

A1: INDIVIDUAL Final Assessment // Extracting using SQL and Loading into Data Viz

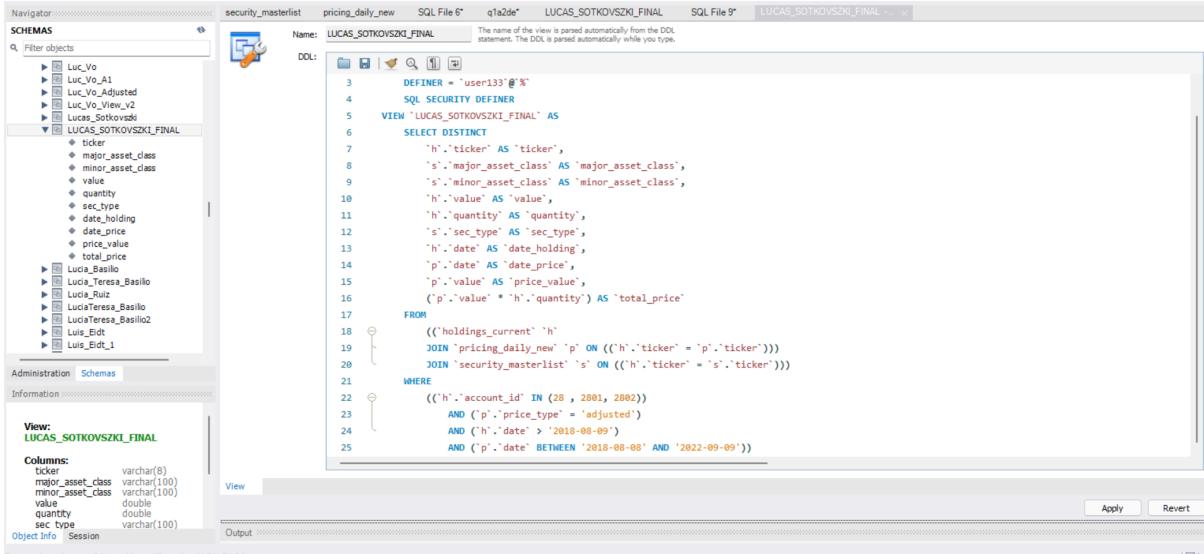
Lucas Sotkovszki | 15 December 2024

PART 1

First, I had to create a view with all the necessary information about my client. In order to have the minimum number of join tables possible and make the query faster, I searched for all the different accounts that my client Paul Bistre had and added it to the filter. To finish out what account_ids were from my client, figured out that his accounts_id are 28, 2801, and 2802 with this formula:

```
SELECT account_id FROM account_dim WHERE client_id = 148;
```

Once I know his different accounts, I start by selecting all the necessary information to make the analysis. For the filter, I first filtered only the accounts from my client. Then, I selected only the adjusted price_types. Lastly, I filtered the holdings and price dates up to 2018 to have enough historical data for my analysis.



```
Name: LUCAS_SOTKOVSKIZ_FINAL
The name of the view is parsed automatically from the DDL statement. The DDL is parsed automatically while you type.

DDL:
3  DEFINER = 'user133'@'%'
4  SQL SECURITY DEFINER
5  VIEW `LUCAS_SOTKOVSKIZ_FINAL` AS
6  SELECT DISTINCT
7      `h`.`ticker` AS `ticker`,
8      `s`.`major_asset_class` AS `major_asset_class`,
9      `s`.`minor_asset_class` AS `minor_asset_class`,
10     `h`.`value` AS `value`,
11     `h`.`quantity` AS `quantity`,
12     `s`.`sec_type` AS `sec_type`,
13     `h`.`date` AS `date_holding`,
14     `p`.`date` AS `date_price`,
15     `p`.`value` AS `price_value`,
16     (`p`.`value` * `h`.`quantity`) AS `total_price`
17
18  FROM
19      ((`holdings_current` `h`
20      JOIN `pricing_daily_new` `p` ON ((`h`.`ticker` = `p`.`ticker`)))
21      JOIN `security_masterlist` `s` ON ((`h`.`ticker` = `s`.`ticker`)))
22
23  WHERE
24      ((`h`.`account_id` IN (28, 2801, 2802))
25      AND (`p`.`price_type` = 'adjusted')
26      AND (`h`.`date` > '2018-08-09')
27      AND (`p`.`date` BETWEEN '2018-08-08' AND '2022-09-09'))
```

1. Using data for your client tickers from the VIEW you created in Step2 : what is the most recent 12 months, 18 months, 24 months return for each of the securities (and for the entire portfolio)?

