

MATURITY EFFECT IN INDIAN COMMODITY MARKET

¹G. Buvaneswari, ²Dr. K. Chandra Sekhara Rao

¹Research Scholar, ²Professor
¹Department of Banking Technology,
¹Pondicherry University, Puducherry, India

Abstract: In this paper maturity effect in Indian commodity market is analyzed with the help of Basis to spot price ratio. The hypothesis of Maturity Effect was first proposed by Samuelson and (Chen, Duan, & Hung, 1999) offered a different view about maturity effect. The maturity effect on Futures price is a crucial factor for hedging, speculative and portfolio diversification strategies. The daily trend in basis ratio is declining as contract approaches the expiry date and which in terns indicates convergence of spot and futures prices. Thus the Indian commodity market exhibits informational efficiency in pricing the futures.

Index Terms: Maturity effect, Basis ratio, Informational efficiency, Hedging

I. INTRODUCTION

Derivative products on commodities are traded worldwide. The first organized derivative trading platform created with the establishment of CBOT, in 1848. In July 2007 CBOT was merged with Chicago Mercantile Exchange. In India, the first organized commodity derivative trading was initiated with the establishment of Bombay Cotton Trading Association in 1875, following cotton futures, contracts were initiated in oilseeds as well as food grains. The first and second world war resulted in wide price fluctuation and the derivative trading was temporarily prohibited. Derivative transactions were banned in mind 1960's. Different committees were constituted by Government of India to reintroduced derivative trading on commodities. In 2003, futures trades on 113 commodities were allowed by Government of India. The Forward Market Commission was the regulator of commodity futures trading until September, 2015. Forward Market Commission was merged with Security Exchange Board of India. There are six national and thirteen state exchanges offering futures on different commodities. Approximately 98% of futures contracts were traded in the six national exchanges. Multi Commodity Exchanges offers futures contract on four major categories Precious metal, Base metal, Energy and Agri Commodities. The size and structure of Indian commodity market is given in Table-I.

Table-I: Performance of Indian Commodity market (MCX)

Year	Traded Contract (in Lots)	Quantity (in 000's)	Total Value of transaction (in lakhs)
2013	264627693	179830608.55	1073320439.67
2014	133751818	98449171.05	526149906.35
2015	216346961	119547861.94	555164431.85
2016	151708980	80781871.81	366458202.66

*Source: Multi Commodity Exchange of India

Aluminium is the second largest metal consumed worldwide. China is the major demanding country of aluminium (50% of global demand), all the demand side shocks were form china which influence the global aluminium price¹. Global per-capita consumption of aluminium is 85 kgs. Whereas India's per-capital consumption is 25-30 Kgs. Aluminium is the underlying commodity for both Aluminium and Aluminium-Mini futures contract. Aluminium futures contract introduced in November, 2005 and aluminium-mini contract was introduced in March, 2011. The contracts were launched five month before its maturity. The only different between these two futures products is Trading unit (5 MT for Aluminium and 1MT for Aluminium Mini). International aluminium price at LME used as benchmark to price aluminium futures contract in corresponding to rupee value against US Dollar.

II. LITERATURE REVIEW

The futures price fluctuation increases as the contract move towards its maturity and this concept was mathematically proved by (Samuelson, 1965), it is called Maturity effect or Samuelson hypothesis. Different studies analyzed maturity effect on equity index futures, commodity futures, interest rate futures and Forex futures contract. Time to maturity on equity index futures affect the futures price and this volatility is better explained with the help of conditional variance of trading volume and open interest (Kenourgios & Katevatis, 2011) but (Moosa & Bollen, 2001) used realized volatility of high frequency data and he concluded that S&P 500 index futures price is not influenced by maturity effect.

(Milonas, 1986) Price of commodity affected by different factors i.e., seasonal effect, monthly effect and contract month effect and he neutralized factors those causes non-stationary and analyzed the relationship between time to maturity and futures price volatility and conformed a negative relationship between futures price volatility and time to maturity.

¹<https://www.motilalosal.com/article.aspx/1314/Base-Metals-How-to-effectively-trade-aluminium-futures>

The Maturity Effect hypothesis always doesn't hold in the market when an alternative logic used for spot price generation, however his finding concluded that the commodities futures price fluctuates widely after accounting for changes in the spot price before maturity compared with the distant day from maturity (Rutledge, 1976)

(Chen et al., 1999) developed a contrasting model, the futures price volatility decreases as the contract approaches its maturity, on the day of maturity the spot and futures price are equal. This maturity effect has a significant impact on optimal hedge ratio comparatively.

