entail automatically an increase in child education.

Since child labour is concentrated in less developed countries, the child labour controversy ends up having a trade related dimension. A portion of politicians and civil societies in developed countries desume from the "abolitionist approach" that child-made products have to be banned. This measure, however, is seen as a trade barrier by developing countries. On the corporate side, the "abolitionist" approach is somewhat consistent with the strategy adopted by "no child labor" labels (such as Rugmark, the international nonprofit organization which provides child-labor-free certification), while the "realistic approach" is followed, among others, by the Fair Trade movement.[2]

[1] The International Labour Organization recently estimated the number of children engaged in work to be 218 million aged 14 and under (ILO 2006).

[2] IFAT, the main federation gathering producers and Fair Trade organizations, specifies the criteria that affiliated producers have to follow. One of them claims that the participation of children, if any, should not adversely affect their well-being, security, educational requirements and need for play, and should conform to the UN Convention on the Rights of the Child as well as the law and norms in the local context.

The objective of our paper is to verify whether the "realistic" approach works by testing the effect of FT affliation on child schooling with field survey data.

More specifically, both Rugmark and Fair Trade (FT) labels aim to sell ethical intangibles to concerned consumers, but their approach is quite the opposite. In the first case we have a "no-child-labor" constraint and no intervention on market prices[3] while, in the second case, producers receive immediately a price premium when they join the cooperative (short run FT effect), while technical support received in their relationship with FT importers increases over time their productivity (medium run FT effect) The consequently higher income makes them more free to choose whether or not to send their children to school t.[4] Therefore, while Rugmark may realize the goal of reducing child labor directly by banning it in its certified products, FT aims to achieve the same goal indirectly by trying to create a virtuous circle between *substitution* and *luxury axiom* (Basu and Van, 1998).

According to the first axiom, the diffusion of child labour may affect the local labour market by depressing adult wages. According to the second, parents send children to school if they overcome a given income threshold. The combination of the two may create a vicious circle where household income below a subsistence threshold triggers child labour and the diffusion of child labour in the area depresses adult wages, thereby making child labour more necessary. Fair Trade, by increasing household income (due to the short term price premium and price stability effects and the medium term productivity effect)[5] may turn the vicious circle into a virtuous one. This occurs if the reduction of

[3] In a recent theoretical model Baland and Duprez (2008) analysing the effects of competition between "child free" and standard products on market prices, outline conditions under which no child labour labels may enhance producers' wellbeing.

[4] By short term we mean the time of affiliation to the cooperative, since producers enjoy immediately the higher price and better sale conditions but not the training and other services. Instead, by medium term we mean that gradually over time the stock of physical and human capital can change and, in turn, the costs sustained to produce honey. In other words, members increase their productivity thanks to the partnership with FT importers.

[5] These effects should arise from the application of FT criteria. According to IFAT such criteria refer to: i) Creation of opportunities for economically disadvantaged producers; ii) Transparency and accountability; iii) Capacity building; iv) Promoting Fair Trade; v) Payment of a fair price; vi) Gender Equity; vii) Working conditions (healthy working environment for producers); viii) The environment; ix) Trade Relations (Fair Trade Organizations trade with concern for the social, economic and environmental well-being of marginalized small producers and do not maximise profit at their expense. They maintain long-term relationships based on solidarity, trust and mutual respect that contribute to the promotion and growth

child labour in the area, due to the originary income effect, generates a positive effect on adult wages. This last effect reinforces the initial shock thus pushing wages further from the luxury axiom threshold.

A second line of interest when testing the impact of Fair Trade on child education is the comparison of several empirical papers evaluating the effects of conditional cash programs aimed at discouraging child labour by lowering the cost of schooling via educational transfers (Progresa in Mexico, Bolsa Escola in Brazil, Mid-day meals program in India).[6] These programs have proven to be effective in reducing child labour (Schultz, 2004; Skoufias and Parker, 2001; Schady and Araujo, 2006). However, it is difficult to disentangle the effect of household income from the reduction of schooling cost effects in this literature.

The advantage of our analysis is that Fair Trade generates an income effect[7] (albeit from different sources) plus changes in allocation of time without any change in the cost of schooling. Another significant difference with respect to these well known programs is that they provide subsidies conditional to the schooling choice, thereby assuming that it is worthwhile to encourage schooling (Baland and Duprez, 2007). Differently, Fair Trade affiliated households have an additional degree of freedom and may decide whether or not to send children to school.

Our empirical analysis falls into a strand of literature which presents mixed evidence on the impact of income on child labour. Most papers find the expected negative nexus (Psacharopoulos, 1995; Cartwright, 1999 and Edmonds, 2005) while others do not register a significant effect (Deb and Rosati, 2002). Ultimately in several theoretical models the income effect may be offset by a substitution effect, when a concurring increase in children wages takes place (Bhalotra and Heady, 2003; Psacharopoulos,

of Fair Trade. Whenever possible, producers are assisted with access to pre-harvest or pre-production advance payment). For the literature debate on the controversial FT initiative see section 3.

[6] See Edmonds (2007).

[7] As it will be shown in the model presented in section 4, this cannot be considered a pure income effect. If labor markets depart from perfect competition or the local community / cooperative is not a price taker in local labor markets, then changes in output prices will change wages (real or shadow) and thus the optimal allocation of child time, even conditional on income.

1997). The goal of our paper is to verify which of these possible relationships is supported by our empirical findings. We do this using evidence collected from a field study in Chile on the Apicoop cooperative working with the FT channel.

A crucial point we want to emphasize is that we adopt a series of methodological approaches to rule out selection bias and heterogeneity: fixed effects, estimates on the treated sample only in absence of significant voluntary dropouts from the program, and tests on preformation trends. The sum of these checks together with the history of the cooperative in which we illustrate a change in selection criteria (more demanding over time) which should go against our results (the significance of FT affiliation years) makes us confident that our conclusions cannot be explained by selection bias.

This paper includes nine sections (including introduction and conclusions) and is structured as follows. In the second section we briefly summarize FT characteristics. In the third we sum up features of the FT-affiliated Apicoop cooperative. In the fourth we sketch a theoretical model which identifies income and substitution effects of Fair Trade affiliation and provides a framework for the empirical analysis. In the fifth we describe our sample features. In the sixth and seventh sections we illustrate the econometric methodology and describe econometric findings, discussing our evidence in the light of standard empirical problems of reverse causality, endogeneity and heterogeneity of the treatment and control samples. The ninth section concludes.

2. Fair trade

Fair trade is an economic initiative promoted by importing organizations from Europe and the US and aims to establish long-term relationships with associations of marginalized producers in LDCs in order to promote capacity building, market inclusion and improvement of local wellbeing. Fair Trade criteria include: i) an anticyclical mark-up on producers' prices incorporating an insurance mechanism which

prevents them from falling below a certain threshold;[8] ii) anticipated financing schemes; iii) export services; iv) direct investment in local public goods (health, education) through the contribution provided to the local producers' associations.

More generally, it has been shown that FT criteria may help addressing market failures such as credit rationing, underinvestment in local public goods (health, education, professional training), monopsony of local intermediaries and/or moneylenders (Becchetti and Rosati, 2007).[9] Fair trade is a new emerging phenomenon which deserves adequate empirical investigation, for at least three reasons.

First, FT practice is growing more rapidly than the capacity of economists interpreting the phenomenon given that both socially and environmentally responsible consumption are becoming more and more fashionable in the US and in Europe. It has been estimated that, at the end of 2010, the number of farmers and workers involved in the Fair Trade system was 1.5 million with an 18% increase from the year 2008. Similarly, the total FT sales were 550 million Euros in 2010 from 443 in 2008 (Fairtrade International, 2011). The scarcity of available data suggests that this fashion turned into significant shares in some market segments (47 percent of bananas in Switzerland and 20 percent of ground coffee in the UK), with consumers' willingness to pay for social and environmental responsibility - revealed in different surveys around Europe - over and above these figures (Bird and Hughes, 1997; Demos and PI/Coop, 2004; De Pelsmacker et al., 2003).[10]

Second, a serious problem in this field is that the social and environmentally friendly characteristics of the products are not an experience good, that is a good for which informational asymmetries on these

[8] An example of Fair Trade price premium is in the banana market. In Ecuador, the 2005 conventional market price for 1.14 kilos of bananas was 2.91 US $, against a FT price of 7.75 US $. Evidence of FT premium on prices of coffee beans and cocoa in the last 20 years is also well known and available from the authors upon request.