12 months:

First, I created a subquery from where the main query will take the information. I want to get the price for the last 252 days, which is 1 trading year, so I used the LAG function named it P0, and filtered with enough data so the LAG function can work. After that, I took the price value and substracted P0, and also divided by P0 so I could get the Ror, and multiplied by 100 since it is a rate. Since I want to get the ROR for 12 months, I filtered so the date_price would only return for the last year. Lastly, I filtered out the null values for ROR.

The screenshot shows a SQL database interface with a query editor and a results grid. The query editor contains the following SQL code:

```

1 -- Q1
2 • SELECT
3     z.ticker, z.date_price, z.price_value, z.p0,
4     (z.price_value - z.p0) / z.p0 * 100 AS ror_12_months
5     FROM (
6         SELECT
7             *,
8             LAG(price_value, 252) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
9         FROM LUCAS_SOTKOVSKY_FINAL
10        WHERE date_price >= '2018-09-09'
11    ) z
12    WHERE date_price >= '2021-09-09'
13    GROUP BY z.ticker
14    having ror_12_months is not null;
15
16 • SELECT
17     z.ticker, z.date_price, z.price_value, z.p0,
18     (z.price_value - z.p0) / z.p0 * 100 AS ror_18_months

```

The results grid displays the following data:

ticker	date_price	price_value	p0	ror_12_months
AAAU	2021-09-09	17.870001	19.42	-7.981457260556144
ACN	2021-09-09	337.005096	232.939987	44.674643602517236
ARB	2021-09-09	25.801001	24.705336	4.434932599176148
Luis_Eidt	2021-09-09	157.550457	161.281275	55.6202260247275

Below the results grid, the message pane shows:

Action Output
Time Action Message
241 00:35:54 SELECT ticker, AVG(ror) AS avg_daily_return, STDEV(ror) AS sigma FROM (SELECT z.ticker, ... 5 row(s) returned

Duration / Fetch
115.485 sec / 0.000 sec

18 months:

Secondly, similar to the 12 months I just had to change the number of days in the LAG function that I calculated to be 378, and then in the last filter, I had to make sure it returned the last 18 months.

The screenshot shows the Oracle SQL Developer interface with the following details:

- Schemas:** The schema tree on the left shows various tables and views, including **LUCAS_SOTKOVSKIZI_FINAL**.
- Query Editor:** The main window contains a complex SQL query for calculating ROR over 18 months. The code includes a LAG function with a partition by ticker and order by date_price, and a having clause to filter for non-null values.
- Result Grid:** The results show data for several tickers (AAAU, ACN, AXP) with their respective dates, prices, and calculated ROR values.
- Action Output:** The bottom pane shows the execution log with two entries: one for the SELECT statement and another for the final query.

```

SELECT
    z.ticker, z.date_price, z.price_value, z.p0,
    (z.price_value - z.p0) / z.p0 * 100 AS ror_18_months
FROM (
    SELECT
        *
        ,LAG(price_value, 378) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
) z
WHERE z.date_price >= '2021-03-09'
GROUP BY z.ticker
having ror_18_months is not null;

```

24 months: Lastly, similar to the 12 and 24 months I just had to change the number of days in the LAG function that I calculated to be 504, 2 years, and then in the last filter, I had to make sure it returned the last 24 months

The screenshot shows the Oracle SQL Developer interface with the following details:

