BEC 30325: MANAGERIAL ECONOMICS

Session 05

DEMAND FORECASTING (PART – I)

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Session Outline

- Forecasting
- Qualitative Forecasts
- Time -Series Analysis
- Trend projection
- Seasonal Variation
- Smoothing Techniques
- Barometirc forecasting
- Input Output Forecasting

Forecasting

- ▶ There is a risk and uncertainty in the business environment
- Managers need to utilize limited resources to gain optimum benefit
- They have to foresee the future
- They have to plan for the future
- Forecasting is an important part of managerial decision making as business decisions involve a great deal of uncertainty.

Objectives of Demand Forecasting

- Reduce risk and uncertainty that the firms face in short term operational decision making
- Reduce risk and uncertainty that the firm faces in planning for long term growth

Micro and Macro forecasting

- Macro forecasts is the forecasting of general economic condition
- Ex: economic growth, price level changes
- These forecasts are made by economists, central bank, policy makers
- They show the future changes based on the historical data and expected changes in the domestic and international conditions

Micro forecasts

- Micro forecast means forecasting of the demand or sales of a firm
- These are based on historical market share of the firm and planned marketing strategy
- These forecasts are used to forecast the firms operational needs: ex: raw material, equipment, warehousing, labour
- Firms use long term forecast to forecast expenditure on plant and equipment to meet its long term growth plan and strategy

Forecasting Techniques

- Qualitative Techniques
- Quantitative Techniques
- Based on only past data
- Use of complex models based on a large set of additional data and relationships
- Performed by the firm
- Performed by consulting firms
- Useful for short term
- Useful for long term

Qualitative Forecast

- ► Usefulness:
- Qualitative Forecast techniques
 - Surveys
 - Opinion polls
 - Market Experiments

Opinion Polls

- Forecasts are done based on the opinions of the experts within or outside the firm. To control the subjective nature of the personal insights, polling is used. Hence, average forecast of the group is used as the forecast
- There are different Polling techniques

Executive Polling

- Forecasting based on the polls of the experts in the field
- Top management of the firm or outside experts can be used
- Personnel in the top management are experts with a very good experience about the firm
- Outside experts have the knowledge about the market and having a free thinking
- Collective judgement entirely based on insights of those with a knowledge of the industry.

Sales force Polling

- Forecast is based on the opinions of sales force in the field
- Advantages
 - Sales force is the closest group to the market
 - They get the responses from the market
 - They can make a better prediction about the firm's demand, competing brands in the market and identify changes going on

Consumer Intension Polling

- Forecasts based on the responses of potential buyers
- Interview the potential buyers to get their purchasing intensions
- Advantages:
 - Their polls are used to make the forecast
 - These consider the future expectations of the consumers
 - Forecasts based on the consumers own opinions, requirements, choices

SURVEYS

Survey of consumer plans generate useful data. Commonly use when introducing a new product or making a substantial changes to existing one. 13

- > When no data available for forecast, survey on anticipated demand
- Surveys of economic activity.
- Value of surveys depend on
- Surveys can use as supplementary information for decision making

MARKET EXPERIMENTS

Usually to overcome weakness of consumer surveys. Generate data prior to full scale introduction of a product or implementation of a policy. 14

- Usually done in a test market and experiment may involve several features
- Evaluating consumer perceptions
- Determine demand elasticity
- Test reaction to a new advertising campaign
- are of relatively short durations, customers not fully aware of pricing and advertising changes

Quantitative Forecasting

- Quantitative forecasting methods use statistical techniques to forecast demand
- They consider the time series trend, impact of different factors, potential changes in the market
- Main quantitative methods:
 - Time Series Analysis
 - Smoothing Techniques
 - Barometric Methods

Time -Series Analysis:

- Forecast based on the analysis of time-series data
- Time Series data: values arranged by days, weeks, years
- Plot past data, examine the trend, forecast the future
- ► Assumption:
- Past trend will remain in the future
- when changes in a variable shows a clear pattern over time, this is appropriate.

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- Fluctuations in Time Series Data
- Reasons:
- Secular trend long run changes
- Cyclical fluctuations cyclical pattern
- Seasonal variations- regular fluctuations
- Irregular influences

TREND PROJECTION

<u>Trend Projection</u>: Commonly used technique of forecasting. Assume there is a identifiable trend in data.
 Project the past trend by fitting a line and extend it to forecast.

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- Methods
 - 1. Graphical curve fitting: free hand method.

Limitation: accuracy depends on the analysts ability to fit a curve to data

2. <u>Statistical curve fitting</u>: use regression to fit a curve.

$S_t = S_o + bt$

☆ Constant rate of change(Linear : assume sales increase by a constant rate from one period to next

Example

Time Period	Quarter	т	Sales
2010	1	1	11
	2	2	15
	3	3	12
	4	4	14
2011	1	5	12
	2	6	17
	3	7	13
	4	8	16
2012	1	9	14
	2	10	18
	3	11	15
	4	12	17
2013	1	13	15
	2	14	20
	3	15	16
	4	16	19

Seasonal Variation

- \Rightarrow Improve the forecast by incorporating the seasonal variations
- Methods: Ratio to trend; dummy variable method
- 1. Ratio-to-Trend method

Ratio =	Actual			
	Т	rend Forecast		
Seasonal Adjustment	 Average of Ratios for Each Seasonal Period 			
Adjusted Forecast	=	Trend Forecast	 Seasonal Adjustment 	

Seasonal Variation

Ratio to Trend Method: Example Calculation for Quarter 1

	Trend		
Year	Forecast	Actual	Ratio
2010.1	12.29	11.00	0.8950
2011.1	13.87	12.00	0.8652
2012.1	15.45	14.00	0.9061
2013.1	17.02	15.00	0.8813
S	0.8869		

Trend Forecast for 2014.1 = 11.90 + (0.394)(17) = 18.60

Seasonally Adjusted Forecast for 2014.1 = (18.60)(0.8869) = 16.50

Smoothing Techniques

Predicts value of a time series on the basis of some average of its past value only .
Smoothing techniques are useful when the time series exhibit little trend or seasonal variations but a great deal of irregular or random variations

Moving Average Forecasts

Forecast is the average of data from *w* periods prior to the forecast data point.

$$F_t = \sum_{i=1}^w \frac{A_{t-i}}{w}$$

Exponential Smoothing:

• Trend projection places equal weight on all data point in the estimation

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- No problem if no or little change in the trend over entire series / period
- If recent observations are more accurate and influential than past, accuracy may be at stake
- Exponential smoothing gives greater weight to more recent observation

Barometirc forecasting

- ☆ Barometric Forecasting.
 - ☆ Trend projection and exponential smoothing use past relationship to predict future
 - ☆ If no clear pattern in a time series, data have little value for forecasting

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☆ One way to forecast or anticipate short-term changes in economic activity or turning points in business cycle is to use the index of leading economic indicators.

Input –Output Forecasting

- A firm can also forecast sales by using input-output tables
- Input –output table examines the interdependence among various industries and sectors of the economy.
- It shows the use of the output of each industry as inputs by other industries and for final consumption
- Since ,this method is time consuming and highly cost associated firms used secondary data