[9] For a theoretical evaluation of the effects of FT from the perspective of trade theories see Maseland and De Vaal (2002). Other relevant papers dealing with various aspects of the impact of FT are those of Moore (2004), Hayes (2004) and Redfern and Sneker (2002).

[10] It is commonly known that from the contingent claim literature, virtual willingness to pay generally tends to be higher than the revealed one (Diamond and Hausman, 1994). In our specific case we add that the virtual choice between a FT and a standard product is easier than the real life choice, due to the differences in search costs for the two types of products and asymmetric information of interviewed consumers about the ethical characteristics of the FT product.

characteristics can be reduced by the simple act of buying and tasting the product. Hence, well grounded empirical work is needed to bridge informational asymmetries between buyers and sellers and to evaluate whether FT promises are met or not.

Third, FT impact analyses may verify the application of FT criteria and contribute to their redefinition. In actual fact, the FT impact study literature mainly consists of some well structured case studies (Bacon, 2005; Pariente, 2000; Castro, 2001; Nelson and Galvez, 2000; Ronchi, 2002; Yanchus and de Vanssay, 2003) and a few econometric impact analyses (Ruben, 2008). Ronchi (2006) finds on a panel based on 157 mill data that FT helped affiliated Costa Rican coffee producers to increase their market power. The author concludes that FT benefits are of a vertical integration type and that "the decision to support fair trade requires other information about its costs and benefits". In an econometric study on the impact of FT on Kenyan farmers, Becchetti and Costantino (2008) show that capacity bulding, trade and product risk diversification (an element not included in official criteria), which reduces their vulnerability to shocks, are the main sources of benefit for local affiliated producers. An empirical analysis on Peruvian producers (Becchetti et al., 2007) finds that affiliation has significant effects on professional self esteem and life satisfaction (also not considered among FT criteria).

The specific goal of our study is to analyse the effects of FT affiliation on child schooling by creating economic opportunities for poor producers. Moreover, as previously mentioned, FT may help in addressing market failures such as credit rationing by providing members with various advantages such as interest-free credit support, anticipated financial schemes, an anticyclical mark-up on producers' prices which incorporates an insurance mechanism, and product risk diversification[11] which lower the producers' vulnerability to shocks (Becchetti and Costantino, 2008). The theoretical and empirical literature supports the importance of access to the credit market and the containment of shocks in

[11] Good markets may also influence child labour through their relative return to child time (Edmonds, 2007).

determining the household decisions concerning children's time allocation.[12] The imperfections of credit and insurance markets, both formal and informal represent, particularly in developing countries, a very relevant point in the allocation of household resources to human capital investments that are often suboptimal. Our empirical analysis aims at verifying whether FT strategy is successful in the specific case of a cooperative (Apicoop) of Chilean FT affiliated honey producers.

3. Apicoop

Apicoop is a Fair Trade organization based in Paillaco, a village close to Valdivia in the region of Los Lagos in Chile, around 900 km south of the capital Santiago. Its history traces back to the '70s when the economic situation during the dictatorship was very difficult and the Church tried to promote development programs through the Diocese. As a consequence, in 1978 the Diocese Valdivia funded Fundesval (FUNdación DESarrollo VALdivia) with capital coming from Western European donations. Fundesval was composed of six programs, one of which was related to the production of honey. The targets of the honey project were to create an additional source of income to farmers, create a cooperative where people could share knowledge and technology, and improve the diet of the population through the honey consumption .

The only profitable program was the honey production project, while the remaining five programs were losing money and were finally closed in 1998, when the Diocese accepted the honey producers' request to let them become independent and take over the cooperative in exchange of 180,000 2008 USD. After the purchase of the cooperative, farmers invested a significant amount of money to realize technical improvements, increase total production and productivity per bee-hive and achieve financial independence. Over the last decade Apicoop has expanded its production considerably and has become the fourth Chilean exporter of honey and the first Chilean producer of Fair Trade honey.

[12] Different empirical studies show the relevance of access to credit markets and of containment of shocks in determining children's labor supply. See, among others, Ranjan (2001), Cigno, Rosati, and Tzannatos (2002), Guarcello, Mealli and Rosati (2002).

Nowadays the association is composed of 127 partners, 123 of whom are individuals and 4 cooperatives, concentrated mostly in the Los Lagos region.

Apicoop members benefit from the commercialization of honey through the cooperative and receive free technical assistance and interest-free credit support. Furthermore, FT associations provide contracts with longer prospects which, in turn, reduce the variation of revenues and profits[13]. All these valuable services have helped farmers to increase their production level and quality over time.

4. The theoretical framework

In order to sketch the potential effect of Fair Trade affiliation we recall the simplified Edmonds (2007) model in which the arguments of the household utility function $U(S,V_k)$ are family wellbeing (S) and children's future wellbeing (V_k). We assume as usual that $U'(.)>0$ and $U''(.)<0$.

Family wellbeing is in turn specified as a linear, homogeneous production function: $S=F(c,H)$ where (S) depends on purchased inputs (c) and hours that a child works inside the household (H). Children's wellbeing, $V_k=R(E,P)$, is, in turn, a function of education (E), and leisure and play (P). The household faces the following budget constraint:

$$c = Y + wM - eE \qquad (1)$$

[13] In the period 2002-2004, for example, there has been a sudden rise in the honey price because of an antibiotic scandal which led the EU to ban the Chinese and Argentinean honey for two years. In 2005, once imports from China and Argentina were restarted, the price fell by more than 40%. Large fluctuations in honey prices like these can severely compromise the producer's loan repayment schedule.

Where (Y) is a parent's exogenous income, (w) is a child's exogenous wage, (M) is hours worked by the child outside the household, with (e) and (E) being the direct costs and the hours of child education respectively.

As a consequence, the household maximises the following function:

$$\underset{M,E,P,H}{Max}\, U\left[F(Y+wM-eE,H);R(E,P)\right] \qquad (2)$$

Subject to: E+P+M+H=1; E≥0; P≥0; M≥0; H≥0

If child is engaged in wage work, parents decide not to send him to school if:

$$\frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} \leq \frac{\partial U}{\partial S}\frac{\partial F}{\partial c}(e+w) \qquad (2')$$

That is, the marginal increase in parents' utility (due to the child wage and the absence of educational expenses) exceeds the marginal utility deriving from the returns on education. In such context, Fair Trade may have some *short run income effects* generated by the price premium applied on commercialised honey. This would increase (Y) and therefore (c) rendering the loss of family wellbeing due to the cost of child education less detrimental. Chances are that parents evaluate more economically feasible the decision to send their child to school, rather than employing him in home work. This effect, is produced automatically after the affiliation to the cooperative, since producers take immediately advantage of the price premium (mark-up over the price of the primary product paid to traditional trade intermediaries).

Consider, however, that most of empirical studies, including that of Becchetti and Castriota (2008) on the same Chilean sample of honey producers, emphasize a progressive increase in productivity in the

medium run. This translates in a higher income for affiliated producers' *vis-à-vis* the not-FT affiliated producers of a control sample working in the same area.[14] Therefore FT benefits do not exhaust their potential in the short run, but also produce some positive *medium run effects*, after the initial affiliation years. These have to do, for example, with the medium/long run relationship between producers and fair trade importers which fosters productivity providing export services and production strategies. These *medium run effects* further increase (Y) and (c), rendering income more stable, and allowing therefore parents to economically afford the educational expenses over time. In the following sections we test precisely whether FT affiliation impacts on parents' decisions to send their children to school.

