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Demand rebalancing in Italy's wine industry: cohort replacement, habit persistence, and policy-relevant demand dynamics

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Abstract

Wine markets in mature economies are increasingly characterised by moderation and premiumisation. Yet long-run demand hinges on how often consumers drink wine. Using repeated cross-sections from the Italian "Aspetti della Vita Quotidiana" survey (1997–2023), we build a pseudo-panel and estimate dynamic age-cohort models of habitual wine consumption, with period conditions captured through macroeconomic proxies. Three results emerge. First, wine consumption is strongly persistent at the cohort level, consistent with habit formation and slow adjustment. Second, after accounting for age and covariates, younger cohorts (Generation X, Millennials and Generation Z) consume wine substantially less than older cohorts, indicating structural cohort replacement. Third, sustainability-oriented lifestyle measures do not robustly predict consumption frequency, whereas meat-centred dietary patterns and economic resources are positively associated with wine, suggesting the endurance of meal-based practices. Regional estimates show sharper cohort declines in the North/Centre than in the South/Islands. Implications for segmentation and demand forecasting are discussed.

1 Introduction

Across mature wine-producing countries, the industry is facing a dual transformation: per-capita volumes are under pressure (Fig. 1A in Appendix), while value growth increasingly relies on premiumisation, product differentiation and the creation of new consumption occasions. In the European Union, this transition is explicit in recent sector assessments and in the policy debate on structural adjustment and demand rebalancing (European Commission, 2024). Global market statistics similarly point to long-run stagnation in traditional markets and intensified competition for consumer attention (OIV, 2024). Italy, despite remaining a leading producer and exporter, is not exempt: the role of wine as a routine part of everyday meals has been gradually replaced by more occasional and situational consumption, although wine is a territorial and identity good, deeply linked to local traditions, social practices, and rural development dynamics (Grazia et al., 2024; Bellandi & De Propris, 2017).

From a business-research perspective, the crucial question is therefore not only what consumers choose (e.g., origin, certifications, price tiers) but how often wine is consumed. Frequency is a key demand margin: a shift from daily to occasional drinking mechanically reduces total volumes even when average spending per bottle increases. Yet frequency has received less attention than purchase determinants such as labels, origin or sustainability claims (Lockshin & Corsi, 2012). Understanding the drivers of frequency is central to demand forecasting, portfolio design and segmentation strategies in a context where volume-led growth is increasingly unrealistic.

Two competing narratives dominate the interpretation of declining frequency. The first attributes change to values and lifestyles, arguing that sustainability and health orientations should translate into lower alcohol consumption or substitution toward no/low alternatives (Grunert et al., 2014; Ramírez Pagès et al., 2024). The second emphasises routines: consumption frequency is reproduced through habits and meal architectures, and it changes mainly through slow-moving practice reconfiguration rather than through rapid attitudinal shifts (Wood & Neal, 2009). Disentangling these narratives matters for strategy: if frequency is primarily

values-driven, communication and positioning may be decisive; if it is routine-driven, changes in occasions, formats and complementary practices become the main levers.

The transformation of wine consumption also unfolds within a sector undergoing profound environmental and structural change. Climate dynamics are increasingly reshaping viticultural suitability, production stability, and regional competitiveness, thereby altering the broader economic context in which consumption patterns evolve (Grazia et al., 2023, 2025).

Empirically, testing these narratives is complicated by the Age-Period-Cohort (APC) identification problem. Younger individuals may drink wine less frequently because of lifecycle constraints (e.g., household formation, work schedules), while common shocks - economic downturns, changing social norms or policy interventions - shift consumption for all cohorts at once. Without an approach that separates ageing from cohort replacement and accounts for period conditions, generational explanations risk conflating fundamentally different mechanisms (Deaton, 1985; Verbeek, 2008).

This study provides long-run evidence for Italy by exploiting repeated cross-sections from the national "Aspetti della Vita Quotidiana" (AVQ) survey and constructing a pseudo-panel. The Italian context is informative for two reasons. First, wine has historically been culturally embedded in meal-based consumption, making it a stringent test for claims that sustainability-oriented lifestyles are reshaping behaviour. Second, Italy exhibits pronounced territorial heterogeneity. Northern and Central areas are typically more integrated into global consumption trends and have higher purchasing power, while the South and Islands retain stronger traditional food practices. These differences can produce distinct regional demand regimes within a single national market.

The empirical strategy estimates a dynamic pseudo-panel model of cohort-level wine consumption. The dynamic component captures behavioural persistence (state dependence) and provides a direct test of habit-based explanations. Generation indicators measure cohort replacement net of age. We also incorporate socioeconomic status, self-reported health and two lifestyle indices extracted through principal component analysis: a sustainable lifestyle orientation and a meat-centred dietary pattern capturing the extent to which wine remains included in traditional meal patterns.

The analysis addresses three research questions. First, is the decline in wine consumption frequency primarily a cohort phenomenon - do younger generations drink wine less frequently than older generations after controlling for age and other covariates? Second, how strong is persistence in wine consumption at the cohort level, and what does it imply for the speed at which the market can change? Third, do cohort and lifestyle patterns differ systematically across Italian macro-areas, suggesting the coexistence of distinct regional consumption regimes?

Results show strong persistence in wine consumption, consistent with slow adjustment and habitual reproduction of practices. After controlling for age and covariates, Generation X, Millennials and Generation Z display substantially lower consumption than older cohorts, indicating structural cohort replacement rather than a transitory youth effect. Lifestyle results point to the primacy of meal-based routines: wine consumption co-moves robustly with a meat-centred dietary profile, whereas a sustainability-oriented lifestyle

index does not robustly predict consumption frequency. Period conditions matter, but they modulate consumption around the cohort trajectory rather than overturning it.

