Fair Trade and Free Entry:
The Dissipation of Producer Benefits in a Disequilibrium Market

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Abstract

The Fair Trade initiative attempts to channel charity from consumers to poor producers by increasing prices. Though widely heralded, this effort to create rents in an otherwise competitive market is unlikely to succeed. We analyze two ways in which the mechanism is undermined by arbitrage: over-certification and quality-invariant pricing. Using data from an association of coffee cooperatives in Central America, we verify that arbitrage on these two margins causes almost complete dissipation of producer rents. This result confirms the presumption that markets are apt to exercise pressure on any system attempting to extend charity via a price distortion.

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1. INTRODUCTION

The Fair Trade (FT) initiative seeks to link up two powerful forces: the desire for charitable giving and international commodity markets. This is a potentially important undertaking given the fact that 75% of US private donations to international causes originate from individuals (reaching $30 billion in 2009, equal to US foreign aid, Giving USA Foundation, 2010). It also poses an institutional challenge in defining mechanisms that can effectively transfer these sums. For coffee, this FT linkage of commodity purchase and charitable gift has become big business, with FT coffee sales of $190 million per year. The institutional innovation is the creation of a price premium within a pre-existing market, overseen by an NGO-monitored certification system. The FT system uses standard supply chains but allows buyers and sellers to elect to transact at a specified higher price. The FT consumer is provided with a hybrid product that satisfies the desire to consume the underlying good while at the same time transferring funds all the way to the poor and vulnerable producer who picked the coffee he is drinking. In this paper we examine the supply side of such a market to assess the extent of producer benefits, first by modeling the behavior of producers offered a FT premium, and second by using detailed micro-data to study the actual premiums that have prevailed in FT coffee markets.

FT certification is qualitatively different from other consumer certification mechanisms such as organic, dolphin-friendly, or fair labor standards because it explicitly seeks to enhance producer profits, whereas these other schemes seek to alter the production process used.[2] Hence higher consumer prices are intended to translate into higher producer profits, as opposed to a certification such as organic where higher consumer prices are necessary simply to cover the greater costs of producing organically. Overseen by FLO-CERT in Bonn, certifiers ensure that producers meet FT standards, and producers are then entitled to transact sales under the FT rules: prices must be above a fixed floor price and no less than 10¢/lb above the commodity market coffee price. This Coasean mechanism appears to have been effective in maintaining producer standards and enforcing the price rules in FT transactions: prices in the market transact just as the FT system specifies they should, and there is little evidence of improper certification. Despite this, the rules of the current system leave quantity and quality as open parameters and arbitrage occurs on these margins, undermining the ability to use market prices as an instrument for rent transfer.

[2] The first sentence of the legal Suggested Fair Trade Messaging reads: "Fair Trade Certified™ products directly support a better life for farmers and farm workers in the developing world through fair prices, community development, and environmental stewardship." The last sentence reads: "all farmers and farm workers benefit from premiums that allow them to invest in building their communities and bettering their lives."

We develop a simple theory illustrating that there are two mechanisms of rent dissipation. The first operates on the supply side. Because the system does not guarantee that all certified output can be sold, producers will be willing to pay to certify more output than they can sell in equilibrium. The second arises because fair trade prices are quality-invariant in that they do not adjust to the quality of coffee sold by a specific producer. As a result coffee markets will be segmented, and FT buyers paying a constant floor price will be able to obtain a higher quality in years when the traditional market price is low, meaning that a part of the apparent FT premium is in fact a quality premium. The theory thus predicts that over-certification and unrecognized quality will act as independent channels for the dissipation of producer rents.

A set of predictions from this formalization of FT are then taken to the data using institutional records from a large Central American association of coffee cooperatives, thereafter referred to as the Association. This data source provides an ideal window on FT markets for two reasons. First, it gives exact prices and dates on more than 11,000 independent sales transactions over 13 years that span the coffee crisis and the more recent commodity boom. Second, the Association is FT certified at the second-tier level, conferring certification on all its first-tier cooperative members. The Association sells only some of its coffee through FT markets each year, giving a unique intensive margin on which we can examine FT sales and prices received. Our estimate of the effective FT premium can then take advantage of those cooperatives whose production is sold on both markets, and even of specific delivery lots that are split and sold on the FT and traditional markets at the same time.

We first confirm that the share of coffee sold through the FT system falls when the price premium increases, an observational correlation that might otherwise be difficult to explain. This occurs in a manner that perfectly counteracts swings in the FT premium, leaving producer benefits low even when the price floor binds. Empirical tests also confirm the core predictions about the correlation between FT premium and quality: FT occupies the middle of the coffee quality distribution and FT quality increases when the FT premium is higher. We then proceed to a rigorous estimation of the net effective premiums actually received by coffee cooperatives over the past 13 years. We find that even during the peak of the coffee crisis when the nominal FT premium was 60¢/lb, producer cooperatives never received more than 10¢/lb in effective premiums. Applying our estimated FT premium to the observed prices, we find that the average monetary benefit of the FT option over the period of our data amounted to $3-$11 per year for the median Guatemalan coffee grower, representing 1.5 to 5% of coffee-related income. The average effective

premium over the past 5 years has been negative, consistent with a put-option interpretation of the contract.

These lackluster results on the value of the FT contract for producers raise two issues that we discuss in the conclusion of the paper: Why does FT persist in spite of lack of delivery as rents to producers of the premium paid by ethical consumers? Then, are there alternative mechanisms to FT that could transfer rents while relying on market forces?

In what follows, we provide in section 2 a model that predicts that market entry and quality arbitrage push producer benefits towards zero despite the fact that all contracts satisfy the explicit terms of FT. In section 3 we explain the empirical specification in estimating FT premiums and the structure of the data. In section 4, we give empirical evidence on the two rent dissipation mechanisms: over-certification and unrewarded quality. In section 5, we report several measurements of the FT premium using strict identification of counterfactual transactions. We use these results in section 6 to calculate the welfare effects derived from FT per pound sold and per participating household. Finally, in section 7 we summarize the results and discuss aspects of FT such as continued existence, potential use of markets to transfer rents, and alternative options.

2. A Conceptual Description of the Fair Trade Market

The academic economics literature on FT is nascent despite the tremendous attention the movement has received in the popular press. Experiments on 'ethical demand' have shown that there exists significant willingness to pay for charity-linked products (Elfenbein and McManus, 2010), motivated not only by the desire to transfer rent but also by an intrinsic utility from consuming these products (Poret and Chambolle, 2007). Consistent with this, FT coffee consumers have been shown to be less price sensitive than non-FT consumers (Arnot et al., 2006; Basu and Hicks, 2008). The effect of FT on rent transfers has been debated with little consensus, with some arguing that they can be substantial (Smith, 2009) and others that they are limited (Berndt, 2007; Henderson, 2008; Sidwell, 2008), and that the FT mechanism rewards low quality coffee (Henderson, 2008). On the broader effect on the welfare of beneficiaries, several studies report positive results (Becchetti and Constantino (2008) for Kenya, Utting-Chamorro (2005) for Nicaragua, and Arnould, Plastina, and Ball (2009) for Peru, Nicaragua, and Guatemala), but these studies are either descriptive or lack control over endogeneity biases.

In what follows we lay out a simple theory of how FT supply chains should respond to the incentives created by the system. We first present a simple model with homogeneous quality to

generate the over-certification predictions, and then introduce quality heterogeneity to show how the market will respond to the quality-invariance of the FT floor price. We then take a set of six predictions from the model to micro-data that permit us to observe coffee from the same producer selling on the FT and the non-FT market at the same time.

2.1. Arbitrage through over-certification

The current FT mechanism permits certified producers to sell coffee at a price that features both a floor and a premium above the market. The floor price varies by regions of the world, and was set for Central America at $1.21/lb until June 2008, when it was raised to $1.25/lb. The 'social premium' is a separate and additional payment for social investment by the producer group, which was originally set at 5¢/lb until June 2007 when it was raised to 10¢/lb. This nominal social premium is paid to the cooperative and is intended for social investment. The price-setting rule for FT coffee is then that producers should be paid no less than the floor price or the market price, whichever is higher, where the reference market is the New York Coffee Exchange 'C' contract (NY 'C' thereafter), plus the FT social premium.

This creation of a producer rent in partial equilibrium is relatively simple; as long as an intermediary can credibly commit to transfer a price premium, the delivery mechanism is already in place. A demand channel providing a rent to producers will, however, trigger competition to sell through that intermediary, putting pressure on producer rents in general equilibrium. If the intermediary seeks to control entry it becomes in effect a cartel, and so is subject to the familiar forces that undermined the International Coffee Organization, a US-backed cartel of Latin American producers that collapsed in 1989 (Bates, 1998). A profit-maximizing intermediary could instead auction off access to the rent, causing all benefits to pass to the party controlling entry. In contrast, the current FT system opens access at a fixed cost to a large supply of eligible producers, does not commit to buy all certified output, and quotes an absolute premium and floor price. In this section we present a formalization of the features of the current FT system that expose it to rent arbitrage.

Our data shed little light on the demand side of FT markets, and so we assume the simplest possible demand structure so as to permit a straightforward exploration of supply-side effects. We think of FT coffee as being additively composed of two underlying goods: the coffee itself and the 'new' ethical product offered by FT. Traditional and FT coffee are perfect substitutes in terms of the physical product, and the existence of FT does not alter the overall demand for coffee. On the

supply side, we also assume that the existence of FT does not produce an aggregate effect. This seems to be an acceptable assumption given that there is a very large oversupply of coffee that could be and is FT certified, and the FT market is in effect still a small share of the aggregate market. Under these assumptions, the existence of the FT market does not affect the price of traditional coffee because FT sales simply 'cancel out': supply and demand will meet in one market or the other and so shift off the traditional market in an exactly counterbalancing way when a FT sale occurs.[3] The aggregate market supply $\bar{Q}$ is determined by a set of exogenous shocks (such as weather in Brazil) driving the price p_t on the traditional market. The FT price p_f is set by an NGO certifier at a level above the traditional market price, and the combination of $\bar{Q}$ and p_f nails down the nominal premium $p_f - p_t$ that producers face.