- Schemas:** The schema tree on the left shows various tables and views, including **LUCAS_SOTKOVSKIZI_FINAL**.
- Query Editor:** The main window contains a complex SQL query for calculating ROR over 24 months. The code includes a LAG function with a partition by ticker and order by date_price, and a having clause to filter for non-null values.
- Result Grid:** The results show data for several tickers (GLD, HDG, MJ, RINF) with their respective dates, prices, and calculated ROR values.
- Action Output:** The bottom pane shows the execution log with two entries: one for the SELECT statement and another for the final query.

```

SELECT
    z.ticker, z.date_price, z.price_value, z.p0,
    (z.price_value - z.p0) / z.p0 * 100 AS ror_24_months
FROM (
    SELECT
        *
        ,LAG(price_value, 504) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
) z
WHERE z.date_price >= '2020-09-09'
GROUP BY z.ticker
having ror_24_months is not null;

```

Based on this historical data, I would recommend Paul Bistre to check those tickers whose ROR is performing poorly and start considering selling them, like MJ which has an ROR of -51.77 in the last 24 months, or BTAL with ROR for the last 12 months -26.52%. At the same time, he should start

buying more assets from GLD whose ROR in the last 24 months was 30.58% or CNBS in the last 12 months got a ROR of 71.64%.

In terms of his whole portfolio, my client got an average of 4.27% ROR for the last 12 months, 14.56% ROR for the last 18 months, and an average of 18.46% ROR for the last 24 months. For this code, I decided to do an average of the ror for the different 12, 28, and 24 months.

The image consists of three vertically stacked screenshots of a database management system (DBMS) interface, likely MySQL Workbench. Each screenshot shows a Navigator pane on the left with a tree view of schemas, tables, and columns, and a central SQL editor pane with a query and its results.

Screenshot 1 (Top): The SQL query calculates the average 12-month return (ror_12_months) for the period from 2018-09-09 to 2021-09-09. The result is 4.274876005595712.

```

SELECT
    AVG((z.price_value - z.p0) / z.p0 * 100) AS ror_12_months
FROM (
    SELECT
        *,
        LAG(price_value, 252) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
) z
WHERE z.date_price >= '2021-09-09'
having ror_12_months is not null
;
SELECT
    AVG((z.price_value - z.p0) / z.p0 * 100)

```

Screenshot 2 (Middle): The SQL query calculates the average 28-month return (ror_28_months) for the period from 2018-09-09 to 2021-03-09. The result is 14.560449047118295.

```

WHERE z.date_price >= '2021-09-09'
having ror_12_months is not null
;

SELECT
    AVG((z.price_value - z.p0) / z.p0 * 100)
FROM (
    SELECT
        *,
        LAG(price_value, 378) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
) z
WHERE z.date_price >= '2021-03-09'
;

```

Screenshot 3 (Bottom): The SQL query calculates the average 24-month return (ror_24_months) for the period from 2018-09-09 to 2021-03-09. The result is 18.463510062116.

```

LAG(price_value, 378) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
) z
WHERE z.date_price >= '2021-03-09'
;

SELECT
    AVG((z.price_value - z.p0) / z.p0 * 100)
FROM (
    SELECT
        *,
        LAG(price_value, 504) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
    FROM LUCAS_SOTKOVSKIZI_FINAL
    WHERE date_price >= '2018-09-09'
)
```

2. What is the most recent 12months sigma (risk) for each of the securities? What is the average daily return for each of the securities?

For this code I used almost the same code for the subquery as question 1, modifying the LAG function so it would return the adjusted price for the the day before, so I could understand how much it varies. Once I have my daily adjusted price as ror, I took the average modification for each ticker to get the average ror and the st dev of each ticker as sigma, so I can understand the risk and volatility of each ticker.

The screenshot shows a database interface with a query editor and a results grid. The query editor displays a complex SQL script for calculating average daily returns and standard deviation for various tickers. The results grid shows the output for four tickers: AAAU, ACN, ARB, and AXP. The columns are 'ticker', 'avg_daily_return', and 'sigma'.

```

46 •   SELECT
47     ticker,
48     AVG(r.ror) AS avg_daily_return, -- Average daily return for the past 12 months
49     STDEV(r.ror) AS sigma -- Standard deviation (risk) of daily returns for the past 12 months
50
51   FROM
52     (SELECT z.ticker,
53      z.date_price,
54      (z.price_value - z.p0) / z.p0 AS ror -- Daily rate of return
55    FROM
56      (SELECT ticker,
57        date_price,
58        price_value,
59        LAG(price_value, 1) OVER (PARTITION BY ticker ORDER BY date_price) AS p0 -- Previous day's adjusted price
60        FROM invest.LUCAS_SOTKOVSKI_FINAL
61        WHERE date_price >= '2021-09-09' -- Filter for most recent 12 months
62      ) AS z
63    ) AS r
64    GROUP BY
65      ticker;
66

