Liquidity and Returns: Analyzing Bid-Ask Spreads and Expected Returns

Microstructure of Financial Markets

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A complete replication code can be found here.

1 Introduction

This study investigates the relationship between expected returns and effective bid-ask spreads, estimated using Roll's estimator, across a comprehensive sample of U.S. common stocks listed on the NYSE, AMEX, and NASDAQ from 1926 to 2025. Utilizing daily return data from the CRSP database, we construct quintile portfolios each month based on the estimated spreads and evaluate their subsequent equally-weighted returns. The aim is to determine whether liquidity, proxied by effective spreads, is significantly associated with expected returns. Section 2 outlines the methodological approach employed. Section 3 presents the empirical findings and concludes.

2 Methodology

To examine the relationship between expected returns and effective bid-ask spreads, we use daily return data from the CRSP database covering U.S. common stocks listed on the NYSE, AMEX, and NASDAQ from 1926 to 2025, encompassing a total of 29,362 stocks. Effective monthly spreads are estimated using Roll's estimator applied to daily returns. On a monthly basis, stocks are ranked by their estimated spreads and sorted into quintile portfolios, with Q1 representing the lowest and Q5 the highest spreads. Equally-weighted returns are then computed for each quintile for the subsequent month.

To evaluate the return differential, we construct a long-short Q5–Q1 portfolio, taking a long position in Q5 and a short position in Q1. To account for rebalancing costs, we subtract half the spread of each quantity of stock we buy or sell, reflecting a transaction cost proxy[1]. We also account for trading diversification, so if Q1 wants to get out of a stock, while Q5 wants to buy it, no trading occurs since we already have it in inventory. For inference, we apply a stationary bootstrap resampling technique to test whether spreads significantly predict expected returns. Specifically, we generate 100,000 bootstrap paths to estimate the distribution of the return differential between Q5 and Q1. We report the number of resampled paths where the mean exceeds zero. A p-value below 0.05 indicates statistical significance at the upper tail, while a p-value above 0.95 suggests significance at the lower tail. Values in between suggest no significant deviation from zero.

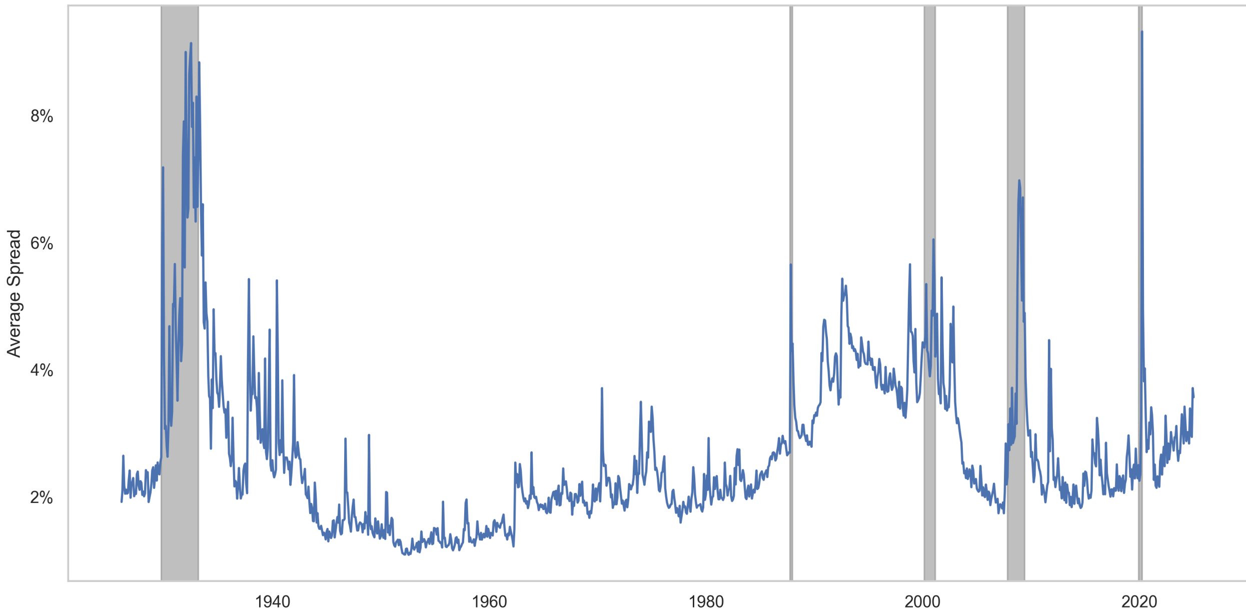
We report results including and excluding transaction costs. For each case, we also present the annualized mean return, standard deviation, Sharpe ratio, skewness, kurtosis, and indicators of statistical significance.

[1] We use Roll's estimator as a proxy for both explicit and implicit transaction costs.

