# Anti Money Laundering Risk Analysis

This AML/CFT data analysis project explores 30,000 simulated transaction records to uncover patterns in laundering activity. The analysis covers key dimensions including high-risk corridors, payment types, laundering methods, and time-based trends. Advanced feature engineering techniques were applied to develop a risk scoring model, categorizing transactions into risk tiers. The insights are visualized in an interactive dashboard to support informed decision-making and regulatory action.

Total Txns	No of Laundered Txn	Laundering Txn Percentage	Sum of Amount in GBP	Total Laundered Amount	Laundering Amount Percentage
30000	16500	55	256.12M	188.10M	73.44

Corridor Analysis

For Details Click

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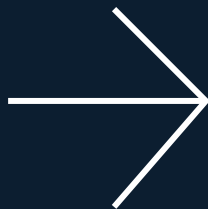
Payment Type Analysis

For Details Click

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Laundering Type Analysis

For Details Click
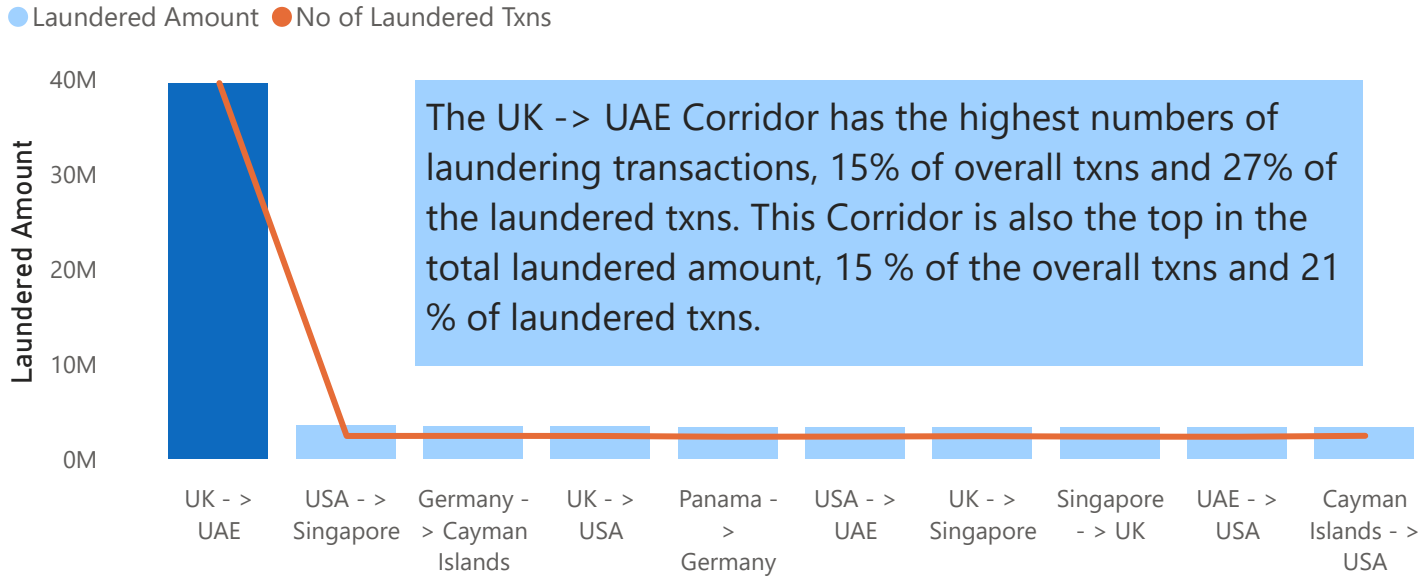
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Time Period Analysis

