HEDGING EFFECTIVENESS OF FUTURES CONTRACTS: A STUDY OF SELECT STOCKS IN INDIAN TOURISM AND HOSPITALITY SECTOR

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ABSTRACT

This paper investigates the hedge effectiveness of futures contracts of tourism and hospitality sector in India using four sample stocks namely, ADANIPORTS, APOLLOHOSP, CONCOR and JETAIRWAYS, traded at NSE, for which data has been collected from January 1, 2016 to December 31, 2017 for near month futures contracts. The optimal hedge ratio is estimated using five specifications: naive, ordinary least square, autoregressive moving average ordinary least squares, vector autoregression and vector error correction. The study finds that one-to-one naive model provides superior hedging effectiveness over all the other models, implying equal investment in both spot and futures market to achieve highest effectiveness. Overall, the study finds that tourism and hospitality sector provides an effective platform for hedging with futures contracts.

Keywords: *Tourism, Hospitality, Futures Contract, Hedging Effectiveness and Optimal Hedge Ratio*

Introduction

In the last few years, India has become one of the favourite tourist destinations[1] for spectators from both within and outside the country owing to its diverse cultures spread across length and breadth of the country as well as

[1] In 2016, India jumped to 40th position from 52nd position (2015) in Travel and Tourism Competitiveness Index (TTCI) released by the World Economic Forum (WEF).

increase in the income levels of the people. The annual foreign tourist arrival (FTA) stands at 88.9 lakh during the year 2016 registering a growth of 10.7 per cent from previous year's FTA which is 80.27 lakh[2], whereas, Domestic Tourist Visits (DTV) stands at 1432 million during 2015, as compared to 1282.8 million in 2014, registering a growth of 11.63%.

The expansion in tourism sector can be undoubtedly attached to India's rich cultural and natural resources, however, more recently, Government's policy initiatives are playing a vital role in its growth. Under the tourism promotion mantras like 'Atithi Devo Bhava' and 'Incredible India', Government is launching wide range of schemes to boost tourism in the country. Two of these schemes are PRASAD (National Mission for Pilgrimage Rejuvenation and Spiritual Augmentation Drive) and Swadesh Darshan which aims to improve the tourism related infrastructure. Apart from this, the development initiatives by the Government are also focussing on niche tourism, which includes eco-tourism, medical and wellness tourism, golf tourism, adventure tourism and cruise tourism[3]. Further, e-Tourist Visa (e-TV) scheme, launched in November 2014, improved the tourist arrival in the country while attracting around 10.8 lakh tourists in 2016 as compared to 4.45 lakh in 2015, registering a growth of 142.5 per cent in tourist arrival to India.

With increasing number of tourists, tourism and hospitality sector has become one of the key contributors towards socio-economic growth of the country as it has become third largest earner of foreign exchange in the country. According to World Travel and Tourism Council (WTTC), Tourism and Hospitality Sector directly contributed USD 91.3 billion to country's GDP during 2017, which is expected to grow to USD 194.7 billion by 2028. Moreover, this sector also plays a significant role in providing employment opportunities in various sectors like hotels, restaurants, air-lines, logistics, clubs, etc. and contributed around 8 per cent in the total employment of India in 2017[4]. According to WTTC, the contribution in the total employment is forecasted to increase to 8.4 per cent by 2028 with annual rise of 2 per cent.

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[2] Source: *Tourism and Hospitality Sector Acheivement Report (2017)*, published by Department of Industrial Policy and Promotion DIPP, Ministry of Tourism, Government of India.

[3] Source: same as above in footnote 2.

