

Question 3

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2025-11-19

Loading the data

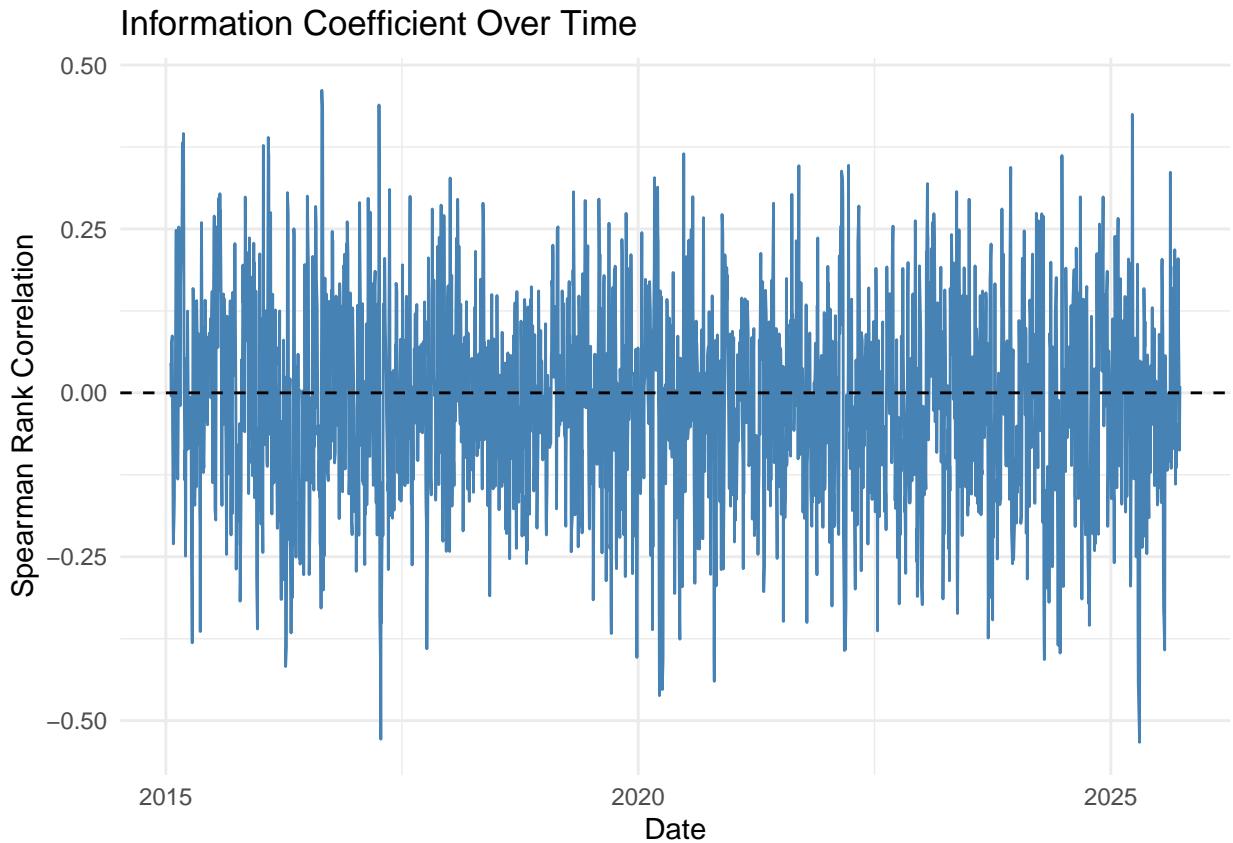
Momentum : Introduction

In this section, I assess the effectiveness of momentum as an investment signal over the past decade. I defined momentum as cumulative returns over the last 12 months. As a result, I used a 12-month return signal (excluding the most recent month), and evaluated whether momentum has demonstrated predictive power. Additionally, I also checked whether a local long-only equity fund has systematically tilted toward high-momentum stocks

