Arbs-Driven Forward Freight Agreements (FFAs) Forecasting

25 September 2024

spartacommodities.com

SPARTA

Trade with conviction

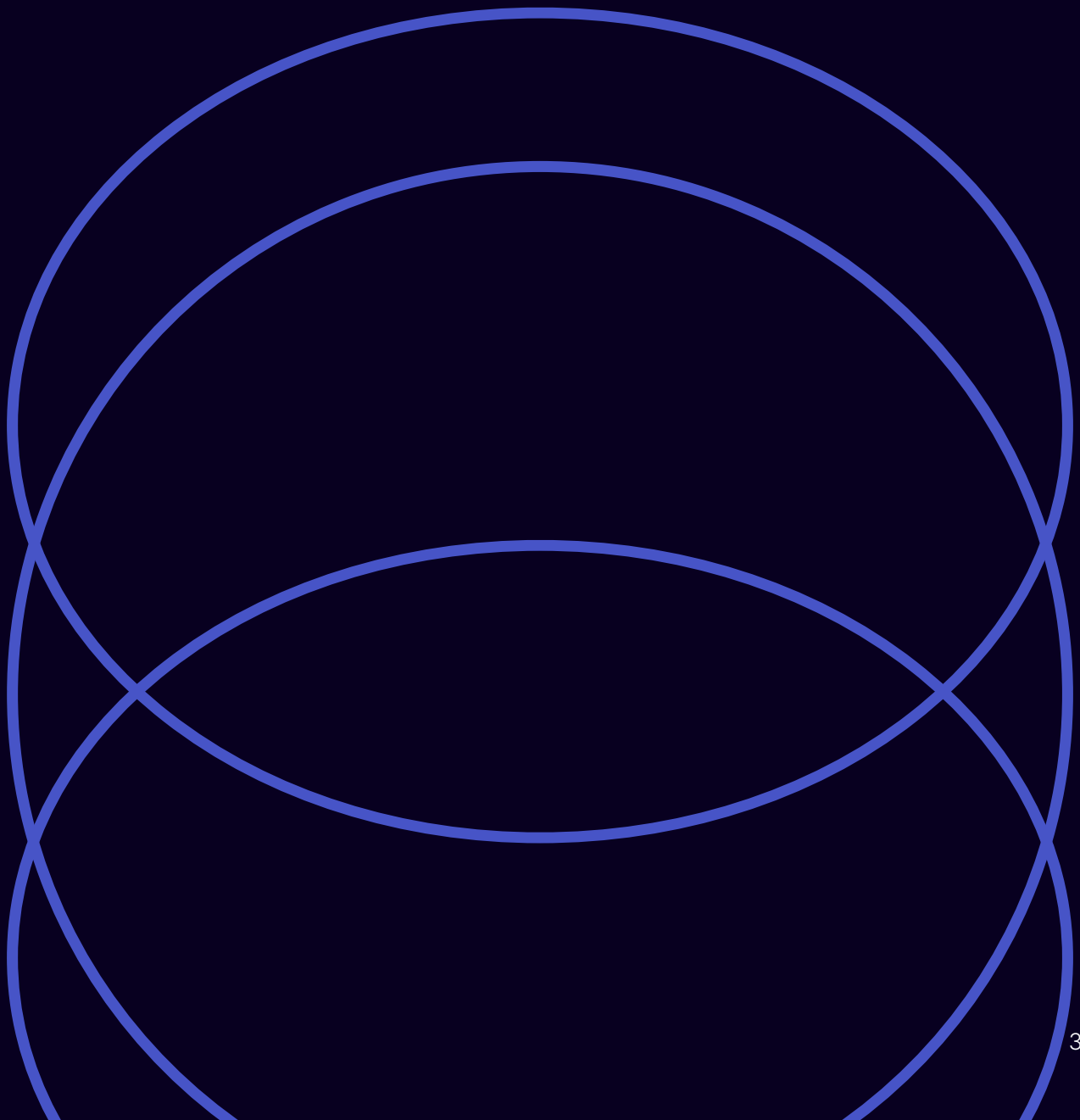
SPARTA

Contents

SPARTA

Summary

In this work, we introduce our arbs-driven freight model covering major Forward Freight Agreements (FFAs) for key shipping routes, including TC14, TC2, TC5, TC7, TC17, TC12, and TC11.