5. Descriptive findings

Evidence presented in the following sections derives from 234 honey producers, randomly sampled from two previously created treatment and control group sets containing farmers affiliated and not affiliated to Apicoop respectively.[15] FT has existed in the area for many years, making it impossible to create a randomised experiment to analyse its impact. However, in the following section we show a methodology and a series of robustness checks which make us quite confident that the selection bias problem does not invalidate our findings. What we already anticipate is that the availability of a graduated exposition to the treatment (different years of affiliation) allows us to perform robustness check estimates only on the treatment group, thereby reducing many of the problems related to the heterogeneity between treatment and control group individuals.

Producers were interviewed in February and March 2008. The questionnaire consisted of a set of standard questions on socio-demographic and economic variables, plus other questions related

[14] The authors find that affiliation years have positive effect on honey sold per hour worked, net of the economies of scale effect to which also FT contributes. The main candidate for this effect is the higher possibility for affiliated producers to benefit from training courses, advances of payments and cooperation with other local producers.

[15] We proceed starting from the list of all Apicoop affiliated. We randomly draw from it a sample corresponding to the number of affiliated farmers in the paper but we must add an additional 10 percent to replace nonresponses. We then draw randomly from a list of non affiliated neighbors an equal number of control farmers. As shown in Table 3 the ex post randomness check confirms the validity of our approach since there are no significant differences in socio-demographic characteristics between the two groups.

specifically to honey production. Table 1 describes the variables considered in this study while Table 2 illustrates their summary statistics for the whole sample of affiliated (FT) and non-affiliated (no FT) producers.

The majority of interviewed producers are male, middle-aged, with elementary or intermediate education (although there are some people with no formal education). On average, around 42 percent of the total farmers' income comes from honey, an additional 7 percent from other activities connected to bees while the remaining 51 percent comes from agriculture, breeding and other activities. Honey and other products from bees play a crucial role for these families. The average production of honey is 3,000 kg, but the second quartile is only 1,000 kg. Therefore, the majority of the sample is composed of small producers. The average productivity of honey per hour of work devoted to this activity is 180 kg, with notable dispersion due to experience, capital accumulated, and the technology adopted.[16]

In our study it is necessary to avoid omitted variable biases by considering all relevant factors affecting child schooling. Again from Table 2 we can see that the number of producers' school years is twice that of their parents: this finding documents a clear advancement in the average level of education over time due to the improving economic conditions of the country as a whole, which is a worldwide trend common in both rich and poor countries.

A second important observation regarding education is the existence of a large number of producers with recent affiliation. More than a third, 36.15 percent, have less than 4 years of affiliation while 50 percent have less than 6 years (see Table 4). Figure 1 shows the education level of the producer and his parents by the number of affiliation years, averaged over the period 2001-2007. The higher the FT age is, the lower the average level of education.

[16] Becchetti and Castriota (2008), using treatment regression and Peer Matching models, find that the higher productivity of Apicoop's producers is partially explained by their superior capacity to exploit economies of scale. The lack of time series data prevents them from fully disentangling the productivity effect due to selection bias, from that attributable to FT affiliation. However, Apicoop's producers receive more training courses and advances of payments than independent ones. It suggests that affiliation contributed both to, and independently from, the economies of scale effect.

Table 5 shows the average education levels by year and by subgroup of FT age for the producer and his parents. Looking at each column we can see that the education level of new FT members is higher than that of older members, while, looking at table rows, we can see the increase of the level of education over time. The same relationship is confirmed if we replace the producer's education with the schooling years of his parents.[17]

In the specifications of the econometric estimates which follow we take into account insights from the above mentioned descriptive results. First, in order to consider the growth of the average education level over time we introduce year dummies in our econometric estimates. Second, due to the strong negative correlation between years of affiliation and the producers' education we introduce fixed effects. The omission of fixed effects (which can capture, among other time invariant components, the education level of the producer and of his parents) is important because producers with a small number of affiliation years entered more recently when admission rules became stricter and, due to this reason, they are likely to have higher education and higher income. As a consequence omission of fixed effects would probably determine a downward bias on the impact of affiliation years on child schooling.

6. Econometric findings

An important problem in development studies is how to reconcile the need of inferring causal relationships with the difficulty of performing repeated surveys (especially in situations where attrition problems may be difficult to overcome). In this paper we propose a "backcast panel" approach which allows us to reconstruct panel data from a unique cross-sectional survey. More specifically, we ask each producer the number of his/her offspring and the age and number of schooling years for each of them. To complete our information, we also ask producers the age at which each child started school and whether there were cases of exits and re-entries.

[17] The only exception is the education of the producer's mother for the 10-12 affiliation year cohort. The latter can be due to noise given the reduced number of observations considered in the considered subsample.

As commonly recognised, we should rely on answers regarding recent past events, so that they are not too difficult to recall. Consider also that standard cross-sectional survey data require a certain degree of memory from the respondents (after all, these questions refer to past events even though they occurred in the same or previous year). In this respect we reasonably argue that it is not difficult for a parent to remember an important part of their children's past, such as the number of their schooling years.[18] With this information we can reconstruct, year by year (from 1987 to 2007), schooling decisions taken by the household. After that we are able to regress the schooling decisions on fixed effects which incorporate the impact of a set of controls that are time invariant during the panel period, [19] and on factors where variation can be reconstructed without information collected in the years before the survey [20]. Note that in this way we rely on a small set of easily defined variables where measurement error problems should be relatively limited.

Once we have constructed the database we can calculate a time varying index of human capital investment for each producer, represented by the number of children attending school over the total number of children in the schooling age cohort in the given year. More formally, the household schooling investment ratio (HSI) is given by the following expression:

$$HSI_{it} = \sum_{j=1}^{n_i} \frac{TOTSCH_{ijt} \left| Entryage_{ijt} \le Age_{ijt} \le Endage_{ijt} \right.}{TOTPOT_{ijt} \left| Entryage_{ijt} \le Age_{ijt} \le Endage_{ijt} \right.} \qquad (3)$$

[18] On the methodology used for the construction of retrospective panel data with memorable events see also Peters (1988), McIntosh et al. (2010), Garces at al. (2002), Smith (2009), Ilahi et al. (2000) and Becchetti and Castriota (2009). The above mentioned authors base their retrospective information on variables which do not require strong memory efforts: divorces and remarriages (Peters, 1988), house restructuring decisions (McIntosh et al. 2010), schooling years and age of children (Becchetti and Castriota, 2009). Peters (1988) provides evidence supporting the reliability of this approach by working on both panel and retrospective data. He demonstrates the accuracy of retrospective information since both sources give the same results when estimating hazard rates of divorce and remarriage.

[19] Including gender, schooling years of the producer and of the producer's parents.

[20] Those are Age, participation to the treatment or to the control sample, FT affiliation years, number of children in the school age cohort.

where the HSI_{it} index is composed of the number of the j children of the i-th producer in a chosen school age cohort (e.g. age range between 6 and 18, if we are interested in elementary, middle and high school, and between 13 and 18 if we are only interested in high school, etc.) [21] who actually went to school in a given year t ($TOTSCH_{ijt}$), divided by the number of children of the i-th producer being in the school age cohort in the same period ($TOTPOT_{ijt}$).[22] In other words, the HSI_{it} index is a ratio of effective to potential household school attendance. In our first exercise the dependent variable is regressed on various controls in a fixed effect model with the following specification:

$$HSI_{it} = \alpha_0 + \alpha_1 Age_{it} + \alpha_2 TOTPOT_{it} + \alpha_3 FTage_{it} + \sum_k \beta_k Dtime_k + \sum_i \gamma_i Dproducer_i + \varepsilon_{i,t} \quad (4)$$

where (Age_{it}) is the age of the i-th producer at time t, ($TOTPOT_{it}$) is the denominator of the schooling index or the number of children for the selected school age cohort in a given year, ($FTage_{it}$) are years of FT affiliation at time t, ($Dtime_t$) are year dummies and (Dproducer) is the producer specific intercept typical of fixed effect models. The effect of other variables such as gender and respondent schooling years are captured by fixed effects which also capture other non measurable individual time invariant characteristics.