We start modeling supply-side decisions in the case where all coffee is of the same quality. The core decision-maker on the supply side is the producer cooperative, which decides at the beginning of the season whether to certify all its coffee for the coming harvest or none of it. Only cooperatives can become certified as FT, and for the large number of producer cooperatives that already satisfy the governance and production standards of FT the decision problem is a simple one: deciding which market gives them higher expected prices inclusive of certification costs. The economic benefits delivered to producers under FT are composed of two parts. The first is the floor price, which we denote by $\underline{p}_f$. The second is a social premium added on to the price of coffee, which we write as ρ. This defines a minimum price, $p_f = \max\left(\underline{p}_f, p_t\right) + \rho$, where p_t is the NY 'C' price.

Consider a representative producer that generates a fixed quantity of output *q,* incurring a variable cost κ in production, and let c be the FT certification cost.[4] Profits are $\left(p_t - \kappa\right)q$ if the producer sells on the traditional market and $\left(p_f - \kappa\right)q - c$ on the FT market.

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[3] As opposed to a standard model of differentiated products that could induce a 'love of variety' and increase the aggregate demand for coffee, or a model of supply response that would suggest an aggregate increase in supply, we view our assumption of no cross-market price effects as an agnostic stand between these two potential effects.

[4] Only cooperative producers can be FT certified. The coop is certified as a productive unit and particular members or specific land plots cannot be independently certified. Initial certification has a base cost of €500, a cost based on the number of cooperative members ranging from €1400 (50 members) to €3400 (10,000 or more members), and cooperatives operating processing facilities pay an additional certification cost of €200-600 depending on the number of workers. Re-certification costs an annual amount varying between €1,138 and 2,713 based on membership and €88 and 350 based on the number of processing workers. These costs, calculated for a representative sample we collected on 16

Because the FT system does not guarantee that all certified output can be sold, it creates a simple mechanism for rent dissipation: over-certification. Estimates of the degree of over-certification vary, but only somewhere between 1/2 and 1/7th of the certified output actually sells on the FT market.[5] This arises because the current system is demand-constrained, meaning that the supply of certifiable output exceeds demand. This says that while producers must pay certification costs on all of their output, they receive the FT rents only on a share of that output.

We assume that each certified producer succeeds in selling the same share s of output through the FT channel. A certified producer receives the ex-post price $sp_f + (1-s)p_t$, but the certification decision must be taken prior to the realization of prices. The equilibrium FT sales share s^* is then given by the arbitrage condition:

$$s^* = \frac{c/q}{E\left(\max\left\{p_t, \underline{p}_f\right\} + \rho - p_t\right)}.$$

Even if a nascent FT market begins with a sales share close to one, new producers will pile into the system as long as expected benefits exist. Expected producer profits are zero at this equilibrium despite the presence of per-unit rents at the margin, and increases in the expected FT premium are met with an increase in over-certification. The equilibrium certified sales share will move inversely to the expected nominal premium, a prediction we verify in Section 4.1.

Producer expectations over the nominal FT premium are complicated by the presence of the floor price, which provides an unusual kind of put contract.[6] Both the price of the put (the cost of certification) and the benefit of exercising the put (the nominal FT premium) are fixed by the rules of the system. The margin on which arbitrage occurs is the probability that the put can be exercised. Ex-post to the realization of prices the benefits from certification are:

Guatemalan cooperatives, suggest that the average coop would pay 6 US¢/lb for the initial year of certification and 3.1¢/lb per year thereafter.

[5] See Muradian and Pelupessy (2005) and Berndt (2007). It is conceptually possible that the FT producer criteria could be set so tightly that the system becomes demand-constrained, at which point FT has become cartelized, and while over-certification will no longer be the relevant problem, maintaining the cartel becomes critical. We return in the conclusion to a discussion of the long-term viability of maintaining a cartelized, demand-constrained FT system.

[6] While renewal of certification is done every year, re-certification of a lapsed producer is substantially more expensive than maintaining ongoing certification. This, plus narrative reports that producers fear losing relationships with FT buyers if they fall out of the mechanism, appears to represent a rigidity in the speed at which FT supply can adjust to price changes across years as well as the predetermination of certification within a season.

$$\begin{cases} s^*\left(\underline{p}_f + \rho - p_t\right) - c/q & \text{if } p_t \le \underline{p}_f \\ s^*\rho - c/q & \text{if } p_t > \underline{p}_f \end{cases},$$

and s^* is given by the point at which expectations over the ex-post benefit is zero. Since the realized benefits to FT are positive for a sufficiently low p_t, the benefits to the system when the put is not exercised, $s^*\rho - c/q$, must be negative. Given the put dimension of the contract, expected returns may be depressed for two additional reasons. First, the contract provides additional option value (Black and Scholes, 1973; Bondarenko, 2009). Second, coffee producers may face missing markets such as credit (Stiglitz and Weiss, 1981) and futures (Marcus and Modest, 1984) and hence face unhedged price risk. In this case the put will provide direct utility through transferring income from good states to bad. The intrinsic cost of the put, as well as the option and insurance values will conspire to cause FT rents to be *negative* in equilibrium when the FT floor does not bind.[7] These losses represent the premiums *paid* by producers in order to gain access to the price insurance created by the FT floor.

The analysis of the certified sales share motivates the following predictions:

P1a. The ratio of FT coffee sales to FT certified coffee will be less than one.

P1b. This ratio will move inversely to the FT premium.

P1c. The actual net benefit to participation in the FT system will be negative in years in which the floor price turns out not to bind.

2.2. Arbitrage through unrewarded quality

We now bring quality heterogeneity into the model, recognizing that a dominant feature of coffee markets is the steep price gradient over quality. Typically price contracts are quoted as a differential from the NY 'C' price, meaning that there is an aggregate international price for a benchmark quality set by aggregate supply and demand, and the deviation from this benchmark price is the quality premium. To capture this feature of the market as simply as possible, we consider the NY 'C' price to refer to a quality draw of zero which receives a price of p_0, so the price of a coffee of quality β_i is $p_i = p_0 + \beta_i$. This naturally places discussion of quality premiums in the same space as the FT premium and makes it straightforward to consider how variation in the NY 'C'

[7] Assuming traditional prices are autocorrelated, when the NY 'C' is high certification will be driven primarily by the social premium, when the NY 'C' is low certification will be driven primarily by the floor, and the option value will be particularly important in driving certification when the NY 'C' is close to the FT floor.

price will alter the quality of coffee that moves through the FT system. Referring to $p_f - p_0$ as the *nominal* FT premium over the NY 'C' price, the *effective* FT premium for a coffee of quality β_i sold on the FT market at price p_f is $p_f - p_0 - \beta_i$. Producers know their quality at the time they must take certification decisions, but they do not know the NY 'C' price that will prevail at harvest time, and consequently do not know the FT premium. We have shown so far that the rules of the system will generate over-certification.

In this quality-heterogeneous world, we can now relax the assumption that every certified producer sells the same share through FT, and proceed to describe how quality will determine the actual coffee that moves through the FT mechanism once prices are revealed. The asymmetry between quality recognition in the traditional and FT markets will lead to three phenomena: segmentation of markets, dissipation of rents, and an inverse relationship between the quality of FT coffee and the NY 'C'. Each of these three effects is now examined in more detail.

Markets will be segmented as long as producers seek the highest price and buyers the best quality at any given price. Consider the sales decisions once prices have been revealed of producers who have sunk the cost of certification. If the quality premium that their coffee commands on the traditional market is greater than the revealed FT premium, or $\beta_i > p_f - p_0 \equiv \beta_f^{\max}$, they choose not to sell on the FT market and sell on the gourmet market instead. FT buyers will start purchasing coffee from the producer with quality $\beta_i = \beta_f^{\max}$, and go down the quality distribution from there to the minimum FT quality threshold $\beta_f^{\min}$, which would be the solution to the problem $\int_{\beta_f^{\min}}^{\beta_f^{\max}} q\phi(\beta)d\beta = Q_f^D$, where ϕ is the PDF of quality. Producers with quality below $\beta_f^{\min}$, though certified, will be unable to find FT buyers, and hence they sell on the low-quality commodity market. The market is therefore divided into three segments by the FT rule: commodity, FT, and gourmet.

Critically, quality heterogeneity provides an independent channel for the dissipation of rents. To see this, take a year in which the realized NY 'C' price is very low and so the FT put is strongly 'in the money'. With quality heterogeneity, the producer at $\beta_i = \beta_f^{\max}$ is able to sell 100% of output through FT but receives exactly zero effective premium from doing so, since the traditional market price in that state is the same for that producer. As the FT buyers include lower quality coffee to satisfy all FT demand producers do gain some incremental benefit, but as long as the overall FT

market is small then even the producer with the maximum benefit $p_f - \left(p_0 + \beta_f^{\min}\right) - c/q$ may receive very little, and possibly even a negative FT benefit inclusive of certification costs.

Finally, the quality-invariant FT price implies that a fall in the NY 'C' price below the floor translates directly into an improvement in the quality of coffee moving through the FT channel. $\beta_f^{\min}$ and $\beta_f^{\max}$ are both increasing in the nominal FT premium, and so move up through the quality distribution as the market falls underneath the floor. Figure 1 illustrates this point, showing the PDF of coffee quality centered on the reference quality $\beta = 0$. The lower horizontal axis refers to the nominal premium. Consider two different market prices, a high price p_{0h} where the floor does not bind and a low price p_{0l} where it does. When the floor price does not bind, $p_f - p_0 = \rho$ and the highest quality sold under FT, $\beta_{fh}^{\max}$, is exactly equal to the social premium, regardless of the NY 'C' price level. When the floor price binds, the highest quality sold under FT is equal to the nominal premium $\beta_{fl}^{\max} = p_f - p_{0l}$, greater than the social premium. Hence, the higher the premium, the higher the quality band within which FT sales will take place. This figure illustrates two further points that will be true of any distribution whose PDF is monotonically decreasing above the point at which the floor binds. The variance of the quality of coffee in the FT channel will increase with the nominal premium, and as a result the average effective premium (measured relative to the traditional market) on FT sales will also rise with the nominal FT premium. Hence the surprising result that the only reason that the effective premium rises with the nominal premium is that the right tail of the density of quality is non-increasing.

