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**The Expansion of Food Retail in Developing Countries and Its Effects on the
Hunger Index**

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The Expansion of Food Retail in Developing Countries and Its Effects on the Hunger Index

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Abstract: This paper presents an empirical analysis of the relationship between the expansion of food retailing in developing countries and hunger index. Our analysis found mixed results between the expansion of food retailing and hunger index for four different countries. These results demonstrate possibilities for food retail expansion in developing countries.

Introduction

Over the past decade many Non-Profit organizations along with the United Nations have taken a stance against world hunger. There are many different factors that affect a developing country's demand for food and its hunger index. With the rise of food retailing in many developing countries, food has become more readily available. The impact of the expansion of food retailing on a developing country's hunger index is still unknown. It is thought the increase in the food supply and convenience could decrease the hunger index in the developing countries.

Food Retail expansion is measured by the increase in investment in food retail in the developing country. Modern food retailing in developing countries has been increasing over the past few decades (Tandon, Landes, and Woolverton, 2011). Food retail expansion has increased efficiency of supply chain and reduced food prices in many developing countries. It has also helped to control price volatility in many areas. These gains and price reductions/stabilization have been more significant in developing countries where consumers are more responsive to prices (Emongor, Rosemary and

Kirsten, 2009). As food becomes cheaper and more easily accessible for the impoverished, hunger levels in the developing countries are expected to begin to decrease.

Developing countries have experienced varied rates of food retail expansion that have been reflections of their domestic per capita income increases, the rise of the middle class, urbanization, increases to infrastructure, liberalization of FDI policies in the food retail sector and increases in governmental stability (Tandon *et al.*, 2011). During the early 1990's there was also an increase in the demand for convenience and processed foods, which further increased the rates of expansion. These increases in expansion also lowered the cost of food at food retailing markets for consumers. During the beginning stages of the food retailing expansion in many developing countries domestic capital was used and contributed to the slow growth. It wasn't until the 1990's FDI increased and caused the rapid further expansion of the retail sector (Roe and Xinshen, 2004). Increases in FDI also helped developing countries to improve technologies and supply chain management to become more efficient and cost effective in the food retail sector.

The Global Hunger Index (GHI) is calculated using various indicators to demonstrate the multi-dimensions of hunger. Three indicators used are the proportion of undernourished as a percentage of the population, prevalence of underweight children under the age of 5 as a percentage of the population, and under the age of 5 mortality rates as a percentage of the population (IFPRI, 2011). The proportion of undernourished as a percentage of the population reflects the share of the population with an insufficient calorie in-take. The prevalence of underweight children under the age of 5 will reflect wasting or stunted growth as a result of undernourishment. To demonstrate the

relationship between inadequate dietary intake and unhealthy environments, the GHI uses the mortality rate of children under the age of 5 as a percentage of the population. Because of the recent rise in world food prices and the volatility of the market, the GHI has become more important and instrumental in depicting a developing countries food and dietary needs (IFPRI, 2011).

In this study, an empirical analysis of the relationship between the expansion of food retailing in developing countries and the hunger index is presented. The countries chosen for this study are Botswana, Ghana, Kenya, and Zimbabwe. All of these countries are located in Africa and considered developing countries according to the World Bank's developing country definition. These countries have experienced extreme poverty and hunger, which can be seen by examining their respective Human Development and Hunger Indexes. With these countries experiencing both expansion and extreme poverty, it makes them prime candidates for analyzing the relationship between the two.

Literature Review

There have been numerous studies examining the dynamics of supermarket expansion in developing countries. Many of these studies have focused on the causes of supermarket expansion. Tandon, Landes, and Woolverton (2011) explore the findings that are potentially important in explaining the growth in modern food retailing: rising demand for dietary diversity, shopping and preparation convenience, food safety that is commonly associated with rising incomes, along with grocery retailers investing in the supply chain to improve efficiency which can lead to shared gains between producers and consumers. They showed modern grocery retail expansion in developing countries was correlated with the share of the working-age population, and was supported by the

growing sales of convenience-packaged foods. They indicated that the expenditure by modern food retailers in a developing country is directly correlated with the income level in the developing country. Tandon (*et al.*, 2011) also found a direct correlation between working age population and the expansion rates of modern food retailing. This shows the importance of using developing countries urban and rural population growth along with GDP growth to help explain supermarket expansion. As a country develops a middle class and incomes overall begin to rise, so does the demand for convenience and modern food retailing.

