Portfolio Risk Diagnostic Report

Paul Bistre: Risk analysis, business insights and recommendations

Regina Garfias

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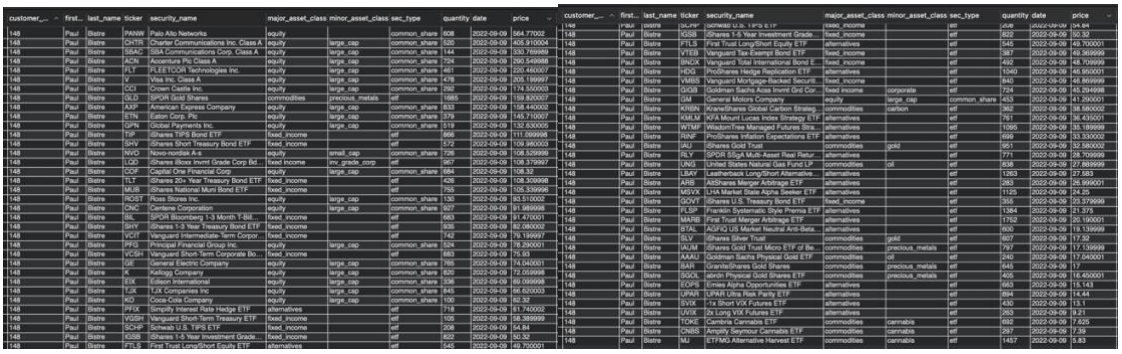
Identification of the client and his Portafolio Standing

To better understand the client, Paul Bistre customer #148, I extracted the relevant information from the dataset; that being ticker, security name, major & minor asset class, security type, quantity, date and price. With this and having all the required relationships between tables I was able to have an overall look at the client's portfolio as seen below.

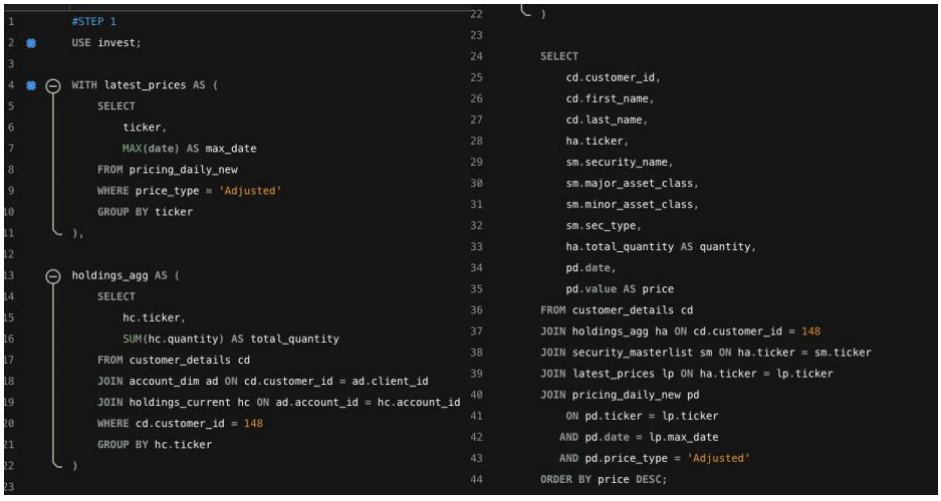
Results:



customer_...	first...	last_name	ticker	security_name	major_asset_class	minor_asset_class	sec_type	quantity	date	price
148	Paul	Bistre	PANW	Palo Alto Networks	equity		common_share	608	2022-09-09	564.77002
148	Paul	Bistre	CHTR	Charter Communications Inc. Class A	equity	large_cap	common_share	520	2022-09-09	405.910004
148	Paul	Bistre	SBAC	SBA Communications Corp. Class A	equity	large_cap	common_share	144	2022-09-09	330.766998
148	Paul	Bistre	ACN	Accenture Plc Class A	equity	large_cap	common_share	724	2022-09-09	290.549988
148	Paul	Bistre	FLT	FLEETCOR Technologies Inc.	equity	large_cap	common_share	461	2022-09-09	220.460007
148	Paul	Bistre	V	Visa Inc. Class A	equity	large_cap	common_share	1097	2022-09-09	200.199997
148	Paul	Bistre	CCI	Crown Castle Inc.	equity	large_cap	common_share	292	2022-09-09	174.550003
148	Paul	Bistre	GLD	SPDR Gold Shares	commodities	precious_metals	etf	1685	2022-09-09	159.820007
148	Paul	Bistre	AXP	American Express Company	equity	large_cap	common_share	833	2022-09-09	158.440002
148	Paul	Bistre	ETN	Eaton Corp. Plc	equity	large_cap	common_share	979	2022-09-09	145.710007
148	Paul	Bistre	GPN	Global Payments Inc.	equity	large_cap	common_share	519	2022-09-09	132.630005
148	Paul	Bistre	TIP	iShares TIPS Bond ETF	fixed_income		etf	666	2022-09-09	111.099998
148	Paul	Bistre	SHV	iShares Short Treasury Bond ETF	fixed_income		etf	572	2022-09-09	109.980003
148	Paul	Bistre	NVO	Novo-nordisk A-s	equity	small_cap	common_share	726	2022-09-09	108.529999
148	Paul	Bistre	LQD	iShares iBoxx Invmt Grade Corp Bd...	fixed_income	mv_grade_corp	etf	967	2022-09-09	108.379997
148	Paul	Bistre	COF	Capital One Financial Corp	equity	large_cap	common_share	684	2022-09-09	108.32
148	Paul	Bistre	TLT	iShares 20+ Year Treasury Bond ETF	fixed_income		etf	426	2022-09-09	108.309998
148	Paul	Bistre	MUB	iShares National Muni Bond ETF	fixed_income		etf	755	2022-09-09	105.339996
148	Paul	Bistre	ROST	Ross Stores Inc.	equity	large_cap	common_share	130	2022-09-09	93.510002
148	Paul	Bistre	CNC	Centene Corporation	equity	large_cap	common_share	927	2022-09-09	91.989998
148	Paul	Bistre	SIL	SPDR Bloomberg 1-3 Month T-Bill...	fixed_income		etf	683	2022-09-09	91.470001
148	Paul	Bistre	SHY	iShares 1-3 Year Treasury Bond ETF	fixed_income		etf	935	2022-09-09	82.080002
148	Paul	Bistre	VCIT	Vanguard Intermediate-Term Corpor...	fixed_income		etf	742	2022-09-09	79.199997
148	Paul	Bistre	PFG	Principal Financial Group Inc.	equity	large_cap	common_share	524	2022-09-09	76.290001
148	Paul	Bistre	VCSH	Vanguard Short-Term Corporate Bo...	fixed_income		etf	883	2022-09-09	75.93
148	Paul	Bistre	GE	General Electric Company	equity	large_cap	common_share	765	2022-09-09	74.040001
148	Paul	Bistre	K	Kellogg Company	equity	large_cap	common_share	825	2022-09-09	72.059998
148	Paul	Bistre	EIX	Edison International	equity	large_cap	common_share	536	2022-09-09	69.099998
148	Paul	Bistre	TJX	TJX Companies Inc	equity	large_cap	common_share	845	2022-09-09	66.620003
148	Paul	Bistre	KO	Coca-Cola Company	equity	large_cap	common_share	1100	2022-09-09	62.32
148	Paul	Bistre	PFIX	Simplify Interest Rate Hedge ETF	alternatives		etf	718	2022-09-09	61.740002
148	Paul	Bistre	VGSH	Vanguard Short-Term Treasury ETF	fixed_income		etf	106	2022-09-09	58.389999
148	Paul	Bistre	SCHP	Schwab U.S. TIPS ETF	fixed_income		etf	208	2022-09-09	54.84
148	Paul	Bistre	IGSB	iShares 1-5 Year Investment Grade...	fixed_income		etf	822	2022-09-09	50.32
148	Paul	Bistre	FTLS	First Trust Long/Short Equity ETF	alternatives		etf	545	2022-09-09	49.700001