Information Coefficient (IC)

To start, I calculated the Information Coefficient, measured as the Spearman rank correlation between the momentum signal and future 3-month returns. The IC series gives us insight into how consistently momentum has predicted returns over time.

```
# Step 3) Visualise IC over time
ic_data %>%
  ggplot(aes(x = date, y = ic)) +
  geom_line(color = "steelblue") +
  geom_hline(yintercept = 0, linetype = "dashed") +
  labs(
    title = "Information Coefficient Over Time",
    y = "Spearman Rank Correlation",
    x = "Date"
  ) +
  theme_minimal()
```

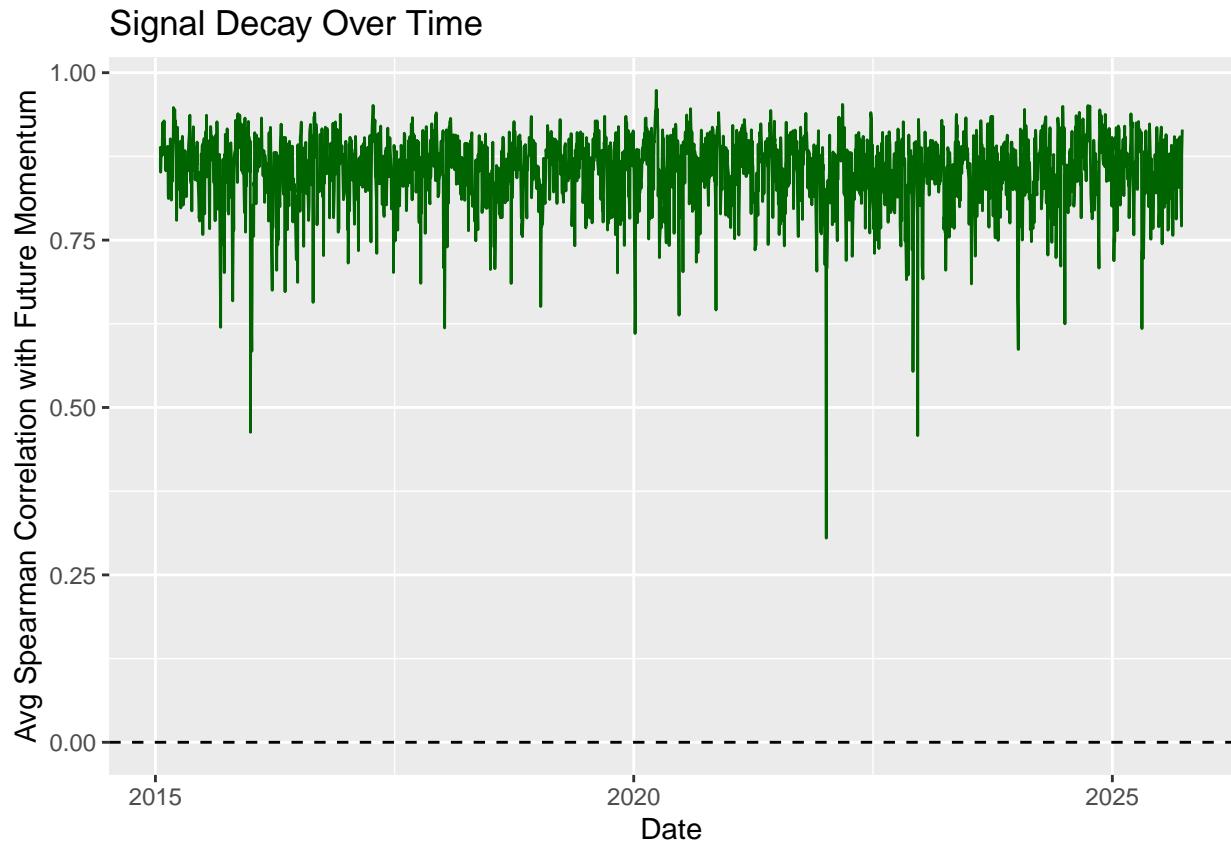


Overall, we see that the IC remains positive across most months, albeit with some noise. This suggests a modest but consistent positive relationship between past returns and future performance. This is consistent with academic findings on momentum.