Roe and Diao (2004) found that modern food markets are more capital intensive than traditional food retailing markets. They found developing countries with more investments in food retailing particularly from FDI, experienced higher rates of expansion. Tandon (*et al.*, 2004) found supermarket retail expansion is not correlated with a number of supply side factors including whether a country has a conducive business environment and the level of infrastructure (paved roads). Supply side factors have had little effect on the expansion of modern food retailing, and while they are a factor, they have not proved to be a significant one. Roe and Diao (2004) also noted that economic growth gives rise to capital deepening in the economy; growth in the economy raises the prices of economy-wide resources. This would make one believe that modern food retail expansion would have a negative effect on the Hunger Index, making food more expensive, and those stuck at the poverty line are less able to obtain necessary sustenance.

While modern food retailing does make food more convenient and may lower the prices of certain items, one must look at the overall effect this will have on the economy.

Stokke (2008) showed that supermarket expansion could produce benefits for local small farmers through increased demand and the development of the supply chain. Emongor and Kirsten (2009) found the same thing noting small farmers had increased profits where supermarket expansion was present. In developing countries much of the population in rural areas are small farmers. The ways in which supermarket expansion can improve their quality of life is an important research question in order to realize all of its potentials, both positive and negative, especially since modern food retail expansion and its effects on the hunger index in a developing country have not yet been fully explored.

Empirical Modeling

For analyzing the expansion of the food retailing market in developing countries and its effects on the developing countries' GHI it is important to examine the factors that affect them both. To begin, the individual country Gross Domestic Product is examined to get a general understanding of the country's economic situation. This is important as many developing countries have difficulties gathering accurate and credible information. Food retailers with a presence in developing countries try to prevent others from entering the market and increasing competition. Food retailers form alliances with weak government structures to create barriers to entry for new food retailers, which present a problem for future food retail expansion in developing countries.

The percentage annual growth in GDP is also chosen as an indicator of food retailing. This variable depicts the developing country's current growth and its ability to progress and expand. Risk aversion can also be a problem for developing countries with low growth rates; however, some food retailers can overlook this problem if the

government and country is in the initial stages of rebuilding and stabilization. Agriculture Value Added as a percentage of GDP is also thought to affect the expansion of food retailing, as it could provide local farmers with more selling options, or show increased competition in the local food markets. Also countries with higher agricultural value added percentages see faster and increased expansion (Stokke, 2008).

Foreign direct investment is one the major contributors to food retail expansion in developing countries. FDI was the spark that increased the rise of food retailing in developing countries in the 1990's (Roe *et al.*, 2004). The liberation of FDI policies is an important factor when looking at modern food retail expansion. When food retailing expands, food becomes more readily available. Prices also stabilize and decrease in some cases as multinational corporations invest their know-how and technology, and both consumers and suppliers in the developing country reap the benefits. The rural and overall populations are also examined, as they are both affected by the expansion of food retailing. Finally, the Human Development Index is included, as it is a calculation of a long and healthy life, knowledge, and a decent standard of living. All of these factors are used as regressors in this analysis as they represent a relationship with modern food retailing and the hunger index in developing countries.

Given data limitations it was difficult to fully assess the impact of modern food retail expansion on the hunger index in developing countries. Using the data available we were still able to draw conclusions on the nature of the relationship between modern food retailing expansion and the hunger index. Data was collected from 1990-2010 for all countries and was examined in a pooled panel model. The following equation was used:

Investment in Food Retail = $\beta_0 + \beta_1 \text{ GDP} + \beta_2 \text{ FDI Net Inflows} + \beta_3 \text{ GDP \% of Annual Growth} + \beta_4 \text{ Agricultural Value Added \% of GDP} + \beta_5 \text{ Population} + \beta_6 \text{ Rural Population} + \beta_7 \text{ Human Development Index} + \text{the error term.}$

For the second regression data was also collected from 1990-2010 for all countries and examined in a pooled panel model. The following equation was used:

Hunger Index= $\beta_0 + \beta_1 \text{ GDP} + \beta_2 \text{ FDI Net Inflows} + \beta_3 \text{ GDP \% of Annual Growth} + \beta_4 \text{ Agricultural Value Added \% of GDP} + \beta_5 \text{ Population} + \beta_6 \text{ Rural Population} + \beta_7 \text{ Human Development Index} + \beta_8 \text{ Investment in Food Retail} + \text{the error term.}$

Using the first equation we are hoping to find relationships between the various regressors and the Investment in Food Retail. There should be a positive correlation between all of the variables and the Investment in Food Retail. The second equation is a look at the relationship between Hunger Index of a developing country and the other variables that are thought to affect both food retail expansion and the Hunger Index in the developing country. We would expect negative relationships with all of the variables except the rural population. We would expect the Hunger Index to be negatively correlated with investment in the food retail sector in developing countries, as it would increase the availability of food. The expansion of food retailing has made food more conveniently located for rural consumers and further expansion will only increase this. This variable has historically fluctuated with the Hunger Index in developing countries (IFPRI, 2011).

