PREPARED FOR:

 IFAMA CONFERENCE 2015

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**MODELLING PRICE AND
VOLATILITY EFFECTS ON
PRODUCER BEHAVIOUR: A CASE OF
NAMIBIAN BEEF MARKET**

*Paper selected for presentation at the
International Food and Agribusiness
Management Association (IFAMA)'s 25TH
Annual World Symposium, Minnesota U.S.A*

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Background

- Agricultural sector is an important sector to the Namibian Economy
- More important than GDP figure show (4.1% in 2012).
- It supports large Number of rural dwellers.
- According to 2009/2010 HIES, 40% of total rural HHs of 247813 rely on subsistence agriculture as main source of income, 1% are commercial farmers
- Land ownership is skewed –apartheid legacy: (41% rural farm, 44% commercial landholding)
- Livestock production is dual, with thriving commercial sector and a resource poor communal husbandry.
- Namibia is divided into animal disease zone (N-VCF & S-VCF), A distinction between disease and disease-free zones.
- The Northern cordon fence has history of disease outbreaks (eg.,FMD), animal sale from this region require quarantine and strict certification conditions compared to the less-restricted southern part of the cordon fence.
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Beef Supply (Numbers) — years 2000–2012

■ S-VCF ■ N-VCF ■ Butchers ■ South Africa

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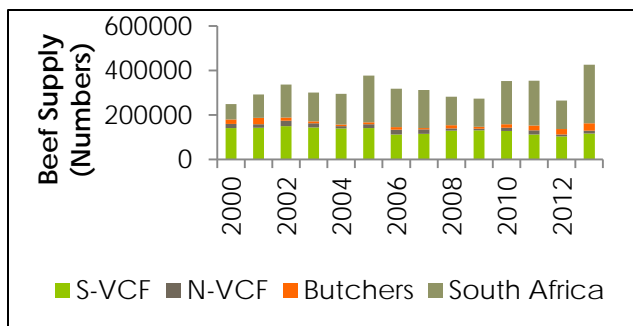
Background

- 44% of all cattle in the country are found in the Northern Communal Areas, while more than 60% are found in the communal areas (south included).

- This is on only 48% of the available agricultural land, while just 40% of all cattle are found in the commercial area (53% of the available agricultural land).

- Livestock contributed 2.3 % to the agriculture GDP,.

- Beef cattle production is the dominant agricultural sector, constituting approximately 85% of agricultural incomes and on average 10% of gross national product .

- The number of beef cattle sold during the third quarter of 2014 was 163753 units (including the Northern Communal Area (NCA) and butchers),

- A decline of about 53% from 348621 livestock marketed in 2013 (Meat board 2014:4).

- The small internal market dictates that Namibia has to export most of its beef.

- Until recently, Namibia exported about 70-80% of its total livestock production on-hoof, mainly to South Africa.

- The country is a net exporter of livestock with major export destination being South Africa, Angola, European Union and Norway.

- The red meat sub-sector contributes more than 80% to the total contribution in the livestock sector, making it an import sub-sector.

Justification

- Because Beef cattle sale is predominantly export, hence, producers are exposed to price risk.
- Live sales is mostly destined to SA, occasionally to Angola, lack of diversification, makes exporters less responsive to price changes.
- Information asymmetry impedes access market information.
- Transaction cost increases production cost
- Export price determination out of the control of the producer-price taker.
- IS PRICE RISK & VOLATILITY IMPORTANT? - MODEL!
- DO PRODUCERS CONSIDER IT WHEN MAKING DECISION TO PRODUCE? YES/NO!
- IS THIS NOTION OF PRICE RISK KNOWN TO ALL? NO!
- HOW DO PRODUCER REACT TO RISK?
- DOES IT HAVE SIMILAR EFFECT ON PRODUCERS? NO!
- IS IT SECTOR, INDUSTRY, COUNTRY SPECIFIC? YES!
- CAN IT BE PREDICTED? YES! HOW!

Objective

- Due to the impact of commodity price volatility on general economic activity, an important concern for producers, policymakers and strategic analysts is to predict the impact of current and future changes in prices on production decision.

- *"The objective of this paper is to characterize price expectation and investigate price volatility response in a rational expectation context for aggregate producers' supply response in the Namibian beef market".*

Concept

- What is the concept behind price expectation and volatility?