Signal Decay

Next I investigated how the signal's predictive power changes over time. This involved measuring the Spearman correlation between current momentum and future momentum swings.

```
# Step 3) Plot the decay
ggplot(decay_by_month, aes(x = date, y = decay)) +
  geom_line(color = "darkgreen") +
  geom_hline(yintercept = 0, linetype = "dashed") +
  labs(title = "Signal Decay Over Time",
       x = "Date",
       y = "Avg Spearman Correlation with Future Momentum")
```



The decay profile shows that the signal retains strong persistence across several months, indicating that stocks with high momentum tend to stay ranked highly for a reasonable period. This supports its use as a predictive signal.

Quintile Performance

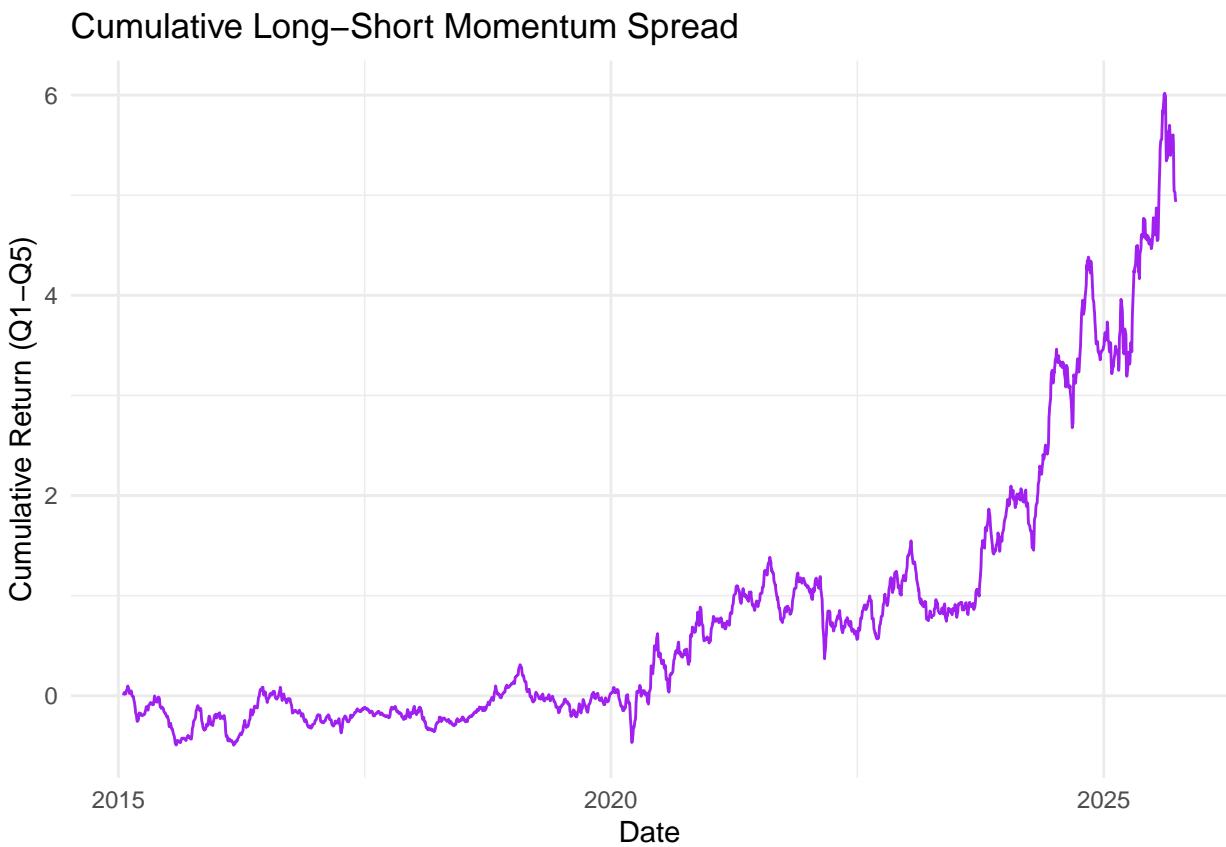
I sorted the stocks into quintiles based on their momentum each month, forming a long-short strategy (Q1-Q5). This allows us to quantify the return spread between high and low momentum portfolios.

```
# Summary stats over full sample
ls_summary <- ls_perf %>%
  summarise(
    mean_ls = mean(long_short, na.rm = TRUE),
    median_ls = median(long_short, na.rm = TRUE),
    hit_rate = mean(long_short > 0, na.rm = TRUE)
  )

ls_summary

## # A tibble: 1 x 3
##   mean_ls median_ls hit_rate
##       <dbl>     <dbl>     <dbl>
## 1  0.000842  0.000806  0.527
```

```
# Step 4) Visualize cumulative long-short performance
ls_perf %>%
  mutate(cum_ls = cumprod(1 + long_short) - 1) %>%
  ggplot(aes(x = date, y = cum_ls)) +
  geom_line(color = "purple") +
  labs(
    title = "Cumulative Long-Short Momentum Spread",
    x = "Date",
    y = "Cumulative Return (Q1-Q5)"
  ) +
  theme_minimal()
```