[4] Source: 'Travel & Tourism Economic Impact 2018 India', research report prepared by World Travel and Tourism Council (WTTC). Accessed online at https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2018/india2018.pdf

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Further, hospitality and tourism sector stands among top ten sectors of the country to attract FDI in the country with a total FDI inflow of USD 10.48 billion between 2000 and 2017. The Government permits 100% FDI in this sector and over the years, FDI inflow has shown a growing trend, however, the highest expansion has been witnessed in the year 2012-13 when FDI equity inflow increased to USD 3259 million as compared to USD 992 million in the previous year, with growth of 228.5 per cent over 2011-12 (see Annexure A). The top five foreign investors, which are mostly based in Europe and South-Asia, include Softbank Group Capital Limited (U.K), Goldman Sachs Investments Holdings (Mauritius), APG Strategic Real Estate Pool N.V. (Netherlands), Fairbridge Capital (Mauritius) and Dunearn Investments (Mauritius) Pte Ltd. The top five Indian counterparts attracting FDI includes Oravel Stays Private Limited, Samhi Hotels Private Ltd, Lemon Tree Hotels Ltd, Devyani International Limited and Coffee Day Enterprises Limited.

In India, tourism and hospitality sector, in addition to being a significant source of income and employment generation, also offers a profitable investment opportunity for different types of investors in the market. The sector is expected to have attracted capital investment of INR 2706.1 billion in 2017 and is expected to rise by 6.7% annually over the next ten years to INR 5546.3 billion in 2028. Active and voluminous trading of tourism and hospitality stocks takes place both in spot and futures market, which shows keen interest of investors to invest and trade in this sector. For instance, the average daily turnover of futures contracts for INDIGO is INR 24292.92 Lac and for JETAIRWAYS is INR 27912.15 Lac[5]. These facts poses a question if futures contracts in hospitality and tourism sector serves the purpose for which these were introduced in year 2000. According to L.C. Gupta Committee report, one of the prime reasons for introduction of derivatives market is to provide a platform to the investors for mitigating the risk of unwanted changes in asset prices by investing in derivatives contract, commonly known as the practice of hedging. The first derivative contract was Sensex Futures launched on June 9, 2000 at Bombay Stock Exchnage of India (BSE) and Nifty50 Index Futures launched on June 12, 2000 at National Stock Exchange of India (NSE).

The underlying strategy of hedging is to invest simultaneously in cash and futures market, but in opposite direction, so that the price change in one market offset the changes in price in another market. In other words, losses in one market are offset by the gains from the other. The essence of hedging is the presence of cost-of-carry relationship between cash and futures market, which allows co-movement of prices in both markets. In the cost-of-carry

[5] Estimated by author on the basis of information obtained from official website of National Stock Exchange of India (NSE) i.e. www.nseindia.com

regime, both prices are tied together and the arrival of information in the market causes contemporaneous change in both spot and futures prices. Thus, existence of stable long-run relationship between spot and futures market is a pre-requisite for efficient hedging (Ederington, 1979).

There are three different views on hedging based upon investor's objective to hedge. The traditional theory assumes investor as a pure risk avoider, whereas, Working (1953) views hedger as a pure risk-taker speculating on the spread between futures and cash prices. The third theory adopts a hybrid approach and claims that a hedger neither purely avoids risk nor does he increases his risk to the highest levels. Instead, hedger prefers a portfolio that optimizes his level of risk and return. This theory, known as Portfolio Hedging Theory, became the most widely accepted framework for designing hedge strategy and the present study applies the same in realising its objectives.

The literature on estimation of optimal hedge ratio initiated with the proposal of Minimum-Variance Hedge Ratio (MVHR) framework suggested by Johnson (1960), Stein (1961) and Ederington (1979). Johnson (1960) and Stein (1961) proposed a theoretical background for estimating minimum variance hedge ratio, known as Portfolio hedging theory, based upon which, Ederington (1979) suggested that MVHR can be estimated as the ratio of covariance of spot-futures returns and variance of futures returns. In this view, Ederington (1979) suggested single regression equation (Ordinary Least Square (OLS)) that regresses cash returns upon futures return for estimating optimal hedge ratio. Ederington's OLS is the most simplest of all models, therefore is highly appreciated by a large body of literature (Malliaris and Urrutia (1991), Deaves (1994), Lien et al (2002), Lien (2005), Bhargava and Malhotra (2007), Moon et al (2009), Mandal (2011) and Bonga and Umoetok (2016)).

