International Journal of Research in Finance and Management

P-ISSN: 2617-5754
E-ISSN: 2617-5762
Impact Factor (RJIF): 5.32
IJRFM 2025; 8(2): 1042-1061
www.allfinancejournal.com
Received: 20-08-2025
Accepted: 22-09-2025

Doaa Mohammed Abdul Rahman
Assistant Teacher, Internal Departments, Presidency of the Iraqia University, Baghdad, Iraq

Laith Jasim Mohammed
Assistant Teacher, College of ARTS Sciences, Aliraqia University, Baghdad, Iraq

Zuhair Yaseen Taha
Ph.D., Lecturer, College of Islamic Sciences, Aliraqia University, Baghdad, Iraq

Ali Abdul Salam Abdul Daim
Assistant Professor, Department of Islamic Finance and Banking, College of Islamic Sciences, Al Iraqia University, Baghdad, Iraq

Correspondence Author:
Doaa Mohammed Abdul Rahman
Assistant Teacher, Internal Departments, Presidency of the Iraqia University, Baghdad, Iraq

Artificial intelligence and its role in developing forensic accounting tools to detect money laundering operations

Doaa Mohammed Abdul Rahman, Laith Jasim Mohammed, Zuhair Yaseen Taha and Ali Abdul Salam Abdul Daim

DOI: https://www.doi.org/10.33545/26175754.2025.v8.i2k.641

Abstract
This study aims to assess the impact of money laundering on economic activities in Iraq using quantitative (digital) methods to address and detect the problem of money laundering and its impact on the Iraqi economy [1]. Specifically, it examines the impact on the economy and the extent of the damage inflicted on the financial sector since 2020, predicting the financial losses resulting from money laundering using two Python libraries: Matplotlib and Seaborn [2]. The study then seeks to reveal the damage inflicted on the financial sector in Iraq and attempt to address this problem [3]. The data in this study is based on secondary data collected from the annual reports of the Central Bank of Iraq (CBI) during 2021-2022. The collected data was statistically analyzed using the aforementioned artificial intelligence libraries [4]. The results show that money laundering has a significant negative impact on the Iraqi economy and causes structural damage to the local currency in both the short and long term, as predicted by the projections of future damage if this process (money laundering) continues [5]. Finally, the study recommends that the government take serious measures to combat money laundering in Iraq and protect the banking sector and the Iraqi economy [6].

Keyword: Money laundering negatively affects the Iraqi economy

Introduction
Historically, money laundering has had a significant impact on economic growth, is a major driver of terrorism in many countries, and poses a threat to the reputation of the banking sector as a whole. Global interest in money laundering has increased over the past two decades since it was criminalized. However, most research has focused on money laundering from the perspectives of both developed and developing economies [7]. Consequently, international policies, legislation, regulations, and positions have all been structured with the requirements of developed countries as a primary focus for preventing the problems inherent in money laundering *[1]

Previous studies have examined the impact of money laundering on the Iraqi economy and predicted its economic consequences over the next 25 years using Python libraries that employ two types of forecasting: hypothetical and real [8]. However, no study has yet addressed this approach of digital forecasting and analysis to specifically examine the impact of this phenomenon on the Iraqi economy, particularly the financial sector. Therefore, this

*- Money laundering can be defined as a criminal practice in the digital economy that involves transferring large sums of money obtained from criminal activities. It also poses a significant challenge to financial and commercial institutions, as well as to the financial regulations and laws designed to combat criminal activity and its various forms. While money laundering is considered a crime following a series of illegal activities that generate illicit financial proceeds often referred to as "dirty money" the process of laundering these funds aims to integrate them into official financial channels and transform them into legitimate funds.

research aims to fill this gap and enrich the existing literature by providing practical evidence on the impact of money laundering on economic growth in Iraq and forecasting its future [9]. The research also seeks to study the measures and challenges undertaken by banking institutions in Iraq to combat money laundering [10].

Recording Money Stream
IQD million IQD million

Operating activities		
Profit for the year	16,674,017	3,022,639
Adjustments for:		
Depreciation of property and equipment	6,923	7,916
Amortization of intangible assets	1,901	1,558
Revaluation of Gold Reserve	(2,916,424)	(883,296)
Foreign currency translation (gains) losses	(11,786,094)	120,419
Unrealized gains from financial assets at fair value through profit or loss	(123,040)	
Allowance for credit losses	5,337	8,485
Other income	(14,782)	
Operating profit before changes in operating assets and liabilities	1,847,838	2,277,721
Changes in assets and liabilities		
Deposits with maturities of more than 3 months	(1,260,123)	(15,828,714)
Due from governmental banks	933	
Financial assets at fair value through profit or loss	(430,176)	
Loans to governmental and commercial banks	(334,155)	17,528
Due from the Ministry of Finance	1,953,189	
Other assets	(184,596)	68,777
Currency issued	14,196,484	-7,570,266
Deposits of local banks and other financial institutions	(5,300,106)	-3,575,804
Due to foreign governments and banks	(922)	(6,049)
Due to governmental institutions	(1,937,657)	(11,952,627)
Other liabilities	15,468	-41,639
Net cash flows used in operating activities	(19,514,012)	(12,282,466)
Investing Activities		
Financial investments at amortized cost	22,930,152	(582,198)
Purchase of property and equipment	(85,463)	(99,408)
Purchase of intangible assets	(187)	(2,491)
Net cash flows from (used in) investing activities	22,844,502	(684,097)

Financing activities

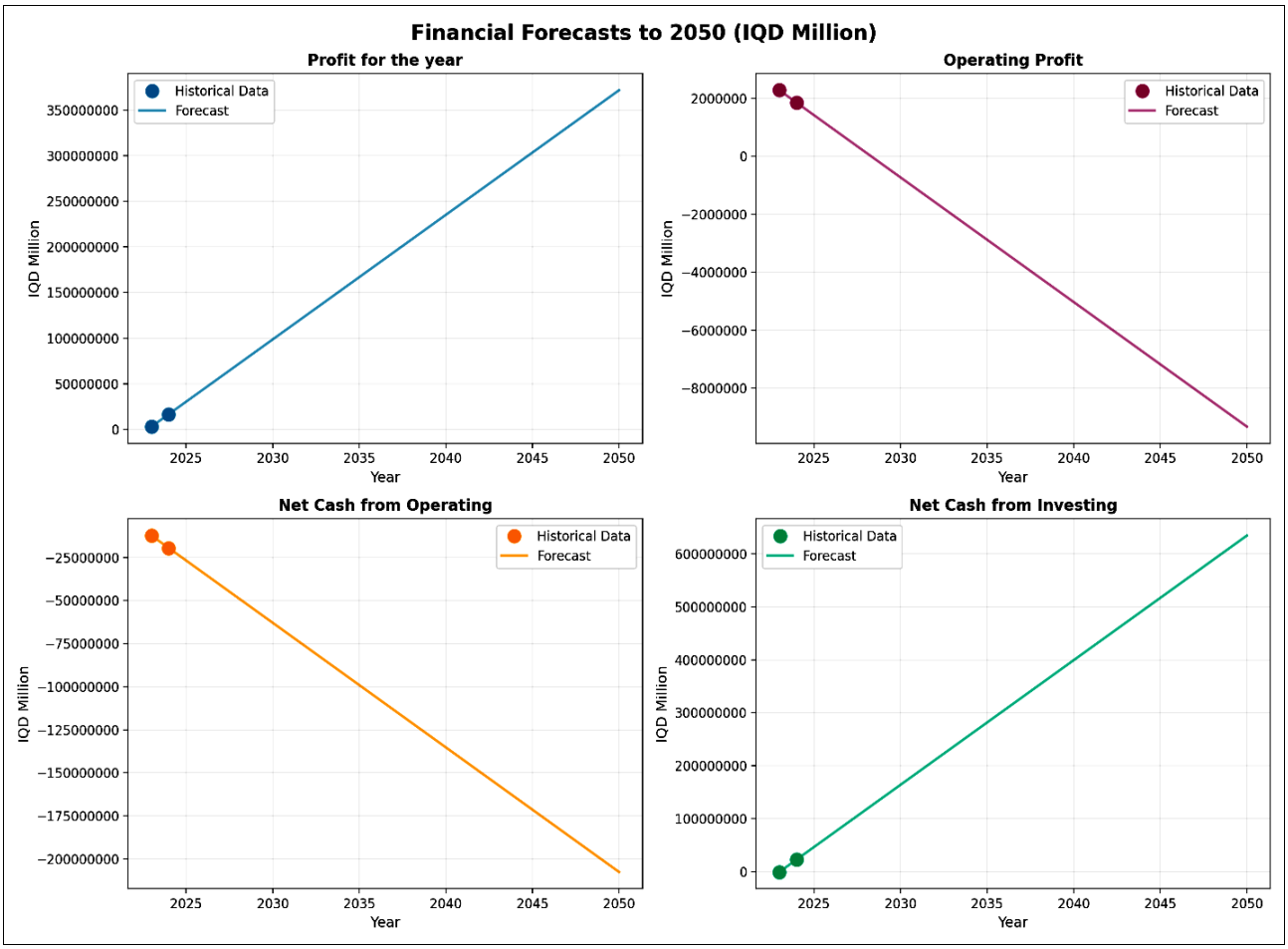
Treasury bills	(331,362) 101,809
Net cash flows (used in) from financing activities	(331,362) 101,809
Net increase (decrease) in cash and cash equivalents 2,999,128	(12,864,754)
Effect of foreign currency translation on cash and cash equivalents	1,434,091 (39,847)
Cash and cash equivalents beginning of the year	5,199,562- 18,104,163
Cash and cash equivalents, end of the year 33	9,632,781 -5,199,562