3 Do Effective Spreads Predict Expected Returns? A Century-Long Analysis

To start, Figure 1 shows the average monthly relative spread of all stocks in our universe over the period from 1926 to 2025. We observe that the highest spreads occur in the late 1920s to early 1930s, peaking above 8% during the Great Depression, as highlighted by the first shaded region. After this peak, the spread generally declines, with periodic increases around the 1940s, 1970s, and early 2000s. A significant spike in spread is observed in the 2020s, marked by the last shaded region, reflecting COVID-19. From the 1950s to the 2010s, the spread fluctuates between approximately 2% and 6%, showing a general stabilization, before rising again in the 2020s.

Figure 1: Average Monthly Relative Spread, 1926–2025



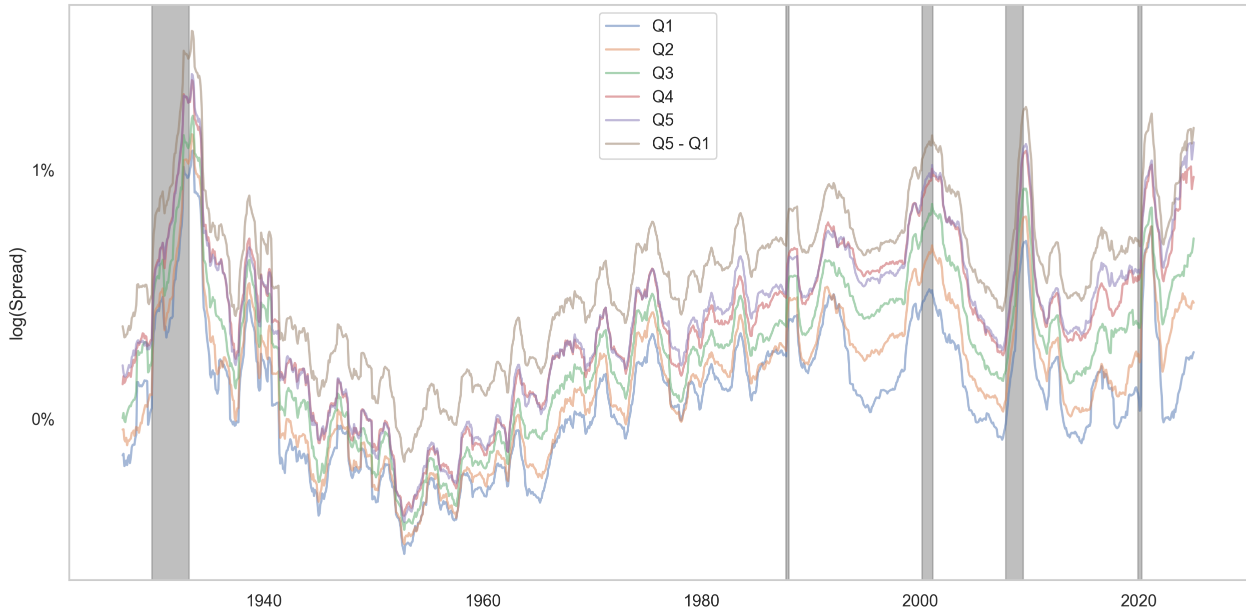
Note: This figure shows the average monthly relative spread of all stocks in our universe over the period from 1926 to 2025.

Moving on, Figure 2 presents the 1-year rolling average spread for each of the five quintiles (Q1 to Q5) as well as for the long-short portfolio over the period from 1926 to 2025. The y-axis is in log-scale for plotting purposes. We see the Q5-Q1 portfolio has the highest spread, as this is the spread of the Q1 and Q5 added together, after accounting for trading diversification. Q1 is the lowest, and Q5 is the second highest by construction. The patterns observed are similar to Figure 1, just lagged a bit, indicating that none of our portfolios are hedged against changes in the spread.

Lastly, Table 1 provides an overview of the statistics for quintiles over different decades from 1926 to 2025, both before and after accounting for spread costs[2]. Mean, Standard Deviation (Std),

[2]Both tables are reported in the appendix due to spacing.

