



INTERNATIONAL FOOD  
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IFPRI Discussion Paper 00719

September 2007

## **The Food Retail Revolution in Poor Countries: Is It Coming or Is It Over?**

Evidence from Madagascar

Bart Minten

New Delhi Office

## **INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE**

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## **ABSTRACT**

Global retail chains are becoming increasingly dominant in the global food trade and their rise leads to dramatic impacts on agricultural supply chains and on small producers. However, the prospects and impacts of a food retail revolution in poor countries are not yet well understood. Here, we examine this question in Madagascar, a poor but stable country where global retailers have been present for over a decade. Our survey and analysis finds that while global retail chains sell better quality food, their prices are 40 to 90% higher, *ceteris paribus*, than those seen in traditional retail markets. In poor settings, characterized by high food price elasticities, a lack of willingness to pay for quality, and small retail margins, supermarkets appear to set prices with an eye toward maximizing profits based on price-inelastic demands for quality products from a small middle class interested in one-stop shopping. It seems unlikely that global retail chains will further increase their food retail share in such poor settings.

**Keywords: food retail, supermarkets, food quality, Africa, Madagascar**



# 1. INTRODUCTION

Global retail chains are increasingly spreading throughout the world, especially into developing and transition economies (Reardon and Timmer 2005). For example, the average share of supermarkets in food retail went from only 10-20% in 1990 to 50-60% by the early 2000s in most of South America, East Asia (outside China) and South Africa (Reardon et al. 2003). This evolution has significant impacts on agricultural systems and food supply chains, largely due to the insistence of global retail chains on improved quality standards (Pingali 2006; Swinnen 2007; Dries et al. 2004; Hu et al. 2004). The instituted changes include centralized procurement systems, the use of specialized-dedicated wholesalers and preferred supplier systems, and demanding requirements of private contracts (Reardon et al. 2003). Much of the available evidence indicates that small farmers are often left out of these modern supply chains;<sup>1</sup> however, emerging literature suggests that small farmers may also benefit from the abovementioned changes (Maertens and Swinnen 2006; Minten et al. 2008; Swinnen 2007).

Global retail chains do not invest uniformly in all countries and some - especially poorer - countries have been left behind in the retail revolution.<sup>2</sup> In an effort to provide new insight into the potential for a retail revolution in poor countries, and thus to anticipate its impact, this study examines current food retailing in a case study of Madagascar, by documenting and comparing the extents to which different types of global chains and local supermarkets have already invested, their niches compared to other outlets, and their growth prospects.<sup>3</sup> The price setting behavior and the quality range of produce offered by supermarkets is rigorously measured and compared with that of the traditional food retailing system. Finally, we characterize which buyers are likely to be attracted by the price setting and quality offers available in supermarkets.

Madagascar is a good case study for such an analysis because it is a poor country by any measure. It was estimated to have a nominal per capita GDP of only \$290 in 2005, and it was ranked 171<sup>st</sup> out of a total of 181 countries by the IMF, based on per capita GDP calculations at purchasing power parity in 2005. Different national household surveys between 1993 and 2005 have evaluated poverty headcount ratios in Madagascar to be around 70%. The country has been politically stable, has not endured major

---

1 See Key and Runsten 1999; Reardon and Barrett 2000; Reardon et al. 2003; Kirsten and Sartorius 2002; Weatherspoon et al. 2001; Gibbon 2003; Dolan and Humphrey 2000; Humphrey et al. 2004; Kherralah 2000; Weatherspoon and Reardon 2003; Minot and Ngigi 2004.

2 In their pioneering work in this area, Reardon and Timmer (2005) distinguished different waves over time. The first three waves were, respectively: 1) South America and East Asia; 2) Southeast Asia and Central America; and 3) Russia, India, China and some countries from the aforementioned regions. The authors hypothesize that the fourth wave will involve the majority of countries in Sub-Saharan Africa.

3 A supermarket is defined in this analysis as a shop owned by one company which sells a multitude of products (food as well as non-food) in a closed-off environment where customers can freely walk around and check and choose the products that they want to purchase using baskets or trolleys. A supermarket is thus a broader concept than global retail chain as it includes shops owned by local companies (referred to as the 'local supermarkets').

military conflicts, and has had a reasonably good investment climate over the past few decades. Investments by global retail chains have thus not been hindered (i.e. compared to other investments) and global retail chains have been present in the country for over a decade, implying that they have moved past the learning curve of doing business in the country. Thus, Madagascar could be seen as a poor country with a business environment that welcomes global retail chains.

The contribution of this paper is threefold. First, it uses unique primary data to offer a rare insight into the functioning of urban food retail outlets in poor countries. This is particularly important because an increasing portion of this population acquires food in such urban settings.<sup>4</sup> We find a large quality difference in foods offered by supermarkets versus traditional markets, and also between global retail chains versus domestic supermarkets. Second, the data show that global retail chains sell significantly more expensive food, even when we control for quality attributes and location, in this poor environment.<sup>5</sup> Given this price setting mechanism, along with high food price elasticities and a limited demand for high-priced quality produce, there would seem to be little scope for market share growth for global retail chains in this environment. Third, we rely on innovative methodologies in food price analysis, using revealed (hedonic pricing on actual prices paid) and stated preference (willingness to pay using visual aids) methods, which allow us to control for important quality differences in the food markets of Madagascar.

The structure of the paper is as follows. Section 2 describes the current food retailing system in Madagascar. Section 3 discusses the methodology used and the primary data collected. In section 4, the prices and available quality of the studied products are compared among the various retail outlets. In section 5, we analyze the actual prices paid and the willingness of traditional retail markets consumers to pay for quality food. Section 6 concludes.

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<sup>4</sup> By 2020, the people living in developing countries will grow to about 6.8 billion. Ninety percent of the population increase will be in cities and towns, with more than half of the population in Asia and Africa and more than three quarters of the population in Latin America will live in urban settings (Garrett 2000).

<sup>5</sup> This finding is in contrast with richer economies (e.g. D'Haese and Van Huylenbroeck (2005) for South-Africa; Farina et al. (2005) for Brazil).

## 2. FOOD MARKETS AND RETAILING IN MADAGASCAR

Agricultural and food marketing policies in Madagascar resemble those found in many other African countries that have gone through cycles of government interventionism and retreat (Berg 1989; Barrett 1995). Following the disastrous socialist period of the 1970s and early 1980s, authorities implemented a structural adjustment program aimed at making the economy more market- and trade-oriented. At the beginning of the reforms, floor and ceiling prices for agricultural products were maintained. In reality, the government still effectively controlled domestic agricultural trade until 1986. While food retailing was mostly liberalized, the government still distributed rice through its fokontany distribution shops until the late 1980s. Except for the rice crisis of 2004, the government has abstained from intervention in food retailing in the years since.

Here, we study food retailing in Antananarivo, the capital and the largest city in Madagascar (current population, 1.5 million). In this city, food is retailed through different modern and traditional outlets. There are three types of traditional food retail outlets. The most important one is the traditional, fixed-location daily market where different traders sell food from designated areas. Traders often specialize in specific products, and traders dealing in the same products are usually clustered within a given market. The second group is comprised of the micro-retailers or street-sellers. These individuals also tend to specialize in products, but they sell in micro-quantities and operate often without formal registration, outside formal markets and sometimes outside regular hours. The third group consists of the small shops (*épiceries*) that may sell different types of food in addition to a variety of other basic products.

