

'Fair Trade' Coffee and the Mitigation of Local Oligopsony Power

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Abstract: Recent years have seen considerable growth in 'Fair Trade' markets for several commodities, most notably coffee. We argue that coffee is grown under conditions that might well subject growers to the market power of intermediaries. Using an approach designed to evaluate the impact of state trading enterprises, we develop an oligopsony model of intermediaries. In this model, 'Fair Trade' firms optimize a welfare function that includes the producer surplus of growers. This concern for growers' welfare among some intermediary firms helps to alleviate the market power distortion. We calibrate a model to price data reported by a fair trade organization, and consider the counterfactual removal of fair trade behaviour by intermediaries and customers downstream. As expected, farm incomes are reduced, though the effects are quite small.

A growing phenomenon in consumer goods markets is the growth of *ethical consumption* movements, including “No Sweat” campaigns for clothing, environmentally-oriented organic food markets, and “fair trade” markets for goods such as coffee. These markets use alternative distribution channels to link consumers with producers that employ particular methods of production. The purpose of alternative channels is typically the mitigation of an apparent market distortion.

We choose the coffee market because fair trade coffee is a prominent example of alternative distribution channels. We argue that the circumstances of many coffee farmers in developing countries leave them plausibly exposed to the market power of intermediaries.¹ We adapt a modelling framework that is used to assess the impact of state trading enterprises in other agricultural markets; fair trade intermediaries maximize an objective function that includes the welfare of developing country farmers. In markets where conventional intermediaries have oligopsony power, the other-regarding behaviour of the fair trade intermediary helps to mitigate this distortion.

In order to investigate the possible magnitude of these effects, we calibrate the model to price data for fair trade and conventional coffees, plausible market shares for the two coffee types, and a number of structural parameters consistent with a medium-run view of the problem. We have difficulty reconciling a large conventional market share, a small difference in intermediaries’ mark-ups in the two sectors, and the idea of sizable oligopsony power in the conventional market. Our calculations suggest that it is indeed possible that fair trade channels can raise the incomes of coffee farmers, but these effects are quite small. For the most plausible parameterization, we calculate that the existence of a fair trade channel can raise the income of coffee farmers by 0.5 to 1 percent.²

Our discussion proceeds as follows. Section I describes market conditions in the coffee supply chain, as well as the fair trade channel. Section II develops the model. In section III we calibrate the model to data, and investigate the consequences of fair trade firms for farmer welfare. Section IV concludes.

¹ This claim is common in the fair trade movement’s own literature. Our contribution is to formalize it, and to evaluate the quantitative limits of fair trade as a response to oligopsony power.

² This effect applies to all farmers, not only those selling into the fair trade channel.

Section I. Market conditions in the coffee supply chain

The conventional coffee market employs a number of intermediaries that link farmers and consumers of coffee. We begin by describing the conventional market channel. Coffee trees produce “berries” which the farmers harvest and sell to private intermediaries. These intermediaries then transport the berries to processing plants, where the berries are processed into green coffee beans. Local exporters sell the processed beans to the international traders, who then sell the beans to coffee roasters. The final product is distributed to retailers who sell coffee to consumers.

For the purposes of this paper, we define ‘fair trade’ coffee as that sold by an alternative trading organization, with the Fair Trade Labelling Organization (FLO) as the most prominent example. FLO is a certification body that verifies that coffee sold under its label has been produced and sold under particular conditions. It has 23 member organizations operating in 21 countries in Central and South America, Africa and Asia (FLO, 2008).

The conditions imposed by FLO include the following. Farmers must produce the coffee berries using ‘sustainable’ methods, and are required to form a cooperative that operates democratically and transparently. Buyers are required to have long-term trading partnerships with farmers and to provide market information and credit upon request. They are required to pre-finance up to 60 per cent of the total purchase, a commitment that allows farmers to smooth their income streams. Downstream firms (e.g. coffee importers) are required to pay either an agreed minimum price to farmers or 5 cents/lb above the market price when the market price exceeds the minimum price.³

Fair trade organizations make a number of claims about their beneficial impact on farmers. The transfer of technology and market information, the smoothing of farm incomes over the season, and insurance against downward price risk are all plausible sources of benefits to farmers that go beyond the scope of this paper. We focus on the specific claim that such organizations reduce the market power of coffee-buying intermediaries. We find this claim plausible, at least in its qualitative form. Market

³ It is likely that these restrictions raise costs, both in the field and in the chain of intermediaries. In calibration, we allow the supply schedule of fair trade and conventional coffee berries to differ. We also allow intermediaries in each channel to have different transport/processing costs. We calibrate over a range of possible parameterizations, and in most of these, costs are higher for producers and intermediaries in the fair trade channel.

conditions in coffee are such that: a) the supply of coffee beans is highly inelastic; and b) competition among intermediaries is plausibly imperfect.

Growing conditions

Coffee tree grows best in tropical areas without frost and with few sudden changes in temperature. The Arabica bean, which is most commonly used in 'fair trade' and other high quality coffees, is best grown in the highlands of tropical zones (Milford, 2004). These climactic conditions ensure that coffee is most often produced in developing countries in Asia, Latin America and Africa.