A traditional problem which may not be fully overcome in our estimates is the missing information on past income which leads to the omission of income from our estimates. If it is true that this omission may generate an upward bias on the affiliation coefficient, it is also true that, as far as affiliation has positive effects on income as shown in previous estimates (see Becchetti and Castriota, 2008), part of the positive effect of income on schooling should be attributed to Fair Trade. Consider also that factors incorporated into the fixed effects, such as schooling years and age cohort, are generally accepted as proxies of this unobserved variable. Starting from this fixed effect specification we will

[21] Entry age is generally 5 or 6 and is based on the respondent declaration.

[22] The total number of children for each farmer (n_i) is indexed to account for heterogeneity in household size.

move to different approaches in order to face the main issues arising from our empirical analysis: heterogeneity between the treatment and control groups, reverse causation, endogeneity, omitted variable bias.

7. Empirical findings: dealing with heterogeneity between treatment and control samples

In Table 6.1 we present results from fixed effect estimates in which the dependent variable differs according to the considered school age cohort (from 10-18 and from 14-18, age ranges).[23] We find that the affiliation year variable is always significant and positive.

An interesting result that we find is related to the producer's age which is always negative and strongly significant, with a coefficient magnitude between .2 and .3. This implies that, net of the year effects capturing country level changes and net of the parents' education years absorbed in the fixed effects, the older the father the lower the child schooling index. This variable could capture the progressively reduced working ability of the father which increases the opportunity cost of sending children to school.

The FT effects are stronger in the high school age cohort and are gradually reduced downward when the cohort gets larger. The total number of children in the considered school age interval for a given year (TOTPOT) is negative and becomes significant in the last three equations (from 12-18 and from 10-18, age ranges). The sign implies that, the higher the number of children sent to school, the larger the total cost of education for the household.

When it comes to economic significance we find that one additional year of FT affiliation raises the schooling index within the 14-18 age range by around 1.8 percent. The average ratio between potential and effective schooling for those between 14 and 18 is 69.5 percent. Hence the 1.8 percent effect of an additional year of FT affiliation corresponds to a 2.59 percent increase in the schooling ratio with

[23] Note that in Table 5.1 the number of observations is much lower than the product of interviewed producers times the panel years. This is because when producers have no children in the school age cohort the observation is dropped from the estimate.

respect to sample average. Since the standard deviation of the dependent variable is .43 we get that 10 years of affiliation generate an effect equal to 42 percent of the variable standard deviation.
With regard to the 10-18 interval one year of FT affiliation has a positive impact of .9 percent on the schooling index. Since the average schooling rate is 82 percent in this case the effect is an increase by 1.1 percent from sample average. Compared to the ratio standard deviation (.33), 10 years of FT affiliation generate in this case an effect equal to 27 percent of the variable standard deviation.
The comparison with the other significant effect (producer's age) shows that one FT affiliation year produces an effect which is close in magnitude to the former even though opposite in sign.

Finally, coefficients of the different year dummies clearly evidence a progressive trend toward increased human capital investment at country level (to which the dynamics of domestic GDP growth must have contributed). This is consistent with evidence shown in Figure 1 on respondents and the schooling years of their parents. The lack of consideration of this phenomenon would have biased downward the effect of FT affiliation, since there is a large share of recently affiliatiated producers (Table 2) and, who are therefore, more likely to send their children to school.

On the other hand, the introduction of fixed effects marks another downward bias of the impact of affiliation on schooling. As shown in the previous section, and also due to the progressive tightening of cooperative entry standards, more recently affiliated producers tend to have higher education and, for this reason, they are expected to be more likely to send their children to school.

We are aware that an important missing variable in our estimate is the dynamics of household income across estimation years. This is a typical problem in child schooling estimates. The literature usually accepts that this missing variable is proxied by household education and by the producer's age. The inclusion in our specification of the total number of children in the schooling age cohort in the year of interest should also help because it captures an effect which reduces household income available for the

education of any individual child.Last, it may be wondered why we include the TOTPOT variable among regressors when the same variable is part of the dependent variable ratio. The rationale is that household schooling investment choices need to be controlled for the number of children in school age since the higher the number of children to send to school, the higher the costs for the family.
In a robustness check we re-estimate our models withtout the TOTPOT variable on the right hand side and find that coefficients and standard errors of FT affiliation years are almost unchanged. Results are omitted for reasons of space and available upon request.

One potential limitation of our approach lies in the heterogeneity between the treatment and control sample. It has, in fact, been observed that problems in the definition of the control sample may introduce systematic biases between control and treatment observations which may affect the validity of the empirical findings. A heterogeneity problem may apply to our analysis where we have a situation of non random placement in the program (the decision to affiliate to FT is not random but depends on a decision taken in the past by the observed producers).

As an extreme solution to this problem we re-estimate our model by excluding observations from the control sample. This is possible since, contrary to many cases in which the treatment effect can just be measured by a (0/1) dummy, we have a measure of the graduation or intensity of the treatment (number of affiliation years).[24]

A primary variation with respect to what is shown in Table 6.1 is that the magnitude of the affiliation year coefficient is larger by around 4 percent (Table 6.2). However, the first two coefficients are significant at 90 percent and the standard deviation of the coefficient is much higher. The overlap of confidence intervals leads us to conclude that the difference in magnitude between coefficients in Table 6.1 and 6.2 is not significant. A second difference is that the variable measuring the total number of

[24] Consider as well that, in the period under examination, we have an extremely low number of voluntary dropouts from the cooperative (0.1 percent per year) which makes us confident about abstence of survivorship bias and heterogeneity between young and old affiliates.

children in the given school age cohort is no longer significant. This implies that, within cooperative members, the negative effect of a higher number of children in education hits less than in the overall sample estimate. Note as well that, in terms of magnitudes, the effect of one year of affiliation is much larger (4.87 percent in the 14-18 interval). In this case ten years of FT affiliation produce slightly more than one standard deviation change of the dependent variable in all the considered age intervals.

At this point of the analysis we wonder why affiliation years increase child schooling. We have two main interpretations for this effect. First, affiliation raises household income by increasing productivity in more affiliated producers, *vis-à-vis* the control sample (see footnote 16). However, an alternative interpretation is that cooperative rules and its attention toward child schooling play an important role in determining this result.[25] Unfortunately, it is not possible to discriminate between these two interpretations with the available information.

8. The problem of endogeneity

As it is well known the endogeneity problem between two variables may arise from reverse causality or a third omitted driver causing both. In our case, in fact, it is possible that explicit selection criteria admit into the cooperative only producers with higher education and who are more willing to send their children to school. It is also possible that affiliation is driven by unobservable factors such as entrepreneurial ability (implicit selection) which is, in turn, correlated with income and child schooling decisions.

An initial argument against reverse causality is the observation of the positive effect of any additional affiliation year on child schooling. The reverse causality link is mostly a once-for-all effect. If it were the only one to work, there would be less reason to expect that the positive relationship between FT and schooling years progresses with affiliation seniority. This specific finding (even though it cannot

[25] Even though, as we remember, FT does not impose a ban on child labor, it has the explicit goal of improving gradually children wellbeing and therefore promotes their education when the household has sufficient income to afford it.

exclude the joint presence of a reverse causation once-for-all effect too) further suggests that there is something which can be acquired through the affiliation experience which promotes child schooling.

A second argument comes from the observation of the Apicoop history. Entry requirements have become progressively stricter so that, if a selection bias exists, it should act in the opposite way and offset the potential impact of affiliation years on productivity. In 2006 this was made explicit in the statute of Apicoop, which now establishes a set of requisites in order to be accepted. The most important of them states that the applicant must have at least 3 years of proven honey production and at least 25 beehives. The progressively more severe affiliation criteria are consistent with what we found in our descriptive findings. We clearly illustrated how a "vintage" factor such as a producer's education (invariant from the first affiliation year to now) which should be correlated with productive skills, gets larger over time (see Figure 1).

As a further check on our findings we consider that our results might also be explained by a significant difference in pre-affiliation trends (hence heterogeneity between the treatment and control sample and where FT benefits would not be the driver of the affiliation effect). We therefore add to Table 6.1 a test on the assumption of common pre-existing trends between treatment and control producers. More specifically, we re-estimate the model in the subsample of observations of control and treatment producers before FT affiliation. Furthermore, with respect to the standard specification we replace the *FTage* variable with a trend variable multiplied by a dummy which picks up future affiliated producers. The interaction variable is never significant in supporting the hypothesis of common preaffiliation trends between treatment and control producers.