Apart from this, literature suggests a wide range of models for estimating optimal hedge ratio to best fit the varied characteristics observed in the financial time-series from time to time. For instance, a number of studies observe that spot-future prices exhibit co-integrating relationship in the long-run (Ghosh, 1992 and Chou et al., 1996) and lead-lag relationship in the short-run (Stoll and Whaley, 1990), therefore, suggests that optimal hedge ratio can be determined using VECM and VAR models respectively. Nonetheless, numerous studies (Choudhary, 2004 and Lee and Chien, 2010) claim superior performance of OLS hedge ratio over its counterparts.

Further, Ederington (1979) suggested a measure of hedging effectiveness, based upon portfolio theory approach proposed by Johnson (1960) and Stein

(1961), according to which hedging effectiveness is measured as proportionate reduction in standard deviation of returns from hedged portfolio. Ederington's measure to estimate hedging effectiveness is simple to compute and understand therefore, has been highly appreciated by various empirical studies.[6]

Apart from the above discussed issues, NSE was ranked second largest derivative exchange in terms of trading of futures contracts in 2015[7] and presently, offers futures contracts on more than 190 securities and 9 indices, all of which observes voluminous trading. In India, literature[8] observes that Indian equity futures market offers an efficient platform to hedge price risk. However, all of these studies have restricted their scope to investigate the hedge effectiveness of either index futures contracts or / and individual stock futures contracts and ignores the hedging performance of sector-specific stocks, despite active trading of futures contracts in various sectors. As discussed in above section 1, tourism and hospitality sector has become one of the key sectors of the economy and observes huge trading in futures contracts. These facts poses a question if futures contracts in the tourism and hospitality sector also provides an efficient platform to hedge, if need be. Therefore, in the light of all the above discussed issues, the present study attempts to contribute to the existing literature by examining hedging effectiveness of futures contracts in tourism and hospitality sector in India.

Database and Research Methodology

The main focus of the study is to investigate hedging effectiveness of futures contracts from tourism and hospitality sector in India. The sample of the study comprises of four stock futures contracts namely ADANIPORTS, APOLLOHOSP, CONCOR and JETAIRWAYS being traded at National Stock Exchange of India. The data has been collected for near month futures contracts for a period of two years from January 1, 2016 to December 31, 2017 from the official website of National Stock Exchange of India (www.nseindia.com). The sample stocks have been selected keeping in consideration their consistent trading and high liquidity. The data used in the study comprises of daily closing prices of spot and futures market, making up a total of 495 observations for each of the four stocks.

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[6] See Park and Switzer (1995), Holmes (1995), Lypny and Powalla (1998), Yang and Allen (2004), Floros and Vougas (2004, 2006), Bhargava and Malhotra (2007), Bhaduri and Durai (2008), Men and Men (2008), Gupta and Singh (2009), Pradhan (2011), Hou and Li (2013)

[7] NSE annual report (2016) accessed at https://www.nseindia.com/global/content/about_us/AnnualReport-2016.pdf

[8] See, Bhaduri and Durai (2007), Rao and Thakur (2008), Gupta and Singh (2009) and Pradhan (2011)

In order to obtain optimal number of futures contracts to hedge given spot position, a wide range of models are available as discussed in section 2. However, as far as the present study is concerned, out of the models suggested by the literature, a total of five econometric procedures have been used for estimating optimal hedge ratio. These models are one-to-one naive model, standard ordinary least square (OLS), Vector Autoregression (VAR) and Vector Error Correction model (VECM).

Model 1: Traditional 1:1 Naive Model

The first is the Naive or traditional one-to-one hedging model which assumes that futures and cash market observes perfect correlation, therefore, optimal hedge ratio suggested by this model is one which implies equal investment in both futures and spot market.

