The Effects of Fair Trade Certification: Evidence from Coffee Producers in Costa Rica

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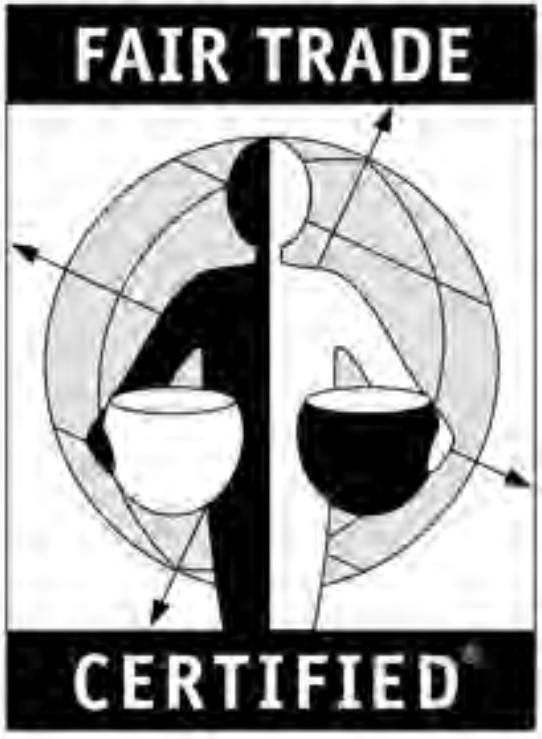

FAIR TRADE
CERTIFIED


FAIRTRADE
Guarantees
a better deal
for Third World
Producers

What is Fair Trade?

1. Producers must be small-scale and organized into **democratic cooperatives** that organize the sale/export of coffee.
   - Intended to shifts rents from intermediaries to farmers.
2. There is a **minimum price** guarantee for coffee.
3. There is a **premium** that is paid over the sales price.
   - Funds used to "improve the quality of life for producers and their communities"
4. **Environmental standards** must be met by coops and farmers.
5. **Hired workers** must be paid at least the minimum / average wage in the region; given a safe, healthy, and equitable work environment; be free to bargain collectively; and not be children or forced labor.

Fair Trade minimum price & premium for coffee (before and after 2011)

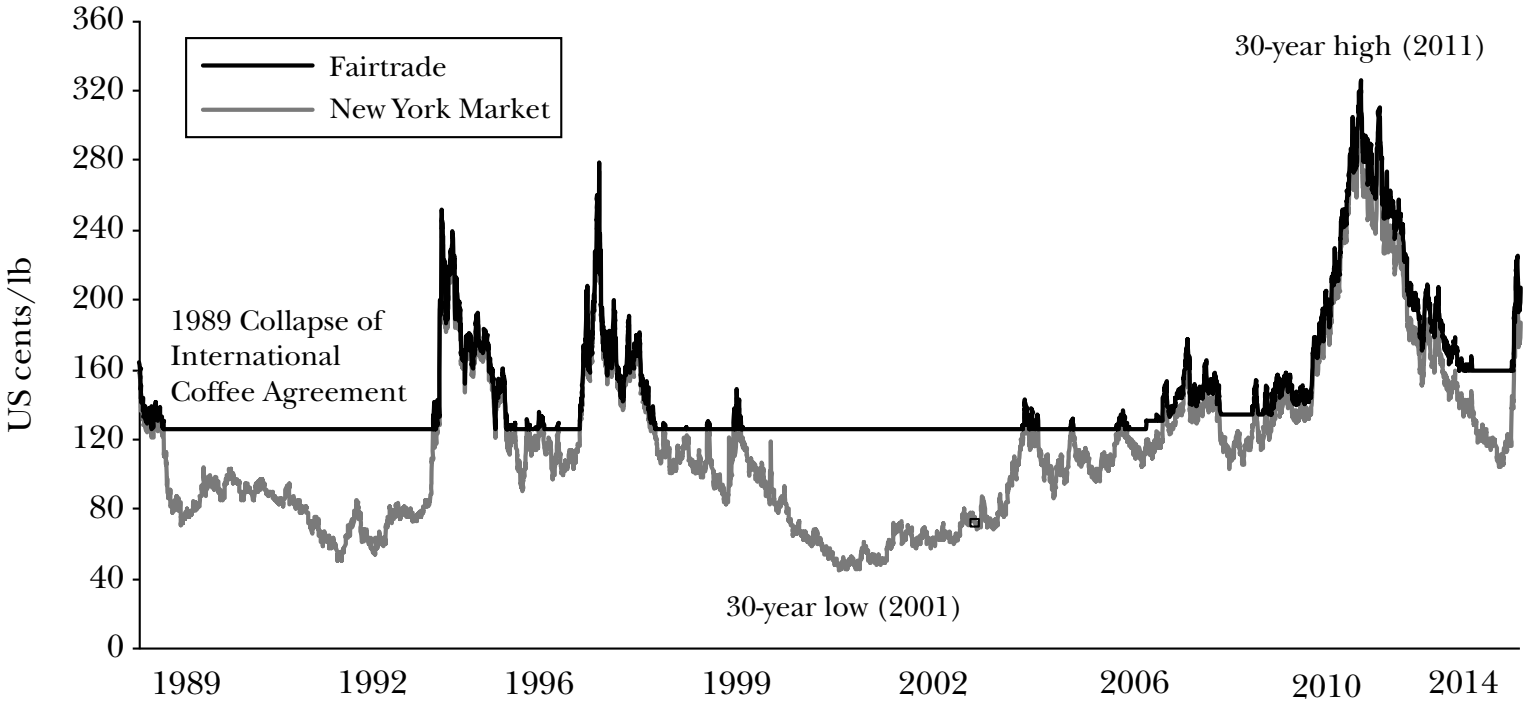
Minimum prices (examples):

- Arabica, conventional, washed: \$1.25/lb (now \$1.40).
- Arabica, organic, washed: \$1.45/lb (now \$1.70).

Price premium (for all coffee):

- 10 cents/lb (now 20 cents/lb); with 5 cents earmarked for productivity improvements.

Fair Trade coffee pricing



Source: © Fairtrade Foundation, adapted and used with permission.
Notes: NB Fairtrade Price = Fairtrade Minimum Price* of 140 cents/lb + 20 cents/lb Fairtrade Premium.** When the New York prices is 140 cents or above, the Fairtrade Price = New York price + 20 cents. The New York Price is the daily settlement price of the 2nd position Coffee C Futures contract at ICE Futures US.
* Fairtrade Minimum Price was increased on June 1, 2008, and April 1, 2011.
** Fairtrade Premium was increased on June 1, 2007, and April 1, 2011.

Existing empirical evaluations of the effects of Fair Trade coffee

- Cross-sectional studies (OLS)
  - Christopher Bacon (2005): 228 farmers from Nicaragua.
  - Mendez et al (2011): 469 HH from 18 cooperatives in 4 Latin American countries.
  - Weber (2011): 845 farmers from Southern Mexico.
- Cross-sectional studies (PS Matching)
  - Beuchelt and Zeller (2011): 327 farmers in Nicaragua.
  - Ruben and Fort (2009) and Ruben and Fort (2012): 360 farmers from 6 cooperatives in Peru.

Consumer valuation of FT

Experimental evidence

- Arnot, Boxall, and Cash (2006)
  - Randomly vary the price of cups of FT and non-FT brewed coffee.
  - Sales of FT coffee showed no sensitivity to price increases (that were up to 42% of price).
- Hiscox, Broukhim, and Litwin (2011)
  - Randomly labelled roasted coffee beans sold on ebay as FT.
  - Sales price was 23% higher for FT coffee than conventional.
- Hainmueller, Hiscox, and Sequeira (2015)
  - Randomly labelled roasted coffee beans as FT (and varied the price) in a well-known grocery store chain.
  - FT label led to a 10% increase in coffee sales.
  - Sales of high-end FT coffee did not decline when the price was increased.

Coffee production in Costa Rica

- One of the largest cash crops in Costa Rica.
  - Approx. 4% of rural employment.
- Producers are typically family farms that also produce subsistence crops.
  - Hire day laborers, particularly during harvests (2-3 months).
- Berries are picked and transported to a local mill or coop (within the same day).
  - Berries are washed, the pulp is removed, they are soaked to remove a gel covering, washed again, and then dried.
- Coffee is then sold/exported.

