

# Fair Trade and Free Entry: Can a Disequilibrium Market Serve as a Development Tool?

## Online Appendix September 2014

### 1. Data Construction

The data consist of the Association's records on all coffee acquisitions and sales for the period 1997 to 2009. Each year the Association procures coffee from about 100 cooperatives. Over the 13-year period, the Association purchased coffee from 300 cooperatives. Suppliers deliver unhusked (parchment) coffee in small batches from September to the following May. The median supplier sells 94,000 pounds of coffee per year, the average is 280,000 pounds, in up to 10 separate deliveries. The Association then processes and stocks the coffee, and sells green (unroasted) coffee beans to international buyers in bags of 150 pounds. Annual sales have increased from less than 100,000 bags to 250,000 bags over this 13-year period (Table A1). Shipment size has not increased; it is the number of sales that has increased from less than 200 per year to more than 400. Over the whole period, we thus observe 11,602 deliveries of coffee from cooperatives to the Association and 3,764 sales from the Association to international buyers.

*Coffee quality.* Although some observable characteristics of the delivery could be informative as to coffee quality (such as its color, moisture, presence of debris, etc.) most of it is revealed after processing and tasting. Characteristics and tasting results at the delivery level are not systematically recorded. The only systematic records on quality we have are those reported on the sale contract. They consist of 13 quality labels such as Extra Prime Washed, Prime Washed, Extra Prime, Strictly Hard Bean, Hard Bean, Small Bean, etc. There is no doubt however that quality factors unobservable to us are known to the Association. We can improve the quality control through a cooperative specific fixed effect, exploiting the fact that most cooperatives have their coffee sold on both markets at some point. Our final, preferred specification uses fixed effects all the way down to the delivery level to provide the finest possible control for quality across cooperatives and across lots.

*Prices:* Each sales price is negotiated between the Association and international buyers. Sale contracts are negotiated throughout the year, but mostly from September to March, for shipments to take place several weeks and months later. Sale contracts proceed in two steps. In a first step, negotiation takes place and a contract is signed that specifies quantity, date of delivery, and the

differential to be paid relative to the NY ‘C’. The final price is “fixed” at a later date, when the NY ‘C’ price is read and applied to the contract. Price negotiations revolve around a differential to be paid over the future NY ‘C’ price for the position just after the planned shipment. The coffee futures market has 5 positions per year, in March, May, July, September, and December. For example, a sale contract settled on December 8 for a shipment of coffee the following April, will use as reference price the December 8 quotation for the May position.<sup>1</sup> Observed prices are driven by the future NY ‘C’ price plus a premium reflecting the quality of each sales lot and, when applicable, the FT social premium. We use the time series provided by the International Coffee Organization, labeled “Indicator price for other Arabica”, to define what we refer to in the rest of the paper as the NYC price without quotation marks on the C.<sup>2</sup> It is built as a monthly average of the future price for the following 2<sup>nd</sup> and 3<sup>rd</sup> positions after the contract date, which approximates the future price that serves in most contracts. Observed sales prices include the social premium, and so the empirically calculated FT premium in each year is inclusive of the social premium. Given this systematic use of the futures market in sales contracts, the date associated with every sale is the shipment date. This is what we use in the rest of the paper.

## 2. Estimation of the FT Premium: Equations for Table 1 and Table A2

The most rigorous estimation of the FT premium comes from estimating the price differential obtained when parts of a same delivery are sold on the FT and non-FT markets, with two specifications:

$$p_{dsmt} = \gamma_t FT_{dsmt} + \nu_{dmt} + \varepsilon_{dsmt} \quad (1)$$

$$p_{dsmt} = \gamma_t FT_{dsmt} + \nu_d + \mu_{mt} + \varepsilon_{dsmt} \quad (2)$$

where  $p_{dsmt}$  is the price observed for the part of the delivery  $d$  that was sold in sale  $s$  in month  $m$  of year  $t$ . Specification 1 is estimated off the split deliveries with the same shipment time (Table 1, col. 1) while specification 2 includes all split deliveries (Table A2 col. 1).