customer_...	first...	last_name	ticker	security_name	major_asset_class	minor_asset_class	sec_type	quantity	date	price
148	Paul	Bistre	SCHP	Schwab U.S. TIPS ETF	fixed_income		etf	208	2022-09-09	54.84
148	Paul	Bistre	IGSB	iShares 1-5 Year Investment Grade...	fixed_income		etf	822	2022-09-09	50.32
148	Paul	Bistre	FTLS	First Trust Long/Short Equity ETF	alternatives		etf	545	2022-09-09	49.700001
148	Paul	Bistre	YTEB	Vanguard Tax-Exempt Bond ETF	fixed_income		etf	387	2022-09-09	49.369999
148	Paul	Bistre	BNDX	Vanguard Total International Bond E...	fixed_income		etf	492	2022-09-09	48.709999
148	Paul	Bistre	HDG	ProShares Hedge Replication ETF	alternatives		etf	1040	2022-09-09	46.950001
148	Paul	Bistre	VMBS	Vanguard Mortgage-Backed Securit...	fixed_income		etf	840	2022-09-09	46.869999
148	Paul	Bistre	GSB	Goldman Sachs Access Invmt Grd Cor...	fixed income	corporate	etf	724	2022-09-09	45.594998
148	Paul	Bistre	GM	General Motors Company	equity	large_cap	common_share	453	2022-09-09	41.290001
148	Paul	Bistre	KRBN	KraneShares Global Carbon Strateg...	commodities	carbon	etf	362	2022-09-09	38.580002
148	Paul	Bistre	KMLM	KFA Mount Lucas Index Strategy ETF	alternatives		etf	761	2022-09-09	36.435001
148	Paul	Bistre	WTMF	WisdomTree Managed Futures Stra...	alternatives		etf	1095	2022-09-09	35.189999
148	Paul	Bistre	RINF	ProShares Inflation Expectations ETF	alternatives		etf	699	2022-09-09	33.330002
148	Paul	Bistre	IAU	iShares Gold Trust	commodities	gold	etf	961	2022-09-09	32.580002
148	Paul	Bistre	RLY	SPDR SSgA Multi-Asset Real Retur...	alternatives		etf	771	2022-09-09	28.709999
148	Paul	Bistre	UNG	United States Natural Gas Fund LP	commodities	oil	etf	836	2022-09-09	27.889999
148	Paul	Bistre	LBAY	Leatherback Long/Short Alternative...	alternatives		etf	1263	2022-09-09	27.583
148	Paul	Bistre	ARB	AltShares Merger Arbitrage ETF	alternatives		etf	283	2022-09-09	26.999001
148	Paul	Bistre	MSVX	LHA Market State Alpha Seeker ETF	alternatives		etf	1125	2022-09-09	24.25
148	Paul	Bistre	GOVT	iShares U.S. Treasury Bond ETF	fixed_income		etf	365	2022-09-09	23.379999
148	Paul	Bistre	FLSP	Franklin Systematic Style Premia ETF	alternatives		etf	1384	2022-09-09	21.375
148	Paul	Bistre	MARB	First Trust Merger Arbitrage ETF	alternatives		etf	1762	2022-09-09	20.190001
148	Paul	Bistre	STAL	AGFiQ US Market Neutral Anti-Beta...	alternatives		etf	600	2022-09-09	19.139999
148	Paul	Bistre	SLV	iShares Silver Trust	commodities	gold	etf	607	2022-09-09	17.32
148	Paul	Bistre	AUM	iShares Gold Trust Micro ETF of Be...	commodities	precious_metals	etf	797	2022-09-09	17.139999
148	Paul	Bistre	AAAU	Goldman Sachs Physical Gold ETF	commodities	oil	etf	240	2022-09-09	17.040001
148	Paul	Bistre	BAR	GraniteShares Gold Shares	commodities	precious_metals	etf	645	2022-09-09	17
148	Paul	Bistre	SGOL	abrdn Physical Gold Shares ETF	commodities	precious_metals	etf	435	2022-09-09	16.450001
148	Paul	Bistre	EOPS	Emles Alpha Opportunities ETF	alternatives		etf	663	2022-09-09	15.143
148	Paul	Bistre	UPAR	UPAR Ultra Risk Parity ETF	alternatives		etf	894	2022-09-09	14.44
148	Paul	Bistre	SVIX	-1x Short VIX Futures ETF	alternatives		etf	430	2022-09-09	13.1
148	Paul	Bistre	UVIX	2x Long VIX Futures ETF	alternatives		etf	293	2022-09-09	9.21
148	Paul	Bistre	TOKE	Cambria Cannabis ETF	commodities	cannabis	etf	692	2022-09-09	7.625
148	Paul	Bistre	CNBS	Amplify Seymour Cannabis ETF	commodities	cannabis	etf	297	2022-09-09	7.39
148	Paul	Bistre	MJ	ETFMG Alternative Harvest ETF	commodities	cannabis	etf	1457	2022-09-09	5.83