For Details Click

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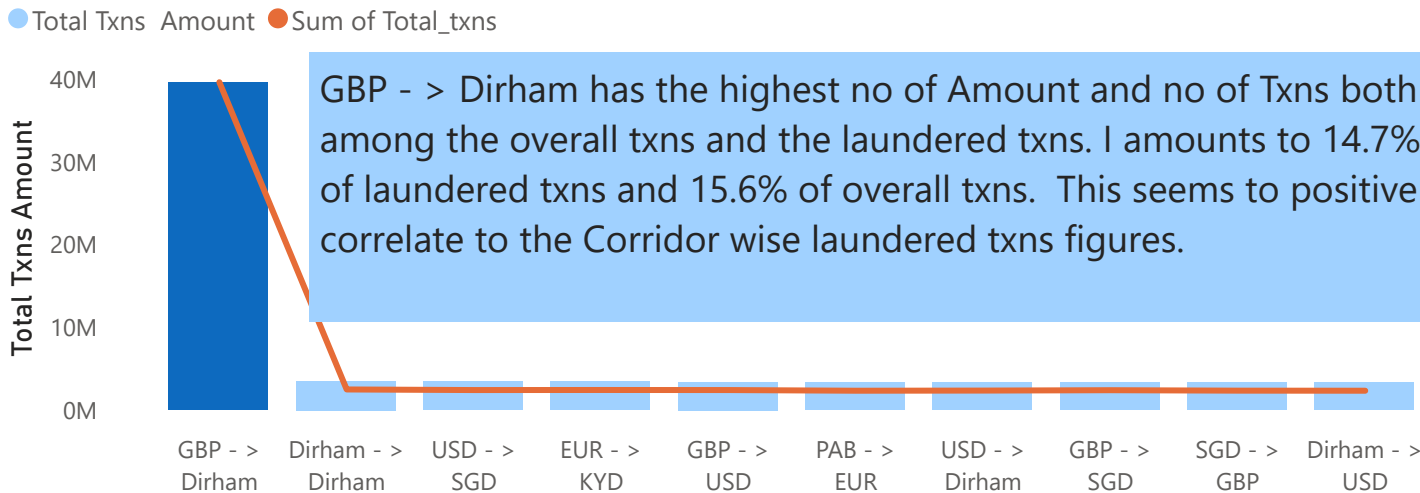**Risk Analysis**

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UK-> UAE corridor has the highest no of laundered txns and volume across laundering txns

● Laundered Amount ● No of Laundered Txns

The UK -> UAE Corridor has the highest numbers of laundering transactions, 15% of overall txns and 27% of the laundered txns. This Corridor is also the top in the total laundered amount, 15 % of the overall txns and 21 % of laundered txns.
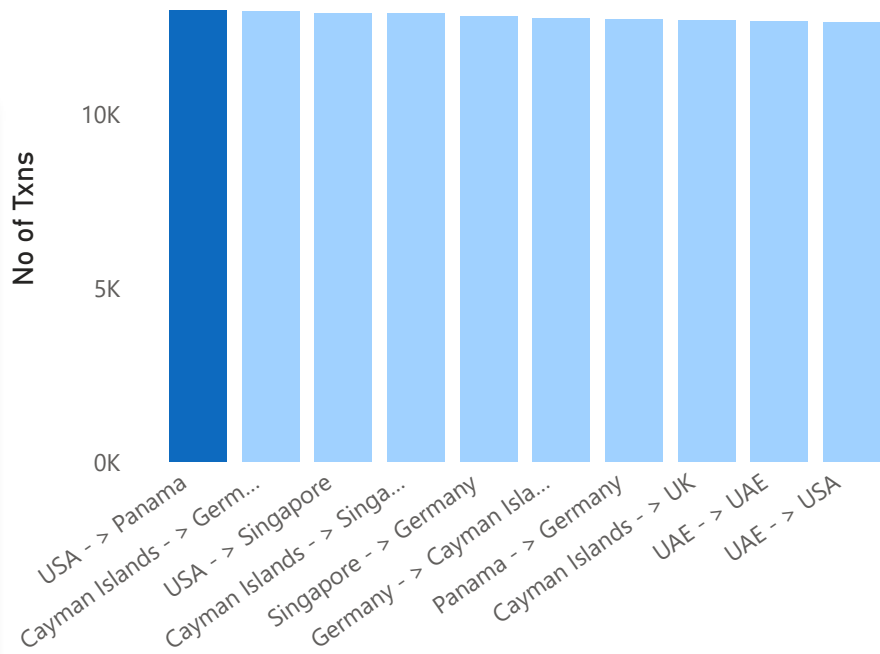
Interestingly, while sorting the txns based upon the average amount for laundering txns , USA -> Panama, Cayman Islands -> and USA -> Singapore topped the chart with around 13K GBP on average Txn and the UK -> UAE stood at the last with around 9K GBP on an average.