High altitudes limit the number of alternative crops in several ways. Centuries of erosion mean that mountainous regions often have thin soils, thereby limiting the biological viability of alternative crops. Rugged terrain and poor quality infrastructure in developing countries combine to make transportation and communication difficult, thereby limiting the number of cash crops that can be successfully marketed compared with those in more populous low-altitude regions.

Milford (2004) also notes that two additionally important features of the coffee market are the slow maturation of coffee trees and their subsequent long harvesting lives. Coffee trees take two years to reach its maturity, and about five years to reach their optimal yield. Once a tree has reached maturity, high quality beans can continue to be harvested for twenty years.

The combination of slow maturation, long harvesting lives, and a lack of economically viable substitute cash crops imply an inelastic supply of coffee berries.⁴ Empirical estimates confirm this intuition. Akiyama and Varangis (1990) estimate supply elasticities over 2-, 5- and 10-year intervals for a number of coffee-producing countries. The simple cross-country averages of these estimates are 0.12, 0.21, and 0.35, respectively. Such low supply elasticities over fairly long time horizons suggest at least two vulnerabilities for small coffee farmers. First, they are highly exposed to fluctuations in world market prices. This is especially true if farmers lack access to credit, futures

⁴ In a general equilibrium sense we can think of the coffee trees, and (to a lesser degree) the land, as a specific factor that the farmers supply jointly with their labour. Ownership of specific factors can make farmers' welfare extremely sensitive to the coffee prices, and can limit the mobility of rural labour when coffee prices fall.

markets and/or adequate storage facilities. Second, inelastic supply makes farmers potentially vulnerable to the oligopsony power of local buyers.

Ownership structure and the potential for oligopsony power

The production of coffee beans is typically organized around smallholder agriculture. Gresser and Tickell (2002) report that seventy per cent of global coffee production is grown on small plantations of less than 10 hectares. Ronchi (2006) notes that ninety-two per cent of Costa Rican coffee farms have fewer than five hectares. That small farmers are vulnerable to the monopsony/oligopsony power of intermediaries is a running theme in agricultural economics, in developed and developing countries alike.⁵ Responses by governments to such market power have often included encouragement of the formation of cooperatives or the creation of state marketing boards with statutory power to buy from farmers and to sell into marketing channels. One can view the fair trade channel as a particular form of these more common responses to oligopsony power.

The discussion of market power within the fair trade literature often focuses on the market shares of global coffee roasters. A frequently cited statistic is that five roasting firms – Kraft, Nestle, Sara Lee, Procter & Gamble, and Tchibo – account for almost 50 per cent of global processing. Such figures typically include freeze-dried markets, and lower quality Robusta beans. Given the focus of the fair trade movement on the fresh, higher-quality Arabica market, we do not wish to lean on concentration in this larger market as our source of oligopsony power. We focus instead on the existence of buying power at the farm gate, which is the place where market power would impinge most directly on farmers' welfare.

There is a number of possible sources of oligopsony power in developing country markets for coffee berries. As in many agricultural markets, local scale economies in transportation and/or processing may limit direct competition through barriers to entry. Farmers in remote regions – with poor communication and transportation links – may

⁵ Empirical evidence of market power is both situational and mixed. Schroeter (1988) finds evidence that U.S. meat packers have small, but statistically significant, market power. Durham and Sexton (1992) find little evidence of such power in California's tomato market.

lack access to alternative buyers.⁶ Credit constraints may also limit farmers' ability to bargain effectively with buyers. Developing country governments may not provide effective enforcement of anti-trust law, where it exists, because of inadequate resources or because of outright corruption.

Regardless of the source of oligopsony power, there is evidence that it is a feature of coffee markets in developing countries. In a study of Costa Rican coffee farmers, Ronchi (2006) finds evidence of market power. Lopez and You (1993) find evidence that the coffee exporters' association in Haiti was a source of oligopsony power. We take the existence of market power in coffee markets as a plausible stylized fact, and develop a suitable theoretical model to represent it.

Section II. A theory of 'Fair Trade' intermediaries

Theoretical work on fair trade channels often focuses on the interaction of fair trade channel with consumers' buying decision. Chambolle and Poret (2007) study how consumers' willingness to pay determines the retailer's decision to sell fair trade products if conventional and fair trade products are differentiated by the nature of the trade relationship. Becchetti and Adriani (2002) analyze how Northern consumers' willingness to pay a premium for fair trade products can affect the wage received by Southern workers. The product is considered to be fair if workers receive wage equal to their marginal product. They show that in equilibrium, the existence of fair trade can lead to both types of firms (fair trade and conventional) paying the value of the marginal product to their workers generating a welfare improvement. In addition, they also look at the net effect of the existence of ethical consumers in the absence of fair trade. They find that the welfare of workers is lower as the consumer's disutility of unfairness is lower. While we do not directly assess the role of consumer's willingness to pay in our model, the effect of removing fair-trade premium in FOB prices and the fair-trade status in our calibration gives a similar conclusion to that of Becchetti and Adriani, though with a very small size of effect.