The core predictions emerging from the quality-dependent theory then are:

P2a. FT Coffee will occupy the middle of the quality distribution, between high-end gourmet coffee and low-end commodity coffee.

P2b. The average quality of the coffee sold through the FT channel and its variance should move inversely with the traditional coffee price when the floor binds.

Finally, on the overall benefits of participation in the system we have:

P3. Over-certification and unrecognized quality will conspire to push the net benefits of FT participation to zero.

How would incorporation of the ex-post quality game alter the ex-ante certification decision in a world of heterogeneous quality? As seen above, the range of coffee quality that will sell on the

FT market in any particular year varies with the NY 'C' price. In the illustrative example of Figure 1, let the high and low NY 'C' prices be the highest and lowest expected prices. Producers with coffee quality below $\underline{\beta}_{fh}^{\min}$ will never choose to certify because there is no NY 'C' price at which their coffee will be purchased by FT buyers. At the other end of the quality spectrum, producers with quality above $\underline{\beta}_{fl}^{\max}$ will always prefer the gourmet market, and hence not certify. Producers in the quality band between $\underline{\beta}_{fh}^{\min}$ and $\underline{\beta}_{fl}^{\max}$ will be able to sell their output through the FT mechanism some years and not others, depending on the realization of the NY 'C' price. The expected value of FT membership now resembles the expected share discussed in the previous section with the addition of a quality-specific and probabilistic sales share. One would expect qualities in the middle of this range to have a higher probability to sell on the FT market. These middle-quality producers are provided with an unusual financial product: a put option that can be exercised only when the price is in a narrow band below the strike price, meaning when the use of the put brings little benefit. Higher-quality producers get a put option that they would only choose to exercise at a market price considerably worse than the nominal strike price of the contract.[8]

3. Specification and Data

3.1. Empirical Specification

The preceding analysis suggests that establishing the effective FT premium empirically is not a straightforward task. The only straightforward way to infer quality is through prices on the traditional market, but the estimation of correct real premiums requires that we control for quality while examining prices. The question therefore presents a logical loop that is difficult to resolve without specialized data. There is a close analogy here to the problem of causal inference in an impact analysis of a program with endogenous selection: if we think of FT as a 'treatment' whose impact on prices we wish to establish, we do not in general observe the same lot of coffee in both

[8] Having discussed the intersection between quality and FT on the supply side it is important to point out the importance of the demand side of this relationship (although our data will shed little light on this). We have assumed that the underlying demand for FT is orthogonal to the demand for quality, while in reality the types of consumers who demand quality may also have a higher willingness to pay for FT. Intriguingly, this raises the possibility that while the overall FT market is oversupplied, there may be specific quality segments in which the FT system (given current certification rules) would be supply-constrained. Some tantalizing evidence of this is given by the fact that the association studied in our empirical section never sold a bag of organic coffee other than through FT, suggesting that a price premium and a lack of oversupply have persisted in that market since the introduction of FT organic in 2003 (these two features are synonymous in our setup). While such supply-constrained niches may also exist within the non-organic FT system, the current mechanism provides no explicit way to market to this segment (other than organic FT) and hence such consumers are left to choose between quality and FT.

markets at the same time. The treated (FT) state gives a quality-invariant price, while the untreated (traditional) state reveals quality. Measuring the correct effective FT premium requires that we know what price each lot of FT coffee *would have received* had it been sold on the traditional market. Because quality (in the absence of a quality-dependent price) contains some unobservable component, and given that we have shown that the decision to certify as FT is driven precisely by a quality known to producers but not to the econometrician, any simple measure of the effective premium is likely to suffer from omitted variables bias.

A very simple approach to estimating the premium would entail the use of a hedonic price equation such as

$$p_{imt} = \beta Q_{imt} + \gamma_t FT_{imt} + \mu_{mt} + \varepsilon_{imt}, \quad (1)$$

where p_{imt} is the contract price of coffee *i* sold in month *m* of year *t*, Q its quality, *FT* an indicator variable indicating whether it was sold as FT, and μ_{mt} is a month of shipment fixed effect. The identification problem comes from the fact that there is no independent indicator for quality, and if we use an imperfect Q_{imt} then FT may be correlated with the unobservable part of quality.

Fortunately, the structure of the Association provides a unique opportunity to gain empirical traction on this problem. Because the Association sells only a fraction of its total output as FT (despite the potential to sell it all) we observe an intensive margin over which to compare prices between FT and non-FT coffee in a relatively homogenous context. Furthermore, the complexity of the internal supply chain in the Association means that within a single year a given cooperative's production may be split into different sales lots that are then sold through different channels. Finally, there are cases in which even a specific delivery of coffee from a cooperative is split and sold on both the FT and the traditional markets. While these transactions represent a subset of all the transactions, they give us the best possible counterfactual because the exact same coffee is sold on the traditional and the FT markets at the same time. Therefore regressions done over different units of observation for coffee *i* (sale, delivery by a cooperative, or even part of a delivery) that include observable quality characteristics and fixed effects at the cooperative or delivery level create a transparent quality counterfactual, allowing us to measure the true quality-adjusted sales premium received on the FT market.

3.2. Data

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 12-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 10 to 12 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 12-year period. 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 15,340 deliveries of coffee from cooperatives to the Association and 3,556 sales from the Association to international buyers.

Coffee quality. Although some observable characteristics of the delivery could inform on 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 in 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 will take them into account through a cooperative specific fixed effect, exploiting the fact that most cooperatives have their coffee sold on both markets at some point.

Prices. On the purchase side, coffee is paid to the cooperatives strictly according to the NY 'C' price at the time of the contract, and the overall net benefits made by the Association (from FT or quality premium) are distributed across cooperatives proportionately to their deliveries. This price is therefore not informative of quality. On the sale side however, each price is negotiated between the Association and the international buyers. Quality coffee is a highly differentiated product, and buyers have specific preferences. Sale contracts are negotiated throughout the year, but mostly from September to March, for deliveries to take place several weeks and months later. Price negotiations revolve around a differential to be paid over the future NY 'C' price for the position just after the planned delivery. 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 delivery of coffee the following April, will use as reference price the December 8 quotation for the

May position.[9] Contracts report both the future NY 'C' price and the differential, with a mention that the differential accounts for quality and, when applicable, the FT social and organic premiums. This information on the NY 'C' future price and the differential are however not separately reported in the database; only the resulting final price is. We thus use the time series provided by the International Coffee Organization, labeled "Indicator price for other Arabica", which we refer to in the rest of the paper as the NYC price without quotation marks on the C.[10] It is built as a monthly average of the future price for the following 2nd and 3rd positions, which approximates the future price that serves in most contracts.

Figure 2 shows the evolution of the traditional and FT market prices for conventional and organic coffee for the 13 years of our analysis. The FT floor price has been binding for most of the 20 years since FT was established, except for periods around 1994 (frost damage in Brazil), 1997-99 (droughts in Brazil), and from 2006 to the present (world food crisis/commodity boom). Particularly during the coffee crisis of 1999-2003, FT was successful in delivering large nominal premiums to producers, in some cases exceeding 60¢/lb. Thanks to effectiveness of the audits conducted by the 19 world labeling initiatives (such as TransFair for the USA), there appear to be virtually no documented cases of corrupt sales in which FT contracts were transacted below the minimum price, meaning that the mechanisms in place to monitor prices seem to be effective.

The average non-FT coffee price received by the Association is very close to the NYC price in all years. The average FT price calculated from the Association data tracks the FT minimum price perfectly during periods in which the NYC price falls beneath the floor. During periods when the NYC price rises above the floor, the average FT price tracks the NYC price quite closely, with some small surplus visible in average prices. Again, it is important to note that all of the FT prices used in this analysis *include* the social premium. The FT organic coffee, on the other hand, while only sold by the Association from 2004 onwards, trades at a large premium compared to all other kinds of coffee.

Unit of observation. Cooperatives provide deliveries of coffee that the Association splits and reassembles to compose sales lots for foreign buyers. There are many deliveries feeding into any one sale, but deliveries are also frequently split across different sales. Prices are defined at the sale level, while quality is partially recorded at the sale level, but also includes unobservables that can only be captured by cooperative fixed effects. Our analysis will thus exploit these various levels of

[9] 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.

[10] http://www.ico.org/coffee_prices.asp

observation. First, sales are characterized by their price, date (month and year), and observable characteristics of coffee quality. Second, in order to build on the knowledge of the cooperative of origin of the different deliveries, most of the analysis will be done at the delivery-sale pair level, with the price defined by the sale but quality characterized by the attributes of the deliveries plus a cooperative fixed effect.

4. EVIDENCE ON RENT DISSIPATION MECHANISMS

Our empirical analysis proceeds in three steps. Sections 4.1 and 4.2 provide evidence that the over-certification and quality arbitrage mechanisms are indeed at play in our data, and Section 5 estimates the effective FT premium.

4.1. The problem of over-certification

This section provides evidence on predictions P1a-P1b from Section 2.1. We start by calculating the share of all sales that move through the FT market within the Association. To date the literature has provided no systematic evidence on the total number of producers or coffee production that are FT certified. We were able to find three estimates of the share of certified coffee that was actually successfully sold on the FT market during the high-premium era: 13.6% in 2001 (Muradian and Pelupessy, 2005), around 50% in 2003 (Levi and Linton, 2003), and 23% in 2006 (Berndt 2007).[11] However, given that its coffee is all certified, the share of the Association's output sold on the FT market allows us to measure this quantity very exactly. Clearly, were it facing unconstrained demand and an effective premium, the Association would sell no coffee on the traditional market. This is what happens on the organic market. Less than 5% of the Association's coffee was organic, and it was all sold under the FT label. On the non-organic market, the share of coffee sold as FT averages around 20% and never exceeds 30%, confirming P1a.

