EFFECTS OF LENDING ON ECONOMIC GROWTH (GDP GROWTH)

Machine Learning and the Economy

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***Abstract*— In this economic era, loans have become very important. However, their significance is not limited only to individuals. Even governments borrow. In other words, there are different types of borrowing. Countries can borrow from other countries (Why Are Loans Important to the Economy - Scoop Empire, 2019). Governments can borrow from individuals, and individuals can as well borrow from governments. Whichever the case, borrowing, and lending of money are essential to the economy of a country. I focused my study on identifying the impact that lending has had on economic growth in Kenya.**

The research is a time series correlation study. Economic growth, the dependent variable, was correlated with the annual rates of changes in lending rates as directed by the Central Bank of Kenya. The data on economic growth was obtained from the Kenya National Bureau of Statistics while the data on lending was obtained from WorldBank's data bank.

Keywords—economy;

I. INTRODUCTION

Kenya is a developing market which is leaning towards ensuring that credit is made available to citizens as an approach to spurring economic growth. Loans are utilized in capital investments. The funds that go to capital expenditures stimulate business activities, leading to the overall growth of the economy. There are cases where governments have been compelled to spend significantly on revenue expenditures.

Governments, through central banks, use loans to control the economy of the country. To contextualize this, there are two ways in which loans can be used to stabilize the economy.

1. During Inflation

   Inflation refers to a state in which there is a general increase in the prices of goods and services in the economy. As a result, the purchasing power of consumers decreases (Inflation Basics | CBK, 2020). In times of inflation, there is a lot of money in circulation chasing few goods. How does inflation come about? It is simple. Inflation sets in when there is an increase in credit and increases the supply of money in the economy. As a result, the prices of commodities increase, raising the inflation rate.

   How can this situation be controlled? Well, the government, through the central bank, will increase the interest rates on loans and deposits. With high-interest rates on loans, individuals cannot borrow. Instead, the high rates favor saving, which reduces the amount of money in circulation. As a result, inflation decreases.

2. During Deflation

   Inflation is not a good condition. Consumers often suffer due to reduced purchasing power. But is deflation better? Well, deflation is the direct opposite of inflation. The prices of goods and services significantly drop, and this may negatively affect the economy. How can this condition be corrected? In this case, there is a need for extra credit to stimulate investments. Therefore, the government, through the central bank, reduces the interest rates on loans and deposits. This condition stimulates consumption but limits savings, and as a result, deflation is controlled.

Researchers in the Central Bank constantly monitor the economy, looking for, amongst other things, any factors affecting the inflation rate. The researchers gather information, analyse the same and make recommendations to the Monetary Policy Committee, which can take action on inflation when appropriate. The Committee's tools impact the cost of money in the local market, and therefore impact it's growth rate. If inflation is increasing, the Committee can work to make money more expensive, thus reducing the amount of money in the market; If it is decreasing, the Committee can work to make money less expensive, and thus increase the amount of

money in the market. Some of these policies include increasing or lowering the interest rates imposed on lending from the Central Bank(Central Bank Rate - CBR). In effect this affects people's ability to secure loans.

3. Policies imposed to control the inflation rate (Main)

Policy	**Effect**	**Notes**
i. Increasing Central Bank Rates (lowest rate at which the Central Bank loans money to commercial banks)	Tightens the cost of credit in the money market.	
ii. Reducing the Central Bank Rates.	Encourages more lending and supports economic growth	
iii. Increasing Reserve Requirements for commercial banks.	Banks have less money available for loans and other services for their consumers, reducing the amount of money in the market.	Commercial banks must hold a certain amount of their deposits in their accounts at the Central Bank.
iii. Reducing Reserve Requirements for commercial banks.	Allows banks to use more of their capital for consumer services.	
iv. Undertaking open market operations to temporarily adjust the amount of money in the market.	Reduced money in the market.	To remove money from the market, the Central Bank enters Repurchase Agreements with commercial banks, where the Central Bank sells government securities to commercial banks for a set period of time. This means that, for that period of time, the Central Bank will hold the excess reserves of commercial banks.
v. Injecting money into the market with reverse repurchase agreements, or reverse repos.	Increased money in the market.	The Central Bank buys government securities from the commercial banks for a set period of time.

