

Dynamic Return Connectedness and Portfolio Implications in Eurozone Alcoholic Beverage Stocks

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Abstract

This paper investigates dynamic return spillovers and portfolio implications for Eurozone alcoholic beverage companies' stocks using a time-varying parameter vector autoregression connectedness framework. Static results indicate moderate average integration of the sector, with an average Total Connectedness Index of 32.37%, while directional measures reveal a clear core-periphery structure in which large multinational producers act as persistent net transmitters and smaller, more specialized firms are predominantly net receivers. Dynamic connectedness rises sharply during major stress episodes, particularly in March 2020 and early 2022. Robustness checks across alternative forecast horizons, lag orders, and forgetting factors preserve the main transmitter-receiver structure and the timing of the principal connectedness peaks. Portfolio comparisons show that the minimum-variance strategy provides the strongest full-sample risk performance, whereas the minimum-connectedness portfolio improves on the naive equal-weight benchmark in volatility and drawdown terms but does not outperform the conventional optimized strategies. Overall, the findings show that sectoral network position contains economically relevant information for understanding risk transmission and diversification among Eurozone alcoholic beverage equities.

Keywords: Alcoholic beverage stocks; Eurozone; Financial connectedness; Time-varying parameter vector autoregression; Spillovers; Portfolio optimization; Hedging effectiveness

JEL Codes

C32; G11; G15; L66

1. INTRODUCTION

European alcoholic beverage producers operate in a market shaped by premiumisation, product innovation, and changing distribution channels, while demand is also influenced by evolving health preferences and the growth of non-alcoholic alternatives. Industry reports describe a large European market supported by premium and craft demand and the expansion of e-commerce channels [1]. This evolution is partly driven by a consumer shift towards healthier choices, leading to increased demand for low- and no-alcohol beverages that aim to replicate the flavor profiles of their full-strength counterparts through advanced technologies [2]. At the same time, recent evidence suggests that younger European consumers are increasingly reducing alcohol consumption, implying that firms face not only cyclical shocks but also structural shifts in demand that can affect revenues, margins, and risk exposures [3]. These developments matter for financial markets because the sector includes several large,

internationally integrated firms, and their equity prices may co-move and transmit shocks through common inputs, distribution networks, regulation, and global demand.

Prior research in wine and alcoholic beverage economics has focused mainly on operational, performance, and market-structure questions rather than inter-firm financial shock transmission. For example, Varsei et al. [4] analyse global wine logistics and emphasise the environmental–cost trade-offs associated with bottling location decisions across supply chains. Neves et al. [5] examine Iberian wine firms and show that the determinants of performance differ depending on whether performance is measured by return on assets or by sales growth, implying that managerial decisions and macro conditions may affect firms through distinct channels. Extending the performance literature, Tomas Žiković et al. [6] use dynamic panel models for European wine companies and highlight the roles of leverage, cash flow, growth, productivity, and institutional quality. A complementary stream links intangibles and firm outcomes: Amadiou and Viviani [7] find that intangible expenses can increase expected profit and reduce variance risk, while Amadiou and Viviani [8] show that the relationship between intangibles and performance varies with legal form and business activity, and that intangible proxies can affect economic and commercial performance differently. At a broader level, Amadiou et al. [9] discuss cyclical pressures and longer-run competitiveness challenges for French wine companies, underscoring that sectoral stress can be persistent and may be reflected in financial valuations.

Other studies focus on pricing and market demand. Rebelo et al. [10] demonstrate that wine price determinants differ across distribution channels, supporting the view that wine markets are heterogeneous and that firms' positioning along the value chain matters for outcomes. On the demand side, Omura [11] documents long-run relationships between wine consumption and food-related consumption in Japan, suggesting that wine demand can be embedded in broader consumption patterns. Milhøj [12] analyses the Danish alcohol market and attributes the rising market share of wine partly to relative price shifts and behavioural change. In international business settings, Yu and Lindsay [13] show that export commitment in New Zealand wine companies responds to past performance and crisis effects, moderated by managerial attitudes and perceived uncertainty, indicating that shocks can affect strategy choices and risk-taking.

A related line of work addresses risk management in wine and viticulture. Cyr et al. [14] propose weather derivatives based on bioclimatic indices to hedge viticulture risks, and Viviani [15] models an option-like protection mechanism against wine price risk. From a producer-behaviour perspective, Aka et al. [16] estimate risk attitudes for French winegrowers and find widespread risk aversion, with heterogeneous patterns across regions. Taken together, these contributions establish that the wine and broader alcoholic beverage value chain is exposed to

multiple sources of uncertainty (demand, climate, costs, regulation), but they do not directly quantify how such shocks propagate across publicly traded firms as a financial network. Financial connectedness research in the broader “wine as an asset” domain has grown, yet it typically examines fine-wine indices relative to other asset classes rather than within-industry equity networks. Let and Siemaszkiewicz [17] study tail dependence and show that the safe-haven or contagion properties of fine wine can depend on the investment horizon. Samitas et al. [18] apply a time-varying parameter vector autoregression connectedness framework to fine wine and major global markets and find that connectedness intensifies during stress periods, with implications for hedging effectiveness during COVID-19. Potrykus [19] explores co-occurring bubble periods across investment-wine indices, precious metals, and stock indices, again emphasizing cross-market dynamics rather than inter-firm spillovers among producers. This evidence supports the idea that wine-related assets are embedded in broader financial systems; however, empirical work that maps time-varying risk transmission among Eurozone-listed alcoholic beverage companies themselves remains comparatively limited.

Despite the growing literature on wine economics, alcoholic beverage markets, and financial connectedness, the firm-level transmission of equity-market shocks within the alcoholic beverage industry remains insufficiently documented. Existing financial studies mainly examine fine-wine indices relative to other asset classes, whereas research on beverage-producing firms has concentrated on performance, pricing, demand, supply chains, and operational risk. As a result, it remains unclear how shocks propagate among listed alcoholic beverage producers that share a common regional economic environment but differ in size, product specialization, geographic exposure, and market visibility.

A second unresolved issue concerns portfolio implications. Existing evidence does not show whether information contained in an intra-industry connectedness network provides diversification benefits that differ from conventional variance- or correlation-based allocation. This question is particularly relevant for a sector exposed to common demand, regulatory, input-cost, and macroeconomic shocks.

The objective of this study is to characterize the time-varying return-transmission network among Eurozone-listed alcoholic beverage firms and to assess whether the resulting network structure contains useful information for portfolio allocation. Accordingly, the study addresses three research questions: How strong and time-varying is return connectedness among these firms? Which firms act as persistent net transmitters or receivers of shocks, and does a core–periphery structure emerge within the sector? Does a minimum-connectedness portfolio provide diversification characteristics that differ from those of minimum-variance, minimum-correlation, and naive equal-weight portfolios?

The contribution of the analysis is therefore not the introduction of a new connectedness estimator, but the identification of a previously undocumented firm-level financial network within the Eurozone alcoholic beverage sector and the evaluation of its portfolio implications. By linking transmitter–receiver roles to alternative allocation rules, the study adds a financial-network dimension to the wine and alcoholic beverage economics literature.

2. DATA

The firm universe was constructed by screening CompaniesMarketCap’s daily updated ranking of the largest publicly traded alcoholic beverage companies by market capitalization and retaining the Eurozone-headquartered constituents [20]. The final sample comprises sixteen firms: Anheuser-Busch InBev SA/NV (Belgium; ABInBev), Heineken N.V. (Netherlands; Heineken), Pernod Ricard S.A. (France; Pernod), Davide Campari-Milano N.V. (Italy; Campari), Rémy Cointreau S.A. (France; Remy), Olvi Oyj (Finland; Olvi), Laurent-Perrier S.A. (France; Laurent), Oeneo S.A. (France; Oeneo), Anora Group Oyj (Finland; Anora), Hawesko Holding SE (Germany; Hawesko), Italian Wine Brands S.p.A. (Italy; IWB), Schloss Wachenheim AG (Germany; SWA), Vranken-Pommery Monopole S.A. (France; Vranken), Brouwerij Handelsmaatschappij NV (Belgium; COBH), Berentzen-Gruppe AG (Germany; Berentzen), and Marie Brizard Wine & Spirits S.A. (France; Brizard). The screening was conducted using the CompaniesMarketCap ranking accessed on March 1, 2026. Because this current ranking is applied retrospectively to the 2019–2025 sample, firms that were delisted, acquired, or otherwise absent from the ranking at the screening date are not represented. The sample therefore contains a potential survivorship-selection element. The connectedness results describe the network among firms that remained listed and met the screening criteria at the selection date, while the retrospective portfolio results may be somewhat upwardly biased relative to those obtainable from a contemporaneously reconstituted investable universe.