These findings contribute to the wine marketing and strategy literature in three ways. First, they clarify the determinants of consumption frequency (an under-studied demand margin compared to purchase choice) by jointly modelling cohort replacement, persistence and lifestyle correlates. Second, they provide one of the longest cohort-oriented assessments for Italy using consistent national microdata. Third, they translate evidence into segmentation implications: the strategic challenge is not the disappearance of demand per se, but the reallocation of demand across cohorts, regions and occasions, reinforcing the need for differentiated portfolios and value-led strategies.

The remainder of the paper is organised as follows. Section 2 develops the theoretical background and hypotheses. Section 3 describes the data, cohort construction and variable measurement. Section 4 presents the empirical specification. Section 5 reports results and robustness checks. Section 6 discusses theoretical and managerial implications, and Section 7 concludes.

2 Theoretical background and hypotheses

This section develops hypotheses by combining two strands: *(i)* cohort segmentation in wine markets and *(ii)* behavioural persistence in food-related routines. Our focus is on consumption frequency, which captures the structural shift from everyday wine drinking to more occasional and situational consumption in mature markets.

The theoretical challenge is twofold. First, frequency lies at the intersection of deliberative choice and routinised behaviour: purchasing may be planned, while drinking can be cue-driven and embedded in stable contexts such as meals and recurring social occasions. Second, generational accounts are persuasive but empirically fragile unless cohort differences are separated from age-related lifecycle patterns and from period shocks that affect all cohorts simultaneously.

2.1 Generations, moderation and cohort replacement in wine consumption

Cohort segmentation has a long tradition in marketing because shared socialisation can shape enduring preferences, category meanings and usage norms. In wine, cohort differences are repeatedly reported. Evidence from different markets documents generational variation in wine attitudes and consumption patterns (Wolf et al., 2005). Cross-cultural studies further indicate that younger cohorts are often less involved with wine, consume it more selectively, and attach different symbolic meanings to the category (Mueller & Remaud, 2011; Thach et al., 2021). In traditional wine-producing contexts, younger consumers tend to rely on situational cues and social contexts rather than routine domestic consumption (Silva et al., 2014).

Evidence from Italy is consistent with this shift. Some studies on Italian Millennials emphasise a more information-intensive and occasion-driven engagement with wine, suggesting weaker habitual consumption and stronger sensitivity to context (Nassivera et al., 2020). At the same time, younger cohorts often exhibit

stronger interest in sustainability and ethical attributes, although these orientations do not necessarily imply higher consumption frequency (Gazzola et al., 2022; Pomarici & Vecchio, 2014).

Cohort narratives also connect to a broader moderation trend. The diffusion of “lighter” drinking norms and the growth of low- and no-alcohol offerings indicate that consumers increasingly manage alcohol intake across situations, rather than simply shifting to abstention (WHO, 2023). For wine, this implies that cohort differences may reflect both a reduced incorporation of wine into everyday routines and a reallocation of drinking toward specific occasions.

The empirical validity of these accounts depends on distinguishing three processes that are confounded in most cross-sectional studies. Age effects capture lifecycle dynamics: period effects capture common shocks such as macroeconomic cycles or evolving social norms; cohort effects capture enduring differences between birth cohorts. Because age, period and cohort are mechanically linked, Age-Period-Cohort (APC) studies require explicit identification choices and are sensitive to design (Deaton, 1985; Yang & Land, 2016). This paper adopts a pseudo-panel approach to separate cohort replacement from lifecycle patterns while using macroeconomic proxies to account for period conditions.

A further limitation concerns the geography of evidence. Much of the wine consumer literature implicitly assumes homogeneous national markets. Territories often differ in purchasing power, food cultures, and the organisation of drinking occasions. Italy provides a clear case, motivating a regionally disaggregated analysis by macro-area.

In line with this stream of evidence, we expect cohort replacement to be visible in wine frequency once age and period conditions are considered.

H1

After controlling for age and covariates, wine consumption frequency is lower for younger generations than for older generations (structural cohort replacement).

2.2 Wine consumption as a routinised practice

Long-run changes in frequency cannot be understood without behavioural persistence. Habit and state dependence capture the idea that past behaviour increases the likelihood of future behaviour because repetition in stable contexts reduces deliberation and strengthens automaticity (Ji & Wood, 2007; Ouellette & Wood, 1998; Wood & Neal, 2009). In empirical terms, persistence implies that cohorts adjust slowly even when macroeconomic and cultural conditions change.

For wine in traditional settings, persistence is plausible because drinking can be part of meal-based routines and local culture. Practice-oriented perspectives emphasise that food consumption is reproduced through interconnected practices (e.g., shopping, cooking, eating with others) rather than isolated choices (Shove et al., 2012; Warde, 2005). If wine remains embedded in these practices, changes in frequency should track changes in complementary practices (e.g., meat-based meals) more closely than abstract value orientations.

In the wine literature, persistence is rarely estimated directly, largely because longitudinal panels that track the same individuals over time are uncommon. However, repeated cross-sections can be leveraged through pseudo-panels to quantify the dynamic component of consumption at the cohort level (Deaton, 1985; Verbeek, 2008).

A related debate concerns sustainability and responsible consumption. Sustainability has become central in wine research, and work shows that consumers respond to environmental labels and corporate responsibility signals (Grunert et al., 2014; Pomarici & Vecchio, 2014). Nevertheless, sustainability orientations may operate primarily through what is purchased (e.g., organic vs conventional, local vs imported) and willingness to pay, rather than through large shifts in overall consumption frequency.

