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MULTIPLE CERTIFICATIONS AND CONSUMER PURCHASE DECISIONS: A CASE STUDY OF WILLINGNESS TO PAY FOR COFFEE IN GERMANY

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Multiple Certifications and Consumer Purchase Decisions:

A Case Study of Willingness to Pay for Coffee in Germany

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Abstract: This study contributes to the literature on consumers' willingness to pay (WTP) for certified coffee with the main objective of trying to understand consumer choices in the presence of (i) multiple labels and (ii) multiple certifications within each label type. The multiple labels we consider are Fair Trade, Wild Grown and Organic coffee while multiple certifications within each of these three main labels include permutations such as Fair Trade + Organic and Organic + Wild Grown. We find that consumers' WTP for the Organic label has the highest mean value but also the highest dispersion of any of the WTP distributions. The distribution of WTP for the Fair Trade label, while somewhat lower than Organic, has a much tighter distribution about around its mean. Comparing the shape of the distributed WTP for Organic versus Fair Trade may provide some evidence for the degree of consumer confidence or knowledge about what the respective labels purport to deliver. Consistent with the above results, we find that consumers are unlikely to choose Wild Grown coffee and are not willing to pay a price premium for this label.

Keywords: Certificate, Fair Trade, Organic, Wild Grown, Coffee, Choice Experiment, Germany

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1. Introduction

Coffee produced in developing countries is sold under a variety of labels in the consumer markets of developed countries – the most prominent being Fair Trade. In addition to Fair Trade coffee, labels such as Organic, Shade Grown and Wild Grown coffee are also becoming popular amongst consumers in the developed countries (Ponte 2002). Labeling of coffee (as well as a variety of products) under the Fair Trade umbrella aims to target two issues simultaneously: (i) provide an income guarantee that acts as an insurance mechanism for poor farmers in developing countries who undertake production in a socially (for instance, no child labor in production) and environmentally-friendly, sustainable way by following certain clearly defined standards, and (ii) introduce market differentiation for a product that helps correct for information distortion on the consumption side, and allows consumers to reveal their true/higher willingness to pay (WTP). In effect, labeling provides for a market-based solution to the under-production and under-consumption of socially and environmentally-friendly products while allowing for a higher income for farmers in developing countries. Thus, labeling can provide a superior alternative to direct production subsidies to farmers as incentive to engage in environmentally-friendly production techniques.

While a number of recent studies have focused on the supply side assessing the impact of certification on producers' welfare and productivity and on consumers' WTP for specific labeled products, studies about consumers' perception and purchase decision making across multiple labels, is non-existent. Consumer decision making in the context of multiple labels is an important issue since the number of labels for a product such as coffee has substantially increased in the main consumer countries in the last two decades, creating not only more consumer choices and complexity, but also the possibility of label fatigue. Not only are labels such as Organic, Fair Trade, Wild Grown, 4 C, Utz Certified, Rainforest Alliance, or Smithsonian Bird-friendly Shade Grown Coffee commonplace, double and triple certification such as Organic + Fair Trade or Organic + Wild Grown + specific geographic indication (such as Ethiopian Yirgacheffe or Jamaica Blue Mountain) are gaining prominence in the consumer markets. In this study we fill the gap on consumers' choice and WTP for multiple certified coffee by focusing on four specific labels: Organic, Fairtrade and Wild Grown, and on the two large Arabica coffee production countries, Brazil and Ethiopia. In addition to identifying which certifications are relatively more valued by consumers, our study also sheds light on whether older, more established labels like Fair Trade enjoy a market share advantage vis-à-vis newer labels like Wild Grown coffee.

1.1 Background Literature

Organic certification started in the 1970s as a means of promoting and regulating eco-friendly agricultural practices. Since 1972, the International Foundation for Organic Agriculture (IFOAM) has been developing a global set of private and public regulations officially endorsed as Organic, based on equivalence with the Common Objectives and Requirements of Organic Standards. All Organic labels indicate that the certified products have been produced and processed without chemical fertilizer, pesticides, fungicides, herbicides or genetically modified organisms (IFOAM 2016). It is estimated that in 2013, 260,000 metric tons of Organic certified coffee were produced on 638,000 ha, representing 6.3% of the total global coffee area (Lernoud et al. 2015) with 75% of the world's Organic coffee being produced in Latin America alone (CBI Market Intelligence 2016).

Fair Trade certification of coffee has increasingly gained worldwide importance (Nicholls 2005; Petit 2007; FLO 2009; Grote et al. 2009). Interestingly, coffee was the first product to be Fair Trade certified. In 1988, the first ever Fair Trade certified coffee was produced in Mexico and sold in the Netherlands. Today, coffee is Fair Trade consumers' most favorite product, accounting for 25% of all Fair Trade certified retail sales (FLO 2016). The idea behind Fair Trade is to ensure 'fair' wages for small-scale producers in the developing countries (Raynolds et al. 2007). Certification by Fairtrade International (FLO) targets poor farmers operating on less than 3 ha of land without hired labor in developing countries, and guarantees them a price floor and other benefits like facilitating credit[1]. Fair Trade coffee guarantees not only that farmers and workers receive a fair price but also that it was produced without any child labor or forced labor, under healthy and safe working conditions, and with sustainable and environmentally-friendly production methods. It provides a floor price to reduce farmers' vulnerability to coffee price fluctuations as well as a social premium which is targeted towards investments in schools, health care centers or other social infrastructure and facilities in the rural coffee community (FLO 2015).

About 1.6 million farmers and workers or an estimated 75% of all poor coffee farmers worldwide are currently involved in Fair Trade (FLO 2016). In recent years, Fair Trade operations have steadily increased: between 2011 and 2014 alone, the area under production of Fair Trade certified coffee increased by 20% worldwide (Lernoud et al. 2015). To put this production scale in perspective, in 2013 alone 400,000 metric tons of Fair Trade certified coffee was produced on more than 880,000 hectares, constituting almost 9% of the global coffee area. Noteworthy here is that 34% of the globally produced Fair Trade certified coffee is also certified as Organic, a fact that we will exploit in our experiments. For consumers, mostly in the developed countries, the Fair Trade movement is generally perceived as a viable alternative to direct subsidies or aid, and enhances the welfare of the poor producers in developing countries. This perception is evidenced in reality by worldwide retail sales of the Fair Trade label which were estimated to be around 8.5 billion dollars in 2013 (FLO 2013).