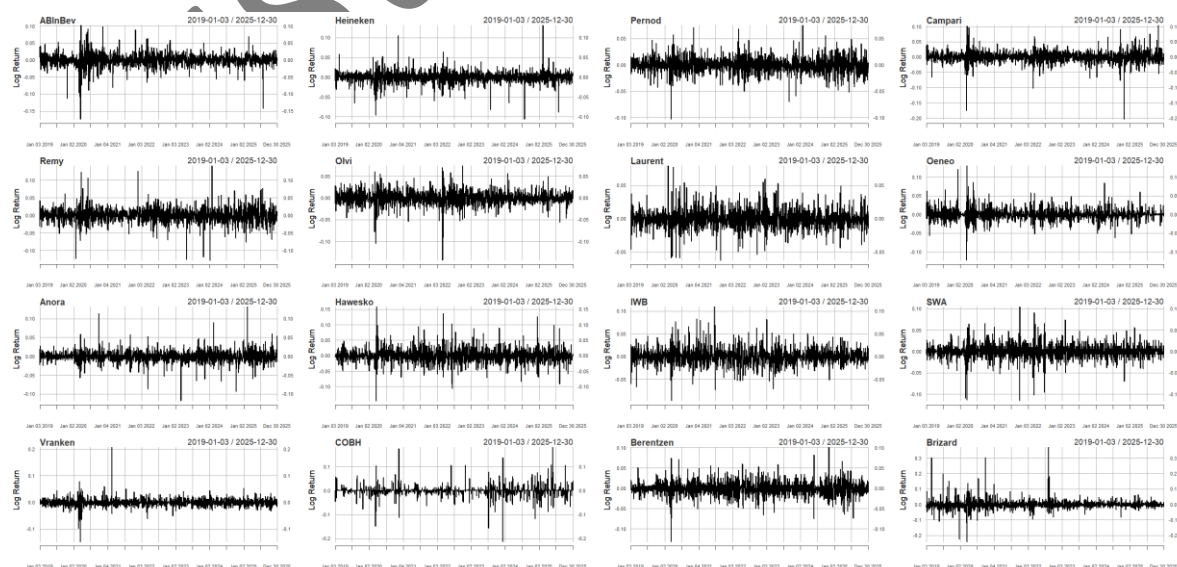
Daily adjusted closing prices were downloaded from Yahoo Finance in R using the quantmod package by Ryan and Ulrich [21]. Returns are computed as first differences of log prices over 2019-01-03–2025-12-30. Table 1 reports descriptive statistics for the 1,701 daily observations available for each firm. The return distributions display substantial non-normality and heterogeneity, with Pearson kurtosis ranging from 6.43 for Pernod Ricard to 38.62 for Marie Brizard. The table also reports the proportion of zero-return days as an indicator of trading intensity. Zero-return observations are rare for the largest firms, including AB InBev (0.65%), Heineken (1.00%), Pernod Ricard (1.23%), and Campari (1.76%), but considerably more frequent for several smaller firms, most notably COBH (69.84%), Schloss Wachenheim (25.75%), Oeneo (20.75%), and Vranken-Pommery (17.81%). These differences are considered

when interpreting the receiver roles of thinly traded firms. Figure 1 provides a visual illustration of the return dynamics, and Ljung–Box tests on squared returns support autoregressive conditional heteroskedasticity-type dependence. Pairwise correlation is generally positive but heterogeneous across firms, motivating the time-varying connectedness framework in the subsequent analysis.

Table 1. Descriptive statistics of daily log returns (%)

Firm	Mean	Std. Dev.	Minimum	Maximum	Skewness	Kurtosis	Zero-return days (%)
ABInBev	0.0014	1.9157	-17.4450	10.2882	-0.8579	13.5097	0.65
Heineken	-0.0087	1.4560	-10.6954	13.1875	-0.1882	14.1577	1.00
Pernod	-0.0430	1.4584	-10.3501	7.5608	-0.0933	6.4327	1.23
Campari	-0.0171	1.8776	-20.4572	10.4625	-0.9728	18.8697	1.76
Remy	-0.0748	2.0362	-12.7792	14.1166	-0.0885	9.1779	2.12
Olvi	0.0170	1.5750	-14.2656	7.3427	-0.7109	10.3257	7.70
Laurent	0.0097	1.3829	-6.2261	7.9481	0.3053	6.5996	15.34
Oeneo	0.0083	1.5633	-12.2282	13.0162	0.6003	12.3092	20.75
Anora	-0.0136	1.5299	-11.8300	13.2154	0.2486	13.1316	5.58
Hawesko	-0.0113	2.2197	-14.6008	15.8546	0.4659	9.0699	13.52
IWB	0.0300	1.7084	-9.7422	10.9739	0.4305	7.1422	13.87
SWA	0.0154	1.6135	-11.5832	10.5361	-0.2331	11.0379	25.75
Vranken	-0.0436	1.3731	-14.7371	7.8988	-0.7760	14.7616	17.81
COBH	-0.0570	1.9445	-21.3149	18.1217	-0.1334	31.9685	69.84
Berentzen	-0.0241	1.6911	-13.1097	10.1003	-0.1543	7.8704	17.52
Brizard	0.0064	2.9542	-24.0141	36.9028	2.6002	38.6237	12.46

Figure 1. Daily log-return series



3. TVP-VAR CONNECTEDNESS FRAMEWORK

In this section, we briefly describe the methodology used to model connectedness in a time-varying parameter framework. We implement the multivariate Kalman-filter TVP-VAR approach of Antonakakis et al. [22], which allows the VAR coefficients to evolve over time and uses multivariate exponentially weighted moving-average updates so that both the innovation variance–covariance matrix and the parameter-variance matrix vary through time. This provides a flexible setting for capturing evolving connectedness dynamics.

Based on the Bayesian information criterion (BIC), we select a time-varying parameter vector autoregression of order one, TVP-VAR(1), as the baseline specification. The generalized forecast error variance decomposition is computed using a 10-step forecast horizon ($H = 10$), while the TVP-VAR forgetting factors are set to $\kappa_1 = \kappa_2 = 0.99$ and the Minnesota-prior shrinkage parameter to 0.1. These values follow the standard implementation of the TVP-VAR connectedness framework and allow gradual parameter adaptation without relying on a rolling estimation window. The model is written in state-space form through a measurement equation and a state equation:

$$z_t = \mathbf{B}_t z_{t-1} + \epsilon_t \quad \epsilon_t \sim N(\mathbf{0}, \Sigma_t) \quad (1)$$

$$\text{vec}(\mathbf{B}_t) = \text{vec}(\mathbf{B}_{t-1}) + \mathbf{v}_t \quad \mathbf{v}_t \sim N(\mathbf{0}, \mathbf{S}_t) \quad (2)$$

In Equations (1)–(2), z_t and ϵ_t are $k \times 1$ vectors, $\mathbf{B}_t$ and Σ_t are $k \times k$ matrices, $\text{vec}(\mathbf{B}_t)$ and $\mathbf{v}_t$ are $k^2 \times 1$ vectors, and $\mathbf{S}_t$ is a $k^2 \times k^2$ time-varying state covariance matrix.

Following the Diebold–Yilmaz connectedness framework, spillovers are measured using the Generalized Forecast Error Variance Decomposition (GFEVD), building on Koop et al. [23] and Pesaran and Shin [24]. The generalized approach is invariant to variable ordering. In accordance with the Wold representation, the TVP-VAR is expressed in a time-varying moving-average form. The coefficient matrix $A(h, t)$ captures the response at horizon h at time t , with the contemporaneous coefficient equal to the identity matrix. The scaled GFEVD normalizes the unscaled variance-decomposition shares so that each row sums to unity. Each normalized off-diagonal element measures the share of the H -step-ahead forecast-error variance of variable i attributable to shocks in variable j and therefore defines directional connectedness from j to i . It is computed as follows:

$$\tilde{\phi}_{ij,t}^g(H) = \frac{\sum_{h=0}^{H-1} (\epsilon_i^T A_{ht} \Sigma_t \epsilon_j)^2}{(\epsilon_i^T \Sigma_t \epsilon_j) \sum_{h=0}^{H-1} (\epsilon_i^T A_{ht} \Sigma_t A_{ht}^T \epsilon_i)} \quad (3)$$

By construction, the normalized GFEVD rows sum to one. Here, H denotes the forecast horizon, and the selection vector for variable i has unity in the i -th position and zeros elsewhere.