Model 2: Ordinary Least Square (OLS)

The second is Ordinary least Square Method also known as single equation method in which cash market returns are regressed upon futures returns to estimate optimal hedge ratio as given in equation (1). Suggested by Ederington (1979), this method is the most widely used for estimating OHR as discussed in section 2 and is specified as follows:

$$R_{s,t} = \alpha_0 + \beta_1 R_{f,t} + \mu_t \quad (1)$$

In the given regression equation (1), $R_{s,t}$ is the cash returns, $R_{f,t}$ is the futures return, α_0 is the intercept term, β_1 is the optimal hedge ratio and μ_t is the error term.

Model 3: Autoregressive Moving Average OLS

The standard OLS model mentioned in equation (1) does not take into account serial correlation of stock returns i.e. the present stock prices are dependent upon its past values, therefore the estimated coefficient of optimal hedge ratio may be biased. In other words, stock prices are not random and any information set continues to affect stock prices for some time. Autocorrelation in stock returns has become stylized in the financial literature Therefore, autoregressive terms are incorporated in equation (1) and the modified estimation procedure is as follows:

$$R_{s,t} = \alpha_0 + \sum_{i=1}^{p} \alpha_i R_{s,t-i} + \beta_1 R_{f,t} + \mu_t \quad (2)$$

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The autoregressive terms in equation (2) is represented by $\left(\sum_{i=1}^{p}\alpha_i R_{s,t-i}\right)$. The order of the autoregressive terms is determined according to Schwartz Information Criteria (SIC).

Model 4: Vector Autoregression (VAR)

Vector Autoregression overcomes the limitation of ordinary least squares regression equation (Equation 1) by modelling the serial correlation of residual series which OLS fails to capture. VAR model can be specified as under:

$$R_{s,t} = \sum_{i=1}^{M}\alpha_i R_{s,t-i} + \sum_{j=1}^{N}\beta_j R_{f,t-j} + \mu_{st} \quad (3)$$

$$R_{f,t} = \sum_{k=1}^{O}\alpha_k R_{s,t-k} + \sum_{l=1}^{P}\beta_1 R_{s,t-1} + \mu_{ft} \quad (4)$$

After running the given regression equations, optimal hedge ratio can be estimated as ratio of covariance of $\mu_{s,t}$ and variance of μ_{ft}. However, this model fails to capture the long-run cointegration between spot and futures prices.

Model 5: Vector Error Correction (VEC) Model

Ghosh (1993) and Lien (2004) argues that when spot-future prices are cointegrated in the long-run, the OLS equation gives an underestimated value of the optimal hedge ratio. Therefore, VAR model with an error correction term (known as VECM) is used to account for long-run co-integrating relationship in addition to capturing short-run lead-lag relationship. The VECM model can be specified as below:

$$R_{f,t} = \alpha_{0f} + \sum_{i=1}^{p}\alpha_{if}(F_{t-i} - S_{t-i}) + \sum_{j=1}^{q}\beta_f R_{f,t-j} + \sum_{k=1}^{m}\beta_f R_{s,t-k} + \mu_{ft} \quad (5)$$

$$R_{s,t} = \alpha_{0s} + \sum_{i=1}^{p}\alpha_{is}(F_{t-i} - S_{t-i}) + \sum_{l=1}^{n}\beta_s R_{s,t-l} + \sum_{h=1}^{o}\beta_s R_{f,t-h} + \mu_{st} \quad (6)$$

The optimal hedge ratio using VECM can be estimated as ratio of covariance of ($\mu_{s,t}$) and variance of (μ_{ft}), as computed in case of VAR model above.

After estimating the optimal hedge ratio(s) using the above discussed econometric procedures, their effectiveness has been tested by using a measure suggested by Ederington (1979) as given below:

$$\text{Hedge effectiveness} \quad \frac{\text{Var}(U) - \text{Var}(H)}{\text{Var}(U)} \tag{7}$$

In the above equation,

Variance of Unhedged Portfolio [VAR (U)] = σ_s^2 and;

Variance of Hedged Portfolio [VAR (H)] = $\sigma_s^2 + h^{*2}\sigma_f^2 - 2h^*\sigma_{s,f}$

Empirical Results

Preliminary Analysis

As the present study involves the analysis of financial time-series to achieve its objectives, therefore, the first step is to test the presence of unit-roots in the series. ADF unit-root test has been applied in three different forms (stationarity with only trend, with trend and intercept and without both) to check the stationarity of series. As expected, the price series was found to be non-stationary. Hence, price series is transformed by taking log of first difference of prices, and the resultant return series is found to be stationary[9] paving the way for further analysis.