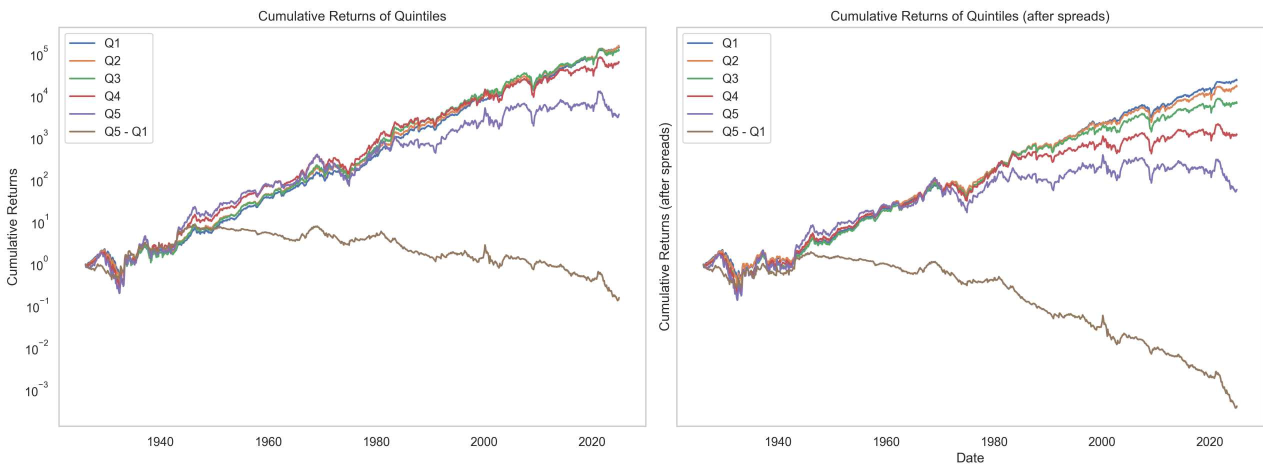
Figure 2: Average 1-year Rolling Spread of each Portfolio, 1926–2025



Note: This figure presents the 1-year rolling average spread for each of the five quintiles (Q1 to Q5) as well as for the long-short portfolio over the period from 1926 to 2025. The y-axis is in log-scale for plotting purposes.

and Sharpe Ratio (SR) are expressed on an annualized basis. Max and Min refer to the peak and lowest monthly returns, respectively. To assess the Q5–Q1 distribution, we employ bootstrapping with 100,000 simulations and determine the p-value by calculating the share of simulations with a positive mean. Hence, a p-value below 0.05 implies a statistically significant mean greater than 0, while a p-value above 0.95 points to a statistically significant mean greater than 0. Significant p-values are highlighted in bold. Figure 3 presents the cumulative return for each of the five quintiles (Q1 to Q5) as well as for the long-short portfolio over the period from 1926 to 2025. The y-axis is in log-scale for plotting purposes.

Figure 3: Cumulative Return of each Portfolio, 1926–2025



Note: This figure presents the cumulative return for each of the five quintiles (Q1 to Q5) as well as for the long-short portfolio over the period from 1926 to 2025. The y-axis is in log-scale for plotting purposes.

3.1 Results over 10 Years periods

1926–1945: Evidence of a Liquidity Premium

In the early decades, particularly from 1936–1945, we find a strong and statistically significant positive return spread (Q5–Q1 = 18.1%, $p = 0.014$). After accounting for transaction costs, the spread remains significant (14.2%, $p = 0.022$), suggesting the existence of a liquidity premium. This is consistent with the historical context of the Great Depression and World War II, when market uncertainty and trading frictions were high. The previous decade (1926–1935) also shows a positive spread, though not statistically significant ($p = 0.065$ before, $p = 0.099$ after).

1946–1965: Post-War Stability and Insignificant Results

In the two decades following WWII, the Q5–Q1 return spreads become small, negative, and statistically insignificant. For example, from 1946–1955, the return spread was –1.9% ($p = 0.804$) before transaction costs and –3.5% ($p = 0.841$) after. These results may reflect improved trading infrastructure and economic stability, which likely reduced the return premium investors demanded for holding illiquid assets.

1966–1995: Technological Transition and Mixed Evidence

The period from 1966 to 1995 shows inconsistent signals. Return spreads fluctuate near zero and are insignificant. We obtain observe p-values close to 0.5, for all these decades, indicating that there is little to none statistically significant pointing at either higher or lower expected returns given the spreads. This relationship is also shown in Figure 3, where we see the Q5 portfolio breaking away from the rest of the portfolios in terms of cumulative returns. This period corresponds to growing institutional trading and early market automation, which may have diluted the predictive power of spreads on returns.

1996–2025: Automation and the Disappearance of the Premium

From 1996 onward, the relationship between effective spreads and expected returns appears to break down entirely. In the most recent decades (2006–2015 and 2016–2025), the Q5–Q1 return spreads are large and negative (–7.5% and –12.0% before costs; –14.0% and –22.1% after), with p-values exceeding 0.9, where as when subtracting transaction costs, the difference becomes significantly negative, pointing to the fact that a higher spread leads to even lower expected returns.

These results coincide with the rise of algorithmic trading and high-frequency market making–all of which drastically improved market liquidity and narrowed bid-ask spreads. In this context, high spreads may reflect poor quality or distressed stocks, not compensated risk.

3.2 Conclusion

Over the past centuries, the relationship between effective spreads and expected returns has undergone a significant transformation. While a liquidity premium seems to have existed in earlier decades, particularly during times of economic stress and market underdevelopment, this relationship weakens post-WWII and disappears entirely in recent years. During the last two decades, we observe a negative liquidity premium, indicating that stocks with higher spread tend to underperform compared in terms expected returns.