217 Total Directional Connectedness to Others (TO) measures the total contribution of shocks in
 218 variable j to the forecast-error variances of all other variables.

$$TO_{jt} = \sum_{i=1, i \neq j}^k \tilde{\phi}_{ij,t}^g(H) \quad (4)$$

219 Total Directional Connectedness from Others (FROM) measures the cumulative contribution
 220 of shocks in all other variables to the forecast-error variance of variable j .

$$FROM_{jt} = \sum_{i=1, i \neq j}^k \tilde{\phi}_{ji,t}^g(H) \quad (5)$$

221 Net Total Directional Connectedness (NET) is defined as TO minus FROM and identifies
 222 whether a variable is a net transmitter (positive NET) or a net receiver (negative NET) of
 223 shocks.

$$NET_{jt} = \sum_{i=1, i \neq j}^k \tilde{\phi}_{ij,t}^g(H) - \sum_{i=1, i \neq j}^k \tilde{\phi}_{ji,t}^g(H) = TO_{jt} - FROM_{jt} \quad (6)$$

224 The Total Connectedness Index (TCI) summarizes the overall degree of system-wide spillovers
 225 by aggregating the off-diagonal forecast-error variance shares.

$$TCI_t = k^{-1} \sum_{j=1}^k TO_{jt} \equiv k^{-1} \sum_{j=1}^k FROM_{jt} \quad (7)$$

226 Net Pairwise Directional Connectedness (NPDC) assesses bilateral dominance between
 227 variables i and j by comparing the directional impact in the two directions:

$$NPDC_{ij,t} = \tilde{\phi}_{ij,t}^g(H) - \tilde{\phi}_{ji,t}^g(H) \quad (8)$$

228 Pairwise Connectedness Index (PCI): Following Gabauer [25], we further summarize bilateral
 229 interconnectedness using an intensity measure that is not captured by the TCI alone. The PCI
 230 between variables i and j is defined as:

$$PCI_{ij,t} = 2 \left(\frac{\tilde{\phi}_{ij,t}^g(H) + \tilde{\phi}_{ji,t}^g(H)}{\tilde{\phi}_{ii,t}^g(H) + \tilde{\phi}_{ij,t}^g(H) + \tilde{\phi}_{ji,t}^g(H) + \tilde{\phi}_{jj,t}^g(H)} \right) \quad (9)$$

231 The PCI takes values in the interval $[0, 1]$ and measures the intensity of bilateral
 232 interconnectedness between variables i and j . Values closer to 1 indicate stronger bilateral
 233 connectedness, whereas values near 0 indicate weaker linkage. Collecting the PCI values for all
 234 pairs yields the time-varying PCI matrix, which is used as an input to the connectedness-based
 235 portfolio allocation.

236 Minimum variance portfolio: The minimum variance portfolio is a standard benchmark in
 237 multivariate portfolio choice and seeks the lowest attainable portfolio volatility for the available

set of assets [26]. Using the conditional variance–covariance matrix from the TVP-VAR innovations, the portfolio weights are computed as:

$$w_{\Sigma_t} = \frac{\Sigma_t^{-1} \cdot I}{I' \cdot \Sigma_t^{-1} \cdot I}$$

where the portfolio-weight vector is $k \times 1$ and I denotes a $k \times 1$ vector of ones.

Minimum correlation portfolio: The minimum correlation portfolio provides an alternative allocation rule based on conditional correlations [27]. Unlike the minimum variance portfolio, it minimizes comovement rather than the conditional variance–covariance structure. The corresponding portfolio weights are computed from the time-varying conditional correlation matrix as follows:

$$R_t = \text{diag}(\Sigma_t)^{-0.5} \cdot \Sigma_t \cdot \text{diag}(\Sigma_t)^{-0.5}$$

$$w_{R_t} = \frac{R_t^{-1} \cdot I}{I' \cdot R_t^{-1} \cdot I}$$

Minimum connectedness portfolio: Finally, the minimum connectedness portfolio uses the time-varying PCI matrix rather than conditional variances or correlations [28]. Its objective is to reduce exposure to bilateral network connectedness and thereby limit sensitivity to transmitted shocks. The portfolio weights are computed as:

$$w_{C_t} = \frac{PCI_t^{-1} \cdot I}{I' \cdot PCI_t^{-1} \cdot I}$$

where the PCI matrix denotes the time-varying pairwise connectedness structure used in the optimization.

Portfolio performance is evaluated using the Sharpe ratio (SR) [29] and hedging effectiveness (HE) [30], together with the additional strategy-level return and drawdown measures described below. The Sharpe ratio, also known as the reward-to-volatility ratio, is computed as:

$$SR = \frac{\bar{r}_p}{\sqrt{\text{var}(r_p)}}$$

where r_p denotes the portfolio return. The reported Sharpe ratio is calculated at the daily frequency as the mean portfolio excess return divided by its standard deviation, using a zero risk-free rate ($R_f = 0$), and is not annualized. The zero-rate assumption is used as a transparent within-sample benchmark and should not be interpreted as implying that the opportunity cost of capital was negligible, particularly during the positive euro-area interest-rate environment in the later part of the sample. Consequently, the Sharpe ratios are interpreted primarily as relative within-sample measures, while the portfolio comparison also emphasizes annualized volatility and maximum drawdown.

Hedging effectiveness (HE) measures the reduction in variance obtained by investing in a portfolio rather than holding a single asset i . Following Antonakakis et al. [31], HE is computed as:

$$HE_i = 1 - \frac{var(r_p)}{var(r_i)}$$

where $var(r_p)$ denotes the portfolio variance and $var(r_i)$ denotes the variance of asset i . HE_i therefore measures the proportional reduction in variance relative to the unhedged position in asset i ; larger values indicate greater variance reduction.

For the strategy-level performance comparison, we additionally report annualized mean return, annualized volatility, maximum drawdown, final cumulative return, and mean hedging effectiveness. Annualized mean return and volatility are based on 252 trading days. Maximum drawdown is the largest peak-to-trough decline in the cumulative wealth index, and final cumulative return is calculated from the accumulated portfolio return series. Mean HE is the average hedging effectiveness across the sixteen single-asset benchmarks. To assess whether the connectedness results depend on the baseline specification, we also conduct one-at-a-time robustness checks using alternative forecast horizons ($H = 5$ and $H = 20$), an alternative lag order ($p = 2$), and alternative forgetting factors ($\kappa_1 = \kappa_2 = 0.98$ and 0.995). The robustness assessment focuses on the level and dynamics of the TCI, the rank ordering of average NET connectedness, the transmitter/receiver classification, and the timing of the main stress peaks.

4. FINDINGS

4.1. Average Total Connectedness Index

Table 2 indicates a materially integrated return network among Eurozone alcoholic beverage equities. Average total connectedness equals 32.37% and corrected total connectedness equals 34.53%, implying that roughly one third of each firm's forecast-error variance is explained by shocks originating in other firms rather than by idiosyncratic dynamics. This magnitude is consistent with the moderate and shock-sensitive spillovers documented for wine-related assets in broader cross-market settings, where connectedness rises during stress periods, as reported by Samitas et al. [18]. It also aligns with the horizon-dependent contagion and hedging evidence in Let and Siemaszkiewicz [17] and motivates the time-varying analysis developed in the remainder of the paper.

At the firm level, the matrix shows a clear core structure. Pernod records the largest outgoing spillovers with TO equal to 81.33% and is the dominant net transmitter with NET equal to 19.81%. Heineken is the second largest transmitter with TO equal to 64.09% and NET equal to 9.01%. Campari and AB InBev also act as net transmitters with NET equal to 5.26% and 4.83%,

while Remy Cointreau remains mildly positive with NET equal to 2.78%. In contrast, several smaller and more specialized firms are net receivers, most notably Oeneo with NET equal to negative 6.10%, Vranken with NET equal to negative 5.87%, Laurent Perrier with NET equal to negative 5.10%, Italian Wine Brands with NET equal to negative 4.37%, Schloss Wachenheim with NET equal to negative 4.36%, and Marie Brizard with NET equal to negative 4.26%. The own shares reinforce this core periphery pattern: own variance shares are comparatively low for Pernod at 38.49% and for the other core firms around the mid 40% to low 50% range, while they are high for peripheral names such as COBH at 84.81%, Marie Brizard at 81.33%, Hawesko at 80.81%, Laurent Perrier at 80.50%, Italian Wine Brands at 80.49%, and Oeneo at 79.59%.

Pairwise channels are concentrated within the core and reveal economically meaningful bilateral transmission. The largest single directional spillover runs from Pernod to Remy at 19.61%, followed by Remy to Pernod at 16.65% and Pernod to Campari at 16.21%. Additional strong links include Campari to Pernod at 13.56%, Pernod to Heineken at 13.37%, Heineken to AB InBev at 13.65%, and AB InBev to Heineken at 12.27%. These concentrated core linkages imply that common shocks and sector-wide repricing are likely to propagate primarily through the large branded producers, while smaller firms absorb a larger share of sectoral disturbances. The net pairwise transmission counts support this interpretation: Pernod records an NPT value of 15 and Heineken an NPT value of 14, indicating the broadest pairwise dominance in bilateral relations, whereas Oeneo and Italian Wine Brands each record an NPT value of 2 and Vranken an NPT value of 1.