(Galloway & Kolb, 1996) used daily settlement price to analyze maturity effect on futures return volatility for equity index futures, interest rate, currency, metal, etc. and used OLS regression to analyze maturity effect. By comparing different month to maturity he concludes that approximately half of the contract across commodity futures return affected by the maturity effect.

III. METHODOLOGY

The study has considered aluminium and aluminium-mini futures contracts traded in Multi Commodity Exchange of India. In terms of trading volume Aluminum contracts are similar to the Gold and Crude oil futures. The study has taken recent 22 contract cycles spanning from January 2013 to June 2018. Daily spot and futures prices are drawn from MCX database for three months prior to expiry. This period represents a structural shift in the Indian commodity market by shifting the regulatory role from Forward Market Commission to Security Exchange Board of India.

IV. DATA

Futures and spot price on Aluminium commodity were collected for Aluminium and Aluminium-Mini futures contracts (two different futures products offered by Multi Commodity Exchange of India). The spot and futures price data were collected from Multi Commodity Exchange of India from 1st January, 2013 to 29th July, 2018. The contract cycle for aluminium and aluminium-mini is generally for five months but active trading is observed from third month onwards. So we used futures data from third month onwards till expiry. Four non overlapping contracts were analyzed for a year to check whether maturity has any impact on futures price movement. Totally 22 contracts are analyzed during the study period.

The maturity effect on futures price movements is analyzed by calculating Basis to spot price ratio. Basis is the difference between Futures price and Spot price on a given day. Basis to spot price ratio is expected to provide a relative measure for the quantum of basis.

$$\text{Basis Ratio} = ((\text{Futures price} - \text{Spot price}) / \text{Spot price}) \times 100$$

Based on the calculated basis ratio for different days to maturity the trend has been plotted graphically. The determinants of daily volatility of basis ratio are not worked out in this paper.

V. RESULTS AND DISCUSSION

Based on the calculated basis ratio for different days to maturity the trend has been plotted graphically. The determinants of daily volatility of basis ratio are not worked out in this paper.

A cursory glance at the Table I & II and the Figure I and II indicate that the basis ratio gradually declines as the days to contract expiry comes down. More specifically the rate of basis declines from 2.862% to 0.343% from 65th day to 5th day to expiry. It also reaches to the zero on day of expiry for aluminium contract. In case of Aluminium mini the basis ranges from 2.354 to 0.274 as the day to expiry comes down. The declining trend in the basis ratio is also visible in Figure I and II.