SPARTA

1. Introduction

In the oil and gas industry, the arbitrage margin shows whether there is a positive or negative margin for shipping a given product from one location to another. Our model uses these margins to predict how FFAs are likely to move over the next seven days, helping you anticipate future price shifts and make informed trading decisions.

Sam Vu
Senior Data Scientist
sam.vu@spartacommodities.com

Claudio Bellei
Head of Data Science
claudio.bellei@spartacommodities.com

Miles Moseley
Co-Founder and COO
miles@spartacommodities.com

Michael Ryan
Commodity Owner - Freight
michael.ryan@spartacommodities.com

SPARTA

2. Data description

SPARTA

2.1 Shipping volume weighted arbs margins

For each region, we analyse the main shipping routes based on volume and determine their arbitrage margins. Where an explicit margin isn't available, we calculate it by taking the difference in the delivered prices between the original route and its cheapest origin. This margin is then used as the main driver of our FFA forecast, helping you spot trading opportunities early. The details of the routes that we used for each FFA curve are below:

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Diesel	Houston	Rotterdam	UKC & Baltic	277	22.50%	TC14	Margin	
Gasoline	Houston	Rosarito, WCMEX	WC Mexico	224	18.20%	TC14	Delivered Price	SING
Gasoline	Houston	Esmeraldas, Ecuador	SAM WC	207	16.82%	TC14	Delivered Price	ARA
Gasoline	Houston	San Jose, Guatemala WCMEX	SAM WC	200	16.25%	TC14	Delivered Price	ARA
Diesel	Houston	Santos	SAM EC	118	9.59%	TC14	Delivered Price	AG
Diesel	Houston	Buenos Aires	SAM EC	95	7.72%	TC14	Delivered Price	AG
Naphtha	Houston	Rotterdam	UKC & Baltic	84	6.82%	TC14	Margin	
Diesel	Houston	Barecelona	Mediterranean	26	2.11%	TC14	Margin	

Table 1: Details of Routes used for TC14 FFA Prediction

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Gasoline	ARA	New York	USAC	546	33.09%	TC2	Margin	
Gasoline	ARA	Offshore Lome	West Africa	380	23.03%	TC2	Delivered Price	HOU
Diesel	Rotterdam	Offshore Lome	West Africa	146	8.85%	TC2	Margin	
Gasoline	ARA	Montreal	ECC	120	7.27%	TC2	Delivered Price	HOU
Gasoline	ARA	Santos	SAM EC	119	7.21%	TC2	Delivered Price	HOU
Gasoline	ARA	Cartagena CO	Caribbean	116	7.03%	TC2	Delivered Price	HOU
Naphtha	Rotterdam	New York	USAC & ECC	77	4.67%	TC2	Margin	
Gasoline	ARA	Argentina	SAM EC	56	3.39%	TC2	Delivered Price	HOU
Diesel	Rotterdam	New York	USAC & ECC	47	2.85%	TC2	Margin	
Naphtha	Rotterdam	New York	USAC & ECC	43	2.61%	TC2	Margin	

Table 2: Details of Routes used for TC2 FFA Prediction

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Naphtha	Jubail	Singapore	SEA	170	27.29%	TC5	Delivered Price	Red Sea Light
Naphtha	Jubail	Chiba	EA	167	26.84%	TC5	Margin	
Naphtha	Jubail	Yeosu	EA	102	17.21%	TC5	Margin	
Gasoline	AG	Karachi	Arabian Sea	55	10.25%	TC5	Delivered Price	ARA
Gasoline	AG	Singapore	SEA	22	5.36%	TC5	Delivered Price	ARA
Gasoline	AG	Singapore	SEA	16	4.47%	TC5	Blender Margin	
Diesel	Jubail	Singapore	SEA	15	4.32%	TC5	Margin	
Diesel	Jubail	Barcelona	MED	15	4.32%	TC5	Margin	

Table 3: Details of Routes used for TC5 FFA Prediction.