Table 2. Average Total Connectedness Index

	ABInBev	Heineken	Pernod	Campari	Remy	Olvi	Laurent	Oeneo	Anora	Hawesko	IWB	SWA	Vranken	COBH	Berentzen	Brizard	FROM
ABInBev	51.55	13.65	8.11	5.34	4.52	2.79	0.58	1.44	2.41	1.32	1.54	1.53	1.23	0.83	1.69	1.48	48.45
Heineken	12.27	44.92	13.37	8.28	6.1	2.68	0.75	1.1	2.45	0.94	1.25	1.4	1.2	0.73	1.78	0.77	55.08
Pernod	6.38	11.57	38.49	13.56	16.65	2.12	1.05	0.91	1.98	0.97	0.62	1.21	1.33	0.52	1.88	0.76	61.51
Campari	4.53	8.46	16.21	45.99	12.61	2.11	0.99	0.64	1.41	1.11	0.89	0.97	1.27	0.64	1.45	0.71	54.01
Remy	4.03	6.26	19.61	12.33	46.14	1.81	1.16	0.42	2.22	1.06	0.99	0.85	0.85	0.61	0.97	0.7	53.86
Olvi	3.92	4.06	3.51	3.34	2.6	67.22	0.97	1.16	3.69	1.22	0.99	1.55	1.82	0.72	2.62	0.62	32.78
Laurent	1.32	1.53	2.3	1.82	1.62	1.37	80.5	1.18	0.9	0.83	0.96	1.25	1.17	0.85	1.56	0.86	19.5
Oeneo	2.64	1.83	1.68	1.36	0.84	1.26	1.44	79.59	0.98	0.95	1.21	1.13	0.91	1.25	1.79	1.14	20.41
Anora	3.34	3.66	3.43	1.96	2.9	3.63	0.75	0.76	71.61	1.42	1.04	2.24	0.67	0.76	1.17	0.64	28.39
Hawesko	1.68	1.32	1.54	1.25	1	1.2	0.82	0.52	1.42	80.81	1.53	1.94	0.73	1.57	1.41	1.27	19.19
IWB	2.42	1.86	1.3	1.43	1.78	1.17	0.99	1.04	1.22	1.57	80.49	0.85	1.14	0.57	1.01	1.18	19.51
SWA	2.43	2.18	2.01	1.93	1.24	1.79	1.04	1.35	2.45	1.88	0.9	76.18	1.03	0.68	1.59	1.33	23.82
Vranken	1.83	2.24	2.43	2.22	1.24	1.97	1.19	1.07	1.2	0.97	0.86	1.15	77.23	0.78	2.28	1.35	22.77
COBH	1.57	1.26	1.15	1.21	0.7	1.14	1.14	0.83	1.09	1.42	0.54	0.74	0.56	84.81	1.16	0.66	15.19
Berentzen	2.27	2.57	3.06	1.98	1.49	2.93	0.92	1.13	1.25	1.09	0.9	1.23	1.85	1.16	75.22	0.94	24.78
Brizard	2.67	1.65	1.62	1.26	1.35	1.15	0.6	0.78	1.54	1.16	0.92	1.4	1.15	0.82	0.62	81.33	18.67
TO	53.28	64.09	81.33	59.28	56.64	29.12	14.4	14.32	26.19	17.9	15.14	19.45	16.91	12.51	22.97	14.41	517.92

Inc.Own	104.83	109.01	119.81	105.26	102.78	96.33	94.9	93.9	97.81	98.71	95.63	95.64	94.13	97.32	98.19	95.74	€TCI/TCI
NET	4.83	9.01	19.81	5.26	2.78	-3.67	-5.1	-6.1	-2.19	-1.29	-4.37	-4.36	-5.87	-2.68	-1.81	-4.26	34.53/32.37
NPT	11	14	15	12	12	8	4	2	10	6	2	5	1	5	7	6	

In the context of wine economics literature, these results add a financial network layer to studies that primarily focus on operations, performance, and strategic decisions. The strong core spillovers complement firm level performance evidence in Neves et al. [5] and Tomas Žiković et al. [6] by showing that listed firm outcomes are not only driven by internal managerial and balance sheet conditions, but also by sector wide risk transmission. The importance of brand and intangible capital discussed in Amadiou and Viviani [7] and Amadiou and Viviani [8] is consistent with a setting where core firms with stronger market visibility and intangible assets may act as information and shock carriers for the sector. Finally, the presence of sizable spillovers provides a natural motivation for financial risk management approaches in wine markets, echoing the hedging perspective in Viviani [15] and Cyr et al. [14], and the crisis sensitivity of export decisions discussed by Yu and Lindsay [13].

4.2. Dynamic Total Connectedness Index

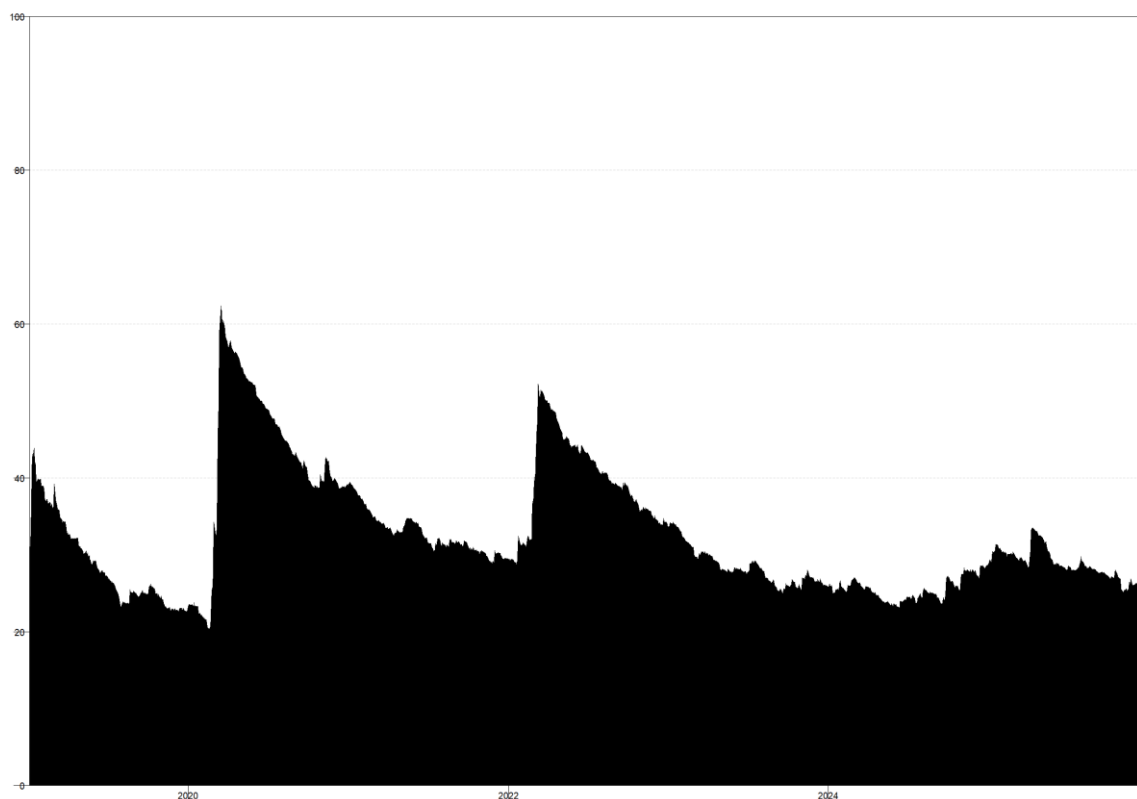
Figure 2 shows that return spillovers among Eurozone alcoholic beverage stocks are clearly regime-dependent. The Dynamic Total Connectedness Index remains mostly in the mid-20% to low-30% range but rises abruptly during crisis windows, consistent with the surge and subsequent mean reversion documented by Diebold and Yilmaz [32] and later time-varying implementations such as Antonakakis et al. [22].

The first and largest jump occurs in March 2020, when the index exceeds 60% and then declines gradually. This pattern is consistent with a common-shock environment in which sector-wide news dominates firm-specific information. In wine-finance evidence, Samitas et al. [18] report that connectedness intensifies during COVID-19, so the timing and magnitude of the spike are consistent with the broader literature.

A second prominent peak appears in early 2022, reaching above 50% before easing again. The timing matches the Europe wide shift in macro and geopolitical conditions, where energy and inflation dynamics and tightening financial conditions increased systematic repricing across consumer sectors. The fact that the index falls back toward the high 20s during 2023 and 2024 suggests a partial return to more differentiated firm level pricing, which is compatible with the corporate wine literature that emphasizes heterogeneity in performance drivers such as leverage, growth, and firm characteristics, as discussed by Neves et al. [5] and Tomas Žiković et al. [6].

The robustness analysis confirms that these results are not driven by the baseline parameter choices. Average TCI is 32.37% under the baseline specification and remains virtually unchanged under $H = 5$ and $H = 20$. Alternative lag and forgetting-factor specifications shift the average level of connectedness to between 30.71% and 36.79%, but the dynamic TCI correlations with the baseline remain high, ranging from 0.941 to 0.994. Spearman correlations of the average NET rankings range from 0.965 to 0.988 for the non-baseline parameterizations, and transmitter/receiver classifications agree in sign for all sixteen firms under every specification. Pernod Ricard and Heineken remain dominant transmitters throughout, while the largest connectedness episode is consistently dated March 16, 2020 and the major early-2022 peak is also preserved. These checks support the qualitative stability of the core-periphery structure and the timing of the main stress episodes.