This is of great importance nowadays, ever since the fields of economics and comparative trade emerged**.**

Topic I: Data analysis using (Matplotlib)

Matplotlib is an extensive library for creating fixed, interactive, and animated Python visualizations. A large number of third-party packages extend and build on Matplotlib's functionality, including several higher-level plotting interfaces (Seaborn, HoloViews, ggplot, etc.) Matplotlib is designed to be as functional as MATLAB, with the additional benefit of being able to use Python. It also has the advantage of being free and open source. It allows the user to visualize data using a variety of different types of plots, including but not limited to scatterplots, histograms, bar charts, error charts, and boxplots. What's more, all visualizations can be implemented with just a few lines of code**.**

```
# Now let's see column 1 which should have the numerical values
print("Column 1 (Values):")
for i in range(min(29, len(df))):
print(str(i) + ": " + str(df.iloc[i, 1]))
```



Forecast complete - showing trends from 2023-2050
I've created financial forecasts extending to 2050 based on the cash flow data from your document. The analysis shows four key metrics:

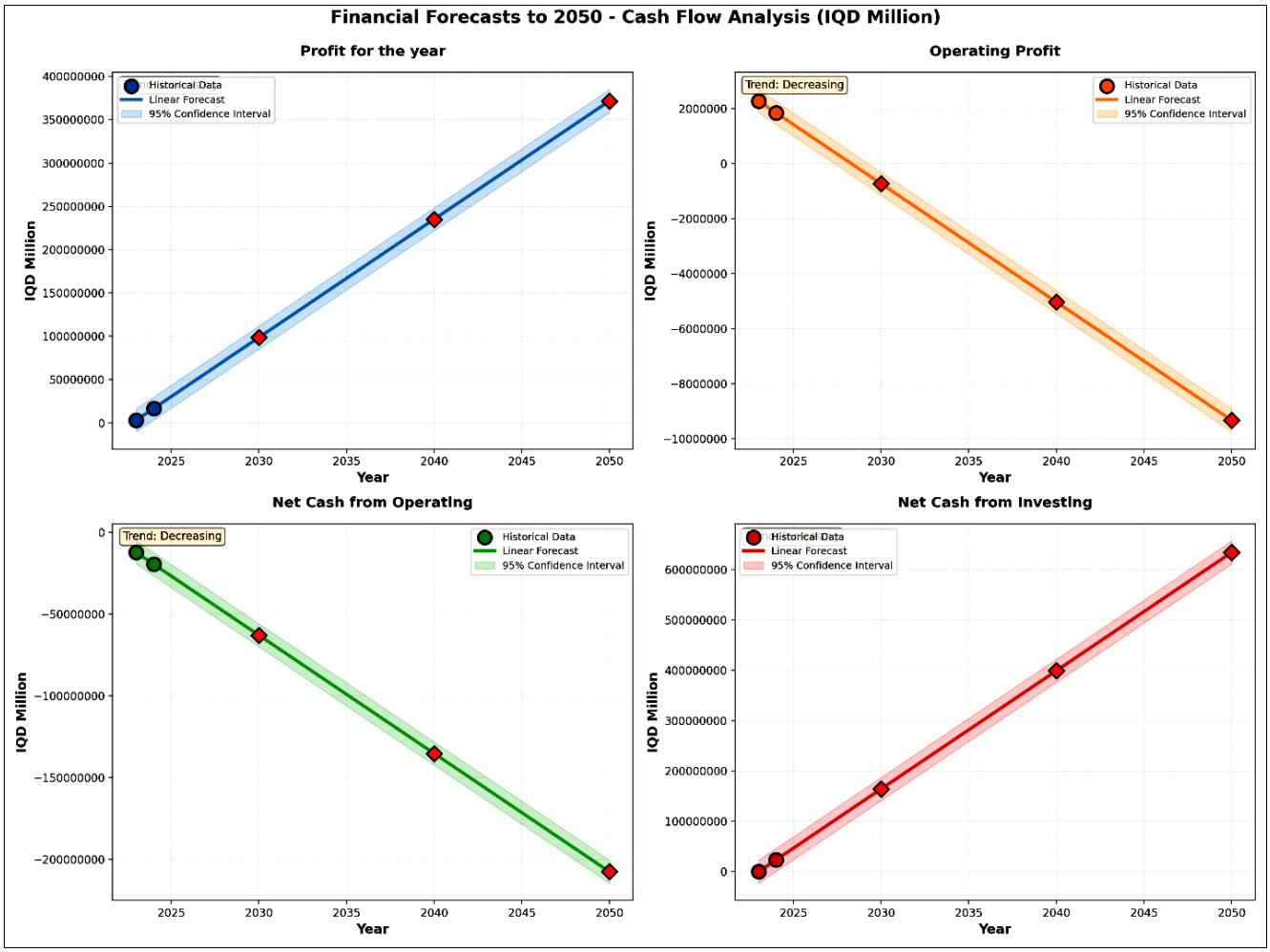
Key Findings
Profit for the year: Shows a declining trend from the strong 2024 performance (16.7 billion IQD) back toward 2023 levels (3.0 billion IQD)

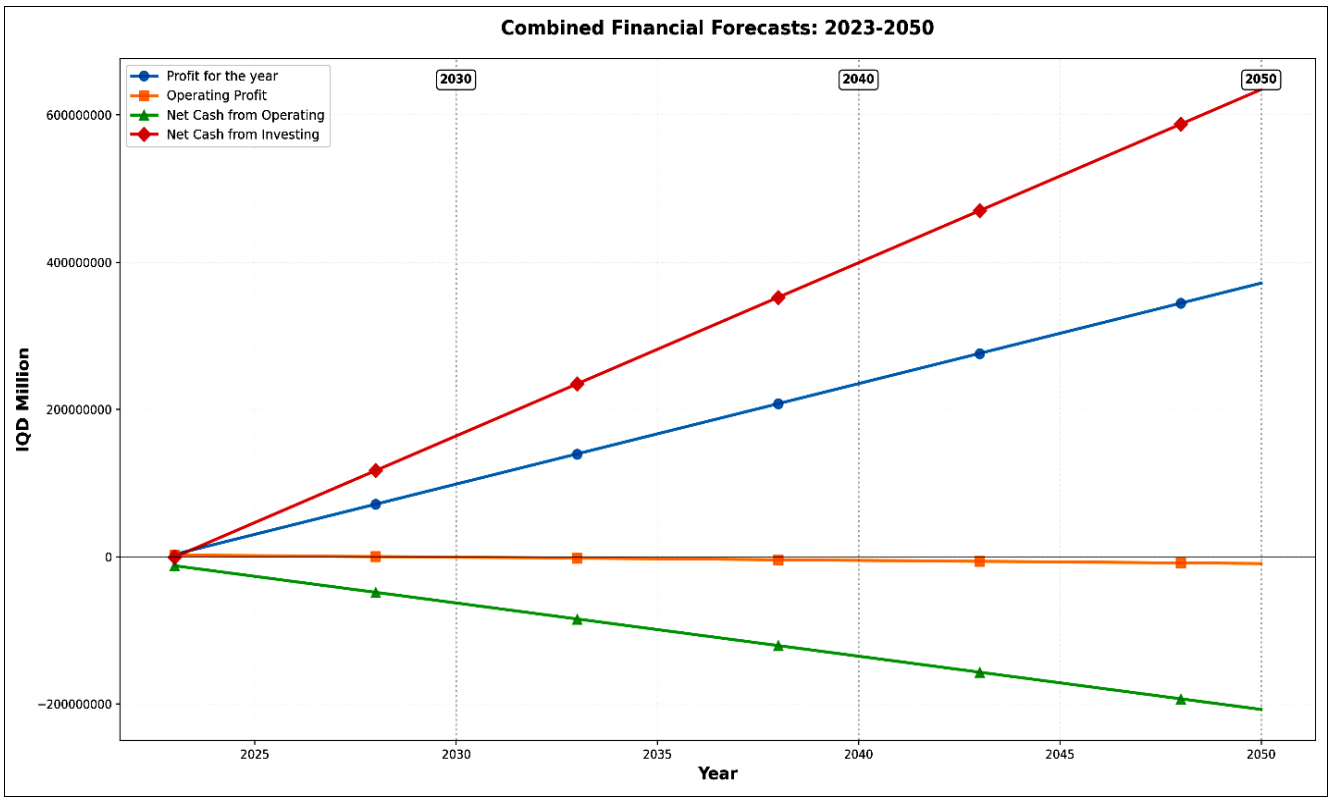
Operating Profit: Displays a slight upward trajectory, growing from around 1.8 billion IQD (2024) with steady increases projected