Therefore, we can say that there is no consistent and statistically significant relationship between effective spreads and expected returns. In modern markets, higher spreads do not predict higher returns and may instead signal underperformance.

3.3 Robustness Check with Longer Timeframes

To assess the robustness of our findings, we repeat the same analysis using longer time horizons: 20-year, 25-year, 50-year, and full-sample (100-year) periods, as reported in Table 2. The results confirm the pattern observed in our 10-year breakdown. Specifically, when the time frames are focused on earlier decades–such as 1926-1945 or 1926-1950–we consistently detect a statistically significant liquidity premium. Conversely, in later periods, especially from the 1980s onward, the premium fades or even reverses.

However, when aggregating data over longer horizons like 50 or 100 years, the signals average out, and the liquidity premium essentially disappears. This is expected as the structural break in the microstructure of the market - particularly the shift toward automation, improved transparency, and tighter spreads - dilutes the relationship over time.

While long-term averages obscure the changing nature of the spread-return relationship, the 10-year interval strikes a useful balance: it captures temporal shifts in market structure while preserving statistical power. Thus, we consider the 10-year segmentation the most informative timescale for this analysis.

Table 1: Summary statistics for 10-year and 100-year periods, 1926–2025

		1926–1935		1936–1945		1946–1955		1956–1965		1966–1975		1976–1985		1986–1995		1996–2005		2006–2015		2016–2025		1926–2025	
		Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Q1	Mean	0.113	0.075	0.148	0.135	0.136	0.129	0.138	0.131	0.063	0.048	0.243	0.226	0.137	0.114	0.155	0.132	0.104	0.084	0.128	0.106	0.137	0.118
	Std	0.338	0.331	0.228	0.228	0.133	0.133	0.111	0.111	0.181	0.180	0.133	0.132	0.132	0.132	0.130	0.130	0.160	0.161	0.149	0.149	0.181	0.180
	Sharpe	0.336	0.225	0.651	0.592	1.025	0.974	1.248	1.187	0.350	0.269	1.826	1.705	1.038	0.861	1.194	1.016	0.652	0.526	0.856	0.713	0.755	0.657
	Skew	1.032	0.734	-0.375	-0.480	-0.534	-0.565	-0.438	-0.468	0.146	0.103	-0.426	-0.473	-1.980	-2.135	-1.074	-1.120	-0.666	-0.796	-0.096	-0.388	0.337	0.035
	Kurtosis	4.751	3.909	3.280	3.328	0.331	0.410	1.298	1.317	0.672	0.629	1.996	2.094	11.900	12.901	3.069	3.266	2.383	2.631	5.222	5.945	9.294	8.065
	Max	0.430	0.391	0.254	0.248	0.091	0.090	0.114	0.112	0.186	0.181	0.142	0.139	0.112	0.108	0.084	0.082	0.152	0.146	0.178	0.170	0.430	0.391
	Min	-0.276	-0.288	-0.230	-0.235	-0.115	-0.118	-0.092	-0.094	-0.135	-0.138	-0.119	-0.121	-0.225	-0.232	-0.159	-0.163	-0.180	-0.189	-0.179	-0.195	-0.276	-0.288
Q2	Mean	0.159	0.115	0.155	0.139	0.141	0.133	0.137	0.129	0.076	0.059	0.238	0.219	0.136	0.109	0.159	0.127	0.101	0.077	0.135	0.106	0.144	0.121
	Std	0.418	0.410	0.259	0.260	0.138	0.138	0.118	0.118	0.207	0.206	0.162	0.161	0.161	0.162	0.163	0.163	0.181	0.182	0.194	0.195	0.215	0.214
	Sharpe	0.380	0.280	0.600	0.537	1.022	0.969	1.161	1.096	0.370	0.285	1.466	1.354	0.845	0.673	0.975	0.775	0.556	0.421	0.695	0.542	0.667	0.566
	Skew	1.444	1.206	-0.352	-0.475	-0.531	-0.566	-0.366	-0.394	0.457	0.399	-0.419	-0.468	-1.993	-2.159	-0.838	-0.907	-0.474	-0.619	-0.239	-0.426	0.824	0.524
	Kurtosis	5.876	5.089	3.619	3.683	0.687	0.779	0.820	0.829	1.777	1.659	1.909	2.012	11.076	12.244	2.131	2.308	2.066	2.275	2.182	2.695	12.218	10.695
	Max	0.565	0.532	0.279	0.272	0.094	0.093	0.114	0.112	0.253	0.246	0.165	0.162	0.126	0.123	0.121	0.113	0.177	0.169	0.179	0.173	0.565	0.532
	Min	-0.302	-0.312	-0.262	-0.269	-0.130	-0.133	-0.090	-0.092	-0.160	-0.164	-0.147	-0.150	-0.273	-0.284	-0.189	-0.194	-0.199	-0.209	-0.211	-0.230	-0.302	-0.312
Q3	Mean	0.162	0.105	0.187	0.166	0.141	0.132	0.141	0.132	0.087	0.065	0.259	0.236	0.136	0.100	0.162	0.116	0.092	0.061	0.113	0.071	0.148	0.119
	Std	0.484	0.474	0.300	0.301	0.147	0.147	0.129	0.129	0.231	0.230	0.186	0.185	0.176	0.177	0.206	0.206	0.204	0.205	0.218	0.218	0.247	0.245