The theoretical literature on the interaction of such channels with farmers is somewhat thinner, but developing. Becchetti and Solferino (2003) use a Bertrand

⁶ For example, in 2000, only 22% of roads in Costa Rica were paved, and similarly only 20% and 24 % of roads in South Africa and Latin America & Caribbean, were paved, respectively. (World Bank Development Indicators, WDI Online, 2008).

Hotelling model to study the effect of an ethical producer's entry on the incumbent (profit-maximizing) firm's price. They find that, by removing the fixed location hypothesis, the entry of an ethical producer has positive indirect effects on aggregate social and environmental responsibility. Richardson and Stahler (2007) develop a theoretical model to study the structure of a farmers' cooperative. In their model, a conventional and fair trade firm compete in the market for high quality beans, while the conventional firm also purchases low quality beans. In this setting, the fair trade firm is vertically integrated with farmers. The contract between the fair trade firm and farmers is assumed to specify only the delivery of input, but not the level of effort. This gives rise to a moral hazard problem faced by the fair trade firm.

We also focus on the behaviour of fair trade and conventional intermediaries. A key point of difference with Richardson and Stahler is our assumption of an upward-sloping supply curve of coffee berries. We take this to be a critical feature of the market, as it generates scope for the exercise of oligopsony power in the conventional market. Our purpose is to build a role for such power into our model, so that we may evaluate the quantitative significance of these effects.

Model set-up

The model consists of two types of processing firm that operate under imperfect competition in the procurement market. The first, and more numerous, are conventional firms that are assumed to maximise only profits. These profits arise from buying coffee berries from growers, processing them and selling processed coffee to consumers. While these firms can influence the price that they pay for berries, their selling price of processed coffee is assumed fixed. The second type of firm is part of the fair-trade movement. It is assumed that the objective function that it maximises contains not only its own profit, but also the welfare of the growers of coffee berries.⁷ Thus, it would be expected that their buying price would exceed that of the conventional firms, i.e., firms that exploit their buying power.

It is assumed that the growers of coffee berries can choose whether to supply conventional processing firms or fair-trade firms. If they sell to the latter, although they

⁷ This modelling technique has been used to evaluate state-trading enterprises. See McCorrison and MacLaren (2007), among others.

receive a higher price, they also incur costs in meeting the standards of the fair-trade movement.

Let the fixed price for commercial roasted coffee be p_C and the corresponding price for fair-trade be p_F . To allow for buying power for both types of berries, assume that the inverse supply functions are upward sloping. Let the inverse supply function of commercial coffee berries be

$$(1) \quad p_C^S(Q_C, Q_F) = \gamma_0 + \gamma_1 Q_C + \gamma_2 Q_F$$

and the inverse supply function of fair-trade coffee berries be

$$(2) \quad p_F^S(Q_C, Q_F) = \phi_0 + \phi_1 Q_F + \phi_2 Q_C$$

where Q_C and Q_F are the total quantities of commercial and fair-trade coffee berries transacted, respectively. It is assumed in general that $\gamma_k \neq \phi_k, k = 0, 1, 2; \gamma_2 \neq 0; \phi_2 \neq 0$, i.e., there is some substitution possible for growers in supplying the downstream markets.

Let the i th commercial processor ($i = 1, 2, \dots, n$) have a profit function

$$(3) \quad \pi_C^i = [p_C(1 - \tau_C) - p_C^S]Q_C^i$$

where τ_C is the unit cost of processing, assumed to be proportional to the consumer price of roasted coffee. The i th commercial firm is assumed to maximise profit with respect to quantity bought and sold and it plays a Cournot game with $n - 1$ commercial firms and with m fair-trade firms. Then,

$$(4) \quad \begin{aligned} \frac{\partial \pi_C^i}{\partial Q_C^i} &= (1 - \tau_C)p_C - p_C^S + Q_C^i \left[(1 - \tau) \frac{\partial p_C}{\partial Q_C^i} - \frac{\partial p_C^S}{\partial Q_C^i} \right] \\ &= (1 - \tau_C)p_C - \gamma_0 - (n + 1)\gamma_1 Q_C^i - m\gamma_2 Q_F^i \end{aligned}$$

At the optimum for the i th commercial firm,

$$(5) \quad (n + 1)\gamma_1 Q_C^i + m\gamma_2 Q_F^i = (1 - \tau_C)p_C - \gamma_0$$

where n and m are assumed fixed.