The modern outlets can be divided between local supermarkets and global retail chains. There are only two domestically owned supermarkets in Antananarivo; they have apparently suffered from competition from the global retail chains but may have location-based advantages in some areas. Three global retail chains are currently active in Madagascar: one South African-owned chain, Shoprite,<sup>6</sup> and two French-owned chains, Leaderprice<sup>7</sup> and Score<sup>8</sup>. Figure 1 shows the trend over time in the number of branches opened by these global retail chains. All but two branches of the global retail chains in Madagascar are located in the capital. The number of branches has more than doubled over the last decade, increasing from seven to sixteen.<sup>9</sup> The most aggressive grower has been Shoprite, which acquired the Champion supermarket chain in 2002 and has set up two additional branches since then. However,

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<sup>6</sup> In the beginning of 2005, Shoprite owned about 700 stores in 16 countries, making it the biggest supermarket chain in Africa.

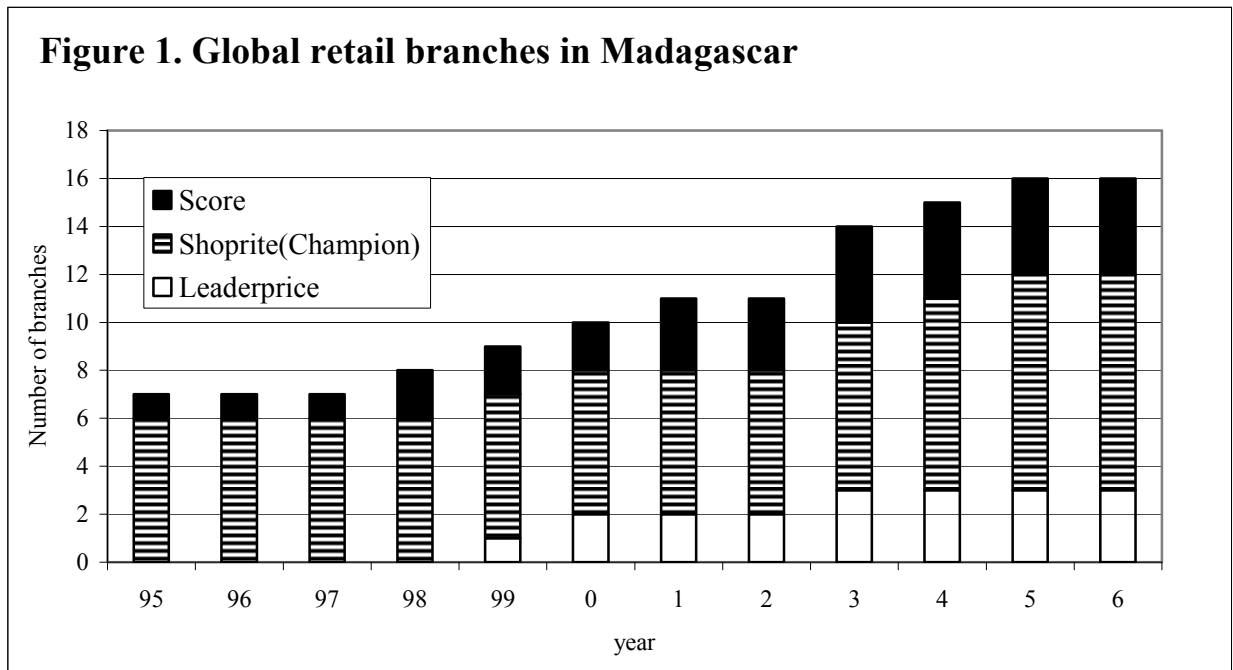
<sup>7</sup> The first Leaderprice stores were opened in 1990 in Paris, France. Currently, over 700 of these stores are operating in 16 countries all over the world.

<sup>8</sup> Score is run by the Bourbon Group, which owns wholesale and retail supermarkets in Ile de La Reunion (France), Mauritius, Mayotte, Vietnam, and Madagascar.

<sup>9</sup> Or, at the national level, approximately one store per one million people.

none of the global retailers currently have any expansion plans. Overall, supermarkets in Madagascar have significantly smaller retail shares than those in neighboring countries (such as the richer neighbors, South Africa and Mauritius), and slightly smaller shares compared to those in similar poor countries such as Kenya, Zambia and Zimbabwe (Weatherspoon and Reardon 2003).

There is a clear differentiation in the store layouts of the different supermarkets. The French supermarkets have the biggest outlets (typically between 2,000 and 7,000 m<sup>2</sup> of shopping area) and provide ample parking space. Score has the biggest stores and sells a large variety of goods in addition to food and basic necessities. In contrast, the South African-owned Shoprite stores are significantly smaller (around 2,000 m<sup>2</sup>), are located in busy urban areas, do not provide parking space and sell fewer goods. The local supermarkets have the smallest stores (typically less than 500 m<sup>2</sup>).



### 3. METHODOLOGY AND DATA COLLECTION

To better understand food retailing, we collected different types of information. Through November and December 2006, we surveyed traders and consumers in the traditional market outlets, and conducted a price survey for all food retail outlets in six randomly selected districts of Antananarivo. In order to make data collection manageable, we focused on a limited number of products found in both traditional and modern retail outlets,<sup>10</sup> including: 1) rice, which is the major staple in Madagascar and represents about half the calories consumed by an average Malagasy citizen; 2) tomatoes, a major vegetable representing the fruit and vegetables category; and 3) zebu meat, which, together with chicken, is one of the most commonly consumed meats in Madagascar. We believe these three products are broadly representative of the different commodities in the food basket of a typical consumer.<sup>11</sup>

Since the primary purpose of the study is to compare price setting between supermarkets and traditional markets, the sampling was designed as follows. We selected six districts where global retail chains are situated. In the absence of a major traditional retail market in that district, a neighboring one was chosen. This selection was intended to avoid transport cost issues in our price comparisons between retail outlets. We then undertook a census of all the shops, street-sellers and sellers in traditional retail markets that offered the three products in each of the selected districts. About 30 traditional retailers, 5 street-sellers and 5 shops (if available) were then randomly selected from each district. In addition to surveying the retail sellers, we also interviewed all wholesalers of rice and tomatoes in Antananarivo.<sup>12</sup>

For analysis of the retail and wholesale traders, we used questionnaires including items that reflected the basic socio-economic characteristics of the traders, their purchase and sale practices, perceived price differences of quality attributes, current prices charged and paid for produce, quality indicators, and marketing costs. We also collected information on prices and quality characteristics for the three studied products, in both the global retail chains and the domestic supermarkets.

In each traditional daily market surveyed, we randomly selected 25 customers for an exit interview designed to help us understand their current consumption habits and their willingness to pay for quality produce (and thus their potential willingness to switch to modern outlets). We also asked about the prices and quality characteristics of their most recent transactions. Furthermore, we showed them pictures of high-quality meat, tomatoes and rice (as sold in the Score supermarket) and described the produce, and

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<sup>10</sup> Since little processed food is found in traditional retail markets, we shied away from analyzing any processed food, even though such foods represent the major items carried by supermarkets.