SQL used:



```sql
#STEP 1
USE invest;

WITH latest_prices AS (
    SELECT
        ticker,
        MAX(date) AS max_date
    FROM pricing_daily_new
    WHERE price_type = 'Adjusted'
    GROUP BY ticker
),

holdings_agg AS (
    SELECT
        hc.ticker,
        SUM(hc.quantity) AS total_quantity
    FROM customer_details cd
    JOIN account_dim ad ON cd.customer_id = ad.client_id
    JOIN holdings_current hc ON ad.account_id = hc.account_id
    WHERE cd.customer_id = 148
    GROUP BY hc.ticker
)

SELECT
    cd.customer_id,
    cd.first_name,
    cd.last_name,
    ha.ticker,
    sm.security_name,
    sm.major_asset_class,
    sm.minor_asset_class,
    sm.sec_type,
    ha.total_quantity AS quantity,
    pd.date,
    pd.value AS price
FROM customer_details cd
JOIN holdings_agg ha ON cd.customer_id = 148
JOIN security_masterlist sm ON ha.ticker = sm.ticker
JOIN latest_prices lp ON ha.ticker = lp.ticker
JOIN pricing_daily_new pd
    ON pd.ticker = lp.ticker
   AND pd.date = lp.max_date
   AND pd.price_type = 'Adjusted'
ORDER BY price DESC;
```

Creation of the client´s personalized view

After understanding the client´s portfolio I was able to proceed by creating a personalized view for Mr. Bistre. The view contains daily adjusted prices, the type of assets, the types of instruments, dates and the values of the securities. I also opted for cleaning the data by

“LOWER(REPLACE(sm.major_asset_class, ' ', '_')) AS major_asset_class,
LOWER(REPLACE(sm.minor_asset_class, ' ', '_')) AS minor_asset_class,”

so that when I reference the view it is not necessary to have to sum the fixed income values which are saved in two separate ways due to spelling.

SQL code:

```sql
CREATE VIEW invest.regina_garfias_clean AS
SELECT
    hc.ticker,
    sm.security_name,
    LOWER(REPLACE(sm.major_asset_class, ' ', '_')) AS major_asset_class,
    LOWER(REPLACE(sm.minor_asset_class, ' ', '_')) AS minor_asset_class,
    sm.sec_type,
    pd.date,
    pd.value AS price,
    hc.quantity
FROM customer_details cd
JOIN account_dim ad
    ON cd.customer_id = ad.client_id
JOIN holdings_current hc
    ON ad.account_id = hc.account_id
JOIN security_masterlist sm
    ON hc.ticker = sm.ticker
JOIN pricing_daily_new pd
    ON hc.ticker = pd.ticker
WHERE cd.customer_id = 148
  AND pd.price_type = 'Adjusted'
ORDER BY pd.date;
```

Performance Metrics, Risk & Portfolio structure

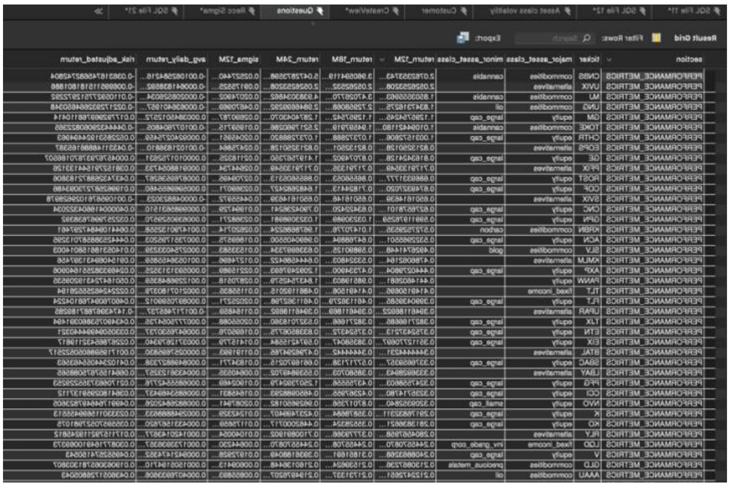
With a data-driven approach that was built from the SQL view as well as Tableau visualizations. The goal of this report is to evaluate performance, risk and overall portfolio positioning by integrating historical data with the client assets as of

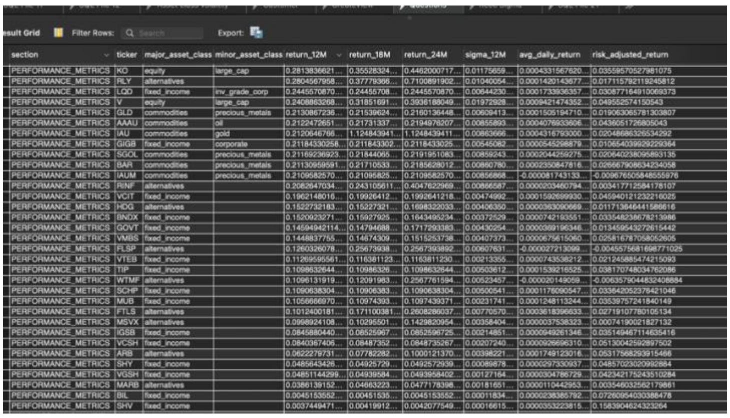
September 9th, 2022 - a period that was marked by elevated inflation, rapid interest-rate hikes and high volatility across global assets classes.

The process of analysing the data began with a calculation of the most recent 12, 18 and 24 month returns for every asset to better understand the performance and discover patterns over different cycles. Moreover, evaluating the yearly volatility (sigma) and average daily returns to map the portfolio risk profile. Providing additional investments recommendations that would improve diversification and risk efficiency considering the client's current assets and the impact of the market conditions of 2022. Finally, calculating the risk-adjusted returns and comparing them to identify which holdings can give the best return in relation to the volatility they incurred.