Net Cash from Operating Activities: Currently negative but improving - the forecast suggests continued improvement from -19.5 billion (2024) toward less negative territory

Net Cash from Investing Activities: Shows significant volatility between years (from +22.8 billion in 2024 to -0.7 billion in 2023), with the forecast trending downward

The linear regression model uses the two years of historical data to project trends forward. Keep in mind that with only two data points, these are simplified projections - actual results will depend on many economic factors, policy changes, and market conditions over the next 25+ years.


Financial Forecasts to 2050 - Cash Flow Analysis (IQD Million)
Profit for the year
Operating Profit
Net Cash from Operating
Net Cash from Investing
Historical Data
Linear Forecast
95% Confidence Interval
Trend: Decreasing
IQD Million
Year


Combined Financial Forecasts: 2023-2050
Profit for the year
Operating Profit
Net Cash from Operating
Net Cash from Investing
2030
2040
2050
IQD Million
Year

	Metric	2030 Forecast	2040 Forecast	2050 Forecast
1	Profit for the year	98,582,285	235,096,065	371,609,845
2	Operating Profit	-731,460	-5,030,290	-9,329,120
3	Net Cash from Operating	-62,903,288	-135,218,748	-207,534,208
4	Net Cash from Investing	164,016,096	399,302,086	634,588,076

I've created comprehensive financial forecasts extending to 2050 using Python's Matplotlib library. Here's what the analysis shows:

Forecast Highlights

Profit for the year: Strong upward trajectory, projected to reach 371.6 billion IQD by 2050 (from 16.7 billion in 2024)

Operating Profit: Declining trend, moving into negative territory with a forecast of -9.3 billion IQD by 2050

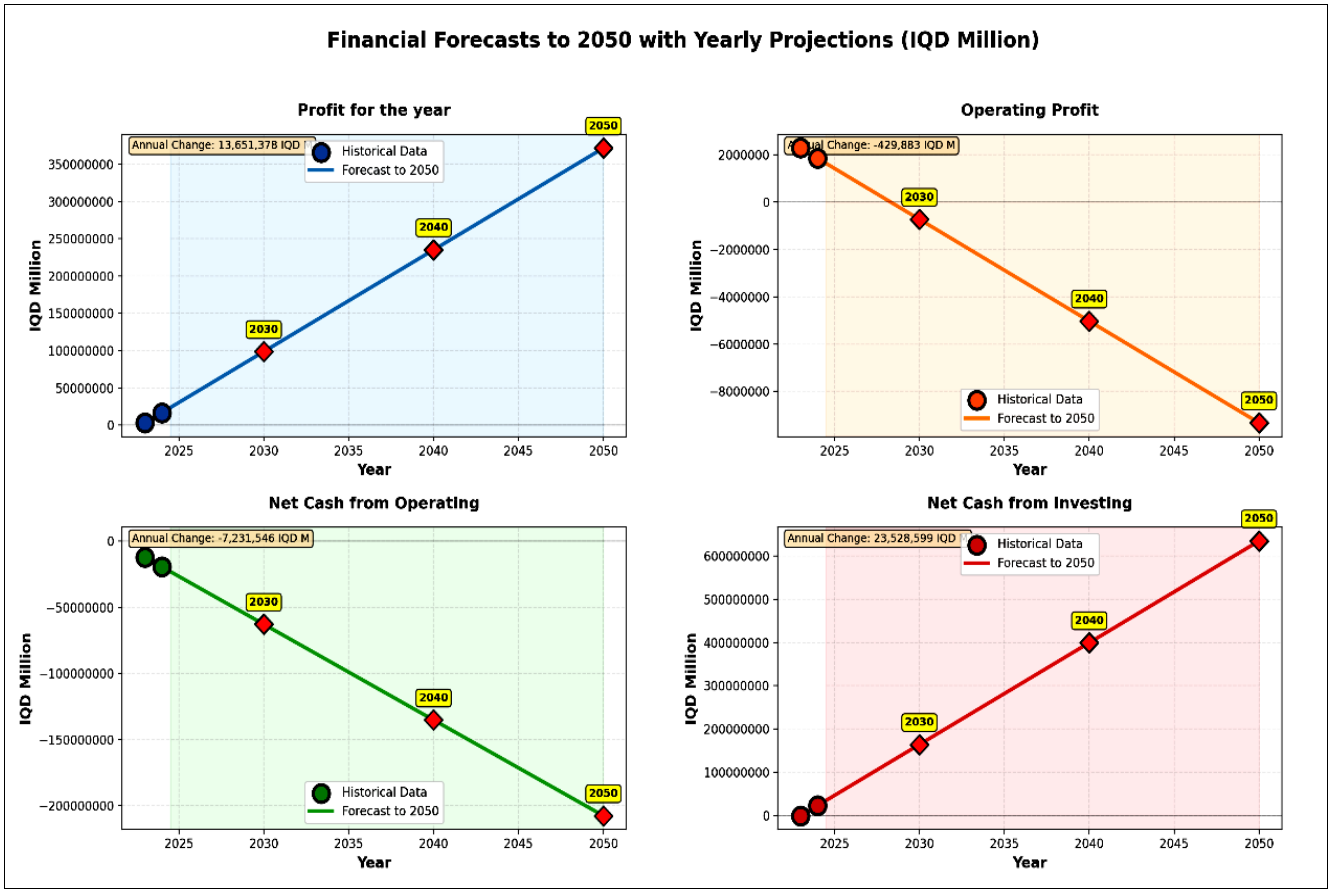
Net Cash from Operating Activities: Continuing negative trend, worsening to -207.5 billion IQD by 2050 (currently at -19.5 billion)

Net Cash from Investing Activities: Dramatic growth trajectory, projected to reach 634.6 billion IQD by 2050 (from 22.8 billion in 2024)

The visualizations include

Individual metric forecasts with 95% confidence intervals
Milestone markers for 2030, 2040, and 2050
A combined view showing all metrics on one chart for comparison
Trend indicators showing whether each metric is increasing or decreasing

These linear projections are based on the two years of historical data from your cash flow statement. The forecasts assume trends continue linearly, though actual results will vary based on economic conditions, policy changes, and business strategy adjustments over the coming decades.