SPARTA

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Diesel	Jubail	Mombasa	EAF	250	28.26%	TC17	Delivered Price	AG
Diesel	Ras Laffan	Durban	SAF	229	25.97%	TC17	Delivered Price	Red Sea
Jet	Jubail	Durban	SAF	78	9.51%	TC17	Delivered Price	WCI
Diesel	Jubail	Singapore	SEA	44	5.80%	TC17	Margin	
Diesel	Ras Laffan	Rotterdam	UKC	43	5.69%	TC17	Margin	
Diesel	Ras Laffan	Barcelona	MED	43	5.69%	TC17	Margin	
Jet	Jubail	Rotterdam	UKC	35	4.82%	TC17	Margin	
Diesel	Jubail	Buenos Aires	SAM EC	33	4.60%	TC17	Delivered Price	USGC
Jet	Jubail	Dar es Salaam	EAF	33	4.60%	TC17	Delivered Price	WCI
Jet	Jubail	Mombasa	EAF	30	4.27%	TC17	Delivered Price	WCI

Table 4: Details of Routes used for TC17 FFA Prediction

Product	Vessel Type	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Diesel	MR	Sikka	Durban	SAF	102	47.49%	TC12	Delivered Price	Red Sea
Diesel	MR	Sikka	Dar Es Salaam	EAF	72	34.04%	TC12	Delivered Price	AG
Diesel	MR	Sikka	Singapore	SEA	18	9.82%	TC12	Margin	
Diesel	MR	Sikka	La Plata	ECSAM	16	8.92%	TC12	Delivered Price	AG

Table 5: Details of Routes used for TC12 FFA Prediction

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Gasoline	Singapore	Rosarito	WCSAM	106	47.53%	TC7	Delivered Price	Houston
Diesel	Singapore	Dar Es Salaam	EAF	73	32.74%	TC7	Delivered Price	AG
Diesel	Singapore	Durban	SAF	44	19.73%	TC7	Delivered Price	Red Sea

Table 6: Details of Routes used for TC7 FFA Prediction

Product	Load Port	Discharge Port	Discharge Region	Discharge Region MR Count	Discharge Region % of Total	FFA Curve (Liquid)	Margin or Delivered Price	vs Cheapest Origin
Diesel	Ulsan	Singapore	SEA	439	72.20%	TC11	Margin	
Diesel	Ulsan	Quintero Bay	SAMWC	85	13.98%	TC11	Delivered Price	USGC
Diesel	Yokohama	Quintero Bay	SAMWC	84	13.82%	TC11	Delivered Price	USGC