SQL Results:

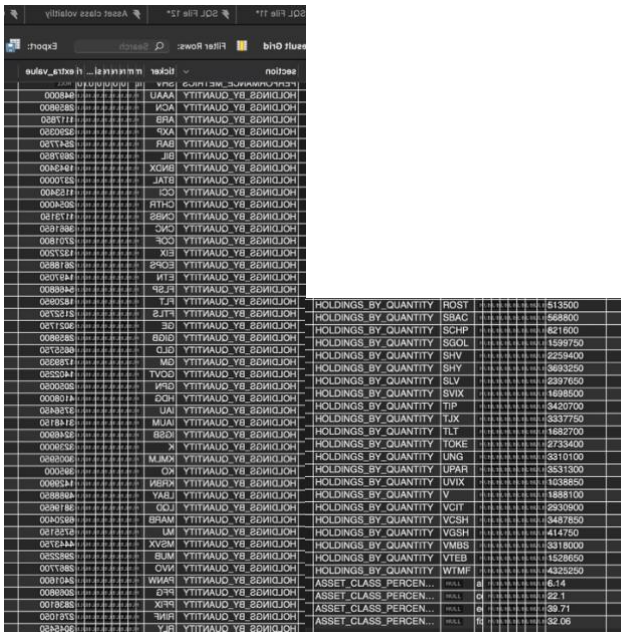
Return 12m,18m &24 m/ Sigma 12m / avg daily return/ risk adjusted return





section	ticker	major_asset_class	minor_asset_class	return_12M	return_18M	return_24M	sigma_12M	avg_daily_return	risk_adjusted_return
PERFORMANCE_METRICS	KO	equity	large_cap	0.2813836621...	0.35528324...	0.4462000717...	0.01175659...	0.0004331567620...	0.03559570527981075
PERFORMANCE_METRICS	RLY	alternatives		0.2804567958...	0.37779366...	0.7100891902...	0.01040054...	0.0001420143677...	0.017115792119245812
PERFORMANCE_METRICS	LQD	fixed_income	inv_grade_corp	0.2445570870...	0.24455708...	0.2445570870...	0.00644230...	0.0001733936357...	0.030877164910069373
PERFORMANCE_METRICS	V	equity	large_cap	0.2408863268...	0.31851691...	0.3936188049...	0.01972928...	0.0009421474352...	0.049552574150543
PERFORMANCE_METRICS	GLD	commodities	precious_metals	0.2130867236...	0.21539624...	0.2160136448...	0.00609413...	0.0001505194710...	0.019063065781303807
PERFORMANCE_METRICS	AAAU	commodities	oil	0.2122472651...	0.21731337...	0.2194976207...	0.00855893...	0.0004076933606...	0.0436051726805043
PERFORMANCE_METRICS	IAU	commodities	gold	0.2120646786...	1.124843941...	1.1248439411...	0.00863666...	0.0004316793000...	0.02048686326534292
PERFORMANCE_METRICS	GIGB	fixed_income	corporate	0.21184330258...	0.211843302...	0.2118433025...	0.00545082...	0.0000545298879...	0.010654039929229364
PERFORMANCE_METRICS	SGOL	commodities	precious_metals	0.21169236923...	0.21844065...	0.2191951083...	0.00859243...	0.0002044259275...	0.020640238095893135
PERFORMANCE_METRICS	BAR	commodities	precious_metals	0.21130959591...	0.21710533...	0.2185628012...	0.00860780...	0.0002350847816...	0.026667908634234058
PERFORMANCE_METRICS	IAUM	commodities	precious_metals	0.2109582570...	0.21095825...	0.2109582570...	0.00856868...	-0.000081743133...	-0.009676505848555976
PERFORMANCE_METRICS	RINF	alternatives		0.2082647034...	0.243105611...	0.4047622969...	0.00866587...	0.0000203460794...	0.003417712584178107
PERFORMANCE_METRICS	VCIT	fixed_income		0.1962148016...	0.19926412...	0.1992641218...	0.00474992...	0.0001592699930...	0.045940121232216025
PERFORMANCE_METRICS	HDG	alternatives		0.1522732183...	0.15227321...	0.1698322033...	0.00406350...	0.0000363090669...	0.011713646441586616
PERFORMANCE_METRICS	BNDX	fixed_income		0.1520923271...	0.15927925...	0.1643495234...	0.00372529...	0.0000742193551...	0.033548238678213986
PERFORMANCE_METRICS	GOVT	fixed_income		0.14594942114...	0.14794688...	0.1717293383...	0.00430254...	0.0000369196346...	0.013459543272615442
PERFORMANCE_METRICS	VMBS	fixed_income		0.1448837755...	0.14674309...	0.1515253738...	0.00407373...	0.0000675615060...	0.025816787058052605
PERFORMANCE_METRICS	FLSP	alternatives		0.1260326078...	0.25673938...	0.2567393892...	0.00607631...	-0.000027213099...	-0.0045575681698771025
PERFORMANCE_METRICS	VTEB	fixed_income		0.11269595561...	0.116381123...	0.1163811230...	0.00213355...	0.0000743538212...	0.021245885474215093
PERFORMANCE_METRICS	TIP	fixed_income		0.1098632644...	0.10986326...	0.1098632644...	0.00503612...	0.0001539216525...	0.038170748034762086
PERFORMANCE_METRICS	WTMF	alternatives		0.1096131919...	0.12091983...	0.2567761594...	0.00523457...	-0.000020149059...	-0.0063579044832408884
PERFORMANCE_METRICS	SCHP	fixed_income		0.1090638304...	0.10906383...	0.1090638304...	0.00500541...	0.0001176090547...	0.033642052376421046
PERFORMANCE_METRICS	MUB	fixed_income		0.1056666970...	0.10974393...	0.1097439371...	0.00231741...	0.0001248113244...	0.03539757241840149
PERFORMANCE_METRICS	FTLS	alternatives		0.1012400181...	0.171100381...	0.2608286037...	0.00770570...	0.0003618396633...	0.02719107780105134
PERFORMANCE_METRICS	MSVX	alternatives		0.0998924108...	0.10295501...	0.1429820954...	0.00358404...	0.0000037538323...	0.00074190021827132
PERFORMANCE_METRICS	IGSB	fixed_income		0.0845880440...	0.08525967...	0.0852596725...	0.00214851...	0.0000949261346...	0.035149467114635416
PERFORMANCE_METRICS	VCSH	fixed_income		0.0840367406...	0.08487352...	0.0848735267...	0.00207240...	0.0000926696310...	0.05130042592897502
PERFORMANCE_METRICS	ARB	alternatives		0.0622279731...	0.07782282...	0.1000121370...	0.00398221...	0.0001749123016...	0.05317568293915466
PERFORMANCE_METRICS	SHY	fixed_income		0.0485643426...	0.04925729...	0.0492572939...	0.00089878...	0.0000297330937...	0.04857023020992884
PERFORMANCE_METRICS	VGSH	fixed_income		0.04851144299...	0.04939584...	0.0493958402...	0.00127164...	0.0000304786729...	0.042342175243510284
PERFORMANCE_METRICS	MARB	alternatives		0.0386139152...	0.04663223...	0.0477178398...	0.00181651...	0.0000110442953...	0.003546032562179861
PERFORMANCE_METRICS	BIL	fixed_income		0.0045153552...	0.00451535...	0.0045153552...	0.00011834...	0.0000238385792...	0.07260954030388478
PERFORMANCE_METRICS	SHV	fixed_income		0.0037449471...	0.00419912...	0.0042077549...	0.00016615...	0.0000353223815...	0.1583904624323264