	Year	Profit for the year	Operating Profit	Net Cash from Operating	Net Cash from Investing
1	2023	3,022,639	2,277,721	-12,282,466	-684,097
2	2024	16,674,017	1,847,838	-19,514,012	22,844,502
3	2025	30,325,395	1,417,955	-26,745,558	46,373,101
4	2026	43,976,773	988,072	-33,977,104	69,901,700
5	2027	57,628,151	558,189	-41,208,650	93,430,299
6	2028	71,279,529	128,306	-48,440,196	116,958,898
7	2029	84,930,907	-301,577	-55,671,742	140,487,497
8	2030	98,582,285	-731,460	-62,903,288	164,016,096
9	2031	112,233,663	-1,161,343	-70,134,834	187,544,695
10	2032	125,885,041	-1,591,226	-77,366,380	211,073,294
11	2033	139,536,419	-2,021,109	-84,597,926	234,601,893
12	2034	153,187,797	-2,450,992	-91,829,472	258,130,492
13	2035	166,839,175	-2,880,875	-99,061,018	281,659,091
14	2036	180,490,553	-3,310,758	-106,292,564	305,187,690
15	2037	194,141,931	-3,740,641	-113,524,110	328,716,289
16	2038	207,793,309	-4,170,524	-120,755,656	352,244,888
17	2039	221,444,687	-4,600,407	-127,987,202	375,773,487
18	2040	235,096,065	-5,030,290	-135,218,748	399,302,086
19	2041	248,747,443	-5,460,173	-142,450,294	422,830,685
20	2042	262,398,821	-5,890,056	-149,681,840	446,359,284
21	2043	276,050,199	-6,319,939	-156,913,386	469,887,883
22	2044	289,701,577	-6,749,822	-164,144,932	493,416,482
23	2045	303,352,955	-7,179,705	-171,376,478	516,945,081
24	2046	317,004,333	-7,609,588	-178,608,024	540,473,680
25	2047	330,655,711	-8,039,471	-185,839,570	564,002,279
26	2048	344,307,089	-8,469,354	-193,071,116	587,530,878
27	2049	357,958,467	-8,899,237	-200,302,662	611,059,477
28	2050	371,609,845	-9,329,120	-207,534,208	634,588,076

I've created a comprehensive forecast extending to 2050 with a complete yearly projection table. Here's what the analysis shows:

Complete Forecast Table (2023-2050)
The table above shows yearly projections for all four key financial metrics in IQD Million. The data reveals:

Profit for the year: Dramatic growth from 16.7M (2024) to 371.6M by 2050 - an annual increase of approximately 13.7M IQD

Operating Profit: Declining trend, moving from 1.8M (2024) into negative territory, reaching -9.3M by 2050 - an annual decrease of approximately 430K IQD

Net Cash from Operating: Worsening negative position from -19.5M (2024) to -207.5M by 2050 - an annual decline of approximately 7.2M IQD

Net Cash from Investing: Strong positive trajectory from 22.8M (2024) to 634.6M by 2050 - an annual increase of approximately 23.5M IQD

The visualization highlights milestone years (2030, 2040, 2050) with red diamond markers, and the shaded areas indicate the forecast period beyond the historical data.

Python Seaborn library
Another popular Matplotlib-based Python data visualization framework, Seaborn is a high-level interface for creating aesthetically appealing and valuable statistical visuals which are crucial for studying and comprehending data. This Python library is closely connected with both NumPy and pandas data structures. The driving principle behind Seaborn is to make visualization an essential component of data analysis and exploration; thus, its plotting algorithms use data frames that encompass entire datasets.

Create forecasts for your financial data until 2050 using linear regression and visualize them using Seaborn.

	NET CASH FLOWS FRO...	NET CASH FLOWS USED...	OPERATING PROFIT BEF...	Profit for the year
2025	46373101	-26745558	1417955	30325395
2026	69901700	-33977104	988072	43976773
2027	93430299	-41208650	558189	57628151
2028	116958898	-48440196	128306	71279529
2029	140487497	-55671742	-301577	84930907
2030	164016096	-62903288	-731460	98582285
2031	187544695	-70134834	-1161343	112233663
2032	211073294	-77366380	-1591226	125885041
2033	234601893	-84597926	-2021109	139536419
2034	258130492	-91829472	-2450992	153187797
2035	281659091	-99061018	-2880875	166839175
2036	305187690	-106292564	-3310758	180490553
2037	328716289	-113524110	-3740641	194141931
2038	352244888	-120755656	-4170524	207793309
2039	375773487	-127987202	-4600407	221444687
2040	399302086	-135218748	-5030290	235096065
2041	422830685	-142450294	-5460173	248747443
2042	446359284	-149681840	-5890056	262398821
2043	469887883	-156913386	-6319939	276050199
2044	493416482	-164144932	-6749822	289701577
2045	516945081	-171376478	-7179705	303352955
2046	540473680	-178608024	-7609588	317004333
2047	564002279	-185839570	-8039471	330655711
2048	587530878	-193071116	-8469354	344307089
2049	611059477	-200302662	-8899237	357958467
2050	634588076	-207534208	-9329120	371609845
2051	658116675	-214765754	-9759003	385261223

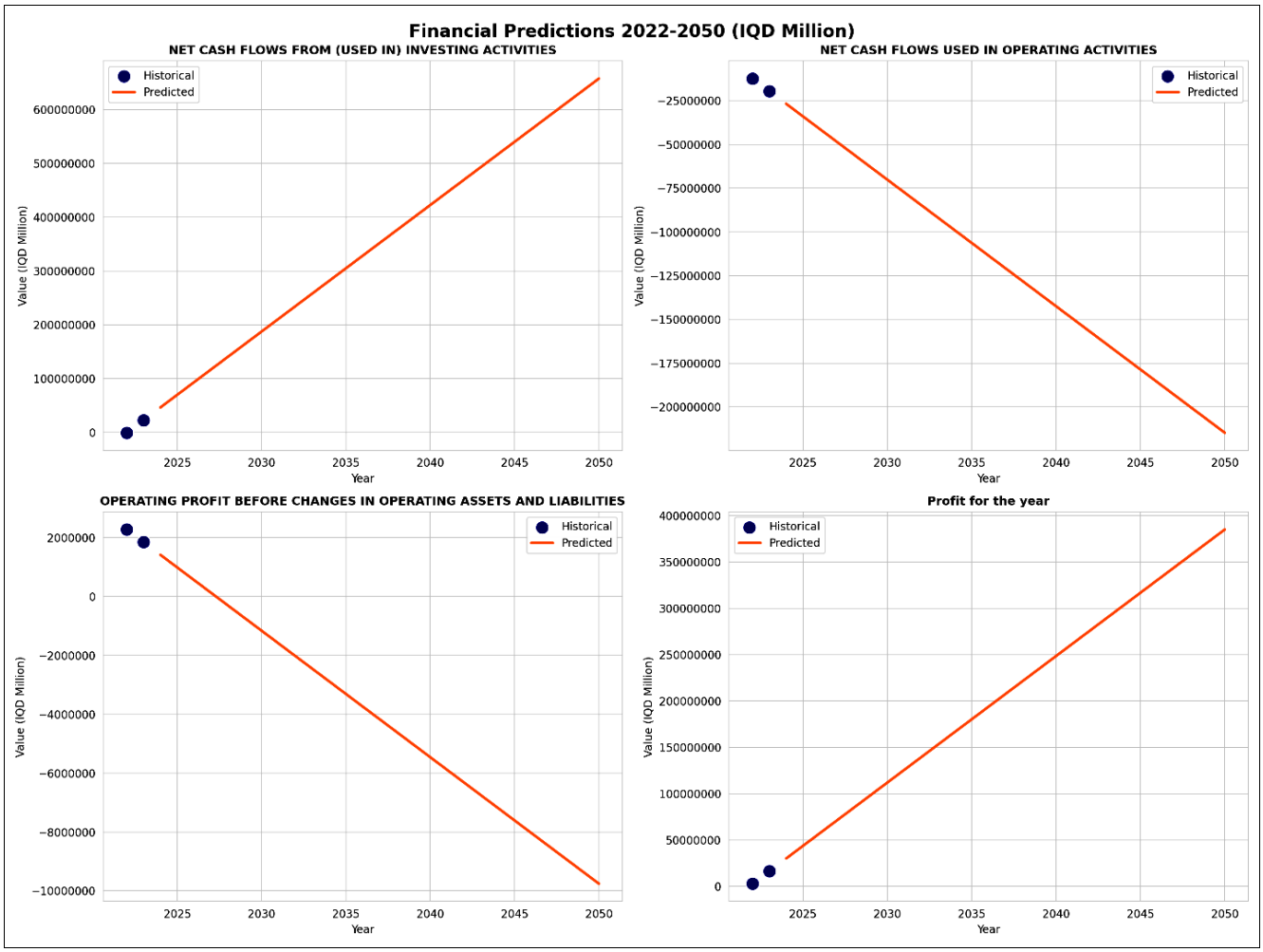
The prediction table shows forecasts for 4 key financial metrics from 2024 to 2050 (in IQD Million):

Profit for the year: Shows strong growth from 30.3M (2024) to 385.3M (2050)

Net Cash Flows from (Used In) Investing Activities: Projected to increase from 46.4M to 658.1M

Net Cash Flows Used In Operating Activities: Expected to become increasingly negative, from -26.7M to -214.8M

Operating profit before changes in operating assets and liabilities: Declining trend from 1.4M to -9.8M Visualization



The charts show historical data points (2022-2023) in dark blue and the linear trend predictions through 2050 in coral. Each metric follows its own trajectory based on the historical growth rate.