As seen in Table 1 and in Figure 3, 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. The correlation between the nominal FT premium and the FT sales share is -0.8 in our data. The specific sales shares are consistent with our theoretical prediction P1b: when the floor price is

[11] All are from sources citing FLO's unpublished data: Muradian and Pelupessy (2005), Raynolds (2002), and Calo and Wise (2005).

irrelevant the share of certified coffee sold on the FT market should equal 30%, the per-unit cost of certification (3¢/lb, as established further down) divided by the social premium (10¢/lb).

The relationship between the FT premium and the share of coffee sold as FT is difficult to square with any decision that would be taken by the producer, and seems consistent only with a story in which supply piles into the market when the premium is high, driving down the share that certified producers are able to sell through the FT channel. Although estimates of the global FT sales share do not agree exactly with the values from our data, it does appear that the Association provides a reasonable microcosm of the overall market in terms of the share sold through the FT market. The Association, uniquely certified to sell whatever it can as FT, saw its ability to move coffee through the FT channel most constrained by oversupply on the global market in years of high premium.

4.2. The price-quality relationship in FT sales

We now test theoretical predictions P2a and P2b on the comovement of prices and quality from Section 2.2. To measure quality, we begin from the fact that quality at the time of purchase from growers may not be obvious, and so the only clear metric for the true quality of a lot of coffee is the final price that it receives on the market. While we observe in the data string variables giving coarse quality metrics for each sale, the Association and the buyers observe more quality information than this (for example, micro-roasting and cupping by tasters at the Association), but these impressions are not systematically recorded. We therefore take the non-FT price to be the sole means to accurately gauge quality. This motivates the attempt to form counterfactuals for the FT price by comparison to equivalent coffee sold on the traditional market, where 'equivalent' means that it comes from the same cooperative and has the same label descriptions. By matching each delivery to the corresponding sale, we can attribute a sale price to each delivery, and thus perform the analysis at the delivery level. We regress the differential between the sale price and the NYC price on the observed quality characteristics, including a cooperative fixed effect:

$$\left(p_{dcsmt} - NYC_{mt}\right) = Z_{smt}\beta + \nu_c + \varepsilon_{dcsmt} \ , \qquad (2)$$

where p_{dcsmt} is the sale price of delivery *d* from cooperative *c* contributing to sale *s* in month *m of* year *t*, Z the vector of indicator variables for each quality label as well as UTZ certified, and ν_c

cooperative fixed effects.[12] The model is estimated on coffee sold on the traditional market only to ensure that the quality measure is not affected by some potentially different appreciation of quality in FT contracts. Because there is no organic coffee sold as non-FT, this does not provide a quality scale for organic coffee. We then define the quality index of any delivery *d* from cooperative *c* in sale *s* as $\hat{Q}_{dcs} = Z_s\hat{\beta} + \hat{v}_c$, applying the estimated parameters to non FT and FT sales alike to provide a consistent metric of quality as if all coffee had sold on the same undistorted market.

Quality is measured in US ¢/lb, and can be interpreted as the differential that, on average, this coffee quality (identified by the type recognized on the sale contract and the cooperative of origin) would fetch above or below the NYC price (that is, it measures β_i). Estimating equation (2) on observed quality types alone, cooperative fixed effects alone, or both, indicates the relative importance of these quality factors in explaining price differentials. Results show that the quality types recorded on sales contracts can explain 24% of the variance in prices, the cooperative fixed effects alone can explain 28%, and together 37%. This suggests the existence of some (but not perfect) correlation between the cooperative quality and the quality types, as confirmed by a correlation of 0.46 between the quality indices based solely on quality types and solely on cooperative fixed effects. The densities of quality reported in Figure 4 show pounds of coffee sold under FT to be more homogenous than coffee sold without the FT label. FT contracts include neither the highest quality coffee, nor the lowest quality that would otherwise garner a price below the NYC. Overall, the range of quality differentials is relatively small, with a width of about 10¢/lb across the different coffees sold as FT. Among coffee qualities not sold as FT, around 5% of the volume is of very high quality, 20% of quality below the NYC standard, and the rest exhibits very homogeneous qualities within a 10¢/lb range.

For quality to serve as an independent rent dissipation mechanism as predicted in Section 2.2, we should see the quality of coffee in the FT channel be inversely related to the NYC price, but only when the floor binds. These relationships are estimated by regressing the quality index of each delivery-sale pair on the NYC price in the following specification:

$$\begin{aligned} \hat{Q}_{dsmt} &= \alpha^q FT_{smt} + \beta^q NYC_{mt} + \gamma^q FT_{smt} * NYC_{mt} + \mu_t^q + \varepsilon_{dsmt} \\ \hat{\varepsilon}^2_{dsmt} &= \alpha^{sd} FT_{smt} + \beta^{sd} NYC_{mt} + \gamma^{sd} FT_{smt} * NYC_{mt} + \mu_t^{sd} + \zeta_{dsmt} \end{aligned} \quad . \tag{3}$$

[12] UTZ Kapeh is an alternative certification based primarily on the quality of ecological stewardship of the land.

where $\hat{Q}_{dsmt}$ is the predicted quality of delivery *d* contributing to sale *s* in month *m* of year *t*, *FT* an indicator variable indicating whether it was sold as FT, and μ_t^q and μ_t^{sd} are year fixed effects. Results are reported in Table 2, panels A and B for the conditional mean and variance equations, respectively. The mean equation is estimated with weighted least squares, to correct for heteroskedasticity as modeled in the conditional variance equation. The variance equation is estimated with OLS, with robust standard errors. In column (3), we also estimate a model with multiplicative heteroskedasticity, i.e., with the second equation written for $\ln\left(\hat{\varepsilon}_{dsmt}^2\right)$ rather than $\hat{\varepsilon}_{dsmt}^2$, using the maximum likelihood estimator with robust standard error for the system.[13]

Columns 1-3 are estimated only on the observations for which the FT floor price was binding, meaning when the NYC price was below the FT floor price.[14] Results reported in Table 2, columns (1) and (2), show as expected that the γ parameters, which account for the sensitivity of the FT coffee quality mean and variance to the NYC price, are negative. In column (1) there are no time fixed effects, μ_t. In column (2) we control for the crop year to account for possible variation in quality or changes in the demand for FT coffee across years not otherwise accounted for in the analysis. The direct effect of the NYC price changes sign depending on whether one controls or not for the crop year. This is simply the result of the year effect taking up much of the variation in price. The critical results, however, are that both the direct effect of the FT variable and its interaction with the NYC price are robust to these additional controls for time effects. Results show that for an average NYC price of 115-130¢/lb for example, which is around the FT floor, FT coffee quality is essentially the same as that of non-FT coffee, while at a NYC price of 50¢/lb, the FT coffee quality is 1.4-1.6¢/lb above the non-FT coffee. This seems like a small number, but appears meaningful when compared to the range of quality observed in Figure 4.[15] In contrast, in column (4), we consider the months where the NYC was clearly above the FT price (FT floor price plus social premium) and verify that the relative quality of the coffee sold as FT is unaffected by the

[13] The concern with heteroskedasticity arises from the fact that we are estimating quality premia using data on price premia above the NYC for non-FT sales, and then regressing the discrete quality premium for each sale on variables including the NYC price. This regression may be expected to feature multiplicative heteroskedasticity.

[14] The FT minimum price is quality-invariant whether or not the floor binds, and so the market segmentation should always be observed. However, the link between the NYC price and the quality of FT exists only when the floor price binds.

[15] Note that what we are observing here is simply the relationship between one supplier (the Association) and its clients, and hence it does not necessarily reflect aggregate market movements. We would need data from a larger segment of the coffee market to verify whether this ratchet effect on quality applies to the Fair Trade market at large.

international price. The data are consistent with P2b; the quality of FT coffee moves inversely to the NYC price, but only when the floor binds.

The relationship between the variance in quality and the NYC price is easier to interpret in the log estimation (column 3). While average quality of coffee sold as FT was rising during the 1998-2000 period, its variance also rose by an estimated 63% (for 70¢/lb increase in NYC price). But, as the NYC price rose back to the FT floor price, the FT quality narrowed again.

Variation of the average FT quality with the NYC price is the outcome of a selection process. An alternative way to see this is thus to estimate the probability that a delivery of a given quality be sold with a FT label in the following specification:

$$FT_{dsmt} = \beta_0 + \beta_1 \hat{Q}_{dsmt} + \beta_2 NYC_{mt} + \beta_3 NYC_{mt} * \hat{Q}_{dsmt} + \varepsilon_{dsmt}, \quad (4)$$

where $\hat{Q}_{dsmt}$ is the quality of the delivery. Expectations are that $\beta_3 < 0$, meaning that, when the NYC price is low, a high quality coffee has a relatively higher probability of being sold to FT exporters. This is verified in Panel C of Table 2, columns (1) and (2). A decline of the NYC price of 70¢/lb increases the probability that a high quality coffee with an index of 10 be sold as FT by 3.7-4.3 percentage points relative to a coffee of quality index 0. This is a large increase considering that, in that range of quality, the share of coffee sold as FT is 35%.

All of the quality-related predictions from our theory are borne out by the data: using quality metrics derived entirely from the traditional market, FT coffee occupies the middle of the quality distribution and both the quality and variance of quality of FT coffee are higher when the premium is higher. FT buyers paying a constant minimum price were able to obtain a higher quality in years when the traditional market price was low, meaning that some of the alleged FT premium was in fact a quality premium and unrecognized quality is providing a channel for rent dissipation. While the slope of the quality-price relationship identifies the mechanism, the actual level of rent dissipation through quality is estimated in the next section.

