

Turkey Food Price Inflation

Visual analysis on Crucial Underlying Causes and Consequences.

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Abstract : Turkey has been experiencing the huge surge in its food prices in the recent times. Various Economists have criticized the actions of President Erdogan for not increasing the interest rates. We explore the scenario to find the underlying cause of the food price inflation and why there aren't any actions taken by the ruling government. We use the Turkey Food price data from 2013-21 and later merge various other relevant economic data into our project using Python and MySQL. Tableau is the major tool preferred for visualizing every relationship between the variables in the charts. The main finding unearths a political incident which triggered the pack of dominos to fall for the inflation to reach 36% in 2022. Based on similar past incidents we put forward the future consequences and possible action needed to prevent the upcoming Hyperinflation in Turkey.

I. PROBLEM STATEMENT.

The major ongoing crisis in the current world economics is undoubtedly the steep inflation in Turkey. The crash of the Turkish currency Lira has contributed to the huge and steep inflation especially in food prices which has caused many people to come to the streets to form large queues just to get a loaf of bread. [12] The situation looks bleak and the major cause for this mishap in the financial handling, Is still in dark.

We attempt to analyze the following project questions

1. What is the root underlying cause of this food price inflation?
Answering the major question provides us ways to solve the following sub questions.
 - i. Why has Lira crashed to its all-time lows?
 - ii. What \$10 in Turkey could have bought you in 2013 compared to 2022?
 - iii. Which food products have contributed to the highest inflation ?
 - iv. What will be the major consequences if trend continues and how to avert further crisis.

The dataset which we have chosen for this analysis is perfect for our findings as it records the various basic food materials, groceries, finished food products, fuel prices and other home need items on unit basis from 01.01.2013 till 01.01.2022 which is the most recent and has a USD conversion attribute for easy interpretation. [4]

In the later stage we merge various other data based on our human reasoning to identify the result. Having these data we attempt to analysis the exact underlying reason for the major inflation boom in Turkey.

II. STATE OF THE ART.

Gonzalo Huertas [8] in his paper summarised the Venezuelan Super hyperinflation process based on the post Keynesian approach by performing various visualisation techniques comparing the rise in basic food prices to the fall in Venezuelan Bolivars (Currency) and its stock performance.

The paper visually interprets the food price, Bolivar performance and GDP growth in a single chart to easily identify the start of the inflation and uses the high-level human reasoning to identify the trend in inflation started in 1970 with FII taking away the money from Venezuela causing the market to enter a bear run. The author further clarifies the major cause because of the Dutch disease pandemic which arose in the 1970's in which many lost their lives. This market sentiment affected the market and the boom in the Brazilian market due to their free trade policy attracted the investors to shift money from Venezuela to Brazil. The trend continued but took a sharp fall in the recent years due to the bad economic governance, high interest rates and excessive printing of money

We use this approach to interpret all the charts on a single scale to identify at where and when the crisis actually started.

J. Davison, A. Halunga and three others [6] in their paper on UK food price inflation focus on our sub question regarding which food products contribute major to the cause of the food inflation and what are the major causes of the same. The paper correlates the collected data and identifies the root cause using the 6- Variable co integrated vector actor regressive(6-Cvar) technique and uses various high technical human interpretation on visualization charts to identify the same.

They deal with the similar quantity of data collected from 1990 -2010 across all UK and to find which food product contributes heavily to the inflation percentage. The paper further explains that food price can be caused even if the economy of the country is strong as the British pound has always been strong since the said period. It later compares the US food price inflation , EU price inflation into context and plots the same in all visualization formats. The paper answers from visually understanding that the labour shortage during the post 2008 Lehmann collapse time and the Fuel price increase contributed hugely and significantly toward the food price inflation.[7]

Both papers gives suggestion on how to improve the problem. Gonzalo suggests that help by means of free loan which can be given by the First world countries, UN and IMF to solve the currency depletion thereby working toward a stronger economy.

J. Davison suggests to use various other labour source and to cut down on future fuel import to being the inflation to normal which was achieved in the UK.

We can take resource from both the papers to combine all the potential contributions to inflation and use our human interpretation to identify if there was any significant socio political impact, identified as the root cause of this inflation.