Data and their sources

1. Fair Trade certification of cooperatives / exporters: Transfair USA; 2003–2014
   - Have this for the universe of producers and products (globally).
2. Data on all Costa Rican coffee mills / cooperatives: Coffee Institute of Costa Rica (Icafe); 1999–2014
   - Sales, exports, prices, etc.
3. Individual & household characteristics: Encuesta de Hogares de Propósitos Múltiples, 1981–2009
   - Nationally representative HH survey of approx. 45,000 individuals per year.
   - Income, education, industry, occupation, etc.
4. Interviews by Raluca Dragusanu in summer of 2012.
   - With representatives from Icafe and managers from four FT-certified coffee cooperatives.

History of FT certification in Costa Rica, 1999–2014

Timing of certifications:

- 9 mills FT certified in 1999
- 3 more certify in 2005
- 3 more in 2006
- 1 more in 2008
- 1 more in 2009
- 5 more in 2010
- 1 more in 2011
- 1 more in 2013

Extent of certification:

- A total of 28 mills are ever-certified in the sample
- Total number of mills ranges from 91 to 209 depending on the year

An example of a Fair Trade cooperative

What drives the decision to certify?

Qualitative information from interviews:

1. Beliefs in the values associated with Fair Trade
   - Concern for environment, community, workers, etc.
2. Mill-specific costs of FT restrictions
   - E.g., FT certification forbids the sales of pesticides (and other chemicals) in stores owned by the mills.
3. Expectations about future prices (and the benefit of the price floor)
4. Knowledge about the FT certification process
5. Ability to obtain and maintain the certification
   - Requires managerial skill, good record keeping, etc.

Empirical evidence on selection into FT certification

$$I_{i,t}^{FT\ Onset} = \alpha_i + \alpha_t + \mathbf{X_{i,t}'\Gamma} + \sum_{j=1}^{3} \varphi_j Duration_{i,t}^{j} + \varepsilon_{i,t}$$

- i denotes coffee mills that are not already FT certified, t denotes years (1999–2014).
- $I_{i,t}^{FT\ Onset}$ - indicator that equals one if producer i becomes fair trade certified.
- $Duration_{i,t}^{j}$ - years mill has not been FT certified.
- $X_{i,t}$ - characteristic of interest:
  - Exports, domestic sales, prices, etc.
  - Consider lagged levels and lagged growth.
- α_i, α_t - mill FE, year FE.

Selection into certification: Levels of observables

	Dependent variable: Indicator for the onset of FT certification					
	Characteristic for independent variable:					
	ln domestic sales	ln exports	ln total sales	Exports as a share of total sales	ln domestic price	ln export price
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Certification onset and one-year lagged characteristics					
One-year lagged characteristic	-0.00048	-0.00092	-0.00148	0.00736	0.00749	-0.00348
	(0.00132)	(0.00221)	(0.00222)	(0.00733)	(0.00938)	(0.00925)
Duration: 3rd order polynomial	Y	Y	Y	Y	Y	Y
Year FE, Mill FE	Y	Y	Y	Y	Y	Y
Observations	1,577	1,553	1,632	1,634	1,577	1,553
R-squared	0.154	0.155	0.153	0.153	0.154	0.155
	Panel B: Certification onset and one- and two-year lagged characteristics					
One-year lagged characteristic	-0.00083	-0.00231	-0.00284	0.00749	0.00792	0.00149
	(0.00167)	(0.00323)	(0.00326)	(0.00824)	(0.01248)	(0.01249)
Two-year lagged characteristic	0.00065	0.00134	0.00097	0.00611	0.00620	-0.01789
	(0.00204)	(0.00240)	(0.00270)	(0.00783)	(0.00829)	(0.02278)
Duration: 3rd order polynomial	Y	Y	Y	Y	Y	Y
Year FE, Mill FE	Y	Y	Y	Y	Y	Y
Observations	1,268	1,270	1,338	1,339	1,268	1,270
R-squared	0.176	0.176	0.175	0.175	0.177	0.176

Notes : Coefficients are reported with standard errors clustered at the mill level in parentheses. All regressions include year fixed effects, mill fixed effects, and a third order polynomial in duration of not being FT certified. The dependent variable is an indicator variable that equals one if the mill switches to certification in that year. The sample includes all observations where a mill was not FT certified in the previous year. Once a mill becomes FT certified, they are no longer in the sample. The independent variable reported in Panel A is the lag of the characteristic reported in the column heading. The independent variables in Panel B are the one- and two-year lags of the characteristic in the column heading. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Selection into certification: Changes in observables

	Dependent variable: Indicator for the onset of FT certification					
	Characteristic for independent variable:					
	ln domestic sales	ln exports	ln total sales	Exports as a share of total sales	ln domestic price	ln export price
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Certification onset and prior one-year growth in characteristics					
Prior 1-year growth (t-1 to t)	-0.00033	0.00114	0.00044	0.00363	-0.00603	0.00008
	(0.00063)	(0.00196)	(0.00174)	(0.00401)	(0.00525)	(0.00452)
Duration: 3rd order polynomial	Y	Y	Y	Y	Y	Y
Year FE, Mill FE	Y	Y	Y	Y	Y	Y
Observations	1,497	1,490	1,583	1,585	1,497	1,490
R-squared	0.180	0.180	0.179	0.179	0.180	0.180
	Panel B: Certification onset and prior two-year growth in characteristics					
Prior 2-year growth (t-2 to t)	-0.00108	-0.00030	-0.00174	0.00399	-0.00783	0.00886
	(0.00111)	(0.00265)	(0.00266)	(0.00570)	(0.00597)	(0.01187)
Duration: 3rd order polynomial	Y	Y	Y	Y	Y	Y
Year FE, Mill FE	Y	Y	Y	Y	Y	Y
Observations	1,242	1,244	1,311	1,312	1,242	1,244
R-squared	0.205	0.204	0.204	0.203	0.206	0.205

Notes : Coefficients are reported with standard errors clustered at the mill level in parentheses. All regressions include year fixed effects, mill fixed effects, and a third order polynomial in duration of not being FT certified. The dependent variable is an indicator variable that equals one if the mill switches to certification in that year. The sample includes all observations where a mill was not FT certified in the previous year. Once a mill becomes FT certified, they are no longer in the sample. The independent variable reported in Panel A is the growth (log change) of the characteristic from period t-2 to period t. The independent variable in Panel B is the growth (log change) of the characteristic from period t-2 to period t. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Effects of FT: Mill-level estimating equation I

$$y_{i,t} = \alpha_i + \alpha_t + \beta\, I_{i,t}^{FT} + \varepsilon_{i,t}$$

- i denotes coffee mills/coops, t years (1999–2014).
- $y_{i,t}$ - outcomes of interest: exports, domestic sales, prices, etc.
- $I_{i,t}^{FT}$ - indicator that equals one if mill i is Fair Trade certified in year t.
- α_i - mill FE.
- α_t - year FE.

Mill-level estimating equation II

$$y_{i,t} = \mu_i + \mu_t + \gamma_1 I_{i,t}^{FT} + \gamma_2 I_{i,t}^{FT} \cdot I_t^{p<\underline{p}} + \epsilon_{i,t}$$

- $I_t^{p<\underline{p}}$ - indicator that equals one if the world coffee price is below the minimum FT price (at any point during the year).
- i denotes coffee mills/coops, t years (1999–2014).
- $y_{i,t}$ - outcomes of interest: exports, domestic sales, prices, etc.
- $I_{i,t}^{FT}$ - indicator that equals one if mill i is Fair Trade certified in year t.