<sup>11</sup> Based on a nationwide representative household dataset, Ravelosoa et al. (1998) estimate that rice, vegetables, and meat make up 40%, 9% and 11% of all food expenses, respectively, in Madagascar. Similarly, based on a household dataset of 500 rural households, Minten and Zeller (2000) calculate that Malagasy households spend 46%, 9%, and 9% of all food expenditures on rice, vegetables and meat, respectively.

<sup>12</sup> Twelve wholesalers refused to be interviewed.

then asked them to evaluate (in an open-ended format) the maximum price they would be willing to pay for the items.

Table 1 provides details of the trader sample, which comprises almost 600 traders, including 235 rice traders, 205 tomato traders and 143 meat traders. Among the rice traders in the survey areas, about one third are wholesalers and none are street-sellers. Among the tomato traders, one quarter are wholesalers and none are shops (*épiceries*). The meat trader sample consists exclusively of meat shops (*boucheries*). There are a few striking differences among the traders of the different commodities. Only one third of the tomato traders are male, whereas more than 80% of the meat traders are male. Such gender-associated specialization has also been observed in other countries (e.g. Harriss-White, 1999). Because of the high number of wholesalers in the rice trader sample, the quantities sold, working capital, and value of trading assets are slightly higher than those for the other categories. The average distance to the nearest supermarket is less than 1 km; this is a consequence of our sampling strategy and controls for the effect of location differences in our price comparisons.

**Table 1. Descriptives of the traditional trader sample**

	Unit	Rice		Tomato		Meat	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
<b>Socio-economic information</b>							
age	years	35.6	10.1	35.3	11.1	40.7	9.2
education	years	9.1	3	6.9	2.7	8.8	2.2
gender	% male	42%		29%		81%	
time in this business	years	7.1	6.7	9.0	7.4	10.7	8.8
<b>Business information</b>							
distance to nearest supermarket	km	0.6	0.3	0.9	0.5	0.6	0.5
quantity sold per week	ton	392	854	16	12	5	35
maximum storage capacity	ton	10.0	45.0	7.5	45.7	0.4	0.2
value of vehicles in business	1000 ariary*	773	6788	88	1016	352	1065
working capital	1000 ariary	547	1116	247	737	375	581
number of known traders	number	6.0	5.6	4.6	4.4	10.7	8.8
<i>type of business</i>							
wholesaler	%	32		25		0	
retailer with table at market	%	53		61		0	
street-seller	%	0		14		0	
shop (epicerie)	%	15		0		100	
observations	number	235		205		143	

\* 2000 ariary=1\$

S.D.: standard deviation

#### 4. PRICES AND FOOD QUALITY OFFERED BY THE VARIOUS RETAIL OUTLETS

Figures 2 to 4 compare the retail prices of rice, tomato and meat in traditional versus modern outlets. These figures show two important features. First, the average prices are significantly higher in modern outlets. While there is some overlap of the curves for the three products, it is fairly small; 95%, 92%, and 89% of rice, tomato, and meat prices, respectively, in modern retail outlets are above the 90<sup>th</sup> percentile price of the same product in traditional outlets. Second, except for tomatoes, there is a significantly larger price variation in supermarkets compared to traditional retail outlets (as illustrated by their absolute lower peaks and the spread of the curves). The largest price variation is found for rice in modern outlets, where the price of rice varies as much as 25-fold, between 560 and 13,960 Ariary/kg.