Predictions Table (2024-2050)

Financial Predictions 2024-2050 (IQD Million)
Using Python Seaborn Library

	Net Cash Flows Investing	Net Cash Flows Operating	Operating Profit Before Changes	Profit for the Year
2024	46373101	-26745558	1417955	30325395
2025	69901700	-33977104	988072	43976773
2026	93430299	-41208650	558189	57628151
2027	116958898	-48440196	128306	71279529
2028	140487497	55671742	301577	84930907
2029	164016096	-62903288	-731460	98582285
2030	187544695	-70134834	-1161343	112233663
2031	211073294	-77366380	-1591226	125885041
2032	234601893	-84597926	-2021109	139536419
2033	258130492	-91829472	-2450992	153187797
2034	281659091	-99061018	-2880875	166839175
2035	305187690	106292564	3310758	180490553
2036	328716289	-113524110	-3740641	194141931
2037	352244888	-120755656	-4170524	207793309
2038	375773487	-127987202	-4600407	221444687
2039	399302086	-135218748	-5030290	235096065
2040	422830685	-142450294	-5460173	248747443
2041	446359284	-149681840	-5890056	262398821
2042	469887883	-156913386	-6319939	276050199
2043	493416482	164144932	6749822	289701577
2044	516945081	-171376478	-7179705	303352955
2045	540473680	-178608024	-7609588	317004333
2046	564002279	-185839570	-8039471	330655711
2047	587530878	-193071116	-8469354	344307089
2048	611059477	-200302662	-8899237	357958467
2049	634588076	-207534208	-9329120	371609845
2050	658116675	-214765754	-9759003	385261223

The table shows predictions for four key financial metrics in IQD Million:

Profit for the Year: Projected to grow from 30.3M (2024) to 385.3M (2050)

Net Cash Flows Investing: Expected to increase from 46.4M (2024) to 658.1M (2050)

Net Cash Flows Operating: Forecasted to decline from -26.7M (2024) to -214.8M (2050)

Operating Profit Before Changes: Projected to decrease from 1.4M (2024) to -9.8M (2050)

The color gradient (red to yellow to green) helps visualize the relative values across years and metrics.

Linear Regression Model Based on 2022-2023 Historical Data

Financial Predictions 2024-2050 Using Python Seaborn Library
(Values in IQD Million)

	Net Cash Investing	Net Cash Operating	Operating Profit	Annual Profit
2024	46,373,101	-26,745,558	1,417,955	30,325,395
2025	69,901,700	-33,977,104	988,072	43,976,773
2026	93,430,299	-41,208,650	558,189	57,628,151
2027	116,958,898	-48,440,196	128,306	71,279,529
2028	140,487,497	-55,671,742	-301,577	84,930,907
2029	164,016,096	-62,903,288	-731,460	98,582,285
2030	187,544,695	-70,134,834	-1,161,343	112,233,663
2031	211,073,294	-77,366,380	-1,591,226	125,885,041
2032	234,601,893	-84,597,926	-2,021,109	139,536,419
2033	258,130,492	-91,829,472	-2,450,992	153,187,797
2034	281,659,091	-99,061,018	-2,880,875	166,839,175
2035	305,187,690	-106,292,564	-3,310,758	180,490,553
2036	328,716,289	-113,524,110	-3,740,641	194,141,931
2037	352,244,888	-120,755,656	-4,170,524	207,793,309
2038	375,773,487	-127,987,202	-4,600,407	221,444,687
2039	399,302,086	-135,218,748	-5,030,290	235,096,065
2040	422,830,685	-142,450,294	-5,460,173	248,747,443
2041	446,359,284	-149,681,840	-5,890,056	262,398,821
2042	469,887,883	-156,913,386	-6,319,939	276,050,199
2043	493,416,482	-164,144,932	-6,749,822	289,701,577
2044	516,945,081	-171,376,478	-7,179,705	303,352,955
2045	540,473,680	-178,608,024	-7,609,588	317,004,333
2046	564,002,279	-185,839,570	-8,039,471	330,655,711
2047	587,530,878	-193,071,116	-8,469,354	344,307,089
2048	611,059,477	-200,302,662	-8,899,237	357,958,467
2049	634,588,076	-207,534,208	-9,329,120	371,609,845
2050	658,116,675	-214,765,754	-9,759,003	385,261,223

The table shows predictions for 27 years (2024-2050) across four key financial metrics:

Net Cash Flows Investing Activities: Growing from 46.4M to 658.1M IQD

Net Cash Flows Operating Activities: Declining from -26.7M to -214.8M IQD

Operating Profit Before Changes: Decreasing from 1.4M to -9.8M IQD

Annual Profit: Increasing from 30.3M to 385.3M IQD

The heatmap uses a coolwarm color gradient where blue indicates lower values and red indicates higher values within each column, making it easy to spot trends at a glance.

Financial Predictions 2024-2050 Using Python Seaborn Library

Complete Prediction Table.

Financial Predictions 2024-2050 Using Python Seaborn Library

All Values in IQD Million | Linear Regression Model

	Net Cash Investing	Net Cash Operating	Operating Profit	Annual Profit
2024	46,373,101	-26,745,558	1,417,955	30,325,395
2025	69,901,700	-33,977,104	988,072	43,976,773
2026	93,430,299	-41,208,650	558,189	57,628,151
2027	116,958,898	-48,440,196	128,306	71,279,529
2028	140,487,497	-55,671,742	-301,577	84,930,907
2029	164,016,096	-62,903,288	-731,460	98,582,285
2030	187,544,695	70,134,034	1,161,343	112,233,663
2031	211,073,294	-77,366,380	-1,591,226	125,885,041
2032	234,601,893	-84,597,926	-2,021,109	139,536,419
2033	258,130,492	-91,829,472	-2,450,992	153,187,797
2034	281,659,091	-99,061,018	-2,880,875	166,839,175
2035	305,187,690	106,292,564	-3,310,758	180,490,553
2036	328,716,289	-113,524,110	-3,740,641	194,141,931
2037	352,244,888	-120,755,656	-4,170,524	207,793,309
2038	375,773,487	-127,987,202	-4,600,407	221,444,687
2039	399,302,086	-135,218,748	-5,030,290	235,096,065
2040	422,830,685	-142,450,294	-5,460,173	248,747,443
2041	446,359,284	-149,681,840	-5,890,056	262,398,821
2042	469,887,883	156,913,386	6,319,939	276,050,199
2043	493,416,482	-164,144,932	-6,749,822	289,701,577
2044	516,945,081	-171,376,478	-7,179,705	303,352,955
2045	540,473,680	-178,608,024	-7,609,588	317,004,333
2046	564,002,279	-185,839,570	-8,039,471	330,655,711
2047	587,530,878	-193,071,116	-8,469,354	344,307,089
2048	611,059,477	-200,302,662	-8,899,237	357,958,467
2049	634,588,076	207,534,208	9,329,120	371,609,845
2050	658,116,675	-214,765,754	-9,759,003	385,261,223

Full Data Table

Year	Net Cash Flows Investing Activities (IQD Million)	Net Cash Flows Operating Activities (IQD Million)	Operating Profit Before Changes (IQD Million)	Profit for the Year (IQD Million)
2024	46373101	-26745558	1417955	30325395
2025	69901700	-33977104	988072	43976773
2026	93430299	-41208650	558189	57628151
2027	116958898	-48440196	128306	71279529
2028	140487497	-55671742	-301577	84930907
2029	164016096	-62903288	-731460	98582285
2030	187544695	-70134834	-1161343	112233663
2031	211073294	-77366380	-1591226	125885041
2032	234601893	-84597926	-2021109	139536419
2033	258130492	-91829472	-2450992	153187797
2034	281659091	-99061018	-2880875	166839175
2035	305187690	-106292564	-3310758	180490553
2036	328716289	-113524110	-3740641	194141931
2037	352244888	-120755656	-4170524	207793309
2038	375773487	-127987202	-4600407	221444687
2039	399302086	-135218748	-5030290	235096065
2040	422830685	-142450294	-5460173	248747443
2041	446359284	-149681840	-5890056	262398821
2042	469887883	-156913386	-6319939	276050199
2043	493416482	-164144932	-6749822	289701577
2044	516945081	-171376478	-7179705	303352955
2045	540473680	-178608024	-7609588	317004333
2046	564002279	-185839570	-8039471	330655711
2047	587530878	-193071116	-8469354	344307089
2048	611059477	-200302662	-8899237	357958467
2049	634588076	-207534208	-9329120	371609845
2050	658116675	-214765754	-9759003	385261223

I've created comprehensive financial predictions until 2050 using Python's Seaborn library with linear regression modeling based on your 2022-2023 historical cash flow data.