Unlike the Fair Trade certification, Wild Coffee certification addresses environmental and biodiversity concerns by targeting preservation of natural habitats and ecosystems around coffee production areas. Wild Grown coffee is used as a label for Arabica coffee produced in its natural and original habitat, namely in the mountainous rain forests in Southern and Southwestern Ethiopia. These forests, some of them still relatively undepleted, are the genetic cradle of Coffee Arabica, today's most popular and highest-quality coffee species (Stellmacher 2007; Stellmacher and Grote 2011). The Wild Grown coffee label foresees that this coffee grows wild in its natural habitat in forests with no or only little human interference. Wild coffee production in the rainforests of Ethiopia entails local farmers either simply picking wild coffee fruits inside these forests, or managing wild coffee stands by removing competing undergrowth vegetation and some canopy trees. It aims to prevent deforestation and preserve a unique ecosystem while also providing income support for local farmers in Ethiopia. It is interesting to note that the 'Wild Grown' coffee label is neither legally protected nor third-party accredited. Unlike Fair Trade labeled coffee, 'Wild Grown Coffee' from Ethiopia is an absolute niche product that has not been stocked in the shelves of larger retailers yet, and as a result, data about production, sales and market shares are not available.

[1] In 2011 Fair Trade USA split from Fair Trade International (FLO), and while FLO's certification applies to 'small' farmers owning less than 3 ha of land, Fair Trade USA certification also includes farmers who own more than 3 ha and employ hired labor on their farms.

To underscore the importance of the location of our study, Germany is the third biggest coffee consuming country in the world, with 9.2 million quintal (à 60 kg) in 2013. The per capita consumption in Germany is one of the highest worldwide, with 162 liter/person in 2014. Brazil is by far the largest country of origin for coffee consumed in Germany (Kaffeeverband 2016). In 2014, the sales volume of Fair Trade certified coffee in Germany was 16,500 tons. Two third of the Fair Trade coffee sold in Germany is also Organic certified (TransFair 2016). The sales of Organic coffee in Germany were around 13,000 tons in 2013, making Germany the largest Organic coffee market in Europe and the second largest worldwide [2] (CBI Market Intelligence 2016).

The literature on WTP for certified coffee generally shows that consumers are willing to pay a price premium but the magnitude of this premium depends on the label in question, the country of origin of the coffee (Howard and Allen 2010), and the demographic profile of the consumers themselves (van Loo et al. 2015). For instance, de Pelsmacker et al. (2006) found that on average, Belgian consumers are willing to pay a 10% premium on the market price for products with a Fair Trade label. Rotaries and Danielis (2011) conducted a choice experiment and found that Italian households are willing to pay a premium of about 2.2 Euros for a 250 g Fair Trade coffee packet. The WTP, however, varied significantly depending on age, gender, income, and purchasing habits of the consumers. Loureiro and Lotade (2005) find the existence of a price premium for Fair Trade, Shade Grown and Organic coffee, although the premium for Organic coffee was lower than that for the Fair Trade label. Yang et al. (2012) found that Chinese consumers are on average willing to pay 22% more for a medium cup of Fair Trade coffee than for a non-certified one. This was especially true for female consumers, consumers who make their own coffee, and consumers who plan to increase their consumption in the following year. Finally, Hiscox et al. (2011) examined consumers' WTP for Fair Trade coffee using eBay auctions. By posting otherwise identical products on eBay, differences in winning auction prices indicated that consumers were willing to pay approximately 23% more for Fair Trade coffee.

Studies that have analyzed the elasticity of demand and the retail pricing strategy for certified coffee include Andorfer and Liebe (2014) who showed that German consumers are likely to increase their Fair Trade coffee consumption in the face of a price reduction. Arnot et al. (2006) found that consumers of Fair Trade labeled coffee are less price sensitive and Grote (2009) found a significant premium for labeled coffee in Germany and noted that (i) conventional coffee costs around €1.5/250g while retail prices for Organic and Wild Grown coffees amount to up to €8.50/250g; (ii) multiple uses of labels seem to have an effect on the price level and price variation, and (iii) both, conventional and Organic coffees were always more expensive if the country or region of origin was mentioned.

There are also a couple of studies that analyze how perceptions about the performance of labels affect consumers' WTP for coffee. Basu and Hicks (2008, 2016) conducted experiments that gave consumers additional information regarding the number of farmers participating in the Fair Trade program and the revenue increases for these farmers due to the price guarantee of the program. Their results show that consumers' WTP exhibits an 'inverted-U' shape – the WTP rises as the number of participating farmers and revenue

[2] In 2013, Germany's Organic coffee imports accounted for around 19% of the world's total. Globally, Germany is second after the United States, which imported about 38% of the world's Organic coffee. These figures do not, however, include Organic coffee produced in Peru, which is not an ICO member but the by far world's largest exporter of Organic coffee (CBI Market Intelligence 2016).

accruing to them increases, reaches a maximum and declines after around 60% of poor farmers are included in a Fair Trade program within a country.

Alongside studies that estimate consumers' WTP, elasticity of demand and the role of information on labels for certified coffees, a group of studies have explored whether (i) consumers prefer a market-based solution to poverty reduction for farmers in developing countries through their WTP a premium for certified coffee or whether they prefer a direct intervention through subsidies, and (ii) whether consumers have a preference in the way the price premium is transferred to the recipient farmers – in-kind versus cash transfers. Koppel and Schulze (2013) used a revealed preference experiment in Germany to test whether consumers prefer a transfer through the purchase of Fair Trade coffee or a direct transfer through aid to poor farmers in developing countries. Evidence suggests that consumers had a strong preference for the indirect transfer mechanism through the purchase of Fair Trade coffee. Chiu et al. (2015) found that on the one hand, consumers in the US who prefer most of the premium to be an in-kind transfer to the recipients, have a WTP of around 50% over standard coffee. On the other hand, the WTP of those who prefer most of the premium to be paid in cash amounts to around 40%, while those who are indifferent to how the premium is transferred to the recipient have a WTP close to 20%.