Holding by Quantity

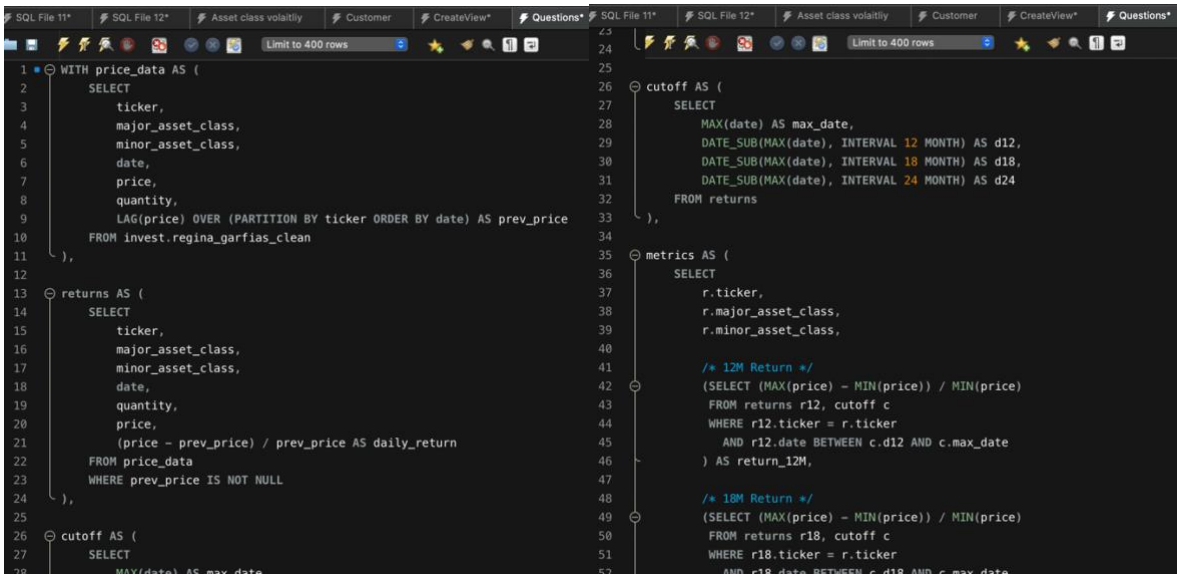


HOLDINGS_BY_QUANTITY	ROST	513500
HOLDINGS_BY_QUANTITY	SBAC	568800
HOLDINGS_BY_QUANTITY	SCHP	621600
HOLDINGS_BY_QUANTITY	SGOL	1599750
HOLDINGS_BY_QUANTITY	SHV	2259400
HOLDINGS_BY_QUANTITY	SHY	3693250
HOLDINGS_BY_QUANTITY	SLV	2397650
HOLDINGS_BY_QUANTITY	SVIX	1698500
HOLDINGS_BY_QUANTITY	TIP	3420700
HOLDINGS_BY_QUANTITY	TJX	3337750
HOLDINGS_BY_QUANTITY	TLT	1682700
HOLDINGS_BY_QUANTITY	TOKE	2733400
HOLDINGS_BY_QUANTITY	UNG	3310100
HOLDINGS_BY_QUANTITY	UPAR	3531300
HOLDINGS_BY_QUANTITY	UVIX	1038850
HOLDINGS_BY_QUANTITY	V	1888100
HOLDINGS_BY_QUANTITY	VCIT	2930900
HOLDINGS_BY_QUANTITY	VCSH	3487850
HOLDINGS_BY_QUANTITY	VGSH	414750
HOLDINGS_BY_QUANTITY	VMBS	3318000
HOLDINGS_BY_QUANTITY	VTEB	1528650
HOLDINGS_BY_QUANTITY	WTMF	4325250
ASSET_CLASS_PERCEN...		6.14
ASSET_CLASS_PERCEN...		22.1
ASSET_CLASS_PERCEN...		39.71
ASSET_CLASS_PERCEN...		32.06

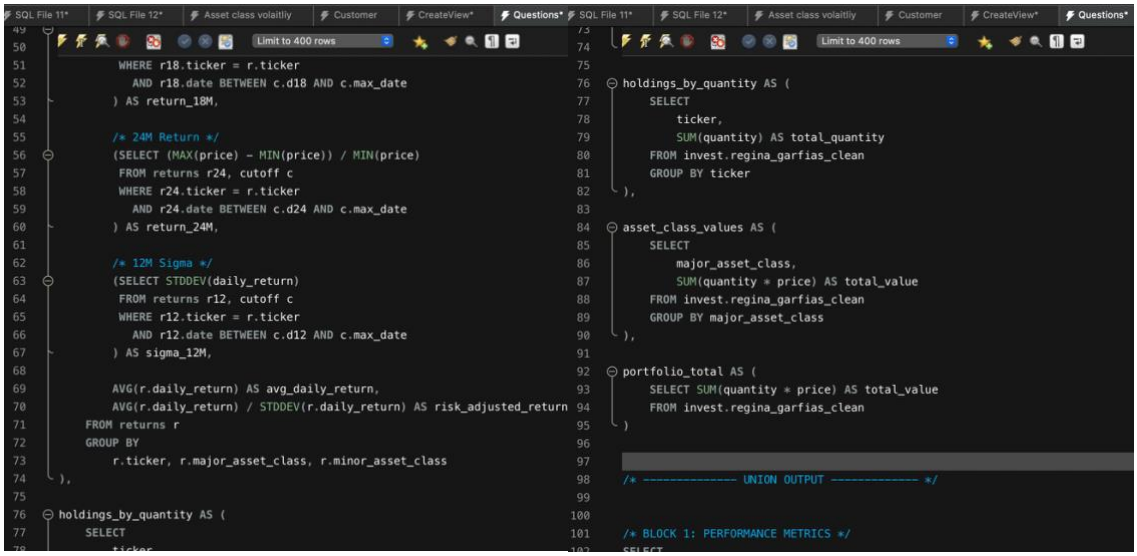
Asset Class Percentage

ASSET_CLASS_PERCENTAGES	alternatives	6.14
ASSET_CLASS_PERCENTAGES	commodities	22.1
ASSET_CLASS_PERCENTAGES	equity	39.71
ASSET_CLASS_PERCENTAGES	fixed_income	32.06