An even more drastic solution to the problem of heterogeneity between the treatment and control sample is, as in the case of fixed effects, the re-estimation of the model with observations from the

treatment sample only to eliminate the problem of heterogeneity between the treatment and control samples. We find that the effect of affiliation years remains robust (Table 6.2).

We apply the same reasoning to preaffiliation trends on the estimate restricted to the treatment sample. Alternatively, an observationally equivalent explanation of our findings here could be heterogeneity between older and younger affiliated producers, with the former having steeper trend effects on the dependent variable with respect to the latter. In this case the positive *FT age* coefficient would not depend on *FT* affiliation benefits but would just reflect heterogeneity among different affiliation cohorts. Again, we restrict the treatment sample estimate to the preaffiliation period and create two additional variables: a linear trend multiplied for a (0/1) dummy for producers with less than 5 years of affiliation and the same linear trend multiplied for a (0/1) dummy for producers with more than 10 years of affiliation. Coefficients and standard errors of the two variables, shown in Table 6.2, reject the assumption of significant preaffiliation trends.

9. Conclusions

Our paper aims to test the effect of a relatively rarely explored approach to improve the wellbeing of marginalized producers (Fair Trade) with original field data and an innovative methodological approach. The originality of the FT strategy is that it does not directly impose restrictions on child labour but tries to reduce it indirectly, by promoting short (price premia) and medium (capacity building) run increases in a producers' household income.

We try to overcome the difficulty of building panel data in field development studies with surveys repeated over time by using a backcast panel data methodology. This reconstructs retrospectively "memorable" past values of relevant variables based on cross-sectional information collected in a single survey. This approach asks respondents to reconstruct some essential traits of the schooling records of their children (year of entry and year of exit). Its success and minimization of measurement error

depends on the fact that very few memorable events in the past are referred to (it is hard to imagine that a parent does not remember the education level of his/her children).

Our empirical analysis is framed in a very simple theoretical approach. From first order conditions of a standard problem of maximization of a household who cares about its own and its children's present and future wellbeing we observe that FT affiliation may generate income and substitution effects. The direction of the total effect is therefore unclear and needs to be tested empirically.

In the econometric part of the paper we start by evaluating the consequences of omitted variable biases. In this respect, with fixed and year effects we try to avoid two potentially omitted variable problems in our survey (negative correlation between affiliation year and producer's education and a relatively larger number of producers with a small amount of affiliation years).

We also evaluate whether the observed positive and significant relationship between affiliation years and child schooling may be affected by problems of heterogeneity between the treatment and control sample, reverse causality and endogeneity. Inclusion of fixed effects, robustness checks of estimates restricted to the treatment group, tests on common preaffiliation trends (between treatment and control producers and between young and old affiliated) and the history of the cooperative admission criteria make us confident that our findings are robust.

References

Arellano, M., and O. Bover, (1995); *Another look at the instrumental variables estimation of error components models*. Journal of Econometrics 68: 29-51

Bacon, C. (2005). *Confronting the Coffee Crisis: Can Fair Trade, Organic, and Specialty CoffeesReduce Small-Scale Farmer Vulnerability in Northern Nicaragua?* World Development 33(3), 497-511.

Basu K. and Van P.H., (1998); *The Economics of Child Labor*. American Economic Review 88:412-427.

Baland, J.M. and Duprez, C. (2008); *Are Fair Trade Labels Effective Against Child Labour?* CEPR Discussion Paper No 6259.

Becchetti L., Castriota S., (2008) Is Fair Trade Honey Sweeter? An empirical analysis on the effect of affiliation on productivity ECINEQ working paper n.104

Becchetti L., Costantino M. (2008); *Fair Trade on marginalized producers: an impact analysis on Kenyan farmers*. World Development 365: 823–842.

Becchetti L., Rosati F. (2007); *Globalisation and the death of distance in social preferences and inequity aversion: empirical evidence from a pilot study on fair trade consumers*, The World Economy, 30 (5): 807-30.

Becchetti L. Costantino M. Portale E., 2007, *Human capital, externalities and tourism: three unexplored sides of the impact of FT affiliation on primary producers*, CEIS working paper n. 262

Bhalotra, S., Heady, C. (2003); *Child Farm Labor: The Wealth Paradox*. World Bank Economic Review 17(2): 197-227.

Blundell, R., Bond S. (1998); *Initial conditions and moment restrictions in dynamic panel data models*. Journal of Econometrics 87: 11,143.

Castro, J.E. (2001); *Impact assessment of Oxfam's fair trade activities. The case of Productores de miel Flor de Campanilla*. Oxford: Oxfam.

Carmichael B. & L. Samson, 2003, Expected returns and economic risk in Canadian financial markets, Applied Financial EconomicsVolume 13, Issue 3, January 2003, pages 177-189

Cartwright, K. (1999); *Child Labor in Colombia*. In The Policy Analysis of Child Labor, A Comparative Study, edited by Grootaert C. and Patrinos H. A., Washington D.C., World Bank.

Chen, Yi-Chi & Chang-Ching Lin, 2012, Information shocks and cigarette addiction: views from dynamic panels with common structural changes, Applied EconomicsVolume 44, Issue 35, December 2012, pages 4651-4660

Cigno, A., Rosati, F. (2005). *The Economics of Child Labour*. (Oxford University Press, Cambridge).

Cigno, A., Rosati, F. and Z. Tzannatos (2002), *Child Labor Handbook*. WB Social Protection Discussion Paper N. 0206.

Davidson, R. and MacKinnon, J. (1993); *Estimation and Inference in Econometrics*. New York: Oxford University Press.

Deb, P. and Rosati, F. (2002); *Determinants of Child Labor and Scholl Attendance: The Role of Household Unobservables*. Understanding Childrens Work Working Paper. Florence: Innocenti Research Center.

Diamond, P., Hausman, J., (1994); *Contingent Valuation: Is Some Number Better than No Number?* Journal of Economic Perspectives, 8: 45-64.

Edmonds, E. V. (2005); *Does child labor decline with improving economic status?* The Journal of Human Resources 40: 77-99.

Edmonds, E. V., (2007); *Child labor*. NBER Working Paper n. 12926.

Fairtrade International, (2011); *Monitoring the Scope and Benefits of Fairtrade, Third Edition, 2011*, http://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/Monitoring_the_scope_and_benefits_of_Fairtrade_2011.pdf.

Garces, E., Duncan, T. and Currie, J. (2002); Longer-Term Effects of Head Start. *American Economic Review*, 92(4), pp. 999–1012.

Guarcello L., Mealli F., Rosati F. (2002). *Household Vulnerability and Child Labour: the Effect of Shocks, Credit Rationing and Insurance*. UCW Working Paper 3, Understanding Children's Work (UCW Project).

Kohler P. (2007); *The Economics of Fair Trade: For Whose Benefit? An Investigation into the Limits of Fair Trade as a Development Tool and the Risk of Clean-Washing*.06-2007, HEI Working Papers.

Hayes, M. (2004); *Strategic management implication of the ethical consumer*. <http://www.fairtraderesearch.org>.

Ilahi, N., Orazem, P. and Sedlack, G. (2000); *The implications of child labor for adult wages, income and poverty: Retrospective evidence from Brazil*. Manuscript (International Monetary Fund).

ILO (2006); *The End of Child Labour: Within Reach*. Geneva.

Leclair, M. S. (2002); *Fighting the tide: Alternative trade organizations in the era of global free trade*. World Development 30(7): 1099–1122.

Maseland, R., & De Vaal, A. (2002); *How Fair is Fair Trade?* De Economist 150(3): 251-272.

McIntosh, C., Villaran, G. and Wydick, B. (2007); *Microfinance and Home Improvement: Using Retrospective Panel Data to Measure Program Effects on Fundamental Events*. University of San Francisco Departmental Working Paper.

Moore, G. (2004); *The Fair Trade Movement: parameters, issues and future research. Journal of Business Ethics 53*(1-2): 73-86

Nelson, V. & Galvez, M. (2000); *Social Impact of Ethical and Conventional Cocoa Trading on Forest-Dependent People in Ecuador*. University of Greenwich.