III. PROPERTIES OF DATA

The data collected for this analysis is a special set. We have used the HDX dataset which is scrapped from the Wood Food price programme database. The said database consists of various food items such a rice, maize, meat, rice, oil, Wheat etc consisting of 50 essential food products, which we are consumed majorly in Turkey.

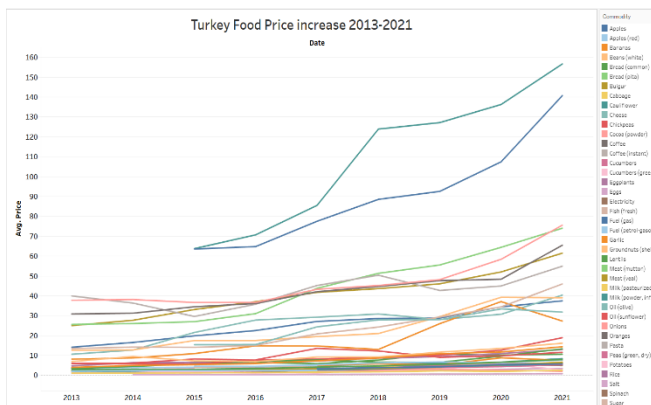


Figure 1: Turkey Food Price 2013- 2021

During our analysis, since we are focusing on looking at the visualisation and using our human interpretation techniques to move forward we need to incorporate various other data into our dataset. The Lira to USD historical price data from Investing.com, Inflation rise in various countries compared to turkey, Turkish people sentiment with president Erdogan, Turkish stock market BIST 100 yearly performance and the foreign investment percentage in Turkey from Yahoofinance.com.

We merge all the data together using the time data frame which is the year in our context for identifying the pattern on a yearly basis. The merging of the data is done on MySQL and Python with pandas library is used for cleaning an preparing the data.

The entire dataset consists of 10590 rows and 20 columns

For each of the transaction the following various information are provided which we will consider as our variables.

1. Data In years.
2. Market location (National Average / Istanbul / Ankara.....etc)
3. Latitude
4. Longitude
5. Category of food (Cereal, Vegetables, Non food etc)
6. Commodity of Food (Apple , Chicken , Zucchini etc)
7. Units (Kgs/Litters)
8. Price Flag – Actual Price

9. Price tag(Retail)
10. Currency in Turkish Lira
11. Price of goods in Turkish Lira
12. Price of goods in USD
13. Inflation rate in 10 different countries
14. Inflation rate in Overall world
15. USD to Turkish Lira
16. Favourable people sentiment with President Erdogan
17. Unfavourable people sentiment with President Erdogan
18. Foreign Investments in Turkey
19. BIST 100 Stock market performance
20. Yearly average inflation rate of all goods in Turkey.

The data follows a significant time frame hence it is a temporal data while the data mostly collected based on food prices in Turkey other location signify that the data is spatial as well but since the inflation percentage is mostly common across the verticals in the same country we choose not to make significant use of the location trends. We shall discuss this later.

The entire dataset dated from the start of 2013 till end of 2021 and there aren't any significant missing values and in our dataset.

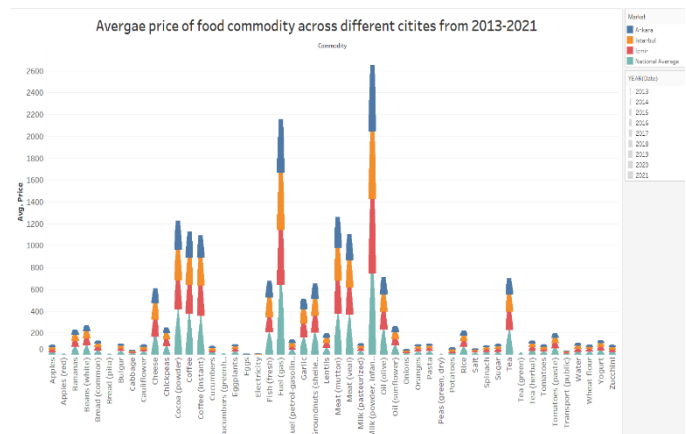


Figure 2: Average price of commodities across cities in turkey from 2013-2021

With reference to the outliers in our dataset we chose to keep them in our mainly because the significant outliers in inflation rates is a trump card to identify the root cause of inflation which is discussed later.