Mill-level estimating equation III

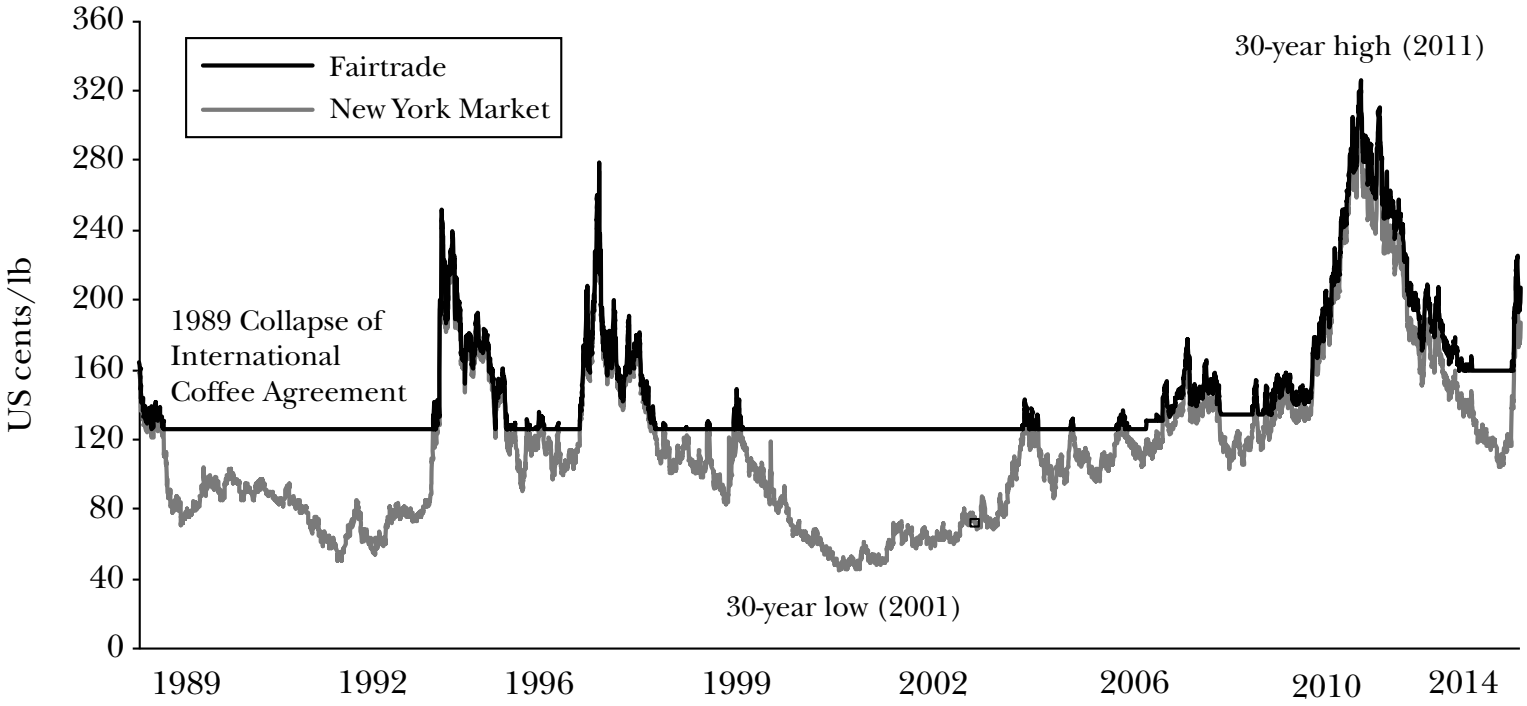
$$y_{i,t} = \zeta_i + \zeta_t + \varphi_1 I_{i,t}^{FT} + \varphi_2 I_{i,t}^{FT} \cdot P_t^{Gap} + \nu_{i,t}$$

- P_t^{Gap} - a continuous measure of the average size of the price premium for FT products in year t.

$$P_t^{Gap} = \max\{0, \text{FT Price}_t - \text{World Price}_t\}$$

- i denotes coffee mills/coops, t years (1999–2014).
- $y_{i,t}$ - outcomes of interest: exports, domestic sales, prices, etc.
- $I_{i,t}^{FT}$ - indicator that equals one if mill i is Fair Trade certified in year t.

Historical coffee prices



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* Fairtrade Minimum Price was increased on June 1, 2008, and April 1, 2011.
** Fairtrade Premium was increased on June 1, 2007, and April 1, 2011.

Effects on prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable:							
	Domestic Price (USD/lb)		ln Domestic Price		Export Price (USD/lb)		ln Export Price	
Fair Trade Certified, FTC	-0.044*	-0.035	-0.021	-0.014	-0.044	-0.030	0.005	0.012
	(0.026)	(0.024)	(0.038)	(0.037)	(0.032)	(0.029)	(0.024)	(0.024)
FTC x Price Gap Indicator	0.055		0.062		0.075***		0.041**	
	(0.035)		(0.038)		(0.022)		(0.020)	
FTC x Price Gap (USD/lb)		0.105		0.180		0.113*		0.078
		(0.079)		(0.127)		(0.063)		(0.102)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Mill FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,038	2,038	2,038	2,038	2,000	2,000	2,000	2,000
Number of clusters/mills	326	326	326	326	307	307	307	307
Mean of dep. variable	1.13	1.13	-0.03	-0.03	1.47	1.47	0.30	0.30
Std. dev. of dep. variable	0.59	0.59	0.61	0.61	0.61	0.61	0.43	0.43

Notes: The table reports OLS estimates of equations (3) and (4). An observation is a mill-year. Each specification contains mill and year fixed effects. The dependent variable in columns 1 and 2 is the domestic price calculated as the average price obtained by a mill in a given year for the domestic coffee sales transactions and expressed in USD/lb. The domestic price was winsorized at the 99th percentile. The dependent variable in columns 3 and 4 is the natural logarithm of the non-winsorized domestic price. The dependent variable in columns 5 and 6 is the export price calculated as the average price obtained by a mill in a given year in export coffee sales transactions and expressed in USD/lb. The export price was winsorized at the 99th percentile. The dependent variable in columns 7 and 8 is the natural logarithm of the non-winsorized export price. The Price Gap Indicator equals one in years in which the world price for Arabica coffee is below the Fair Trade minimum price. The Price Gap variable equals zero when the Price Gap Indicator is zero and equals the difference between the Fair Trade minimum price plus the premium and the world price for years when the Price Gap Indicator is equal to one. The Price Gap variable ranges from 0 to 0.66 USD/lb. The Fair Trade minimum price for washed Arabica coffee was increased from \$1.20/lb to \$1.25/lb in June 2008 and to \$1.40/lb in April 2011. The Fair Trade premium was increased from \$0.05/lb to \$0.10/lb in June 2007 and to \$0.20/lb in April 2011. Coefficients are reported with standard errors clustered at the mill-level in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Magnitude of the price effects

- When the price floor binds, export prices are 7.5 cents per pound higher or 4.1%, (columns 5 and 7).
- The actual export price of coffee does not increase 1-for-1 with the FT price premium.
  - A 1.0 cent increase in the price premium is associated with a 0.11 cent increase in the export price (column 6).
- This is consistent with not all coffee being sold as FT by FT-certified farmers.
  - Taken literally, the estimate implies that only 11% of FT-eligible coffee is sold as FT.
- Also consistent with measurement error biasing the estimated effect towards zero.

Effects on quantities (received and sold by mills)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable:					
	ln Total Quantity Received		ln Total Quantity Sold		Fraction of Quantity Received that is Sold	
Fair Trade Certified, FTC	-0.065	-0.011	-0.164	-0.093	0.002	-0.004
	(0.139)	(0.126)	(0.156)	(0.139)	(0.008)	(0.008)
FTC x Price Gap Indicator	0.400**		0.381*		-0.016**	
	(0.161)		(0.199)		(0.007)	
FTC x Price Gap (USD/lb)		0.829*		0.589		0.044
		(0.438)		(0.427)		(0.113)
Year FE	Y	Y	Y	Y	Y	Y
Mill FE	Y	Y	Y	Y	Y	Y
Observations	1,740	1,740	2,108	2,108	1,740	1,740
Number of clusters/mills	306	306	328	328	306	306
Mean of dep. variable	12.55	12.55	12.85	12.85	0.97	0.97
Std. dev. of dep. variable	2.18	2.18	2.19	2.19	0.09	0.09