In what follows, it will be assumed that the j th fair-trade firm acts independently of the other $(m - 1)$ fair-trade firms in choosing its optimal level of purchases and sales. Let the j th fair-trade processor ($j = 1, 2, \dots, m$) have an objective function

$$\begin{aligned}
(6) \quad W_F^j &= \alpha PS_F + \pi_F^j \\
&= \alpha [p_F^S(Q_C, Q_F) Q_F^j - \int_0^{Q_F^j} p_F^S dz] + [p_F(1 - \tau_F) - p_F^S(Q_C, Q_F)] Q_F^j
\end{aligned}$$

where PS_F is the producer surplus of the farmers selling to the fair-trade processors, and τ_F is the cost of processing, assumed to be proportional to the consumer price of fair-trade roasted coffee. The j th fair-trade firm is assumed to maximise its objective function with respect to quantity bought and sold and it plays a Cournot game with n commercial firms and $(m - 1)$ fair-trade firms. Then,

$$\begin{aligned}
(7) \quad \frac{\partial W_F^j}{\partial Q_F^j} &= \alpha [p_F^S + Q_F^j \frac{\partial p_F^S}{\partial Q_F^j} - p_F^S] + [(1 - \tau_F) p_F - p_F^S] + Q_F^j [(1 - \tau_F) \frac{\partial p_F}{\partial Q_F^j} - \frac{\partial p_F^S}{\partial Q_F^j}] \\
&= (1 - \tau_F) p_F - \phi_0 - \phi_1 [(1 - \alpha) + m] Q_F^j - n \phi_2 Q_C^i
\end{aligned}$$

At the optimum for the j th fair-trade firm,

$$(8) \quad n \phi_2 Q_C^i + \phi_1 [(1 - \alpha) + m] Q_F^j = (1 - \tau_F) p_F - \phi_0$$

The consolidated FOCs for the i th commercial firm and the j th fair-trade firm are

$$(9) \quad \begin{bmatrix} (n+1)\gamma_1 & m\gamma_2 \\ n\phi_2 & \phi_1[(1-\alpha)+m] \end{bmatrix} \cdot \begin{bmatrix} Q_C^i \\ Q_F^j \end{bmatrix} = \begin{bmatrix} (1-\tau_C)p_C - \gamma_0 \\ (1-\tau_F)p_F - \phi_0 \end{bmatrix}$$

Solving these conditions for the optimal quantities transacted by the i th conventional firm and the j th fair-trade firm, gives

$$\begin{aligned}
(10) \quad \begin{bmatrix} Q_C^i \\ Q_F^j \end{bmatrix} &= \frac{1}{\Delta} \begin{bmatrix} \phi_1[(1-\alpha)+m] & -m\gamma_2 \\ -n\phi_2 & (n+1)\gamma_1 \end{bmatrix} \cdot \begin{bmatrix} (1-\tau_C)p_C - \gamma_0 \\ (1-\tau_F)p_F - \phi_0 \end{bmatrix} \\
&\text{where } \Delta = \gamma_1 \phi_1 (n+1) [(1-\alpha)+m] - mn\gamma^2
\end{aligned}$$

Note that, if the fair-trade firm were to maximise only profit, then $\alpha = 0$, and the coefficient on Q_F^j in the first-order condition takes the same form as that on Q_C^i . Note also that the value taken by α affects not only the choice made by the fair-trade firm but also the optimal choice of the conventional firm, *ceteris paribus*. This observation is consistent with one claim of the fair-trade movement, namely, that fair-trade exists to moderate the perceived exploitation of the growers of coffee berries by conventional

firms. The extent to which this moderation is quantitatively significant is pursued in the next section.

Section III. Calibration

In the previous section we have shown that the behaviour of fair trade intermediaries affects the price and quantity of coffee berries in the fair and conventional channels. In this section we derive quantitative implications for farm revenues. We calibrate our theoretical model to illustrative data on prices, quantities, and a number of structural parameters. We then consider counterfactual scenarios that eliminate fair-trade behaviour by intermediaries and downstream customers. Our results indicate that there is a beneficial impact of fair trade on coffee farmers' incomes, but this effect is small. Within our Cournot framework, at least, it is difficult to reconcile: a) the relatively small observed gap in price margins between conventional and fair-trade intermediaries; b) the relatively small market share of fair trade coffee; and c) any sizable effect on conventional markets flowing from the behaviour/existence of fair trade firms.

Our calibration strategy is similar to that of Dixit (1988), though the firms in our model have oligopsony, rather than oligopoly, power. We also improve the theoretic consistency of Dixit's calibration technique by bringing the first-order conditions of the intermediaries into the calibration.⁸ We use data on prices at the farm gate, and at the developing country port, from Pierre (2006), who provides cost breakouts for a Swiss FLO, *Max Havelaar*.⁹ The traded quantities in each sector vary across calibrations, with the fair-trade share ranging from 0.001 to 0.03. Our calibration employs a system of seven equations (five of them counterparts to those in Dixit, and the two first-order conditions) to translate price and quantity data, two elasticity parameters, and some conjectures about the number of firms, into an operational model that follows equations (1), (2), (5) and (8).

⁸ These additional equations allow us to make model-consistent inferences about intermediaries' marginal costs in each sector.

⁹ The actual cost structure of intermediaries must certainly vary substantially across coffee growing regions. In particular, the transportation costs of moving goods from farm to the developing country port will depend greatly on the infrastructure and institutions of specific coffee-growing countries. Our application uses data that can plausibly be treated as representative of the general problem. It does not evaluate any specific market for intermediary services.