	Sharpe	0.334	0.222	0.621	0.552	0.956	0.899	1.092	1.020	0.379	0.285	1.396	1.274	0.775	0.564	0.783	0.562	0.450	0.296	0.520	0.327	0.600	0.485
	Skew	1.629	1.374	-0.185	-0.322	-0.435	-0.471	-0.366	-0.394	0.406	0.349	-0.414	-0.467	-1.896	-2.071	-0.447	-0.554	-0.513	-0.684	-0.108	-0.273	1.059	0.727
	Kurtosis	6.165	5.283	3.816	3.793	0.333	0.412	0.825	0.831	1.136	1.044	1.781	1.893	10.201	11.382	1.027	1.095	2.450	2.719	1.763	2.069	13.000	11.172
	Max	0.657	0.611	0.331	0.318	0.101	0.099	0.130	0.128	0.262	0.254	0.185	0.181	0.133	0.126	0.190	0.175	0.207	0.196	0.195	0.189	0.657	0.611
	Min	-0.334	-0.351	-0.299	-0.309	-0.129	-0.132	-0.098	-0.100	-0.176	-0.180	-0.175	-0.179	-0.293	-0.306	-0.203	-0.210	-0.233	-0.246	-0.220	-0.240	-0.334	-0.351
Q4	Mean	0.225	0.146	0.226	0.200	0.136	0.127	0.134	0.122	0.082	0.055	0.251	0.221	0.117	0.067	0.159	0.094	0.081	0.039	0.100	0.031	0.152	0.111
	Std	0.576	0.560	0.341	0.341	0.156	0.157	0.144	0.143	0.270	0.268	0.220	0.219	0.183	0.184	0.277	0.274	0.224	0.224	0.257	0.256	0.289	0.286
	Sharpe	0.390	0.260	0.663	0.586	0.872	0.810	0.931	0.850	0.305	0.205	1.142	1.012	0.638	0.363	0.575	0.344	0.363	0.174	0.389	0.122	0.524	0.388
	Skew	2.063	1.799	0.048	-0.098	-0.554	-0.594	-0.242	-0.277	0.562	0.501	-0.405	-0.466	-1.520	-1.731	0.067	-0.082	-0.200	-0.416	0.052	-0.130	1.671	1.282
	Kurtosis	7.588	6.506	3.105	3.033	0.561	0.665	0.749	0.753	1.416	1.292	1.796	1.923	8.935	10.133	1.431	1.255	2.548	2.685	1.746	1.923	16.099	13.432
	Max	0.770	0.708	0.383	0.367	0.096	0.094	0.136	0.134	0.316	0.306	0.206	0.200	0.147	0.137	0.315	0.293	0.251	0.237	0.233	0.220	0.770	0.708
	Min	-0.336	-0.352	-0.316	-0.328	-0.144	-0.148	-0.099	-0.101	-0.192	-0.197	-0.219	-0.224	-0.295	-0.310	-0.224	-0.233	-0.239	-0.255	-0.254	-0.276	-0.336	-0.352
Q5	Mean	0.239	0.159	0.329	0.304	0.117	0.108	0.099	0.087	0.057	0.029	0.200	0.167	0.123	0.075	0.181	0.115	0.029	-0.016	0.007	-0.072	0.139	0.097
	Std	0.647	0.628	0.487	0.485	0.185	0.185	0.170	0.169	0.333	0.331	0.262	0.261	0.231	0.230	0.379	0.375	0.254	0.252	0.315	0.313	0.354	0.350
	Sharpe	0.370	0.253	0.676	0.627	0.634	0.582	0.584	0.515	0.170	0.087	0.765	0.641	0.534	0.323	0.477	0.307	0.112	-0.065	0.023	-0.230	0.393	0.277
	Skew	2.623	2.400	1.709	1.602	-0.184	-0.218	-0.179	-0.205	1.016	0.965	-0.099	-0.150	0.706	0.571	1.054	0.923	0.083	-0.110	0.387	0.288	2.375	2.092
	Kurtosis	10.791	9.570	8.593	8.092	0.409	0.461	0.404	0.412	3.053	2.900	1.919	1.990	8.482	8.502	4.448	4.020	1.978	1.971	1.314	1.361	18.538	16.135
	Max	1.032	0.970	0.823	0.804	0.135	0.133	0.140	0.138	0.440	0.431	0.260	0.255	0.352	0.342	0.554	0.531	0.273	0.260	0.280	0.267	1.032	0.970
	Min	-0.299	-0.316	-0.338	-0.348	-0.160	-0.163	-0.113	-0.115	-0.217	-0.223	-0.253	-0.257	-0.290	-0.301	-0.233	-0.241	-0.243	-0.257	-0.247	-0.267	-0.338	-0.348
Q5–Q1	Mean	0.126	0.006	0.181	0.142	-0.019	-0.035	-0.039	-0.058	-0.007	-0.049	-0.043	-0.093	-0.013	-0.085	0.026	-0.062	-0.075	-0.140	-0.120	-0.221	0.003	-0.058
	Std	0.367	0.336	0.318	0.314	0.075	0.075	0.083	0.082	0.183	0.180	0.146	0.144	0.139	0.137	0.308	0.303	0.131	0.129	0.220	0.217	0.220	0.213
	Sharpe	0.343	0.019	0.568	0.452	-0.249	-0.466	-0.469	-0.699	-0.036	-0.273	-0.293	-0.647	-0.097	-0.621	0.085	-0.205	-0.575	-1.087	-0.547	-1.022	0.013	-0.272
	Skew	3.309	2.903	3.383	3.203	1.005	0.920	0.229	0.168	1.598	1.493	0.206	0.099	2.489	2.297	1.772	1.563	1.021	0.648	0.922	0.817	3.486	2.985
	Kurtosis	15.482	12.794	17.749	16.230	1.761	1.654	1.202	1.161	4.560	4.058	1.015	1.060	11.537	10.488	7.851	7.069	2.064	1.283	3.128	2.989	26.618	21.929
	Max	0.673	0.586	0.629	0.603	0.073	0.071	0.064	0.061	0.255	0.240	0.118	0.110	0.240	0.226	0.487	0.459	0.120	0.102	0.257	0.242	0.673	0.603
	Min	-0.147	-0.160	-0.119	-0.136	-0.055	-0.056	-0.069	-0.070	-0.087	-0.093	-0.145	-0.152	-0.070	-0.084	-0.198	-0.213	-0.083	-0.088	-0.173	-0.179	-0.198	-0.213
p-value ($\mu_{Q5} - \mu_{Q1} > 0$)		0.065	0.099	**0.014**	**0.022**	0.804	0.841	0.917	0.943	0.548	0.624	0.798	0.872	0.636	0.832	0.397	0.580	0.929	**0.978**	0.931	**0.984**	0.167	0.293