Figure 2. Dynamic Total Connectedness Index



A smaller re-intensification is visible in 2025, when the index climbs back toward the low-30% range. One plausible common-shock channel is trade policy. Reuters [33] reports that new tariffs were expected to raise prices and disrupt product availability in alcoholic beverages, while Reuters [34] describes a broad market shock as investors reassessed growth and retaliation risks. The sharp global equity drawdown reported by Reuters [35] provides a consistent background for synchronized repricing across listed beverage producers. In the same period, the European Central Bank cut key policy rates by 25 basis points with effect from April

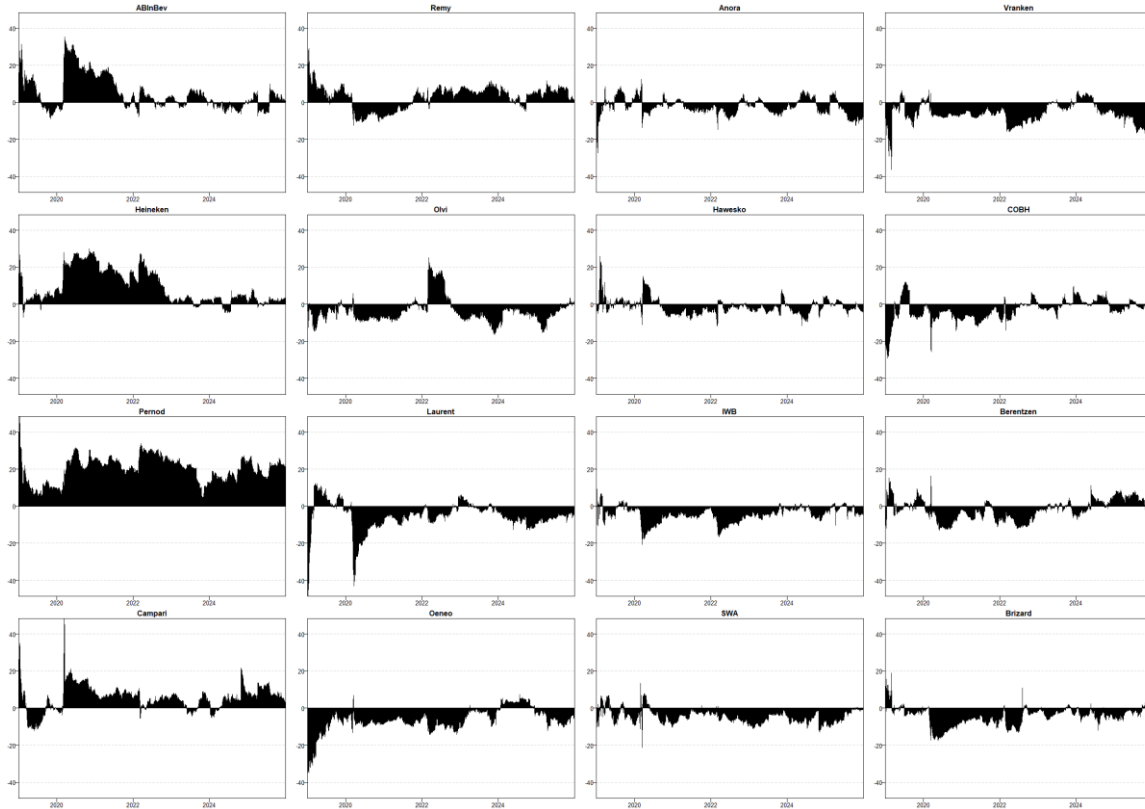
23, 2025, adding a further discount-rate and risk-appetite channel that could temporarily increase cross-firm co-movement.

Toward the end of 2025, sector wide demand narratives may also matter. When Rumney [3] reports evidence that many European consumers are reducing alcohol consumption for taste and health reasons, this kind of broad demand shift can operate as another common factor that investors price across the whole sector rather than firm by firm.

4.3. Firm-Level Net Spillover Roles

Figure 3 presents the time-varying net directional spillovers for each firm (spillovers transmitted minus spillovers received). Positive values indicate net transmitters, while negative values indicate net receivers. The results point to a clear core-periphery structure within the Eurozone alcoholic beverage equity network.

A small set of large, internationally exposed firms—most notably Pernod, Heineken, and AB InBev—remain net transmitters for substantial portions of the sample. Their sustained positive net positions are consistent with the idea that firms with broader geographic revenue bases and stronger exposure to global demand conditions tend to shape sector-wide expectations more strongly than domestically oriented or niche players. In this sense, the pattern echoes the export-commitment evidence that firms' strategic exposure to external markets becomes especially consequential when macro uncertainty rises [13]. It is also in line with firm-performance studies showing that sales growth is more sensitive to macro conditions than "pure" profitability measures, implying that macro news can propagate unevenly across firms depending on their market-facing growth exposure [5].

Figure 3. Dynamic NET connectedness

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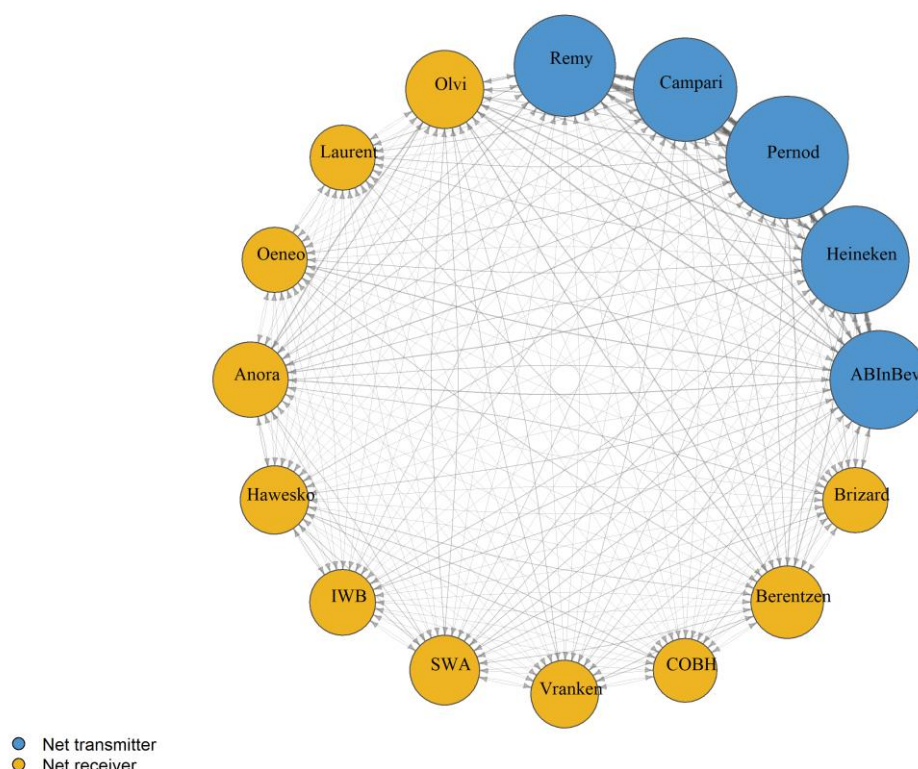
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In contrast, several smaller or more specialised companies—such as Oeneo, Laurent, IWB, SWA, and Brizard—are predominantly net receivers, spending long stretches below zero. This persistent receiver role is consistent with a sector characterised by heterogeneous business models and market segments, where many firms mainly react to sector-wide information rather than generate it. However, the descriptive evidence also shows materially higher zero-return frequencies for several smaller firms. Their receiver status should therefore be interpreted with some caution because infrequent or nonsynchronous trading can delay the incorporation of common information into observed prices. The channel-based heterogeneity documented by Rebelo et al. [10]—where price formation differs across distribution segments—offers an additional economic interpretation: firms positioned differently along the value chain and across channels may absorb common shocks without being central drivers of system-wide repricing.

A third group exhibits role switching around the zero line, with Rémy and Campari being the clearest examples. These alternating positions suggest that systemic influence is not fixed; it varies with regimes in which brand- and segment-specific demand conditions, cost pressures, or strategic news become more salient. This type of time variation is compatible with the broader view that firm characteristics shaping profitability and resilience differ across firm size classes and balance-sheet conditions [6], which can translate into shifting spillover roles even within the same sector.

Overall, the firm-level panels indicate that sector-wide risk transmission is concentrated in the largest multinational producers, while smaller and more specialised firms primarily absorb shocks, and selected mid-sized firms switch roles over time—an economically plausible structure given documented heterogeneity in performance drivers, market segmentation, and international exposure in wine and alcoholic beverage industries [5,10,6,13].

Figure 4. Average connectedness network



This network plot is a directed, weighted graph constructed from the GFEVD matrix in the Diebold–Yilmaz connectedness framework. Each directed link visualises pairwise directional connectedness from asset j to asset i : it measures how much a shock in j contributes to the H -step-ahead forecast-error variance of i . Accordingly, edge thickness is proportional to the magnitude of the normalized off-diagonal GFEVD element; thicker arrows indicate stronger spillover channels, while thinner arrows represent weaker, yet still present, transmissions. The direction of each arrow indicates the spillover direction from j to i . Node size is scaled to total directional connectedness TO , so larger nodes correspond to firms that contribute more to the forecast-error variance of other firms. Node colour reflects NET connectedness: blue nodes are net transmitters and yellow nodes are net receivers. Figure 4 suggests a clear core–periphery structure: a small group of large blue nodes sits at the core of the system and sends relatively strong spillovers to many other firms, whereas most yellow nodes absorb shocks rather than originate them. In practical terms, sector-wide disturbances tend to originate from a limited set

of dominant firms and then propagate across the rest of the Eurozone alcoholic beverage equity universe.