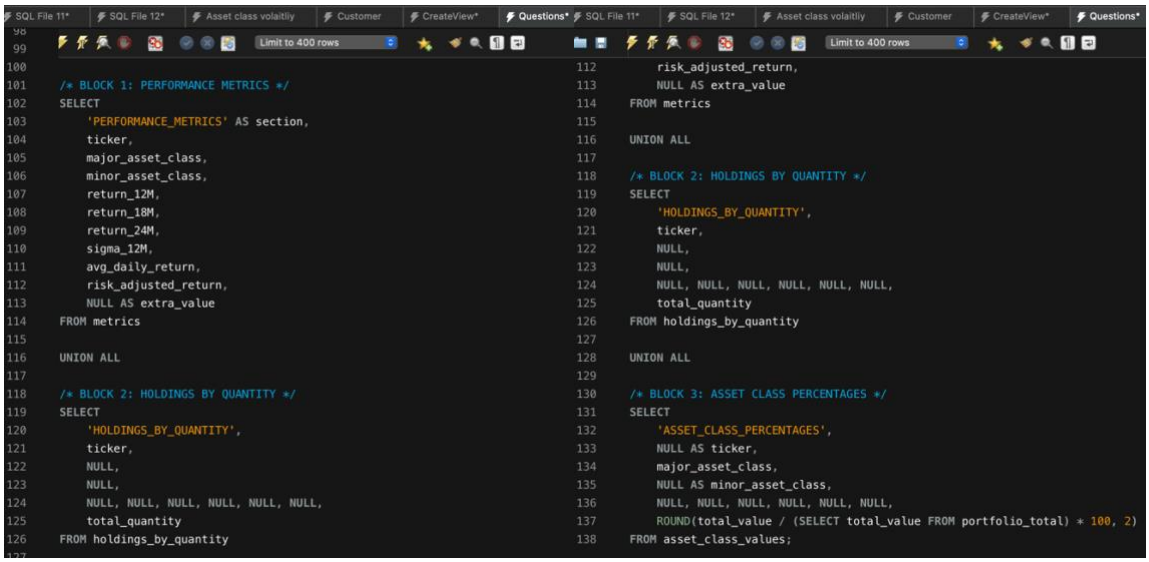
SQL Code:



```sql
WITH price_data AS (
    SELECT
        ticker,
        major_asset_class,
        minor_asset_class,
        date,
        price,
        quantity,
        LAG(price) OVER (PARTITION BY ticker ORDER BY date) AS prev_price
    FROM invest.regina_garfias_clean
),

returns AS (
    SELECT
        ticker,
        major_asset_class,
        minor_asset_class,
        date,
        quantity,
        price,
        (price - prev_price) / prev_price AS daily_return
    FROM price_data
    WHERE prev_price IS NOT NULL
),

cutoff AS (
    SELECT
        MAX(date) AS max_date,
        DATE_SUB(MAX(date), INTERVAL 12 MONTH) AS d12,
        DATE_SUB(MAX(date), INTERVAL 18 MONTH) AS d18,
        DATE_SUB(MAX(date), INTERVAL 24 MONTH) AS d24
    FROM returns
),

metrics AS (
    SELECT
        r.ticker,
        r.major_asset_class,
        r.minor_asset_class,

        /* 12M Return */
        (SELECT (MAX(price) - MIN(price)) / MIN(price)
         FROM returns r12, cutoff c
         WHERE r12.ticker = r.ticker
           AND r12.date BETWEEN c.d12 AND c.max_date
        ) AS return_12M,

        /* 18M Return */
        (SELECT (MAX(price) - MIN(price)) / MIN(price)
         FROM returns r18, cutoff c
         WHERE r18.ticker = r.ticker
```



```
        WHERE r18.ticker = r.ticker
          AND r18.date BETWEEN c.d18 AND c.max_date
        ) AS return_18M,

        /* 24M Return */
        (SELECT (MAX(price) - MIN(price)) / MIN(price)
         FROM returns r24, cutoff c
         WHERE r24.ticker = r.ticker
           AND r24.date BETWEEN c.d24 AND c.max_date
        ) AS return_24M,

        /* 12M Sigma */
        (SELECT STDDEV(daily_return)
         FROM returns r12, cutoff c
         WHERE r12.ticker = r.ticker
           AND r12.date BETWEEN c.d12 AND c.max_date
        ) AS sigma_12M,

        AVG(r.daily_return) AS avg_daily_return,
        AVG(r.daily_return) / STDDEV(r.daily_return) AS risk_adjusted_return
    FROM returns r
    GROUP BY
        r.ticker, r.major_asset_class, r.minor_asset_class
),

holdings_by_quantity AS (
    SELECT
        ticker,
        SUM(quantity) AS total_quantity
    FROM invest.regina_garfias_clean
    GROUP BY ticker
),

asset_class_values AS (
    SELECT
        major_asset_class,
        SUM(quantity * price) AS total_value
    FROM invest.regina_garfias_clean
    GROUP BY major_asset_class
),

portfolio_total AS (
    SELECT SUM(quantity * price) AS total_value
    FROM invest.regina_garfias_clean
)

/* ---------------- UNION OUTPUT ---------------- */

/* BLOCK 1: PERFORMANCE METRICS */
```