II. OBJECTIVES

A. Main Objective

The objective of this study is to determine the effect of changing of interest rates imposed on lending on the Kenyan economy. This data will be helpful in identifying whether there is a direct need for governments to review the policies imposed on lending as a way of positively impacting the countries' economy.

B. Other Objectives

Identify how policies imposed on lending (in this case interest rates) affect commercial banks' lending.

III. RESOURCES

A. Methodology

After the case study analysis, using my credible dataset, I will use the supervised learning approach to develop my predictive model and build my arguments considering the following methods:

Method	**Description**
Comparative	Draw graphs of the data

Visualization of the datasets	to be used for the project and show trends over the years and how it correlates. This will provide a visual aspect to how these key data changed over the years and the impact it had on the other factors.
Create Prediction Model	Develop a model that uses historical data to make informed predictions. I used data from the year 2000 to 2018 to create a model that can predict the interest rates as inflation rate in the country changed.
Fine tune model to improve accuracy.	This will involve making variations to the sample sizes used to make the model more accurate.

B. Datasets

1. Central Bank Rates
   Shows the variation in the CBK's CBR rate which is the lowest rate at which the Central Bank loans money to commercial banks from 1995 to 2019 fiscal year (Inflation Rates | CBK, 2020). When the Monetary Policy Committee increases this rate, it signals a tightening of the cost of credit in the money market. If the inflation expectations improve, the Monetary Policy Committee can reduce the CBR to encourage more lending and support economic growth.

2. Inflation Rates
   Shows Kenya's variation in Inflation Rates over the years (Inflation Rates | CBK, 2020). This will be compared with the Central Bank Rates to reflect the policy change made by the Central Bank of Kenya to control the economy.

3. Kenya's GDP Growth
   Data showing how Kenya's economy has grown over the past (GDP growth (annual %) - Kenya | Data, 2020). This will be compared to the monetary policies (changing of interest rates) passed in previous years to reflect the effects those policies had on the growth or deterioration of economic growth. An economy's growth is measured by the change in the volume of its output or in the real incomes of its residents.

IV. HYPOTHESIS

This study attempts to prove how monetary policies imposed by Central Banks affect the economic growth of a country. The results will be used in developing a model that guides policy makers on actions to take to manage the economic growth through predictive data.

A. Assumptions
   - For the GDP Data, Annual percentage Growth rate of GDP at market prices assumes that the local currency remains constant.
   - An abrupt increase in the inflation rate indicates negative economic growth, the same as a slow increase in the inflation rate indicates that there is no economic growth in the country.

B. Expected Results
   - Result 1:
     If a decrease in the economic (GDP) growth is causing the reduction of Central Bank Rates to enable more lending and hence increase the money in the market and vice versa, then I expect the correlation of GDP Growth and Central Bank Rate to be higher.

Comb through other repositories and find some previously done and published work in the area your study is placed and list them down as:

V. RELATED WORKS

A. The Effect Of Lending Interest Rate On Economic Growth In Kenya:

Daniel Musyoka Mutinda [5], in his study explores how changing lending rates for the banks affects the banks' lending capacity and ultimately affects economic growth in Kenya.

B. Solution implementation:

The solution created was a predictive model that predicts the Central Bank Interest Rates which is a key determinant of the Banks' capacity to lend to consumers and hence drive economic(GDP) growth.

C. Solution verification:

The solution will benefit the Central Bank of Kenya which is incharge of making and imposing monetary policies that are aimed at controlling economic growth in Kenya. The solution uses historical data on inflation over the years and compares this to show the impact this has on economic(GDP) growth.