As shown in the cumulative return plot above, the strategy delivered strong and consistent outperformance, particularly in the most recent years. From 2015 to 2025, the long–short spread compounded to nearly six times, indicating that momentum has been a robust and persistent signal across the sample period.

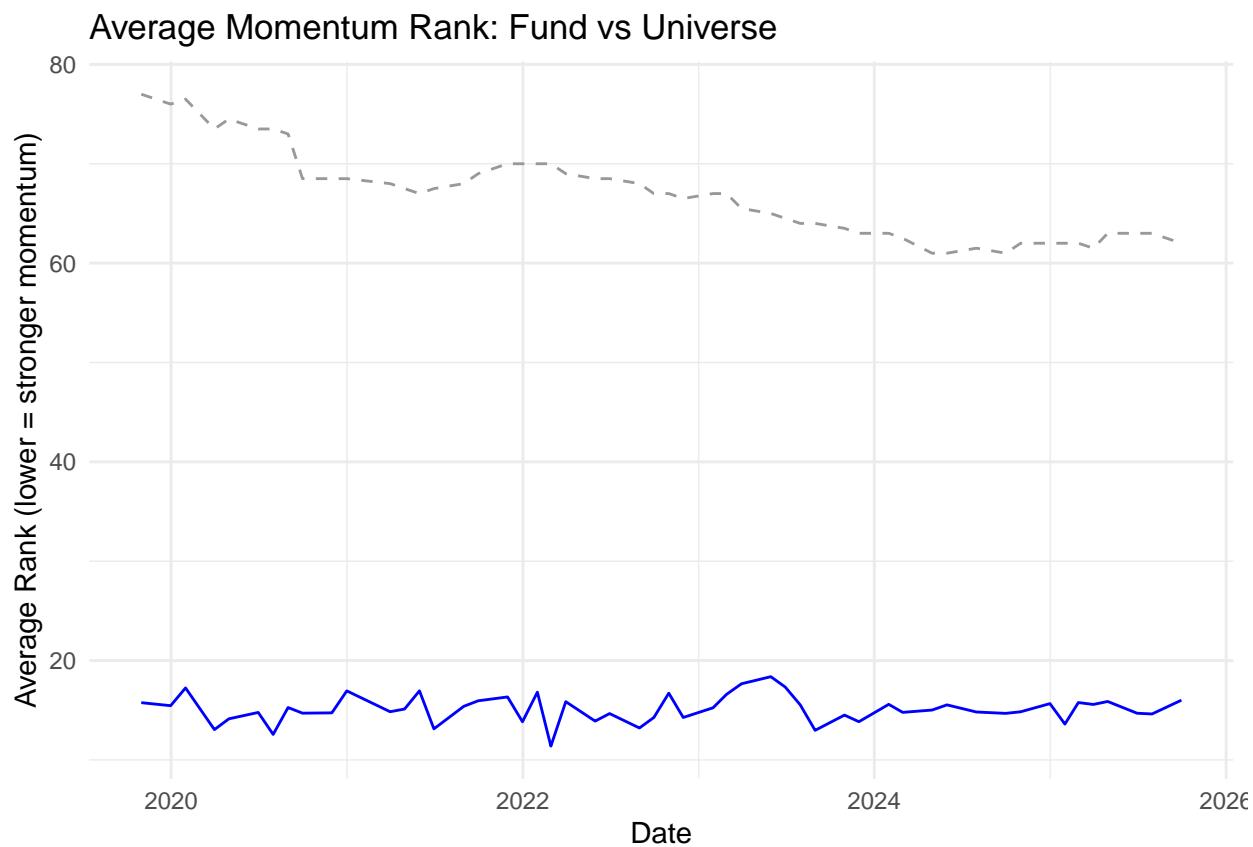
Quantitatively, the average monthly return of the strategy was approximately 0.0842%, with a median of 0.0806%. Importantly, the strategy had a hit rate of 52.7%, meaning that in over half the months, the high momentum stocks outperformed their low momentum counterparts. This edge, though modest monthly, compounds meaningfully over time as illustrated in the chart above.