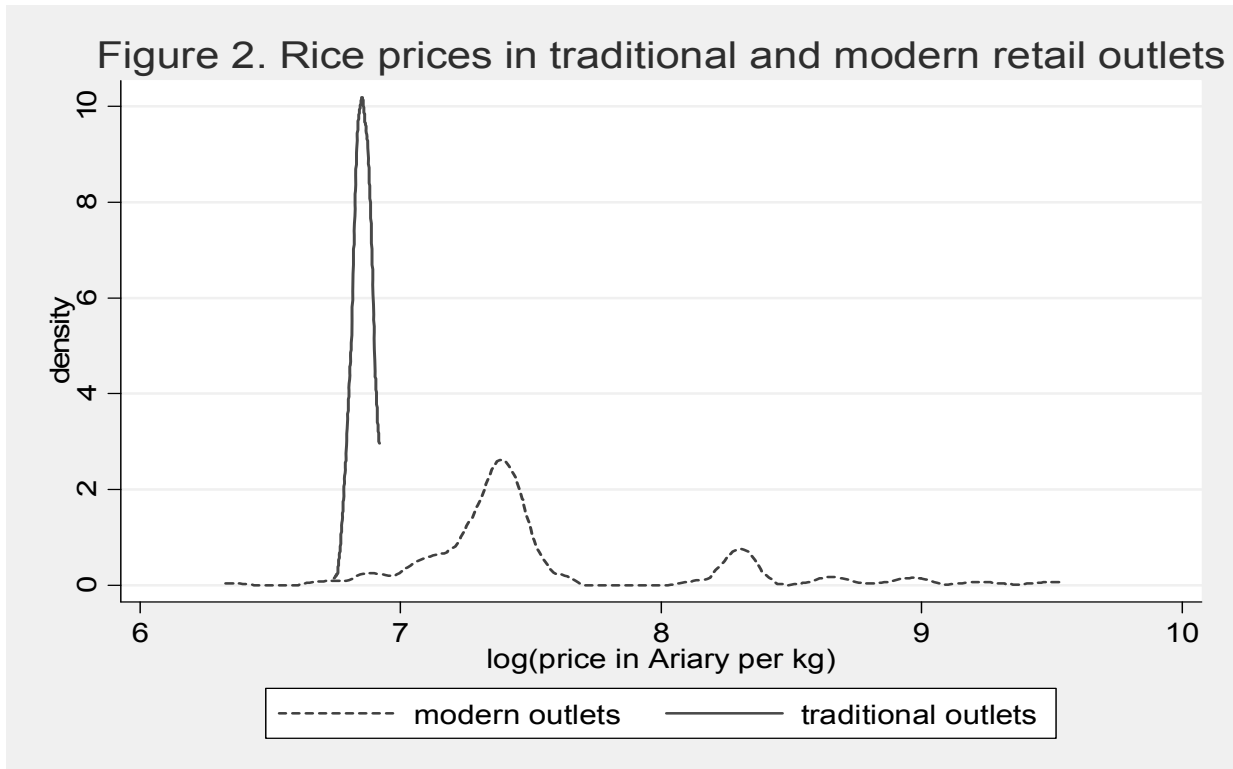


Figure 3. Tomato prices in traditional and modern retail outlets

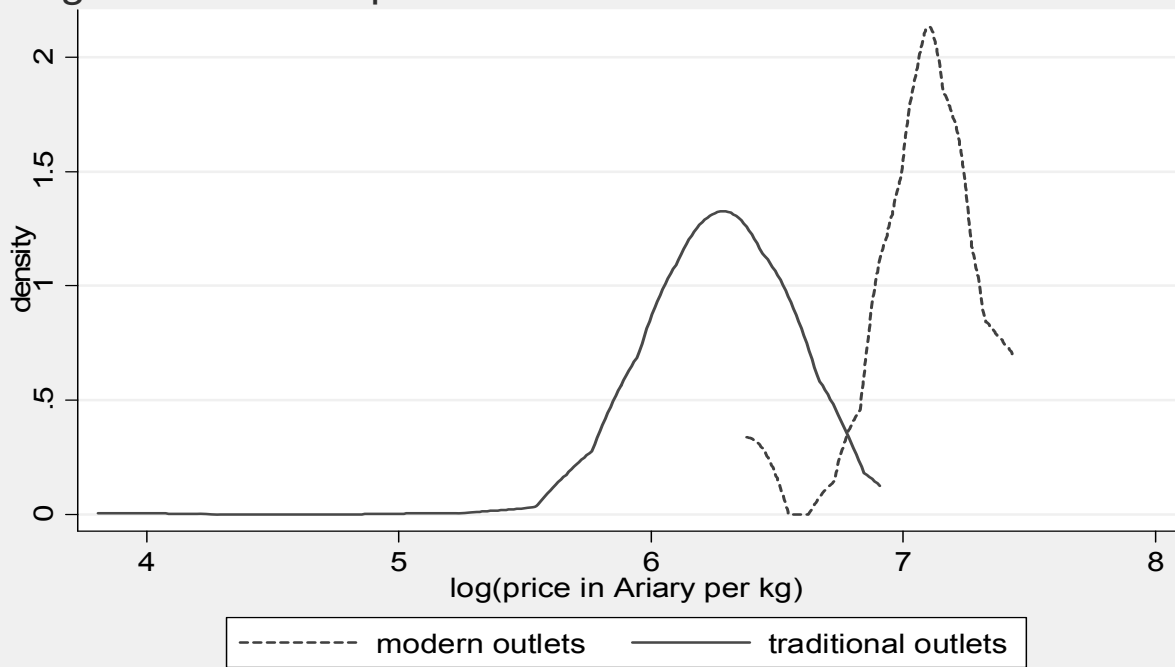
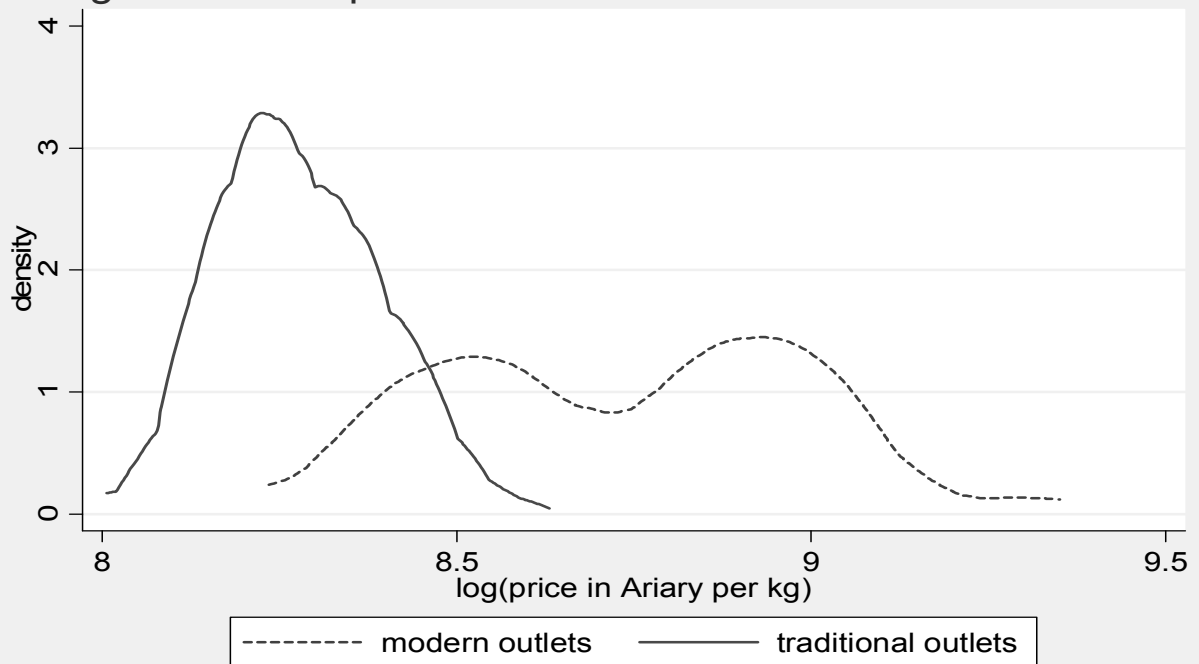


Figure 4. Meat prices in traditional and modern retail outlets





Part of the difference in prices between modern and traditional outlets is explained by differences in produce quality (Table 2),<sup>13</sup> with the quality of produce sold in supermarkets being overall superior to that offered in traditional markets.<sup>14,15</sup> In the case of rice, the supermarkets do not sell any local lower-quality rice, they carry a large variety of imported rice, they mostly sell long, white grain rice, there is little impurity (in the form of stones or paddy husks), and the percentage of broken rice is very low. Within the supermarket group, local supermarkets seem to have lower quality control than the global retail chains.<sup>16</sup> While the variety that is offered by traditional markets is significantly larger at the lower end, the markets also sell high quality rice as well. Similar patterns are seen for tomatoes and meat. Supermarkets sell mostly larger, ripe tomatoes with few black or rotten spots. Meat sold in supermarkets has lower levels of fat. It is almost always kept cold in the supermarkets, whereas it is rarely refrigerated in traditional markets.

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<sup>13</sup> In the trader survey, traders are asked to give information on the three most important types of produce they are selling. In the supermarkets, information is obtained for all on-sale products.

<sup>14</sup> This is not always the case; for example, Zinkhan et al. (1999) find in Brazil that traditional markets are perceived to sell higher quality produce than that found in modern market outlets.

<sup>15</sup> See Lehmann-Grube (1997) for a discussion on why supermarkets choose to deliver high quality products.

<sup>16</sup> For example, 65% of the rice in local supermarkets is long grain, compared to 79% and 82% in Shoprite and the French supermarkets; 35% of the rice in local supermarkets is the higher-valued white rice compared to 75% in Shoprite and 86% in the French supermarkets; 75% of the rice is <5% broken in local supermarkets compared to 93% and 99% in Shoprite and the French supermarkets, respectively; and 70% of rice in the local supermarkets has no paddy husks impurities, compared to 95% in Shoprite and 100% in the French supermarkets.

**Table 2. Availability of different qualities at various retail outlets**

			Traditional market			Supermarkets		
		unit	wholesaler	daily market	shop*- street-seller	local	Shoprite	French
<b>Rice</b>								
variety	local lower quality**	%	38	41	32	0	0	0
	local high quality***	%	52	48	48	85	67	72
	imported	%	10	10	18	15	34	28
long grains		%	54	62	64	65	79	82
color	red	%	21	28	22	35	21	13
	rose	%	35	22	24	30	4	1
	white	%	44	49	54	35	75	86
no odor		%	82	88	78	85	96	99
<5% broken		%	67	86	87	75	93	99
no stone impurity		%	82	71	81	95	100	100
no paddy husk impurity		%	58	61	55	70	95	100
observations		number	223	350	93	20	77	85
<b>Tomato</b>								
size	small	%	25	28	32	25	7	0
	medium	%	36	45	42	25	50	44
	large	%	39	27	26	50	43	55
ripeness	green	%	12	1	2	0	0	0
	ripe	%	84	76	84	100	100	100
	very ripe	%	4	23	15	0	0	0
round		%	2	25	26	75	64	55
no rotten spots		%	32	76	53	100	85	55
no black spots		%	37	63	66	100	79	55
observations		number	126	296	62	4	14	9
<b>Meat</b>								
level of fat	high	%		21		14	0	0
	medium	%		43		71	67	41
	none	%		36		14	32	59
no odor		%		98		100	100	100
refrigerated	never	%		89		0	0	0
	some parts	%		11		100	50	0
	always	%		0		0	50	100

