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## SYNOPSIS

### IMR-DCAL SPECIAL PAPER

#### FORECASTING THE PRICE OF GOLD: AN ERROR CORRECTION APPROACH

Kausik GANGOPADHYAY, Abhishek JANGIR and Rudra SENSARMA

India is a major gold consuming country and the demand from India is acknowledged to be a significant factor in determining international gold prices. We submit that this paper is the first of its kind to develop a model for explaining and forecasting gold prices in India.

Gold is regarded as a good hedge both against inflation as well as the fall in value of other assets. Some factors that influence gold prices are inflation, exchange rate, bond prices, market performance, seasonality, income, oil prices, and business cycles. While these factors are expected to work in India as in other countries, there is an additional role of gold that may not be

relevant elsewhere and has been hitherto ignored in literature. Indians buy gold not just for investment, but also for personal reasons, to be used as a luxury good. If this reason to buy gold is significant, then higher affordability should lead to increased demand and therefore higher price for gold. We capture this wealth effect through the stock market index.

Our time series (April 1990 to August 2013) variables are non-stationary. We use a cointegrating framework, that is, vector error correction approach, to model and forecast the price of gold. The stock market index has a negative relationship with gold price contradicting the argument for gold

being a luxury good but supporting the role of gold as a portfolio hedge. Oil price and exchange rate have negative relationships with gold price implying that gold is a good hedge against oil and the dollar as an investment. The consumer price index has a positive relationship with gold indicating that gold is a good inflation hedge. We affirm robustness of the results of our exercise. The predictive capacity of our error correction model beats alternative specifications such as the random walk, using different sub-periods and forecasting horizons.

### IMR-DCAL SPECIAL PAPER

#### THE IMPACT OF CUSTOMER-BASED BRAND EQUITY ON THE OPERATIONAL PERFORMANCE OF FMCG COMPANIES IN INDIA

Bijuna C. MOHAN and A.H. SEQUEIRA

Measurement of brand equity is critical to meeting the big challenge of performance for companies in the Indian fast moving consumer goods (FMCG) industry.

One of the main challenges lies in the quantification of brand equity and its components. This study investigates the impact of brand equity on the operational performance of businesses in the FMCG industry.

The study adopts a mixed research approach of both descriptive and exploratory types. The descriptive approach was used to measure the perceptions of

FMCG consumers on the various dimensions of brand equity. A sound theoretical framework was developed prior to the collection of data.

The study adopted judgment sampling to obtain the responses from FMCG consumers. Through survey, 826 filled-in questionnaires were collected from FMCG consumers in five major cities in India. The samples focussed on two aspects: a sample of brands (stimuli) to be selected from the entire set of FMCG brands, and a sample of FMCG consumers. Data was analysed using both descriptive and inferential statistics.

It was observed that correlation was moderate between brand equity and operational performance of business. The findings also indicated that consumer based brand equity for FMCG consists of four dimensions: brand association, brand loyalty, perceived quality, and brand awareness. Brand association was the most important source of brand equity and brand awareness had the least effect on brand equity. The practical implication of this research is that brand equity has to be effectively managed for improved operational performance.

While many studies have identified the importance of brand equity dimensions for individual products and services, few have tested the model with FMCG companies.

The findings of this study provide practical pointers to brand managers to manage brand equity of Indian FMCG brands for improved performance. Further, the results

also provide a model for brand equity and operational performance that can be effectively used by companies in the FMCG industry.

## IMR-DCAL SPECIAL PAPER

### A SIMPLE EXAMPLE FOR THE TEACHING OF DEMAND THEORY: AGGREGATE DEMAND ESTIMATION FOR ONIONS IN INDIA

Devlina CHATTERJEE

Empirical examples of demand estimation using real data are not often found in managerial economics textbooks. In classical papers on demand, estimation economists looked at coupled demand systems. Estimation of such demand systems requires a sophisticated understanding of economics and econometrics, which are beyond the scope of typical introductory texts. Our aim in this study was to estimate the demand curve for a single commodity, viz onions. We chose onions for this illustrative study because of the unique nature of the demand for onions in India, as described below. In estimating demand from price-volume data, one encounters the "identification

problem". It is not known whether the observed price-volume points lie on the same demand curve, or at the intersections of different pairs of supply and demand curves. Since the onion has no substitutes, is not prone to fluctuating tastes, and is not susceptible to changes in technology, one may assume that its demand curve does not shift within a short time. Thus, any changes in price and volume must occur due to shifts in the supply, and the price-volume points lie on the same demand curve. We collected daily price-volume data for onions over a short period of time from all listed mandis in India from the website <http://www.agmarknet.in>. A scatter plot of price vs volume indicates that the demand

curve had two distinct regimes. A piecewise linear fit to the data was computed and the break-point was identified at a wholesale price of about Rs 1620 per quintal. The estimated demand curve was horizontal below this price indicating inelastic demand. Above this price, the demand curve was negatively sloped with a price elasticity of  $-1$ . In other words, at low prices, the aggregate quantity of onions consumed remains roughly constant. However, at higher prices, the total expenditure on onions remains roughly constant.

## IMR-DCAL SPECIAL PAPER

### A STUDY AND ANALYSIS OF RECOMMENDATION SYSTEMS FOR LOCATION-BASED SOCIAL NETWORK (LBSN) WITH BIG DATA

Murale NARAYANAN and Aswani Kumar CHERUKURI

A recommender system suggests an item to a user that he/she may be interested in. To suggest an item of interest to a user, information from social networks is utilised to provide a suitable recommendation based on the user's location. Different databases are used to solve the location dimension problem. These databases use

small scale datasets to provide recommendation based on location, but in real time, the volume of data is large. Analysis can be performed in two ways: qualitative and quantitative. Here, we analyse Foursquare data set qualitatively to study the need for big data in recommendation systems for location-based

social networks (LBSN). A few quality parameters such as parallel processing and multimodal interface have been selected to study the need for big data in recommender systems. This paper gives a study and analysis of quality parameters of recommendation systems for LBSN with big data.

### SUDDEN BREAKS IN DRIFT-INDEPENDENT VOLATILITY ESTIMATOR BASED ON MULTIPLE PERIODS OPEN, HIGH, LOW, AND CLOSE PRICES

Dilip KUMAR

The study of volatility is of considerable interest because of its importance in portfolio allocation, risk management, derivatives pricing, futures hedging, trading strategies and asset pricing. Several studies

have highlighted the importance of volatility estimators that utilise the opening, high, low and closing prices. Among them, the Yang & Zhang (YZ) estimator proposed by [Yang & Zhang \(2000\)](#)

is unbiased regardless of the drift parameter, and incorporates opening jump in estimation. In this paper, we make use of the variance estimator that utilises high, low and closing prices proposed by Yang &