Several specifications are estimated that include quality characteristics observed on the sale contract, cooperative fixed effects, and shipment time fixed effects:

$$p_{dcsmt} = \gamma_t FT_{smt} + Z_{smt}\beta + \nu_c + \mu_{mt} + \varepsilon_{dcsmt} \quad (3)$$

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<sup>2</sup> [http://www.ico.org/coffee\\_prices.asp](http://www.ico.org/coffee_prices.asp)

where the unit of analysis is the delivery  $d$  from cooperative  $c$  included in sale  $s$  in month  $m$  of year  $t$ .  $Z_{smt}$  is the vector of indicator variables for each quality label as well as UTZ certified, as recorded at the sale level,  $\nu_c$  a cooperative fixed effect, and  $\mu_{mt}$  is a month of shipment fixed effect. Specification (3) is estimated on all delivery-sale pairs in Table 1 col. 2. In Table A2, col. 2, we restrict the sample to the deliveries that were only sold as either FT or without the FT label. This provides an estimation from a sample that is completely distinct from the sample of split deliveries. In Table A2, col. 3, instead of using individual quality categories, we use a quality index  $Z_{smt}\hat{\beta}$ , with  $\hat{\beta}$  obtained from estimating equation (3) on the sale price in non-FT contracts. The idea is to ensure that the quality control is not affected by some potential different appreciation of quality in FT contracts.

As sales prices are explicitly established with reference to the NY ‘C’ price, this suggests an alternative specification as follows:

$$(p_{dcsmt} - NYC_{mt}) = \gamma_t FT_{smt} + Z_{smt}\beta + \nu_c + \varepsilon_{dcsmt} \quad (4)$$

for the price differential calculated over the NYC price in the corresponding month. This estimation is reported in Table A2, col. 4.

We further limit the control for quality by estimating a standard hedonic price model at the sale level:

$$p_{smt} = \gamma_t FT_{smt} + Z_{smt}\beta + \mu_{mt} + \varepsilon_{smt} \quad (5)$$

$$(p_{smt} - NYC_{mt}) = \gamma_t FT_{smt} + Z_{smt}\beta + \varepsilon_{smt} \quad (6)$$

where  $p_{smt}$  is the price observed for sale  $s$  in month  $m$  of year  $t$ . Estimation of (5) is reported in Table 1, col. 3, and without any control for quality in col. 4. Estimation of (6) is reported in Table A2, col 5.

### 3. Excess Certification: Equations for Table 2

In order to show that the ratio of FT coffee sales to FT certified coffee will be less than one and move inversely to the FT premium (H1 and H2), we first establish that the FT premium moves in accordance with the rules of the system (as visually apparent in Figure 1). The FT price rule suggests the following specification:

$$p_{st} = \beta_0 + \delta NYC_t + [\beta_1 \rho_t + \beta_2 (p_{ft} - NYC_t)] 1(p_{ft} > NYC_t) FT_{st} \\ + [\beta_3 \rho_t + \beta_4 (p_{ft} - NYC_t)] 1(p_{ft} \leq NYC_t) FT_{st} + \varepsilon_{st}$$

where  $p_{st}$  is the contract price of sale  $s$  with shipment at time  $t$ ,  $NYC_t$  is the corresponding NYC price,  $\rho_t$  and  $p_{ft}$  the prevalent social premium and floor price at time  $t$ , and  $FT_{st}$  is a binary variable that indicates whether the sale was under a FT contract or not. The term in the first bracket captures the FT premium when the floor price is binding, the second bracket when the floor price is not binding. If the price of coffee sold under the FT label was set at the required minimum, we should have  $\beta_1 = \beta_2 = \beta_3 = 1, \beta_4 = 0$ , and  $\delta = 1$ . Results are reported in Column 1 of Table 2. Although tests would reject these theoretical values, the point estimates are very close to those suggested by the rule. Hence, FT prices follow this minimum rule quite closely.

The share of coffee that was sold as FT was particularly low (down to 13%) in the years where the premium was high, and then as the premium fell over the past five years of our data the share of coffee sold as FT began to rise again, reaching 27% in 2008-09 (see Figure 2). The correlation between the nominal FT premium and the FT sales share is -0.8 in our data. This relationship is verified in the following linear probability model:

$$FT_{st} = \beta_0 + \beta_1(p_{ft} - NYC_t)1(p_{ft} > NYC_t) + \beta_2(p_{ft} - NYC_t)1(p_{ft} \leq NYC_t) + \varepsilon_{st}$$

where we expect to have  $\beta_1 < 0$  and  $\beta_2 = 0$ . Results reported in Table 2, column 2, confirm this prediction. The predicted probabilities are consistent with

#### 4. Calculating FT certification costs for an average producer coop

In order to arrive at a correct estimate of net effective premiums, we need estimates of certification costs that the producers began to bear in 2004 (prior to this we set certification costs to zero). We bring together two data sources. First, the table of FLO-Cert certification costs in place from 2004-2006, which differ for initial and ongoing applications, for producer cooperatives and associations, and are based on the number of members and processing units per cooperative. Then we take data from a census of producer cooperatives we conducted in 2008, and calculate what the costs would have been for the group of 16 producer cooperatives and 2 associations for which we had sufficient data.