\*: shop (epicerie) in the case of rice; street-seller in the case of meat

\*\* : tsipala, vary gasy II

\*\*\* : makalioka, vary gasy I

Different outlets thus sell different quality foods at significantly different prices. However, there is also an overlap of food with similar quality characteristics being sold in the different outlets. In these cases, we are able to test to what extent the prices match the quality attributes in the different retail outlets. Two price regressions are run for each product. In the first regression, we relate the price per kg of the three products with the different types of outlets (Table 3, 1<sup>st</sup> and 2<sup>nd</sup> column of each product

heading). This gives us an idea of the price difference per kg of produce. Consistent with the information in Figures 2 through 4, the results of the regression show that the prices of the three products are significantly higher in the supermarkets compared to traditional markets, as shown by significant F-tests (Table 3, bottom). The supermarket prices of one kg of rice, tomatoes and meat are 50-75%, 70-95% and 42-51%, respectively, higher than those seen in traditional daily retail markets. The price differences are largest for the fresh vegetable category.

However, as this analysis does not control for quality differences, the comparison masks price differences due to quality differences between the various outlets. To address this issue, we run a second, hedonic price regression where we include quality attributes as additional controls on top of the retail outlet variable (Table 3, 3<sup>rd</sup> and 4<sup>th</sup> column for each product heading). These quality attributes were visually evaluated by enumerators specifically trained on this evaluation prior to the actual survey. The regression included quality attributes for rice (variety, length of grain, color of grain, odor, percentage broken, stone impurity and paddy husk impurity), tomato (size, form, ripeness, rottenness and spots), and meat (type of meat, level of fat, odor, and refrigeration).

In this regression, the price differences between supermarkets and traditional markets become smaller due to the higher quality found in supermarkets, but they stay significant for all three products, as shown again by the appropriate F-tests. Furthermore, there are differences among the supermarkets; the local supermarkets are the cheapest, the global French chains are the most expensive, and the South African-owned Shoprite falls in between.<sup>17</sup> However, significance is seen only in a comparison of rice prices between the global retail chains and the local supermarkets. For the other products, the difference is non-significant, as indicated by F-test.<sup>18</sup>

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<sup>17</sup> The Economist (15/01/05) called Shoprite the ‘Walmart of Africa,’ and credited the chain with bringing low-priced goods en masse to the poor.

<sup>18</sup> There is also differentiation within traditional markets, as street-sellers sell less expensive tomatoes than those found in traditional daily markets.

**Table 3. Price differences at various retail outlets**

	Rice				Tomato				Meat			
	Without controls		With controls*		Without controls		With controls*		Without controls		With controls*	
Default#	coeff.	t-value	coeff.	t-value	coeff.	t-value	coeff.	t-value	coeff.	t-value	coeff.	t-value
traditional daily retail market	0.063	<b>23.390</b>	0.066	<b>6.650</b>	0.467	<b>14.300</b>	0.473	<b>12.470</b>				
street-seller					0.346	<b>8.210</b>	0.354	<b>8.380</b>				
traditional shops (epicerie)	0.057	<b>14.320</b>	0.054	<b>4.360</b>								
local supermarket	0.563	<b>8.320</b>	0.528	<b>9.440</b>	1.183	<b>23.080</b>	1.124	<b>14.440</b>	0.422	<b>3.280</b>	0.335	<b>3.540</b>
Shoprite	0.820	<b>13.060</b>	0.677	<b>15.290</b>	1.167	<b>13.910</b>	1.138	<b>9.500</b>	0.419	<b>9.620</b>	0.387	<b>5.670</b>
French supermarket	0.797	<b>12.750</b>	0.685	<b>13.950</b>	1.417	<b>25.280</b>	1.335	<b>20.770</b>	0.512	<b>10.440</b>	0.512	<b>5.530</b>
Number of observations	849		799		514		504		499		491	
F	187.750		50.120		205.240		78.780		69.670		63.750	
Prob>F	0.000		0.000		0.000		0.000		0.000		0.000	
R2	0.599		0.721		0.529		0.607		0.554		0.757	
Root MSE	0.252		0.182		0.271		0.242		0.138		0.104	
<b>F-tests</b>												
Price is significantly different between:	F(1,843)	Prob>F	F(1,778)	Prob>F	F(1,508)	Prob>F	F(1,489)	Prob>F	F(1,495)	Prob>F	F(1,473)	Prob>F
local supermarket and trad. retail market	54.59	<b>0.000</b>	67.05	<b>0.000</b>	258.50	<b>0.000</b>	86.78	<b>0.000</b>	10.73	<b>0.000</b>	12.51	<b>0.000</b>
Shoprite supermarket and trad. retail market	154.53	<b>0.000</b>	183.30	<b>0.000</b>	76.59	<b>0.000</b>	35.26	<b>0.000</b>	92.47	<b>0.000</b>	32.13	<b>0.000</b>
French supermarket and trad. retail market	138.01	<b>0.000</b>	173.89	<b>0.000</b>	361.52	<b>0.000</b>	242.47	<b>0.000</b>	109.06	<b>0.000</b>	30.61	<b>0.000</b>
Shoprite supermarket and local supermarket	7.77	<b>0.005</b>	4.83	<b>0.028</b>	0.04	0.850	0.01	0.916	0.00	0.982	0.20	0.655
French supermarket and local supermarket	6.45	<b>0.011</b>	4.30	<b>0.038</b>	13.46	<b>0.000</b>	5.94	<b>0.015</b>	0.43	0.514	1.81	0.179
Shoprite and French supermarket	0.07	0.791	0.02	0.902	7.42	<b>0.007</b>	2.72	0.100	2.04	0.151	4.10	<b>0.044</b>

\*rice controls: variety, length of grains, color of grains, odor, percentage broken, stone impurity, paddy husk impurity

tomato controls: size, ripeness, form, rotten or not, spotted or not

meat controls: type of meat, level of fat, odor, refrigeration

# intercept in all specifications included

These analyses indicate that supermarkets, particularly the global retail chains, sell significantly more expensive food. In order to better understand why supermarkets choose this type of pricing strategy, we next use a variety of methodologies to examine consumer demand for quality food in this context.

## 5. CONSUMER DEMAND FOR QUALITY FOOD

We address the issue of quality demand by interviewing buyers at traditional retail markets, in order to better understand to what extent they are interested in and willing to pay for higher quality products, and if quality differences might induce them switch to modern retail outlets. Information on the basic socio-economic characteristics and shopping habits of the interviewed consumers is given in Table 4. The interviewed consumers average 40 years of age, half are women and half men, they have approximately twelve years of schooling on average (corresponding to a completed secondary education), and their monthly household income averages 245,000 Ariary or \$125 USD. 56% of the interviewees say they would never go to a supermarket, while 40% say they would go once in a while. Of the latter group, the majority of individuals indicate they would never buy rice, tomato or meat at the supermarket, largely because these products are too expensive at supermarkets (Table 4). These responses seem to confirm the analysis in the previous section, suggesting that the majority of consumers are aware of this difference. This is perhaps not surprising given the proximity of the modern and traditional outlets in our sample.