- Producers are rational in the sense that they have adaptive expectations about price levels and volatility (**Muth, 1961;** Nerlove, 1969; Nerlove and Bachman, 1960).

- The expectations that determine supply decisions are conditional on information available at the time resources are committed to production.

- As a result, supply response is based on the hypothesis that quantity produced depends on input prices and producers' expectation of output price

- Because of production lag, there is a lag in the information set, production at time (t) is the result of decision made in time (t-1).

- Marketing takes place at different time set, production at time t is marketed at (t-1). Therefore planned output may not equal realized output.

- Therefore, we hypothesize that planned out at time (t) equals output, at (t-1), depending on the number of planning horizon, weekly, quarterly, monthly or annually.

- Y(t) ≡ S(t-1),where, Y(t) is the planned output, S(t) the realized output at time (t-1)

- We then predict the realized output using the unconditional mean EPPB and conditional variance of price PPBV, i.e., we use the unobserved expected price conditional on information set at time (t-1), we then determine the conditional forecast-error variance of price into the future.

- The conditional variance in a GARCH process is then expressed as a function of moving average of squared innovations and the lagged conditional variance.

METHODOLOGY

Methods so far used :

- -time series
- -GARCH
- -EGARCH

Model :

(1)
$$QSB = a_0 \sum_{i=1}^{12} a_{it} D_{it} + a_{it} DTm_T + a_{10} EPPB_t + a_{11} PPBV_t + a_{12} Ymaz_{t-8} + a_{19} QSB_{t-1}$$
$$+ a_{20} QSB_{t-12} + a_{31} Rn_{t-1} + a_{32} Tm_T + \varepsilon_{1t}$$

(2)
$$PPB_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i PPB_{t-i} + Tm_T + \varepsilon_{2t}$$

(3)
$$\log h_t^2 = \exp\left[\psi + \sum_{i=1}^{q} a_i g(z_{i-1}) + \sum_{k=1}^{p} b_k \log(h_t^2) \right]$$

Maximum Likelihood Estimation of Beef Risk Responsive Supply-Price Equation

Variables	Coefficient	Standard. Error	z-Statistic	Probability
Beef Supply Equation Results				
Constant	6.9129	0.9641	7.1707	0.0000*
Dum2	-0.3989	0.1028	-3.8789	0.0001*
Dum10	-0.3370	0.0786	-4.2850	0.0000*
Dum11	-0.5274	0.0870	-6.0599	0.0000*
Dum12	-0.9302	0.1807	-5.1483	0.0000*
Dum2T	0.0026	0.0010	2.7648	0.0057*
Dum3T	0.0022	0.0005	4.2909	0.0000*
Dum10T	0.0023	0.0010	2.3353	0.0195**
Dum11T	0.0031	0.0010	3.2023	0.0014*
Dum12T	0.0033	0.0018	1.8733	0.0610***
EPPB	0.2722	0.1079	2.5226	0.0116**
PPBV	-0.0479	0.0270	-1.7733	0.0762***
Ymaz	-0.0151	0.1454	-0.1569	0.4971
QSB(t-1)	0.5414	0.0547	9.8985	0.0000*
QSB(t-12)	-0.0920	0.0562	-1.6356	0.1019
RAIN(t-1)	-0.0001	0.0001	-1.9407	0.0523***
TIME(t-1)	-0.0019	0.0007	-2.5204	0.0117**
R^2	0.73			
Log Likelihood	73.1026			
Durbin Watson	2.2815			
No. Observations	153			
Price Equation Results				
Constant	-3.761682	0.375716	-10.01203	0.000*
	2.597291	0.192132	13.51827	0.000*
	-0.729213	0.164152	-4.442308	0.000*
	0.601408	0.060289	9.97545	0.000*
Constant	-3.761682	0.375716	-10.01203	0.000*

Empirical Result….