Note: This table provides an overview of the statistics for quintiles over each decade from 1926 to 2025, as well as for the entire timeframe, both before and after accounting for spread costs. Mean, Standard Deviation (Std), and Sharpe Ratio (SR) are expressed on an annualized basis. Max and Min refer to the peak and lowest monthly returns, respectively. To assess the Q5–Q1 distribution, we employ bootstrapping with 100,000 simulations and determine the p-value by calculating the share of simulations with a positive mean. Hence, a p-value below 0.05 implies a statistically significant mean greater than 0, while a p-value above 0.95 points to a statistically significant mean greater than 0. Significant p-values are highlighted in bold.

Table 2: Summary statistics for 20-year, 25-year, and 50-year periods, 1926–2025

		1926–1945		1946–1965		1966–1985		1986–2005		2006–2025		1926–1950		1951–1975		1976–2000		2001–2025		1926–1975		1976–2025	
		Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Q1	Mean	0.149	0.126	0.105	0.094	0.167	0.149	0.159	0.137	0.128	0.108	0.123	0.100	0.117	0.107	0.178	0.157	0.128	0.108	0.127	0.109	0.153	0.132
	Std	0.268	0.268	0.145	0.145	0.138	0.138	0.144	0.144	0.149	0.149	0.266	0.263	0.142	0.141	0.133	0.133	0.149	0.149	0.212	0.211	0.141	0.141
	Sharpe	0.557	0.470	0.725	0.649	1.209	1.081	1.103	0.952	0.861	0.724	0.461	0.381	0.826	0.759	1.339	1.177	0.861	0.724	0.600	0.515	1.084	0.936
	Skew	0.586	0.586	-0.104	-0.104	-0.985	-0.985	-0.761	-0.761	-0.483	-0.668	0.707	0.401	-0.090	-0.146	-1.193	-1.287	-0.483	-0.668	0.305	0.220	-0.873	-0.976
	Kurtosis	5.614	5.614	1.714	1.714	4.933	4.933	4.367	4.367	3.307	3.714	6.091	5.082	1.572	1.532	6.357	6.886	3.307	3.714	4.664	4.364	5.650	6.300
	Max	0.434	0.434	0.191	0.191	0.143	0.143	0.149	0.149	0.178	0.170	0.430	0.391	0.186	0.181	0.142	0.139	0.178	0.170	0.434	0.391	0.149	0.146
	Min	-0.284	-0.284	-0.141	-0.141	-0.223	-0.223	-0.228	-0.228	-0.180	-0.195	-0.276	-0.288	-0.135	-0.138	-0.225	-0.232	-0.180	-0.195	-0.284	-0.288	-0.228	-0.232
Q2	Mean	0.171	0.146	0.110	0.098	0.166	0.141	0.161	0.134	0.130	0.103	0.145	0.120	0.122	0.110	0.177	0.151	0.130	0.103	0.141	0.122	0.153	0.127
	Std	0.320	0.320	0.161	0.161	0.168	0.168	0.173	0.173	0.182	0.183	0.318	0.315	0.157	0.157	0.163	0.163	0.182	0.183	0.242	0.241	0.171	0.171
	Sharpe	0.535	0.456	0.683	0.609	0.988	0.839	0.931	0.774	0.714	0.565	0.457	0.380	0.773	0.703	1.091	0.929	0.714	0.565	0.582	0.506	0.895	0.743
	Skew	1.094	1.094	0.242	0.242	-0.979	-0.979	-0.754	-0.754	-0.361	-0.519	1.215	0.926	0.237	0.161	-1.187	-1.291	-0.361	-0.519	0.668	0.584	-0.867	-0.980
	Kurtosis	7.936	7.936	3.125	3.125	4.354	4.354	3.789	3.789	1.917	2.263	8.413	7.264	3.003	2.849	5.778	6.400	1.917	2.263	6.525	6.225	5.071	5.722