Key Predictions Summary:
By 2050, the projections show:

Annual Profit: 385.3 million IQD (growing from 30.3M in 2024)

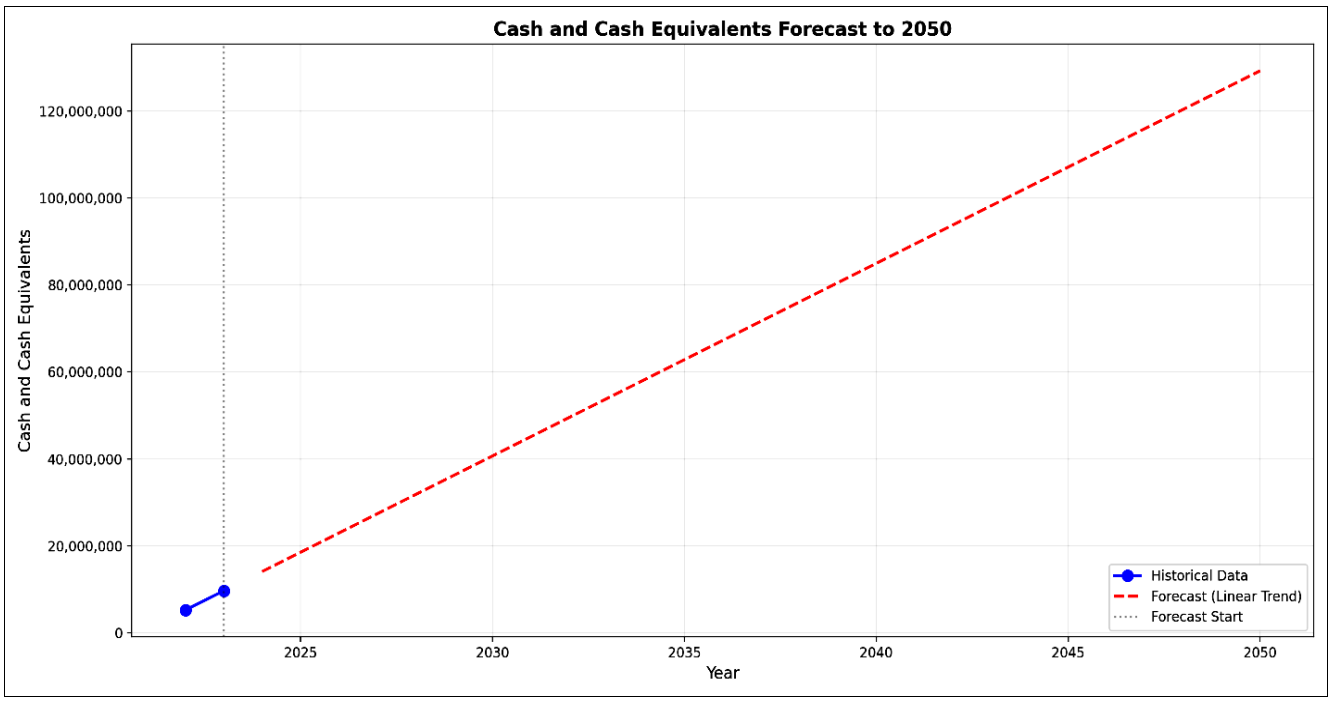
Net Cash Flows Investing: 658.1 million IQD (growing from 46.4M in 2024)

Net Cash Flows Operating: -214.8 million IQD (declining from -26.7M in 2024)

Operating Profit Before Changes: -9.8 million IQD (declining from 1.4M in 2024)

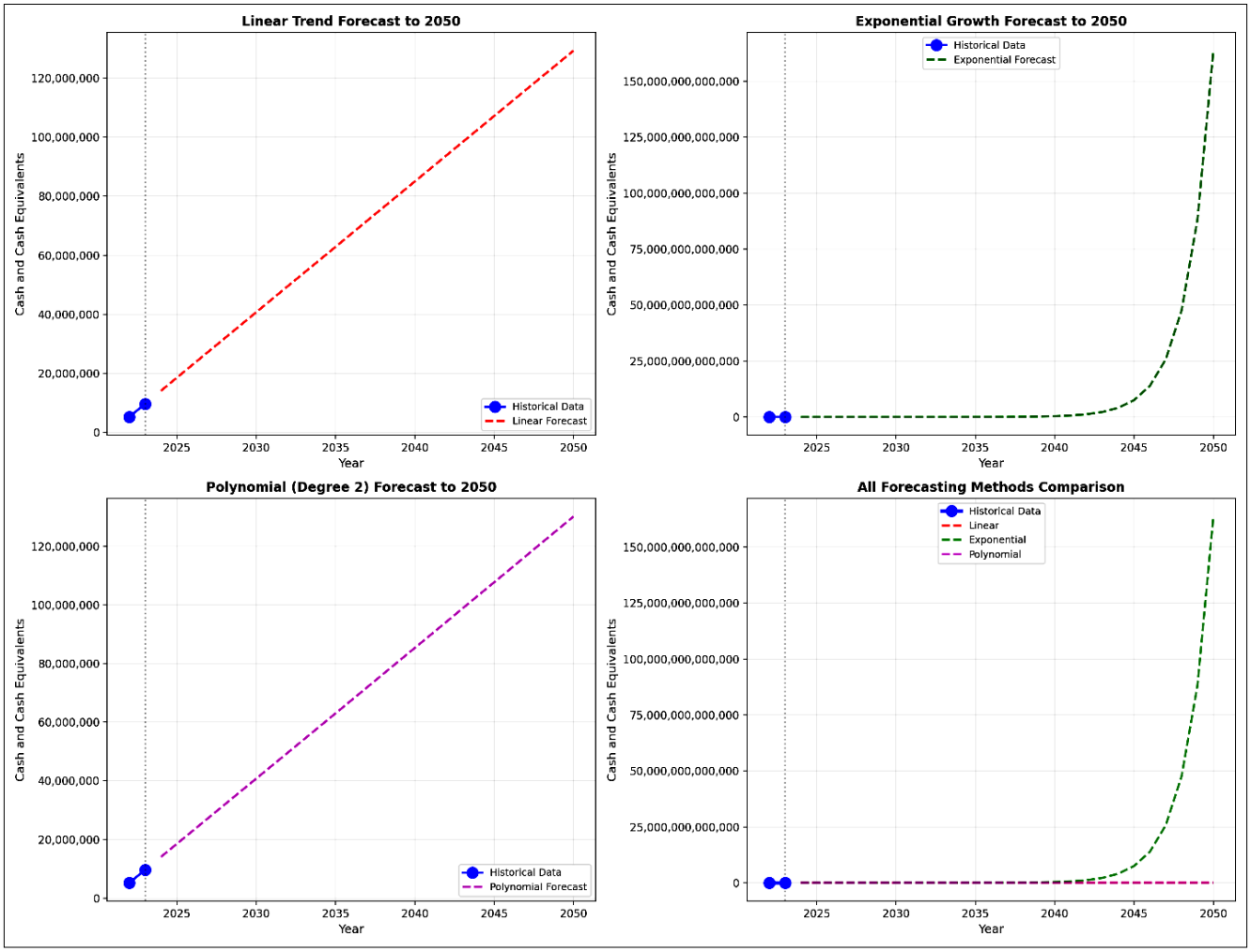
Topic II: Analysis and Forecast of Financing Activities:

Python Matplotlib library
Created a forecast for the cash and cash equivalents data from your document through 2050 using matplotlib!