```

ticker	avg_daily_return	sigma
AAAU	-0.00015192048489862177	0.008569629290529944
ACN	-0.00041274645501056766	0.01873204376488717
ARB	0.0001880738250165901	0.03990094643374493
AXP	0.0002699062943706923	0.02220320298204183

Since the client is a moderate/aggressive investor, based on the data of the last 12 months, I would recommend him to buy those assets with high average daily returns and high 12-month RoR as risk is not a problem for him, such as UNG, PFIX, CNC, KMLM, and PANW. In addition, he should sell those assets with negative average daily returns, high risk, and negative 12-month RoR, such as MJ, CNBS, and CHTR.

3. Suggest adding a new investment to your portfolio - what would it be and how much risk (sigma) would it add to your client?

I would recommend the client add VWO (Vanguard FTSE Emerging Markets ETF). Emerging markets offer the potential for high growth, aligning with an aggressive investment strategy. VWO provides diversified exposure to emerging markets, mitigating some of the risks associated with individual stocks, and It has a low expense ratio, making it a cost-effective investment. VWO's sigma (risk) is moderate to high, reflecting the volatility of emerging markets, however, this aligns with Paul Bistre's existing portfolio, which already includes high-equity assets (Vanguard, 2024) (GeminiAI, 2024).

4. Calculate risk adjusted returns for each of your securities by following this formula: $\text{AVG}(\text{returns for ticker})/\text{STD}(\text{returns for ticker})$. Which of the securities is best from the rest (with highest risk adjusted returns), why?

For this code, I reused the code for question 2 adding the risk-adjusted average daily return.

```

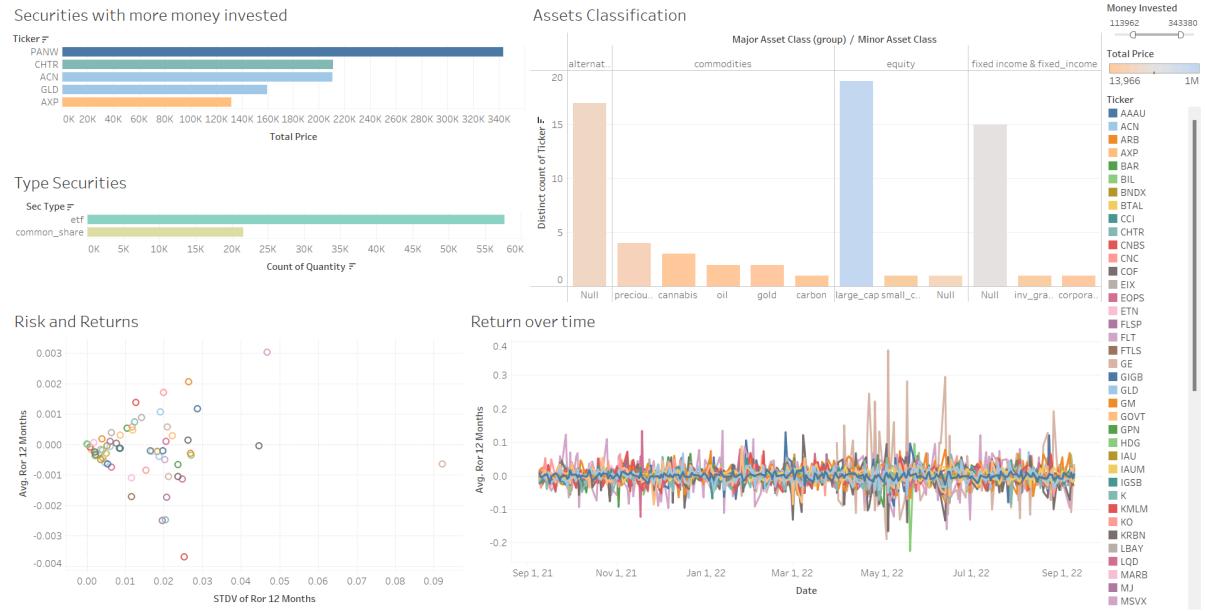
security_masterlist pricing_daily_new SQL File 6* q1a2de* LUCAS_SOTKOVSK1_FINAL SQL File 9* LUCAS_SOTKOVSK1_FINAL -.
90 -- Q4
91 • SELECT
92   ticker,
93   AVG(r.ror) AS avg_daily_return,
94   STDEV(r.ror) AS sigma,
95   AVG(r.ror)/STDEV(r.ror) AS adjusted_risk
96
97   FROM
98   (SELECT z.ticker, (z.price_value - z.p0) / z.p0 AS ror
99    FROM (SELECT *, LAG(price_value, 1) OVER (PARTITION BY ticker ORDER BY date_price) AS p0
100      FROM invest.LUCAS_SOTKOVSK1_FINAL
101      WHERE date_price >= '2020-09-09'
102    ) AS z
103  ) AS r
104  GROUP BY
105    ticker;

