Foods and Fads: The Welfare Impacts of Rising Quinoa Prices in Peru

Marc Bellemare (U. Minnesota), Johanna Fajardo-González (U. Minnesota) and Seth Gitter (Towson U.)

Minnesota Population Center

University of Minnesota

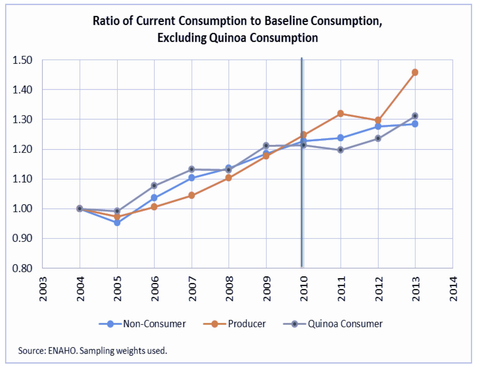
Introduction

- Quinoa went in less than a decade from being largely unknown outside of South America to being an upper-class staple in the United States
- International price of quinoa tripled between 2006 and 2013
- Media reports concerns about effects of rising quinoa prices on welfare of households in places where quinoa had traditionally been produced and consumed
- Most claims are not based in any rigorous empirical work
- We study relationship between value of household consumption and local consumer price of quinoa for those households that report consuming quinoa and those that report producing quinoa

2004-2013 ENAHO

- The Peruvian *Encuesta Nacional de Hogares* (ENAHO) is an annual, nationally representative household survey conducted by the Peruvian government's *Instituto Nacional de Estadistica e Informática*
- 227,400 household-year observations from 2004 to 2013
- 1,838 districts in 195 provinces in 25 departments
- **Pseudo Panel:** average over household-level measures within each geographical unit and then treat those geographical units as our primary units of observation
- **Outcome of interest:** total value of household consumption (welfare)
- **Consumers:** increasing proportion (26.8% to 30.8%) and increasing budget shares of quinoa in total consumption (0.10% to 0.63%)
- **Producers:** decreasing proportion (3.69% to 2.63%) but increasing revenues (12 PEN to 171 PEN)

Welfare of Quinoa Producers and Quinoa Consumers



- Up until 2009, the welfare of quinoa consumers increased at a faster rate than that of quinoa producers
- Starting in 2010 quinoa producers saw their welfare increase faster than quinoa consumers
- At peak of the quinoa price boom in 2013, welfare of quinoa producers increased much faster than that of quinoa consumers
- Welfare of quinoa producers increased by almost 50 percent over the period 2004-2013,
- Welfare of quinoa-consuming and quinoa-neither-consuming-nor-producing households increased by about 30 percent

Econometric Framework

Difference-in-Differences

Quinoa Consumers

$$\ln c_{gt} = \alpha_0 + \alpha_1 \ln p_{gt} + \delta_g + \tau t + \epsilon_{gt}$$

- $\ln c_{gt}$: mean household consumption in geographical unit g in year t
- $\ln p_{gt}$: mean of the consumer price of quinoa
- δ_g: vector of geographical-unit fixed effects
- t: linear time trend
- ϵ_{gt}: error term with mean zero
- α_1: estimate of quinoa price elasticity of household welfare for g where quinoa is consumed

Quinoa Producers

$$\ln c_{gt} = \theta_0 + \beta_0 D_{gt} + \sum_{t=2005}^{2013} \theta_t T_t + \sum_{t=2005}^{2013} \beta_t D_{gt} \times T_t + \gamma_g + \upsilon_{gt}$$

- D_{gt}: proportion of households that produce quinoa in geographical unit g in year t
- T_t: equals1 in year t and 0 otherwise
- γ_g: geographical unit fixed effects
- υ_{gt}: error term with mean zero
- DID estimates: D_{gt} and T_t are interacted >> difference in household welfare trends over time between quinoa producers and quinoa non-producers

Results and Conclusions

Pseudo-Panel Regression of Total Household Consumption on the Price of Quinoa
Unit of Observation: Provinces

Variables	(1)	(2)	(3)	(4)	(5)
Dependent Variable: Log of Total Value of Household Consumption					
Log of Price of Quinoa	0.110***	0.090***	0.092***	0.115***	0.120**
	(0.023)	(0.033)	(0.025)	(0.023)	(0.036
Constant	-52.621***	8.768***	8.705***	-49.746***	8.742**
	(6.234)	(0.040)	(0.021)	(5.949)	(0.040
Observations	1,590	1,590	1,590	1,590	1,590
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes
Linear Trend	Yes	No	No	No	No
Year Fixed Effects	No	Yes	No	No	No
Province-Specific Linear Trends	No	No	Yes	No	No
Department-Specific Linear Trends	No	No	No	Yes	No
Department-Year Fixed Effects	No	No	No	No	Yes
R-squared	0.386	0.396	0.620	0.461	0.553

Pseudo-Panel Regression of Total Household Consumption on the Proportion of Producers
Unit of Observation: Provinces

Variable	All Provinces	Quinoa-Producing Provinces	Quinoa-Consuming Provinces
Dependent Variable: Log of Total Household Consumption (in 2004 PEN			
2013*Proportion of Quinoa Producers	0.407**	0.169	0.461***
	(0.161)	(0.192)	(0.156)
2012*Proportion of Quinoa Producers	0.133	-0.094	0.163
	(0.147)	(0.176)	(0.142)
2011*Proportion of Quinoa Producers	-0.050	-0.131	-0.012
	(0.144)	(0.180)	(0.139)
2010*Proportion of Quinoa Producers	0.004	-0.167	-0.037
	(0.162)	(0.194)	(0.155)
2009*Proportion of Quinoa Producers	0.048	-0.225	-0.010
	(0.164)	(0.193)	(0.156)
2008*Proportion of Quinoa Producers	-0.012	-0.047	-0.015
	(0.201)	(0.251)	(0.200)
2007*Proportion of Quinoa Producers	0.073	0.050	0.087
	(0.164)	(0.191)	(0.158)
2006*Proportion of Quinoa Producers	0.080	0.077	0.092
	(0.105)	(0.140)	(0.106)
2005*Proportion of Quinoa Producers	-0.113	-0.210	-0.116
	(0.128)	(0.159)	(0.130)
Constant	8.824***	8.606***	8.837***
	(0.019)	(0.033)	(0.018)
Observations	1,919	851	1,750
Province Fixed Effects	Yes	Yes	Yes
R-squared	0.345	0.412	0.374
Number of Provinces	194	115	193

Note: *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

Demand side: 1-percent increase in the purchase price of quinoa is associated with a 0.07 percent increase in the welfare of quinoa-consuming households.

Supply side: positive effects on the welfare of producer households.

- *Direct effects:* faster increase in rate of welfare growth for households that produced quinoa relative to households that did not, but only in 2013, when quinoa prices were at their highest
- *Indirect effects:* reduction in the variability of welfare for households that produced quinoa