Table A3a presents the table of certification costs from FLO in Euros, and Table A3b gives the average initial application cost and yearly maintenance cost for this group of organizations in US cents per pound of coffee that they produce in an average year. Certification costs increase less than linearly with cooperative size, meaning that the per-pound costs are lower for larger organizations.

We calculate that the average producer cooperative would have paid 5.7¢/lb to apply for certification in the first year and 3.09¢/lb to remain certified thereafter. The average association would have paid 2.30¢/lb to apply and 1.30¢/lb to recertify. The range of average certification costs

thus lies between 1 and 6¢/lb, and we choose a value of 3¢/lb as being representative of the ongoing costs of certification for producer cooperatives. Subtracting this amount off of the effective quality-adjusted premium gives our final annual estimate of the per-pound benefit of FT certification.

**Table A1. Share of non-organic coffee sold under FT contract and effective premium**

Shipment year	Total sales (bags of 69kg)	Fair Trade share (%)	NYC price US\$ cents/lb	FT av. price US\$ cents/lb	FT premium (US\$ cents/lb)			FT premium (% of FT price)
					FLO formula	On FT sales	Effective	
1997*	14,065	23.1	170.5	190.6	5.0	0.8	0.2	0.4
1998	64,760	27.2	141.6	161.4	6.2	14.1	3.8	8.7
1999	105,801	22.1	105.5	127.9	19.9	10.0	2.2	7.8
2000	131,805	14.3	91.2	126.7	34.5	20.5	2.9	16.2
2001	128,293	18.7	65.0	127.8	62.1	64.3	12.0	50.3
2002	153,290	12.6	60.9	129.8	65.7	60.6	7.6	46.7
2003	153,533	19.3	64.0	128.6	61.7	61.8	11.9	48.0
2004	164,237	19.7	79.4	128.5	46.8	42.8	8.4	33.3
2005	187,302	22.1	120.0	132.3	11.4	4.1	0.9	3.1
2006	200,742	26.5	112.8	129.3	12.6	9.2	2.4	7.1
2007	216,324	23.6	120.0	135.1	8.6	6.5	1.5	4.8
2008	251,489	27.3	143.4	151.0	10.4	2.0	0.6	1.3
2009*	227,010	26.7	137.4	148.3	10.0	12.9	3.4	8.7

The reference NYC price for each sale is a monthly average of the future price (other Arabica, International Coffee Organization) for the following 2nd and 3rd positions after the date on which the sale contract was signed. The reported annual NYP is the weighted average of the NYP for all shipments in the given calendar year.

The FT floor price is \$1.21/lb until June 2008, and \$1.25/lb afterwards. The social premium is 5¢/lb until June 2007 and 10¢/lb afterwards.

The FLO formula is based on the FT floor price, the NYC price, and the social premium; The premium on FT sales is estimated, controlling for observed quality characteristics (Quality categories are: Prime-Washed, Extra Prime Washed, HB, SHB, Fancy SHB, SHB-HH, SHB-EPW, GAP, Small Beans, and UTZ certified), and cooperative and shipment month fixed effects. The effective premium is obtained by multiplying the premium of FT sales by the share of the coffee sold with the FT label.

\* Sales in 1997 are only those of the 1997 harvest, which occurred in November and December. Sales in 2009, up to July 2009.