With this at hand, the model utilizes the changes made to the Interest Rates in Kenya over the years to create a predictive model of what these values might look like in the future. This solution will give the Central Bank of Kenya an automated data driven benchmark to aid in setting the value of interest rates in Kenya in the event of different circumstances that impact GDP Growth.

The proposed system is dependent on historical data that is easily accessible to the Central Bank of Kenya. While this data might automate the process of coming up with an appropriate interest rate, a human aspect is still required to bring on board the other logic that comes in play to set these values. In this section, I break down the different components of the solution along with the processes that are entailed.

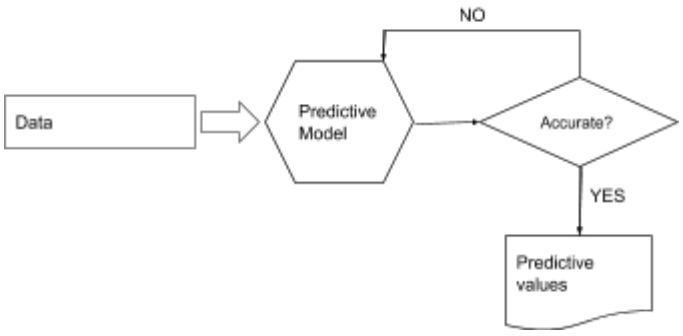

Fig. 1. Representation of sequence of interactions among the systems.

1) System process architecture:

According to Figure 1, the system has a number of interactions it makes with other systems and here we break down the different aspects:

a) Data:

This is the historical data pertaining to making the prediction. This is data on inflation rates in Kenya over the years, GDP Growth and Interest rates over the years.

b) Predictive Model:

The predictive model consumes the data to make predictions.

c) Accuracy:

After the predictions are made, the accuracy of the model can be improved by varying the sample size of data use. The system will grow more accurate as it consumes more data.

d) Predictive values:

This part of the system presents the predicted interest rate values and accuracy report on the data.

III. Results

Upon completion of the system, I was able to make predictions of how the interest rates would look like as the inflation changed.

IV. Conclusion

The successful development of an automated Interest Rate prediction model is invaluable to the growth of Kenya's economy. While this system can make data driven predictions, it undoubtedly requires logical input from humans who bring onboard critical decision making skills. The historical data available doesn't span a long period of time making it less accurate, this is as a result of relevant institutions not tracking this data till early 2000.

In order to ensure more accurate predictions, institutions will need to adapt to tracking any relevant data that can help in making the system more efficient.

References

[1] Centralbank.go.ke. 2020. Inflation Basics | CBK. [online] Available at: <https://www.centralbank.go.ke/project/inflation-basics/> [Accessed 2 April 2020].

[2] Centralbank.go.ke. 2020. Inflation Rates | CBK. [online] Available at: <https://www.centralbank.go.ke/inflation-rates/> [Accessed 2 April 2020].

[3] Centralbank.go.ke. 2020. Inflation Rates | CBK. [online] Available at: <https://www.centralbank.go.ke/inflation-rates/> [Accessed 2 April 2020].

[4] Data.worldbank.org. 2020. GDP Growth (Annual %) - Kenya | Data. [online] Available at: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2018&locations=KE&start=1961&view=chart> [Accessed 2 April 2020].

[5] Musyoka, D., 2012. The Effect Of Lending Interest Rate On Economic Growth In Kenya. [online] Chss.uonbi.ac.ke. Available at: <https://chss.uonbi.ac.ke/sites/default/files/chss/Musyoka%20Dan%20Project-2-1%20pdf.pdf> [Accessed 25 April 2020].

[6] Scoop Empire. 2019. Why Are Loans Important To The Economy - Scoop Empire. [online] Available at: <https://scoopempire.com/why-are-loans-important-to-the-economy/> [Accessed 2 April 2020].