All data are taken from Investing.com, Yahoo.finance.com are free to use and in public domain and hence the risk of GDPR is not applicable in this said context.

IV. ANALYSIS

A. Analysis Approach :

The Prepared clean data is used for our analysis. We use different sets of data and merge based on a temporal yearly time frame and make into a full new merged dataset consisting of all the necessary information required using the powerful MySQL and Python Pandas library.

Using the said fully functional data frame we shall use Tableau to identify the main causes and effects of the food price inflation. Tableau is used because is a very easy to use and allows a high level of manipulation and aggregation. Any amount of further required data can be integrated easily into the model.

With the available set of recent yearly data of the food price and other economic data we are not attempting to predict the price of the inflation in the coming years which is easily possible by any computational/data analytics process but we are attempting to identify the main cause of the inflation which is only possible by efficient human interpretation as there are lot of socio economic and political aspects to be looked in the same.[9]

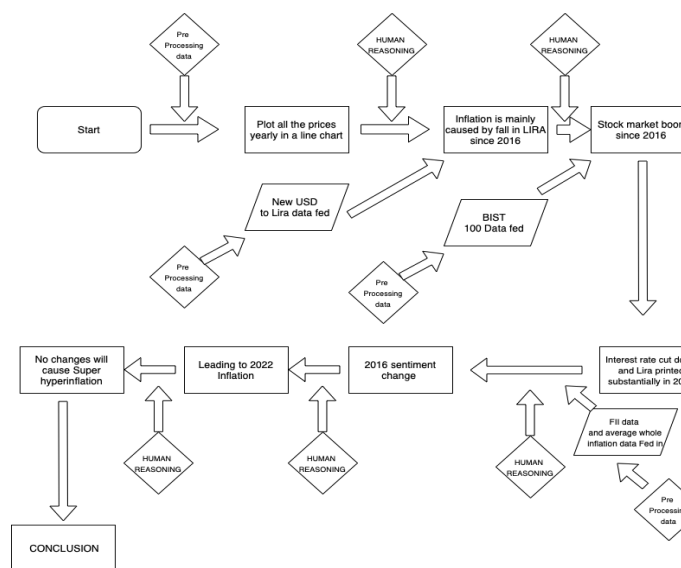


Figure 3: Workflow chart

We shall use the data charting in the following formats to check for any results.

- Plot the temporal commodity prices rise (figure 1) and their category of (figure4) on a line graph to find any discrepancy within the data and to find any outliers. Use human interpretation to find any signals which may arise based on the same
- Collate all the items into a bubble chart to identify which goods contribute to the maximum spend of the Turkish people.
- We plot the USD to Lira to identify when the biggest bear run started from & to find signals for answering our second question, we use base signals by human interpretation on the chart signals to move forward with our analysis
- During the further analysis stage we shall discuss the need for interpreting the Turkish people sentiment, BIST 100, Foreign investment rate to predominately identify the root cause of the inflation.
- To answer our question of identifying what \$10 could buy, we shall accumulate the major breakfast items required in the commodity and collate in the sense to find our solution.

Based on our finding we use human reasoning to identify the major signals evident in the chart and use the available resources to cross verify all the political, social and economic and religious decision taken by the Turkish government and the world governments in general to identify the root cause of this inflation.

We use our model in Tableau to predict the future price over the coming years, if things don't change and we use our spatial knowledge and historical data of similar situation based on the paper on other of the world to interpret our data for finding consequences of the same in the coming years to give our suggestion to prevent the inevitable based on factorial evidences which have contributed to strength of economy.

B. Analysis Process

From figure 1 & 4 it is evident that the prices have been on a upward trend. They follow a pattern of significant gains in inflation for the period of time. The cost of few materials such as garlic and ground nut have gone down during the temporal path, is a serial outlier which isn't significant but will be considered as an evidence.