5. ESTIMATING THE FT PREMIUM

We now move to a direct comparison of FT and non-FT prices, presenting estimates of the empirical FT premium moving through successively more robust control structures. First, we estimate a hedonic price equation, including fixed effects for the thirteen quality labels recorded in the Association data. The regression specification is:

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

where p_{smt} is the contract price of sale *s* in month *m* of year *t*, Z the vector of indicator variables for each quality label as well as UTZ certified, μ_{mt} is a month of shipment fixed effect, and *FT* is an indicator variable indicating coffee sold as FT. The γ_t parameters are thus the average annual FT premiums, holding quality premiums constant across time and within quality categories.

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

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

for the price differential calculated over the NYC price in the corresponding month.

We then use the matching of each delivery to the corresponding sale to perform the estimation at the delivery-sale pair level. Once we know the cooperative of origin for each delivery, we can substantially improve the degree of quality control through the inclusion of cooperative fixed effects. The contract price equation that can be estimated is:

$$p_{dcsmt} = Z_{smt}\beta + \gamma_t FT_{smt} + \mu_{mt} + \nu_c + \varepsilon_{dcsmt}, \quad (7)$$

where the unit of analysis is the delivery *d* from cooperative *c* included in sale *s* in month *m* of year *t*. The advantage of this approach is the possibility of adding a cooperative fixed effect ν_c that absorbs all the cooperative-specific coffee quality known to the Association or the buyers and hence potentially used in the selection of coffee for the FT contracts and in the price negotiation. A similar equation for the price differential with the NYC price is also estimated.

The most rigorous control for quality can be obtained from the coffee deliveries that are split and then partially sold under FT and partially sold without the FT label. The splitting and recombination of deliveries to compose sale batches is very common, and these split deliveries are not different from any other cooperative deliveries in terms of coffee quality, cooperative size, and average sale price fetched. We observe between 80 and 300 such deliveries each year. For each of these deliveries we have a price for the part sold under the FT contract and a price for that sold without the FT label, while in all aspects the product is completely homogeneous. This is a rare case of a perfect counterfactual for a FT price because we effectively observe the same unit in the 'treated' and 'untreated' states. The only potential substantial difference between these sales is their timing. We therefore control for the sale time by estimating the following equation:

$$p_{idsmt} = \gamma_t FT_{idsmt} + \mu_{mt} + \nu_d + \varepsilon_{idsmt} \quad (8)$$

where p_{idsmt} is the price observed for the part *i* of the delivery *d* that was sold in sale *s* in month *m* of year *t*. With a delivery fixed effect ν_d, the coefficient γ_t measures the average FT premium on these split deliveries.

Estimated annual premiums from these different models are reported in Table 3. Columns (1) and (2) report results for the contract price (equation 5) and column (3) for the price differential (equation 6). They show similar results, except for the last year where the price differential model estimates a lower premium. Estimations including cooperative fixed effects are reported in columns (4), (5), and (7). In column (5), we restrict the sample to the deliveries that were only sold as either FT or without the FT label. This provides an estimation form a sample that is completely distinct from the sample of split deliveries. In column (6), instead of using individual quality categories, we use a quality index defined by the sale price in non-FT contracts, as reported in section 4.2 above. The idea is to ensure that the quality control is not affected by some potential different appreciation of quality in FT contracts. Results on the sub-sample of split deliveries are reported in column (8). The sample is further restricted to the split deliveries sold in the same month in column (9).

The estimated FT premiums are similar across the different specifications and samples. The estimates show that the nominal premium was quite significant in the years 2001 to 2004 with low NYC price, reaching an average of 62¢/lb over a market price of 63¢/lb, but falling to 6¢/lb over a market price of 126¢/lb in 2006-2008. These estimated FT premiums are 5-10¢/lb below the value expected from the FLO formula (FLO, 2009) due to the fact that the quality of the coffee sold as FT is higher than the coffee that sells at the NYC price. These annual premiums are represented in Figure 5.

We now bring in the two quantities needed to speak to the net economic benefits of FT which are the subject of predictions P1c and P3. These are the rate of over-certification and the cost of certification. First, the product of the sales share and the premium gives the effective premium per unit of coffee *certified,* rather than per unit *sold* through FT. The negative correlation between the share of the coffee that the Association is able to sell as FT and the premium largely erases the differential average premium received across the years. This effective premium remained very low, never exceeding 12¢/lb while the coffee sold under the FT label carried a 60-70¢/lb nominal premium (Figure 5).

Finally, in order to arrive at a correct estimate of net effective premiums, we need estimates of certification costs. Data from the Association give a figure of 3.09¢/lb. Because this organization

is large it has somewhat lower per-unit costs than those estimated based on a small sample of 16 first-tier Guatemalan cooperatives (3.4¢/lb) for which we calculated certification expenses ourselves. Certification costs are higher in the first year (6.2¢/lb), and so as a means of picking a conservative number that captures the ongoing per-pound costs of certification, we use 3¢/lb for our analysis. Subtracting this amount off of the effective quality-adjusted premium gives our final annual estimate of the per-pound benefit of FT certification.

The lowest line in Figure 5 gives our estimate of the effective net premium from FT certification. We see that this benefit has never exceeded 10¢/lb (although coffee was selling for 60¢/lb when the premium was at its highest) and the average net premium over the 13 years of our data is 1.6¢/lb over an average NY 'C' price of 107¢/lb. Over the past five years the average result of participating in the FT market is a loss of 1.2¢/lb, confirming the put-option pricing of the FT contract due to the presence of the floor. These losses when the floor is not binding indicate that producers believe that they will in fact be able to exercise the FT option on at least some of their output in the event of another coffee crisis. These results are entirely consistent with the story that we have free entry to a mechanism that provides producers with a put on the NY 'C'. As predicted by P3 the average benefit overall benefit of FT has been small (1.6 ¢/lb) and over the past five years when the floor has turned out non-binding the benefit of FT participation has been negative on average (a loss of 1.2 ¢/lb), consistent with P1c.

6. ASSESSING THE PRODUCER WELFARE GAINS FROM FT PREMIUMS

Using the rigorously estimated FT premium, we now assess the welfare gains of FT to producers by simulating alternative price schemes for the 1997-2009 period. This is done both on a per pound sold basis and, using information on average farm household coffee production, on a per household basis.

6.1. Producer welfare gains per pound sold

We simulate counterfactual prices without the quality and FT premiums as follows. First, taking out the average annual FT premium from the price of each FT sale, we can calculate what prices would have prevailed in absence of the FT opportunity. The difference between this price and the NYC price is attributable to quality. At the other extreme, applying the FLO price rule to all sales that were sold below this prescribed minimum price, we can compute the prices that would

have prevailed had the FT contract applied to all sales. Note that this rule leaves out on the gourmet market those sales that fetched a higher price than the FLO price rule.

The distributions of these simulated prices for all sales made over the period are shown in Figure 6 and Table 4. Under the FLO rule, no prices should have been observed below the floor price. This is not the case. However, prices observed below the floor are less frequent than would have prevailed had all sales been at the NYC price, showing that FT did offer some price protection in spite of over-certification.

Mean prices with all sales at the NYC price (no FT and no quality premium) would have been 107.1¢/lb, rising to 111.6¢/lb with observed prices less the estimated FT premium (no FT but quality premium), and to 136.1¢/lb applying the full FLO rule honoring the FT implicit promise of a minimum price. However, with observed prices (FT with over-certification), mean prices were only 116.3¢/lb. The standard deviation of prices would have been 30.8¢/lb with all sales at the NYC, falling to 15.8¢/lb had the full FLO rule been honored, but rising to 33.3¢/lb with over-certification.

These mean and variance effects can be combined in a welfare measure per pound sold using a mean-variance utility function

$$U = \overline{p} - \frac{1}{2}\frac{r}{\overline{p}}\mathrm{var}(p),$$

where r is the coefficient of relative risk aversion, arbitrarily set equal to 1.5. This shows that welfare that would have risen from 100.4 had all prices been at the NYC to 134.7 had the full FLO rule been honored, only reached 109.1 with prices observed for sales over the period. Welfare gain was thus a modest 9% instead of the 34% expected by ethical consumers.

6.2. Producer welfare gains per farm household

We can also assess the welfare value of these price effects for producers by combining them to the sales and revenues of a typical Guatemalan coffee farmer. To do this, we use the 2006 *Encuesta Nacional de Condiciones de Vida* (ENCOVI), a nationally representative household survey. Among coffee producing households, median coffee sales for that year were 910 lbs of unhusked (parchment) coffee, which corresponds to roughly 725 lbs of green coffee. This means that if the whole FT average effective transfer of 1.6¢/lb were transferred through to producers (a big if), the producer's income would have increased by about $11 over the course of a year, relative to a median reported coffee sales value of $206. However, these data also suggest that producers receive around

28¢/lb in a year where the NY'C' was just over a dollar, so if an analogous share of the FT premium is passed through, this average annual benefit would fall to $3. Taking the actual 2006 effective premium of –0.5 ¢/lb, the median farmer would have lost about $3.65 by participating in FT that particular year.

7. CONCLUSION

We used unique data from a large Central American association of coffee cooperatives to measure the price premium effectively paid to member cooperatives for FT coffee. Batches delivered by a particular cooperative were often split between FT and non-FT sales, allowing us to observe exactly the same coffee being sold at the same time on the two markets and providing us with an ideal identification of the premium actually paid to FT coffee producers. We find that, while the nominal FT price premium was up to 60¢/lb at the worst of the coffee crisis, the effective premium at that time was only about 10¢/lb once adjustments are made for over-certification and unrewarded quality. Over the 13 year period for which sales are observed, the average NY 'C' market price was 107¢/lb. Subtracting a conservative certification cost of 3¢/lb, the adjusted FT premium over the period was 1.6¢/lb. Over the last 5 years, the premium was negative, equal to –1.2¢/lb. Once rent dissipation mechanisms have been taken into account, it appears to be the case that FT price premiums have been close to zero.