**Table A2. Estimation of the annual FT premium**

	Contract price (US cts/lb) (1)	Contract price (US cts/lb) (2)	Contract price (US cts/lb) (3)	Price differential (US cts/lb) (4)	Price differential (US cts/lb) (5)
Fair trade premium					
1997	4.73** [1.04]	14.74** [1.45]	1.88 [1.39]	8.19** [1.64]	6.35 [5.21]
1998	18.22** [1.16]	10.76** [1.54]	13.93** [0.98]	6.60** [0.68]	13.34** [2.68]
1999	10.97** [0.70]	13.58** [1.20]	9.86** [0.99]	13.58** [1.12]	12.58** [1.51]
2000	19.62** [0.86]	24.80** [3.53]	20.33** [1.27]	25.34** [1.42]	24.07** [2.80]
2001	60.88** [0.65]	64.72** [0.86]	63.87** [0.61]	58.35** [0.77]	64.47** [1.08]
2002	53.71** [2.91]	62.12** [0.59]	60.20** [0.76]	63.26** [0.71]	61.96** [1.26]
2003	57.51** [1.20]	61.52** [0.39]	61.05** [0.33]	58.20** [0.53]	60.43** [0.67]
2004	41.17** [1.98]	43.11** [1.13]	42.56** [0.91]	42.18** [0.71]	44.16** [1.38]
2005	0.79 [1.78]	3.76** [0.87]	4.11** [0.87]	9.99** [0.87]	6.05** [1.05]
2006	6.87** [0.87]	9.17** [0.56]	9.18** [0.57]	10.15** [0.58]	7.70** [0.61]
2007	8.27** [0.86]	6.06** [0.70]	6.97** [0.64]	6.75** [0.83]	7.23** [0.86]
2008	0.14 [1.13]	1.95* [0.85]	2.17** [0.65]	4.78** [0.76]	4.93** [1.18]
2009	5.55* [2.56]	13.32** [1.22]	12.44** [1.29]	4.34** [1.34]	13.60** [1.38]
Controls					
Quality	-	Y	Index	Y	Y
Shipment month FE	Y	Y	Y	N	N
Coop FE	N	Y	Y	Y	N
Delivery FE	Y	N	N	N	N
Unit of analysis	Split-deliveries		Coop delivery - sale		Sale
Observations	5758	12478	18234	18234	3764
Number of coops / deliveries FE	1,874	285	296	296	
R-squared	0.73	0.93	0.92	0.62	0.76

Robust standard errors in brackets. \* significant at 5%; \*\* significant at 1%

The reference NYC price for each sale is a monthly average of the future price (other Arabica, International Coffee Organization) for the following 2nd and 3rd positions after the date on which the sale contract was signed. The price differential (col. 4 and 5) is the difference between the contract price and the corresponding reference NYC.

Individual quality indicators are: Prime-washed, Extra Prime washed, HB, SHB, Fancy SHB, SHB-HH, SHB-EPW, GAP, and Small Beans, and UTZ certification. The quality index is based on the projecting the price differential in the non FT market on quality indicators and cooperative fixed effects.

Restricted samples: (1) deliveries sold partly as FT and partly as non-FT, (2) deliveries exclusively sold as FT or non-FT.

**Table A3a. Fair Trade Certification Fees, Euros**

FLO Cert fees in force 2004-2006.

<b>Producer Cooperatives (First-tier)</b>						<b>Associations (Second-tier)</b>					
<b>Initial Application</b>						<b>Initial Application</b>					
Base	Extra Product	Members	Initial Fee	Processing Unit		Base	Extra Product	Members	Initial Fee	Processing Unit	
500	200	50	1,400	Workers	Fee	1500	200	50	900	Worker	Fee
		100	2,000	10	200			100	1000	10	200
		250	2,200	100	400			250	1100	100	400
		500	2,400	10000	600			500	1200	10000	600
		1000	3,000					1000	1500		
		10000	3,400					100000	1700		
<b>Annual Maintenance</b>											
Base	Extra Product	Members	Initial Fee	Processing Unit							
	175	50	1,138	Worker Annual Fee							
		100	1,575	10	88						
		250	1,750	100	175						
		500	1,925	10000	350						
		1000	2,363								
		10000	2,713								

**Table A3b. Fair Trade Certification Costs for Producers, US cents/pound**

	<b>Producer Coops</b> (16 respondents)	<b>Associations</b> (2 respondents)
<b>FT Application Costs in Initial Year</b>	<b>5.70</b>	<b>2.30</b>
<b>FT Maintenance Costs in Subsequent Years</b>	<b>3.09</b>	<b>1.30</b>

Source: FLO cert fees applied to data from a January 2008 census of coffee cooperatives in Guatemala. Costs calculated using number of members, workers, and processing facilities per organization, averaged over 2005-2008. Includes cost discount for organic coops and extra charge for widely dispersed membership, excludes costs for additional products such as honey and cardamom .