**Objective**

**Babban Gona is an agricultural firm based in Nigeria. Their primary source of revenue is selling Maize for wholesale prices to big organizations in the local markets. They would like a predictive model to help decide when is the best time of year to sell their maize at competitive prices.**

Build a predictive model to determine the best time of year to sell Babban Gona maize in order to maximize return to farmers.

**Basic Pricing Framework**

|  |  |
| --- | --- |
| **Demand Forces** | **Supply Forces** |
| **Industrial Consumption (60%)**   * Cereal, baby food (Nestle) * Flour (Flour Mills of Nigeria) * Beer production (Breweries) | **Total Maize Produced in Country**   * Hectares Planted * Yield/Ha * Fertilizer Prices * Estimated Post Harvest Demand (?) |
| **Human Consumption (30%)**   * Part of daily diet * Rice, Maize, Garri | **Imports**   * FX * World Market Price for Maize * Volume of Imports * Import Prices |
| **Local Poultry market (10%)**   * Chicken feed (65% of feed is composed of maize) * Cheaper substitutes for premium maize (lower quality) * Is local poultry market growing or shrinking? | **Early Harvest**  - Changes the timeline of price movements |
| **FX Changes**   * Importation is now cheaper (each dollar buys more naira – imports are cheaper) * Makes Local maize more expensive |  |
| **Maize Exports**   * Volume of maize exported to other countries * Export prices |  |

**Data Collected:**

In order to build a robust model, at least 3 years of historical data is required.

**Nigerian country level data:**

**Maize specific:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Source** | **Frequency** | **Units** |
| Annual Production | USDA | Annual | 1000 MT |
| Domestic Consumption | USDA | Annual | 1000 MT |
| FSI Consumption | USDA | Annual | 1000 MT |
| Domestic Feed Consumption | USDA | Annual | 1000 MT |
| Area Harvested | USDA | Annual | 1000 MT |
| Beginning Stocks | USDA | Annual | 1000 MT |
| Imports (Total) | USDA | Annual | 1000 MT |
| Total Supply | USDA | Annual | 1000 MT |
| Exports | USDA | Annual | 1000 MT |
| Area Harvested | USDA | Annual | 1000 HA |
| Ending Stocks | USDA | Annual | 1000 MT |
| Local Price/Kg (Kano, Lagos, Giwa, Ibadan, Maiduguri) | FAO | Monthly | Nominal + Real Naira / USD |
| Yield | USDA | Annual | MT/HA |

**Local Industry:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Source** | **Frequency** | **Units** |
| Live Animal Stocks (Cattle, Chicken, Pigs, Sheep) | FAO | Monthly | 1000 Head |
| Fertilizer Consumption | FAO | Annual | Tonnes |
| Foreign Exchange Rate | Nigerian Bureau of Statistics | Monthly | Naira |
| Fertilizer Import + Export value | FAO | Annual | 1000$ |

**Global data:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Source** | **Frequency** | **Units** |
| Annual Production | USDA | Annual | 1000 MT |
| Domestic Consumption | USDA | Annual | 1000 MT |
| FSI Consumption | USDA | Annual | 1000 MT |
| Domestic Feed Consumption | USDA | Annual | 1000 MT |
| Area Harvested | USDA | Annual | 1000 MT |
| Beginning Stocks | USDA | Annual | 1000 MT |
| Imports (Total) | USDA | Annual | 1000 MT |
| Total Supply | USDA | Annual | 1000 MT |
| Exports | USDA | Annual | 1000 MT |
| Area Harvested | USDA | Annual | 1000 HA |
| Ending Stocks | USDA | Annual | 1000 MT |
| Brazil and US Maize International Maize Export Prices | FAO | Monthly | USD/Tonne |
| Yield | USDA | Annual | MT/HA |
| World Maize market price | US Fed | Monthly | USD/metric ton |

**Other Factors:**

* Ramadan and Eid Dates
* **Early Harvest?**
* Availability of substitutes + Prices
* Fertilizer prices
* Pesticide prices

**Questions**

* Forecast prices in Kano/Lagos or both? Wholesale?
* Importation prices are hard to find. Substitute w/ export prices from Brazil + US?

**Analysis Process (High Level)**

* Various Descriptive statistics and Exploratory Plots
* Correlations between Prices and Input variables
* Determine which are intuitive sound and statistically significant
* Use above information to start testing various Regression models
* Research more advanced techniques as required
* Keep iterating and backtesting

**Final Deliverable:**

* Predictive model in Python that forecasts prices by month in Lagos/Kano
* Adequate documentation about data collection and model implementation so team can update the model moving forward