Guided by a simple theoretical setting, we seek to understand the ties that bind a FT market to its traditional counterpart in a product with strong quality heterogeneity. Our theory suggests that over-supply will play a major role given the current rules of the FT system, and that an inverse relationship between FT sales share and FT premiums will emerge, consistent with dynamic entry. The FT price should command middle-quality coffee when traditional market prices are high, but during market crashes paying the FT floor price enables to procure high-quality coffee. Our empirical analysis confirms that both of these arbitrage mechanisms are at work, driving down effective premiums.

Our results are based on a single organization within a single country, and so it is natural to question the extent to which they are representative of FT coffee markets as a whole. Our estimates of the effective premium are composed of three basic quantities: the nominal FT premium net of quality, the share of certified coffee sold as FT, and the per-unit costs of certification. Because of the internal diversity and second-tier certification of our study institution, we have an unusual ability

to look at price variation within seasons, within individual cooperatives, and even within specific deliveries across FT and non-FT sales. We therefore believe that the most rigorously estimated part of the study is the nominal FT premium. As for the share sold as FT, there is no particular reason that any one institution is representative of the market as a whole, given the issues of quality heterogeneity presented in Section 2.2. However, the average share sold as FT by our study institution (22%) is close to the average of independent estimates of the global sales share (26%) and so it appears that this institution is broadly representative of the overall market.[16] Finally, our per-unit certification cost (3¢/lb) is for recertifying a large cooperative, and therefore if anything underestimates the cost for an average-sized cooperative considering the decision to undertake certification on the margin. While a single institution naturally contains less overall quality heterogeneity than the potential FT market as a whole, our average traditional price is very close to the NY 'C' price and we are nonetheless able to reject the null in testing theoretical predictions on the co-movement of market prices and FT quality within our data. Overall, it therefore appears that our results do provide real insights into the working of the FT coffee market.

We close by discussing to aspects of the FT puzzle: Why does it persist in spite of lack of delivery? Are there other ways of using the market mechanism to transfer to producers the price premiums paid by ethical consumers?

We started from the observation that 75% of private donations in the United States originate from individuals, posing the challenge of how to effectively transfer millions of dispersed small donations. By using the market mechanism and the existing value chain for coffee, FT promises to be a way of combining low transactions costs with effective targeting of the "hands that picked my coffee". In terms of mechanism design, we suggest that this promise is not borne out in reality. The current FT market fails to deliver large benefits because the system codifies prices while leaving quantity and quality as free parameters. The design of the current system thereby allows for the complete dissipation of producer rents without any infraction of the rules. Lack of transparency in the rent dissipation mechanisms helps explain the puzzling coincidence of persistent high popularity among ethical consumers and lack of substantial benefits to producers. Consumers cannot easily infer the two quantities they would need to know to correctly gauge producer rents: the certified sales share and the price of that exact same coffee on the traditional market. Producer benefits may

[16] Replacing the observed annual share sold as FT from our institution with the constant average from the independent estimates (26%) makes virtually no difference to our results; the peak effective premium would be 2-3¢/lb higher during the coffee crisis but would still have been negative for four of the last five years.

indeed have been large when the system was nascent, but the trend towards rent dissipation is relatively opaque to consumers. If all consumer welfare from FT arises from a desire for producer profits, this fully arbitraged market is inherently unstable and may collapse if consumers come to perceive that producers see no benefit. If FT consumption provides any intrinsic benefit to consumers, then the market can continue to endure in the open-access equilibrium, even without delivering rents to producers.

While this paper revealed the specific mechanisms that cause price arbitrage under the current FT system, careful consideration of other potential market-linked charity mechanisms seems to suggest that pessimism is in order. One is cartelization of FT as a solution to the free entry problem studied here. However, if only a quantity of coffee is fixed, then arbitrage on the quality margin would still have the tendency to erase benefits. Another is the 'direct trade' system, whereby buyers and producers contract directly with each other at a price above the market price. While the dyadic nature of such contracts may prevent arbitrage, such a system imposes enormous search and transactions costs and may prove untenable for producers if buyers are fickle across seasons. Ultimately, market forces will be working to unwind any mechanism that attempts to transfer benefits through a distortion of competitive prices. The logic laid out here suggests that well-intentioned consumers may be better served by institutions that transfer benefits directly rather than trying to channel them through product markets.

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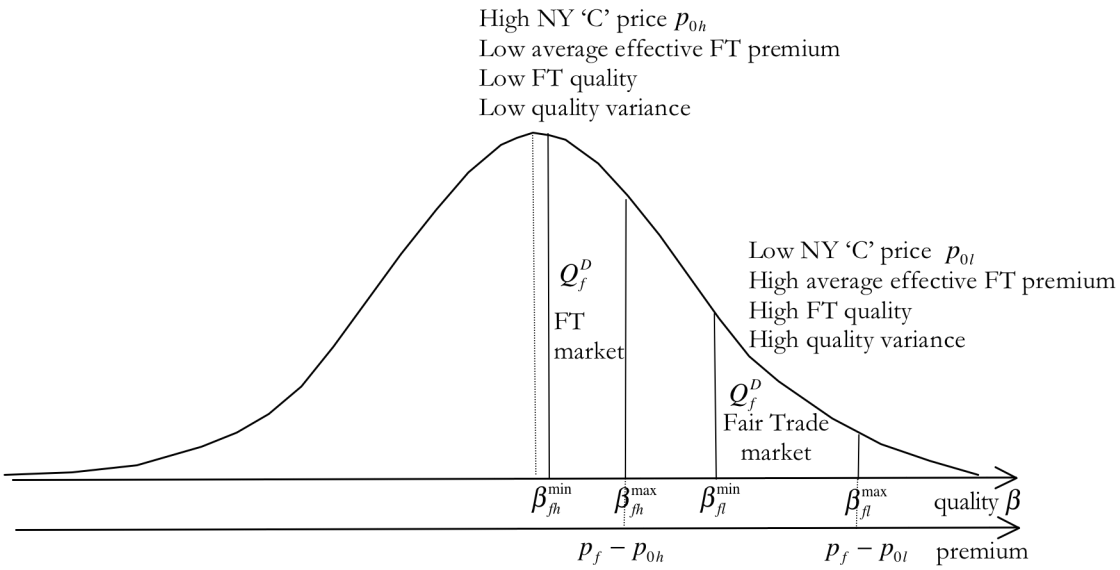

Figure 1. The relationship between price, quality, and average effective FT premiums

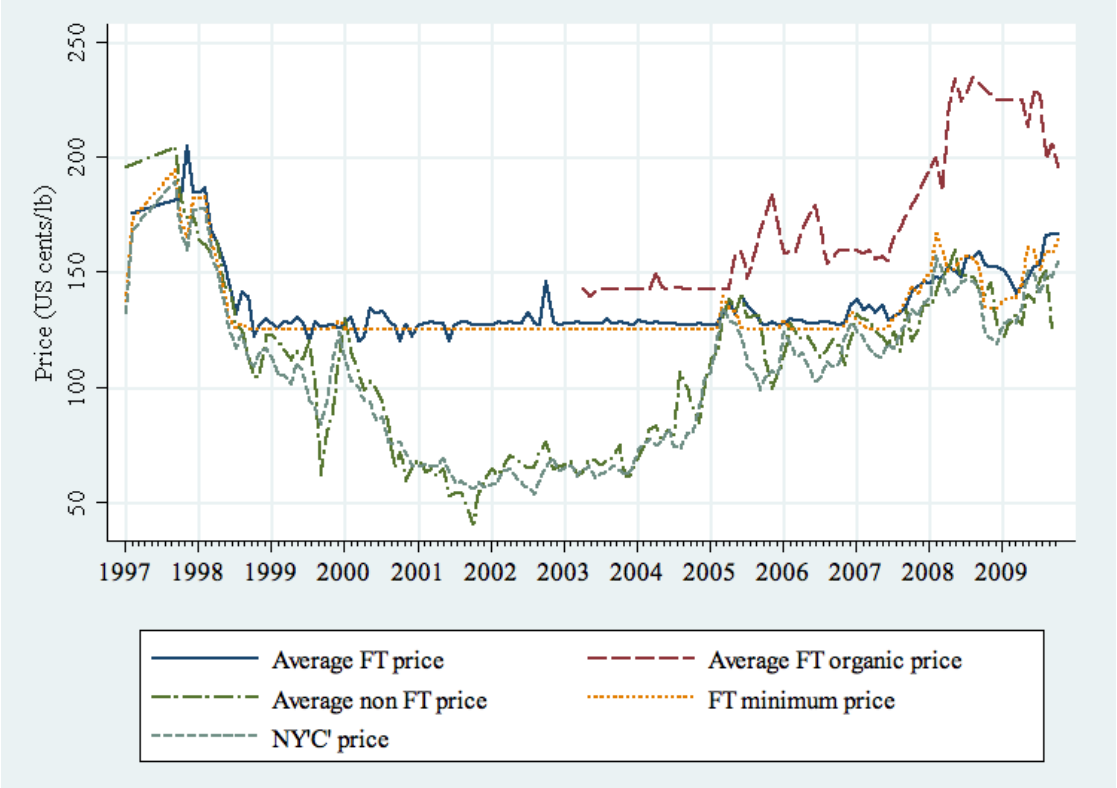

Figure 2. Evolution of coffee prices over time (US¢/lb)

Note: NYC price is the International Coffee Organization Indicator price for other Arabica (www.ico.org/coffee_prices.asp). Average prices are from the Association sales.