```

ticker	avg_daily_return	sigma	adjusted_risk
AAAU	-0.0002190723983932659	0.00895964294593209	-0.24451018831362074
ACN	0.0005714443052338082	0.01628831755694171	0.03508307737960767
ARB	0.0001815276513142471	0.0032751930040639432	0.05542502414025767
APX	0.0011273906281048505	0.02204801767040625	0.051133423646429685
BAR	-0.0002194985216039529	0.00897630094848875	-0.24453117574568833
BIL	0.000006189463866226839	0.0010415221919979804	0.05942709539729942
BNDX	-0.00024581809196844205	0.002905341512378891	-0.08460901788002417
BTAL	-0.0003254258523659648	0.0118406024837713	-0.02747818938188365

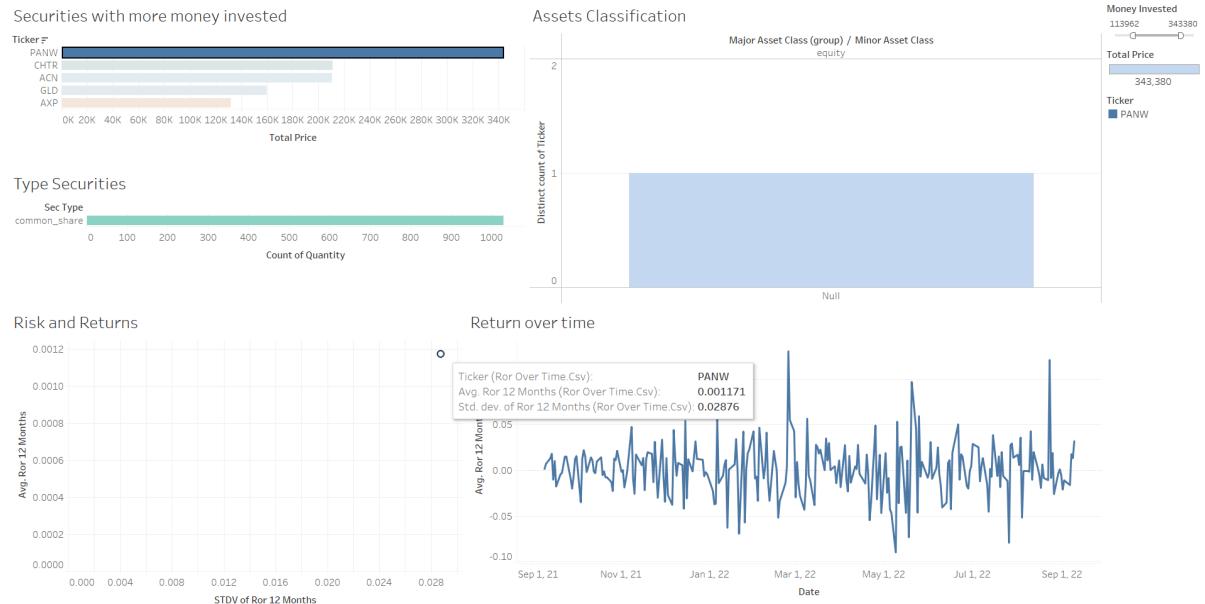
The best security is KMLM since it has the highest risk-adjusted return at 0.0915. From our data, we can say that KMLM offers the best balance between return and risk compared to the other securities, in other words, the higher value indicates a better return per unit of risk, making KMLM the most efficient choice in that area.

