Tuna and Fuel Price Prediction Report

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Figure 1

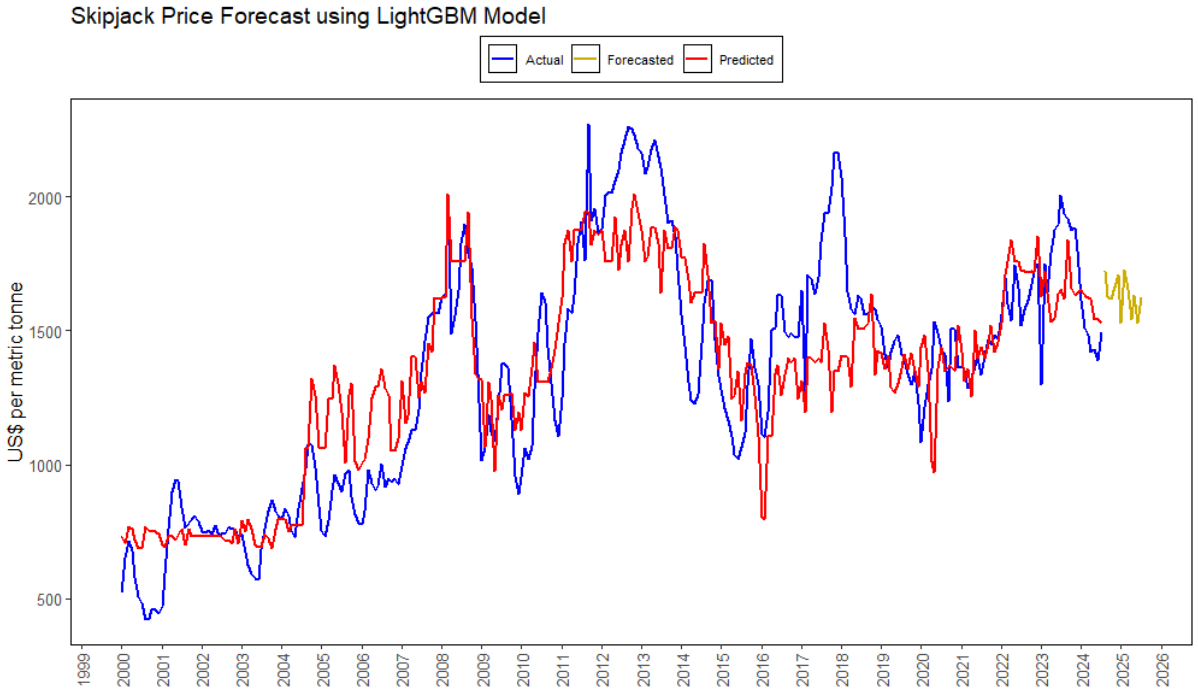

Figure 1 presents a detailed analysis of Thai import Skipjack Tuna[1], measured in USD per metric tonne from 2000 to 2025, using a LightGBM model[2] for prediction and forecasting**.** For the monthly frozen (Whole) Skipjack Tuna Raw Material Prices at Bangkok stands at 1580/mt in July 2024.[3]

Historical Data (Blue Line). The actual price data reveals significant volatility, characterized by distinct peaks and troughs over the years. Between 2007 and 2009, prices surged sharply, nearing 2,000/mt, followed by a period of pronounced fluctuations with multiple peaks and declines. A notable peak occurred around 2012-2013, after which prices entered a declining trend, marked by shorter cycles of rises and falls. From 2014 to 2016, prices experienced a sharp decline, dropping from $1,689/mt to $1,101/mt. This was followed by a brief recovery between 2017 and 2019, where prices fluctuated between $1,228/mt and $2,167/mt. The period from 2020 to 2022 saw increased volatility, with prices ranging from $1,084/mt to $1,750/mt. In the most recent period, 2023 to 2024, prices exhibited moderate fluctuations, ranging between $1,301/mt and $2,007/mt. This indicates a

[1] Thai frozen skipjack import price is used as the main indicator of market conditions and trends for the purse seine fishery as almost 90% of WCPO catch goes to Thailand for processing into loins and/or canned products: see here

[2] LightGBM is a fast and efficient machine learning algorithm used for classification and regression tasks, which works by building multiple decision trees to improve predictions.

[3] For the current BKK market price see here

trend towards stabilization following the earlier volatility, with prices maintaining a more consistent level within this range, suggesting a more stable market compared to previous periods.