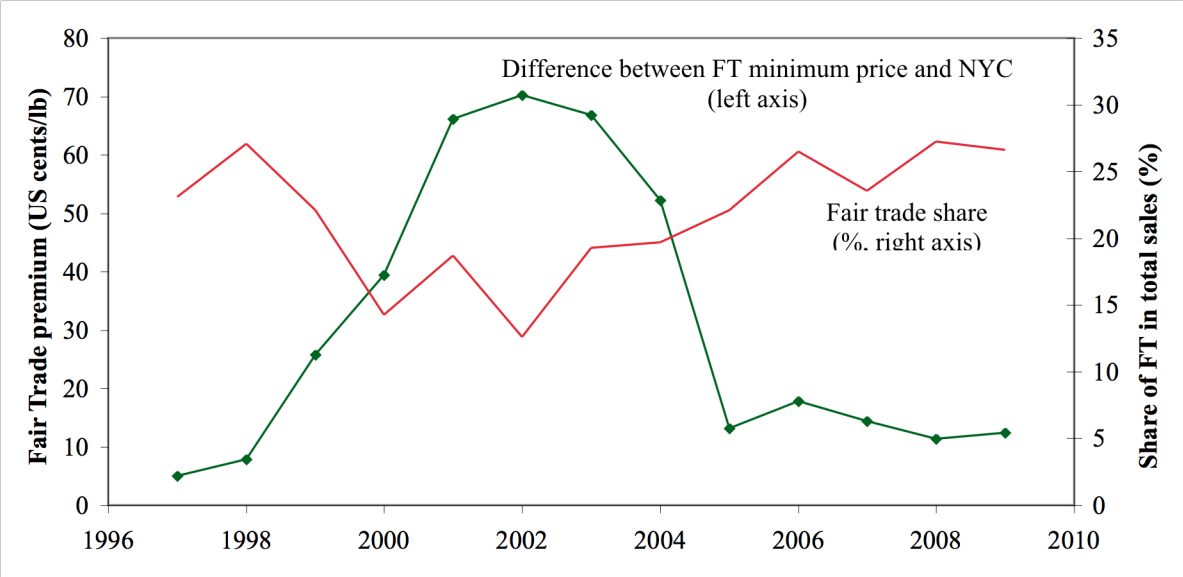

Figure 3. Gross FT premium and share of non-organic coffee sold under FT contracts
Note: The gross FT premium reported is from column (4) in Table 3. Share is from the Association sales data.