Further, Table 1 reports the statistics of lower and higher moments of returns of spot and futures contract for all the four stocks under study. All stocks show excess kurtosis and their coefficient of skewness is negative implying that the return series are leptokurtic in nature. These statistics indicate that the returns are not normal, which is further supported by Jarque-Bera test that rejects the null hypothesis that cash and futures market returns are normal.

[9] The results of ADF unit root test have not been reported in the paper, but are available on demand.

Table 1: Descriptive Statistics of Returns

Symbol	Return	Count	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
ADANIPORTS	Futures	494	0.000838	0.022192	-0.276771	6.505945	259.3101 (0.000000)
	Cash	494	0.000842	0.022565	-0.244747	6.096621	202.3067 (0.000000)
APOLLOHOSP	Futures	494	-0.000390	0.015242	-0.120964	4.651757	57.36224 (0.000000)
	Cash	494	-0.000390	0.015610	-0.071504	4.316578	36.09962 (0.000000)
CONCOR	Futures	494	-2.62E-05	0.019253	-2.462322	33.27843	19369.65 (0.000000)
	Cash	494	-1.27E-05	0.019469	-2.744989	36.58582	23838.52 (0.000000)
JETAIRWAYS	Futures	494	0.000183	0.027227	-0.559103	6.260572	244.5653 (0.000000)
	Cash	494	0.000181	0.026739	-0.555570	6.345806	255.8313 (0.000000)

Optimal Hedge Ratio and Hedging Effectiveness

The estimation of optimal hedge ratio has been done using five hedging models proposed in the literature. These results are reported in Table 2. It is found that in case of ADANIPORTS and APOLLOHOSP, the optimal hedge ratio of one suggested by traditional naive hedging approach is the lowest estimate, whereas for CONCOR and JETAIRWAYS, VAR and VECM models gives lowest coefficient of optimal hedge ratio. It is also observed that the coefficient of optimal hedge ratio for ADANIPORTS and APOLLOHOSP is greater than one which implies that higher investment is required in futures market relative to cash market in order to obtain efficient hedge. On the other hand, for CONCOR and JETAIRWAYS, optimal hedge ratio is less than one. Another observable fact is that all the estimates of the OHR are very close to each other making it insignificant for investors to decide upon the model to be used for hedging, which confirms the findings of Yaganti and Kamiah (2012).

Table 2: Results of Optimal Hedge Ratio

Symbol	Naive	OLS	ARMA OLS	VAR	VECM
ADANIPORTS	1	1.01120	1.01006	1.00755	1.00453
APOLLOHOSP	1	1.00642	1.00790	1.00933	1.00574
CONCOR	1	0.99869	0.99914	0.99417	0.99337
JETAIRWAYS	1	0.97736	0.98338	0.97200	0.97338

Further, using Variance Reduction Framework, the effectiveness of optimal hedge ratios obtained using five models applied in the study has been estimated and the results are shown in Table 3. A significant observation from these results is that one-to-one naive hedging strategy gives highest hedging effectiveness for three out of four stocks (ADANIPORTS, APOLLOHOSP and JETAIRWAYS) under study. The exception to these results is CONCOR for which VECM model provides maximum variance reduction of returns from hedged portfolio.