The broader sustainable consumption literature highlights a persistent intention-behaviour gap: values often translate into low-cost actions (e.g., choosing a label) more readily than into changes that require reconfiguring routines (Devinney et al., 2010; Vermeir & Verbeke, 2006; White et al., 2019). Low- and no-alcohol products may therefore function as situational tools (e.g., for weekday meals or driving) rather than as drivers of a systematic decline in drinking frequency (WHO, 2023).

Taken together, this literature suggests that long-run change in wine frequency is shaped by path dependence: once consumption routines are established, they tend to persist because they are reinforced by repeated contexts and low deliberation. Accordingly, we expect wine consumption frequency to display measurable behavioural persistence over time.

H2: Wine consumption frequency is persistent over time: cohorts that consumed wine more frequently in the previous period maintain higher consumption frequency in the current period.

Moreover, prior work points to systematic within-country heterogeneity in the stability of meal-based practices and the organisation of drinking occasions. Given the marked sociocultural differences across Italian macro-areas, we expect cohort differences in frequency and the strength of persistence to vary geographically.

H3

Cohort replacement patterns are heterogeneous across Italian macro-areas, reflecting regional differences in economic structure and food-related practices.

3 Data and methodology

This section describes the data sources and empirical strategy adopted to analyse long-term patterns in wine consumption frequency across generations in Italy. The analysis combines repeated cross-sectional survey data with a pseudo-panel approach, allowing the identification of age and cohort effects while accounting for unobserved heterogeneity and persistence in consumption behaviour. Given the absence of true longitudinal data tracking individuals over time, the pseudo-panel framework provides a suitable methodological compromise to study dynamic consumption patterns within a population-based setting. The section first

introduces the data and variables' details and construction, then the pseudo-panel construct, and the cohort definition.

3.1 Data and variables

The analysis is based on data from the AVQ Italian survey, conducted annually by the Italian National Institute of Statistics (ISTAT). The AVQ survey provides nationally representative repeated cross-sections of the Italian population and collects detailed information on sociodemographic characteristics, health status, lifestyles, and dietary habits (ISTAT, 2024).

The study exploits repeated cross-sectional data to construct a pseudo-panel that allows the identification of age and cohort effects while accounting for unobserved heterogeneity. The sample includes adult individuals (18–85 years old), residing in Italy, and observed over the period 1997–2023[1]. Observations with missing information on key variables are excluded.

Outcome variable. The main outcome of interest is wine consumption frequency, measured at the individual level using information on consumption frequency reported in the AVQ questionnaire. Respondents report their usual wine consumption using ordered categories that distinguish non-consumption, occasional/seasonal consumption, and daily consumption levels. To ensure comparability over time, responses are harmonised into an ordinal score in which higher values correspond to more regular consumption (Table 1A in Appendix). Individual responses are averaged within cohort–year cells to obtain cohort-level means. Because the analysis is conducted on cohort means, the dependent variable is treated as continuous at the cell level. To capture behavioural persistence, the empirical specification includes the lagged cohort mean of wine consumption.

Control variables. The regression models include a rich set of cohort-level controls. These include: *(i)* gender; *(ii)* educational attainment, included as categorical indicators; *(iii)* economic situation; *(iv)* self-reported health status, and *(v)* composite variables, such as meat diet, sustainable life index, and life satisfaction. Regional fixed effects are consistent to account for time-invariant geographical heterogeneity. All individual-level controls are aggregated to the cohort level prior to estimation and are therefore interpreted as cohort averages or proportions.

Composite variables. The following items were considered in the Principal Component Analysis (PCA): *(i)* commuting mode to school/work (walking vs. use of one or multiple public/private transport modes); *(ii)* frequency of meeting friends during leisure time; *(iii)* participation in sport activities, distinguishing between regular and occasional practice; and *(iv)* consumption frequency of beef and processed/cured meats. The PCA yielded two orthogonal lifestyle dimensions. The first reflects an animal-based dietary pattern, driven by higher intake of beef and processed meats, and is labelled the Meat diet. The second captures a socially embedded and behaviourally oriented profile, combining the intensity of social interactions (as a proxy for a supportive social circle) with mobility patterns. We interpret this second component as a Sustainable Lifestyle Index.

A further set of variables was analysed jointly, comprising self-reported satisfaction over the previous 12 months with one's economic situation, work, health, family relationships, relationships with friends, and

leisure time. Responses were recorded on a four-point Likert scale (1 = not at all satisfied; 4 = very satisfied). The PCA of these six domain-specific satisfaction indicators yields a single dominant component with consistently positive loadings across all items. We therefore interpret this latent dimension as an index of Overall Subjective Well-Being.

3.2 Pseudo-panel construction

Given the repeated cross-sectional nature of the AVQ survey, a pseudo-panel approach is adopted. Individuals are grouped into cohorts defined by immutable characteristics, following the methodology proposed by Browning et al. (1985), Deaton (1985), Verbeek (2008). Specifically, cohorts are constructed based on age, gender, educational attainment, and region of residence.

Birth cohorts are defined using five- or ten-year intervals, allowing for a meaningful balance between cohort homogeneity and sufficient cell size (Table 1A in Appendix). The resulting cohorts correspond to commonly used generational groupings (e.g. Silent Generation, Baby Boomers (1 and 2), Generation X, Millennials, Generation Z).