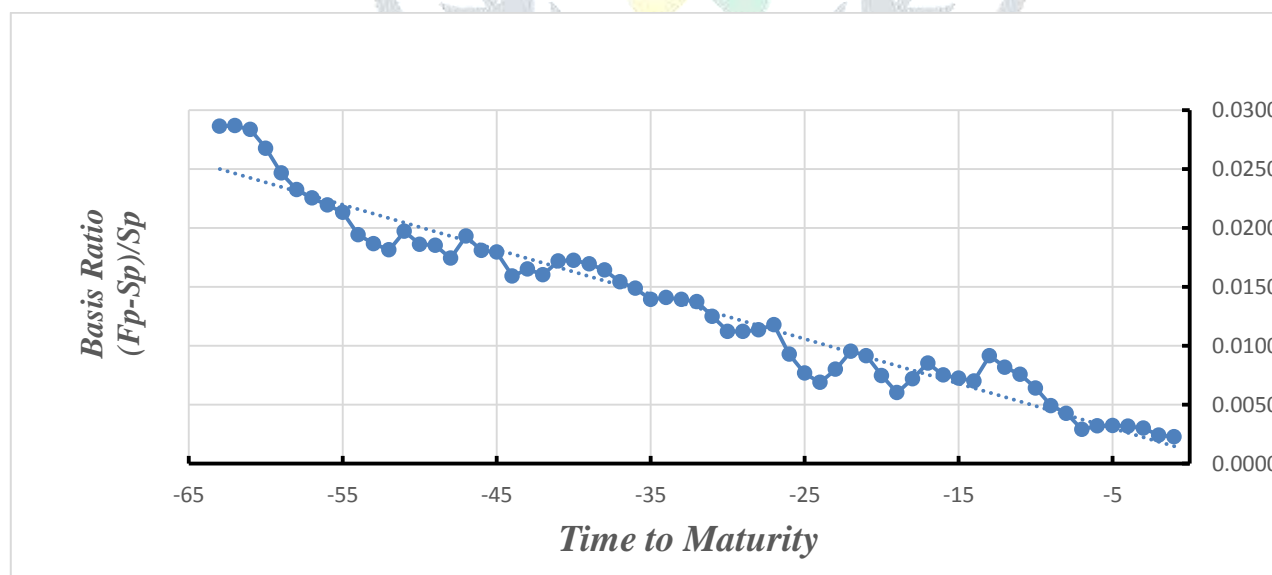


Figure-1: Maturity Effect on Aluminum Futures

Table-II: Maturity Effect in Aluminum Futures during 2013-18

Time to Maturity	Average basis						Aggregate	
	2013	2014	2015	2016	2017	2018	Average basis	Standard deviation of basis
-65	3.227%	4.388%	2.285%	2.655%	0.832%	4.708%	2.862%	2.074%
-60	3.635%	3.457%	2.618%	2.753%	0.407%	1.088%	2.439%	1.515%

-55	3.383%	2.829%	1.655%	2.035%	1.221%	0.928%	2.107%	1.860%
-50	3.084%	2.105%	1.890%	1.503%	1.049%	-2.581%	1.516%	1.920%
-45	2.637%	1.969%	2.655%	1.361%	0.830%	0.290%	1.745%	1.195%
-40	2.625%	1.543%	2.464%	1.262%	1.301%	0.896%	1.753%	1.463%
-35	2.989%	1.191%	1.765%	0.822%	-0.025%	1.748%	1.384%	1.293%
-30	1.983%	1.036%	1.878%	0.256%	0.129%	-0.504%	0.914%	1.325%
-25	2.354%	0.405%	1.759%	-0.143%	-0.112%	-0.883%	0.695%	1.760%
-20	1.196%	-0.110%	0.832%	-0.193%	0.399%	0.068%	0.392%	0.779%
-15	1.900%	0.483%	1.691%	0.318%	0.580%	0.796%	0.977%	0.945%
-10	1.445%	0.892%	0.499%	0.596%	0.299%	0.334%	0.709%	0.758%
-5	0.117%	0.282%	0.276%	0.616%	0.829%	-0.468%	0.343%	0.784%