Recommendations:
Implement enhanced due diligence (EDD) and stricter monitoring controls specifically for transactions routed through the UK → UAE corridor. Consider introducing corridor-based risk scoring and targeted audits to detect patterns early. Also, collaborate with UAE counterparts to share intelligence and close regulatory gaps.

USA-> Panama Corridor has the highest on average txn amount among laundered txns

GBP-> Dirham txns has the highest laundering txns and volume, suggesting a positive correlation between Corridor wise laundering break up.

● Total Txns Amount ● Sum of Total_txns

GBP - > Dirham has the highest no of Amount and no of Txns both among the overall txns and the laundered txns. I amounts to 14.7% of laundered txns and 15.6% of overall txns. This seems to positively correlate to the Corridor wise laundered txns figures.

Laundering txns using Credit card has the highest volume ,i.e, 33 M and in numbers. It accounts to 30% of the total laundered txns. Whereas cash deposits which thought to be the popular mode of money laundering, have a total volume of 26 M, comprises 12% of the total laundered transactions.
In the historical analysis across payment types also we see the similar trend
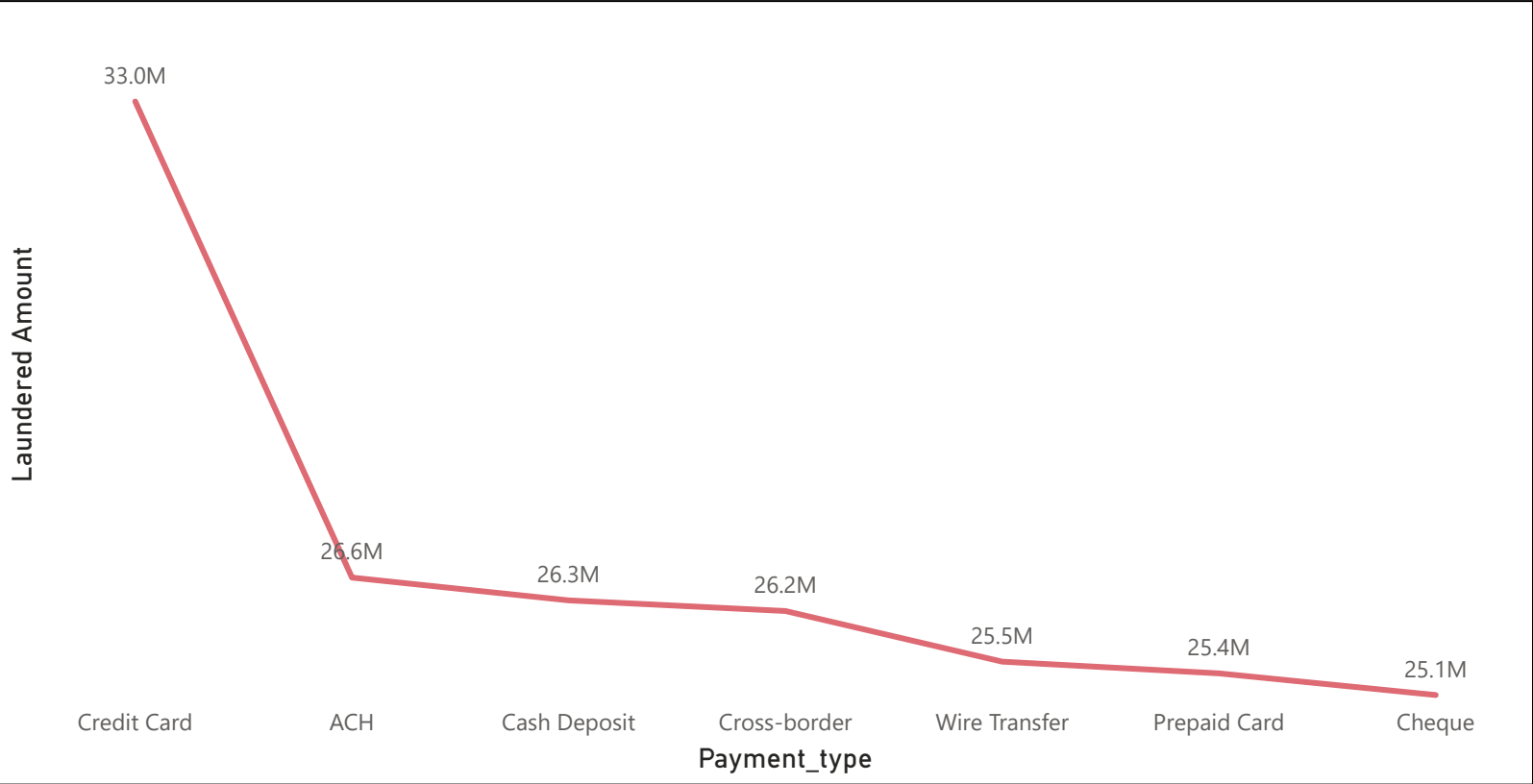
Year	Payment_type	Amount in GBP
2021	ACH	12.01M
2021	Cash Deposit	11.72M
2021	Cheque	11.72M
2021	Credit Card	14.18M
2021	Cross-border	12.41M
2021	Prepaid Card	12.05M
2021	Wire Transfer	11.79M
2022	ACH	11.68M
2022	Cash Deposit	12.38M
2022	Cheque	11.86M
2022	Credit Card	14.31M
2022	Cross-border	12.23M
2022	Prepaid Card	11.81M
2022	Wire Transfer	11.89M
2023	ACH	11.93M
2023	Cash Deposit	12.20M
2023	Cheque	11.66M
2023	Credit Card	14.10M
2023	Cross-border	11.49M
2023	Prepaid Card	11.32M
2023	Wire Transfer	11.39M
Total		**256.12M**