Pariente, W. (2000); *The impact of fair trade on a coffee cooperative in Costa Rica. A producers behaviour approach*. Université Paris I Panthéon Sorbonne, No 1161-98, University of Wisconsin.

Peters H. E. (1988) Retrospective Versus Panel Data in Analyzing Lifecycle Events. *The Journal of Human Resources*, (23) 4, pp. 488-513.

Psacharopoulos G., Patrinos H. (1995); *Educational Performance and Child Labor in Paraguay*. International Journal of Educational Development, 15(1): 47-60.

Psacharopoulos G. (1997); *Child Labor Versus Educational Attainment: Some Evidence from Latin America*. Journal of Population Economics, 10(4): 377-386.

Ranjan, P. (2001), *Credit Constraints and the Phenomenon of Child Labor*. Journal of Development Economics, LXIV, 81-102.

Redfern, A. & Snedker, P. (2002); *Creating market opportunities for small enterprises: experiences of the fair trade movement*. ILO, Geneva.

Ronchi, L. (2006); *"Fairtrade" and Market Failures in Agricultural Commodity Markets*. World Bank Policy Research Working Paper 4011. Washington: IBRD.

Ronchi, L. (2002); *The impact of fair trade on producers and their organizations: a case study with Coocafê in Costa Rica*. University of Sussex.

Ruben, R., (2008); *The impact of fair trade*. Wageningen Academic Publishers, Wageningen.

Schady, N. and M., Araujo (2006); *Cash transfers, conditions, school enrollment, and child work: Evidence from a randomized experiment in Ecuador*. Policy Research Working Paper no. 3930 (The World Bank, Washington, D.C.).

Schultz, T. (2004); *School subsidies for the poor: Evaluating the Mexican progresa poverty Program*. Journal of Development Economics 74: 199-250.

Skoufias, E. and Susan W. Parker (2001); *Conditional Cash Transfers and their Impact on Child Work and Schooling: Evidence from the PROGRESA program in Mexico*. *Economia*, 2(1):45-96.

Smith, J.P. (2009) The Impact of Childhood Health on Adult Labor Market Outcomes. *Review of Economics and Statistics*, 91(3), pp. 478-489.

White, H. (1980); *A heteroskedasticity-consistent covariance matrix and a direct test for heteroskedasticity*. Econometrica 48: 817-38.

Windmeijer, F. (2005); *A finite sample correction for the variance of linear efficient two-step GMM estimators*. Journal of Econometrics 126: 25-51

Yanchus, D. and X. de Vanssay (2003); *The Myth of Fair Prices: A graphical analysis*. Journal of Economic Education. 34(3):235-240.

Table 1. Variable legend

Variable	Description
Male	DV equal to 1 if the respondent is male
Age	Age in years
Education	Years of school attended
Education mother	Education of the mother in years
Education father	Education of the father in years
Children	Number of children
Income total	Actual total income realized last year
Income honey	Income from honey last year
Income bees	Income from other bees' products last year
Honey production	Total production of honey in kilos
Productivity per hour	Prodution of honey per hour worked
FT	DV (dummy variable) equal to 1 if the respondent is directly associated to FT cooperatives
Half FT	DV equal to 1 if the respondent is only indirectly associated to FT cooperatives
No FT	DV equal to 1 if the respondentis not associated to FT cooperatives
FT age	Number of affiliation years

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Male	234	0.84	0.37	0	1
Age	234	49.74	12.70	24	88
Education	233	9.92	4.19	0	22
Education mother	224	4.56	4.01	0	16
Education father	224	4.66	4.27	0	18
Children	231	2.50	1.89	0	11
Income total	231	4,988,680	11,400,000	0	110,000,000
Income honey	229	2,109,031	3,878,463	0	40,000,000
Income bees	230	346,100	1,016,250	0	10,000,000
Honey production	225	3,232	6,134	0	60,000
Productivity per hour	224	180	306	0	3,333
FT	234	0.46	0.50	0	1
Half FT	234	0.12	0.33	0	1
No FT	234	0.42	0.49	0	1
FT age	137	6.90	5.36	0	25

Table 3. Confidence intervals of selected variables for treatment (FT affiliated producers) and control samples

	Control sample				FT affiliated			
Variable	**Obs**	**Mean**	**[95% Conf.**	**Interval]**	**Obs**	**Mean**	**[95% Conf.**	**Interval]**
Male	98	0.78	0.69	0.86	108	0.89	0.83	0.95
Age	98	48.29	45.62	50.95	108	50.60	48.42	52.78
Education	98	10.35	9.49	11.20	107	9.46	8.69	10.23
Children	97	2.47	2.10	2.85	106	2.66	2.28	3.05
Hectares	98	11.83	6.28	17.37	107	8.26	4.44	12.08
House	98	0.88	0.81	0.94	108	0.91	0.85	0.96
Main activity								
Honey	98	0.49**	0.39	0.59	108	0.69**	0.60	0.77
Other bees	98	0.03	0.00	0.07	108	0.00	0.00	0.00
Agriculture	98	0.19**	0.11	0.27	108	0.06**	0.02	0.11
Breeding	98	0.06	0.01	0.11	108	0.07	0.02	0.12
Other activity	98	0.23	0.15	0.32	108	0.18	0.10	0.25
Hours worked								
Hours total	97	40.79	37.10	44.49	107	42.40	39.13	45.68
Hours honey	98	14.89	12.07	17.71	108	20.32	17.62	23.03
Hours agriculture	98	9.16	6.30	12.03	108	5.90	3.66	8.14
Hours breeding	98	3.42	1.18	5.66	108	4.55	2.52	6.57
Hours other	97	10.62	6.86	14.38	108	9.92	6.67	13.16
Income and productivity								
Income necessary	98	5,177,143	4,263,280	6,091,006	107	4,308,785	3,771,018	4,846,552
Income total	95	4,399,368	2,218,092	6,580,645	108	5,787,667	3,266,378	8,308,955
Income honey	94	1,251,649**	860,207	1,643,091	107	2,998,411**	1,997,739	3,999,084
Other sources	95	0.69	0.60	0.79	102	0.54	0.44	0.64
Honey production	95	1,991**	1,208	2,774	103	4,403**	2,867	5,940
Productivity per hour	94	110**	81	140	103	248**	168	328