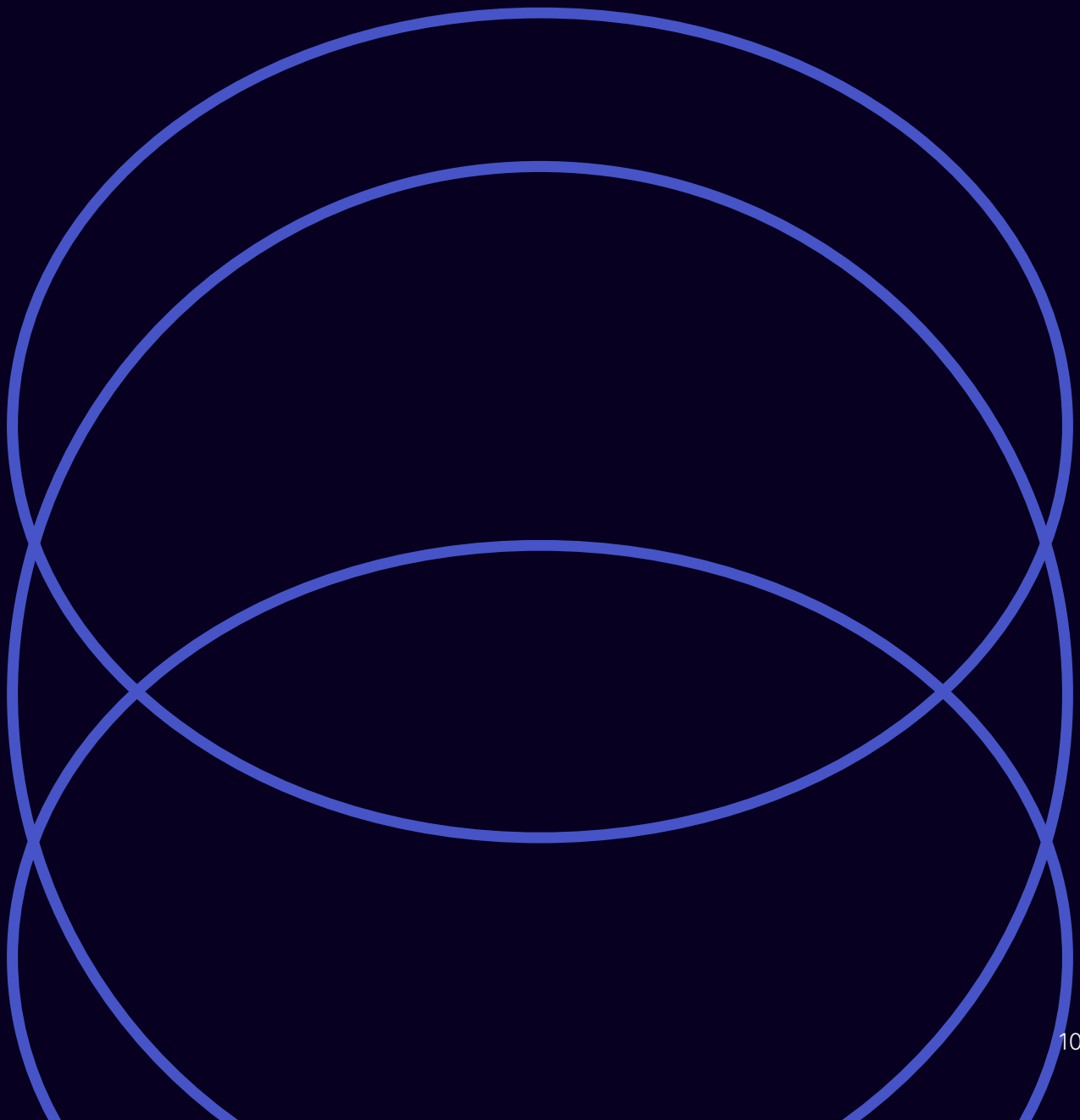
Table 6: Details of Routes used for TC7 FFA Prediction

2.2 Additional features

Besides arbs margins, we also factor in the FFA's recent price trends and seasonality (e.g., winter vs. summer). These elements capture short-term supply-demand changes and seasonal patterns, improving the accuracy of our predictions.

SPARTA

3. Forecasting model



3.1 Statistical significance of arbs margin

We built the forecasting model by using simple linear regression, combining volume-weighted arbs margins, recent trends, and seasonal effects to predict spot FFA price moves in $/mt over the next seven days.

For technical readers, we demonstrate that our calculated arbs margins are statistically significant in forecasting FFAs. The table below reports the p-values for each TC. All p-values are less than 0.2, indicating that we can reject the null hypothesis that arbs margins have no predictive power for FFAs with at least 80% confidence.

	P-VALUES
TC14	0.07
TC2	0.04
TC5	0.20
TC7	0.19
TC12	0.20
TC17	0.06
TC11	0.00

Table 8: the p-values of the arbs margin when used to predict FFAs

SPARTA

3.2 Backtested performance

We backtested a simple strategy:

Buy the number of FFA contracts such that our position is long one FFA contract when our model predicts a price increase (bullish sentiment).

Sell the number of FFA contracts such that our position is short one FFA contract when the forecast indicates a price decrease (bearish sentiment).