**Table 4. Characteristics of consumers interviewed at traditional daily markets**

	Unit	Mean	S.D.
<b>Demographic information</b>			
age	years	42.1	10.1
gender	% male	50	
monthly income	1000 Ariary	245	288
education	years	11.8	3.9
household size	number	5.7	2.2
<b>Shopping habits</b>			
% of households that visit a supermarket:	regularly	4	
	once in a while	40	
	never	56	
Of those that go to a supermarket, ... % of households that buy rice in a supermarket	regularly	3	
	once in a while	35	
	never	61	
Of those that never buy rice in a supermarket, ...% citing reason why they do not buy	too expensive	68	
	custom	32	
Of those that go to a supermarket, ... % of households that buy tomatoes in a supermarket	regularly	5	
	once in a while	21	
	never	74	
Of those that never buy tomatoes in a supermarket, ...% citing reason why they do not buy	too expensive	69	
	custom	30	
Of those that go to a supermarket, ... % of households that buy meat in a supermarket	regularly	5	
	once in a while	39	
	never	56	
Of those that never buy meat in a supermarket, ...% citing reason why they do not buy	too expensive	71	
	custom	29	
Number of observations		131	

To further understand the value these buyers put on quality, we ask what they consider important determinants of quality for the three products. Most of the studied attributes matter to the buyers, with the most important being variety and stone or paddy husk impurities in the case of rice, rottenness in the case of tomatoes, and odor and meat type in the case of meat (Table 5). When asked, most respondents state that they check these attributes prior to purchasing (Table 5).

**Table 5. Importance of various quality determinants to traditional market consumers**

Quality Characteristics	% of respondents for whom this characteristic is important			% of buyers who check this characteristic before purchase
	very	a bit	not at all	
<b>Rice</b>				
variety	80	19	1	92
length of grains	19	49	32	64
color of grains	20	42	38	59
odor	65	25	11	79
percentage broken	68	26	5	88
stone impurity	78	17	5	90
paddy hull impurity	59	38	3	87
date of harvest	28	32	40	-
origin	11	17	72	-
<b>Tomato</b>				
size	20	66	14	67
ripeness	43	35	22	91
form	9	20	71	31
level of rottenness	93	8	0	98
presence of spots	45	18	37	58
date of harvest	31	24	45	-
origin	2	14	84	-
<b>Meat</b>				
type of meat	81	19	0	99
level of fat	21	40	40	75
odor	91	8	1	98
continuous refrigeration	37	22	41	-
date of slaughter	47	21	32	65
origin	8	19	73	-

The number of observations varies by question, but is ~130.

The above findings indicate that quality matters to the surveyed consumers. However, consumers must also be willing and able to pay for such quality. An important determinant of the willingness and the ability to pay for food quality is income (Timmer et al. 1983; Deaton and Muellbauer 1980; Deaton 1988). Here, we explore the linkage between quality and income in two ways, using both revealed and stated preference methods. First, we observe the price they paid for their most recent purchase of rice, tomato and meat, and subject this information to a parsimonious regression where the log of the price per kg of product is related with the log of income. Our results reveal a strong positive and significant relationship; the price paid per kg of rice, tomato and meat increases by 11%, 60% and 50%, respectively, when the respondent's income doubles, as shown in Table 6, row (a). When food quality (and other) controls are included in the analysis, however, these coefficients decrease significantly, and in some cases becoming insignificant, as seen in Table 6, rows (b) and (c). The changes between regressions illustrate

the importance of income in the demand for food quality; this is consistent with previous findings in other countries (Timmer et al., 1983).

To guard against the possibility of bad attribute measurement and/or omitted variable bias in this analysis, we perform a second analysis using contingent valuation techniques to study each consumer's willingness to pay for quality food. We presented all respondents with the same pictures of high-quality rice, tomato and meat (bought in the French Score supermarket), and gave additional information on these products.<sup>19</sup> We then asked the respondent to give the maximum price they would be willing to pay for this produce. As shown in Figures 5 to 7,<sup>20</sup> we find that while traditional market consumers consider quality to be important, they are not willing - or able - to pay high prices for such quality. Only 2%, 1% and 1% of the customers report being willing to pay the price charged by the French Score supermarket for the pictured rice, tomatoes and meat. Thus, our analysis indicates that supermarkets would have to significantly reduce their margins and prices to be able to entice traditional market shoppers to make the switch. Even if the Score prices are reduced by one-quarter, only a small proportion the traditional market shoppers would potentially buy the high-quality rice (5%), tomatoes (1%) and meat (5%) at the lower price. In addition, this result does not imply that buyers would switch stores at that lower price, as traditional markets might also be able to offer quality produce at that price.<sup>21</sup>

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<sup>19</sup> The high-quality products were as follows: rice, makalioka, luxury rice, long white grains, <5% broken, no paddy/stone impurities, no odor; tomatoes, large size, ripe, oval, no spots, not rotten; meat: zebu meat, entrecote without bones, without fat, slaughtered that day, no odor.

<sup>20</sup> In this type of methodology, non-respondents usually have specific characteristics that should be taken into account in the analysis. The non-response rate in this case was low, at 0% for rice, 3% for tomatoes and 6% for meat. It was thus deemed not necessary to build in corrections for these results.

<sup>21</sup> Notably, the shopping experience in traditional markets might be more enjoyable for some consumers, due to better customer service and a more social environment, whereas the supermarket environment offers advantages such as cleanliness, more space, an enclosed space, etc. To correctly quantify these preferences, we would need to add other elements (not available in the present dataset) to our analysis of food prices and quality characteristics.



Figure 5. Willingness to pay for quality rice  
(straight vertical line: price in French supermarket)