PART 2



Paul Bistre's investment portfolio shows a diversified approach with a strategic allocation across various asset classes. While a significant portion of the portfolio is invested in equity securities, indicating a growth-oriented strategy, the presence of a substantial fixed-income component and a smaller allocation to alternative investments suggests a balanced approach between risk and moderation.

The top three securities that he has more money invested in are PANW with 343,380, CHTR with 211,073, and ACN with 210,358. This demonstrates that he has a diversified portfolio and likes to spread his risks among different industries since PANW is a cybersecurity company, ACN is a Marketing company and CHTR is a telecommunications security.

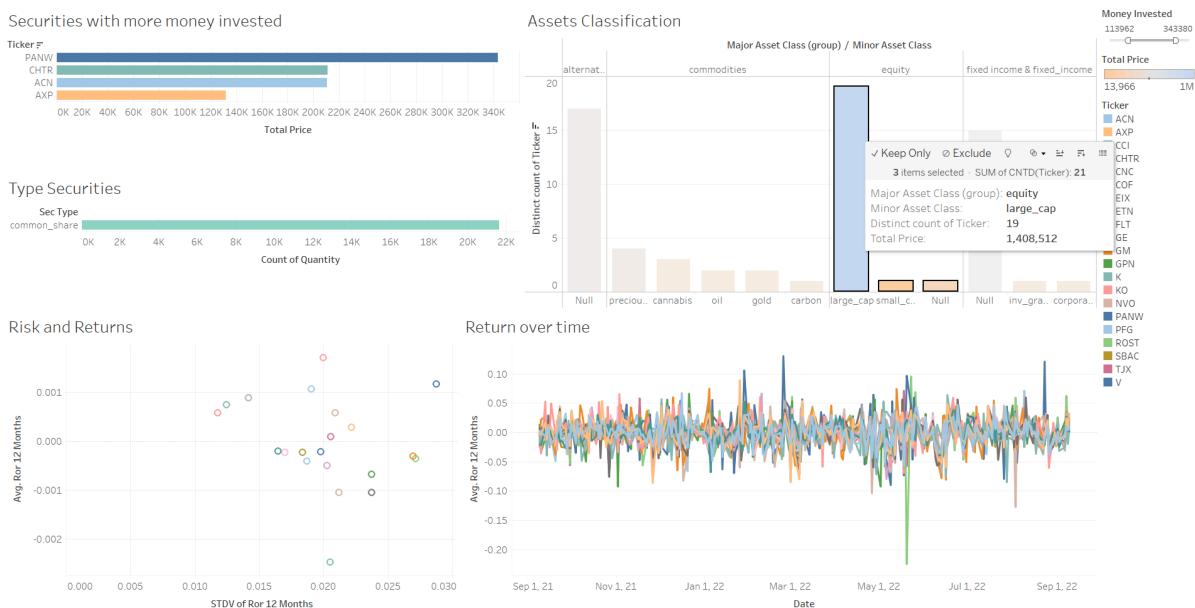


Since those are the securities he has more money invested in, it is important that he keeps periodic reviews about potential emerging trends in these industries. This will be crucial in assessing the long-term viability of these holdings and identifying potential opportunities or threats.

Paul Bistre has 57,680 securities in ETFs, and 21,630 securities in Common shares. The preference for ETFs over individual common shares indicates that Paul Bistre prioritizes diversification and risk mitigation, which are characteristics of a moderate investor.



This graph shows the asset classification, we can find from this graph that there are 19 distinct securities with a total investment of \$1,408,512 in large_cap equities. In fixed income, there are 17 different securities that has a value of approximately \$800,00. There are 17 distinct securities in alternatives with a total investment of \$409,14. Finally, for commodities he has invested in 12 different securities in industries like cannabis, gold, oil, carbon, or precious metals.