Model Predictions (Red Line): The backtest predictions (where the model is applied to past data) closely follow the actual historical prices. This indicates that the LightGBM model was effective in capturing the price dynamics, with the predicted line (red) aligning well with the actual data, despite the complexity of the price movements.

Forecasted data (Gold Line): The forecast for future prices, starting from around mid-2024, indicates a more stable price trend compared to the high volatility seen in the past. While minor fluctuations continue, the forecast suggests that prices will hover around the $1,500/mt to $1,730/mt range over the forecasted period. This suggests a possible stabilization of the Skipjack tuna market in the upcoming years.

Overall Trends: The plot captures both the cyclical nature and unpredictability of the Skipjack tuna market, which is likely influenced by various factors such as supply chain disruptions, environmental changes, and market demand.

Conclusion: The forecast suggests that while historical prices were characterized by significant peaks and drops, the future may see more moderate and stable price behaviour**. However, given the historical volatility, stakeholders should remain cautious of potential deviations from the forecasted trends.** The forecasted skipjack prices from August 2024 to July 2025 values, are detailed in the Appendix.

Figure 2

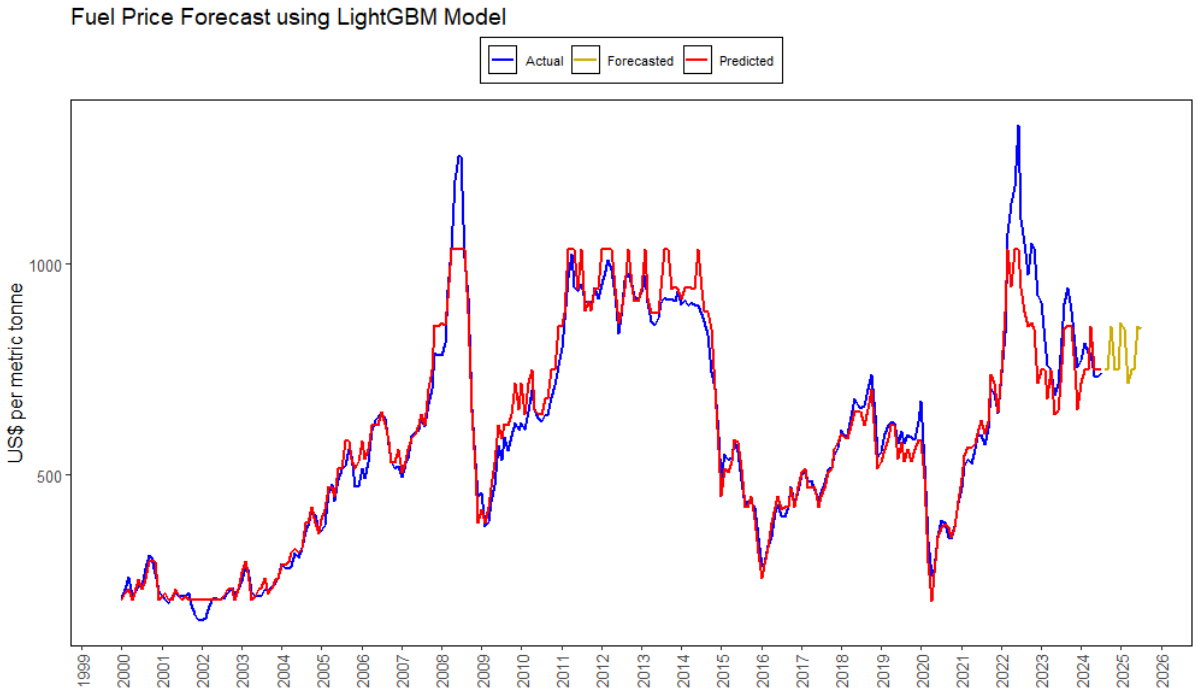

Figure 2 illustrates a time series analysis of fuel prices[4] (measured in metric tonnes) from 2000 to 2025, using a LightGBM model for both historical backtesting and future forecasting.

Historical Data (Blue Line): This line shows the historical fuel prices. The prices exhibit substantial volatility, with notable trends and cycles over the past two decades.

Model Predictions (Red Line): This backtest predictions represents the model's performance when applied to the historical data. The red line closely follows the actual data, indicating that the model has effectively captured the patterns of fuel price movements.