After the cohort definition, individual observations are collapsed into cohort-year cells. For each cell, mean values of the outcome variable and time-varying characteristics (such as age, gender composition, lifestyle behaviours, and health status) are computed. Cohort size varies across cells (see Table 1A in Appendix); therefore, to mitigate heteroskedasticity arising from unequal cell sizes, estimation is performed using Weighted Least Squares (WLS), with weights equal to the square root of the number of individuals in each cell. This procedure ensures that cohort-level estimates are not disproportionately influenced by small cells and is standard practice in pseudo-panel analyses (Aitken, 1935). Estimations are performed for the full sample and separately for Northern, Central, and Southern/Islands regions to explore territorial heterogeneity in cohort patterns.

Using the pseudo-panel approach is also justified conceptually, since long-run observation is particularly relevant in the wine sector, where environmental pressures and adaptation processes unfold slowly over decades rather than years (Grazia et al., 2024).

3.3 Age-Period-Cohort (APC) identification strategy

A key challenge in the analysis of age, period, and cohort effects is the well-known identification problem arising from their exact linear dependence. The present study focuses on identifying age and cohort effects while treating period effects as common shocks affecting all cohorts simultaneously. Age effects are captured through the inclusion of the average age of individuals within each cohort–year cell. Cohort effects are identified by including cohort dummy variables, with one cohort serving as the reference group (Deaton, 1985; Di Novi & Marenzi, 2022; Yang & Land, 2016). Period effects are not modelled through a full set of year dummies, which would lead to perfect multicollinearity, but are instead proxied through macroeconomic indicators in sensitivity analyses.

This strategy allows the separation of lifecycle dynamics from generational differences while avoiding the identification issues associated with fully saturated APC models.

4 Empirical strategy

The empirical analysis is based on a pseudo-panel specification that models average wine consumption at the cohort–year level. Let $\bar{y}_{ct}$ denote the mean level of wine consumption for cohort $c$observed in year t. The baseline specification is given by:

$$\bar{y}_{ct} = \rho\, \bar{y}_{c,t-1} + \beta_1\, \bar{a}_{ct} + \beta_2' \mathrm{C}_c + \beta_3' \bar{\mathrm{X}}_{ct} + \beta_4' \mathrm{R}_c + \varepsilon_{ct}, \qquad (1)$$

where $\bar{y}_{c,t-1}$ is the lagged cohort-level mean of wine consumption, $\bar{a}_{ct}$ denotes average age, C_c is a vector of cohort (generation) indicators, $\bar{\mathrm{X}}_{ct}$ is a vector of time-varying cohort-level controls (including gender composition, education, lifestyle behaviours, and health status), and R_c captures region fixed effects. The error term ϵ_{ct} represents unobserved shocks at the cohort-year level:

$$\varepsilon_{ct} = \mu_c + u_{ct}, \qquad (2)$$

where μ_c captures time-invariant cohort-specific unobserved heterogeneity.

Sensitivity analysis. To assess the robustness of the estimated cohort effects to period-specific macroeconomic conditions, additional specifications include alternative proxies for common economic shocks. Annual real GDP growth and the national unemployment rate are introduced as time-varying controls at the cohort-year level. These variables capture aggregate economic conditions that may simultaneously influence consumption behaviour across cohorts. Stability of cohort coefficients across these alternative specifications is interpreted as evidence that the estimated generational patterns are not driven by period effects.

5 Results

5.1 Sample composition

Table 1 shows clear structural differences across birth cohorts (capturing meaningful sociodemographic variation rather than purely age-related differences).

Table 1 Sample distribution by Generation: 1997-2023

	Sample distribution (%)						
	Greatest Generation	Silent Generation	Baby Boomer 1	Baby Boomer 2	Generation X	Millennials Generation	Generation Z
Gender							
Female	54.13	56.32	52.47	51.53	51.06	50.03	51.65
Male	45.87	43.68	47.53	48.47	48.94	49.97	51.65
Educational level							
No/primary school	42.82	68.05	39.37	14.30	4.48	1.97	0.52
Secondary	24.44	15.86	28.13	37.05	35.96	27.22	23.89
High school	26.60	11.85	23.59	36.59	45.53	52.25	59.48
Degree	6.13	4.23	8.91	12.06	14.02	18.57	16.10
Economic situation							
Poor	3.40	4.08	4.41	4.73	4.99	5.78	4.71
Somewhat insufficient	30.99	36.16	32.06	30.42	32.16	34.91	32.19
Somewhat sufficient	64.24	58.72	62.32	63.49	61.52	58.11	61.56
Optimal	1.36	1.04	1.21	1.36	1.34	1.19	1.53
Regions							
Northern regions	43.09	43.04	43.16	41.97	42.58	38.96	41.64
Central regions	18.93	20.02	18.87	18.29	18.18	17.52	17.55
Southern regions	37.99	36.93	37.96	39.74	39.24	43.52	40.81

First, gender composition is relatively balanced across cohorts, with a slight female majority among older generations and near parity among younger ones. This suggests that changes observed in consumption patterns are unlikely to be driven by major shifts in gender structure.

Second, educational attainment displays a strong generational gradient. Older cohorts (Greatest and Silent generations) are characterised by a high prevalence of low education, while younger cohorts (particularly Millennials and Generation Z) show a sharp increase in high school and tertiary education. This reflects long-

term human capital expansion and indicates that cohort effects partly capture broader social modernisation processes.

Third, perceived economic conditions remain comparatively stable across generations. Most individuals in every cohort report their situation as “somewhat sufficient,” with only small shares in extreme categories. This suggests that generational differences in wine consumption are unlikely to be explained primarily by large income disparities.

Finally, the regional distribution is relatively constant, with around 40-43% of individuals in the North, about 18-20% in the Centre, and the remainder in the South. The stability of the territorial composition supports the interpretation that estimated cohort effects reflect behavioural differences rather than geographic sample shifts.