** the difference between Flo and no Flo producers is significant at 99 percent

Table 4. Distribution of FT producers' affiliation age

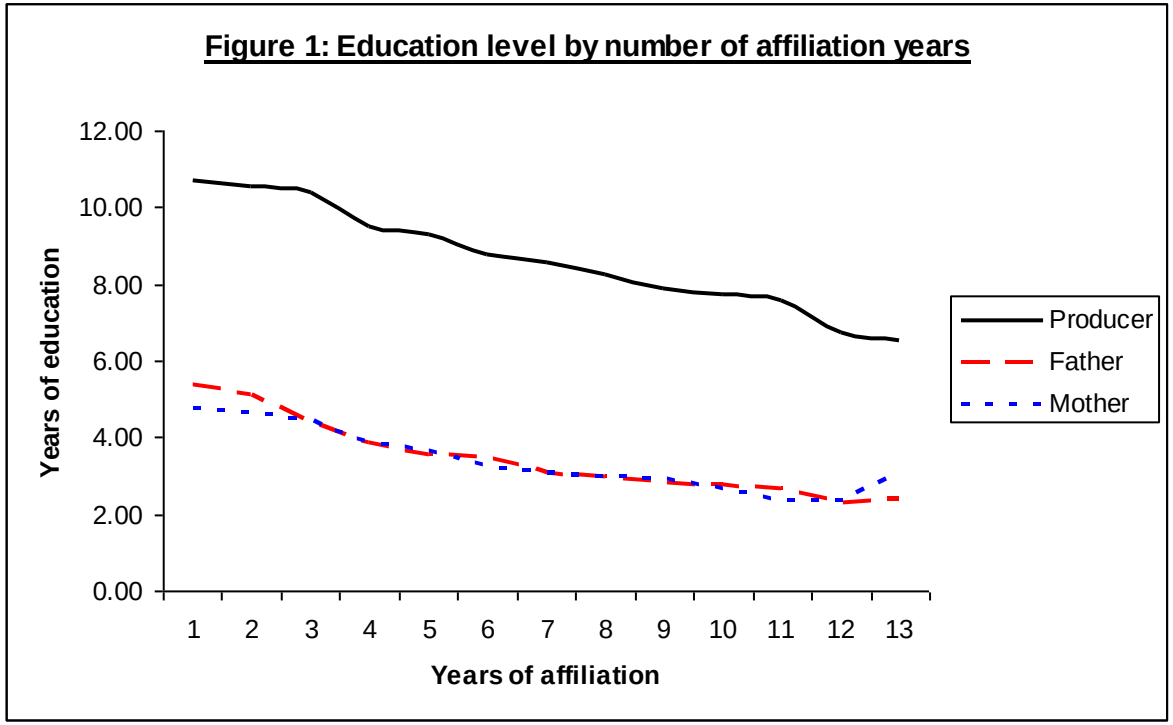
Affiliation years	Observations	Percent	Cumulative
1	14	10.77	10.77
2	13	10.00	20.77
3	20	15.38	36.15
4	10	7.69	43.85
5	9	6.92	50.77
6	7	5.38	56.15
7	2	1.54	57.69
8	8	6.15	63.85
9	2	1.54	65.38
10	19	14.62	80.00
11	2	1.54	81.54
12	7	5.38	86.92
14	3	2.31	89.23
15	4	3.08	92.31
16	1	0.77	93.08
18	2	1.54	94.62
20	6	4.62	99.23
25	1	0.77	100.00
Total	130	100	100

Table 5. Education level by number of affiliation years

Aff.Years	2007	2006	2005	2004	2003	2002	2001
Education of the producer							
1-3	10.40	10.45	10.43	10.44	10.37	10.38	10.15
4-6	10.38	9.52	9.58	8.37	8.60	8.11	8.62
7-9	8.37	8.60	8.11	8.42	6.77	6.00	6.50
10-12	8.62	6.77	6.00	6.50	6.80	7.66	6.50

Aff.Years	2007	2006	2005	2004	2003	2002	2001
Education of the producer's father							
1-3	5.33	5.18	5.21	5.18	5.11	5.10	4.89
4-6	3.94	4.41	3.58	3.77	3.23	2.89	2.88
7-9	3.17	3.26	2.89	2.88	1.80	2.14	2.37
10-12	2.89	1.80	2.14	2.37	3.20	3.00	2.50

Aff.Years	2007	2006	2005	2004	2003	2002	2001
Education of the producer's mother							
1-3	5.16	5.09	5.04	5.04	4.96	4.98	4.80
4-6	4.00	3.70	4.16	3.39	3.50	2.62	2.88
7-9	3.39	3.05	2.62	1.88	1.50	2.71	1.87
10-12	1.88	1.50	2.71	2.87	3.40	4.00	4.00



Note: Figures refer to averages over the period 2001-2007

Table 6.1 Fixed effects model over the full sample

	HSI 10-18	HSI 11-18	HSI 12-18	HSI 13-18	HSI 14-18
Tot. Pot.	-0.030962	-0.0311771	-0.0299827	-0.0212994	-0.0185246
	(-3.33)	(-2.87)	(-2.31)	(-1.32)	(-0.93)
Age	-0.0273542	-0.0248527	-0.0213023	-0.0199538	-0.017313
	(-10.45)	(-8.50)	(-6.43)	(-5.39)	(-4.16)
FT Age	0.0095477	0.0126911	0.0148914	0.0158515	0.0181
	(2.29)	(2.70)	(2.81)	(2.57)	(2.56)
N	1.823	1.691	1.544	1.388	1.222
Nr. of Groups	165	165	160	151	148
R^2 within	0.1303	0.1130	0.0996	0.0943	0.0931
R^2 between	0.0444	0.0416	0.0416	0.0266	0.0180
R^2 overall	0.0545	0.0506	0.0423	0.0322	0.0286
F1(overall	11.68	9.13	7.18	6.03	5.15
goodness of fit)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
F2 (significance	7.31	7.11	7.21	6.92	6.62
of fixed effects)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tests on common	1.23	0.98	1.04	1.15	1.03
Preaffiliation trends	(0.93)	(1.03)	(1.21)	(0.85)	(0.92)

Table 6.2 Fixed effects model (treatment group only)

	HSI 10-18	HSI 11-18	HSI 12-18	HSI 13-18	HSI 14-18
Tot. Pot.	-0.0293442	-0.0542311	-0.0423416	-0.069751	-0.118689
	(-1.08)	(-1.84)	(-1.18)	(-1.55)	(-2.28)
Age	-0.051717	-0.054143	-0.054811	-0.0510052	-0.0465714
	(-2.67)	(-2.62)	(-2.38)	(-2.05)	(-1.72)
FT Age	0.0475852	0.0513154	0.0539982	0.0527196	0.0487114
	(2.30)	(2.29)	(2.14)	(1.92)	(1.60)
N	450	426	397	366	330
Nr. of Groups	75	75	71	68	67
R^2 within	0.1715	0.1650	0.1511	0.1773	0.1879
R^2 between	0.0082	0.0013	0.0034	0.0017	0.0000
R^2 overall	0.0276	0.0226	0.0143	0.0203	0.0229
F1(overall	3.49	3.10	2.59	2.84	2.67
goodness of fit)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
F2 (significance	3.04	3.01	2.88	2.63	2.58
of fixed effects)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tests on common					
Preaffiliation trends	1.06	0.81	1.41	1.37	1.41
(old producers)	(0.82)	(1.31)	(1.02)	(0.91)	(0.71)
Tests on common					
Preaffiliation trends	1.31	0.52	1.03	1.30	1.01
(young producers)	(0.64)	(1.01)	(1.21)	(1.75)	(0.92)

We estimate the following model $HSI_{it} = \alpha_0 + \alpha_1 Age_{it} + \alpha_2 TOTPOT_{it} + \alpha_3 FTage_{it} + \sum_k \beta_k Dtime_k + \sum_i \gamma_i Dproducer_i + \varepsilon_{i,t}$

where (Age_{it}) is the age of the i-th producer at time t, ($TOTPOT_{it}$) is the denominator of the schooling index or the number of children for the selected school age cohort in a given year, ($FTage_{it}$) are years of FT affiliation, ($Dtime_t$) are year dummies and $Dproducer_i$ is the producer specific intercept typical of fixed effect models.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

http://www.feem.it/getpage.aspx?id=73&sez=Publications&padre=20&tab=1
http://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalbrowse&journal_id=266659
http://ideas.repec.org/s/fem/femwpa.html
http://www.econis.eu/LNG=EN/FAM?PPN=505954494
http://ageconsearch.umn.edu/handle/35978
http://www.bepress.com/feem/