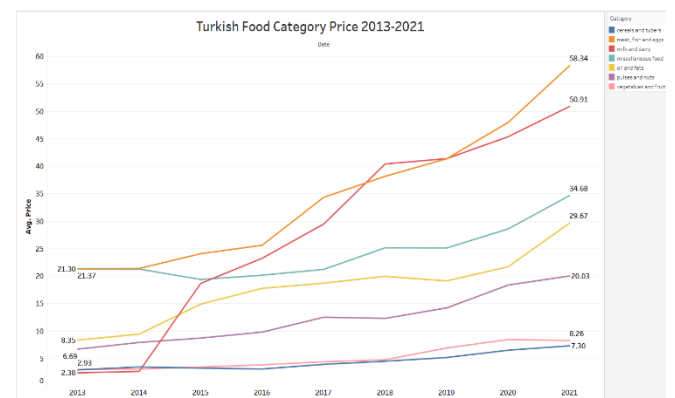


Figure 4: Turkish Food category prices 2013-2021

Form figure 4 we can clearly identify signals indicating the excessive increase in the price of meat, milk dairy and various miscellaneous food items like Vegetables tea coffee, sugar etc have contributed a major portion to the high amount of inflation experienced currently.

We understand that fuel price has contributed to price increase but not significant for being the root cause, as in figure 1 it is blatantly evident that a surge In fuel price is mainly because of the transitory inflation[11] taking part throughout as recorded in paper 2 by J. Davison.

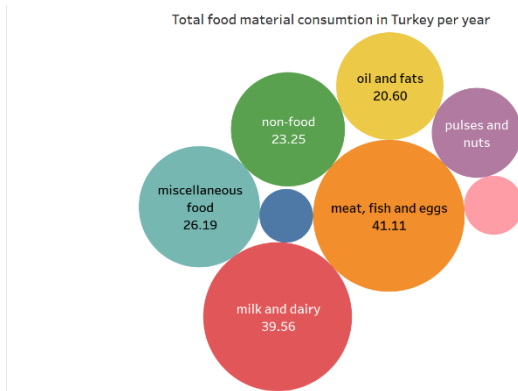


Figure 5: Contributors to the inflation

We use figure 5 to answer our third question that the major inflation contributor is seen in meat products, milk and miscellaneous which is understandable as they are goods in heavy demand. Meat is the major portion of meal in a Turk household and has seen significant inflation thereby contributing to low income group consuming significantly less compared to a year before mainly due to the price inflation.[6][12]

To answer our next sub question of how much could \$10 buy you in Turkey in 2013 Vs 2021, we consider the case of an average breakfast gives a very shocking result.

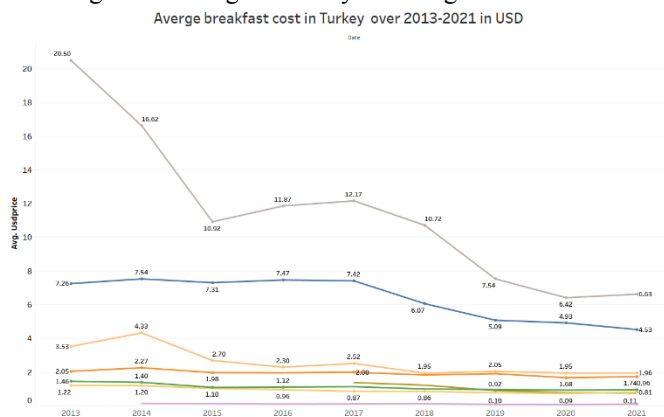


Figure 6: Average Breakfast cost in TURKEY with USD

Figure 6 signifies that there is a drastic change with respect to price. In 2013 approx. \$35 was required for getting all necessary ingredients for making a ideal breakfast and in 2022 the number has plummeted to \$10 which is quite shocking. This answers our sub question and clearly explains the necessity of preventing further inflation.

The above finding is a clear representation of the huge underperformance of the LIRA and we dive to analyse the fall in the same.

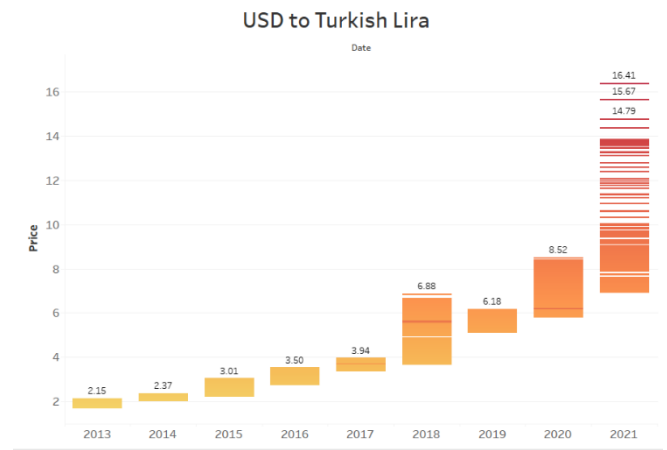


Figure 7: USD to Turkish Lira

Figure 7 denotes the results which we have interpolated in the earlier charts that inflation in major is caused by the fall in Lira But the underlying reason for this fall which is our major question is not answered by this chart.[14]