Overall, the table confirms that generational cohorts capture structural sociocultural change (especially education) while remaining broadly comparable in gender, economic conditions, and regional composition, strengthening the identification of genuine cohort-specific consumption patterns.

Figure 1 highlights a clear generational and spatial transformation in wine consumption patterns across Italy (specifically for each covariate, see Table 2A in the Appendix). Older cohorts (Greatest Generation and Silent Generation) display relatively high consumption levels throughout most of the country, with particularly intense consumption in Northern regions and some Central areas. As cohorts become younger, the overall intensity of consumption progressively declines, and regional contrasts become less pronounced.

Among Baby Boomers, the traditional North-South gradient is still visible, but starting with Generation X and especially among Millennials and Generation Z, consumption becomes uniformly lower across the national territory. This suggests that generational change reduces not only the overall frequency of consumption but also the geographical differentiation historically characterising Italian wine drinking habits. Overall, the map supports the presence of a nationwide cohort-driven transition from a widespread habitual consumption model toward a lower and more homogeneous consumption pattern.

Figure 1 Spatial distribution of mean wine consumption frequency in Italy (1997-2023) by generation

Notes: The average cohort-level wine consumption frequency across Italian regions for successive birth cohorts is presented in the figure. Darker shades indicate higher consumption intensity. The scale ranges: 1- Does not consume any; 2- Seasonally; 3- Less often; 4- 1-2 glasses per day (less than ½ litre); 5- From ½ litre to 1 litre per day; 6- More than 1 litre per day.

5.2 Main models’ results

Table 2 reports WLS estimates of the pseudo-panel APC specification for wine consumption frequency. Model 1 refers to the full sample, while Models 2-4 replicate the same specification separately for the North, Centre, and South/Islands, thereby allowing an assessment of regional heterogeneity.

The results reveal a combination of strong behavioural persistence, pronounced generational gradients, and structural complementarities between wine consumption, dietary habits, and socioeconomic conditions, while offering more nuanced evidence on the role of sustainability-oriented lifestyles.

Table 2 WLS estimates of the pseudo-panel APC model for wine frequency consumption

	Model 1	Model 2	Model 3	Model 4
Wine (t)				
	Overall	North	Central	South and Islands
Wine (t-1)	0.500***	0.422***	0.406***	0.477***
	(0.009)	(0.015)	(0.023)	(0.012)
Age	0.000	-0.000	0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Gender (*Baseline: male*)				
female	-0.417***	-0.423***	-0.466***	-0.509***
	(0.009)	(0.014)	(0.022)	(0.015)
Education level (*Baseline: no formal education/primary*)				
lower secondary	0.008	0.048***	0.024	-0.016
	(0.008)	(0.013)	(0.019)	(0.012)
upper secondary	0.011	0.109***	0.026	-0.040***
	(0.009)	(0.014)	(0.021)	(0.014)
tertiary	0.034***	0.179***	0.050*	-0.015
	(0.011)	(0.018)	(0.027)	(0.018)
Economic situation	0.191***	0.102***	0.212***	0.164***
	(0.018)	(0.035)	(0.058)	(0.025)
Generation (*Baseline: The Greatest Generation*)				
The Silent generation	0.023	-0.052	0.042	0.270**
	(0.062)	(0.075)	(0.091)	(0.124)
The Baby Boomer 1	-0.016	-0.117	-0.015	0.257**
	(0.062)	(0.075)	(0.091)	(0.124)
The Baby Boomer 2	-0.081	-0.227***	-0.097	0.212*
	(0.062)	(0.076)	(0.091)	(0.124)
The Generation X	-0.208***	-0.403***	-0.237**	0.086
	(0.063)	(0.077)	(0.094)	(0.125)
The Millennials (Gen Y)	-0.355***	-0.542***	-0.407***	-0.098

	(0.065)	(0.080)	(0.098)	(0.127)
The Generation Z	-0.423***	-0.621***	-0.458***	-0.185
	(0.066)	(0.083)	(0.104)	(0.129)
Meat diet	0.028***	0.043***	0.047***	0.019**
	(0.006)	(0.009)	(0.013)	(0.010)
Sustainable lifestyle index	0.002	0.024**	0.012	-0.005
	(0.006)	(0.010)	(0.016)	(0.010)
Health status reported	0.038***	0.026	0.081***	0.057***
	(0.013)	(0.025)	(0.031)	(0.019)
Overall subjective well-being	0.008	-0.040***	0.009	-0.003
	(0.007)	(0.013)	(0.017)	(0.012)
Constant	0.952***	1.564***	1.015***	0.770***
	(0.101)	(0.158)	(0.206)	(0.172)
Observations	14,782	5,543	3,067	6,172
Adjusted R-squared	0.802	0.799	0.768	0.826

Notes: Wine (t-1) is the first lag of wine consumption frequency; *** p < 0.001, ** p < 0.05, and * p < 0.1.

Persistence and habitual consumption. Across all specifications, the lagged dependent variable is positive and highly significant, with coefficients ranging between 0.41 and 0.50. This indicates a high degree of persistence in wine consumption frequency, consistent with the interpretation of wine consumption as a habitual and culturally embedded behaviour rather than a purely situational choice.

Similar persistence patterns have been documented in studies of alcohol consumption dynamics, where past behaviour strongly predicts current intake (e.g. Livingston et al. (2018)). The magnitude of the persistence parameter supports the view that changes in wine consumption occur gradually and are shaped by long-run routines.