Recommendations:
Consider developing **specialized monitoring rules for digital payment methods**, especially credit card cross-border transactions, which may be exploited for laundering due to their speed and relative anonymity. While cash deposits still pose risks, allocate additional resources to **non-cash laundering vectors**, reflecting evolving laundering tactics.
Additionally, conduct a **root cause analysis** to understand why credit cards are favored—whether it's due to gaps in controls, loopholes in digital onboarding, or specific institutions being targeted—and work with financial institutions to tighten controls.

The most amount was laundered by 'Structuring', that is 33% of laundered txns and it amounts to around 44 million, whereas surprisingly "Cross Border Movement" is just 17%. Also if we look at the average amount laundered during txns, it is by 'Fan Out'

Laundering_type	Avg Laundered Amount	Avg Legit Amount
Cross-Border_Movement	12724.52	NULL
Cash_Deposits	13013.62	NULL
Fan-In	13014.97	NULL
Fan-Out	13084.83	NULL
Structuring	8193.76	NULL
Normal_Cash_Deposits	NULL	5088.85
Normal_Fan_In	NULL	4968.83
Normal_Fan_Out	NULL	5017.49
Normal_Small_Fan_Out	NULL	5076.67

33% of Laundered Transactions are by "Structuring", whereas "Cross Border Movement" is suprisingly just 17% of the transaction.
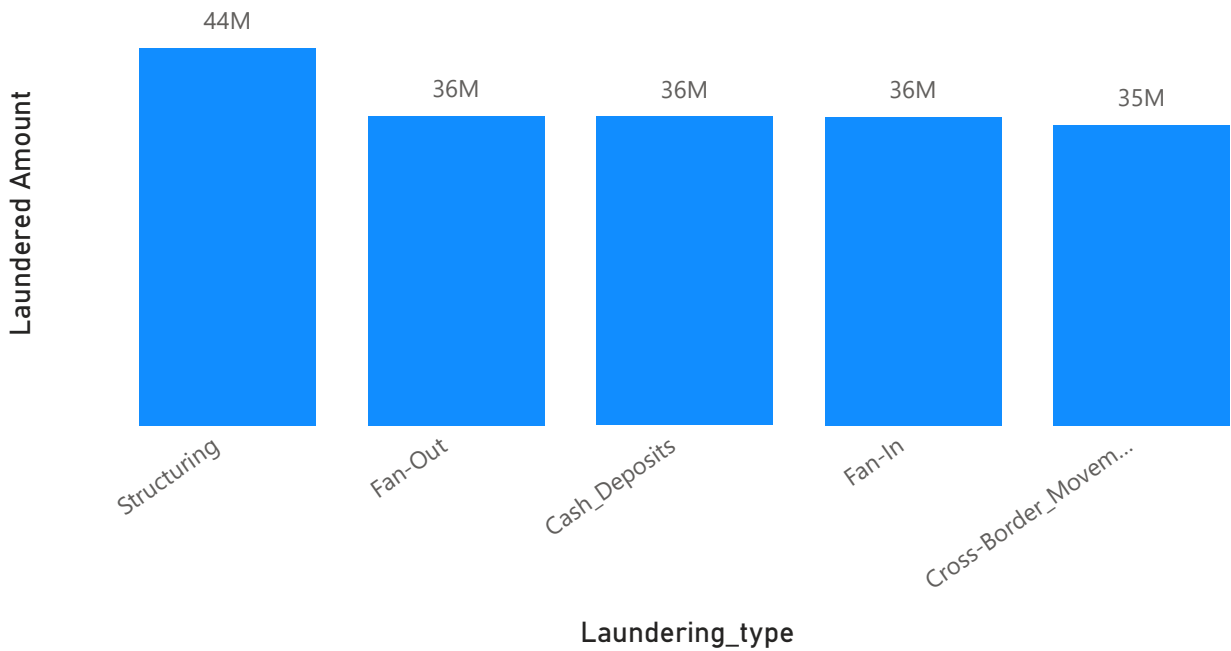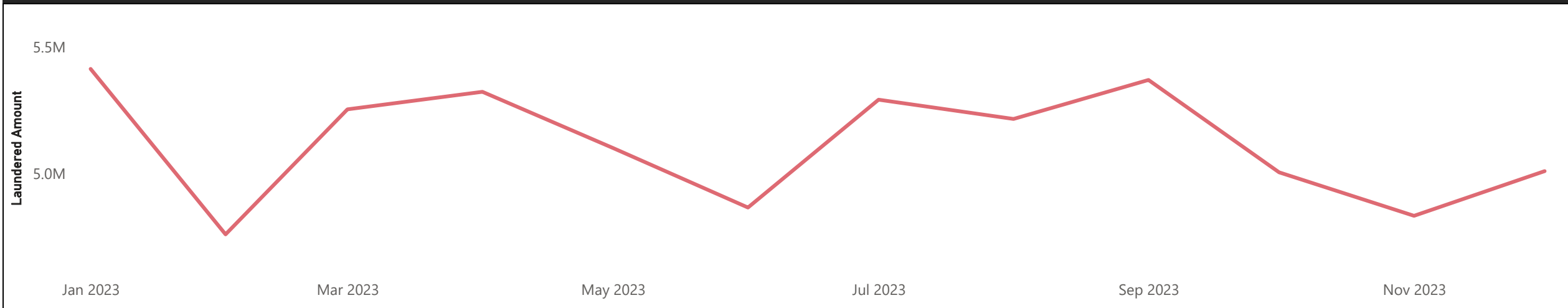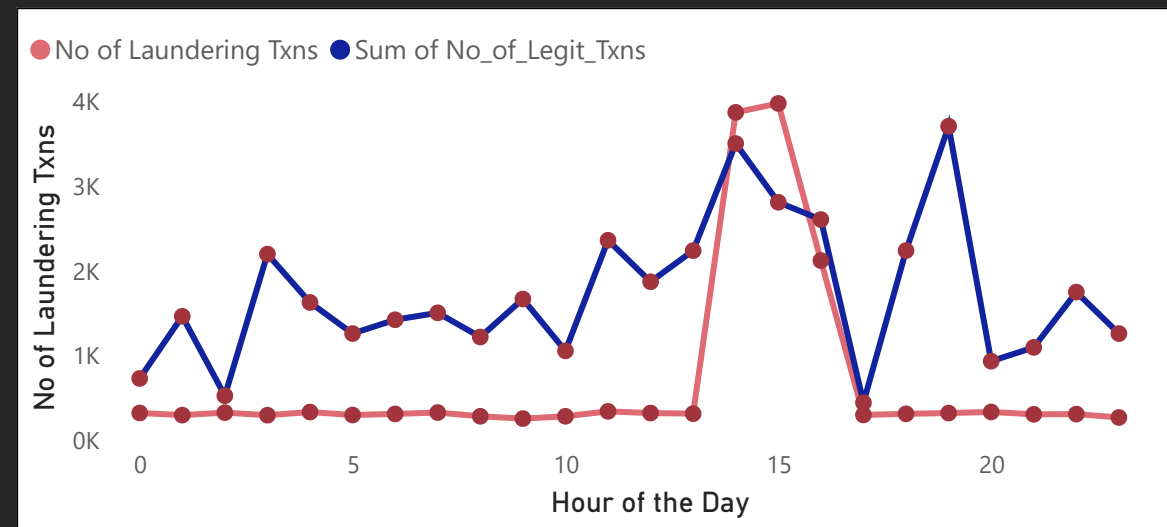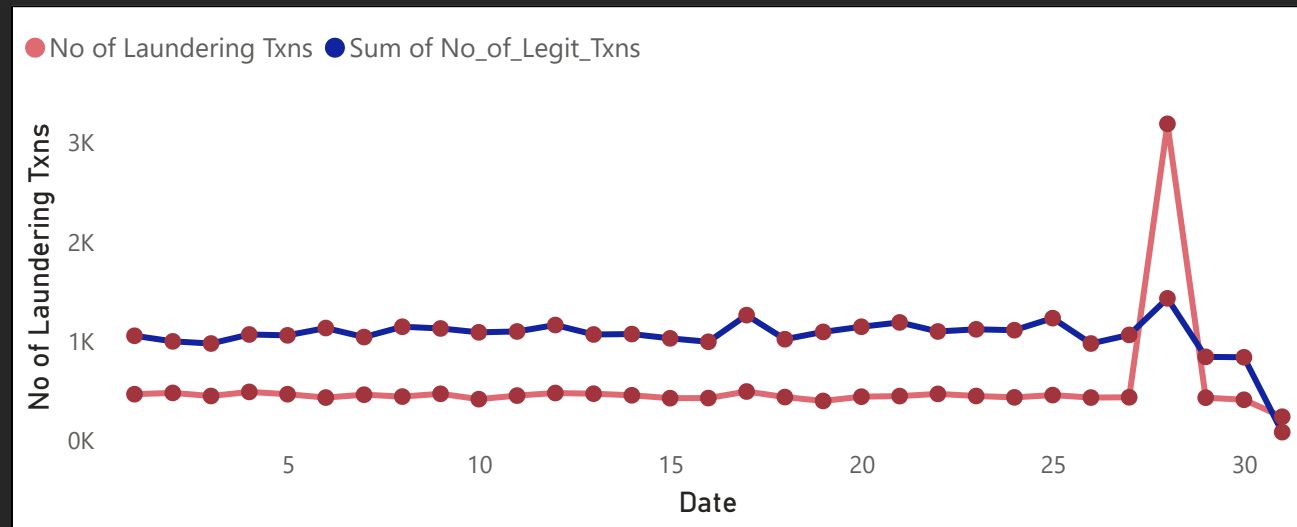