Data

The data used in this study was collected from the World Bank and IFPRI data sets. A 20-year span from 1990 through 2010 was used. As some of the variables chosen such as

the Global Hunger Index and Human Development Index are not calculated annually the average between the years were calculated and were used for the intermediary years. Limitations of data include but are not limited to the fact that not all factors affecting the supermarket expansion in developing countries can be quantified.

Descriptive Statistics for each country

Botswana

	Mean	Std Dev	Mini	Max
Investment in Food Retail	20.15	11.42	6.27	47.55
FDI Net Inflows	3.02	4.24	-6.89	12.01
Agriculture Value Added %GDP	3.19	1.18	1.81	5.2
Rural Population	807,353	12,266	780,701	823,304
GDP	7,421,839,874	3,558,075,050	3,791,585,992	14,904,834,649
GDP Growth Annual %	5.04	3.32	-4.82	10.57
GHI	14.52	1.24	13.2	15.9
HDI	0.59	0.01	0.58	0.63
Population	1.72	0.18	1.38	2.00

Ghana

	Mean	Std Dev	Mini	Max
Investment in Food Retail	13.66	9.12	0	34.37
FDI Net Inflows	2.83	2.47	0.25	9.51
Agriculture Value Added %GDP	38.75	5.26	29.04	45.55
Rural Population	10,708,624	732,824	9,408,611	11,830,034
GDP	11,481,842,362	8,824,282,149	4,977,488,790	32,174,576,820
GDP Growth Annual %	4.99	1.39	3.3	8.43
GHI	13.59	4.31	8.7	21
HDI	0.44	0.3	0.41	0.53
Population	19.34	2.9	14.793	24.39

Kenya

	Mean	Std Dev	Mini	Max
Investment in Food Retail	23.15	15.1	5.27	50.55
FDI Net Inflows	0.58	0.71	0.4	2.67
Agriculture Value Added %GDP	29.27	2.4	25.01	33.32
Rural Population	25,216,768	3,784,043	19,179,790	31,518,866
GDP	15,745,892,457	8,172,556,014	5,751,786,610	32,198,151,217
GDP Growth Annual %	3.06	2.19	-0.79	6.99
GHI	19.69	0.82	18.6	20.6
HDI	0.46	0.02	0.44	0.54
Population	31.56	5.2	23.44	40.51

Zimbabwe

	Mean	Std Dev	Mini	Max
Investment in Food Retail	81.13	111.88	9.3	487.82
FDI Net Inflows	1.05	1.48	-0.13	6.94
Agriculture Value Added %GDP	17.56	3.25	7.41	21.78
Rural Population	7,972,712	246,822	7,433,133	8,281,273
GDP	6,697,469,149	1,186,012,469	4,415,702,801	8,783,816,666
GDP Growth Annual %	-0.94	7.912	-17.66	10.36
GHI	20.01	2.02	17.7	22.3
HDI	0.39	0.3	0.34	0.42
Population	12.05	0.68	10.46	12.61

Results

Investment in Food Retail = $\beta_0 + \beta_1 \text{ GDP} + \beta_2 \text{ FDI Net Inflows} + \beta_3 \text{ GDP \% of Annual Growth} + \beta_4 \text{ Agricultural Value Added \% of GDP} + \beta_5 \text{ Population} + \beta_6 \text{ Rural Population} + \beta_7 \text{ Human Development Index} + \text{the error term}$

	Variable	Coefficient	t-Statistic
Botswana	GDP	2.66E-09	2.00**
Ghana	GDP	1.88E-10	0.32
Kenya	GDP	-1.29E-09	-1.06
Zimbabwe	GDP	2.05E-08	0.60
Botswana	FDI	0.944594	2.84
Ghana	FDI	2.594128	2.09**
Kenya	FDI	3.860007	1.66*
Zimbabwe	FDI	-4.974486	-0.32
Botswana	AGPDG	-0.516673	-1.35
Ghana	AGDPG	-2.774549	-1.64*
Kenya	AGDPG	1.779570	1.79*
Zimbabwe	AGDPG	-0.952385	-0.185232
Botswana	AVA	-4.101214	-1.09
Ghana	AVA	1.550146	2.33**
Kenya	AVA	0.668231	0.53
Zimbabwe	AVA	-4.900239	-0.58
Botswana	POP	-28.92499	-1.09
Ghana	POP	6.374381	2.59***
Kenya	POP	45.46967	2.04**