1.2 Motivation

This study contributes to the literature on consumers' WTP for certified coffee with the main objective of trying to understand consumer choices in the presence of (i) multiple labels and (ii) multiple certifications within each label type. The multiple labels we consider are Fair Trade, Wild Grown and Organic coffee while multiple certifications within each of these three main labels include permutations such as Fair Trade + Organic and Organic + Wild Grown. Our choice of the three labels, Fair Trade, Wild Grown and Organic is based on two factors: First, the Fair Trade and Organic labels are older and well established in the German consumer market, while the Wild Grown label is relatively new. An interesting question here is whether the Wild Grown label being a late entrant has been able to penetrate the certified coffee market or whether the market is still dominated by the Fair Trade label. Second, the objectives of two of the labels, Fair Trade and Wild Grown, are quite different. While the Fair Trade label's main goal is to promote the welfare of poor producers in developing countries through a price guarantee with environmental sustainability as a secondary goal, the Wild Grown label's primary goal is to preserve an ecosystem through sustainable farming with farmer's incomes as the secondary goal. Thus, an interesting question here is to test whether consumers put more weight on social vis-à-vis environmental considerations in their purchase decisions holding all other attributes of these two labels (prices and country of origin) constant. Finally, the use of multiple certifications allows us to test whether, and to what extent, the likelihood of either the Fair Trade or Wild Grown coffee is driven by the additional attributes like Organic and country of origin.

2. Research Design and Methodology

2.1 Research Design

We investigate the stated preferences of consumers over products having various label attributes such as Fair Trade, Wild Grown, Organic, country of origin and price. The choice experiment is designed to examine the sensitivity of how these various attributes impact the valuation of Fair Trade and Wild Grown coffee by German consumers. This methodology has been used for a wide variety of consumer products and has been shown to yield reliable information about market choices of respondents (e.g. see Ben-Akiva and Morikawa 1990; Adamowicz et al. 1994). A major advantage of this methodology in our context is that it generates a large number of observations and structural estimation of preferences with fairly flexible functional forms. Blocked experimental design techniques were used to select the 12 sets of 6 questions *for each experiment* that maximizes the tradeoffs of the coffee choice experiments[3]. The actual levels of the attributes chosen by the experimental design algorithm differ by question, block, and experiment. Details on the attribute levels are presented in Table 1. We determined the price level in Table 1 by comparing prices in different sales outlets (discounter, specialty shops, etc.) where coffee is available. Conventional coffee costs around €1.5/250g, while retail prices for Organic and Wild Grown coffee amount to up to €8.50/250g. The most common countries of origin are Brazil and Ethiopia.

Each respondent was randomly assigned to one of the 12 blocks. Within each block a respondent received six sets of choices, with each set consisting of three coffee choices and an opt-out option. An example of a set of choices faced by a respondent is presented in Figure 1. Respondents were given information about each certification scheme (Fair Trade, Wild Grown and Organic (BIO)) at the beginning of the survey, and were explicitly instructed to assume that the product quality is identical across all three choices. In our hypothetical choice experiment, it is important for respondents to believe that the product quality and price are not positively correlated[4]. The experiments were conducted at the Leibniz University Hannover between January-April, 2016 amongst undergraduate students, their friends and families. We had a total of 149 respondents with 2,614 observed coffee choices.

2.2 Summary Statistics

In the questionnaire we solicited information from the respondents about their (i) social and environmental preferences; (ii) awareness about existing Fair Trade, Wild Grown and Organic certifications in Germany; (iii) preference for the certifying agency; and (iv) educational and income profiles. The results are presented in Figures 2-5 in the Appendix. To summarize, Figure 2 shows that most respondents found it very important that farmers who grow coffee can achieve a higher standard of living; the opinions ranged between somewhat important to extremely important. Only a very small share of respondents indicated that this is not important to them while there was general consensus among German respondents that coffee should be produced without child labor. Regarding environmental awareness, the survey revealed that it is important to the majority of respondents that coffee is produced using environmentally-friendly and sustainable farming methods. There was also a high

[3] In practice, this means maximizing D efficiency or the determinant $|X'X^{-1}|$.

[4] A major issue with field experiments involving actual tasting of coffee would lead to the problem of a possible positive correlation between price and unobserved product quality.

degree of consensus that coffee has to be free of chemical residues and should not be genetically modified. Interestingly, it was even more important to the respondents that coffee needs to be cultivated in a way that enhances biodiversity – all of which point to consumers having a strong preference for a label that provides a pure public good.

Figure 3 captures respondents' awareness about the various labels of interest to us. Most consumers indicated that they know quite well the characteristics of Organic coffee. A slightly lower but still quite high share of consumers is familiar with the characteristics of the Fair Trade coffee. The familiarity with Wild Grown coffee is much less pronounced which is not surprising as this is not a label widely available in the major sales outlets. Figure 4 shows that a majority of respondents indicated that a Non-Governmental Organization (NGO) should be in charge of the certification. But many of the German consumers also liked the idea of a German Government Office or the European Union being in charge of the certification. A smaller share of respondents saw the countries of origin to be in charge but retailers were not seen as being credible certifiers. Finally, Figure 5 captures the characteristics of respondents. Most respondents were students which is reflected by their age (between 16 and 25 years), academic degree (studying for a Bachelor or Master's degree), and an average annual income of less than 5,000 Euros.

2.3 Econometric Methodology

Our experimental design allows for the identification of all the main and two-way interaction effects. For a coffee ***k*** presented to respondents, the utility is expressed as:

$$\begin{aligned} U_k = {} & \beta_{price} P_k + \beta_{None}(None_k == 1) + \beta_{Ethiopia}(Ethiopia_k == 1) \\ & + \beta_{Brazil}(Brazil_k == 1) + \beta_{FT}(FT_k == 1) + \beta_{Organic}(Organic_k == 1) \\ & + \beta_{Wild}(Wild_k == 1) + \beta_{FT,BIO}(FT_k == 1)(BIO_k == 1) \\ & + \beta_{Wild,Organic}(Wild_k == 1)(Organic_k == 1) \\ & + \beta_{FT,Wild}(FT_k == 1)(Wild_k == 1) + \epsilon_k \end{aligned} \quad (1)$$

where the attribute levels in the experimental design are "turn on" parameters. For example, for coffees having no country of origin label, the term $(None_k == 1)$ would equal one, whereas $(Ethiopia_k == 1)$ and $(Brazil_k == 1)$ would both be zero. Unlike the country of origin attribute, it is possible for multiple labels to appear for a coffee presented to respondents for the Fair Trade (FT), Organic Label (BIO), and Wild Grown (Wild) attributes. This allows us to identify interaction effects such as $\beta_{FT,Organic}$. Below, we further outline the basis for our calculations for the WTP distributions for single and double certified coffees that are presented in Tables 2 and 3, and Figures 6 and 7.