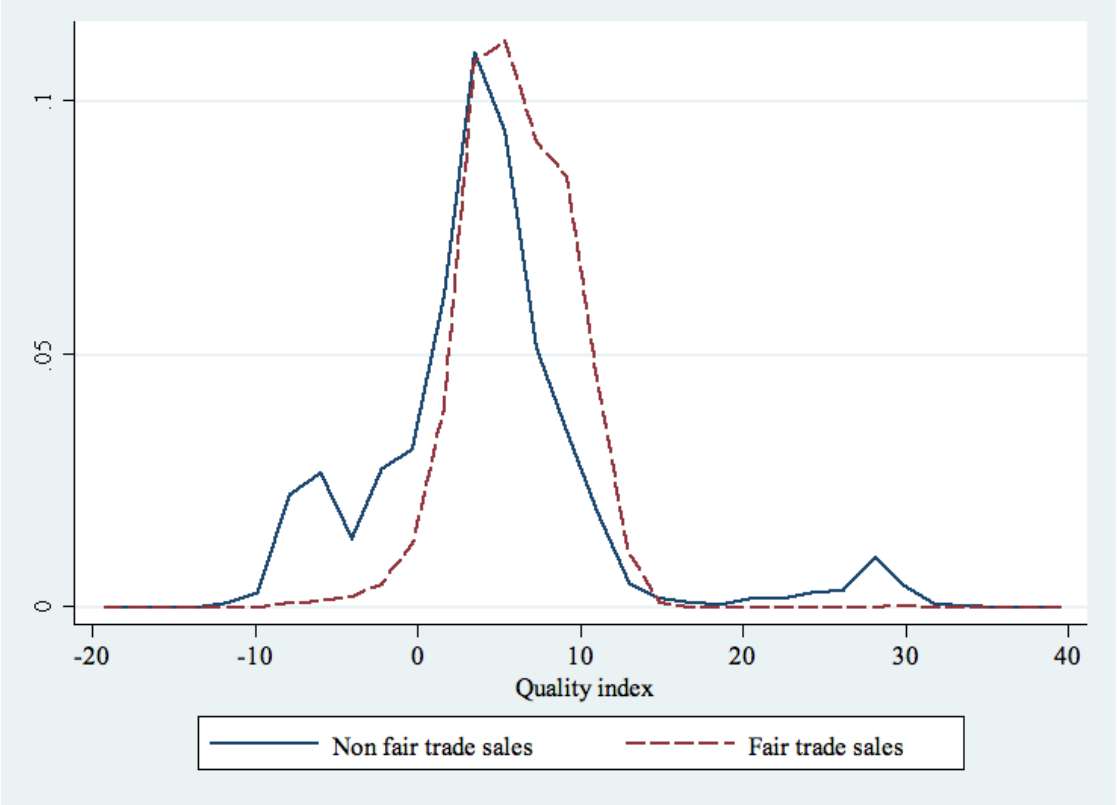

Figure 4. Observed quality distribution of non-organic FT and non-FT coffee

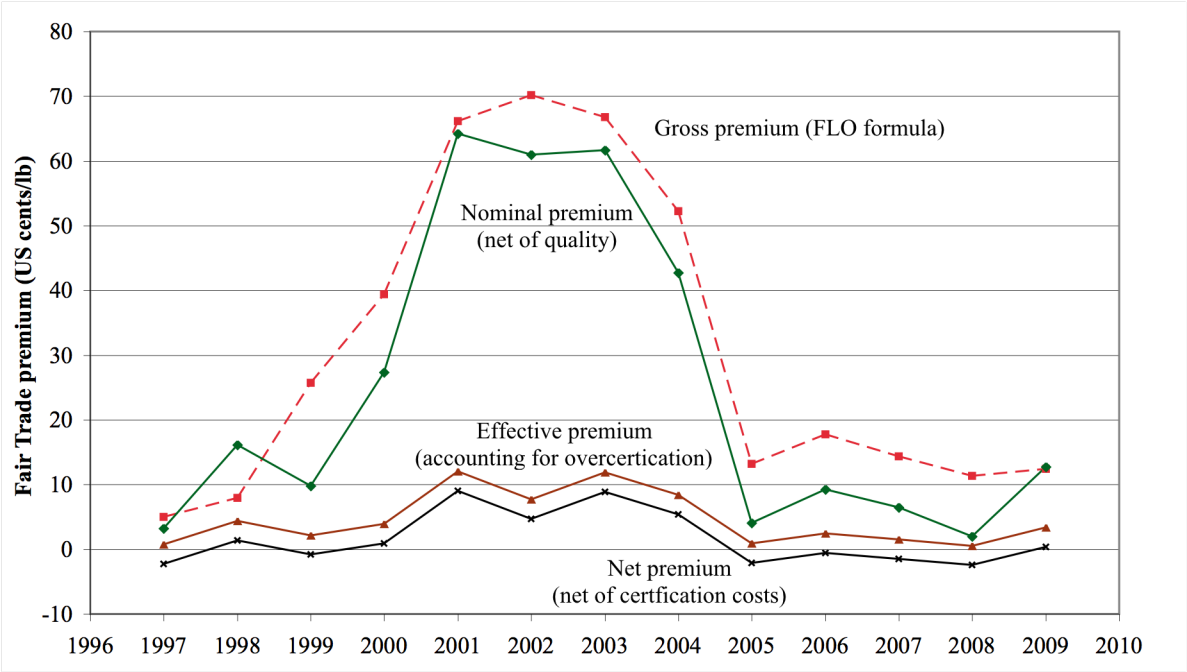

Figure 5. Net effective FT premium over time

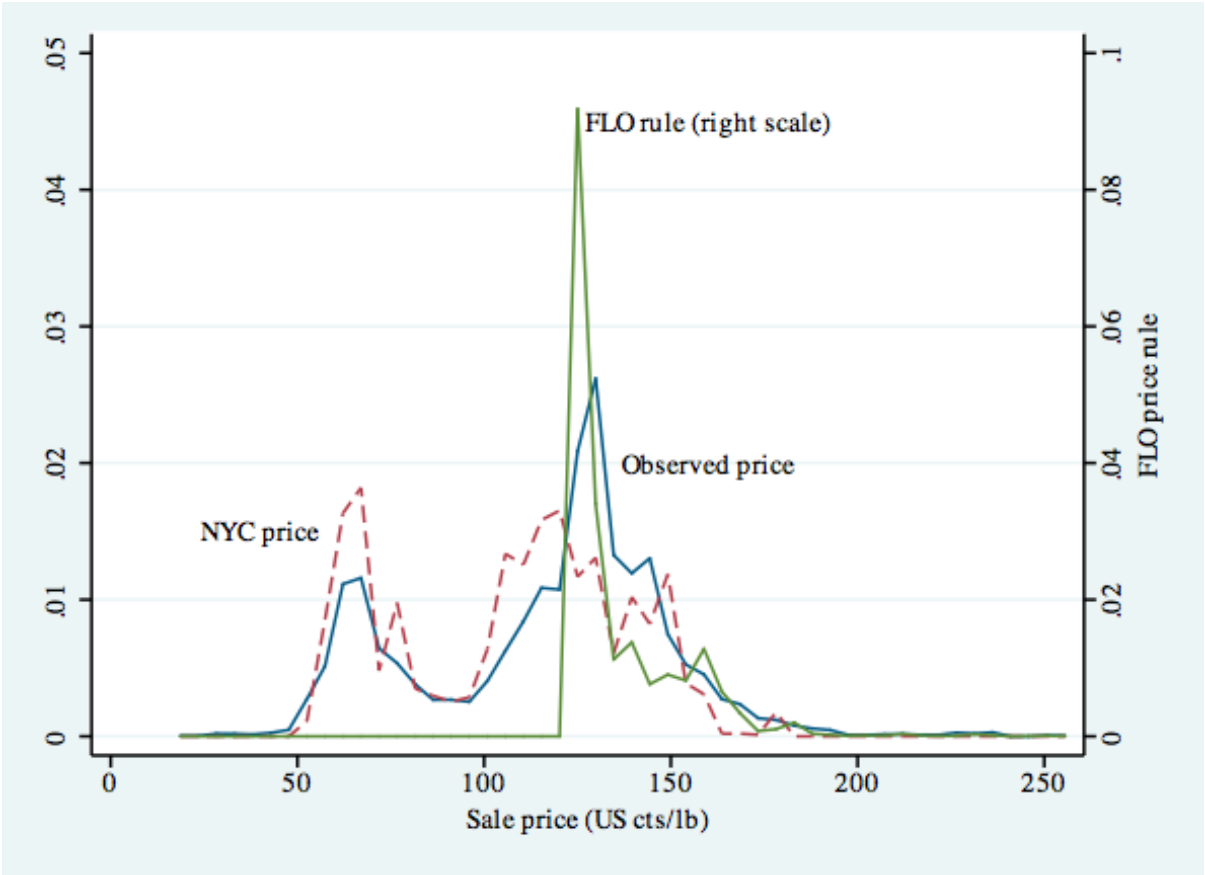

Figure 6. Price distribution under different pricing rules

Table 1. 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) FLO formula	on FT sales	Effective	FT premium (% of FT price)
1997*	14,065	23.1	171.5	190.6	5.0	3.3	0.8	1.7
1998	65,025	27.1	143.0	161.4	7.9	16.1	4.4	10.0
1999	105,801	22.1	105.3	127.9	25.7	9.8	2.2	7.7
2000	131,805	14.3	91.6	126.7	39.4	27.4	3.9	21.6
2001	128,293	18.7	64.9	127.8	66.1	64.3	12.0	50.3
2002	153,290	12.6	60.8	129.8	70.2	61.0	7.7	47.0
2003	153,533	19.3	64.2	130.1	66.8	61.7	11.9	47.4
2004	164,237	19.7	78.7	130.2	52.3	42.7	8.4	32.8
2005	187,302	22.1	119.5	134.3	13.2	4.1	0.9	3.0
2006	200,744	26.5	113.3	133.0	17.8	9.3	2.5	7.0
2007	216,474	23.6	120.0	138.6	14.4	6.4	1.5	4.6
2008	251,739	27.3	143.6	159.1	11.3	2.0	0.5	1.3
2009*	227,360	26.6	139.4	153.0	12.4	12.8	3.4	8.3

NYC price: Indicator price for other Arabica, International Coffee Organization

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 characteritics, and cooperative and shipment time 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 2. Quality of FT coffee and the international price

	FT floor price binding			FT floor price not binding
	(1)	(2)	(3)	(4)
Panel A: Mean quality	(WLS)	(WLS)	(mult. het.)	(WLS)
Fair Trade	2.655	2.188	1.393	1.536
	(5.27)**	(4.59)**	(2.74)**	(0.71)
NYC price	0.026	-0.078	-0.136	-0.064
	(6.89)**	(8.28)**	(9.12)**	(3.83)**
NYC price * Fair Trade	-0.023	-0.017	-0.011	0.003
	(4.11)**	(3.12)**	(1.88)	(0.24)
Panel B: Variance of quality	(OLS)	(OLS)	(mult. het.)	(OLS)
Fair Trade	25.659	10.859	0.329	-100.5
	(2.55)*	(1.08)	(0.80)	(3.01)**
NYC price	0.521	-0.697	-0.019	-1.12
	(8.22)**	(3.13)**	(2.29)*	(3.60)**
NYC price * Fair Trade	-0.660	-0.469	-0.009	0.348
	(6.21)**	(4.50)**	(2.00)*	(1.52)
Panel C: Coffee sold as Fair Trade (coefficients multiplied by 100)				
	(OLS)	(OLS)		(OLS)
Quality index	0.802	0.718		-0.524
	(3.66)**	(3.28)**		(0.49)
NYC price	0.164	-0.183		0.178
	(7.84)**	(2.54)*		(1.92)
NYC price * quality index	-0.0062	-0.0054		0.0085
	(2.67)**	(2.31)*		(1.17)
Crop year FE	N	Y	Y	Y
Observations	11189	11189	11189	3634

Absolute value of t statistics in parentheses from robust standard errors. * significant at 5%; ** significant at 1%
Col. 1-3: Sample of sales in months where the NYC price was lower than the FT floor price. Col. 4: months where the NYC price is greater than the FT floor price + social premium.
Over all observations, mean quality is 5.6cts/lb, variance is 48 , and the share of coffee sales that are FT is 27%.

Table 3. Estimation of the annual FT premium

	Contract price (US cts/lb) (1)	Contract price (US cts/lb) (2)	Price differential (US cts/lb) (3)	Contract price (US cts/lb) (4)	Contract price (US cts/lb) (5)	Contract price (US cts/lb) (6)	Price differential (US cts/lb) (7)	Contract price (US cts/lb) (8)	Contract price (US cts/lb) (9)
Fair trade premium									
1997	11.25	6.31	10.07	3.26	14.86	4.74	8.80	4.73	4.73
	[5.16]*	[5.21]	[7.28]	[4.70]	[5.80]*	[4.47]	[7.00]	[1.03]**	[1.02]**
1998	7.87	11.79	8.51	16.12	14.42	15.75	7.01	18.22	22.50
	[3.19]*	[2.85]**	[1.95]**	[3.91]**	[4.45]**	[3.72]**	[3.24]*	[1.27]**	[1.20]**
1999	10.79	12.54	15.60	9.83	13.06	9.79	13.45	10.97	10.95
	[1.70]**	[1.50]**	[1.51]**	[1.48]**	[1.90]**	[1.49]**	[1.88]**	[0.65]**	[0.66]**
2000	25.14	24.03	27.59	27.36	27.97	27.42	31.17	19.62	20.35
	[2.94]**	[2.80]**	[2.71]**	[2.78]**	[7.49]**	[2.81]**	[2.86]**	[0.75]**	[0.73]**
2001	64.57	64.41	58.52	64.26	64.73	63.24	58.08	60.88	61.11
	[1.09]**	[1.08]**	[0.96]**	[0.88]**	[1.15]**	[0.82]**	[0.80]**	[0.60]**	[0.59]**
2002	61.85	61.90	64.72	60.97	62.34	60.84	63.55	53.71	52.80
	[1.24]**	[1.28]**	[1.08]**	[1.65]**	[1.07]**	[1.49]**	[1.15]**	[2.80]**	[3.27]**
2003	60.60	61.69	60.66	61.69	61.57	60.82	58.33	57.51	53.83
	[0.87]**	[0.79]**	[0.66]**	[0.55]**	[0.65]**	[0.49]**	[0.58]**	[1.16]**	[1.46]**
2004	45.19	46.51	46.17	42.71	43.18	41.92	42.56	41.17	45.22
	[1.45]**	[1.40]**	[0.87]**	[1.72]**	[1.47]**	[1.71]**	[0.94]**	[1.84]**	[1.68]**
2005	6.73	7.62	12.24	4.09	3.92	4.04	9.91	0.79	2.63
	[1.17]**	[1.10]**	[1.14]**	[1.11]**	[1.18]**	[1.06]**	[1.29]**	[1.62]	[2.32]
2006	12.58	13.55	16.54	9.26	9.19	8.89	10.14	6.87	6.76
	[1.33]**	[1.30]**	[1.35]**	[0.69]**	[0.76]**	[0.67]**	[0.76]**	[0.80]**	[1.07]**
2007	12.36	12.86	14.83	6.44	6.1	6.59	7.00	8.27	9.14
	[1.27]**	[1.22]**	[1.11]**	[0.99]**	[1.03]**	[0.91]**	[0.95]**	[0.82]**	[1.03]**
2008	17.79	17.66	19.63	2.01	1.96	1.93	4.56	0.14	3.34
	[2.49]**	[2.41]**	[2.50]**	[1.28]	[1.45]	[1.25]	[1.58]**	[1.05]	[1.29]**
2009	19.74	21.49	14.60	12.77	13.32	11.44	4.09	5.55	2.83
	[2.54]**	[2.50]**	[2.32]**	[1.32]**	[1.33]**	[1.30]**	[1.43]**	[2.41]*	[3.31]
Controls									
Quality	N	Individual	Individual	Individual	Individual	Index	Individual	-	-
Shipment month FE	Y	Y	N	Y	Y	Y	N	Y	-
Coop FE	N	N	N	Y	Y	N	Y	N	N
Delivery FE	N	N	N	N	N	N	N	Y	Y
Unit of analysis	Sale	Sale	Sale	Coop delivery - sale					
Observations	3934	3934	3934	16312	12480	16312	16312	5759	4403
Number of coops / deliveries FE				296	286		296	1874	1451
R-squared	0.83	0.86	0.57	0.94	0.94	0.93	0.67	0.73	0.68

Robust standard errors in brackets (clustered at the sale level for columns (4) to (7)).
* significant at 5%; ** significant at 1%
Individual quality indicators are: Prime-washed, Extra Prime washed, HB, SHB, Fancy SHB, SHB-HH, SHB-EPW, GAP, and Small Beans. All regressions also control for UTZ certification.
Restricted samples: (5) deliveries exclusively sold as FT or non-FT, (8) deliveries sold partly as FT and partly as non-FT, (9) deliveries sold partly as FT and partly as non-FT with same shipment month.

Table 4. Decomposing the welfare effects of FT: Price distribution and utility under different pricing rules

	Mean price (US cts/lb)	Standard deviation of prices (US cts/lb)	Mean-variance welfare
1 All prices equal to NYC	107.1	30.8	100.4
2 Observed prices less estimated FT premium	111.6	33.5	104.1
3 Applying FLO rule	136.1	15.8	134.7
4 Observed prices	116.3	33.3	109.1

Welfare = (mean - 0.5 (rho/mean) variance), where relative risk aversion rho = 1.5.