A key visual message is that the strongest spillover channels are concentrated around a few major transmitters. The most prominent node in the figure is Pernod Ricard, which appears to be the central net transmitter, with multiple thick outgoing links that indicate broad influence on other firms. Other large blue nodes, including AB InBev, Heineken, Campari, and Rémy Cointreau, also display sizeable outgoing influence, reinforcing the idea that spillovers are not evenly distributed across companies but are driven primarily by the sector's largest and most internationally exposed players. In contrast, the yellow nodes are generally smaller and more peripheral, indicating that these firms tend to be net recipients of shocks transmitted from the core rather than independent sources of spillovers.

This firm-level picture directly supports the main connectedness results reported in the paper. First, it visually confirms the ranking of net transmitters and net receivers obtained from the quantitative outputs: the firms identified as net transmitters are highlighted at the network core. Second, the figure strengthens the interpretation that return spillovers are concentrated around a limited number of leading companies. Third, the network structure provides a basis for testing whether connectedness-based allocation offers diversification benefits relative to both conventional optimized strategies and a naive equal-weight benchmark; the portfolio results reported below show that such benefits are relative rather than uniformly dominant.

4.4. Portfolio Allocation Patterns, Time Variation, and Performance

Space limitations prevent us from reporting the full set of time-varying weights and dispersion statistics in a table. In what follows, all reported allocation numbers refer to average portfolio weights, meaning the share of total portfolio capital assigned to each firm. The three optimized strategies are also compared with a naive equal-weight ($1/N$) benchmark that assigns $1/16$, or 6.25%, to each firm. Table 3 reports strategy-level return and risk measures, while Figure 5 illustrates selected time-varying optimized portfolio weights and Figure 6 presents the cumulative portfolio returns.

The minimum variance portfolio shows the strongest concentration. It allocates most persistently to a small subset of names, with the largest average weights going to Vranken at about 0.13 and Laurent at about 0.12, while Oeneo and COBH are each around 0.10. Several large core firms receive comparatively small weights, often around 0.01 to 0.03. This pattern follows the variance-minimisation logic of Markowitz [26], where the optimiser reallocates capital toward assets that deliver the greatest conditional variance reduction as the covariance structure changes.

The minimum correlation portfolio is more evenly spread, and it almost excludes Pernod, with an average weight close to 0.00. The redistributed weight shifts toward firms that are less correlated with the rest of the set. COBH carries about 0.11, Laurent and Oeneo are each around 0.09, and many holdings cluster around 0.06 to 0.08. This outcome is consistent with an objective that reduces comovement rather than focusing on marginal variance alone.

The minimum connectedness portfolio yields the most uniform optimized allocations. Many firms receive similar average weights around 0.07 to 0.08, while Pernod remains very small at about 0.01. This aligns with the connectedness-based allocation argument developed by Broadstock et al. [28]. The optimiser treats bilateral network connectedness as an additional source of portfolio risk and shifts weight away from firms that frequently occupy central transmission positions.

Figure 5 illustrates these differences for the selected firms. For example, the MVP weight assigned to COBH increases substantially during 2021–2022 and subsequently falls close to zero after 2023. By contrast, the displayed MCoP weights are comparatively stable over time. This pattern is consistent with the broader allocation results, which show that the minimum-connectedness strategy produces more uniform weights than the minimum-variance strategy.

Figure 5. Selected time-varying portfolio weights under MVP, MCP, and MCoP

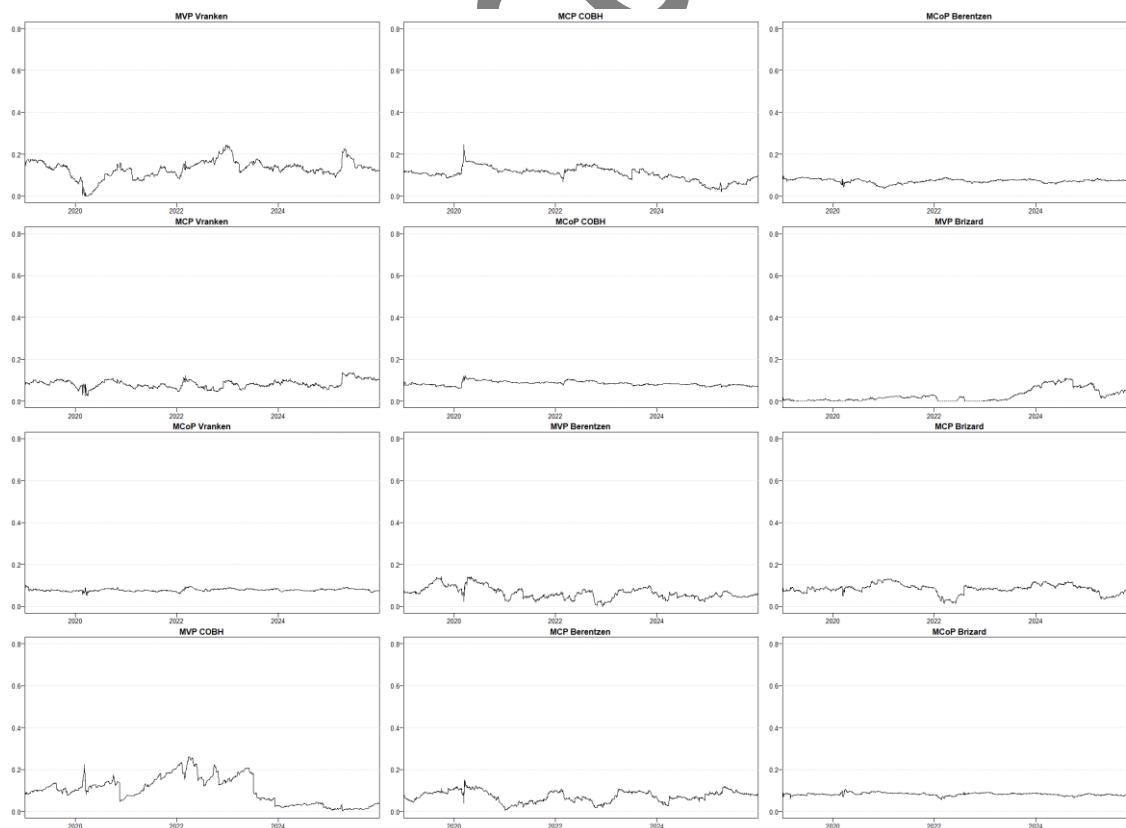


Table 3 shows that the minimum-variance portfolio provides the strongest full-sample risk performance among the four strategies. Its annualized volatility is 8.38%, maximum drawdown

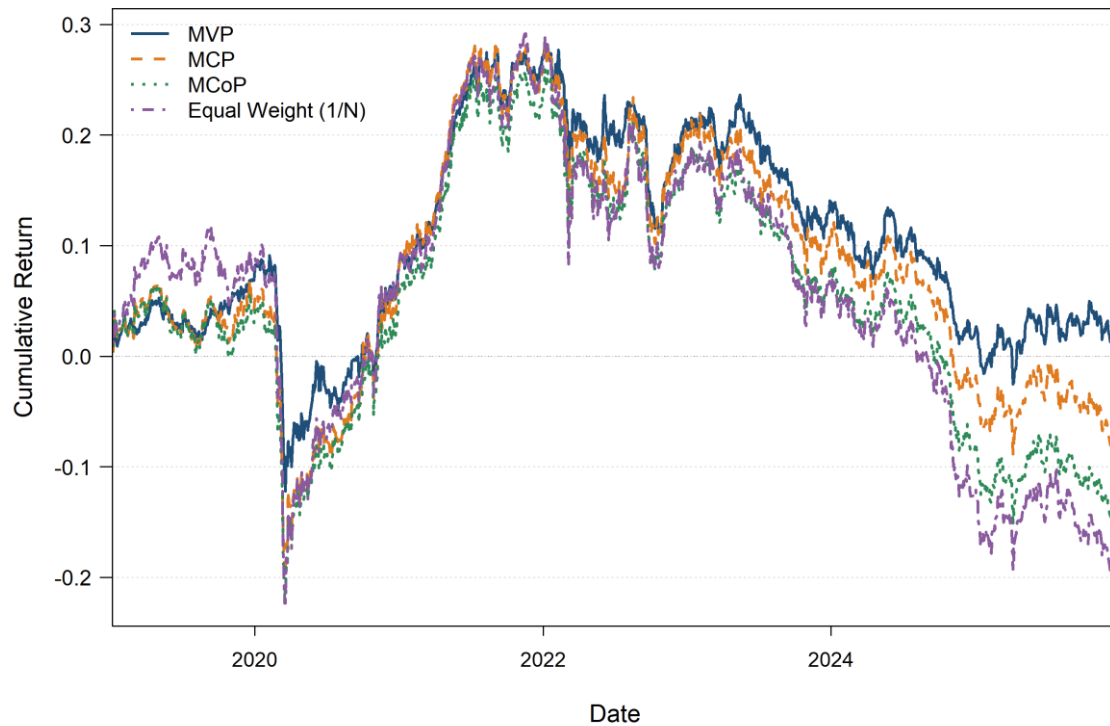
is 24.06%, and final cumulative return is 2.03%. The minimum-correlation portfolio records annualized volatility of 10.16%, a maximum drawdown of 29.09%, and a final cumulative return of -7.01%. The corresponding figures for the minimum-connectedness portfolio are 10.49%, 32.78%, and -13.99%, while the equal-weight benchmark performs least favorably, with annualized volatility of 11.90%, a maximum drawdown of 37.75%, and a final cumulative return of -18.66%. Under the zero-risk-free-rate benchmark, the daily Sharpe ratios are 0.0022 for MVP, -0.0067 for MCP, -0.0134 for MCoP, and -0.0162 for the equal-weight portfolio. Thus, MCoP improves on naive equal weighting in volatility, drawdown, and cumulative-return terms, but it does not outperform MVP or MCP over the full sample. Figure 6 visualizes these differences using distinguishable line styles.