	Max	0.569	0.569	0.258	0.258	0.166	0.166	0.172	0.172	0.179	0.173	0.565	0.532	0.253	0.246	0.165	0.162	0.179	0.173	0.569	0.532	0.172	0.169
	Min	-0.310	-0.310	-0.165	-0.165	-0.271	-0.271	-0.276	-0.276	-0.211	-0.230	-0.302	-0.312	-0.160	-0.164	-0.273	-0.284	-0.211	-0.230	-0.310	-0.312	-0.276	-0.284
Q3	Mean	0.184	0.151	0.117	0.102	0.172	0.137	0.167	0.131	0.122	0.086	0.158	0.125	0.129	0.115	0.183	0.148	0.122	0.086	0.151	0.127	0.159	0.124
	Std	0.370	0.370	0.178	0.178	0.191	0.191	0.197	0.197	0.210	0.210	0.368	0.362	0.174	0.174	0.186	0.186	0.210	0.210	0.274	0.273	0.194	0.194
	Sharpe	0.497	0.408	0.657	0.573	0.901	0.717	0.848	0.665	0.583	0.407	0.431	0.346	0.739	0.662	0.983	0.795	0.583	0.407	0.551	0.465	0.820	0.639
	Skew	1.306	1.306	0.221	0.221	-0.828	-0.828	-0.623	-0.623	-0.237	-0.401	1.427	1.110	0.216	0.137	-1.036	-1.143	-0.237	-0.401	0.763	0.678	-0.716	-0.823
	Kurtosis	8.415	8.415	2.544	2.544	3.027	3.027	2.452	2.452	1.692	1.915	8.892	7.566	2.422	2.291	4.472	5.010	1.692	1.915	6.604	6.304	3.744	4.294
	Max	0.661	0.661	0.267	0.267	0.186	0.186	0.199	0.199	0.207	0.196	0.657	0.611	0.262	0.254	0.185	0.181	0.207	0.196	0.661	0.611	0.199	0.195
	Min	-0.342	-0.342	-0.181	-0.181	-0.291	-0.291	-0.298	-0.298	-0.233	-0.246	-0.334	-0.351	-0.176	-0.180	-0.293	-0.306	-0.233	-0.246	-0.342	-0.351	-0.298	-0.306
Q4	Mean	0.226	0.181	0.110	0.092	0.158	0.111	0.153	0.107	0.116	0.060	0.200	0.155	0.122	0.105	0.169	0.122	0.116	0.060	0.168	0.136	0.145	0.099
	Std	0.432	0.432	0.204	0.204	0.223	0.223	0.229	0.229	0.249	0.248	0.430	0.422	0.200	0.199	0.218	0.218	0.249	0.248	0.316	0.315	0.226	0.226
	Sharpe	0.523	0.419	0.539	0.451	0.708	0.497	0.668	0.467	0.464	0.243	0.464	0.368	0.608	0.525	0.772	0.559	0.464	0.243	0.532	0.432	0.642	0.438
	Skew	1.864	1.864	0.425	0.425	-0.484	-0.484	-0.280	-0.280	0.146	-0.055	1.985	1.626	0.420	0.328	-0.692	-0.815	0.146	-0.055	1.064	0.979	-0.372	-0.495
	Kurtosis	11.777	11.777	3.136	3.136	1.573	1.573	1.115	1.115	2.149	2.110	11.254	9.421	3.070	2.872	3.070	3.423	2.149	2.110	8.415	8.115	2.362	2.913
	Max	0.774	0.774	0.320	0.320	0.207	0.207	0.221	0.221	0.315	0.293	0.770	0.708	0.316	0.306	0.206	0.200	0.315	0.293	0.774	0.708	0.221	0.215
	Min	-0.344	-0.344	-0.197	-0.197	-0.297	-0.297	-0.300	-0.300	-0.254	-0.276	-0.336	-0.352	-0.192	-0.197	-0.295	-0.310	-0.254	-0.276	-0.344	-0.352	-0.300	-0.310
Q5	Mean	0.270	0.225	0.081	0.062	0.136	0.089	0.131	0.085	0.071	0.011	0.244	0.199	0.093	0.076	0.147	0.100	0.071	0.011	0.190	0.158	0.123	0.077
	Std	0.522	0.522	0.248	0.248	0.276	0.276	0.282	0.282	0.313	0.310	0.520	0.511	0.244	0.243	0.271	0.270	0.313	0.310	0.378	0.377	0.279	0.278