The counterfactual exercise we wish to imagine is the removal of ‘fair trade’ status from the coffee berries that are currently sold under these mechanisms. We retain the notion that the two types of berries are differentiated in production; the inverse supply curves are parameterized the same in both benchmark and counterfactual calculations.¹⁰ We provide a quantitative estimate of the effect of ‘fair trade’ status on prices by removing fair-trade behaviour in the counterfactual exercises. We consider two possible counterfactual scenarios, which we intend as plausible lower and upper bounds for the overall effect of fair trade. In one counterfactual, we simply reparameterize the fair trade intermediaries’ welfare function, setting $\alpha = 0$. In the second counterfactual, we also remove the fair trade premium in FOB prices. This premium might reflect the mark-up that fair-trade coffee receives in downstream markets.¹¹ The counterfactual removal of fair trade status does not affect a) the cost schedule for producing this ‘type’ of coffee bean, and b) any cost (dis)advantage that the fair-trade intermediary retains in transportation/processing.

Price and quantity data

Our price data we take from Pierre (2006), who reproduces illustrative data from a Swiss FLO, *Max Havelaar*. The 2005 data are reported in Swiss Francs, though we convert them to US Dollars at an exchange rate of 1.25 SFr/USD. These data put the price of fair and conventional coffee beans at \$1.26/lb and \$1.15/lb, respectively. *Max Havelaar* reports these as FOB prices, and we take them to be inclusive of any processing and or transport costs that the intermediaries have incurred in reaching the developing country port. We treat the FOB prices as given by the world market, and therefore not affected by the behaviour of the intermediaries.

The reported farm-gate prices paid to farmers in the *Max Havelaar* data are \$0.88/lb for fair trade and \$0.69/lb for conventional coffee beans. In our model, the gaps

¹⁰ Fair trade coffee berries are likely somewhat differentiated from other berries, even after accounting for their fair-trade status. Fair-trade coffee is typically sold to high end consumers, and so may be above average in quality. The berries may also be grown with methods (organic methods, for example) that generate a premium that is independent of their fair-trade status. We refrain therefore from simply treating conventional and fair-trade berries as perfect substitutes in the counterfactual.

¹¹ Some part of this premium probably measures quality, or some other characteristic that might not disappear if fair trade status were removed. To the extent that consumers value organically grown coffee, for example, and associate that characteristic with fair-trade channels, only a portion of the premium should be removed.

between the price paid to farmers and the FOB price at the port must be attributed either to transaction costs (the intermediaries' marginal costs) or to a per unit profit margin.¹² The division of this margin will be determined in calibration, and will vary over various parameterizations of the model.

The absolute quantities of fair and conventional coffee beans we use in calibration are unimportant, we focus on market shares.¹³ The world market share of fair trade coffee is extremely small, about 0.55 percent.¹⁴ We view this figure as not completely relevant, for two reasons. First, fair trade coffee berries compete most directly with specialty coffee berries sold through conventional channels. Most conventional coffee berries are eventually processed as freeze dried coffee. We treat the fair trade share as a share of the specialty coffee market, which should raise the benchmark fair trade share of the market considerably. Second, our thought experiment is meant to reflect market behaviour in a specific geographic market (i.e., a mountain valley in a developing country). This would seem to be an appropriate sense of the relevant market. In those areas where fair trade cooperatives are active, they will account for a somewhat larger share of the total activity than they do in the world market as a whole. We lack data on any specific market, so we choose arbitrary but sensible market shares. We vary the fair trade share from 0.1 to 3 percent of the total local market for specialty coffee beans.

Elasticities

As noted above, empirical studies of coffee supply elasticities have demonstrated that the supply of coffee beans is quite inelastic, even over relatively long intervals. Akiyama and Varangis (1990) estimate supply elasticities over 2-, 5- and 10-year intervals for a number of coffee-producing countries. The simple averages of these estimates are 0.12, 0.21, and 0.35 respectively. We take the longest of these time frames as the more interesting one, as it suggests the farmers' susceptibility to oligopsony power is potentially sustainable over the medium-run. We therefore use 0.35 as our estimate of the supply elasticity.

¹² In the case of the fair trade intermediary, which is a cooperative in this case, the profits might better be thought of as rents that go to the employees of the cooperative. Assuming $\alpha = 1$, as we do, leads the cooperative to price at marginal cost, and earn zero economic profits.

¹³ Any absolute quantities can be scaled by an arbitrary normalization.

¹⁴ See Ronchi (2006).

In his calibration of consumer demand schedules for domestic and foreign automobiles, Dixit (1988) also employs an elasticity of substitution. In our case, this elasticity should measure the ability of coffee bean producers to substitute between fair-trade and conventional supply. Since we are assuming a relatively long time horizon (i.e., 10 years), we also choose this parameter to be quite high, 100.¹⁵

Firm numbers

We conduct multiple calibrations of the model, fitting the price data and a series of quantity data to various numbers of conventional firms. In doing so, we find that some areas of the parameter space can only be reconciled with the model by assuming negative marginal (transportation/processing) costs for conventional intermediaries. In particular, it is difficult to reconcile large conventional market shares with a small number of conventional firms, and the small gap between farm and FOB prices observed in our data.¹⁶ Throughout our calibrations we assume a single fair-trade firm (i.e., $m = 1$). Given our interpretation of this as a market with limited geographic scope, we view this as appropriate.