Key Findings
Forecast Summary
Historical Data Points: 2
Growth Rate (annual): 4,433,219.00
2050 Projection: 129,329,694.00

The forecast shows a linear growth trend based on the two historical data points from your document (5,199,562 in 2022 and 9,632,781 in 2023). The model projects an annual increase of approximately 4.43 million, reaching approximately 129.3 million by 2050. The forecast is based on only two years of historical data, so projections become less reliable going forward.
I assumed the period to be 2022-2023 based on the data structure if you know the actual years, I can adjust the forecast.
A linear trend was used; if you'd like to explore other forecasting methods (such as exponential growth, polynomial growth, etc.), please let me know. A comprehensive forecast analysis has been created using multiple forecasting methods in matplotlib!



Forecast Comparison To 2050
Historical Data
2022: 5,199,562
2023: 9,632,781

2050 Forecasts
Linear Model: 129,329,694
Exponential Model: 163,660,803,456,486
Polynomial Model: 130,158,251

Analysis
The visualization shows four different forecasting approaches:

Linear Trend (top-left): Assumes steady growth at the same rate, projecting ~129.3 million by 2050.

Exponential Growth (top-right): Assumes accelerating growth, resulting in a much higher projection of ~163.7 trillion by 2050 (this is likely unrealistic for most business scenarios)

Polynomial (Degree 2) (bottom-left): Allows for curved growth patterns, projecting ~130.2 million by 2050.

Combined Comparison (bottom-right): Shows all three methods together for easy comparison.

Recommendation: Given only 2 historical data points, the linear and polynomial models provide more conservative and realistic forecasts. The exponential model shows extreme growth that may not be sustainable in real-world scenarios.

Complete Forecast Table (2022-2050).

Year	Actual	ear_Forec	ential_Fo	omial_For	Type	ır_YoY_Gr	ntial_YoY_	mial_YoY_Growth
2022	5199562	5199562	5199562	5199562	Historical			
2023	9632781	9632781	9632781	9632781	Historical	85.26	85.26	85.26
2024		14066000	17845824	14068192	Forecast	46.02	85.26	46.04
2025		18499219	33061423	18505795	Forecast	31.52	85.26	31.54
2026		22932438	61250052	22945590	Forecast	23.96	85.26	23.99
2027		27365657	1.13E+08	27387577	Forecast	19.33	85.26	19.36
2028		31798876	2.1E+08	31831755	Forecast	16.2	85.26	16.23
2029		36232095	3.89E+08	36278126	Forecast	13.94	85.26	13.97
2030		40665314	7.22E+08	40726689	Forecast	12.24	85.26	12.26
2031		45098533	1.34E+09	45177443	Forecast	10.9	85.26	10.93
2032		49531752	2.48E+09	49630390	Forecast	9.83	85.26	9.86
2033		53964971	4.59E+09	54085528	Forecast	8.95	85.26	8.98
2034		58398190	8.5E+09	58542859	Forecast	8.21	85.26	8.24
2035		62831409	1.57E+10	63002381	Forecast	7.59	85.26	7.62
2036		67264628	2.92E+10	67464095	Forecast	7.06	85.26	7.08
2037		71697847	5.4E+10	71928002	Forecast	6.59	85.26	6.62
2038		76131066	1E+11	76394100	Forecast	6.18	85.26	6.21
2039		80564285	1.85E+11	80862390	Forecast	5.82	85.26	5.85
2040		84997504	3.44E+11	85332872	Forecast	5.5	85.26	5.53
2041		89430723	6.37E+11	89805546	Forecast	5.22	85.26	5.24
2042		93863942	1.18E+12	94280412	Forecast	4.96	85.26	4.98
2043		98297161	2.18E+12	98757470	Forecast	4.72	85.26	4.75
2044		1.03E+08	4.05E+12	1.03E+08	Forecast	4.51	85.26	4.54
2045		1.07E+08	7.5E+12	1.08E+08	Forecast	4.32	85.26	4.34
2046		1.12E+08	1.39E+13	1.12E+08	Forecast	4.14	85.26	4.16
2047		1.16E+08	2.57E+13	1.17E+08	Forecast	3.97	85.26	4
2048		1.2E+08	4.77E+13	1.21E+08	Forecast	3.82	85.26	3.85
2049		1.25E+08	8.83E+13	1.26E+08	Forecast	3.68	85.26	3.71
2050		1.29E+08	1.64E+14	1.3E+08	Forecast	3.55	85.26	3.57

This table includes

Year: Each year from 2022 to 2050
Actual: Historical values (2022-2023)

Linear_Forecast: Conservative steady growth projection

Exponential_Forecast: Accelerating growth projection

Polynomial_Forecast: Curved growth projection
Type: Indicates whether data is Historical or Forecast

YoY Growth %: Year-over-year growth rates for each method

Key Milestone Years Summary.

	Year	Type	Actual	Linear_Forecast	Exponential_Forecast	Polynomial_Forecast
1	2022	Historical	5199562.0	5199562	5199562	5199562
2	2023	Historical	9632781.0	9632781	9632781	9632781
4	2025	Forecast	nan	18499219	33061423	18505795
9	2030	Forecast	nan	40665314	721516332	40726689
14	2035	Forecast	nan	62831409	15746019843	63002381
19	2040	Forecast	nan	84997504	343633442258	85332872
24	2045	Forecast	nan	107163599	7499288316532	107718162
29	2050	Forecast	nan	129329694	163660803456487	130158251

This summary shows the projected values at 5-year intervals, making it easier to see the long-term trends.

Key Observations

The Linear and Polynomial models show similar, conservative growth patterns

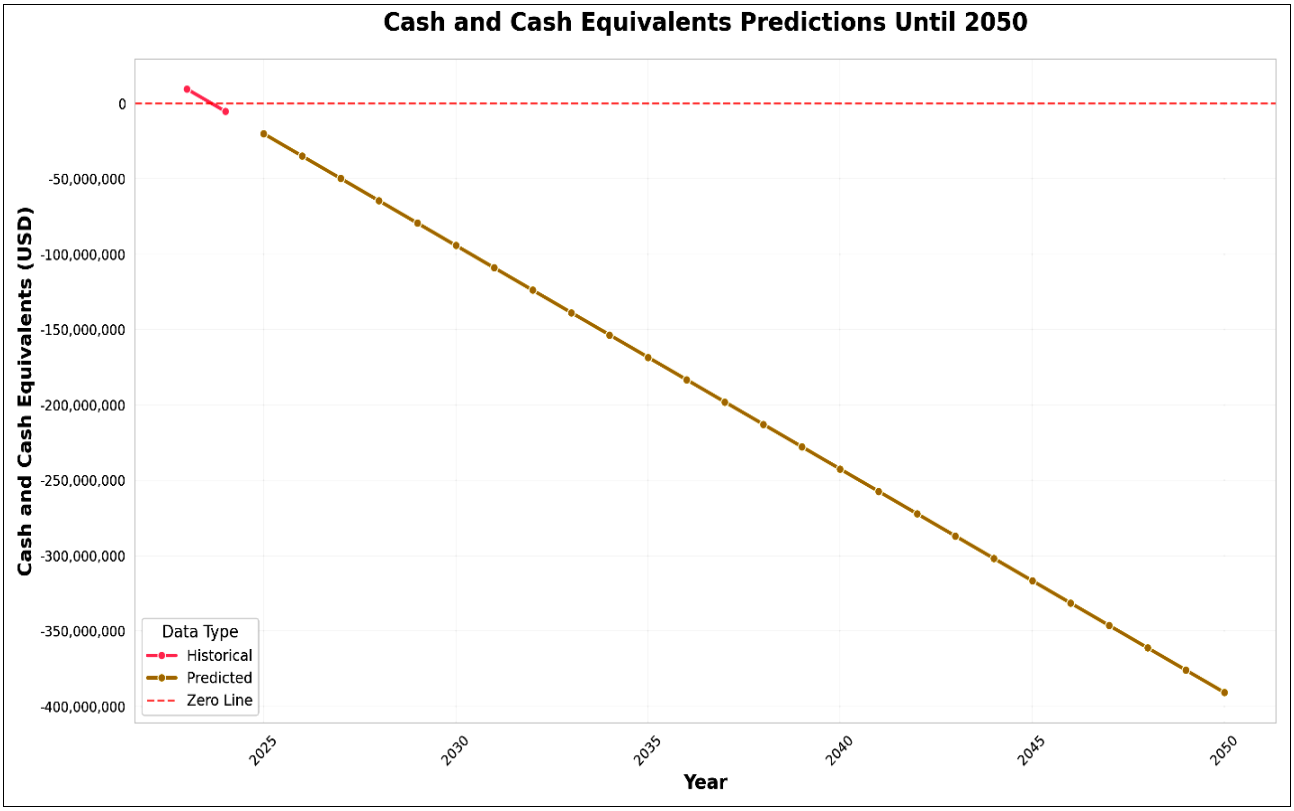
The Exponential model shows extreme growth (85.26% annually), reaching over 163 trillion by 2050

For most business planning purposes, the Linear or Polynomial forecasts are more realistic

Python Seaborn library

Analysis Summary: The document contains cash flow data showing Cash and Cash Equivalents for two historical years (2023 and 2024). Using linear regression, I've projected these values through 2050.