Single Certification: Denoting 0 as the baseline unlabeled coffee, the indirect utility from consuming this baseline coffee is simply

$$U(P^0, 0) = \beta_p P^0 + \beta_N + \epsilon_0 \quad (2)$$

We next compare the baseline indirect utility in equation (2) to the indirect utility of consuming the three single labeled coffees – Fair Trade, Organic and Wild.

$$U(P^0, FT) = \beta_p P^0 + \beta_N + \beta_{FT} + \epsilon_1 \quad (3)$$

$$U(P^0, Organic) = \beta_p P^0 + \beta_N + \beta_{Organic} + \epsilon_2 \quad (4)$$

$$U(P^0, Wild) = \beta_p P^0 + \beta_N + \beta_{Wild} + \epsilon_3 \quad (5)$$

Holding the coffee price and country of origin constant across all coffees, we can extract the expected WTP for coffee i by solving:

$$E\left[U\left(P^0 + WTP^i,\ i\right) = U(P^0,\ i)\right] \quad (6)$$

Thus, for example the willingness to pay for Fair Trade labeled coffee (WTP^{FT}) is

$$E\left[\beta_p(P^0 + WTP^{FT}) + \beta_N + \beta_{FT} + \epsilon_1 = \beta_p P^0 + \beta_N + \epsilon_0\right] \quad (7)$$

or

$$E\left[\beta_p WTP^{FT} + \beta_{FT}\right] = 0 \quad (8)$$

Equation (8) can then be simplified to $E[WTP^{FT}] = \frac{-\beta_{FT}}{\beta_p}$. Thus, the expected WTPs for BIO and Wild coffees are respectively $E[WTP^{BIO}] = \frac{-\beta_{BIO}}{\beta_p}$ and $E\left[WTP^{Wild}\right] = \frac{-\beta_{Wild}}{\beta_p}$.

Double Certification: For double certification where the labels FT + Organic or Wild Grown + Organic or FT + Wild Grown are combined, WTP calculations require modification of equations (3)-(8) as follows:

$$U(P^0, FT, Organic) = \beta_p P^0 + \beta_N + \beta_{FT} + \beta_{Organic} + \beta_{FT,Organic} + \epsilon_4 \quad (9)$$

$$U(P^0, Organic, Wild) = \beta_p P^0 + \beta_N + \beta_{Organic} + \beta_{Wild} + \beta_{Organic,Wild} + \epsilon_5 \quad (10)$$

$$U(P^0, FT, Wild) = \beta_p P^0 + \beta_N + \beta_{FT} + \beta_{Wild} + \beta_{FT,Wild} + \epsilon_6 \quad (11)$$

Where $\beta_{i,j}$ (e.g., $\beta_{FT,BIO}$) is an interaction term if the coffee has double labels i and j. We can then solve for expected WTP for double-labeled coffees as compared to the baseline coffee (captured by equation (2)). For example, the expected WTP for a coffee labeled as both Fair Trade and BIO would be

$$E\left(WTP^{FT,Organic}\right) = \frac{-(\beta_{FT} + \beta_{Organic} + \beta_{FT,Organic})}{\beta_p} \quad (12)$$

Triple Certification: For triple certified coffees such as FT + Organic + Wild, we can replicate the steps in equations (9) – (12) with an additional label, and the analogue of equation (12) would be

$$E\left(WTP^{FT,Org.,Wild}\right) = \frac{-(\beta_{FT} + \beta_{Org.} + \beta_{Wild} + \beta_{Org.,FT} + \beta_{Wild,Org.} + \beta_{FT,Wild})}{\beta_p} \quad (13)$$

Consumer preference parameters for labeled coffees are estimated using data from the experimental design outlined in Table 1 and depicted in Figure 1. We implement a discrete choice model using a multinomial logit approach where alternatives are defined by each coffee alternative. Our estimation approach samples the posterior of the distribution of our parameter estimates by constructing a Monte Carlo Markov Chain, where the posterior is defined as $P(\beta|d, \boldsymbol{X}) \propto P(d|\beta, \boldsymbol{X})P(\beta|\beta^0)$. $P(d|\beta, \boldsymbol{X})$ is the likelihood function for a multinomial logit model, $P(\beta|\beta^0)$ are our priors on the model parameters, $\boldsymbol{X}$ are the coffee attribute levels as given by the experimental design, and d indicates which coffee was chosen for each coffee choice in the data. In this study we assume flat priors (any real numbered parameter vector is equally likely), making our posterior $P(\beta|d, \boldsymbol{X}) \propto P(d|\beta, \boldsymbol{X})$.

Consequently, when constructing our Monte Carlo Markov Chain to sample from the posterior distribution of parameters, we are sampling exactly from the distribution of parameters that maximizes the likelihood. The primary advantage of our estimation approach versus classical Maximum Likelihood (since it uncovers the maximum likelihood estimates) is that we can simultaneously sample from the distribution of our willingness to pay measures while estimating the model parameters[5].

3. Results

Table 2 contains our estimates about consumers' preferences for labeled coffee. Note, for each estimated variable we report the posterior mean and standard deviation (analogous to the maximum likelihood parameter estimate and standard error). While not reported, all p-values are significant at the 5% (and even 1%) level except for Wild Grown coffee, and the Organic and Wild Grown coffee interaction term. In addition, we report percentiles of our sampled parameter values including the median, minimum, and maximum. Using the 2.5% and 97.5% percentiles, one can construct the 95% confidence interval for each parameter. For example, the 95% confidence interval for the Fair Trade parameter is [2.374, 3.172].

The signs and significance levels of all one way effects (except for Wild coffee) accord with our expectations. The results show that (assuming all other coffee attributes are equal) consumers prefer cheaper coffee, coffee labeled with Fair Trade and Organic labels, and weakly prefer coffee having a labeled country of origin. For interaction terms, we see that coffees with multiple labels typically have a negative sign indicating that the whole is less than the sum of its parts: consumers prefer additional labels but their utility is increasing at a decreasing rate. The only exception to this is the Organic and Wild Grown coffee interaction term which is not significant.