Together, these results confirm that the momentum signal successfully discriminates between winners and losers, and that a simple quintile-based approach would have added considerable value over the last decade.

Fund's Exposure to Momentum

Lastly, I compared the fund's average momentum rank (based on its holdings) to that of the broader market. This allowed me to assess whether the fund has been actively tilting toward high-momentum stocks.

```
# Step 5) Plot the comparison
fund_vs_univ %>%
  ggplot(aes(x = date)) +
  geom_line(aes(y = avg_fund_rank), color = "blue") +
  geom_line(aes(y = avg_univ_rank), color = "grey60", linetype = "dashed") +
  labs(
    title = "Average Momentum Rank: Fund vs Universe",
    x = "Date",
    y = "Average Rank (lower = stronger momentum)"
  ) +
  theme_minimal()
```



As seen in the chart above, the blue line represents the fund's average momentum rank, while the grey dashed line reflects the average across the entire market. Over the observed period, the fund consistently ranked much lower (i.e. stronger) than the universe.

This tells me that the fund has been systematically tilted toward high-momentum stocks. In fact, the gap between the fund's average rank and that of the universe has been wide and stable, suggesting a deliberate or highly effective selection bias toward momentum.

This pattern supports the idea that the manager has either intentionally or coincidentally picked up on momentum characteristics in portfolio construction. This has potentially contributed to improved relative performance.

Conclusion

Looking back over the past decade, my analysis suggests that momentum has been a meaningful and consistent investment signal in the local market. The information coefficient shows a generally positive relationship between momentum ranks and future returns, while the signal decay analysis confirms that this predictive power persists over the short term. Additionally, the quintile portfolio results further reinforce this. The long-short momentum spread has delivered positive returns, with a hit rate above 50% and solid average performance.

When comparing my colleague's fund to the broader universe, I found that the portfolio consistently held stocks with stronger momentum than average. This suggests that the fund manager has effectively tapped into momentum exposure, whether by design or indirectly through their investment style.

All in all, I would conclude that momentum has worked as a signal and that the fund's performance can be at least partially explained by its alignment with this factor.