Within each major asset class, the portfolio is further diversified like equities that include both large-cap and small-cap stocks, or fixed incomes, which include corporate bonds and inv_grade_corp bonds.

After analyzing this the client's portfolio supports my previous argument that his portfolio is diversified, however, the significant allocation to equity securities may suggest the opposite, and that my client is an aggressive investor. This diversified allocation across asset classes suggests a balanced and risk-aware investment strategy. Therefore, I would classify my client as a moderate to aggressive investor since while he still holds a significant portion of his portfolio in equities, the choice of ETFs suggests being also moderate.

Paul should consider exploring the idea of diversifying the portion to commodities and of large-cap stocks into small-cap stocks, this can potentially increase his chances of return even if it meant to increase the risk too. Since most of his securities are in large-cap equities, he should keep updated on the different market trends to minimize threats from his securities and explore those small caps to find opportunities for new investments.



This Return over 12 months graph illustrates the dynamic performance of Paul Bistre's investments. While most securities exhibit semi-stationary behavior with fluctuating returns around a mean, certain assets like MARB and BIL demonstrate a more stationary pattern. This contrasts with assets like SVIX or UVIX which show a much wider range, indicating more significant fluctuations. This mix of semi-stationary and mostly stationary assets suggests a portfolio that balances moderation and aggression in its investment strategy.



While Paul Bistre has an aggressive/moderate risk tolerance, the extreme volatility of SVIX and UIVIX could introduce more risk than he's comfortable with. CNC, with its more stable performance, likely contributes to mitigating overall portfolio volatility.

Recommend a thorough evaluation of UIVIX and SVIX, considering their long-term growth prospects and risk-adjusted returns. If these assets are deemed too risky or inefficient, consider reducing their allocation. Explore increasing exposure to assets like CNC or KMLM or other stable assets to decrease the overall portfolio volatility while still aiming for a high return

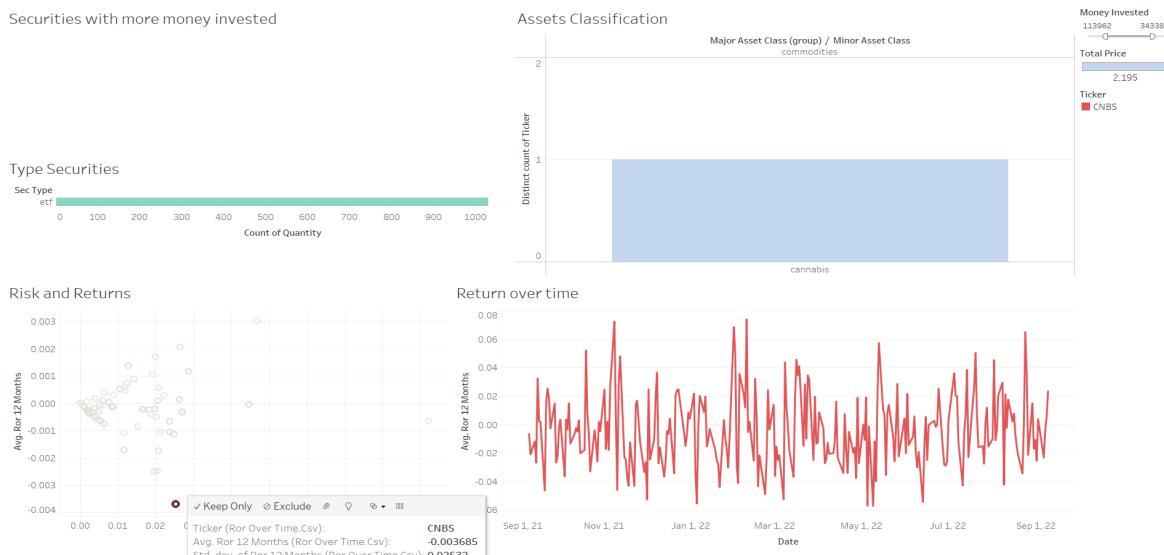


Most assets in the portfolio fall within a standard deviation range of 0.001 to 0.02 and an average return range of 0.005 to 0.007. Knowing the center of the distribution we can now access the outliers and analyze them. The first outlier identified is UVIX with an average ror of -0.000642, which I named P1. The second main outlier identified is CNBS which has a sigma (risk) of 0.02532, and an average rate of return of -0.03685, which I named as P2. As P3 I classified UNG, who is another identified outlier with an average rate of return of 0.00301616 and a risk of 0.0468023. In addition, I add to P3 which has an average rate of return of 0.00204423 and a risk of 0.0264998