Notes: The table reports OLS estimates of equations (3) and (4). An observation is a mill-year. Each specification contains mill and year fixed effects. The dependent variable in columns 1 and 2 is the natural logarithm of the total quantity received by the mill from coffee farmers. This variable is only reported in the sample years 2003 to 2014. The dependent variable in columns 3 and 4 is the natural logarithm of the total quantity (expressed in lbs) sold by a mill on the export market and domestic market. The dependent variable in columns 5 and 6 is equal to the ratio of total quantity sold and total quantity received. Note that this variable is only reported in the sample years 2003 to 2014. The Price Gap Indicator equals one in years in which the world price for Arabica coffee is below the Fair Trade minimum price. The Price Gap variable equals zero when the Price Gap Indicator is zero and equals the difference between the Fair Trade minimum price plus the premium and the world price for years when the Price Gap Indicator is equal to one. The Price Gap variable ranges from 0 to 0.66 USD/lb. The Fair Trade minimum price for washed Arabica coffee was increased from \$1.20/lb to \$1.25/lb in June 2008 and to \$1.40/lb in April 2011. The Fair Trade premium was increased from \$0.05/lb to \$0.10/lb in June 2007 and to \$0.20/lb in April 2011. Coefficients are reported with standard errors clustered at the mill-level in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Effects on quantity sold domestically vs. internationally

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable:					
	ln Domestic Quantity Sold		ln Export Quantity Sold		Export Quantity as a Fraction of Total Quantity Sold	
Fair Trade Certified, FTC	-0.357	-0.238	-0.085	-0.024	0.056*	0.047
	(0.225)	(0.207)	(0.178)	(0.162)	(0.033)	(0.031)
FTC x Price Gap Indicator	0.737***		0.289		-0.060	
	(0.203)		(0.198)		(0.044)	
FTC x Price Gap (USD/lb)		1.474***		0.327		-0.121
		(0.430)		(0.420)		(0.075)
Year FE	Y	Y	Y	Y	Y	Y
Mill FE	Y	Y	Y	Y	Y	Y
Observations	2,038	2,038	2,000	2,000	2,110	2,110
Number of clusters/mills	326	326	307	307	329	329
Mean of dep. variable	10.9	10.9	12.8	12.8	0.79	0.79
Std. dev. of dep. variable	2.3	2.3	2.1	2.1	0.25	0.25

Notes: The table reports OLS estimates of equations (3) and (4). An observation is a mill-year. Each specification contains mill and year fixed effects. The dependent variable in columns 1 and 2 is the natural logarithm of the total quantity (expressed in lbs) sold by a mill on the domestic market. The dependent variable in columns 3 and 4 is the natural logarithm of the total quantity (expressed in lbs) sold by a mill on the export market. The dependent variable in columns 5 and 6 is equal to the ratio of export quantity sold over total quantity sold. The Price Gap Indicator equals one in years in which the world price for Arabica coffee is below the Fair Trade minimum price. The Price Gap variable equals zero when the Price Gap Indicator is zero and equals the difference between the Fair Trade minimum price plus the premium and the world price for years when the Price Gap Indicator is equal to one. The Price Gap variable ranges from 0 to 0.66 USD/lb. The Fair Trade minimum price for washed Arabica coffee was increased from \$1.20/lb to \$1.25/lb in June 2008 and to \$1.40/lb in April 2011. The Fair Trade premium was increased from \$0.05/lb to \$0.10/lb in June 2007 and to \$0.20/lb in April 2011. Coefficients are reported with standard errors clustered at the mill-level in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Effects on mill revenues

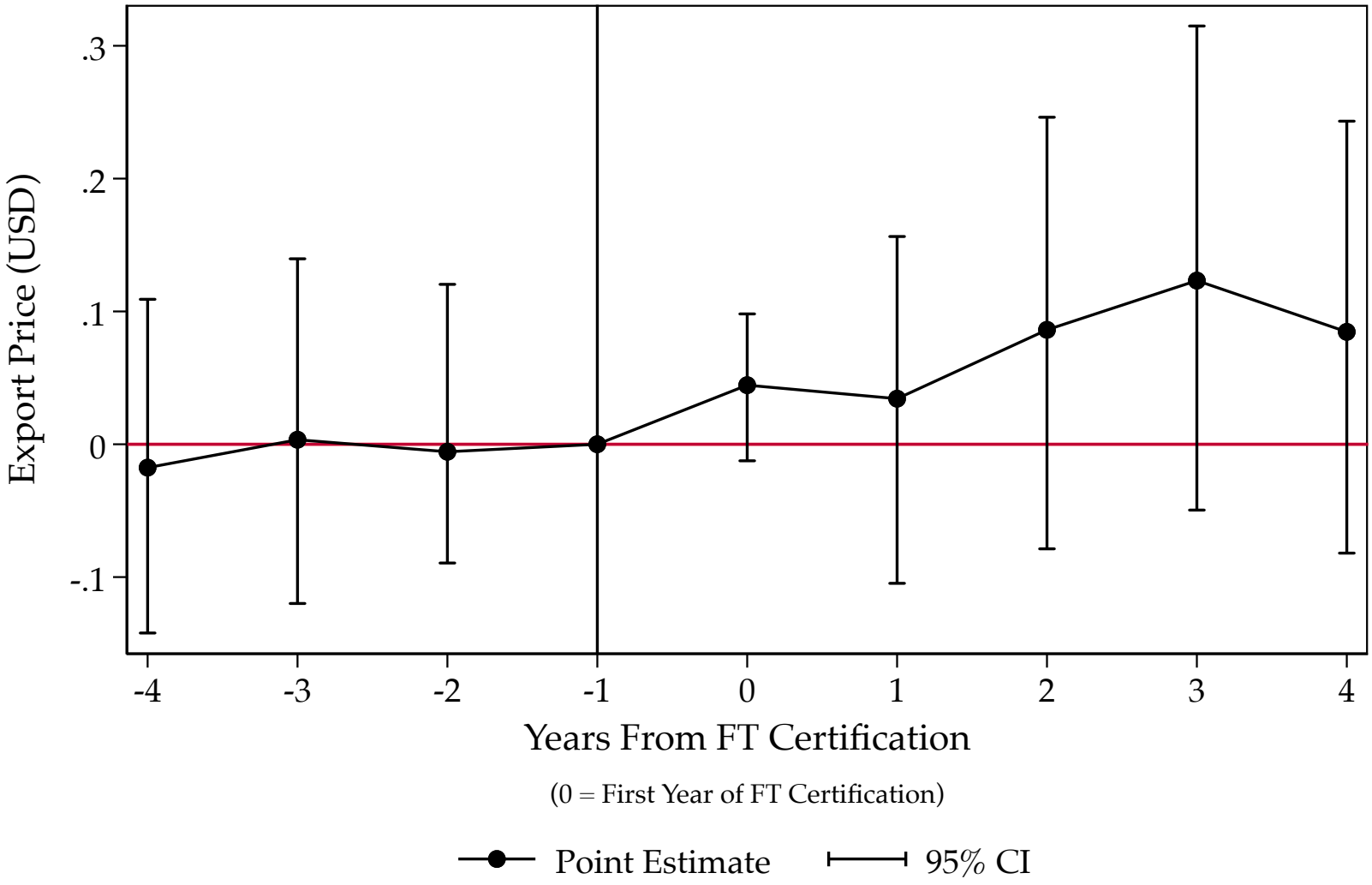
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable:					
	ln Total Revenue		ln Domestic Revenue		ln Export Revenue	
Fair Trade Certified, FTC	-0.163	-0.088	-0.378	-0.252	-0.081	-0.013
	(0.156)	(0.139)	(0.239)	(0.222)	(0.174)	(0.158)
FTC x Price Gap Indicator	0.400**		0.799***		0.329*	
	(0.201)		(0.215)		(0.199)	
FTC x Price Gap (USD/lb)		0.618		1.654***		0.405
		(0.437)		(0.467)		(0.431)
Year FE	Y	Y	Y	Y	Y	Y
Mill FE	Y	Y	Y	Y	Y	Y
Observations	2,110	2,110	2,038	2,038	2,000	2,000
Number of clusters/mills	329	329	326	326	307	307
Mean of dep. variable	13.12	13.12	10.83	10.83	13.10	13.10
Std. dev. of dep. variable	2.02	2.02	2.17	2.17	1.95	1.95

