WAITE FIRST SECURITIES FINAL CASE STUDY

Following the investment goals, I have analyzed the three investment options you're considering Apple, Intel, and Kroger.

For a stock that delivers solid performance in both favorable and challenging markets, we strongly recommend Apple due to its close alignment with the broader market and this correlation suggests that Apple's performance tends to mirror broader market trends, making it a reliable choice for consistent results.

Intel Corp offers an average return similar to the S&P 500 but with less price fluctuation. However, it carries higher risk relative to return, meaning the potential for higher returns is accompanied by a bit more risk. Additionally, Intel's performance is not as closely linked to the market, which might be advantageous if you seek some independence from market movements.

Kroger presents the lowest average returns among the options, but it's the least volatile and sensitive to market changes. This stability could be appealing. However, it comes with the highest risk relative to return, meaning the stable returns are also riskier. Furthermore, Kroger's performance is almost independent of the market, indicating a degree of autonomy from broader market trends.

In summary, for a stock that offers reliable performance across different market conditions, Apple appears to be the most suitable option.

Please bear in mind that all investments carry some level of risk, and past performance is not a guarantee of future results. Thank you for trusting us with your financial decisions, and we are here to provide support throughout your investment journey.

Descriptive Statistics, Estimated Investment Betas, R^2s, 2015-2020
Sample Size: 72 months (6 years)
Timeframe: 2015-2020

Part 1: Statistical tables based on analysis.

	S&P 500	Apple Computer	Intel Corp	Kroger
Arithmetic Mean	0.9%	2.7%	0.9%	0.4%
Geometric Mean	0.8%	2.3%	0.7%	0.1%
Standard deviation	4.3%	8.4%	7.1%	7.9%
Coefficient of variation	4.6	3.1	7.7	17.8
Beta	1.0	1.3	0.8	0.3
R^2		42.8%	20.9%	3.3%

Part 2: CAPM Equations

Apple-hat = 0.015 + 1.27*S&P500

```
## Residuals:
##            Min             1Q         Median             3Q            Max
## -0.22172339124 -0.03347149321 -0.00557697015  0.04147438580  0.14308268244
##
## Coefficients:
##                  Estimate    Std. Error t value   Pr(>|t|)
## (Intercept) 0.01493250175 0.00768703414 1.94256   0.056093 .
## S.P.500     1.26616052715 0.17500816148 7.23487 4.6515e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0637370978 on 70 degrees of freedom
## Multiple R-squared:  0.427839438,    Adjusted R-squared:  0.419665716
## F-statistic: 52.3432802 on 1 and 70 DF,  p-value: 4.65151802e-10
```

Intel-hat = 0.002 + 0.75*S&P500

```
## Residuals:
##           Min            1Q        Median            3Q           Max
## -0.2457146682 -0.0456730060  0.0088323394  0.0416468609  0.1761904570
##
## Coefficients:
##                 Estimate    Std. Error t value   Pr(>|t|)
## (Intercept) 0.00220612620 0.00771974353 0.28578    0.77589
## S.P.500     0.75470076449 0.17575284525 4.29410 5.5413e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.064008308 on 70 degrees of freedom
## Multiple R-squared:  0.208496835,    Adjusted R-squared:  0.197189647
## F-statistic: 18.4393179 on 1 and 70 DF,  p-value: 5.54134576e-05
```

Kroger-hat = 0.001 + 0.34*S&P500

```
## Residuals:
##            Min             1Q         Median             3Q            Max
## -0.21688084109 -0.06296302153  0.00380068306  0.05045295654  0.23940977699
##
## Coefficients:
##                 Estimate    Std. Error t value Pr(>|t|)
## (Intercept) 0.00120488849 0.00946532676 0.12729  0.89907
## S.P.500     0.33519051855 0.21549396076 1.55545  0.12435
##
## Residual standard error: 0.0784818236 on 70 degrees of freedom
## Multiple R-squared:  0.0334085891,   Adjusted R-squared:  0.0196001404
## F-statistic: 2.41943102 on 1 and 70 DF,  p-value: 0.124348378
```

Definition of terms in non-technical terms

Arithmetic mean is the average of the returns from an investment over a period, Apple has the highest stock return of 2.7%.