P1



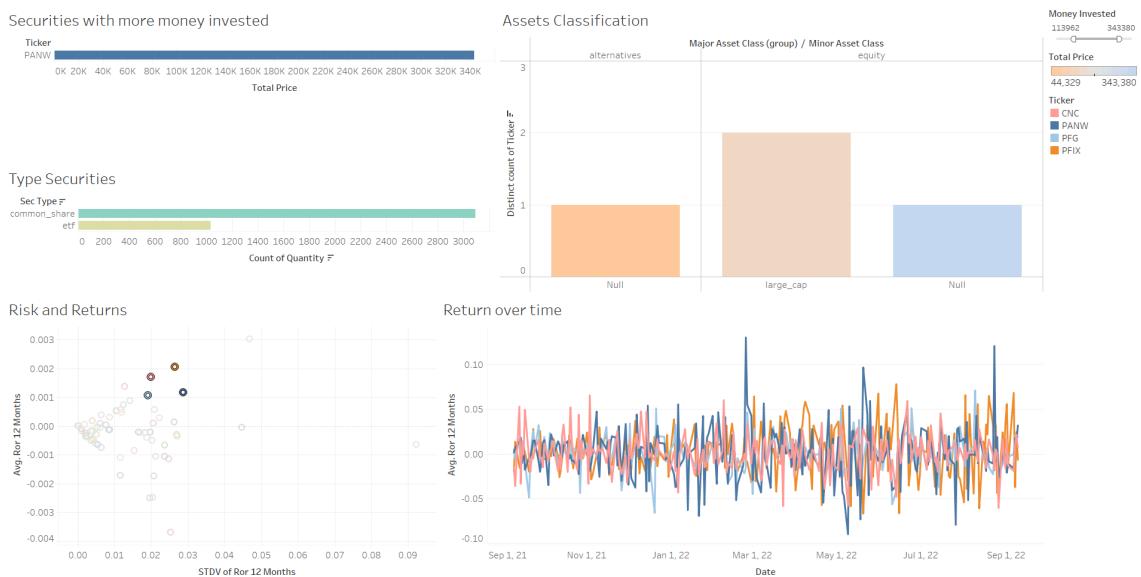
P2



P3



The analysis of Paul Bistre's portfolio reveals a generally well-structured investment strategy with most assets demonstrating a moderate level of risk and a reasonable return range, aligning with his aggressive/moderate investor profile. P2 shows a lower-than-expected average return despite its low risk, and P1 even being high risk is not performing as expected, those two show problematic investments. P3 shows an appealing average ror, specifically UNG, despite the risk included it is looking like a good investment. In addition to outliers, other securities worth noticing for their positive performance are KMLC, CNC, and PANW, which with an average risk is achieving a higher average rate of return. Furthermore, other securities worth noticing for the opposite reason are TOKE and CHTR, which have an average risk, but their average ror is way above the expected.



As a recommendation, Paul Bistre should start considering selling P1 and P2 and buy more P3. P1 supposes too much risk for not a sufficient rate of return, adding from the average rate of return over time, we can also see how volatile that security is, so my recommendation would be to wait until its rate of return increases again and sell it. For P2, I would recommend selling as the risk is too high for the negative return that it is given. Instead, the client should focus more on buying P3, despite the risk of the securities their returns are really appealing and match the client's aggressive characteristics.

Additional considerations would be to allocate more to securities with a moderate risk but a higher average ror like KMLC, CNC, and PANW, and start considering selling securities like TOKE and CHTR.



References

Gemini. (2024, December 15). Google. <https://gemini.google.com/app/d847a7688f3ee1ee>

VWO-Vanguard FTSE Emerging Markets ETF | Vanguard. (2024). Vanguard.com.
<https://investor.vanguard.com/investment-products/etfs/profile/vwo>