We also report on the consumers' WTP for a number of possible combinations of labels versus a generic unlabeled coffee in Table 3. Recall that for label \$i\$, the mean willingness to pay is $\left[WTP^{i}\right] = \frac{-\beta_i}{\beta_p}$. For multiple labels, the WTP measure is given as $\left(WTP^{i,j}\right) = \frac{-(\beta_i+\beta_j+\beta_{i,j})}{\beta_p}$.
Focusing on the single labeled coffees ($WTP^{FT}, WTP^{Organic}, WTP^{Wild}$), results show that both the Fair Trade and Organic labels are very valuable to German consumers whereas we do not see evidence that they value Wild labeled coffee. For coffees with multiple labels, we see that the Organic and Fair Trade labeled coffee is the most valuable coffee on average of any other label considered in this study, including the triple-labeled coffee ($WTP^{FT+Wild+Organic}$). There is some evidence of complementarity between the Organic and Wild Grown coffees (mean WTP of 4.30) since taken together the WTP is greater than the WTP for Organic. However, we do not see this complementarity between Wild Grown and Fair Trade coffees (mean of 2.84).

Figures 6 (for the single-labeled coffees) and 7 (for the multiple-labeled coffees) explore in more detail the posterior distributions of consumers' WTP for labeled coffees. We see that consumers have high valuation (and relatively low dispersion) for the Organic and Fair Trade coffees, whereas we see consumers do not have any preferences (statistically

[5] We sample from the posterior 20,000 times with a burn-in of 2,000. Using standard diagnostics we can confirm that our Markov Chain has converged (which is needed for statistical inference).

speaking) for Wild Grown coffee, and are not willing to pay a positive price premium for this label. In Figure 7, we again see some evidence of complementarity between coffees labeled as Organic and Wild Grown compared to coffees labeled as Fair Trade and Wild Grown. The latter has a very high degree of dispersion and we cannot say with confidence that the consumer values the coffee over the generic unlabeled one. We also see that the Fair Trade and Organic labeled coffees are the most valuable of the coffees considered here, even marginally more valuable than the triple-labeled coffee (Fair Trade, Organic, and Wild). These results suggest that when a relatively unknown coffee attribute (Wild Grown coffee) is added to existing labeling schemes, the multiplicity of labels sometimes causes willingness to pay to fall compared to coffees with fewer but established labeled attributes.

4. Conclusion

This study set out to explore consumer purchase decisions for certified coffee in a setting where the choice set included multiple labels and multiple certifications for each label. An important issue that we wanted to address was whether earlier certifications have an inherent advantage in the sense that more recent certifications are less likely to be chosen by consumers. Our results indicate that there is a discrepancy between consumers' responses with regards to their preference for environmental sustainability and biodiversity and their observed choices when faced with alternatives. Specifically, we see that while the majority of consumers feel that environmental sustainability and biodiversity is important, they tend to avoid choosing Wild Grown coffee when presented with the alternatives of Fair Trade and Organic coffee. Given that the Wild Grown label is a fairly new one (compared to Fair Trade and Organic labels), possible explanations of this observation could well be consistent with the following: (i) consumers are not aware of the exact benefits that the Wild Grown label imparts on the environment; (ii) Fair Trade and Organic labels are older and have an established market; and (iii) consumers when faced with a pure social label (Fair Trade) and a pure eco-label (Wild Grown) tend to favor the social label. These results imply that the target group should be identified and their WTP estimated prior to promoting a new label. It also suggests that social issues are important aspects to consider when investing in a new label. While the design of our study prevents identifying the precise reason as to why the Wild Grown label is not yet popular with German consumers, we hope that this study encourages further investigations into (i) the issue of consumer decision making in the face of multiple certifications and (ii) the possible market share advantage that older, established labels enjoy.

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Table 1: Choice Sets, Attributes and Levels

Attributes	Levels	Definitions
Price	1,50€ 3,50€ 4,25€ 4,50€ 5€	Price per 250g package of coffee based on comparison across various outlets. Conventional coffee costs around €1.5/250g, retail prices for organic and wild coffees amount to up to €8.50/250g.
Country of Origin	Not specified Brazil Ethiopia	Origin of the Coffee Beans.
Certificate	Not specified Fairtrade Organic (BIO) Wild Grown	Information about each certification was presented at the beginning of the survey.