Geometric mean considers how an investment grows or shrinks each year. Apple's geometric mean of 2.3% means that an investment in Apple would have grown by about 2.3% each year, considering how the gains or losses from one year affect the starting amount for the next year.

SD (standard deviation) measures how much returns vary from the average over time. A higher SD indicates more unpredictable and riskier returns. Apple has an SD of 8.4%, making it a riskier investment.

Coefficient of variation measures how much returns vary relative to the average itself. A higher coefficient of variation indicates more risk compared to the average return. Apple has a 3.1% coefficient of variation, meaning its returns tend to have relatively low fluctuations.

Investment beta measures how much an investment moves with the overall market. A higher beta means the investment is more sensitive to market changes and riskier. Kroger's low beta of 0.3 suggests its performance is less tied to market movements, while Apple's high beta of 1.3 makes it more sensitive to market changes.

R^2 measures how well an investment's performance can be explained by the market's performance. A higher R^2 means the investment follows the market more closely. Kroger's low R^2 of 3.3% suggests its performance is less tied to the broader market compared to Apple

Key findings

Apple Computer has the highest average returns and is more volatile and sensitive to market changes than other companies. However, it has a lower risk relative to return and its performance is closely tied to the market.

Intel Corp has an average return such as the S&P 500, but lower average annual return. It's less volatile and sensitive to market changes than the market, but has a higher risk relative to return, and its performance isn't well explained by the market.

Kroger has the lowest average returns and is the least volatile and sensitive to market changes. However, it has the highest risk relative to return and its performance is almost independent of the market.

In summary, Apple Computer offers high returns with higher volatility, Kroger presents the highest risk, and Intel provides lower risk-adjusted returns.

Intuition

Apple demonstrates superior average returns both in arithmetic and geometric terms. However, it also exhibits the highest level of volatility, evident from its substantial standard deviation and beta. On average, Intel and Kroger yield lower risk-adjusted returns compared to both the S&P 500 and Apple. Nevertheless, they also feature lower betas, indicating potentially less susceptibility to market shifts. Kroger stands out with the largest coefficient of variation and standard deviation, signifying the highest risk relative to return. Apple boasts the highest R-squared value (42.8%), indicating that the chosen benchmark, the S&P 500, can account for a significant portion of its fluctuations.

Appropriate recommendation

Apple stands out as a desirable option when taking Alex's goal of investing in a high-performing company into account. Although there is more volatility, the corporation has a strong average return. The R-squared score of 42.8% further indicates a strong association with the benchmark. Overall, Apple makes a strong case for itself by providing exceptional average returns and a clear relationship to the benchmark.

Limitation

It is important to realize that the statistical data given shed light on the historical performance and correlations of these stocks. They can't be taken as 100% accurate forecasters of future outcomes. Even though a stock may have had a good correlation with the benchmark as indicated by a high R-squared score, unforeseen market events or shifts could alter this relationship.

Technical Report

	AAPL	INTC	KR
H0	Beta = 1	Beta = 1	Beta = 1
Ha	Beta ≠ 1	Beta ≠ 1	Beta ≠ 1
Beta	1.27	0.75	0.34
DF	70	70	70
SE	0.175	0.176	0.215
t	1.54	-1.42	-3.07
p	0.13	0.16	0.003
Significant @ 5%	FALSE	FALSE	TRUE
Significant @ 1%	FALSE	FALSE	TRUE
Significant @ 0.1%	FALSE	FALSE	FALSE

t = (Beta - 1) / SE

Testing the beta value of a stock determines its relationship and relative risk to the market. Two common tests are: 1) Testing against a beta of 0, which determines if a stock's return has any relationship with the market return, with the null hypothesis stating no relationship; and 2) Testing against a beta of 1, which evaluates if the stock is risky than the market. The latter is often seen as more meaningful because it offers insights into relative risk, aids in portfolio construction, is simpler to interpret, and aligns with established financial theories that consider the market to have a beta of 1.

Similarities and differences between new and older data:

- Between 2015-2020, the S&P 500 witnessed improved returns and stability compared to 1999-2004, with a decrease in volatility.
- Apple's returns slightly decreased but became more consistent and stable. The stock is now more aligned with the S&P 500 trends.
- While Intel's returns marginally dropped, its consistency improved. The stock's volatility decreased.
- Kroger has outperformed Safeway with better returns and consistency. Additionally, correlation with the S&P 500 has further weakened.