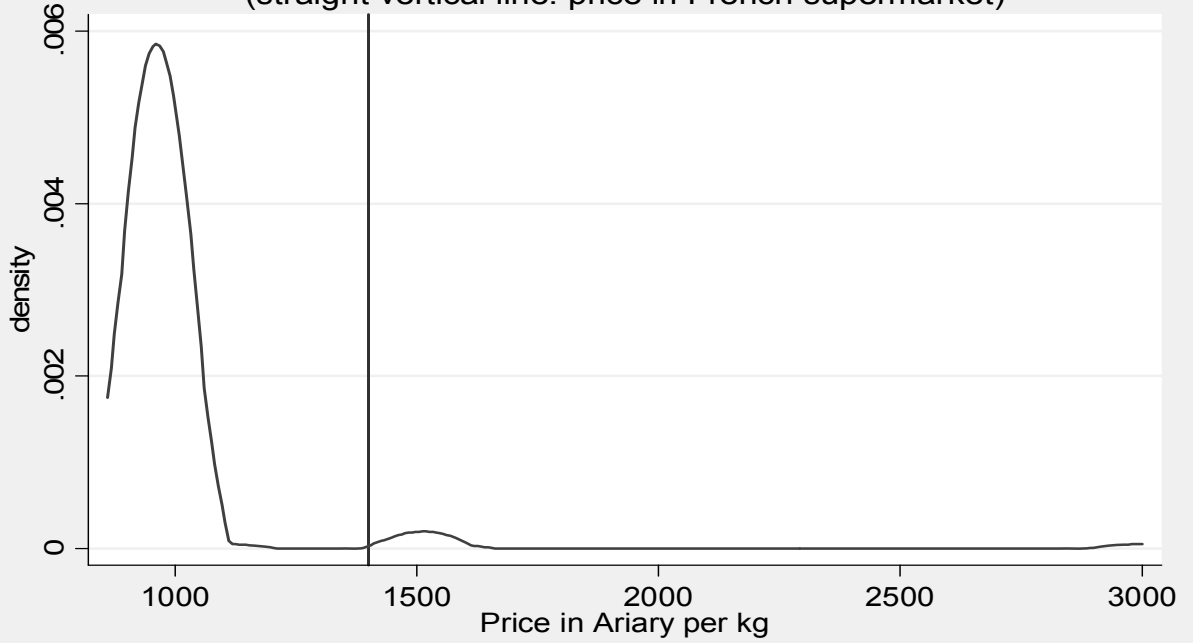
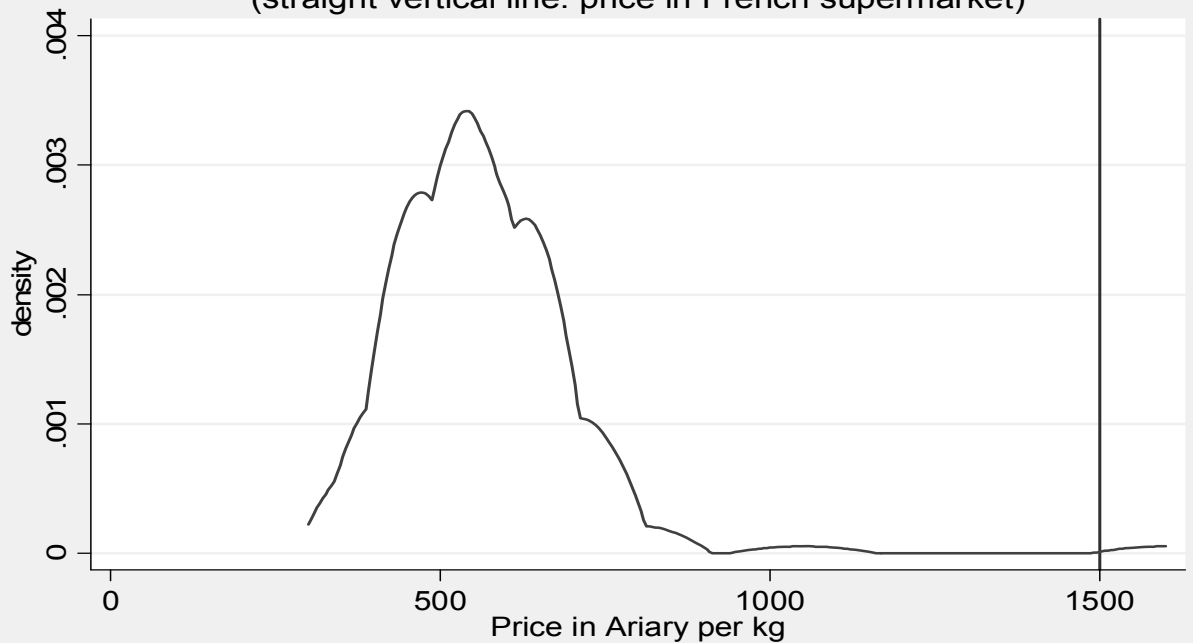
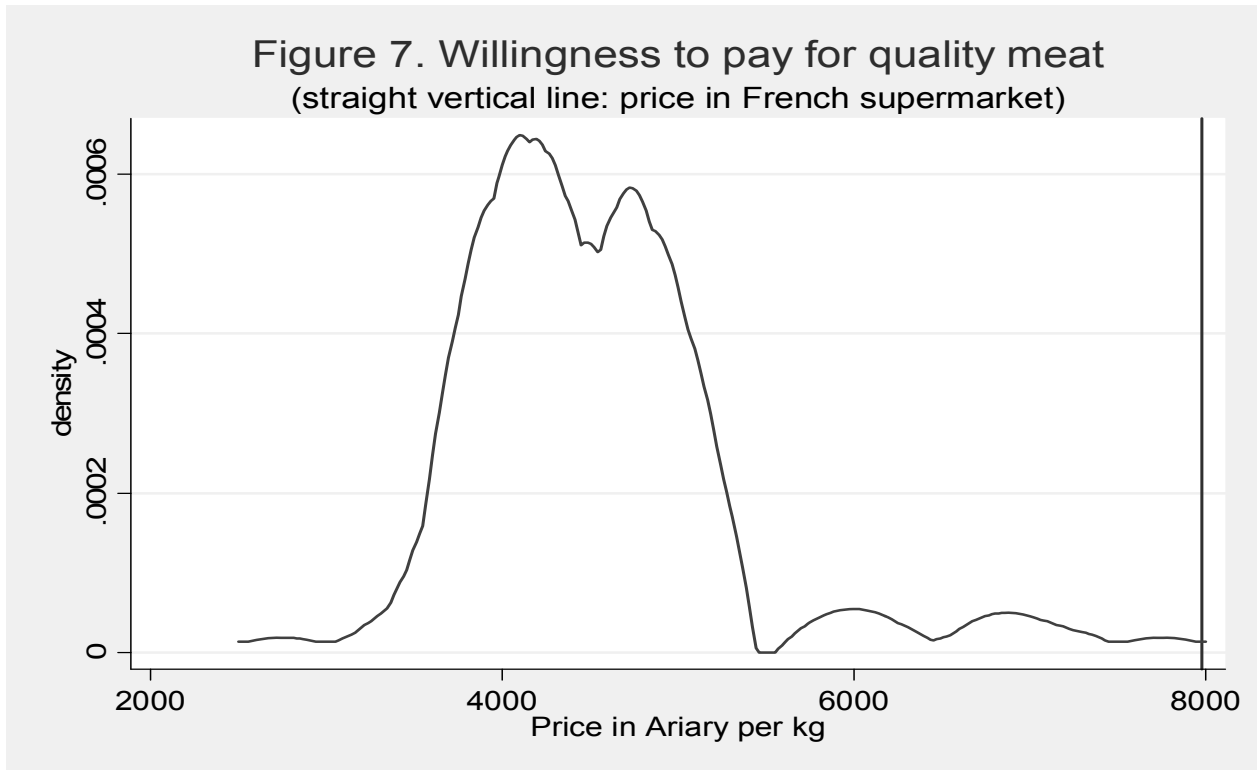


Figure 6. Willingness to pay for quality tomatoes  
(straight vertical line: price in French supermarket)





When we examine the determinants of the stated price buyers are willing to pay,<sup>22</sup> we find that income is a major significant determinant. Doubling the income variable increases the willingness to pay for quality rice, tomato and meat by 11%, 14% and 14%, respectively (Table 6). None of the other socio-economic variables that were included in the regression are found to be significant. Notably, the coefficients on income have a similar magnitude (except for tomatoes) and are comparable between the revealed (Table 6, row (c)) and stated preference methods.

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<sup>22</sup> The included determinants are income, age, education, and gender, as well as the number of children, adults and elders in the household.