	Sharpe	0.517	0.431	0.327	0.250	0.493	0.322	0.464	0.301	0.228	0.034	0.468	0.390	0.382	0.312	0.543	0.369	0.228	0.034	0.503	0.419	0.441	0.277
	Skew	2.437	2.437	0.899	0.899	0.068	0.068	0.154	0.154	0.962	0.806	2.558	2.304	0.934	0.854	0.182	0.073	0.962	0.806	1.426	1.341	0.108	-0.001
	Kurtosis	13.768	13.768	5.512	5.512	1.644	1.644	1.186	1.186	5.052	4.633	13.245	11.606	5.421	5.144	3.141	3.135	5.052	4.633	9.766	9.466	2.413	2.964
	Max	1.036	1.036	0.436	0.436	0.353	0.353	0.363	0.363	0.554	0.531	1.032	0.970	0.440	0.431	0.352	0.342	0.554	0.531	1.036	0.970	0.363	0.353
	Min	-0.346	-0.346	-0.222	-0.222	-0.292	-0.292	-0.295	-0.295	-0.247	-0.267	-0.338	-0.348	-0.217	-0.223	-0.290	-0.301	-0.247	-0.267	-0.346	-0.348	-0.295	-0.301
Q5–Q1	Mean	0.121	0.099	-0.024	-0.032	-0.031	-0.060	-0.028	-0.052	-0.057	-0.097	0.121	0.054	-0.024	-0.051	-0.031	-0.100	-0.057	-0.138	0.063	0.049	-0.030	-0.055
	Std	0.312	0.312	0.133	0.133	0.190	0.190	0.189	0.189	0.214	0.210	0.309	0.294	0.129	0.127	0.186	0.184	0.214	0.210	0.185	0.184	0.189	0.187
	Sharpe	0.388	0.317	-0.181	-0.241	-0.163	-0.316	-0.148	-0.275	-0.266	-0.462	0.391	0.184	-0.187	-0.401	-0.167	-0.542	-0.266	-0.655	0.341	0.266	-0.159	-0.294
	Skew	3.681	3.681	1.907	1.907	1.122	1.122	1.110	1.110	2.307	2.071	3.692	3.303	1.918	1.716	1.134	0.870	2.307	2.071	2.395	2.310	1.118	0.874
	Kurtosis	20.449	20.449	9.409	9.409	6.887	6.887	6.875	6.875	15.083	13.723	20.460	17.494	9.420	8.329	6.899	6.381	15.083	13.723	13.557	13.257	6.883	6.345
	Max	0.675	0.675	0.257	0.257	0.323	0.323	0.325	0.325	0.487	0.459	0.673	0.603	0.255	0.240	0.321	0.301	0.487	0.459	0.675	0.603	0.323	0.303
	Min	-0.149	-0.149	-0.089	-0.089	-0.200	-0.200	-0.197	-0.197	-0.173	-0.179	-0.147	-0.160	-0.087	-0.093	-0.198	-0.213	-0.173	-0.179	-0.149	-0.160	-0.200	-0.215
p-value ($\mu_{Q5} - \mu_{Q1} > 0$)		**0.006**	**0.013**	0.804	0.862	0.779	0.908	0.763	0.885	0.883	**0.979**	**0.007**	**0.016**	0.799	0.867	0.779	0.923	0.883	**0.979**	0.054	0.082	0.775	0.904

Note: This table provides an overview of the statistics for quintiles over different periods from 1926 to 2025, both before and after accounting for spread costs. Mean, Standard Deviation (Std), and Sharpe Ratio (SR) are expressed on an annualized basis. Max and Min refer to the peak and lowest monthly returns, respectively. To assess the Q5–Q1 distribution, we employ bootstrapping with 100,000 simulations and determine the p-value by calculating the share of simulations with a positive mean. Hence, a p-value below 0.05 implies a statistically significant mean greater than 0, while a p-value above 0.95 points to a statistically significant mean greater than 0. Significant p-values are highlighted in bold.