Recommendations:
Strengthen **transaction monitoring systems** to better detect **structuring patterns**, such as multiple small transactions that cumulatively exceed thresholds. Implement **real-time alerting for aggregation patterns** and encourage **enhanced due diligence (EDD)** for accounts showing signs of structuring, even when individual transactions fall below standard reporting limits. Also, even though 'Cross Border Movement' appears lower in volume, continue close monitoring, as cross-border risks remain critical, especially when combined with other laundering methods.
For 'Fan Out', focus on **high-value transaction monitoring**, as these larger-value dispersals, though

Time Period Analysis

No of Laundering Txns display a sudden shoot up on 28th day of the month, which is nearly 5% above the average txns during the month, possibly indicates the later days of the month, whereas the legit txns maintain a steady flow throughout the month. Similarly laundering txns display a sudden 5% spike during 13 hrs to 17 hrs during the day, whereas the legit txns do not any particular trend.

Year 2023 see a steady downward trend in the laundering activity, nearly 3.5% than the previous year. Further investigation needed to point possible reason.

Using Feature Engineering, I have created some conditional columns calculating cross border score, amount score, currency score, payment type score, geography score, temporal score and amount pattern score. Then I have added those scores to arrive at a risk score and categorized each transaction into three risk categories as High, Medium and Low. Also depending on those scores and some logic I have calculated Review on Priority flag. This Risk Category and Priority Review Flag column help to indicate high risk transactions.
The logic I followed for calculating these columns are as follows:
1️⃣**Cross Border Score:**
Logic:

Year	Month	Day	Sender_account	Sender_bank_location	Receiver_bank_location	Sum of Receiver_account	Payment_currency	Received_currency	Sum of Total_Risk_Score	risk_category		priority_review_flag	
2021	January	1	3907708359	Panama	Cayman Islands	9788209505	PAB	KYD	80	High	⬇	1	❌
2021	January	1	3989035292	UK	UAE	9705466496	GBP	Dirham	75	High	⬇	1	❌
2021	January	1	4511302118	UK	Germany	5218480852	GBP	EUR	75	High	⬇	1	❌
2021	January	1	5364129855	Germany	UAE	3341858135	EUR	Dirham	73	High	⬇	1	❌
2021	January	1	6270616990	UK	USA	6759965920	GBP	USD	65	Medium	↗	1	❌
2021	January	1	7362517645	Panama	UAE	3261216688	PAB	Dirham	85	High	⬇	1	❌
2021	January	1	7396708715	Germany	USA	6513402210	EUR	USD	65	Medium	↗	1	❌
2021	January	1	7415359341	UAE	Singapore	6691242125	Dirham	SGD	75	High	⬇	1	❌
2021	January	1	8565907902	UK	Panama	3709246459	GBP	PAB	80	High	⬇	1	❌
2021	January	2	1311174060	Cayman Islands	UK	1491741469	KYD	GBP	80	High	⬇	1	❌
2021	January	2	1875905988	USA	UK	8197933750	USD	GBP	75	High	⬇	1	❌
2021	January	2	3860716726	UK	Cayman Islands	4899765697	GBP	KYD	80	High	⬇	1	❌
2021	January	2	3861024122	UK	Singapore	6038483556	GBP	SGD	75	High	⬇	1	❌
2021	January	2	4844644844	Panama	Cayman Islands	8695613075	PAB	KYD	80	High	⬇	1	❌
2021	January	2	6033995612	UK	UAE	2320817370	GBP	Dirham	90	High	⬇	1	❌
2021	January	2	6358016493	USA	Germany	1469809301	USD	EUR	70	High	⬇	1	❌
2021	January	2	6491352966	Germany	Cayman Islands	3508304895	EUR	KYD	80	High	⬇	1	❌