Figure 1: Sample Set of Choices faced by a Respondent

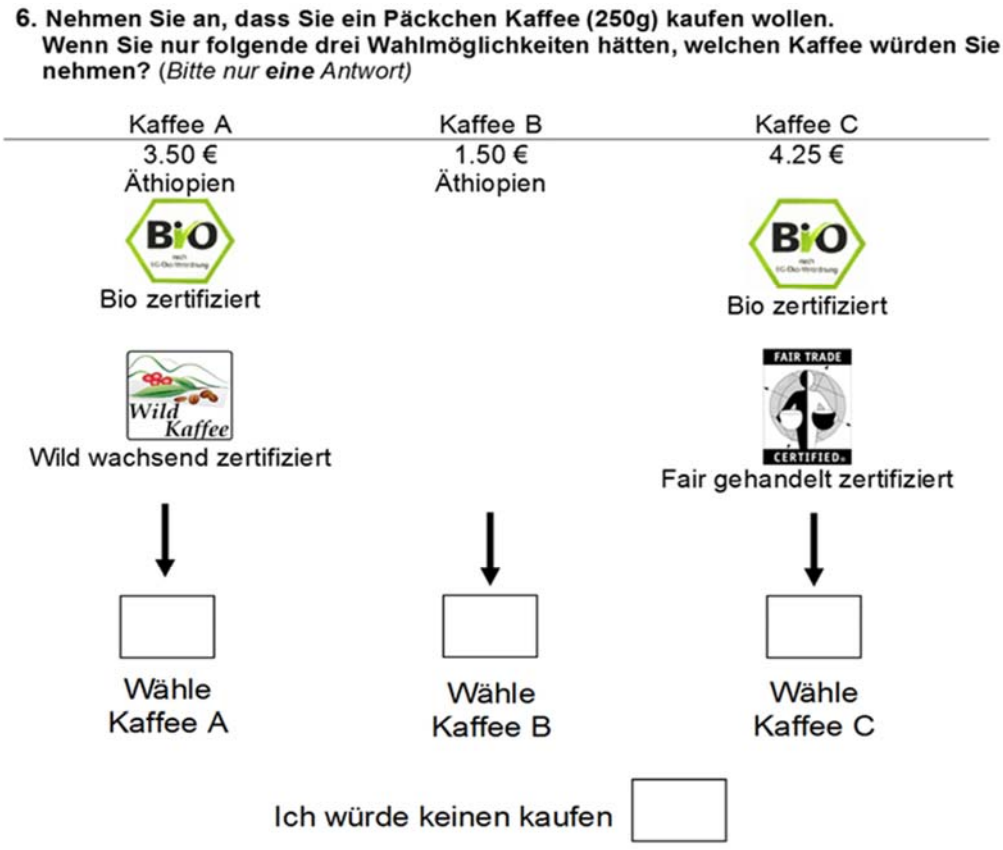
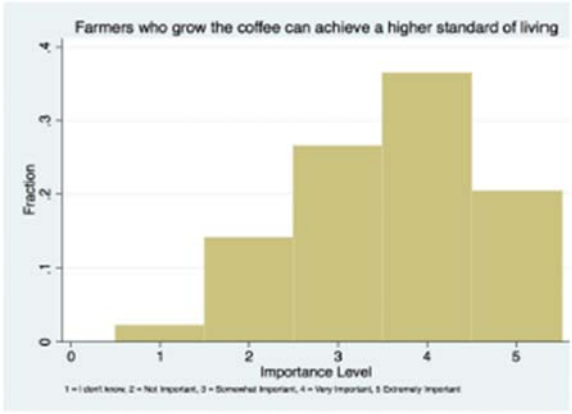
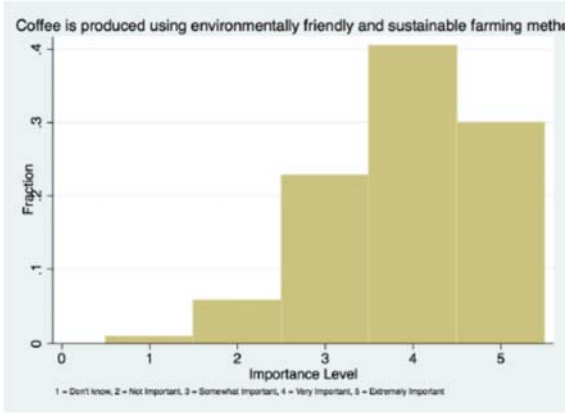
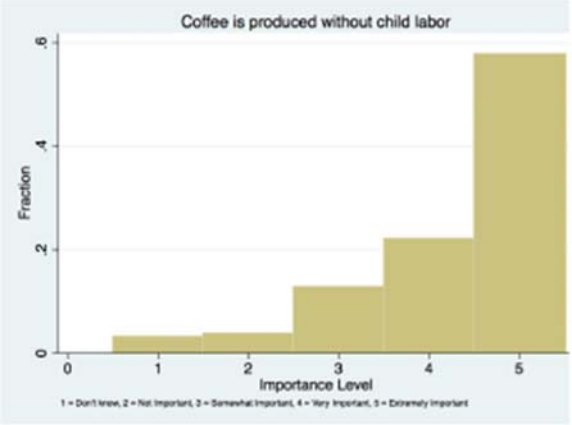
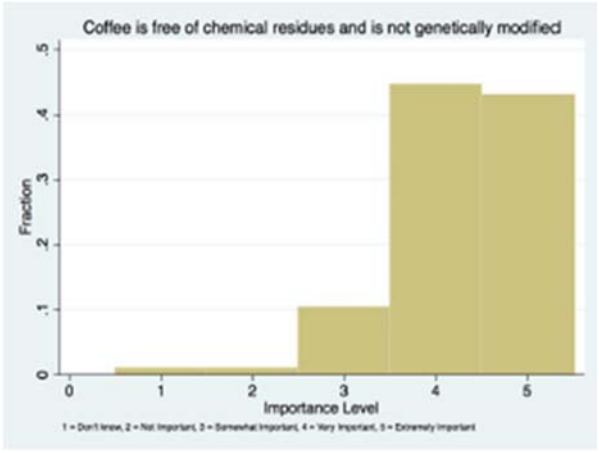