Forecasted Data (Gold Line): Beginning around mid-2024, this line shows the model's forecast for future fuel prices up to July 2025. The forecast anticipates moderate price fluctuations over the next 12 months, with prices expected to remain relatively stable compared to previous periods of volatility, fluctuating within the 720/mt to 860/mt range.

Key Observations:

Rising Trends (2000-2008): Fuel prices exhibit a strong upward trend from 2000, peaking sharply around 2008, which is indicative of market dynamics during the global financial crisis. Prices surged past 1,000/mt, reflecting a significant increase in costs during this period.

Post-2008 Decline and Fluctuations: Following the 2008 peak, there is a noticeable decline in fuel price in 2009. Following this decline, the fuel price recovers and show a relatively steady increase with some fluctuations from 2009 to around 2012. The subsequent period up to 2014 shows more stability with minor fluctuations before a noticeable decline towards December 2014.

Period 2015 – 2019: Fuel price experienced a decline from around 500/mt in early 2015 to below 300/mt by early 2016. Following this dip, there was a steady upward trend, culminating in a peak exceeding 700/mt toward end of 2018. After this peak, the price saw a sharp decline but stabilized between 500/mt and 630/mt throughout 2019, reflecting some volatility but overall growth in fuel price over the observed period.

Second Major Peak (2022): A second substantial peak occurs in 2022, where fuel price again reaches high levels to an average of $1,038/mt in 2022, an 80% increase from 2021, driven primarily by the Russia-Ukraine conflict[5]. A notable decrease occurred in 2020, with prices averaging $394/mt, largely due to reduced demand for marine fuels during the COVID-19 pandemic[6]. This reflects the sensitivity of fuel prices to external shocks, such as the pandemic and the extreme geopolitical conflicts.

In 2023, despite concerns over potential price spikes due to the Israel-Hamas conflict in October, the impact on Singapore's container volumes and global trade flows remained minimal, as Israeli ports account for only 0.4% of the world's container throughput[7]. This is reflected in the observed data, with the average fuel price reaching $810/mt in 2023.

Recent Stabilization and Forecast: From 2022 onwards, the actual and predicted data suggest a relatively stable period with less severe fluctuations. **The model's forecast for 2023-2025 predicts**

[4] Singapore marine diesel oil price (MDO): see here
[5] Ship & Bunker. S&B Analysis: Assessing the Impact of the Russia Crisis on Bunker Markets: see here
[6] S&B Analysis: OPEC+Collapse and Covid-19 Could be perfect storm for Bunker Suppliers: see here
[7] International Shipping news: Israel-Hamas war could disrupt shipping, spike freight rate, but Singapore unaffected for now: see here

that fuel prices will remain within a moderate range of 720/mt to 860/mt**, showing some minor fluctuations but avoiding the extreme peaks observed in the past.**

Conclusion:

The plot reveals that fuel prices have historically been subject to significant volatility, with sharp peaks during periods of global economic disruption. The LightGBM model has effectively captured these dynamics in its backtest predictions. Looking forward, the forecast suggests a more stable fuel cost environment, though minor fluctuations are expected to continue. However, given the historical volatility, this forecast indicates a cautious outlook with potential for moderate price fluctuations. The forecasted fuel prices from August 2024 to July 2025 values, are detailed in the Appendix.

Appendix A

Skipjack Price Forecasted values		
date	**Price/mt**	
2024-08-01	1721.145	Forecasted
2024-09-01	1626.557	Forecasted
2024-10-01	1619.441	Forecasted
2024-11-01	1664.782	Forecasted
2024-12-01	1710.108	Forecasted
2025-01-01	1530.417	Forecasted
2025-02-01	1728.174	Forecasted
2025-03-01	1653.552	Forecasted
2025-04-01	1541.728	Forecasted
2025-05-01	1633.902	Forecasted
2025-06-01	1527.266	Forecasted
2025-07-01	1622.865	Forecasted

Fuel Price Forecasted values		
Date	**Price/mt**	
2024-08-01	749.913	Forecasted
2024-09-01	748.869	Forecasted
2024-10-01	853.809	Forecasted
2024-11-01	748.869	Forecasted
2024-12-01	748.869	Forecasted
2025-01-01	862.304	Forecasted
2025-02-01	847.124	Forecasted
2025-03-01	718.472	Forecasted
2025-04-01	749.913	Forecasted
2025-05-01	749.913	Forecasted
2025-06-01	853.809	Forecasted
2025-07-01	847.124	Forecasted