International Journal of Advance Interdisciplinary Research
Vol. 2, Special Issue 1, (Jan-March) 2026, pp. 150-154, e-ISSN: 3107-913X
DOI: https://doi.org/10.66095/ijair.2026.v2.S1.15

Supply and Demand Modelling in a Local Market

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Abstract: With simulations and analysing method, the paper demonstrates how both liner and differential model can effectively capture the behaviour of local markets, offering valuable tools for the small-scalar a producer. The results highlight the importances of the mathematical modelling in predicting market outcomes, understanding economic forces, and guidelines of the subject level. This paper presents a mathematical modelling approach to analyse the supply and demand interactions within a local market, incorporating both linear models and differential equations. The study begins with classical static models where supply and demand are represented as liner functions of price. These functions are used to determine equilibrium price and quantity, providing insights into local producers and consumers respond to changes in pricing, subsides or external shocks.

To understand bitterly the dynamic behaviour of the market over time, the paper extends to analysis by the introducing a system of first-order differential equations that model how prices adjust based on excess demand or supply. This model simulates gives the real-world market price and other adjustments where price changes are not means changing of price instantaneous but it evolves which means prisents in response to market imbalances. Stable analysis is performed to the determine under what conditions the market converges to equilibrium or experiences the oscillations.

Assuming liner supply and demand functions, we simulate market behaviour over a series of scenarios including price shocks and demands surges. The model highlights and gives the nonlinear impacts of even modest parameter changes and this will demonstrates with example the importances of the accurate forecasting. It has (Theoretical background) Liner supply and Demand Models, Market Equilibrium, Dynamic Adjustment via Differential Equations. (Model Construction and Assumption) like assumptions, Model Parameters, Equilibrium Calculations

Keywords: Market Equilibrium, Dynamic Modelling, Supply and Demand Analysis

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Introduction

The interaction of buyers and sellers are through the operating markets. The satisfaction of human needs are the simple and important end and goal of all production unlimite and recurring into demand wise, where as means are present to satisfy very limite. The demand and supply analysis the production of the framework, the markets which are local will know the price value, and local markets will decide the price value of the stores.

In the bignning let us know the meaning of the terms like: desire, want and demands of the markets which helps us to know better. Like suppose if the desire to possess a commodity is backed by the purchasing power and the consumer is also willing to buy then that commodity, will becomes and it want. Now coming to the demand in the other side the

- First the demand is quantity desired to be purchased. The quantity actual bring from a is referred to as actual purchase. It is desired purchase which will be taken.
- Secondly, quantity demand are as always mentioned over a period of time, like if the quantity demanded of oranges is 10, and it must be per day or per week, etc.
- Thirdly, the quantity demanded will have an economic meaning only at a constant value.

  Let see with an example: 1. The need for mangoes is equal to 10 units per week at a price of Rs. 100 per dozen is a full and meaningful statement, which is used in many theories.

Determination of demand:

The demand for commodity or the quantity demanded of a commodity on the part of the consumer is dependent on a number of factors.

And there are the mentioned factors:

1. Price of a commodity.
2. Price of another related and similar commodity.
3. Taste of a other consumer.
4. Income and outcomes of the consumers.

The Demand function shows that how the quantity demanded depends on the above given factors. A demand function which is present like:

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$$D_x = f(P_x, P_y, P_Z, M, T)$$

Now is the quantity demanded of Y commodity,

From all the factors are influencing the needs for Y and if it simultaneously, the picture must be high to complicat and present. Therefore, in normally we allows only one of the factors to change in the presented demand value of the price, assuming that all other factors remain unchanged

Theoretical Framework:

(2.1) Demand model:

This present in the given percentage changes in the demand divided by percentage change in the price value , which means if the divide the change in price and percentage value.

- For linear demand :

  Elasticity (Ed) = $(\frac{dQ}{dp})\frac{P}{Q}$

(2.2) Supply Mode:-

The supply model it measure the producer to price variation and responsiveness. And the positive elasticity confirms rational product

Equilibrium Analysis:

It exists when the functional values gives the similar things and it is inter connecting with each other

P* = $\frac{(a-c)}{(b+d)}$

Econometric Data Simulation:

In this the estimation produced a demand value of R^2= 0.972and supply R^2= 0.922

This demands regression and also demands quantity.

Both the values are given by R values and it gives the price

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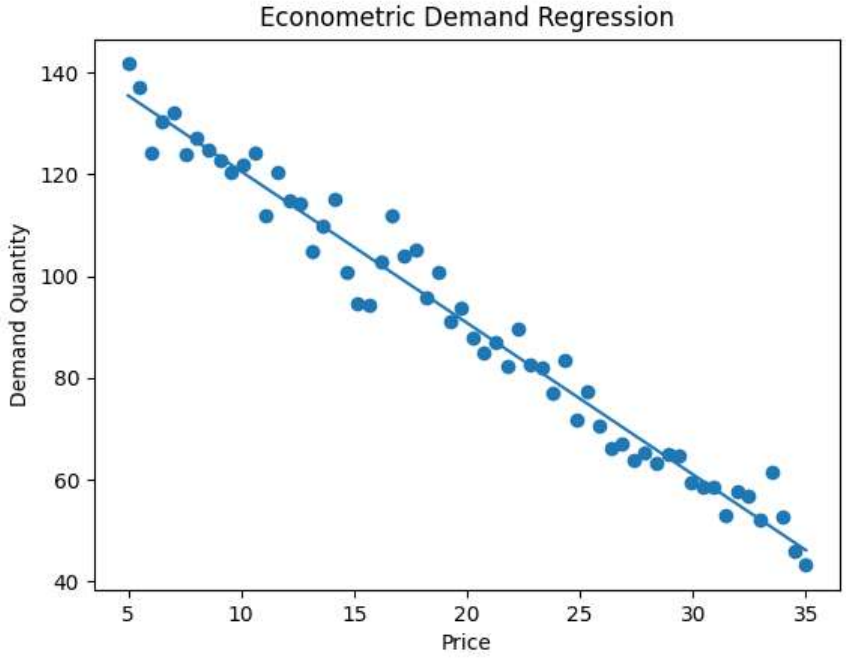

Methods and Mathematical Analysis:

1. The Data source and prepared: the analysis uses the " wheat price and quantity data" from the economics.
2. The mathematical modelling of supply and demand: The relationships between price(p) and quantity demand Q_d and supplied $Q_s$are represented by using linear function

Demand Function:- Q_d = a - bp

Supply Function:- Q_s = c + dp.

Where :- Q_d = Quantity demanded

Q_s = Quantity supplied

P = price of the mangoes.

A, b, c, d = parameters estimate from the data graph.

Result

Demand Regression shoed a statistically significate negative relationship between price and quantity demand ($\beta < 0$), consistent with the law of demand.

- Supply Regression:- this is gives a positive relationship between price and quantity supplied which is ($\delta > 0$), consistent all the values and with and present the law of supply.

Future Research Direction:

For the future research should integrate machine learning for the non linear modelling and multi market equilibrium system work.

Conclusion:

In the Quantity demand presents hopeful on the part of the consumer to at a commodity in the market at a given price value. Because price value keeps on changing so it analyse the research work to give the exact price of the related commodities. And also generate by consumers determine for price.

Supply refers to the quantity of the product, with all low and high values and trying to sell in the given price, in normal day or 24 hours price. It only send the required things to the consumer.

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