Notes: The table reports OLS estimates of equations (3) and (4). An observation is a mill-year. Each specification contains mill and year fixed effects. The dependent variable in columns 1 and 2 is the total revenue (expressed in USD) obtained by a mill in a given year and equals the sum of domestic and export revenue. The dependent variable in columns 3 and 4 is the natural logarithm of domestic revenue (expressed in USD) obtained by a mill in a given year. The dependent variable in columns 5 and 6 is the natural logarithm of export revenue (expressed in USD) obtained by a mill in a given year. The Price Gap Indicator equals one in years in which the world price for Arabica coffee is below the Fair Trade minimum price. The Price Gap variable equals zero when the Price Gap Indicator is zero and equals the difference between the Fair Trade minimum price plus the premium and the world price for years when the Price Gap Indicator is equal to one. The Price Gap variable ranges from 0 to 0.66 USD/lb. The Fair Trade minimum price for washed Arabica coffee was increased from \$1.20/lb to \$1.25/lb in June 2008 and to \$1.40/lb in April 2011. The Fair Trade premium was increased from \$0.05/lb to \$0.10/lb in June 2007 and to \$0.20/lb in April 2011. Coefficients are reported with standard errors clustered at the mill level in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

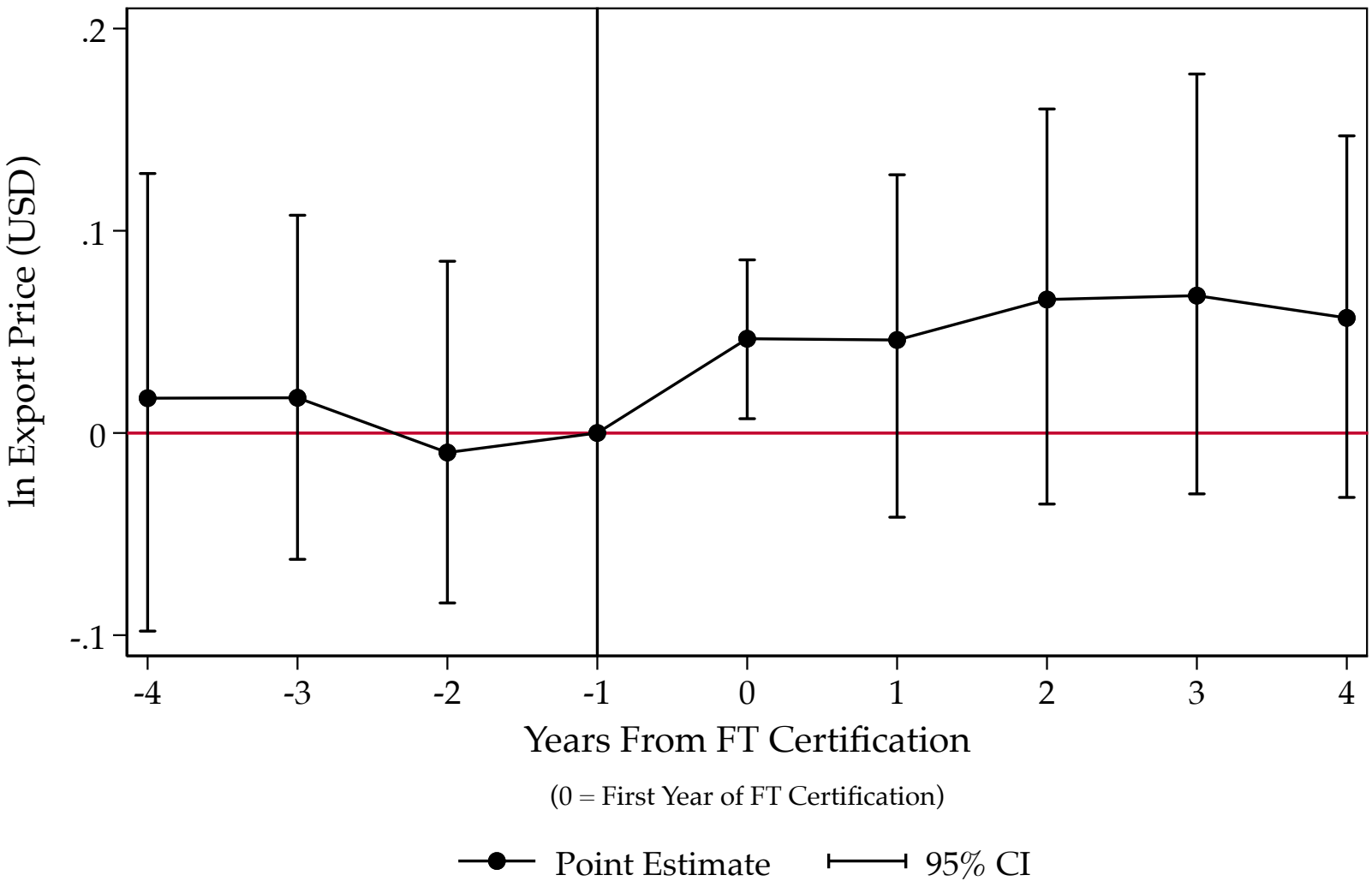
Event study analysis

- Verify and visualize our estimates using an event study analysis.
- Consider all mills that switch FT status in our sample.
- Look at year-by-year effects before and after.
  - Conditioning on mill and year FEs.

Event study analysis: Export price



Event study analysis: Export price (ln)



Summary of mill-level estimates

- When the price floor binds, FT-certified farmers have access to a market with higher prices.
- Recognizing this, they sell more through the local FT-certified cooperative to which they are a member (instead of conventional mills).
- The amount of coffee that farmers sell to FT cooperatives increases.
- The FT cooperative then sells more coffee.
- More of the 'extra' coffee is sold on the domestic market than the export market.
- **Overall: when the price floor binds, FT-certified mills receive a higher price, sell greater quantities, and have higher total revenues (for both domestic and exports).**

Effects of Fair Trade on households

- Due to data limitations, sample period is restricted to 2001–2009.
- Pay particular attention to:
  1. Within-canton spillovers.
  2. Distribution of benefits to different occupations within the coffee industry.
- Outcomes examined:
  1. Income of wage earners in households.
  2. Education of children.
- Question: How do we link FT certification, which is at the mill/coop level, to households?

Linking FT certification to households: Fair Trade intensity

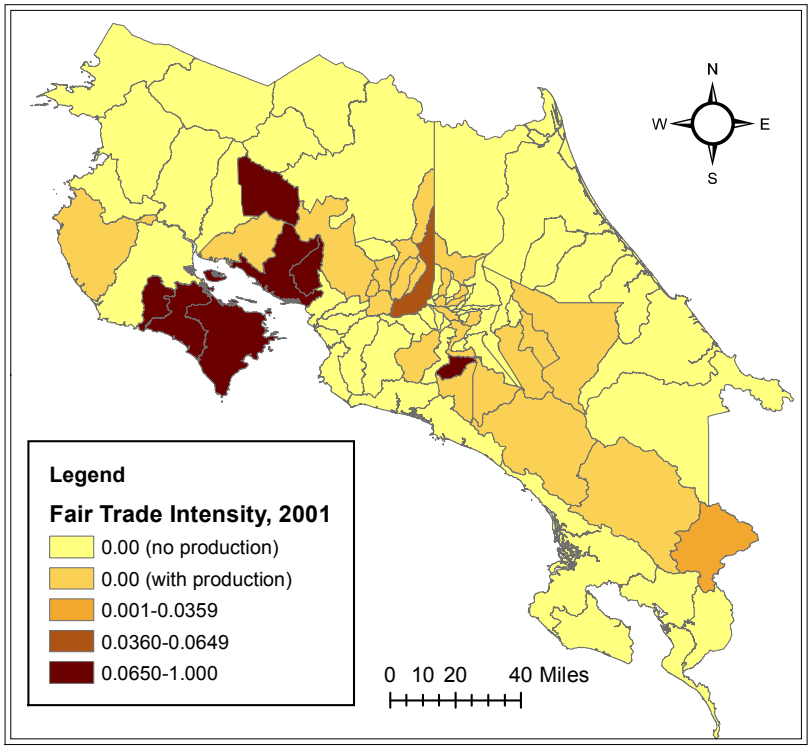
Exported-weighted share of coffee mills that are FT certified:

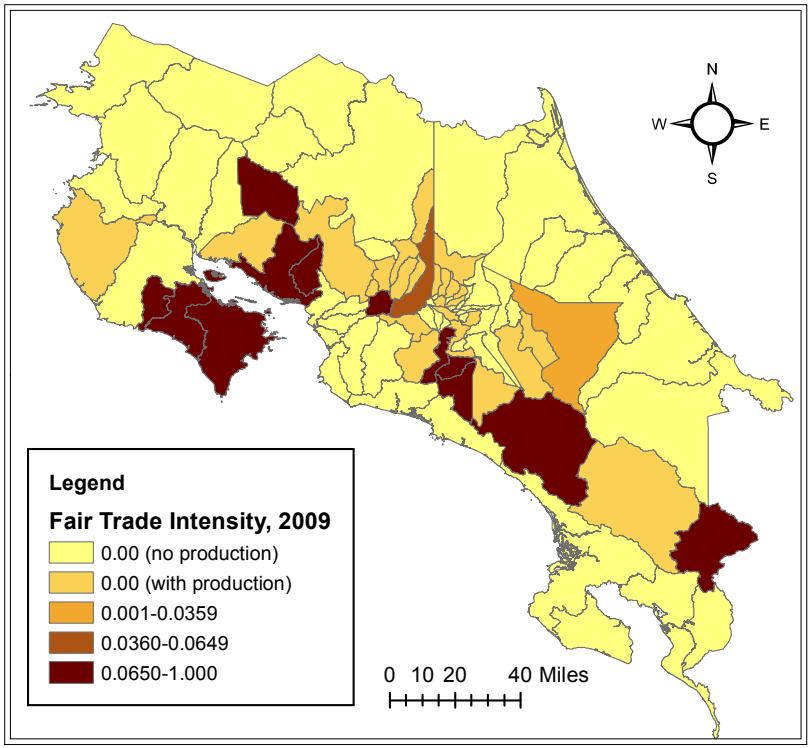
$$FTI_{c,t} = \sum_k \frac{X_{k,c,t}}{X_{c,t}} \cdot I^{FT}_{k,c,t}$$

where:

- c denotes cantons, t years, and k mills.
- $X_{k,c,t}$ denotes coffee exports by mill k in canton c in year t.
- $X_{c,t}$ denotes total coffee exports in canton c in year t.
- $I^{FT}_{k,c,t}$ is an indicator variable that equals one if mill k is FT certified in year t.
- When there is no coffee production in a county and year, i.e., $\sum_k X_{k,c,t} = 0$, we assign $FTI_{c,t}$ the value of zero.

Fair Trade intensity: 2001 & 2009





Price effects for restricted sample period: 2001–2009

	(1)	(2)	(3)	(4)
	Dependent variable:			
	Domestic Price (USD/lb)	ln Domestic Price	Export Price (USD/lb)	ln Export Price
Fair Trade Certified, FTC	-0.007	0.008	0.062***	0.087***
	(0.03)	(0.07)	(0.02)	(0.03)
Year FE	Y	Y	Y	Y
Mill FE	Y	Y	Y	Y
Observations	977	977	972	972
Number of clusters/mills	209	209	201	201
Mean of dep. variable	0.80	-0.36	1.08	0.02
Std. dev. of dep. variable	0.37	0.56	0.34	0.34

Notes : The table reports OLS estimates of equation (2). An observation is a mill-year. Each specification contains mill and year fixed effects. The dependent variable in column 1 is the domestic price calculated as the average price obtained by a mill in a given year for the domestic coffee sales transactions and expressed in USD/lb. The domestic price was winsorized at the 99th percentile. The dependent variable in column 2 is the natural logarithm of the non-winsorized domestic price. The dependent variable in column 3 is the export price calculated as the average price obtained by a mill in a given year in export coffee sales transactions and expressed in USD/lb. The export price was winsorized at the 99th percentile. The dependent variable in column 4 is the natural logarithm of the non-winsorized export price. Coefficients are reported with standard errors clustered at the mill-level in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Individual-level estimating equation I

$$\ln y_{j,i,c,t} = \alpha_i + \alpha_c + \alpha_t + \varphi_c Time_t + \theta FTI_{c,t} + \mathbf{X}'_{j,t}\boldsymbol{\Gamma} + \varepsilon_{j,i,c,t},$$

- j denotes individuals (all wage earners over the age of twelve).
- i industries (461), c cantons (79), t years (2001–2009).
- $\ln y_{j,i,c,t}$ - ln avg monthly income from principal economic activity.
- $FTI_{c,t}$ - Fair Trade intensity of canton c in year t.
- $\mathbf{X}_{j,t}$ - age, age^2, gender, gender x age, gender x age^2, and educational attainment FEs.
- α_i, α_c, α_t - industry, canton, year fixed effects.
- $\varphi_c Time_t$ - canton-specific time trends.

Individual-level estimating equation II

$$\begin{aligned}\ln y_{j,i,c,t} &= \alpha_i + \alpha_c + \alpha_t + \varphi_c Time_t \\ &\quad + \mu_1 FTI_{c,t} + \mu_2 FTI_{c,t} \cdot I_j^{i=\text{coffee}} + \mathbf{X}_{j,t}\boldsymbol{\Gamma} + \varepsilon_{j,i,c,t}\end{aligned}$$

- j denotes individuals, i industries (461), c cantons (79), t years (2001–2009).
- $\ln y_{j,i,c,t}$ - ln monthly income from principal economic activity.
- $FTI_{c,t}$ - Fair Trade intensity of canton c in year t.
- $I_j^{i=coffee}$ - indicator if j's industry is "cultivation of coffee".
- $\mathbf{X}_{j,t}$ - age, age^2, gender, gender x age, gender x age^2, and educational attainment FEs.

Individual-level estimating equation III

$$
\begin{aligned}
\ln y_{j,i,o,c,t} = \; & \alpha_{i,o} + \alpha_c + \alpha_t + \varphi_c Time_t + \gamma_1 FTI_{c,t} \\
& + \gamma_2 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{skilled}} \\
& + \gamma_3 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{unskilled}} \\
& + \gamma_4 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{nonfarm}} + \mathbf{X}_{j,t}\boldsymbol{\Gamma} + \varepsilon_{j,i,o,c,t},
\end{aligned}
$$

- $\alpha_{i,o}$ - industry-occupation FEs (9,793).
- $I_j^{i=coffee,o=skilled}$ - indicator if j is in coffee cultivation and has a skilled farm occupation: "farmer or skilled worker".
- $I_j^{i=coffee,o=unskilled}$ - indicator if individual j is in coffee cultivation and has an unskilled farm occupation: "coffee picker" or "agricultural laborer".
- $I_j^{i=coffee,o=nonfarm}$ - indicator if j is in coffee cultivation and has non-farm occupation.

Occupational categories

Detailed description:	Workers in the coffee industry: Skilled agriculture	Unskilled agriculture	Nonfarm occupations	Total
Farmers or skilled workers in crop production	939	0	0	939
Agricultural laborers	0	1,454	0	1,454
Coffee pickers	0	269	0	269
Technical or middle professions in chemistry, physics, or engineering	0	0	55	55
Driving of vehicles and operating heavy machinery	0	0	19	19
Services, protection or security	0	0	17	17
Management level at private companies or public institutions	0	0	12	12
Support of the administrative process	0	0	10	10
Unskilled occupations in mining, construction, manufacturing and transportation	0	0	10	10
Mechanical construction, metallurgy, and related occupations	0	0	9	9
Other technical or middle professional level occupations	0	0	9	9
Unskilled occupations in sales and services	0	0	8	8
Salesemen at shops and wharehouses	0	0	7	7
Operating and installing cement or metallurgy machinery	0	0	6	6
Breeders of livestock or producers of milk and its derivatives	4	0	0	4
Professional level occupations in life sciences, medicine and health	0	0	4	4
Skilled occupations in construction industries	0	0	3	3
Technical-level occupations in life sciences, medicine and health	0	0	1	1
Other laborer	0	0	1	1
Total:	943	1,723	171	2,837

Notes : Data are from the 2001-2009 household surveys. The table reports the number of observations in each occupation category for workers whose primary industry is coffee for various groups of workers. For skilled and unskilled agricultural workers, we report occupations using the most detailed occupation codes. For nonfarm workers, we report occupations using one higher level of aggregation.