Table 3. Portfolio performance comparison

Strategy	Ann. mean return (%)	Ann. volatility (%)	Sharpe ratio (Rf=0)	Max. drawdown (%)	Final cumulative return (%)	Mean HE
MVP	0.30	8.38	0.0022	24.06	2.03	0.9008
MCP	-1.08	10.16	-0.0067	29.09	-7.01	0.8544
MCoP	-2.23	10.49	-0.0134	32.78	-13.99	0.8445
Equal Weight (1/N)	-3.06	11.90	-0.0162	37.75	-18.66	0.7999

Notes: Sharpe ratios are calculated at the daily frequency with $R_f = 0$ and are not annualized. Annualized mean return and volatility use 252 trading days. Maximum drawdown is the largest peak-to-trough decline in the cumulative wealth index. Mean HE is the average hedging effectiveness across the sixteen single-asset benchmarks.

515 **Figure 6. Cumulative returns of MVP, MCP, MCoP, and the equal-weight (1/N) portfolio**



517 5. DISCUSSION

518 This study documents moderate but highly time-varying risk interdependence among Eurozone
 519 alcoholic beverage equities. The average connectedness results indicate that spillovers account
 520 for a meaningful share of return variability, while the dynamic index and firm-level NET
 521 measures show that system-wide transmission intensifies sharply during stress regimes and
 522 subsequently recedes. This regime sensitivity is consistent with the broader wine and
 523 alternative-asset finance literature, which reports stronger spillovers during turbulent periods,
 524 including COVID-19 [18].

525 The largest connectedness spike in 2020 and the second surge in early 2022 (Figure 2) suggest
 526 that sector pricing became dominated by common shocks rather than firm-specific information.
 527 Industry-based explanations are plausible. Mordor Intelligence notes that growth in the value
 528 of Europe's alcoholic beverage market has been supported by tourism recovery, a shift toward
 529 premium products, and rapid e-commerce adoption, while volume growth remains limited in
 530 mature categories such as mainstream beer [36]. These features imply that when
 531 macroeconomic conditions shift through mobility restrictions, tourism cycles, energy and
 532 inflation shocks, or changes between on-trade and off-trade channels, firms may be repriced
 533 together, increasing connectedness.

534 The structural aspect matters as well. The market narrative increasingly emphasizes health-
 535 driven moderation and substitution toward non-alcoholic options. For instance, Reuters reports
 536 survey evidence that a large share of European consumers is cutting back on alcohol, and that

non-alcoholic beverages are growing within the broader beverage market [3]. Such demand shifts are consistent with a connectedness pattern where common information (category headwinds, regulation, wellness trends) synchronizes valuation updates across producers. The average spillover table and the net directional connectedness panels jointly point to a clear core-periphery structure. Large multinational producers—especially Pernod, Heineken, and AB InBev—act as persistent net transmitters, whereas smaller and more specialized firms are more often net receivers. This configuration is economically consistent with (i) broader global revenue exposure, (ii) deeper institutional ownership and information flow, and (iii) higher sensitivity to common macro narratives among the largest firms. This interpretation aligns with several strands of the wine-company literature. Performance studies show that firm outcomes depend on leverage, growth capacity, productivity, and institutional settings [6], and that sales growth is more responsive to macro conditions than “pure management” profitability measures [5]. In connectedness terms, firms whose performance is more tightly linked to macro conditions are more likely to become system-wide shock conduits. Likewise, evidence on intangible spending highlights that firms can use strategic investment (brand, marketing, distribution capabilities) as a risk-management lever, affecting the mean-risk profile of outcomes [7]. Such firm-level resilience differences help explain why transmitter/receiver roles persist for some names but switch for others. Market structure evidence also helps interpret asymmetries. Rebelo et al. [10] show that pricing determinants differ across distribution channels, implying heterogeneity in how firms translate demand and channel shocks into revenues and margins. In our network, this heterogeneity is consistent with a setting where some firms primarily absorb sector-wide repricing (receivers), while others initiate it (transmitters) when their segment becomes the market’s focal point. Firm actions and category headlines support the notion that shared demand shocks can synchronize valuations. A recent business report describes Heineken’s plan to cut 6,000 jobs, framed explicitly in the context of weakening beer demand and falling alcohol consumption [37]. Whether one treats this as firm-specific or category-wide, the key point is that such news can shift investor expectations for the entire brewer segment and, through sector rotation, influence adjacent spirits and wine names—exactly the type of mechanism that produces time-varying connectedness. At the supply-chain level, Varsei et al. [4] emphasize trade-offs across cost and environmental impacts in global wine distribution. These trade-offs matter for listed firms because energy prices, logistics disruptions, and packaging choices can translate into common margin shocks. When such cost-side pressures are salient, the pricing of multiple firms becomes jointly driven by shared inputs, raising spillovers.

The portfolio evidence provides a more qualified interpretation of the economic value of connectedness information. Figure 6 shows that the strategies follow broadly similar market phases but differ materially in cumulative loss and drawdown. The minimum-variance portfolio performs best over the full sample, with the lowest volatility and maximum drawdown. The minimum-connectedness portfolio does not dominate the conventional optimized strategies; however, it improves on the naive equal-weight benchmark, reducing annualized volatility from 11.90% to 10.49% and maximum drawdown from 37.75% to 32.78%. The result therefore supports the usefulness of network information as a diversification input without implying that connectedness minimization is universally superior to variance- or correlation-based allocation. These portfolio comparisons should also be interpreted in light of two data limitations. First, the retrospective firm screen may introduce survivorship bias because firms that disappeared before the 2026 screening date are not represented. Second, several smaller stocks exhibit high zero-return frequencies, most notably COBH, which may affect both estimated dependence and portfolio allocation. These considerations are more relevant for the magnitude of backtested portfolio performance than for the qualitative finding that the largest firms occupy the transmitter core.

The portfolio results therefore reinforce the main network evidence: connectedness contains useful information about diversification, but its value is comparative rather than universally dominant. In this sample, conventional variance minimization performs best over the full period, while connectedness minimization still improves materially on naive equal weighting.

Robustness outputs and the complete portfolio-analysis tables can be supplied as supplementary material.

6. CONCLUSION

Our findings show that Eurozone alcoholic beverage equities form a connected risk network with moderate average integration but strong regime dependence. Connectedness spikes during major stress windows and a persistent core-periphery structure emerges, with large multinationals more frequently transmitting shocks and smaller/specialized firms more often receiving them. These patterns are consistent with industry fundamentals: Europe's market expansion in value has been linked to tourism recovery, premiumization, and e-commerce adoption, while mature categories (notably mainstream beer) face limited volume growth [36]. Together with evidence of consumer moderation and the rise of non-alcoholic alternatives [3], these forces provide a real-economy rationale for why sector-wide narratives can dominate pricing and amplify spillovers.

607 From an investment perspective, the results imply that diversification within the sector depends
608 not only on pairwise correlation but also on system-wide transmission structure. The
609 connectedness-based portfolio improves on naive equal weighting in volatility and drawdown
610 terms, but the minimum-variance portfolio delivers the strongest full-sample performance
611 among the strategies considered. Network information should therefore be viewed as a
612 complementary diversification signal rather than as a universally superior allocation rule. The
613 portfolio evidence is subject to the retrospective firm-selection procedure and to thin trading in
614 several smaller stocks, so the reported backtested performance should be interpreted with
615 appropriate caution. Future work can extend the analysis by using contemporaneously
616 reconstituted firm universes, incorporating liquidity filters, decomposing spillovers across
617 horizons, and linking transmitter/receiver roles to observable firm characteristics such as
618 product mix, geographic revenue exposure, and innovation intensity in low/no-alcohol
619 offerings.