Figure 2: Social and Environmental Awareness









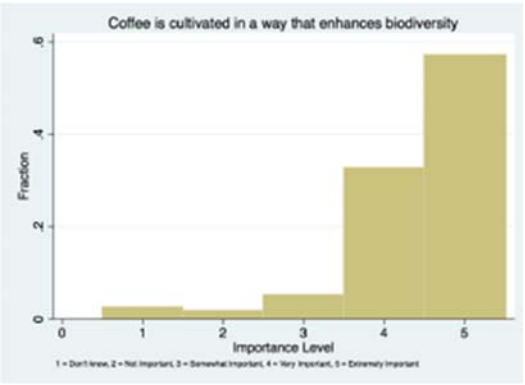


Figure 3: Awareness of Coffee Certification

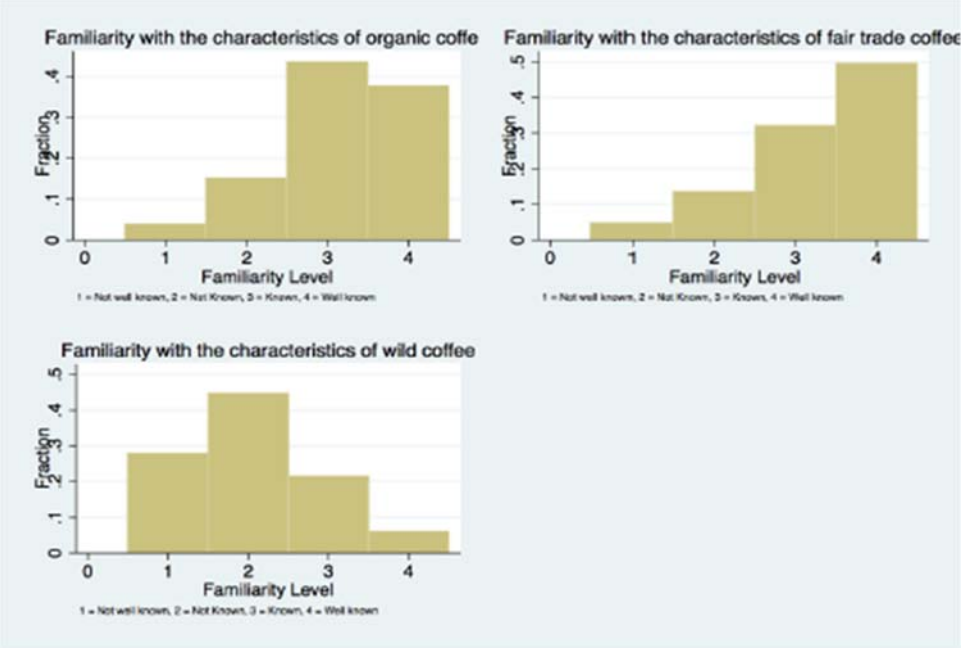


Figure 4: Preference for Certifying Agency

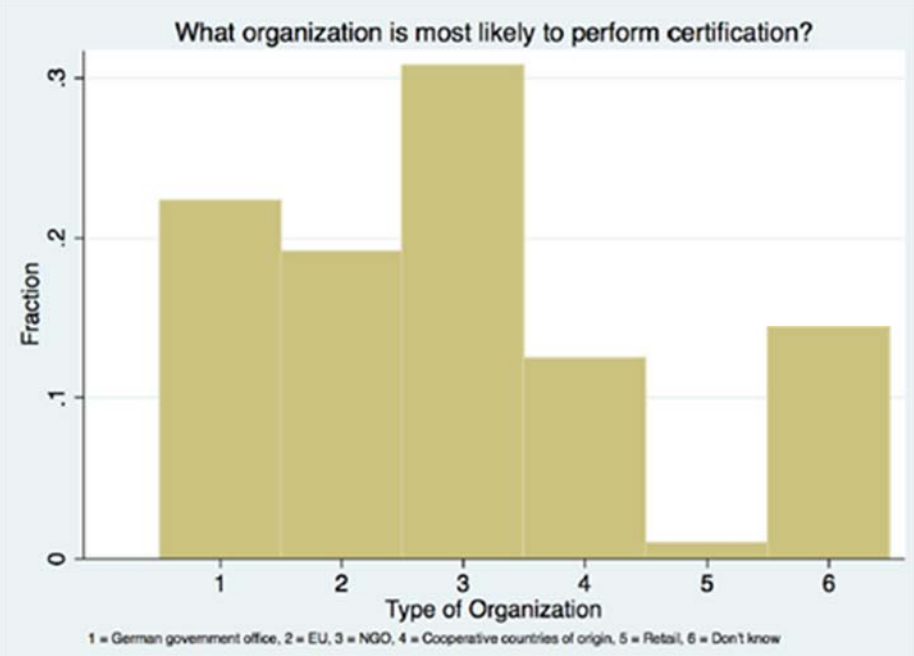
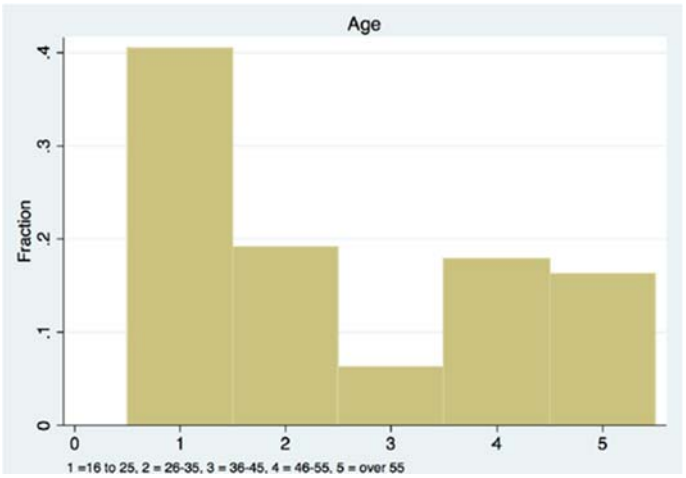
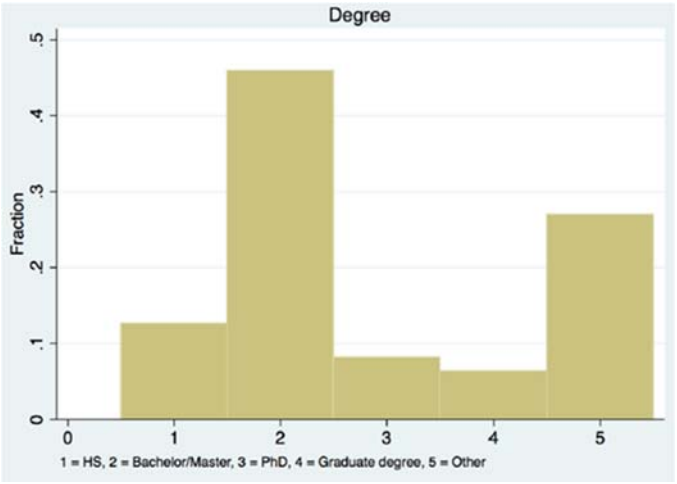