Inferred marginal transport/processing costs

The data available to us on prices allows a comparison of the prices paid and received by conventional intermediaries to that of a fair-trade cooperative. Despite the fact that the co-operative has no explicit profit motive, we model the fair trade intermediary with profits in its welfare function. In our calibrated case, where $\alpha = 1$, the practical significance of the profit term is limited, as a fair trade firm with $\alpha = 1$ finds it optimal to price at marginal cost and make zero profits

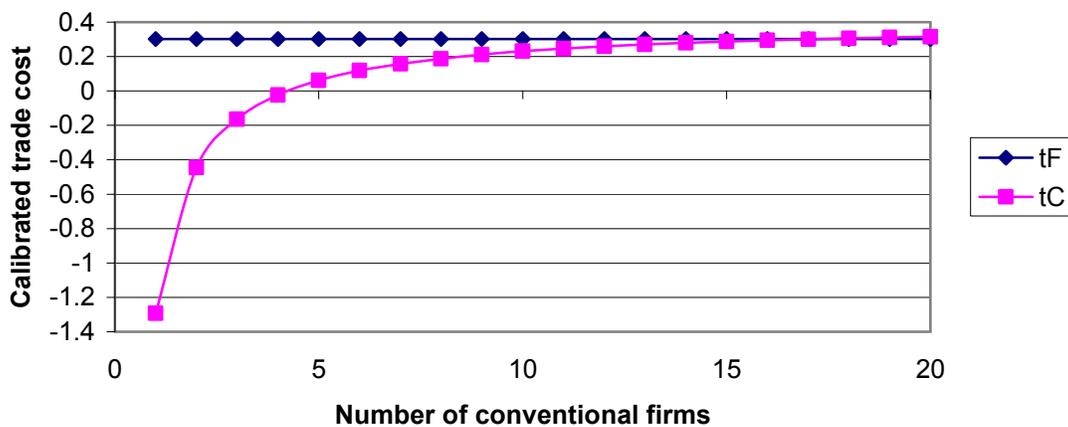
¹⁵ Because of the unequal market shares, the choice of this parameter has little substantive effect on the parameterization of the inverse supply curve for conventional coffee. The price response of fair-trade coffee berries to changes in own quantities (ϕ_1) is the only parameter substantially affected by our choice of elasticity of substitution. Counterfactual results are largely insensitive to the choice of elasticity of substitution. Lower values of this parameter reduce the competition between the two distribution channels, and so reduce the impact of fair-trade coffee on farmers who supply the conventional channel.

¹⁶ We are able to identify model-consistent estimates of marginal costs because we have included two additional equations in the calibration, relative to Dixit (1988). In the case of small numbers (i.e. less than 5) of conventional firms, profit-maximizing conventional firms would require substantial unit subsidies if they were to accept the rather small price mark-ups over farm gate prices that are observed in the *Max Havelaar* data.

The calibration procedure divides the price premium in each commodity into two parts, marginal (processing + transport) cost and profit margin. Ideally, we ought to have direct data on the marginal costs, but we do not know of such data. We believe it likely that fair trade processing and transport costs are larger than those in the conventional sector.¹⁷ Because these costs are a residual, of sorts, in our calibration, they also vary with the inputs into calibration, especially the number of firms.

Figure 1 shows the calibrated marginal costs for each type of intermediary.¹⁸ These are the proportion of the FOB price that is attributed to intermediaries' marginal costs, under the assumption that firms choosing observed price and quantity data are maximizing their respective objective functions. Inferred costs vary with numbers of firms because the mark-up is fixed across calibrations, but larger numbers of conventional firms imply smaller profit margins. Thus, larger numbers of conventional firms imply higher marginal costs.

Figure 1. Calibrated marginal transport/processing costs



Note: Benchmark fair trade market share = 0.01. Marginal cost estimates are very similar over all considered benchmark market shares. Marginal costs below zero indicate a per unit subsidy is needed for model consistency.

¹⁷ There are plausible scale economies in both processing and transport, so the small, fair-trade share of the transport market might generate these higher costs. Fair-trade standards for treating workers (e.g., minimum/living wages) are also likely to raise the costs of processing and transport.

¹⁸ These are the results for a 1 percent fair trade market share. Initial market share makes almost no difference on the inferred marginal costs.

There are three main lessons in Figure 1. First, the fair trade firm's inferred marginal cost is constant across calibrations. Our assumption that $\alpha = 1$ implies marginal cost pricing, so the entire FOB/farm gate price margin in the fair trade sector is attributed to processing/transport costs $\left(\tau_F = 1 - \frac{0.88}{1.26} = 0.302 \right)$. Second, the fair trade marginal cost is generally greater than that of conventional firms, especially when conventional firm numbers are low.¹⁹

Finally, it is very difficult to associate the observed data with severe concentration in the conventional market. For firm numbers less than 5, optimizing conventional firms would have to receive a per unit subsidy ($\tau_C < 0$) in order to choose large market shares at the observed FOB/farm gate price margins. Negative values for trade costs in the conventional market mean that the given number of conventional firms would not choose to operate at these levels (i.e., market shares) without large subsidies on their marginal cost activities. We treat these parts of the parameter space as infeasible solutions, and limit our counterfactual results to those examples where conventional firms face positive marginal costs.