Visualization



The chart shows a concerning downward trend. Starting from a positive $9.6 million in 2023, the cash position dropped to -$5.2 million in 2024, and the linear model predicts this negative trend will continue.

Key Predictions at 5-Year Intervals.

Year Cash and Cash Equivalents: Type

2023: $9,632,781 Historical

2024: -$5,199,562 Historical

2025: -$20,031,905 Predicted

2030: -$94,193,620 Predicted

2035: -$168,355,335 Predicted

2040: -$242,517,050 Predicted

2045: -$316,678,765 Predicted

2050: -$390,840,480 Predicted

Important Notes

The model shows increasingly negative cash positions, reaching approximately -$390.8 million by 2050

This is based on a simple linear trend from only 2 data points, so actual results will likely vary significantly

The sharp decline from 2023 to 2024 drives this pessimistic forecast

In reality, companies would take corrective actions long before reaching such extreme negative positions

Complete Data Export

1	Year	ash Equiva	Data Type
2	2023	$9,632,78	Historical
3	2024	-$5,199,56	Historical
4	2025	-$20,031,9	Predicted
5	2026	-$34,864,2	Predicted
6	2027	-$49,696,5	Predicted
7	2028	-$64,528,9	Predicted
8	2029	-$79,361,2	Predicted
9	2030	-$94,193,6	Predicted
10	2031	-$109,025,	Predicted
11	2032	-$123,858,	Predicted
12	2033	-$138,690,	Predicted
13	2034	-$153,522,	Predicted
14	2035	-$168,355,	Predicted
15	2036	-$183,187,	Predicted
16	2037	-$198,020,	Predicted
17	2038	-$212,852,	Predicted
18	2039	-$227,684,	Predicted
19	2040	-$242,517,	Predicted
20	2041	-$257,349,	Predicted
21	2042	-$272,181,	Predicted
22	2043	-$287,014,	Predicted
23	2044	-$301,846,	Predicted
24	2045	-$316,678,	Predicted
25	2046	-$331,511,	Predicted
26	2047	-$346,343,	Predicted
27	2048	-$361,175,	Predicted
28	2049	-$376,008,	Predicted
29	2050	-$390,840,	Predicted

Styled Table Visualization

Cash and Cash Equivalents Predictions: 2023-2050
(Using Python Seaborn Library)

Year	Cash and Cash Equivalents (USD)	Data Type
2023	$9,632,781.00	Historical
2024	-$5,199,562.00	Historical
2025	-$20,031,905.00	Predicted
2026	-$34,864,248.00	Predicted
2027	-$49,696,591.00	Predicted
2028	-$64,528,934.00	Predicted
2029	-$79,361,277.00	Predicted
2030	-$94,193,620.00	Predicted
2031	-$109,025,963.00	Predicted
2032	-$123,858,306.00	Predicted
2033	-$138,690,649.00	Predicted
2034	-$153,522,992.00	Predicted
2035	-$168,355,335.00	Predicted
2036	-$183,187,678.00	Predicted
2037	-$198,020,021.00	Predicted
2038	-$212,852,364.00	Predicted
2039	-$227,684,707.00	Predicted
2040	-$242,517,050.00	Predicted
2041	-$257,349,393.00	Predicted
2042	-$272,181,736.00	Predicted
2043	-$287,014,079.00	Predicted
2044	-$301,846,422.00	Predicted
2045	-$316,678,765.00	Predicted
2046	-$331,511,108.00	Predicted
2047	-$346,343,451.00	Predicted
2048	-$361,175,794.00	Predicted
2049	-$376,008,137.00	Predicted
2050	-$390,840,480.00	Predicted

The table shows
2 Historical data points (2023-2024) highlighted in green
26 Predicted years (2025-2050) shown in light blue
All values formatted in USD with proper currency notation

Key Insights
Starting position: $9,632,781.00 (2023)
Current position: -$5,199,562.00 (2024)
Final prediction: -$390,840,480.00 (2050)
Annual decline rate: Approximately $14.8 million per year

Note.
Matplotlib provides a virtual reality, while Seaborn provides real-world predictions based on the data.

Conclusions
As shown in Table 1, the cash flow in billions of Iraqi dinars, based on the Matplotlib analysis, shows a downward trend in performance from 17.7 billion Iraqi dinars to 3.0 billion Iraqi dinars in 2023. The net profit for 2024 is projected to grow to 1.8 billion Iraqi dinars, reflecting the net localization of activities in some years (-19.5 billion Iraqi dinars). Meanwhile, the net investment cooperation of investment activities increased significantly between 2023 and 2024, rising by 22.8 billion Iraqi dinars, while the second half of the year saw a decrease of 0.7 billion Iraqi dinars, indicating a future trend towards decline. The projected operating profit for 2050 is 16.7 billion Iraqi dinars, and the expected operating profit for 2050 is -9.3

billion Iraqi dinars. The table also shows continued strong and substantial net cooperation for investment activities, projected to reach 2050. 634.6 billion dinars, operating profits for the two years, 2050-2024, for the first year with an annual decrease estimated at approximately 430 thousand Iraqi dinars, which is -9.3, while for the second year 2024, 1.8 million dinars, and here is half of the net profit for November 2050, but Francisco Investment in 2050 is 23.6 million Iraqi dinars. While Seaborn Library projected a net annual profit of 30.3 million Iraqi dinars for 2024, rising to 385.3 million by 2050, net operating cash flow is projected to decrease from 657.1 million dinars in 2024 (-26.7) to -214.8 million by 2050. Operating profit for 2050 is projected to be -9.8 million Iraqi dinars.

Table 2 shows that financing activity, after the implementation of the Seaborn Library model for 2050, is projected to increase annually by 4.43 million Iraqi dinars, reaching 129.3 million Iraqi dinars. However, the exponential model reveals a massive growth of 85.26% annually, reaching over 163 trillion Iraqi dinars by 2050. Applying the Seaborn Library model to the financing activity variable results in a projected value of US$390,840,480 by 2050. The model shows increasingly negative cash positions, reaching -US$390.8 million by 2050, representing an annual decrease of approximately US$14.8 million.

References

1. Barakat A. The phenomenon of money laundering and its economic and social effects at the global level. North Africa Journal. 2017;(4):216–232.
2. Chaikin D. How effective are systems for reporting suspicious transactions? Anti-Money Laundering Diaries. 2009;12:253–283.
3. Kovolo F. The EU's response to the misuse of cryptocurrencies: the fifth generation, which is obsolete. 2020.
4. Anti-money laundering mandate. European Crime Diaries. In: Criminal Law and Criminal Justice. 2019;28:52–217.
5. Kristin J. Money laundering: thought processes, strategies, influence, and countermeasures. In: Organized Crime: Studies on the Global Challenge to Majority Rule. Political Science. 2013;17:17–33.
6. Dimitriadis B, Radosveta F. Money laundering and central bank governance within the European Union. Global Financial Law Diaries. 2020;23:33–509.
7. Dobrovolsky Z, Lucas S. Developing a workable model for anti-money laundering within the Common National Development Goals. Sustainability. 2019;12:244.
8. Ferroirda J, Alexander FS, Brigitte U, Gietzner M. Assessing cash laundering flows through a gravity-based model re-enactment. Logical Report. 2020;10:1–11.
9. Reda M, Zan Q, Sana R. The cash component in money laundering and financial misconduct: a case study. Financial Misconduct Diaries. 2020;27:31–911.
10. Szetila B, Grzegorz M, Yuri B, Ursula M. The relationship between skewness and trading volume in the Bitcoin market. Eurasian Financial Survey. 2021;11:25–42.
11. Rose KJ. The simple exit control issue: the EU's approach to money laundering. Money Laundering Control Diaries. 2019;22:76–166.