Figure 5: Demographic Profile





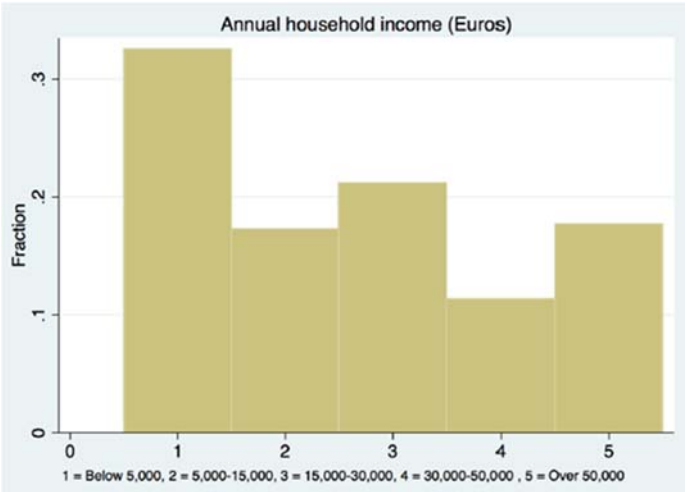


Table 2: Parameter Estimates

	Mean	Std Dev	Lower 2.5% CI	Upper 2.5% CI
β_{Price}	-0.683	0.059	-0.798	-0.569
β_{Brazil}	1.477	0.201	1.087	1.876
$\beta_{Ethiopia}$	1.456	0.211	1.045	1.867
β_{None}	1.415	0.215	0.994	1.834
β_{Bio}	2.450	0.202	2.059	2.850
β_{FT}	2.771	0.205	2.374	3.172
β_{Wild}	-0.206	1.320	-2.856	2.086
$\beta_{FT,Bio}$	-1.853	0.278	-2.405	-1.314
$\beta_{FT,Wild}$	-0.637	0.284	-1.180	-0.071
$\beta_{Bio,Wild}$	0.685	1.327	-1.649	3.327

Table 3: Willingness to Pay Estimates

	Mean	Std Dev	Lower 2.5% CI	Upper 2.5% CI
WTP FT	4.070	0.262	3.567	4.586
WTP Bio	3.601	0.306	3.010	4.209
WTP Wild	-0.306	1.957	-4.212	3.116
WTP Wild + FT	2.825	2.005	-1.121	6.483
WTP Bio + FT	4.951	0.370	4.218	5.663
WTP Bio + Wild	4.304	0.307	3.710	4.906
WTP Bio + Wild + FT	4.715	0.312	4.124	5.340

Figure 6: WTP for Various Single Labels

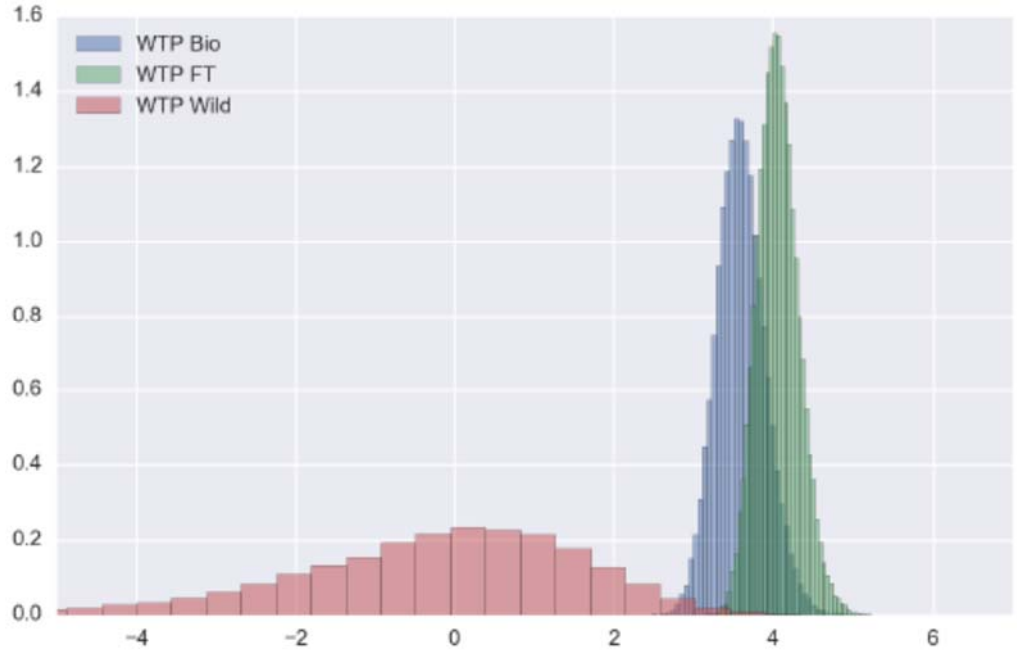
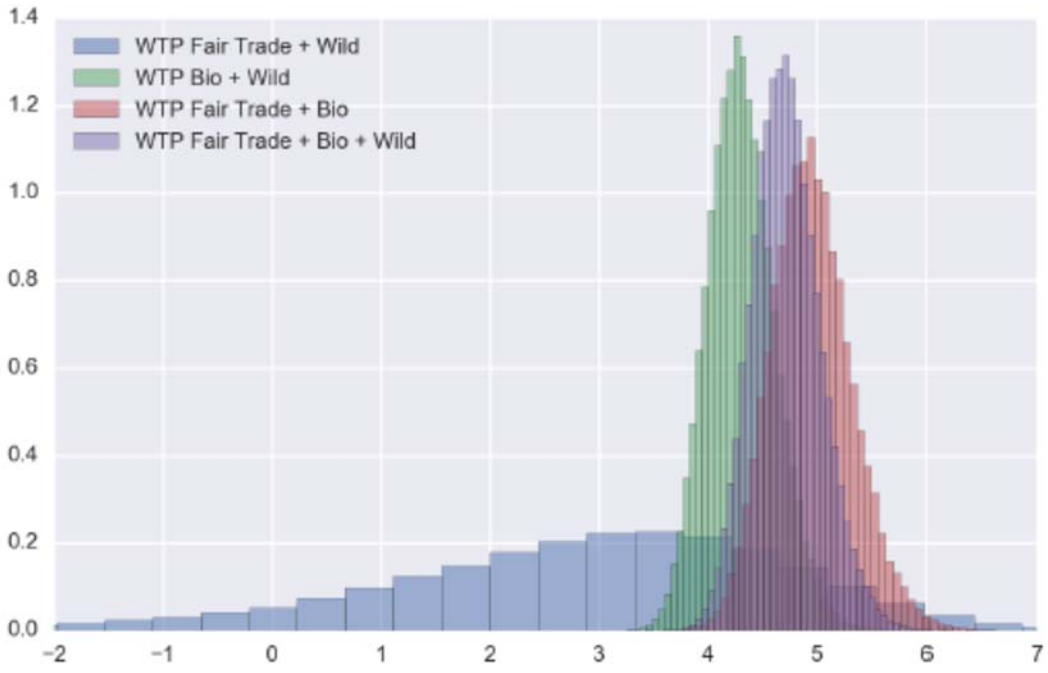


Figure 7: WTP for Single and Double Labels



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