To understand the economic stability of the country we analysis the major stock market indices of Turkey known as the BIST 100

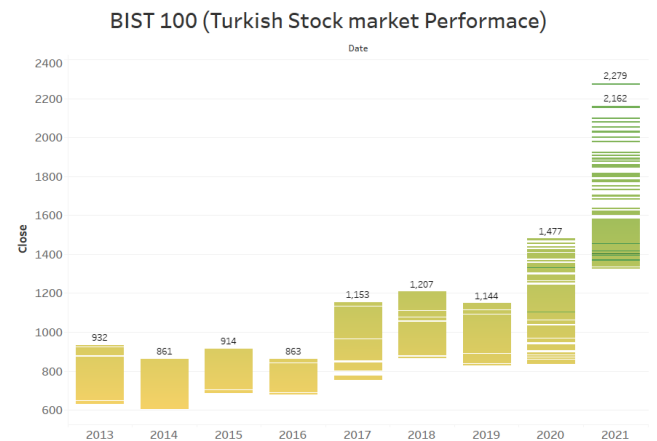


Figure 8: BIST 100 performance

Figure 8 indicates a very strange pattern. Even though the stock market is said the climb the walls of worry and perform significantly better during inflation but the turmoil in economy isn't at all predominant in the chart. It is also understood from the figure that from 2016 the markets has been shooting up.[15]

We shall look at the FII (foreign indirect investment) data into the stock market to get further details

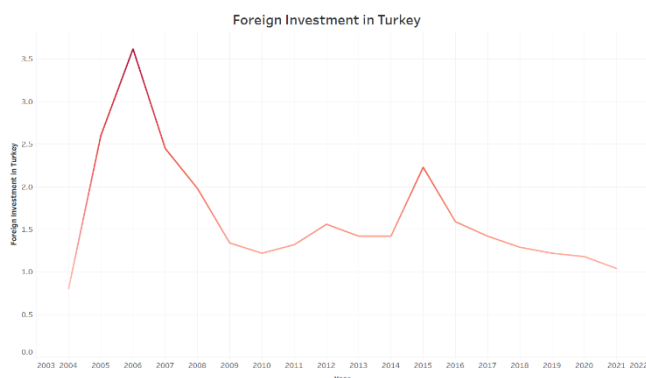


Figure 9: FII investment in BIST 100

Figure 9 provides a contrarian to figure 8 as naturally when FII's are taking out money from the country in 2016, the stock market should go down but what has played out has been exactly opposite.

The interest rate in Central bank of republic turkey from the period of time has been kept consistent with other emerging economies. When covid happened in the early 2020 all countries slashed their interest rates, also did Turkey but even though the world is currently ongoing its second or third waves none of the countries have further reduced the rates rather Bank of England announced that they are increasing the rates.[2]

Turkey meanwhile has slashed interest rates further in their depleting economy, This is usually done to improve the stature of the government to win an upcoming election or to strengthen its roots in the hearts of people by giving money for less. [5]We try to analyse further points to understand this decision by the president.

We attempt to understand the average inflation cost of all good in turkey. From figure 10 we can easily understand that the inflation started in 2016 due to this, Lira become weaker.[13]

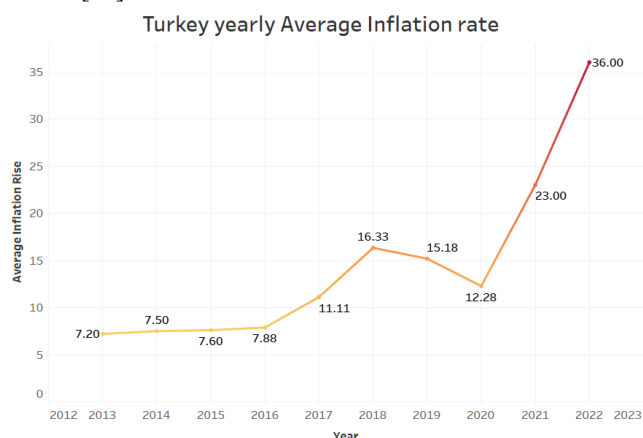


Figure 10: Average inflation of all products in Turkey

Further investigation into the subject we understand that the printing of Lira bank notes by Central bank of Republic Turkey (CBRT) have increased hugely since 2016.