Zimbabwe	POP	58.24093	0.55
Botswana	RPOP	6.35E-05	0.62
Ghana	RPOP	1.78E-07	0.03
Kenya	RPOP	-5.77E-05	-2.00**
Zimbabwe	RPOP	-1.61E-05	-0.07
Botswana	HDI	21.06467	0.12
Ghana	HDI	-371.8853	-3.36****
Kenya	HDI	75.83324	1.04
Zimbabwe	HDI	-1372.556	-0.86

*** 1% Significance

** 5% Significance

* 10% Significance

Hunger Index = $\beta_0 + \beta_1$ GDP + β_2 FDI Net Inflows + β_3 GDP % of Annual Growth + β_4 Agricultural Value Added % of GDP + β_5 Population + β_6 Rural Population + β_7 Human Development Index + β_8 Investment in Food Retail + the error term

	Variable	Coefficient	t-Statistic
Botswana	GDP	-5.95E-10	-5.05****
Ghana	GDP	2.70E-10	2.61****
Kenya	GDP	3.39E-11	0.43
Zimbabwe	GDP	-4.97E-10	-1.27
Botswana	FDI	-0.076512	-2.56****
Ghana	FDI	-0.171467	-0.72
Kenya	FDI	0.338350	2.05**
Zimbabwe	FDI	0.244577	1.40
Botswana	AGPDG	0.083647	2.49**
Ghana	AGPDG	-0.398621	-1.36
Kenya	AGDPG	-0.001610	-0.02
Zimbabwe	AGDPG	0.120533	2.04**
Botswana	AVA	0.319543	1.03
Ghana	AVA	0.206915	1.53
Kenya	AVA	0.136667	1.57
Zimbabwe	AVA	-0.098605	-1.09
Botswana	POP	11.31216	5.25****
Ghana	POP	-2.873263	-5.75****

Kenya	POP	-3.931433	-2.36**
Zimbabwe	POP	-4.021125	-3.16***
Botswana	RPOP	4.43E-06	0.48
Ghana	RPOP	5.75E-06	4.80***
Kenya	RPOP	5.22E-06	2.43***
Zimbabwe	RPOP	1.01E-05	3.67***
Botswana	HDI	-9.374036	-0.64
Ghana	HDI	-0.770334	-0.03
Kenya	HDI	16.68197	3.20***
Zimbabwe	HDI	-17.80309	-0.99
Botswana	IFR	0.008390	0.53
Ghana	IFR	-0.057331	-1.68*
Kenya	IFR	-0.014665	-1.09
Zimbabwe	IFR	3.74E-05	0.02

*** 1% Significance

** 5% Significance

* 10% Significance

Conclusions/Policy Implications

After analyzing the data collected for the 20-year period for the four developing countries we found mixed results for the relationship between food retail expansion in developing countries and their respective hunger index. The factors looked at to have contributed to food retail expansion in developing countries, and as influences on the Hunger Index were significant in many cases however, results varied in all countries and no patterns were present. When the Investment in Food Retail was the dependent variable in three of the four countries Foreign Direct Investment had a positive effect, demonstrating a foreign interest in food retail expansion in these developing countries. Population also had strong positive relationships with Investment in Food Retail in two of the four countries. This could be a response to the growing of the middle class or an increased in demand for convenience foods. In the second equation where the Hunger Index was used as the dependent variable Population negatively affected the Hunger Index in three out of the four countries. This would go along with a lowering of the Hunger Index. Population

was one of the only variables to be significant in two or more countries in both equations. It seems to follow logically that an increase in the population of a country would increase the demand for food and by responding to this demand food will in turn be provided to more of the population simply because it is more readily available. Rural Population had a positive effect on the Hunger Index, which was expected. Typically countries with larger rural populations are poorer and lack the capacity to expand markets to those in rural areas.

Through further research on stability measure and policies within these developing countries we also found that increases in government stability and the opening of FDI policies contributed to expansion in the food retail sector. When governments began investing in the food retail sector and developing policies and infrastructure that would aid expansion and increase the efficiency of supply chains, MNC and other supermarket retailers began to invest in these developing countries as well. India was a prime example of this with first the government investing and promoting the food retail sector then once stable opening the market further to foreign investors and the improved technologies and practices that went along with them. In all of these developing countries the relaxing of FDI policies was crucial to expansion.

These findings will be useful for future policy makers and during policy negotiations in that they show how liberalization of FDI can affect the expansion of modern food retail. In order for a country to expand it must first have the policy ground work that will be the foundation for development. Policy makers will be able to show with evidence the effects of liberalizing FDI and also the gains it can have for the country in the food retail sector as well as for the impoverished small farmers.

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