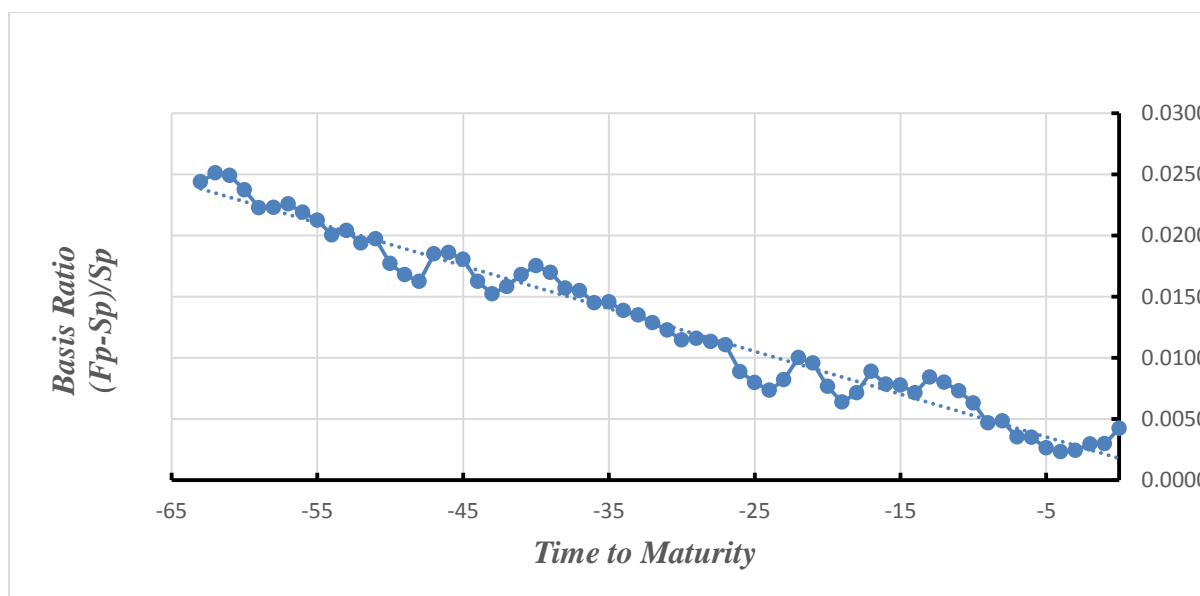


Figure-1: Maturity Effect on Aluminium Futures during 2013-2018

Table-III: Maturity Effect in Aluminium Mini Futures during 2013-18

Time to Maturity	Average basis						Aggregate	
	2013	2014	2015	2016	2017	2018	Average basis	Standard deviation of basis
-65	3.647%	3.357%	2.141%	2.461%	0.346%	1.886%	2.345%	1.457%
-60	3.515%	2.877%	2.230%	2.338%	0.438%	1.090%	2.171%	1.373%
-55	3.219%	3.211%	1.845%	1.981%	1.134%	1.301%	2.189%	1.352%
-50	2.822%	2.191%	2.074%	1.704%	0.431%	-2.740%	1.427%	2.109%
-45	2.628%	1.913%	2.691%	1.351%	0.511%	0.271%	1.678%	1.289%
-40	2.590%	1.552%	2.257%	1.263%	1.136%	-0.433%	1.560%	1.481%
-35	3.001%	1.224%	1.786%	0.834%	0.125%	2.363%	1.482%	1.363%
-30	1.993%	1.070%	1.925%	0.245%	0.096%	0.758%	1.038%	1.213%
-25	2.320%	0.395%	1.677%	-0.130%	-0.148%	0.145%	0.761%	1.693%
-20	1.218%	-0.121%	0.830%	-0.191%	0.229%	0.060%	0.363%	0.828%
-15	1.869%	0.461%	1.703%	0.318%	0.323%	-0.193%	0.832%	1.012%
-10	1.384%	0.892%	0.499%	0.586%	0.292%	0.301%	0.691%	0.724%
-5	-0.435%	0.282%	0.287%	0.639%	0.134%	1.193%	0.274%	1.057%

VI. CONCLUSION

Form the above analysis the maturity effect is visible through declining basis ratio. This trend provides a meaning full interpretation for commodity futures pricing in the Indian commodity market. A positive basis always provides a room for hedgers to hedge their price risk through futures contract. When futures prices are above the spot prices, it provides a possibility to recover the cost of carry or storage cost and time value of money. Hence, the futures pricing in India is said to be informational efficient. The finding of the above study provides a policy direction for market players and regulators on the healthy pricing of futures. Futures prices are said to be arrived at with wider information, while spot prices are always influenced by cartel risk, demand and supply asymmetry.

REFERENCES

- [1] Chen, Y., Duan, J., & Hung, M. (1999). Volatility and Maturity Effects in the Nikkei Index Futures. *The Journal of Futures Markets*, 19(8), 895–909.
- [2] Galloway, T. M., & Kolb, R. W. (1996). Futures Prices and Maturity Effect. *The Journal of Futures Market*, 16(7), 809–828.
- [3] Kenourgios, D., & Katevatis, A. (2011). Maturity effect on stock index futures in an emerging market. *Applied Economics Letters*, 18, 1029–1033.
- [4] Milonas, N. T. (1986). Price Variability and the Maturity Effect in Futures Markets. *The Journal of Futures Markets*, 6(3), 443–460.
- [5] Moosa, I. A., & Bollen, B. (2001). Is there a maturity effect in the price of the S & P 500 futures contract? *Applied Economics Letters*, 8(December 2014), 693–695.
- [6] Rutledge, D. J. S. (1976). A Note on the Variability of Futures Prices. *The Review of Economics and Statistics*, 58(1), 118–120.
- [7] Samuelson, P. A. (1965). Proof That Properly Anticipated Prices Fluctuate Randomly. *Industrial Management Review*, 6(2), 41–49.