References

- [1] S.M. Mueller Loose, R. del Rey, State of the International Wine Markets in 2023. The wine market at a crossroads: Temporary or structural challenges?, *Wine Econ. Policy* 13(2) (2024) 3–14. <https://doi.org/10.36253/wep-16395>.
- [2] K. Anderson, The emergence of lower-alcohol beverages: The case of beer, *J. Wine Econ.* 18(1) (2023) 66–86. <https://doi.org/10.1017/jwe.2023.8>.
- [3] E. Rumney, Europeans ditching alcohol for taste and health reasons, research firm says, Reuters, 7 October 2025. <https://www.reuters.com/business/europeans-ditching-alcohol-taste-health-reasons-research-firm-says-2025-10-07/>.
- [4] M. Varsei, K. Christ, R. Burritt, Distributing wine globally: Financial and environmental trade-offs, *Int. J. Phys. Distrib. Logist. Manag.* 47(5) (2017) 410–428. <https://doi.org/10.1108/IJPDLM-01-2016-0012>.
- [5] E. Neves, A. Dias, M. Ferreira, C. Henriques, Determinants of wine firms' performance: The Iberian case using panel data, *Int. J. Account. Inf. Manag.* 30(3) (2022) 325–338. <https://doi.org/10.1108/IJAIM-10-2021-0203>.
- [6] I. Tomas Žiković, J. Katunar, J. Višić, Firm size and profitability: Key determinants of performance in European wine firms, *J. Wine Econ.* 20(4) (2025) 329–347. <https://doi.org/10.1017/jwe.2025.10092>.
- [7] P. Amadieu, J.-L. Viviani, Intangible expenses: A solution to increase the French wine industry performance?, *Eur. Rev. Agric. Econ.* 38(2) (2011) 237–258. <https://doi.org/10.1093/erae/jbr012>.
- [8] P. Amadieu, J.-L. Viviani, Intangible effort and performance: The case of the French wine industry, *Agribusiness* 26(2) (2010) 280–306. <https://doi.org/10.1002/agr.20226>.
- [9] P. Amadieu, J.-P. Couderc, J.-L. Viviani, Financial reaction to the business cycle in periods of difficulties: The case of French wine companies, in: E. Giraud-Héraud, M.-C. Pichery (Eds.), *Wine Economics: Quantitative Studies and Empirical Applications*, Palgrave Macmillan, London, 2013, pp. 200–228. https://doi.org/10.1057/9781137289520_11.
- [10] J. Rebelo, L. Lourenço-Gomes, T. Gonçalves, J. Caldas, A hedonic price analysis for the Portuguese wine market: Does the distribution channel matter?, *J. Appl. Econ.* 22(1) (2019) 40–59. <https://doi.org/10.1080/15140326.2018.1550596>.
- [11] M. Omura, An analysis of wine and food consumption dynamics in Japan using a vector error correction model, *Appl. Econ.* 48(44) (2016) 4257–4269. <https://doi.org/10.1080/00036846.2016.1156230>.
- [12] A. Milhøj, The market share of wine in Denmark, *J. Wine Econ.* 5(2) (2010) 327–338. <https://doi.org/10.1017/S1931436100000973>.

- [13] Y. Yu, V. Lindsay, Export commitment and the global financial crisis: Perspectives from the New Zealand wine industry, *J. Small Bus. Manag.* 54(2) (2016) 771–797. <https://doi.org/10.1111/jsbm.12171>.
- [14] D. Cyr, M. Kusy, A.B. Shaw, Hedging adverse bioclimatic conditions employing a short condor position, *J. Wine Econ.* 3(2) (2008) 149–171. <https://doi.org/10.1017/S1931436100001188>.
- [15] J.-L. Viviani, Protection against wine price risks: A real option approach, *J. Wine Econ.* 2(2) (2007) 168–186. <https://doi.org/10.1017/S1931436100000419>.
- [16] J. Aka, A.A. Ugaglia, J.-M. Lescot, Pesticide use and risk aversion in the French wine sector, *J. Wine Econ.* 13(4) (2018) 451–460. <https://doi.org/10.1017/jwe.2018.55>.
- [17] B. Let, K. Siemaszkiewicz, Looking for alternatives in times of market stress: Tail dependence between European stock markets and Bitcoin, gold and fine wine market, *Czech J. Econ. Finance* 70(5) (2020) 407–430. <https://doi.org/10.32065/CJEF.2020.05.02>.
- [18] A. Samitas, S. Papathanasiou, D. Koutsokostas, E. Kampouris, Volatility spillovers between fine wine and major global markets during COVID-19: A portfolio hedging strategy for investors, *Int. Rev. Econ. Finance* 78 (2022) 629–642. <https://doi.org/10.1016/j.iref.2022.01.009>.
- [19] M. Potrykus, Investing in wine, precious metals and G-7 stock markets: A co-occurrence analysis for price bubbles, *Int. Rev. Financ. Anal.* 87 (2023) 102637. <https://doi.org/10.1016/j.irfa.2023.102637>.
- [20] CompaniesMarketCap, Largest alcoholic beverage companies by market cap, 2025. <https://companiesmarketcap.com/alcoholic-beverages/largest-alcoholic-beverage-companies-by-market-cap/> (accessed 1 March 2026).
- [21] J.A. Ryan, J.M. Ulrich, quantmod: Quantitative financial modelling framework (R package), The Comprehensive R Archive Network, 2023. <https://cran.r-project.org/package=quantmod>.
- [22] N. Antonakakis, I. Chatziantoniou, D. Gabauer, Refined measures of dynamic connectedness based on time-varying parameter vector autoregressions, *J. Risk Financ. Manag.* 13(4) (2020) 84. <https://doi.org/10.3390/jrfm13040084>.
- [23] G. Koop, M.H. Pesaran, S.M. Potter, Impulse response analysis in nonlinear multivariate models, *J. Econom.* 74(1) (1996) 119–147. [https://doi.org/10.1016/0304-4076\(95\)01753-4](https://doi.org/10.1016/0304-4076(95)01753-4).
- [24] M.H. Pesaran, Y. Shin, Generalized impulse response analysis in linear multivariate models, *Econ. Lett.* 58(1) (1998) 17–29. [https://doi.org/10.1016/S0165-1765\(97\)00214-0](https://doi.org/10.1016/S0165-1765(97)00214-0).

- [25] D. Gabauer, Dynamic measures of asymmetric & pairwise connectedness within an optimal currency area: Evidence from the ERM I system, *J. Multinat. Financ. Manag.* 60 (2021) 100680. <https://doi.org/10.1016/j.mulfin.2021.100680>.
- [26] H.M. Markowitz, *Portfolio Selection: Efficient Diversification of Investments*, Wiley, New York, 1959.
- [27] P. Christoffersen, V. Errunza, K. Jacobs, X. Jin, Correlation dynamics and international diversification benefits, *Int. J. Forecast.* 30(3) (2014) 807–824. <https://doi.org/10.1016/j.ijforecast.2014.01.001>.
- [28] D.C. Broadstock, I. Chatziantoniou, D. Gabauer, Minimum connectedness portfolios and the market for green bonds: Advocating socially responsible investment (SRI) activity, in: C. Floros, I. Chatziantoniou (Eds.), *Applications in Energy Finance: The Energy Sector, Economic Activity, Financial Markets and the Environment*, Springer Nature, 2022, pp. 217–253. https://doi.org/10.1007/978-3-030-92957-2_9.
- [29] W.F. Sharpe, Mutual fund performance, *J. Bus.* 39(1) (1966) 119–138.
- [30] L.H. Ederington, The hedging performance of the new futures markets, *J. Finance* 34(1) (1979) 157–170. <https://doi.org/10.1111/j.1540-6261.1979.tb02077.x>.
- [31] N. Antonakakis, J. Cunado, G. Filis, D. Gabauer, F.P. de Gracia, Oil and asset classes implied volatilities: Investment strategies and hedging effectiveness, *Energy Econ.* 91 (2020) 104762. <https://doi.org/10.1016/j.eneco.2020.104762>.
- [32] F.X. Diebold, K. Yilmaz, Better to give than to receive: Predictive directional measurement of volatility spillovers, *Int. J. Forecast.* 28 (2012) 57–66. <https://doi.org/10.1016/j.ijforecast.2011.02.006>.
- [33] Reuters, Trump's tariffs set to drive up bar bills and wipe out spirits jobs, 3 April 2025. <https://www.reuters.com/business/retail-consumer/trumps-tariffs-set-drive-up-bar-bills-cut-jobs-2025-04-03/> (accessed 20 February 2026).
- [34] Reuters, Trump tariffs slam markets, stunned investors brace for slow growth, retaliation, 3 April 2025. <https://www.reuters.com/markets/wealth/global-markets-tariffs-graphic-pix-2025-04-02/> (accessed 20 February 2026).
- [35] Reuters, S&P 500 loses \$5 trillion in two days in Trump tariff selloff, 4 April 2025. <https://www.reuters.com/markets/global-markets-wrapup-1-2025-04-04/> (accessed 20 February 2026).
- [36] Mordor Intelligence, Europe alcoholic beverage market size & share analysis – growth trends and forecast (2026–2031), 9 January 2026. <https://www.mordorintelligence.com/industry-reports/europe-alcoholic-beverage-market> (accessed 21 February 2026).

746 [37] BS Ekonomi, Alkol tüketimi düşüyor, Heineken 6.000 kişiyi işten çıkartıyor, 16 February
747 2026. <https://bsekonomi.com/alkol-tuketimi-dusuyor-heineken-6-000-kisiyi-isten->
748 [cikariyor/](https://bsekonomi.com/alkol-tuketimi-dusuyor-heineken-6-000-kisiyi-isten-) (accessed 21 February 2026).

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