**Table 6. Link between food prices and income based on answers from traditional market customers**

Variable	Unit	Rice#		Tomato#		Meat#	
		Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
<b>Price paid during most recent purchase</b>							
a. Parsimonius specification							
Income	log(ariary)	0.109	<b>2.01</b>	0.605	<b>8.86</b>	0.501	<b>7.27</b>
Number of observations		127		128		129	
F		4.02		78.46		52.81	
Prob>F		0.05		0.00		0.00	
R2		0.03		0.38		0.29	
Adjusted R2		0.02		0.38		0.29	
b. Including controls for food quality*, size of transaction, and retail outlet							
Income	log(ariary)	0.055	0.90	0.245	<b>3.01</b>	0.293	<b>4.28</b>
Number of observations		127		128		123	
F		2.62		13.59		11.79	
Prob>F		0.00		0.00		0.00	
R2		0.29		0.58		0.64	
Adjusted R2		0.18		0.54		0.59	
c. Additional socio-economic controls, on top of (b)**							
Income	log(ariary)	0.161	1.68	0.325	<b>2.88</b>	0.150	1.46
Number of observations		94		95		99	
F		1.86		8.51		7.94	
Prob>F		0.02		0.00		0.00	
R2		0.42		0.71		0.72	
Adjusted R2		0.19		0.63		0.63	
<b>Willingness to pay for quality food***</b>							
Income**	log(ariary)	0.107	<b>5.51</b>	0.140	<b>4.18</b>	0.143	<b>6.62</b>
Number of observations		107		104		100	
F		5.23		4.65		7.35	
Prob>F		0.00		0.00		0.00	
R2		0.27		0.25		0.36	
Adjusted R2		0.22		0.20		0.31	

#: intercept is included in all regressions; dependent variable is log (price per kg in ariary)

\* rice controls: variety, length of grains, color of grains, odor, percentage broken, impurity of stones and paddy husks

tomato controls: size, ripeness, form, rotten or not, spotted or not

meat controls: type of meat, level of fat, odor, refrigeration

\*\* socio-economic variables: age, education, and gender of head of household, number of children, adults and elder in household

\*\*\* high quality rice: makalioka, luxury rice, long white grains, broken <5%, no paddy/stone impurities, no odor

high quality tomato: large size, ripe, oval, no spots, not rotten

high quality meat: zebu meat, entrecote without bones, without fat, slaughtered that day, no odor

Using the previously estimated coefficients, we find that even if we double the incomes of all consumers that currently shop in traditional markets, only 4%, 1%, and 3% would be willing to pay the price charged in the supermarket for the high-quality rice, tomato and meat, respectively. These results indicate that unless purchasing power increases dramatically, there is little prospect for growth in demand for high priced quality produce in this type of setting, and thus most people will not switch to modern retail outlets in order to obtain quality produce. These findings are not surprising given the socio-

economic situation of Madagascar. Incomes in Madagascar are low overall and in urban settings. The national poverty levels have hovered around 70% over the last fifteen years, and little improvement has been seen over time. Urban and rural poverty rates were 44% and 77%, respectively, in 1993 and 54% and 77%, respectively in 2005. Demand analysis in other countries (e.g. Sahn 1988; Pinstrup-Andersen 1985) as well as in Madagascar (Ravelosoa et al. 1998; Minten and Zeller 2000) shows that poor people are very sensitive to food prices and will quickly adjust consumption patterns in response to changing market conditions.<sup>23</sup> The rewards for food quality are limited, and poor people largely prefer food with low per-calorie costs.

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<sup>23</sup> Both studies in Madagascar show that cassava has inferior crop characteristics and is mostly eaten by the poor, and the basic staple of rice typically has high price and income elasticities.

## 6. CONCLUSIONS

Global retail chains are becoming increasingly dominant in the global food trade, and their rise has impacted agricultural supply chains and small producers, largely through the inception of stringent quality standards. However, the impact and the prospect of a food retail revolution in poor developing countries is not yet fully understood. Here, we examine this issue in a case study of Madagascar, which is a poor but stable country where global retailers have been present for over a decade. We herein measure and compare the price setting behavior and the quality range of produce offered by supermarkets versus traditional food retailing systems, and evaluate what type of buyer is likely to switch to supermarket shopping based on the identified price setting strategy and quality offerings. This study fills a gap in recent literature on the food retail revolution in developing and transition economies.

Using novel, primary price, consumer and trader data from traditional and modern food retail outlets, we find that the various outlets deliver foods with largely different attributes and prices. However, when we control for quality attributes, we find that food prices in the global retail chains are 40-90% higher than those in traditional retail markets. Two characteristics typical of poor food economies might help explain why the prices charged by global retail chains are so much higher. First, food retail margins are small in these countries and supermarkets might have little profit incentives for price competition with a largely informal retail sector. Here, we find that the median gross retail margins are as small as 5% for a storable staple such as rice, 15% for meat, and 33% for fresh vegetables such as tomatoes. Second, as the majority of the population is poor, general price elasticities are high for food and quality, meaning that there is a limited demand for high-priced quality food. Furthermore, our data clearly illustrate the importance of income as a significant determinant of demand for quality food.

In such an environment, profit-maximizing supermarkets seem to prefer a pricing strategy in line with the price-inelastic demand of a middle class interested in one-stop shopping and a clean shopping environment free from the threats of rain and heat. In poor countries with a small middle class, modern retailers might even reap oligopoly benefits, and might adjust prices upward accordingly.<sup>24</sup> For example, in an interesting relevant article, Ellickson (2006) develops a formal model showing how escalating investments in distribution systems yield a natural oligopoly of high quality supermarkets, while a number of low quality stores serve customers that do not value quality.<sup>25</sup> Formal testing of this possibility is left for future research.

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<sup>24</sup> See, for example, Dobson and Waterson (2005), Smith (2004), Smith and Hay (2005), Pesendorfer (2002), and Slade (1998) for an analysis of optimal supermarket price setting.

<sup>25</sup> Oligopoly concerns related to supermarkets even exist in developed economies such as Great Britain (Competition Commission 2000) and Australia (Cotterill 2006).

Given the speed of supermarket penetration over the past decades, this is a relatively new research area. Thus, there is limited evidence allowing us to interpret to what extent our results from Madagascar can be transposed to other poor developing countries. Using simple comparisons, without controlling for quality, Tshirley and Ayecho (2005) compare the prices of 14 fresh foods and vegetables between supermarket chains and local markets in Nairobi (Kenya), and find that the average supermarket price is about 50% higher. In India, Chengappa (2006) finds that supermarket shoppers are mostly confined to the richer middle class and that prices in food retail chains are higher (but quality is surprisingly not). This evidence might thus indicate that the case of supermarket pricing in Madagascar is not unique among the poorer countries, whereas it appears to differ from that seen in other relatively richer economies for which studies are available (e.g. Brazil, South-Africa).<sup>26</sup>

The growing global importance of supermarkets might then be driven by factors other than prices. For example, the cross-country analysis of Traill (2006) finds a significant growth in the retail share of supermarkets due to GDP growth, income distribution, urbanization, female labor force participation and openness to foreign investments. However, unless these other determinants of local food demand in poor economies dramatically change, low food prices (which are offered by local markets but not supermarkets) will likely matter most for food demand by poor consumers. It thus seems that agriculture for local consumption in poor countries will be largely bypassed by the global food retail revolution.

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<sup>26</sup> Traditional retailing might be less competitive in this richer environment, as food retailing in developing economies is a highly labor-intensive activity that critically depends on the supply of cheap labor (Hayami and Kawagoe 1993).

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