Age and cohort effects. Once cohort indicators are included, the average age effect is negligible, suggesting that lifecycle dynamics are largely dominated by generational differences rather than by ageing per se. In contrast, cohort coefficients display a clear and monotonic pattern. Relative to the Greatest Generation, all younger cohorts exhibit significantly lower wine consumption frequencies, with the strongest negative effects observed among Millennials and Generation Z. This finding aligns with a growing international literature documenting a structural decline in alcohol consumption among younger cohorts, often attributed to changing social norms, alternative leisure practices, and heightened health awareness (Vashishtha et al., 2021). Importantly, the persistence of these cohort effects across regional subsamples suggests that generational change represents a nationwide structural shift, rather than a purely regional phenomenon.

Gender and education. Female cohorts consistently display significantly lower wine consumption frequencies than males, confirming well-established gender differentials in alcohol consumption patterns (Wilsnack, 2018). Education effects are more heterogeneous. While higher educational attainment is associated with more frequent wine consumption in some specifications (particularly in Northern Italy), this relationship weakens or reverses in Southern regions. This pattern is consistent with evidence showing that education may correlate with moderate, culturally framed wine consumption, but that its effect depends on regional social norms and drinking contexts (Bloomfield et al., 2006; Holmes et al., 2014).

Economic conditions and health. Economic situation exhibits a positive and robust association with wine consumption frequency across all models, indicating that wine behaves as a normal good at the cohort level. This result is in line with studies highlighting the role of income and economic security in shaping regular alcohol consumption, particularly for wine consumed with meals (Holmes et al., 2014).

Self-reported health status is also positively associated with wine consumption in most specifications. This finding should not be interpreted as a health-enhancing effect of wine, but rather as a selection and self-regulation mechanism: individuals perceiving poorer health are more likely to reduce alcohol intake, while those in good health maintain established consumption routines. Similar interpretations are common in the public-health literature (Johansson et al., 2008; Rehm et al., 2010).

Diet, sustainability, and well-being. One of the most robust results concerns *the Meat diet index*, which is positive and highly significant across all models. This indicates a strong complementarity between wine consumption and traditional, animal-based dietary patterns. The finding reinforces the interpretation of wine as a food-embedded cultural good, closely linked to meal structures rather than to recreational or compensatory drinking. Comparable complementarities between diet and wine consumption have been documented in Mediterranean contexts (Turrini et al., 2001).

By contrast, *the Sustainable Lifestyle Index* does not display a robust or systematic association with wine consumption once dietary habits and socioeconomic conditions are controlled for. This suggests that sustainability awareness alone does not immediately alter habitual consumption behaviour, which instead adjusts gradually within a transforming production and environmental context (Grazia et al., 2023). This result contrasts with value-based narratives suggesting that sustainability-oriented lifestyles should translate into reduced alcohol consumption or substitution toward no-/low-alcohol alternatives (Farace et al., 2020). Instead, the evidence suggests that sustainability orientations, as captured by socially embedded and behaviourally oriented practices, do not exert an independent effect on habitual wine consumption.

Finally, Overall Subjective Well-Being shows weak or negative associations with wine consumption, particularly in Northern Italy. This supports the interpretation that wine consumption is not used as a coping mechanism for lower life satisfaction but rather remains integrated into routine social and dietary practices. Similar conclusions emerge in studies distinguishing social drinking from compensatory alcohol use (Peirce et al., 1994).

Taken together, the estimates point to three robust results: (i) wine consumption is highly persistent across time and regions; (ii) women consume wine less frequently than men in all macro-areas; and (iii) wine consumption is positively correlated with economic resources and with a meat-oriented dietary profile. At the

same time, the disaggregated models reveal meaningful regional heterogeneity: education gradients and the linkage between wine and the social, closely-tied lifestyle component are largely concentrated in the North, whereas the Centre displays the strongest association with economic conditions, and generational declines in wine consumption appear sharper in the North and Centre than in the South/Islands.

5.3 Sensitivity analysis: controlling for macroeconomic period shocks

To assess whether the estimated cohort effects are sensitive to period-specific macroeconomic conditions, additional specifications augment the baseline APC model with alternative proxies for common economic shocks. We sequentially include annual real GDP growth as time-varying macroeconomic controls. Introducing GDP growth as a period-specific (temporal) shock leaves the core structure of the results essentially unchanged, while adding a clear macroeconomic signal (Table 3). The sensitivity analysis for the national unemployment rate is also provided (see Table 3A in Appendix).

Stability of the main correlates. Compared with the baseline models, the coefficients for habit persistence (lagged wine), the gender gap (lower frequency among women), the positive association with economic situation, the generational gradient (younger cohorts consuming less), and the positive link with the Meat diet index remain very similar in sign, magnitude, and statistical significance across specifications. This suggests that the baseline relationships are not driven by omitted aggregate time effects and are robust to controlling for macroeconomic conditions.

Direct effect of the temporal shock. GDP growth enters positively and significantly in the overall sample and in the North and Centre (small coefficients but highly significant), indicating that wine consumption tends to be procyclical: in periods of stronger macroeconomic expansion, average wine consumption frequency increases.

In the South and Islands, the GDP growth coefficient is small and not statistically significant, pointing to a weaker (or noisier) transmission of aggregate economic fluctuations into consumption behaviour in that macro-area.

Adding GDP growth therefore mainly contributes by (i) capturing an independent period effect consistent with procyclicality of wine consumption, and (ii) highlighting regional heterogeneity in exposure/sensitivity to macroeconomic shocks (stronger in the North/Centre, negligible in the South/Islands) without materially altering the estimated effects of individual- and lifestyle-related covariates.