Printing money in huge quantify clearly suggests the cut in interest rates for making the retail investors (common people) borrow money in cheap and are investing it in the stock market.

This makes the situation clear that from 2016 the stock market bubble is evident in Turkey with retail people investing with the abundance of Lira and the FII's have been moving money of Turkey.

As money is going out of the country significantly, This is the major reason for the crash in Lira.

We understand that 2016 is an important year for our reasoning and our necessity to ponder why for the Central bank to print abundance of money and the reason for FII's to remove money out of the county is under question.

We analyse the people's sentiment on the ruling government indicator data and analyse the same.

Figure 11 clearly explain that the people sentiments have been becoming unfavourable since 2016 towards the ruling government and the presidents is a the major reason for the foreigners to remove money from the country.

From our analysis we can conclude that some significant political happening in 2016 triggered the people sentiment to go lower thereby, made the FIIs to sell which made the Lira weak and thereby contributing hugely to the inflation in 2022.

From the series of visual correlation with our human interpretation, we understand that 2016 is the major start of the inflammatory push for this hyperinflation scenario We dig deep into 2016 to find out what was the major political happening to come across this article on Al Jazeera About the 2016 Turkey Coup d'etat attempt.[1]

2016 Turkey Coup d'etat attempt.[10]

On July 15 2016 a faction of Turkish armed forces called themselves as the Peace at Home council whose members have still never been identified attempted to coup against the Turkish government and its President Erdogan for taking full control over the country.[1]

The coup resulted in failure as the common citizens of turkey went to the streets and nullified the protesters who surrendered. It resulted in the death of 300 people and left over 2100 injured.

A coup attempt against a very strong county is always a huge risk for nay foreign investors putting money. This sentiment derailed the investors who started selling their shares and taking money out of this county. The basic sentiment of the county among the citizens of the world also took a blow which caused the Turkish people sentiment in their president to go down too as per figure 11

Political situation :

President Recep Tayyip Erdoğan known as the reformer of modern Turkey mainly due to this hugely globalization and trade friendship with the EU since early 2000, for over a decade laid a path for Turkey to flourish in trade and tourism.

After the coup attempt president Erdogan fearing another coup attempt changed his ways. Not increasing the interest rates when in fact the inflation is on 3X times is said to be because of a religious factor.[16]

A President for the globalisation and revolutionary policies after the coup has resulted in inside government without making inroads for smooth input of foreign money thereby resulted in this inflation scenario.

We attempt to identify the consequences of the same as our 4th question.

We extrapolate the chart to identify the rate of inflation in Turkey will reach the super hyperinflation stage if not controlled significantly.(figure12)

Comparing to the price inflation of Venezuela it gives a grave picture that Turkey which will follow suit of Venezuela in food price inflation crisis.[3]

The price of meat, milk and other good tends to be to the highest climber which will result in huge humanitarian crisis which will not only affect the people of turkey but also the world economy in general.

To answer our final question on ways to prevent inflation we look at our paper analysed.

We have seen many significant attempts at averting inflation crisis which hasn't never materialised but Turkey being an emerging economy we can expect some level of action to be taken.

The IMF and the world first order countries and superpowers should lend hugely and generously at zero or near zero interest to Turkey in order for it to resurrect its economy.

C. Analysis Results:

Based on analysis we can conclude that the 2016 failed coup attempt is a significant incident which triggered the various actions to result in the current ongoing food price inflation in Turkey.

The peaks in the data and the significant cross reference of human interpretation was hugely necessary to identify the same.