Counterfactual analysis

We conduct two counterfactual analyses, each with a different interpretation of the behavioural effects of fair trade. In the first counterfactual, we simply change the behaviour of the fair trade intermediary, setting $\alpha = 0$ in the counterfactual. In the second exercise, we consider the joint effects of setting $\alpha = 0$ and removing the fair trade FOB premium. This premium may reflect downstream customers' greater willingness to pay for fair trade coffee, so removal of fair trade status should also eliminate this premium.²⁰

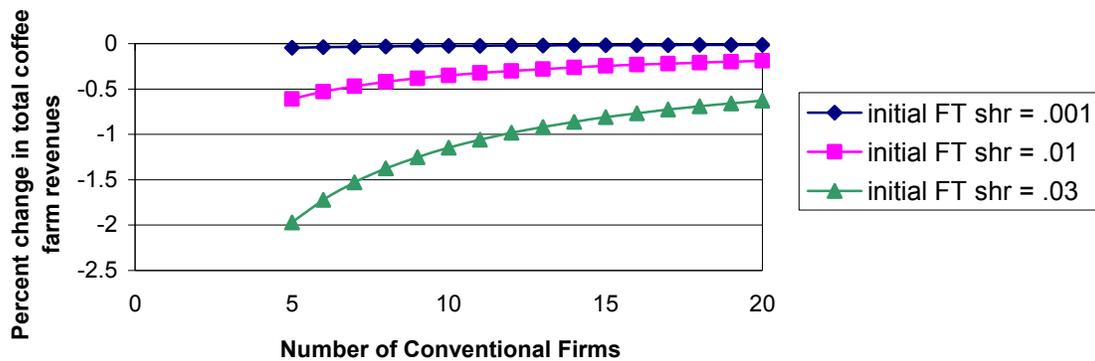
Figure 2 shows the results of the first counterfactual. In our calibrated model, changing the fair trade intermediaries' objective function to profit maximization alone reduces the revenue of coffee farmers by 0.5 to 2 percent. The more concentrated the conventional market, the more deleterious the effects of the change for coffee farmers.

¹⁹ The calibration has to reconcile a larger FOB/farm gate price gap in the fair trade sector, a small fair trade market share, and behavioural parameters that imply more aggressive market behaviour by the fair trade firm. These can only be reconciled if marginal costs are higher in the fair trade sector.

²⁰ As noted above, some part of the premium for fair trade coffee may reflect characteristics that can be separated from the fair trade status of the berries. In this sense, we are evaluating an upper bound.

This result is consistent with intuition and it suggests that it is plausible that fair trade intermediaries generate a (small) pro-competitive effect on the market for coffee berries. The response of farm revenues to fair trade behaviour is larger for larger initial fair trade market shares.

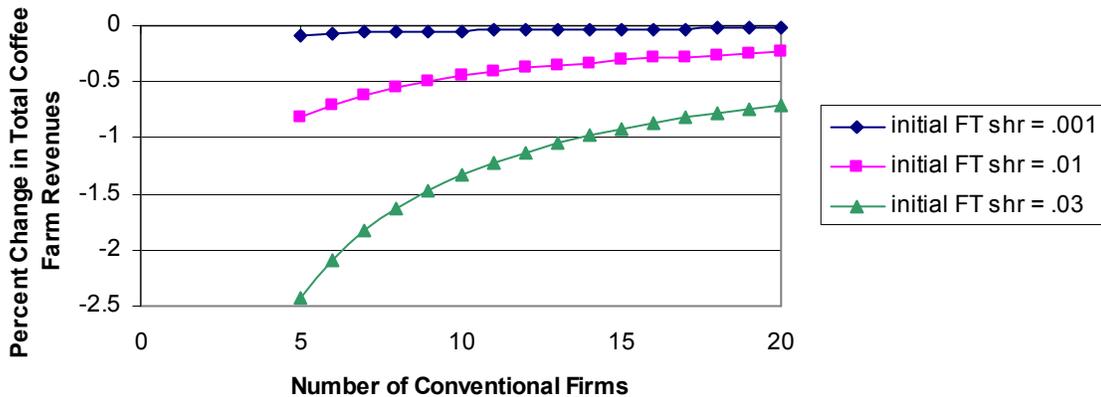
Figure 2. Estimated change in farm revenues when α set = 0.



We next consider the broader counterfactual. In addition to eliminating the fair trade intermediaries’ concern for farmers’ welfare, we also eliminate the FOB price gap between fair trade and conventional coffees. In the *Max Havelaar* data we employ, this means a 9% reduction in the fair trade FOB price. The results of this counterfactual analysis appear in Figure 3. The results are largely similar to those in the earlier experiment, with only slightly larger effects from removing fair trade behaviours.²¹ The largest effects arise when the initial fair trade market share is relatively large and the conventional market is relatively concentrated (i.e., n is small).