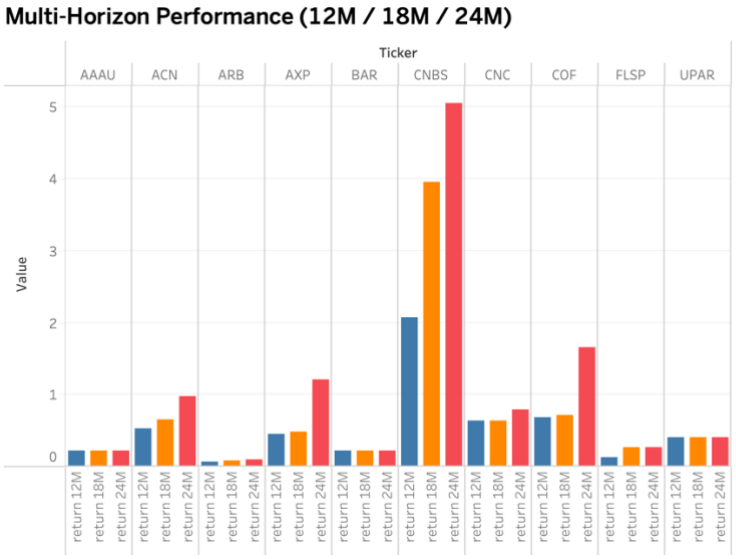
```
/* BLOCK 1: PERFORMANCE METRICS */
SELECT
    'PERFORMANCE_METRICS' AS section,
    ticker,
    major_asset_class,
    minor_asset_class,
    return_12M,
    return_18M,
    return_24M,
    sigma_12M,
    avg_daily_return,
    risk_adjusted_return,
    NULL AS extra_value
FROM metrics

UNION ALL

/* BLOCK 2: HOLDINGS BY QUANTITY */
SELECT
    'HOLDINGS_BY_QUANTITY',
    ticker,
    NULL,
    NULL,
    NULL, NULL, NULL, NULL, NULL, NULL,
    total_quantity
FROM holdings_by_quantity

    risk_adjusted_return,
    NULL AS extra_value
FROM metrics

UNION ALL

/* BLOCK 2: HOLDINGS BY QUANTITY */
SELECT
    'HOLDINGS_BY_QUANTITY',
    ticker,
    NULL,
    NULL,
    NULL, NULL, NULL, NULL, NULL, NULL,
    total_quantity
FROM holdings_by_quantity

UNION ALL

/* BLOCK 3: ASSET CLASS PERCENTAGES */
SELECT
    'ASSET_CLASS_PERCENTAGES',
    NULL AS ticker,
    major_asset_class,
    NULL AS minor_asset_class,
    NULL, NULL, NULL, NULL, NULL, NULL,
    ROUND(total_value / (SELECT total_value FROM portfolio_total) * 100, 2)
FROM asset_class_values;
```

1.Portafolio Performance: 12M,18M, 24M Returns

The return patterns for 12, 18, and 24M periods provide distinct patterns for various asset types, showcasing the portfolio variety over time. Various equity investments such as ACN, AXP, and CNBS perform well on various time horizons, with ACN performing 53% on the 12-month period, 64% on the 18-month period, and almost 97% on the 24-month period, reflecting global post-pandemic recoveries and large-cap companies performing well in the United States. On the other hand, various commodities or equity-linked assets such as AAAU (Gold) and BAR perform

moderately well on various periods, reflecting their defensive nature within volatile markets.

Relative to this, alternative/fixed income tickers including ARB, FLSP, and UPAR contribute lower or even negative returns, suggesting that certain parts of the portfolio are potentially impacting long-term returns. Moreover, data from this multi-horizon return analysis points to equity as the main contributor, with alternatives/fixed income adding to a more stabilizing but weaker return profile. This discrepancy in inter-temporal patterns points to an informed recommendation on balanced allocation later on.

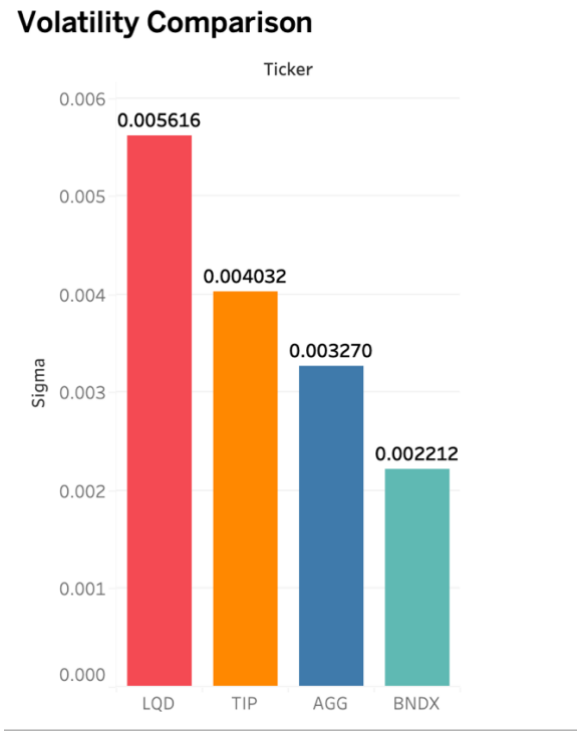


2. 12-Month Volatility (Sigma), Average Daily Returns & Risk Profile

The volatility pattern for the previous 12M indicates that BNDX ($\sigma \approx 0.0022$) and AGG ($\sigma \approx 0.0032$), representing fixed income investments, form the bottommost category, preserving portfolio stability with global and domestic investment-grade bonds. TIP ($\sigma \approx 0.0040$) has a slightly higher level due to its direct link to inflation breakevens, which are relevant for September 2022, as inflation in the United States stayed above 8% while maintaining one of its quickest acceleration cycles in four decades. LQD ($\sigma \approx 0.0056$) is recognized as the most volatile bond portfolio constituent, reflecting its longer duration profile and focus on corporate debt.

Conversely, equity and alternative exposures present σ levels that are higher, reflecting overall market uncertainty within the 2022 rate increases. Growth-oriented equities including CNBS, ACN, and AXP present higher volatility while also showing elevated daily average returns, denoting risk vs reward dynamics typical for equity markets. The majority of alternative investments including UPAR, ARB, and FLSP operate within very extreme parts of risk space, with elevated σ levels coupled with adverse or nonstationary returns, making them contribute to large draw-downs on overall portfolio performances. The commodities-linked gold assets including AAAU and BAR, on the other hand, present preferable risk and return characteristics with moderate vol levels alongside stable returns, denoting continued function within their defensive capacities within inflation uncertainty environments.

Sigma within the portfolio offers insight into risk allocation distribution that appears to favor certain areas over others. This bond index fund provides sufficient defensive strategies, commodities add significant tail-risk protection, but alternatives add only volatility with no corollary ROI. This is further reflected in its average daily returns, where equity acts as major return-generating investments, commodities add diversification, but certain alternatives hinder portfolio efficiency. This risk profile can therefore inform efforts to implement selective adjustments to balance BNDX, AGG, TIP protection for inflation, and cut ties with poorly performing alternative investments with high sigma risk.