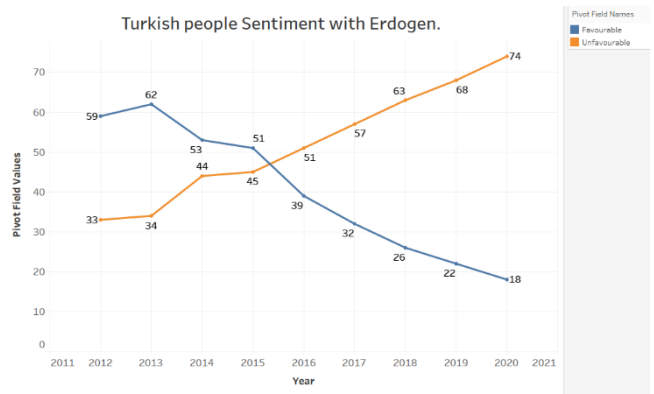


Figure 11: Turkish People sentiment with the current president Erdogan.

This particular event triggered the foreign investors to withdraw from Turkey plummeting Turkish Lira to all-time lows.

The bubble chart figure 5 is a clear identification for the identifying Meat, milk and miscellaneous products contribute heavily to the high inflation more.

Based on the exploratory analysis as per figure 12 for future prediction, If the trend continues we might see a huge setback and super hyperinflation status in turkey by 2025

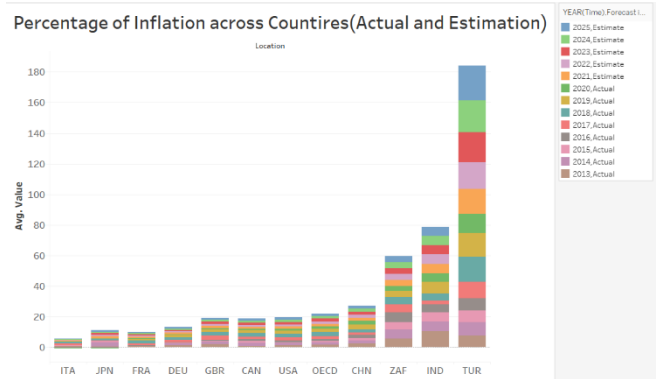


Figure 12: Inflation actual vs estimated for various countries.

Various economic political changes from within contributing to interest free loan from the outside world is needed for solving the issue.

Indicator peaks in all of the analysed charts in the particular year of 2016, was very crucial in identification of the results which help us to understand the major reason for the increase in the food prices.

V. CRITICAL ANALYSIS

The path mainly chosen for this involved very simple approach to visualisation. This includes construing series of relationship using graphs of various important features and target variables and using plain human interpretation on the same to identify disordered patterns which can contribute to answer our question

The answer identified about the impact of 2016 failed coup was a completely different topic which could only be possible when a human interpolation is involved in the said subject. The various extensive identification of the charts of various data and comparing them was hugely significant in analysing the desired result from the set analysed.

- 1) The major drawback about our project is we were too stuck up on the approach. We fixed on human reasoning approach and didn't wander away from using the various matplotlib in Python and other business intelligence tools. Using analytical methods like clustering, outlier detecting in pandas and scikit learn libraries. It could have been used in the said process which could have significantly helped us identify the cause of the inflation, And maybe change the reason too.
- 2) We analysed based on our findings as the 2016 coup attempt was the m major reason for the start of the inflation crisis. But the result was derived from the fact that data from the time period of 2013-2021 was only used, if used a different earlier set of data the result obtained would have different where the inflation. starting point could have been significantly earlier.
- 3) The amount of food prices in our data sent only contributes to 50 items in our dataset which is very minuscule compared to the actually food grains in the real world.
- 4) The labour cost or the wage aspect of the citizens will be increased significantly during the time of high inflation which can make the inflation transitory and flawless. However we know from the flash news that this scenario is not prevalent in the real world. However a clean data of the average wage in turkey data would have changed our approach.
- 5) In our consequences and prevention strategies we followed the advice with respect of Venezuela. But the political and demography of Turkey is whole new concept and cannot be used to be give a clear comparisons between the two countries.
- 6) The change in fuel prices in the beginning of 2020 owing to the rumour of Turkey finding a petroleum resource highly spooked the markets which was the major death knell for the inflation to soar out of control. Theis particular aspect was not studied and presented.

Word Counts

- Problem Statement: 249 words
- State of the Art: 497 words
- Properties of data: 498 words and 2 images
- Analysis Approach : 492 words and 1 diagram
- Analysis process : 1448 words and 7 images
- Analysis results : 199 words and 2 images
- Critical reflection : 427 words

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