Table 3 APC model for wine frequency consumption, economic shock: GDP growth rate

	Model 1	Model 2	Model 3	Model 4
Wine (t)				
	Overall	North	Central	South and Islands
Wine (t-1)	0.500***	0.421***	0.405***	0.477***
	(0.009)	(0.015)	(0.023)	(0.012)
Age	-0.000	-0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Gender (*Baseline: male*)	-0.418***	-0.425***	-0.468***	-0.509***
female	(0.009)	(0.014)	(0.022)	(0.015)
Education level (*Baseline: no formal education/primary*)				
lower secondary	0.010	0.052***	0.027	-0.015
	(0.008)	(0.013)	(0.019)	(0.012)
upper secondary	0.015*	0.116***	0.033	-0.038***
	(0.009)	(0.014)	(0.021)	(0.014)
tertiary	0.040***	0.189***	0.059**	-0.012
	(0.011)	(0.018)	(0.027)	(0.018)
Economic situation	0.179***	0.078**	0.192***	0.159***
	(0.018)	(0.035)	(0.059)	(0.025)
Generation (*Baseline: The Greatest Generation*)				
The Silent generation	0.028	-0.043	0.051	0.270**
	(0.062)	(0.075)	(0.091)	(0.124)
The Baby Boomer 1	-0.010	-0.107	-0.004	0.258**
	(0.062)	(0.075)	(0.091)	(0.124)
The Baby Boomer 2	-0.078	-0.221***	-0.091	0.212*
	(0.062)	(0.076)	(0.092)	(0.124)
The Generation X	-0.207***	-0.400***	-0.235**	0.085
	(0.063)	(0.077)	(0.094)	(0.125)
The Millennials (Gen Y)	-0.356***	-0.542***	-0.409***	-0.100

	(0.064)	(0.080)	(0.098)	(0.127)
The Generation Z	-0.429***	-0.628***	-0.468***	-0.189
	(0.066)	(0.083)	(0.104)	(0.129)
Meat diet	0.028***	0.043***	0.047***	0.020**
	(0.006)	(0.009)	(0.013)	(0.010)
Sustainable lifestyle index	0.001	0.023**	0.012	-0.005
	(0.006)	(0.010)	(0.015)	(0.010)
Health status reported	0.029**	0.015	0.069**	0.054***
	(0.013)	(0.025)	(0.031)	(0.019)
Overall subjective well-being	0.013*	-0.034***	0.015	-0.001
	(0.007)	(0.013)	(0.018)	(0.012)
GDP growth rate	0.003***	0.005***	0.005***	0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Constant	1.020***	1.673***	1.124***	0.799***
	(0.103)	(0.161)	(0.213)	(0.175)
Observations	14,782	5,543	3,067	6,172
Adjusted R-squared	0.803	0.800	0.769	0.826

Notes: Wine (t-1) is the first lag of wine consumption frequency; *** p < 0.001, ** p < 0.05, and * p < 0.1.

6 Discussion

Taken together, the dynamic pseudo-panel estimates reframe what drives wine consumption frequency in contemporary Italy. Although sustainability-oriented values are often portrayed as increasingly decisive for food-related choices (Grunert et al., 2014; Joshi & Rahman, 2015), our results indicate that frequency responds primarily to behavioural persistence, cohort replacement, and the meal- and occasion-structures in which wine is embedded. Socioeconomic conditions matter as well, shifting frequency procyclical, while a sustainability-oriented lifestyle proxy has no robust national association with frequency. The combined evidence points to gradual change through routines and generational turnover rather than to a rapid, values-led reconfiguration of consumption regularity.

The most stable empirical regularity is the large coefficient on lagged wine consumption, which signals state dependence and slow adjustment. This is consistent with habit theory: repeated behaviour in stable contexts becomes cue-driven and less deliberative, so past consumption predicts future consumption even when preferences and information evolve (Ji & Wood, 2007; Ouellette & Wood, 1998; Wood & Neal, 2009). From a broader perspective, such persistence reflects path dependence and lock-in: routines are reproduced through

repeated practices, know-how, and stable contexts of use, making frequency less responsive to marginal attitudinal shifts unless the contexts that trigger consumption change (Arthur, 1989; Shove et al., 2012; Warde, 2005).

Consistent with this interpretation, age is not statistically informative once cohort indicators are included. This is precisely the advantage of the pseudo-panel framework (Browning et al., 1985; Deaton, 1985; Verbeek, 2008): it clarifies that the long-run decline in frequency is better described as cohort replacement than as a generic life-cycle trajectory. In other words, what matters is not simply getting older but belonging to cohorts socialised under different cultural, economic, and market environments that shape the baseline scripts for drinking wine with meals and social occasions.

The cohort gradient is pronounced and largely monotonic: relative to the oldest cohort, wine consumption frequency is lower for Generation X, markedly lower for Millennials, and lowest for Generation Z. Because these differences persist after controlling for contemporaneous economic conditions and period shocks, they are more consistent with a structural moderation shift than with a temporary youth effect. The pattern aligns with the long-run contraction in wine volumes observed in traditional wine countries (Anderson & Nelgen, 2012; European Commission, 2024), and with recent international statistics documenting continuing consumption decline (OIV, 2024). Rather than reflecting a simple shift toward sustainable abstention, generational differences appear consistent with a long-term reconfiguration of the wine system, where climatic, economic, and territorial dynamics reshape participation patterns across cohorts (Grazia et al., 2025). Regional estimates qualify the national narrative: the generational decline is steeper in the North and Centre, while the South and Islands retain elements of a more meal-centred regime, suggesting that distinct consumption regimes coexist within the same national market.