²¹ The removal of the fair trade premium tends to make the fair trade sector uneconomic. Intermediaries in the “fair trade” sector choose zero quantities in the second counterfactual. Since quantities chosen in the first counterfactual were already quite small, the marginal impact of FOB price changes is limited.

Figure 3. Estimated change in farm revenues from second counterfactual



Note: Counterfactual considers the joint impact of setting α to zero and setting the FOB price of fair trade coffee at the FOB price for conventional coffee.

We view the results of the calibrations as teaching us a few lessons. First, a model in which fair trade firms consider the welfare of upstream producers can generate beneficial impacts of fair trade distribution channels. However, it is difficult to reconcile the rather small fair trade market shares with joint propositions that a) there is a highly uncompetitive conventional market, and b) fair trade firms are substantially reducing this market power. In this model, at least, high levels of oligopsony power are difficult to reconcile with small fair trade market shares and the relatively small gap in conventional markets between farm and FOB prices. Within the context of the Cournot model, this can only be reconciled by a large gap in marginal processing + transport costs.

Sensitivity

Our calibration study so far has relied upon a number of parameters that we selected. In particular, we parameterized the fair trade firm's concern parameter ($\alpha = 1$), the elasticity of producer substitution between fair trade and conventional berries ($\sigma = 100$), and the number of fair trade firms ($m = 1$). These parameters were chosen as plausible, but extreme, values. In each case, less extreme choices would have reduced the impact of fair trade coffee.

Consider first the concern parameter α . At the chosen value of $\alpha = 1$, the fair trade firm acts like a competitive firm, pricing at marginal cost. When α is set to zero, the fair trade firm severely contracts output, so that it operates like a monopsonist in the

fair trade market. When we select $\alpha < 1$, the firm is already withholding output to some degree in the benchmark.²² In this situation, their counterfactual response to setting $\alpha = 0$ is less severe than in our simulations above. Choosing $\alpha = \frac{1}{2}$ reduces the impact of fair trade by approximately $\frac{1}{2}$ in counterfactual scenario 1. The effects in counterfactual 2 are virtually unchanged. In most cases the fair trade firm exits when the FOB price falls, for both choices of benchmark α .²³

As noted earlier, we have chosen the producer substitution elasticity σ , to be relatively large ($\sigma = 100$). Given the relatively long time frame considered (our supply elasticity is a 10-year estimate), we view a large value for σ as an appropriate choice. We are giving coffee farmers in our model substantial leeway to switch between fair trade and conventional production. Since this parameter affects the degree of competition between fair trade and conventional intermediaries, it also affects counterfactual results. As a sensitivity check we reduce the value of σ in half, and rerun the model. Our results are virtually equivalent to simulations with larger values of σ .

We also consider changes in the value of m , the number of fair trade firms. In our baseline estimates above, the fair trade firm becomes a monopolist in the counterfactual exercise. It thus reduces its output choice substantially, generating relatively large impacts on the farmers. For larger chosen values of m , the counterfactual output reduction is smaller, so the effects of removing fair trade status are smaller. Choosing $m = 2$ reduces the impact of fair trade by about $\frac{1}{4}$ in the first scenario, with the effects in the second counterfactual basically unchanged.

The results of this section indicate that our baseline calibrations are extremely fair to the claims of the fair trade movement. Plausible alternative parameterizations suggest smaller effects of removing fair trade behaviour in the fair trade channel. It is likely, therefore, that our estimates are at the upper end of the distribution of plausible estimates.

²² One might argue that participants in the fair trade channel are earning rents through their participation in these activities. One could view these rents as the profits in the welfare function. $\alpha < 1$ implies some concern for these rents in the behaviour of the fair trade firm.

²³ One could imagine a choice of $\alpha > 1$, implying a concern for farmer welfare that is greater than the concern for profits. In practice, such a welfare function implies pricing below marginal cost. This would imply exit, were we also to include zero-profit conditions. We thus view $\alpha = 1$ as the upper limit for this model.

The model shows that the qualitative claim that fair trade reduces oligopsony power can be supported, but it is difficult to argue that these effects are quantitatively important.

Section IV. Conclusion

A key claim of the fair trade coffee movement is that oligopsony power reduces the welfare of developing country coffee farmers. We review the growing conditions for coffee, as well as an econometric literature on the topic, and argue that this claim is plausible. Given that plausibility, one might ask whether fair trade channels are an effective solution to an oligopsony market distortion.

We develop a model in which a fair trade firm can alleviate the distortionary effects of oligopsony power. The fair trade firm includes the welfare of farmers in its objective function. This behaviour leads the firm to act aggressively, reducing the deleterious effects of oligopsony power in the conventional market.

In order to evaluate the quantitative impact of the model, we calibrate the model to representative data on prices and quantities, along with plausible parameterizations of the models and other structural parameters. We focus on a particular parameterization that we view as especially favourable to the fair trade movement. Even in this case, the effects of fair trade on farm revenues are quite small.

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