NOTE DI LAVORO PUBLISHED IN 2012

CCSD	1.2012	Valentina Bosetti, Michela Catenacci, Giulia Fiorese and Elena Verdolini: The Future Prospect of PV and CSP Solar Technologies: An Expert Elicitation Survey
CCSD	2.2012	Francesco Bosello, Fabio Eboli and Roberta Pierfederici: Assessing the Economic Impacts of Climate Change. An Updated CGE Point of View
CCSD	3.2012	Simone Borghesi, Giulio Cainelli and Massimiliano Mozzanti: Brown Sunsets and Green Dawns in the Industrial Sector: Environmental Innovations, Firm Behavior and the European Emission Trading
CCSD	4.2012	Stergios Athanassoglou and Valentina Bosetti and Gauthier de Maere d'Aertrycke: Ambiguous Aggregation of Expert Opinions: The Case of Optimal R&D Investment
CCSD	5.2012	William Brock, Gustav Engstrom and Anastasios Xepapadeas: Energy Balance Climate Models and the Spatial Structure of Optimal Mitigation Policies
CCSD	6.2012	Gabriel Chan, Robert Stavins, Robert Stowe and Richard Sweeney: The SO2 Allowance Trading System and the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation
ERM	7.2012	Claudio Morana: Oil Price Dynamics, Macro-Finance Interactions and the Role of Financial Speculation
ES	8.2012	Gérard Mondello: The Equivalence of Strict Liability and Negligence Rule: A « Trompe l'œil » Perspective
CCSD	9.2012	Eva Schmid, Brigitte Knopf and Nico Bauer: REMIND-D: A Hybrid Energy-Economy Model of Germany
CCSD	10.2012	Nadia Ameli and Daniel M. Kammen: The Linkage Between Income Distribution and Clean Energy Investments: Addressing Financing Cost
CCSD	11.2012	Valentina Bosetti and Thomas Longden: Light Duty Vehicle Transportation and Global Climate Policy: The Importance of Electric Drive Vehicles
ERM	12.2012	Giorgio Gualberti, Morgan Bazilian, Erik Haites and Maria da Graça Carvalho: Development Finance for Universal Energy Access
CCSD	13.2012	Ines Österle: Fossil Fuel Extraction and Climate Policy: A Review of the Green Paradox with Endogenous Resource Exploration
ES	14.2012	Marco Alderighi, Marcella Nicolini and Claudio A. Piga: Combined Effects of Load Factors and Booking Time on Fares: Insights from the Yield Management of a Low-Cost Airline
ERM	15.2012	Lion Hirth: The Market Value of Variable Renewables
CCSD	16.2012	F. Souty, T. Brunelle, P. Dumas, B. Dorin, P. Ciais and R. Crassous: The Nexus Land-Use Model, an Approach Articulating Biophysical Potentials and Economic Dynamics to Model Competition for Land-Uses
CCSD	17.2012	Erik Ansink, Michael Gengenbach and Hans-Peter Weikard: River Sharing and Water Trade
CCSD	18.2012	Carlo Carraro, Enrica De Cian and Massimo Tavoni: Human Capital, Innovation, and Climate Policy: An Integrated Assessment
CCSD	19.2012	Melania Michetti and Ramiro Parrado: Improving Land-use modelling within CGE to assess Forest-based Mitigation Potential and Costs
CCSD	20.2012	William Brock, Gustav Engstrom and Anastasios Xepapadeas: Energy Balance Climate Models, Damage Reservoirs and the Time Profile of Climate Change Policy
ES	21.2012	Alireza Naghavi and Yingyi Tsai: Cross-Border Intellectual Property Rights: Contract Enforcement and Absorptive Capacity
CCSD	22.2012	Raphael Calel and Antoine Dechezleprêtre: Environmental Policy and Directed Technological Change: Evidence from the European carbon market
ERM	23.2012	Matteo Manera, Marcella Nicolini and Ilaria Vignati: Returns in Commodities Futures Markets and Financial Speculation: A Multivariate GARCH Approach
ERM	24.2012	Alessandro Cologni and Matteo Manera: Oil Revenues, Ethnic Fragmentation and Political Transition of Authoritarian Regimes
ERM	25.2012	Sanya Carley, Sameeksha Desai and Morgan Bazilian: Energy-Based Economic Development: Mapping the Developing Country Context
ES	26.2012	Andreas Groth, Michael Ghil, Stéphane Hallegatte and Patrice Dumas: The Role of Oscillatory Modes in U.S. Business Cycles
CCSD	27.2012	Enrica De Cian and Ramiro Parrado: Technology Spillovers Embodied in International Trade: Intertemporal, Regional and Sectoral Effects in a Global CGE Framework
ERM	28.2012	Claudio Morana: The Oil Price-Macroeconomy Relationship since the Mid- 1980s: A Global Perspective
CCSD	29.2012	Katie Johnson and Margaretha Breil: Conceptualizing Urban Adaptation to Climate Change Findings from an Applied Adaptation Assessment Framework

ES	30.2012	Angelo Bencivenga, Margaretha Breil, Mariaester Cassinelli, Livio Chiarullo and Annalisa Percoco: The Possibilities for the Development of Tourism in the Appennino Lucano Val d'Agri Lagonegrese National Park: A Participative Qualitative-Quantitative Approach
CCSD	31.2012	Tim Swanson and Ben Groom: Regulating Global Biodiversity: What is the Problem?
CCSD	32.2012	J. Andrew Kelly and Herman R.J. Vollebergh: Adaptive Policy Mechanisms for Transboundary Air Pollution Regulation: Reasons and Recommendations
CCSD	33.2012	Antoine Dechezleprêtre, Richard Perkins and Eric Neumayer: Regulatory Distance and the Transfer of New Environmentally Sound Technologies: Evidence from the Automobile Sector
CCSD	34.2012	Baptiste Perrissin Fabert, Patrice Dumas and Jean-Charles Hourcade: What Social Cost of Carbon? A mapping of the Climate Debate
ERM	35.2012	Ludovico Alcorta, Morgan Bazilian, Giuseppe De Simone and Ascha Pedersen: Return on Investment from Industrial Energy Efficiency: Evidence from Developing Countries
CCSD	36.2012	Stefan P. Schleicher and Angela Köppl: Scanning for Global Greenhouse Gas Emissions Reduction Targets and their Distributions
CCSD	37.2012	Sergio Currarini and Friederike Menge: Identity, Homophily and In-Group Bias
CCSD	38.2012	Dominik Karos: Coalition Formation in Generalized Apex Games
CCSD	39.2012	Xiaodong Liu, Eleonora Patacchini, Yves Zenou and Lung-Fei Lee: Criminal Networks: Who is the Key Player?
CCSD	40.2012	Nizar Allouch: On the Private Provision of Public Goods on Networks
CCSD	41.2012	Efthymios Athanasiou and Giacomo Valletta: On Sharing the Benefits of Communication
CCSD	42.2012	Jan-Peter Siedlarek: Intermediation in Networks
CCSD	43.2012	Matthew Ranson and Robert N. Stavins: Post-Durban Climate Policy Architecture Based on Linkage of Cap-and-Trade Systems
CCSD	44.2012	Valentina Bosetti and Frédéric Ghersi: Beyond GDP: Modelling Labour Supply as a 'Free Time' Trade-off in a Multiregional Optimal Growth Model
ES	45.2012	Cesare Dosi and Michele Moretto: Procurement with Unenforceable Contract Time and the Law of Liquidated Damages
CCSD	46.2012	Melania Michetti: Modelling Land Use, Land-Use Change, and Forestry in Climate Change: A Review of Major Approaches
CCSD	47.2012	Jaime de Melo: Trade in a 'Green Growth' Development Strategy Global Scale Issues and Challenges
ERM	48.2012	ZhongXiang Zhang: Why Are the Stakes So High? Misconceptions and Misunderstandings in China's Global Quest for Energy Security
CCSD	49.2012	Corrado Di Maria, Ian Lange and Edwin van der Werf: Should We Be Worried About the Green Paradox? Announcement Effects of the Acid Rain Program
CCSD	50.2012	Caterina Cruciani, Silvio Giove, Mehmet Pinar and Matteo Sostero: Constructing the FEEM Sustainability Index: A Choquet-Integral Application
CCSD	51.2012	Francesco Nicolli and Francesco Vona: The Evolution of Renewable Energy Policy in OECD Countries: Aggregate Indicators and Determinants
CCSD	52.2012	Julie Rozenberg, Céline Guivarch, Robert Lempert and Stéphane Hallegatte: Building SSPs for Climate Policy Analysis: A Scenario Elicitation Methodology to Map the Space of Possible Future Challenges to Mitigation and Adaptation
ES	53.2012	Nicola Comincioli, Laura Poddi and Sergio Vergalli: Does Corporate Social Responsibility Affect the Performance of Firms?
ES	54.2012	Lionel Page, David Savage and Benno Torgler: Variation in Risk Seeking Behavior in a Natural Experiment on Large Losses Induced by a Natural Disaster
ES	55.2012	David W. Johnston, Marco Piatti and Benno Torgler: Citation Success Over Time: Theory or Empirics?
CCSD	56.2012	Leonardo Becchetti, Stefano Castriota and Melania Michetti: The Effect of Fair Trade Affiliation on Child Schooling: Evidence from a Sample of Chilean Honey Producers