Individual-level estimating equation IV

$$
\begin{aligned}
\ln y_{j,i,o,c,t} = \; & \alpha_{i,o} + \alpha_c + \alpha_t + \varphi_c Time_t + \beta_1 FTI_{c,t} \cdot I_j^{o=\text{skilled}} \\
& + \beta_2 FTI_{c,t} \cdot I_j^{o=\text{unskilled}} + \beta_3 FTI_{c,t} \cdot I_j^{o=\text{nonfarm}} \\
& + \beta_4 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{skilled}} \\
& + \beta_5 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{unskilled}} \\
& + \beta_6 FTI_{c,t} \cdot I_j^{i=\text{coffee},o=\text{nonfarm}} + \mathbf{X}_{j,t}\boldsymbol{\Gamma} + \varepsilon_{j,i,o,c,t}
\end{aligned}
$$

- This specification also allows the FT spillover effect to vary by occupation.
- This also controls for double interactions:
  - E.g., $FTI_{c,t} \cdot I_j^{i=coffee}$, $FTI_{c,t} \cdot I_j^{o=skilled}$.
- The industry-occupation double interactions are absorbed by the industry-occupation fixed effects.
  - E.g., $I_j^{i=coffee} \cdot I_j^{o=skilled}$; $I_j^{i=coffee} \cdot I_j^{o=unskilled}$; etc.

FT intensity and log income

	Sample: All individuals 12 or older Dependent variable: ln (monthly income)			
	(1)	(2)	(3)	(4)
Fair Trade Intensity, FTI	-0.018 (0.066)	-0.029 (0.064)	-0.031 (0.057)	
FTI x Coffee		0.086 (0.089)		
FTI x Skilled				-0.106 (0.067)
FTI x Unskilled				-0.031 (0.057)
FTI x Nonfarm				-0.025 (0.061)
FTI x Coffee x Skilled			0.275* (0.156)	0.347** (0.156)
FTI x Coffee x Unskilled			-0.085 (0.082)	-0.089 (0.091)
FTI x Coffee x Nonfarm			-0.251** (0.096)	-0.258*** (0.094)
Age, age^2, gender & interactions	Y	Y	Y	Y
Education FE	Y	Y	Y	Y
79 Canton FE	Y	Y	Y	Y
9 Year FE	Y	Y	Y	Y
Canton-specific time trends	Y	Y	Y	Y
9,793 Industry x Occupation FE	N	N	Y	Y
461 Industry FE	Y	Y	N	N
Observations	143,364	143,364	143,364	143,364
Clusters	79	79	79	79
R-squared	0.522	0.522	0.612	0.612

Notes: The unit of observation is an individual. The sample includes all individuals, who are 12 or older, and report positive income and an industry and occupation of employment. The dependent variable is the natural log of monthly income. The variable *Coffee* is equal to 1 if the individual's primary industry of employment is coffee cultivation. The variables *Skilled, Unskilled,* and *Nonfarm* equal one if an individual's primary occupation is skilled agricultural worker, unskilled agricultural worker, or other nonfarm occupation, respectively. All regressions include education FE, canton FE, year FE, and controls for age, age-squared, gender, gender x age, and gender x age-squared. Coefficients are reported with standard errors clustered at the canton level. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Magnitude of estimated income effects (column 3)

Effects on income from an increase from zero to the mean level of FTI:

Skilled coffee growers:

- $0.091 \times (-0.031 + 0.275) = 0.022$ or **2.2%**.

Unskilled coffee workers:

- $0.091 \times (-0.031 - 0.085) = -0.011$ or **-1.1%**.

Nonfarm coffee occupations:

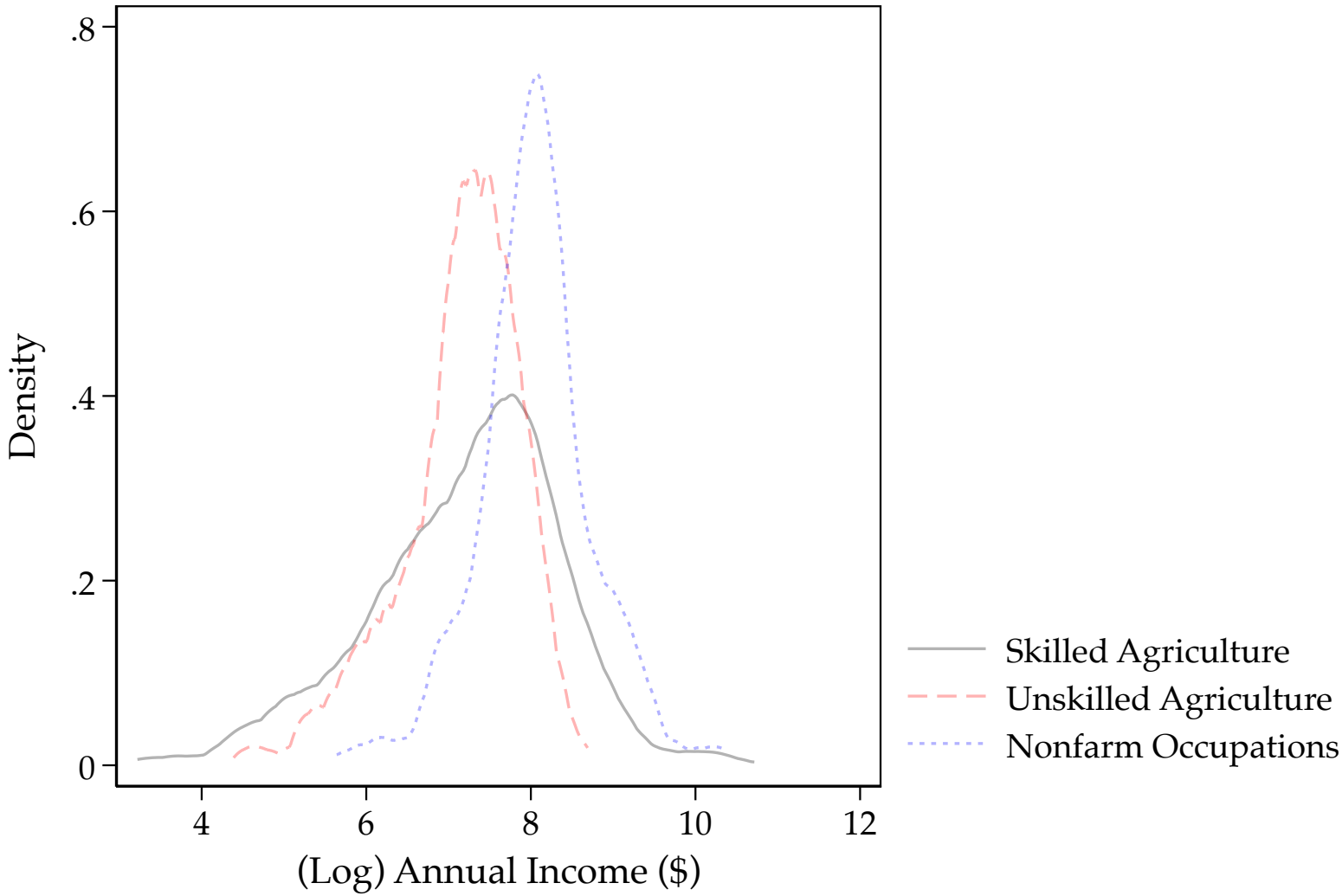
- $0.091 \times (-0.031 - 0.251) = -0.026$ or **-2.6%**.

Average monthly income by occupation and industry

	All occupations	Skilled agriculture only	Unskilled agriculture only	Nonfarm occupations
		All of Costa Rica		
All industries	$4,457 n = 143,364	$3,029 n = 8,554	$2,193 n = 16,942	$4,886 n = 117,868
Coffee industry only	$2,019 n = 2,837	$2,432 n = 943	$1,592 n = 1,723	$4,047 n = 171
		Coffee Producing Cantons Only		
All industries	$4,450 n = 71,747	$2,718 n = 4,253	$1,915 n = 6,943	$4,862 n = 60,551
Coffee industry only	$2,008 n = 2,557	$2,385 n = 867	$1,594 n = 1,542	$4,115 n=148
		Rural Parts of Coffee Producing Cantons Only		
All industries	$3,884 n = 42,627	$2,638 n = 3,777	$1,896 n = 6,485	$4,428 n = 32,365
Coffee industry only	$1,920 n = 2,436	$2,327 n = 822	$1,578 n = 1,495	$3,392 n = 119

Notes: The table reports average monthly income (converted to U.S. dollars per year) and the number of observations. For the conversion, it was assumed that 500 Costa Rican colones is equal to approximately one U.S. dollar.