Conditional Price Volatility and the Relative Marginal Risk Premium
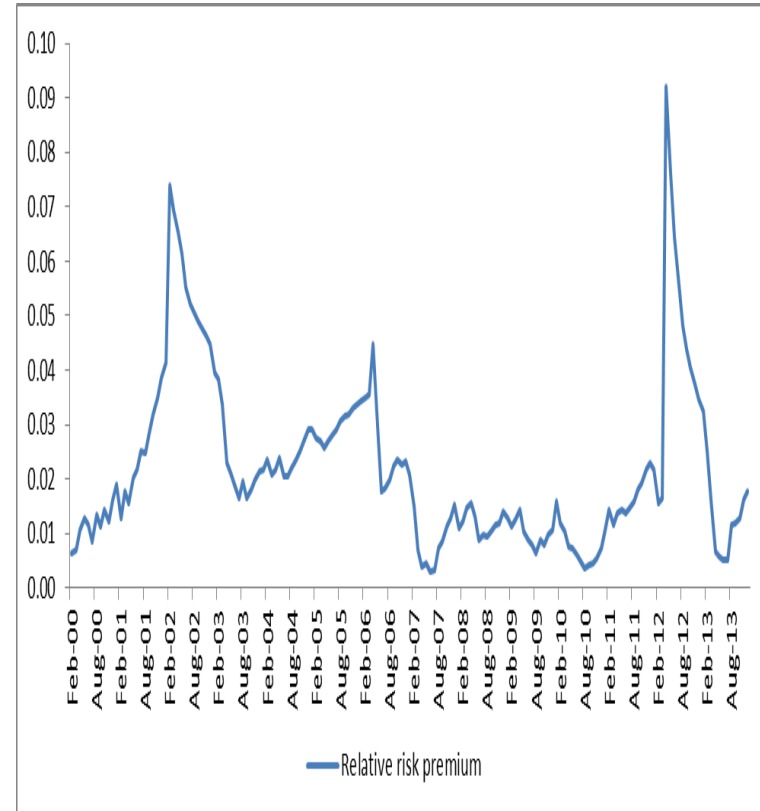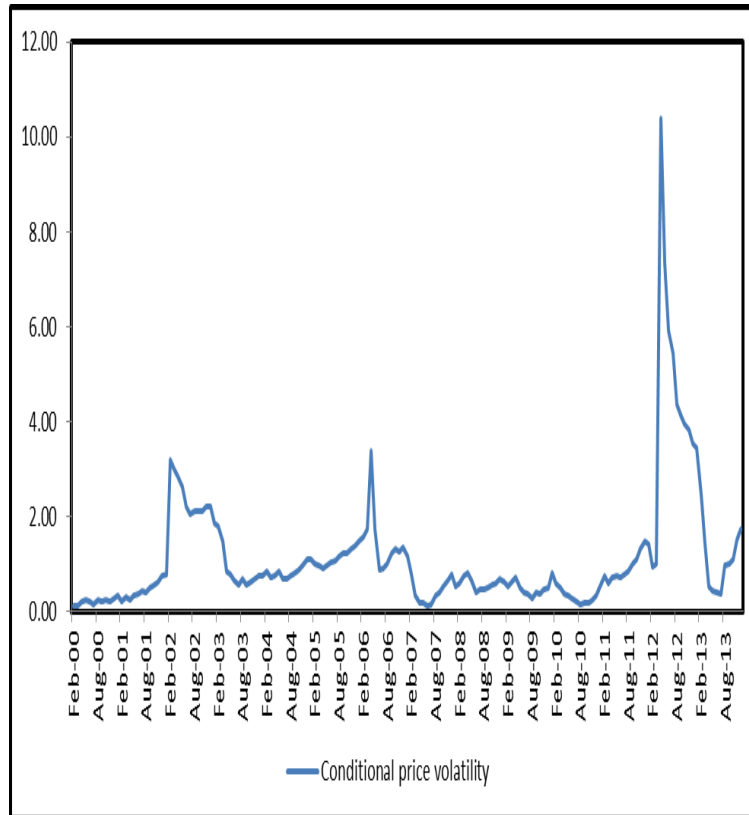
Conclusion and Recommendations

- The study found that price uncertainty has strong influence in the beef market, as a result, production may be constrained, and producers are unlikely to expand to gain scale economies.

- Weak influence of technology in beef production implies poor application, perhaps poor service delivery by the responsible stakeholders.

- Farmers training through extension services and other stakeholders should be improved to foster gains from technological innovation.

- Poor market infrastructure often results in asymmetric information; improvement in the market infrastructure will encourage producers to make proper production and marketing decisions.

- The outcome of the study shows that it is important to adopt measures to manage price risk such as insurance or price hedge through commodity derivative market.

- To improve production and market performance, joint investment initiative such as private public partnership is encouraged.

- End Thanks