Table 3: Variance Reduction in Hedged Portfolio

Symbol	Naive	OLS	ARMA OLS	VAR	VECM
ADANIPORTS	0.98495	0.98429	0.98437	0.98453	0.98471
APOLLOHOSP	0.96174	0.96116	0.96102	0.96087	0.96123
CONCOR	0.97144	0.97150	0.97148	0.97170	0.97173
JETAIRWAYS	0.98578	0.98475	0.98513	0.98436	0.98447

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Conclusion

Indian Tourism and Hospitality industry has become one of the rapidly growing industries of the country due to increasing tourist arrival and continuous efforts of the government in promoting tourism. Tourism and Hospitality sector is also contributing towards the economic growth of the country by generating income and employment, earning foreign exchange and increasing share in GDP. In order to tap the unexplored potential of the sector, investors are showing a keen interest in the sector, which is quite evident from the fact that FDI shows a consistently increasing trend in tourism and hospitality sector (See Annexure A). Moreover, Indian Equity Futures Market holds a significant position among world's top-most futures market and literature[10] suggests that it provides an efficient hedging platform to the investors. However, these studies investigate the hedging performance of either index futures contracts or / and individual stock futures contracts, while ignoring hedging performance of sector-specific stocks, despite their active trading in futures contracts. Therefore, considering the growing importance of tourism and hospitality sector and active trading in futures contracts, the present study aims to investigate if futures contracts in tourism and hospitality sector provide efficient hedging platform to the investors.

The sample size of the study comprises of four stocks namely, ADANIPORTS, APOLLOHOSP, CONCOR and JETAIRWAYS, chosen on the basis of high liquidity and consistent trading history. The data has been collected for two years from January 1, 2016 to December 31, 2017. For estimating optimal hedge ratio, five econometric procedures have been used including naive, ordinary least square, autoregressive moving average OLS, vector autoregression and vector error correction. The results of optimal hedge ratio suggest that the estimates of the OHR are very close to each other for all the four stocks under study. It is an important finding for investors as it makes it insignificant for them to decide upon the model to be used for hedging. These findings are consistent with the findings of Yaganti and Kamaiah (2012).

Further, hedging effectiveness of the optimal hedge ratios have been estimated using variance-reduction framework of Ederington (1979) and the results suggest that traditional one-to-one naive model performs best in providing highest hedging effectiveness as three out of four stocks (ADANIPORTS, APOLLOHOSP and JETAIRWAYS) favour naive hedging. In other words, the results indicate that the investors can reduce the variance

[10] See, Bhaduri and Durai (2007), Rao and Thakur (2008), Gupta and Singh (2009) and Pradhan (2011)

of their hedged portfolio to the maximum extent by investing equal amounts in futures as well as cash market. These results are consistent with the findings of Alexander and Barbosa (2007) and Wang et al (2015).

Overall, the findings of the study suggests that futures contracts in tourism and hospitality sector provides efficient hedging tool to investors and on the top of it, investors can use model free optimal hedge ratio of one to achieve highest hedging effectiveness.

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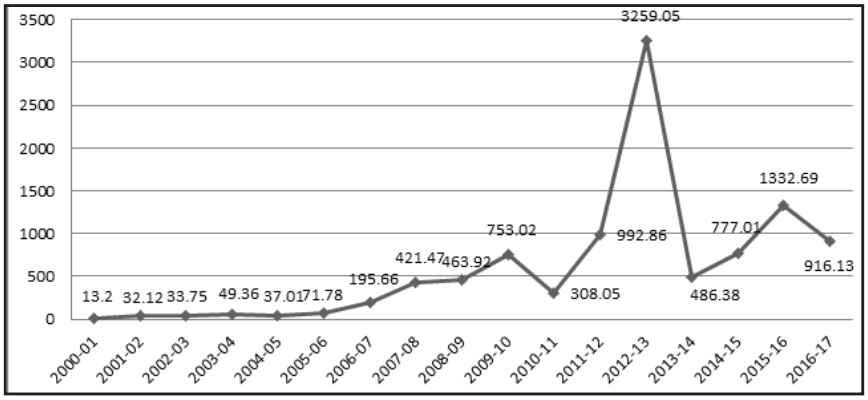
Annexure A

FDI and Equity Inflow in Indian Tourism and Hospitality Sector

(Amount in USD Million)



Source: Department of Industrial Policy and Promotion, Ministry of Commerce and Industry.