The results show clear potential for profitable trading across different FFAs. The charts below illustrate the theoretical Profit and Loss (PnL) for each strategy:

Figure 1: TC14 Strategy PnL

Figure 2: TC2 Strategy PnL

Figure 3: TC5 Strategy PnL

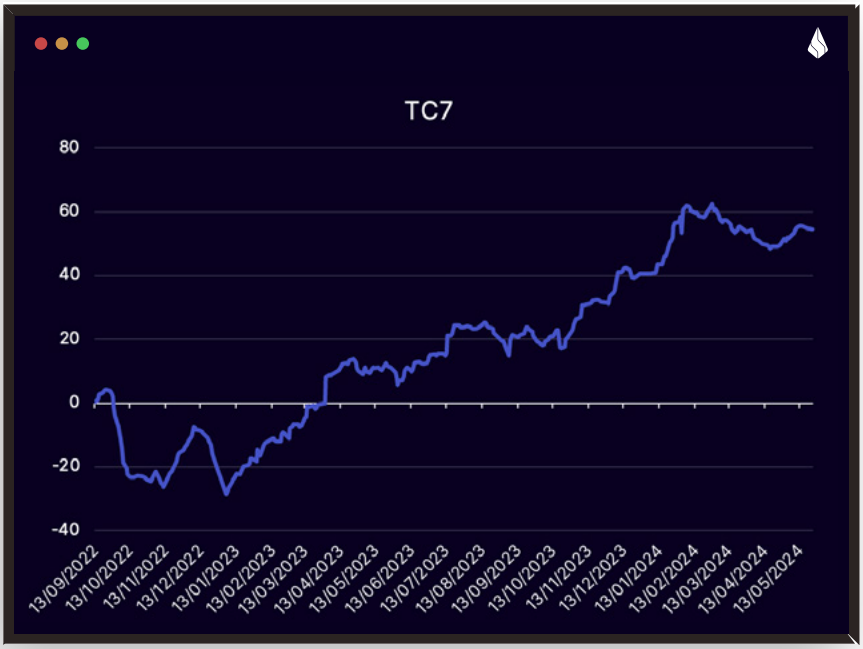


Figure 4: TC7 Strategy PnL

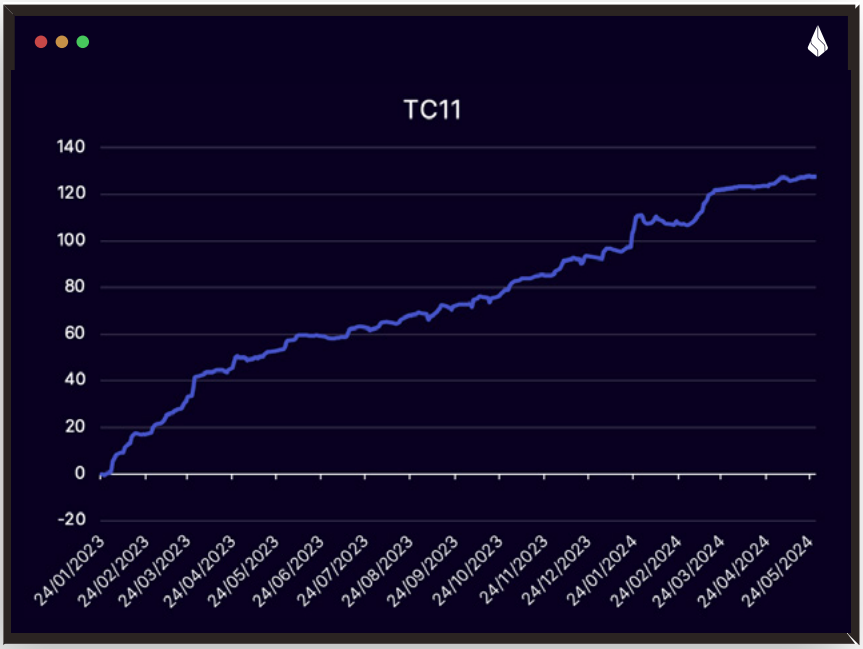


Figure 5: TC11 Strategy PnL

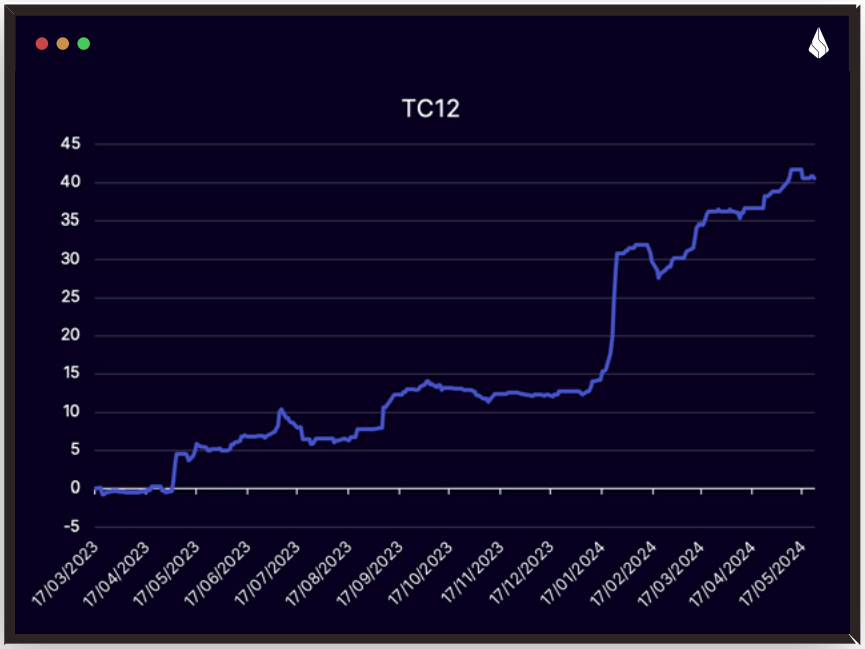


Figure 6: TC12 Strategy PnL

Figure 7: TC17 Strategy PnL

SPARTA

3.3 Strategy monitoring and improvement

We will continue to monitor the performance of our model and strategy using new, unseen data. Additionally, we will work on continuously improving the model by incorporating more valuable features.

SPARTA

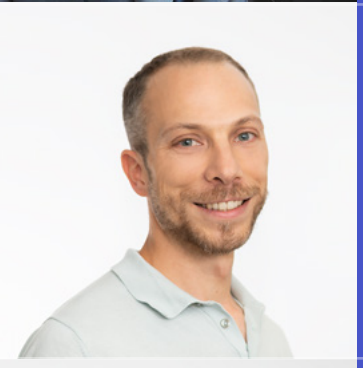
Conclusion

This paper demonstrates that arbs margins play a critical role in forecasting FFAs over the next seven days. When the arbitrage margin increases, freight rates tend to follow, reflecting greater shipping demand. Our model leverages this relationship to help you stay ahead of market moves and capture profitable opportunities in the freight market.

SPARTA

About the Authors

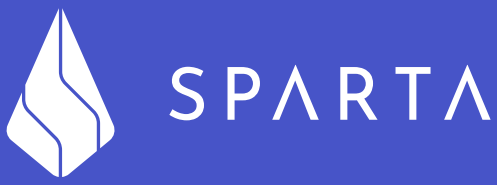
Sam Vu is a Senior Data Scientist at Sparta. He previously held similar positions at bulge bracket investment banks. Sam holds a Master of Science from Oxford University.



Claudio Bellei is Head of Data Science for Sparta. After spending a few years working on nuclear fusion in the US and in Europe under a Marie Curie Fellowship, he left academia to pursue a career in data science. Claudio holds a Ph.D. from Imperial College London.

Miles Moseley is Co-Founder and COO of Sparta. Miles leads daily operations at Sparta. He makes sure ideas are converted into realities. Before Sparta Miles worked and traded for BP.

Michael Ryan our Freight Commodity Owner at Sparta brings over a decade of experience in the energy trading sector. His career started and flourished at Trafigura, where he managed risk across products and regions before becoming Head of Risk for subsidiary Puma Energy. Michael then joined the Trafigura commercial team trading clean and gas freight while successfully growing the physical fleet through strategic dealmaking.



spartacommodities.com

For traders who want to anticipate future pricing trends and seize opportunities, Sparta provides real-time, actionable market intelligence. Sparta is built by traders for traders and sets itself apart from data analytics providers by delivering forward-looking, actionable insights.