3. Recommended New Investment Based on September 2022 Market Conditions

SQL Code:

```sql
WITH price_data AS (
    SELECT
        ticker,
        date,
        value AS price,
        LAG(value) OVER (PARTITION BY ticker ORDER BY date) AS prev_price
    FROM invest.pricing_daily_new
    WHERE ticker IN ('AGG','LQD','TIP','BNDX')
      AND price_type = 'Adjusted'
),

returns AS (
    SELECT
        ticker,
        (price - prev_price) / prev_price AS daily_return
    FROM price_data
    WHERE prev_price IS NOT NULL
)

SELECT
    ticker,
    STDDEV(daily_return) AS sigma
FROM returns
GROUP BY ticker;
```

100% 3:10

Result Grid Filter Rows: Search Export:

ticker	sigma
AGG	0.0032703883962771473
BNDX	0.002212317488352306
LQD	0.005615594444723892
TIP	0.004032450515128905

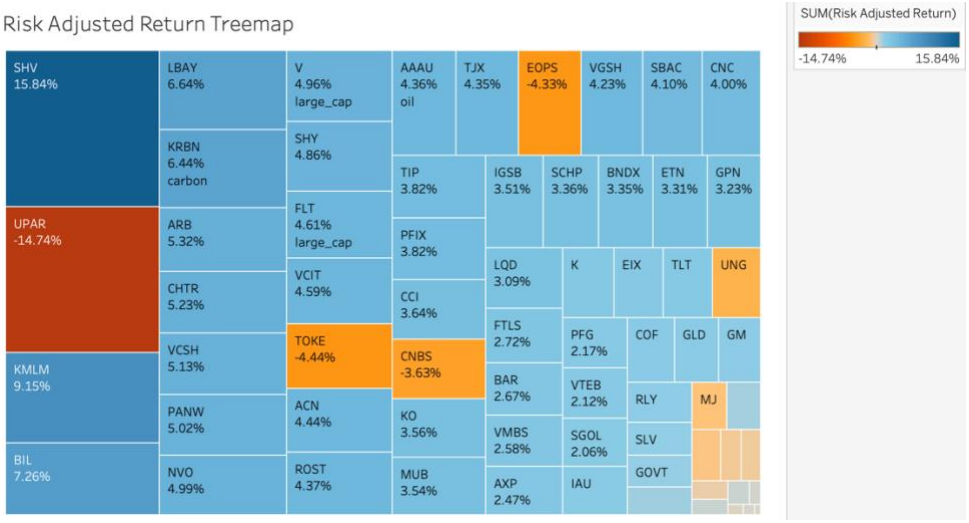
The September 2022 macroeconomic backdrop was defined by the existence of inflation, sharp Fed tightening, and volatility in interest rates within fixed income markets. The U.S. CPI remained above 8% on a year-over-year basis (Bureau of Labor Statistics, 2022), and the Fed had already raised rates on several occasions by 75 bp, the quickest tightening cycle since the 1980s (Federal Reserve, 2022). Against this backdrop, there arose twin implications for the portfolio: the need for its management/stability & the need to ensure sufficient protection against inflation.

To improve diversification as well as manage risk, the suggested asset class to add to the portfolio is AGG, as it is currently not held within the client's portfolio. Offering broad index coverage of U.S. Treasuries, agency mortgage-backed securities, and investment-grade corporate bonds, optimizing duration and making it less volatile than other alternatives within the data set ($\sigma \approx 0.0032$). As such, AGG offers core bond portfolio allocation for smoothing out returns within situations where interest rates are uncertain or where growth is decelerating on a macroeconomic scale.

Regarding existing positions, reducing LQD, which has the highest volatility in the fixed income segment ($\sigma \approx 0.0056$) is benefitial, as it has long durations and is mainly exposed to investment-grade corporate debt. Therefore, it has remained quite vulnerable to the rising interest rate. Moreover, its draw-downs did not provide sufficient reward for accepting incremental risk. Reduction in its allocation will enhance its ability to handle duration risks, reducing risks emanating from credits.

Client allocation to TIP securities must also be raised for its importance within inflationary environments. TIP securities are directly linked to inflation, while they are only slightly more volatile than global aggregate bonds, they are certainly important for protection against real rates. With inflation running at very high levels and real yields turning negative, raising TIP allocation becomes important for mitigating volatility. This instrument has balanced sigma and strategic importance in inflationary cycles.

4. Risk-Adjusted Returns: Identifying the Best Security



Risk-adjusted returns reveals how much return is earned for every unit of risk, pointing to which assets “pay the most” for every unit of risk they introduce into investors' portfolios.

It can be seen that out of all the assets in its portfolio, SHV is most distinctive in terms of its risk-adjusted return ratio, about 0.1584. As an alternative fund, it has managed to exhibit both moderate daily returns and relatively lower than expected volatility, making it rather efficient within its respective group. It can therefore be concluded that this asset has managed to reward its client rather well for its respective risk assumed.

Within equity, ACN and AAAU show a competitive risk-adjusted profile with risks around 0.044 and 0.043, generating returns while effectively managing risk. Their profile scores are higher than others with higher risks, including volatile investments in UPAR or FLSP or other cyclical names, which provide lower rewards on risk or are more exposed to additional risks amidst current inflationary pressures in 2022. Within commodities, AAAU and BAR prove their efficiency as hedge instruments that generate return streams with effectively controlled risks on the downside.

For the bond portfolio, TIP, AGG, and LQD provide lower risk-adjusted returns than other equity and commodities, consistent with their function as stabilizers. However, they are essential to balance out the overall portfolio against the more volatile parts.

On balance, the strongest risk-adjusted outperformer, SHV, shows that relative to opportunity costs, it has tended to contribute most to client outperformance in the most efficient manner.

References:

*Bureau of Labor Statistics. (2022). Consumer Price Index Summary: September 2022. U.S. Department of Labor. https://www.bls.gov/news.release/archives/cpi_10132022.htm

*Federal Reserve. (2022). Federal Open Market Committee: September 2022 Statement. Board of Governors of the Federal Reserve System. https://www.federalreserve.gov/newsevents/pressreleases/monetary20220921a.htm

*iShares. (2022). iShares Core U.S. Aggregate Bond ETF (AGG): Fund Overview. BlackRock. https://www.ishares.com

*U.S. Department of the Treasury. (2022). Treasury Inflation-Protected Securities (TIPS). https://home.treasury.gov

*Morningstar. (2022). LQD: iShares iBoxx Investment Grade Corporate Bond ETF – Risk and Duration Profile. https://www.morningstar.com

AI USAGE DISCLOSURE:

*This analysis was completed with assistance from ChatGPT (OpenAI). AI was used for code structure, visualization techniques, and narrative development. All analytical decisions and interpretations are my own.
Reference: OpenAI. (2025). ChatGPT (Version 5.1) [Large language model]. OpenAI. https://chat.openai.com

*This analysis was completed with assistance from Gemini (Google DeepMind). AI was used for SQL optimization, statistical explanation, and support in interpreting financial results. All analytical decisions and interpretations are my own.
Reference:Google. (2025). Gemini Advanced [Large language model]. Google DeepMind.https://gemini.google.com