Income distributions of those in the coffee sector by occupation groups



Magnitude of rent shifting from intermediaries to farmers

Rent transfer from intermediaries to farm owners:

- The estimated total annual gains to all skilled coffee growers is:
  - **$897,773.44**
- The estimated total annual loses from FT for all coffee intermediaries is:
  - **$95,195.42**
- Implies that transfers from non-farm workers (e.g., intermediaries) accounts for:
  - **10.6%** of the total benefits of FT for skilled coffee growers (e.g., farm owners)

Estimated vs. calculated effects

Skilled coffee grower effects:

- If 100% of the price gap each year were distributed equally to all skilled coffee growers, then each would have received an average of:
  - **$45.45** or **1.92%** of annual income (if **12%** of FT-eligible coffee sold as FT).
  - **$82.64** or **3.58%** of annual income (if **20%** of FT-eligible coffee sold as FT).
  - **$123.97** or **5.51%** of annual income (if **30%** of FT-eligible coffee sold as FT).

- Recall that the estimated effect of FT for the coffee owners was **2.2%** of income.

What about certification costs?

Actual costs:

- Cooperative level (some examples):
  - Coope Agri: $5,800 in first year and $3,800 in subsequent years.
  - Coocafe: $8,000 in first year and $5,100 in subsequent years.
  - Coope Victoria: $6,100 in first year and $4,100 in subsequent years.
- Farmer level:
  - About **$2 per year per coffee grower**.
  - Likely paid through the price premium.

Sensitivity to alternative samples

	Dependent variable: ln (monthly income)				
	All cantons			Rural parts of coffee producing cantons	All cantons
	All individuals	Household heads only	Coffee producing cantons only		Canton-year fixed effects
	(1)	(2)	(3)	(4)	(5)
FTI x Skilled	-0.106	-0.075	-0.094	-0.064	-0.084
	(0.067)	(0.072)	(0.074)	(0.078)	(0.056)
FTI x Unskilled	-0.031	0.018	0.016	0.087	-0.005
	(0.057)	(0.063)	(0.065)	(0.059)	(0.040)
FTI x Nonfarm	-0.025	0.004	-0.015	0.031	--
	(0.061)	(0.059)	(0.066)	(0.066)	
FTI x Coffee x Skilled	0.347**	0.365**	0.328*	0.339*	0.335**
	(0.156)	(0.159)	(0.164)	(0.167)	(0.160)
FTI x Coffee x Unskilled	-0.089	-0.120	-0.117	-0.138	-0.113
	(0.091)	(0.089)	(0.103)	(0.099)	(0.092)
FTI x Coffee x Nonfarm	-0.258***	-0.158	-0.239**	-0.270**	-0.284***
	(0.094)	(0.106)	(0.112)	(0.113)	(0.101)
Age, age^2, gender & interactions	Y	Y	Y	Y	Y
Education controls	Y	Y	Y	Y	Y
79 Canton FE	Y	Y	Y	Y	Y
9 Year FE	Y	Y	Y	Y	Y
Canton-specific time trends	Y	Y	Y	Y	N
9,793 Industry x Occupation FE	Y	Y	Y	Y	Y
Canton-year FE	N	N	N	N	Y
Observations	143,364	74,590	71,747	42,627	139,508
Clusters	79	79	36	35	79

Notes: The unit of observation is an individual. The sample includes all individuals, who are 12 or older, and report an income and an industry and occupation of employment. Coefficients are reported with standard errors clustered at the canton level. The variable *Coffee* is equal to 1 if the individual's primary industry of employment is coffee cultivation. The variables *Skilled*, *Unskilled,* and *Nonfarm* equal one if an individual's primary occupation is skilled agricultural worker, unskilled agricultural worker, or other nonfarm occupation, respectively. All regressions include canton FE, industry-occupation fixed effects, year fixed effects, and controls for age, age-squared, gender, gender x age, and gender x age-squared. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

Sensitivity to alternative FTI variables

	Dependent variable: ln (monthly income)			
	Fair Trade intensity measure:			
	Baseline: Export weights	Production weights	Time invariant export weights, 2001-2009	Initial export weights, 2001
	(1)	(2)	(3)	(4)
FTI x Skilled	-0.106	-0.091	-0.079	-0.069
	(0.067)	(0.066)	(0.058)	(0.058)
FTI x Unskilled	-0.031	-0.016	-0.015	-0.006
	(0.057)	(0.055)	(0.040)	(0.038)
FTI x Nonfarm	-0.025	-0.009	-0.013	-0.004
	(0.061)	(0.056)	(0.038)	(0.035)
FTI x Coffee x Skilled	0.347**	0.343**	0.296**	0.280**
	(0.156)	(0.161)	(0.125)	(0.121)
FTI x Coffee x Unskilled	-0.089	-0.085	-0.071	-0.065
	(0.091)	(0.093)	(0.084)	(0.084)
FTI x Coffee x Nonfarm	-0.258***	-0.260***	-0.192**	-0.182**
	(0.094)	(0.096)	(0.073)	(0.072)
Age, age^2, gender & interactions	Y	Y	Y	Y
Education controls	Y	Y	Y	Y
79 Canton FE	Y	Y	Y	Y
9 Year FE	Y	Y	Y	Y
Canton-specific time trends	Y	Y	Y	Y
9,793 Industry x Occupation FE	Y	Y	Y	Y
Observations	143,364	143,364	143,364	143,364
Clusters	79	79	79	79

Notes: The unit of observation is an individual. The sample includes all individuals, who are 12 or older, and report an income and an industry and occupation of employment. Coefficients are reported with standard errors clustered at the canton level. The variable *Coffee* is equal to 1 if the individual's primary industry of employment is coffee cultivation. The variables *Skilled, Unskilled,* and *Nonfarm* equal one if an individual's primary occupation is skilled agricultural worker, unskilled agricultural worker, or other nonfarm occupation, respectively. All regressions include canton fixed effects, industry-occupation fixed effects, year fixed effects, and controls for age, age-squared, gender, gender x age, and gender x age-squared and education. ***, **, and * indicate significance at the 1, 5, and 10 percent levels.

FT certification and education

- There are many ways that Fair Trade could affect children's education:
  - Social programs aimed at education, such as scholarships or bursaries.
    - E.g. *COOCAFE*'s Children of the Field Foundation (*Fundación Hijos del Campo*) provides scholarships to students and financial support to schools.
  - Increased incomes to skilled growers.
  - Opportunity cost effects.
  - Indirect effects if transportation is improved.
- We examine school attendance, linking children to the industry and occupation of the household head.

FT certification and school attendance

	Dependent variable: Indicator for school enrollment		
	Ages 7-12	Ages 13-17	Ages 18-25
	(1)	(2)	(3)
FTI x Skilled	-0.011	0.117	-0.079
	(0.012)	(0.080)	(0.075)
FTI x Unskilled	-0.008	0.055	-0.153***
	(0.016)	(0.093)	(0.056)
FTI x Nonfarm	-0.009	0.025	-0.103
	(0.008)	(0.073)	(0.063)
FTI x Coffee x Skilled	-0.006	-0.005	-0.074
	(0.022)	(0.076)	(0.113)
FTI x Coffee x Unskilled	0.027	-0.170*	-0.101
	(0.034)	(0.098)	(0.079)
FTI x Coffee x Nonfarm	-0.009	-0.801***	0.084
	(0.011)	(0.183)	(0.104)
Age, age^2, gender & interactions	Y	Y	Y
Canton FE	Y	Y	Y
Year FE	Y	Y	Y
Canton-specific time trends	Y	Y	Y
Industry x Occupation FE (of hh head)	Y	Y	Y
Observations	45,755	39,271	51,765
Clusters	79	79	79
R-squared	0.096	0.251	0.297

Conclusions

Mill-level

1. Selection: no evidence of variation in observables predicting the onset of FT certification
2. Fair Trade certification is associated with higher prices and more revenues when the price floor is binding

Conclusions

Individual-level

3. No evidence for within-canton spillover benefits to those outside of the coffee industry
4. Fair Trade certification has a positive effects on the incomes of skilled coffee growers (e.g., farm owners)
   - Relatively poor and account for 33% of coffee's workforce
5. No estimated benefit to unskilled coffee workers
   - Are even poorer and account for 61% of coffee's workforce
6. Non-farm workers (e.g., intermediaries and their employees) are hurt by FT
   - Much wealthier and account for 6% of coffee's workforce
7. No evidence that FT is associated with increased school attendance; appears lower for the children of coffee intermediaries