The strong positive association between wine frequency and the meat-centred diet component provides further support for a practice-based account. Wine appears to co-move with meal architectures anchored in red and processed meat, implying complementarity between wine and specific eating practices rather than a purely symbolic alignment with abstract values. An implication for sustainability debates is indirect but consequential: dietary transitions that reduce meat-anchored meals (whether for health, prices, or environmental reasons) can depress wine frequency by shrinking the contexts in which wine is routinely consumed, even if wine itself is not framed as environmentally problematic. This mechanism is consistent with evidence of cohort differences in dietary repertoires and a gradual reconfiguration of meat consumption across generations in Italy (Di Novi & Marenzi, 2022).

Against this backdrop, the absence of a robust national effect for the sustainable lifestyle index is informative. It does not imply that sustainability is irrelevant to wine markets; rather, it suggests that sustainability may operate mainly through composition effects - attribute choice, legitimacy, and trust (e.g., organic cues, provenance, packaging, verifiable claims) - more than through reduced frequency. This distinction is consistent with the sustainable consumption literature documenting the intention-behaviour gap and the frictions involved in translating values into changes in entrenched routines (Devinney et al., 2010; Vermeir & Verbeke, 2006; White et al., 2019), and with evidence that sustainability cues in wine are often processed as quality or credibility signals (Gazzola et al., 2022; Pomarici & Vecchio, 2014). The fact that the

index is significant only in the North suggests that in more modernised areas, sustainability-related lifestyles may correlate with social and mobility practices that also sustain particular drinking occasions.

Economic conditions add a clear demand-side channel. Perceived economic situation is positively associated with wine frequency, and the sensitivity analysis indicates procyclicality: frequency rises with GDP growth and declines when unemployment increases. Wine consumption frequency, therefore, behaves as a normal good and is vulnerable to downturns, plausibly through both disposable-income constraints and fewer consumption occasions. Importantly, period shocks modulate frequency around the cohort trajectory rather than overturning the generational gradient, which matters for forecasting and for long-run portfolio strategy. Finally, subjective well-being is not a systematic driver; the negative association found only in the North cautions against interpreting wine frequency as a general coping response.

7 Conclusions and policy implications

The evidence from the dynamic pseudo-panel models supports a clear diagnosis for Italy's wine industry: the long-run erosion of high-frequency consumption is structural, driven by cohort replacement and by a gradual reconfiguration of food-related routines rather than by a temporary life-cycle effect. Consumption frequency displays strong persistence at the cohort level, consistent with slow adjustment and behavioural lock-in, yet younger cohorts (Generation X, Millennials, and Generation Z) consume wine substantially less frequently than older cohorts after controlling for age and covariates. At the same time, frequency co-moves robustly with a meat-centred dietary profile and with economic resources, while a sustainability-oriented lifestyle proxy does not show a robust independent association with frequency at the national level. Regional estimates further indicate heterogeneous demand regimes, with sharper cohort declines in the North and Centre and more persistent traditional patterns in the South and Islands. For firms, these results imply that defending volume through broad, undifferentiated marketing is unlikely to be effective over the medium term, because the cohort gradient points to a shrinking base of routine consumers. Strategy should therefore prioritise demand rebalancing from a volume logic to a value logic, leveraging the persistence of incumbent routines while building relevance in contexts where younger cohorts still participate. Moreover, a coherent response combines occasion-led competition and portfolio adaptation: strengthening on-trade and experience-based positioning, investing in smaller formats and lower-alcohol lines consistent with moderation, and designing premiumisation paths that are not mechanically tied to frequency. The findings also suggest that "sustainability" is more plausibly a composition mechanism than a frequency mechanism. In practice, this means treating environmental performance as a capability and a source of legitimacy, anchored in measurable improvements along the supply chain and in verifiable claims that reinforce quality, trust, and territorial identity, rather than assuming that sustainability communication will, by itself, reshape habitual consumption regularity.

Policy implications follow directly from the demand-side nature of the transition. Structural adjustment in the wine sector should not be framed only around supply management, but also around the drivers of consumption frequency that determine long-run volumes. Policies that support innovation in products and packaging, foster credible environmental measurement and standards for claims, and enable the creation of new consumption occasions (e.g., through wine tourism and experience-oriented local development) are consistent with a value-led transition. At the same time, regional heterogeneity argues for differentiated

interventions: in the North and Centre, where cohort decline is steeper, policy can prioritise market diversification and innovation; in the South and Islands, where routines appear more persistent, policies can focus on reinforcing territorial differentiation and upgrading without assuming convergence to the same demand trajectory.

Finally, this study has some limitations. First, the dependent variable is an ordinal self-reported measure of habitual wine consumption; cohort averaging reduces idiosyncratic noise, but the measure captures regularity rather than quantities or expenditure. Second, pseudo-panels recover cohort-level dynamics and cannot identify within-cohort heterogeneity or substitution across wine styles, price tiers, and occasions. Third, period effects are proxied through macroeconomic indicators rather than a fully flexible set of year effects; while this preserves cohort interpretability, residual unobserved period variation cannot be ruled out. Future research could integrate richer measures of product choice (type, formats, certification, price tier), estimate non-linear models distinguishing participation from intensity, and link survey cohorts to regional market statistics or scanner data to test how firm strategies interact with cohort replacement across areas and occasions.

Declarations

Conflict of Interest

The authors declare that they have no conflicts of interest that could have influenced the research, analysis, or interpretation of the results reported in this manuscript.

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Footnotes

1. The data for the missing year 2004 were interpolated linearly.

Figures

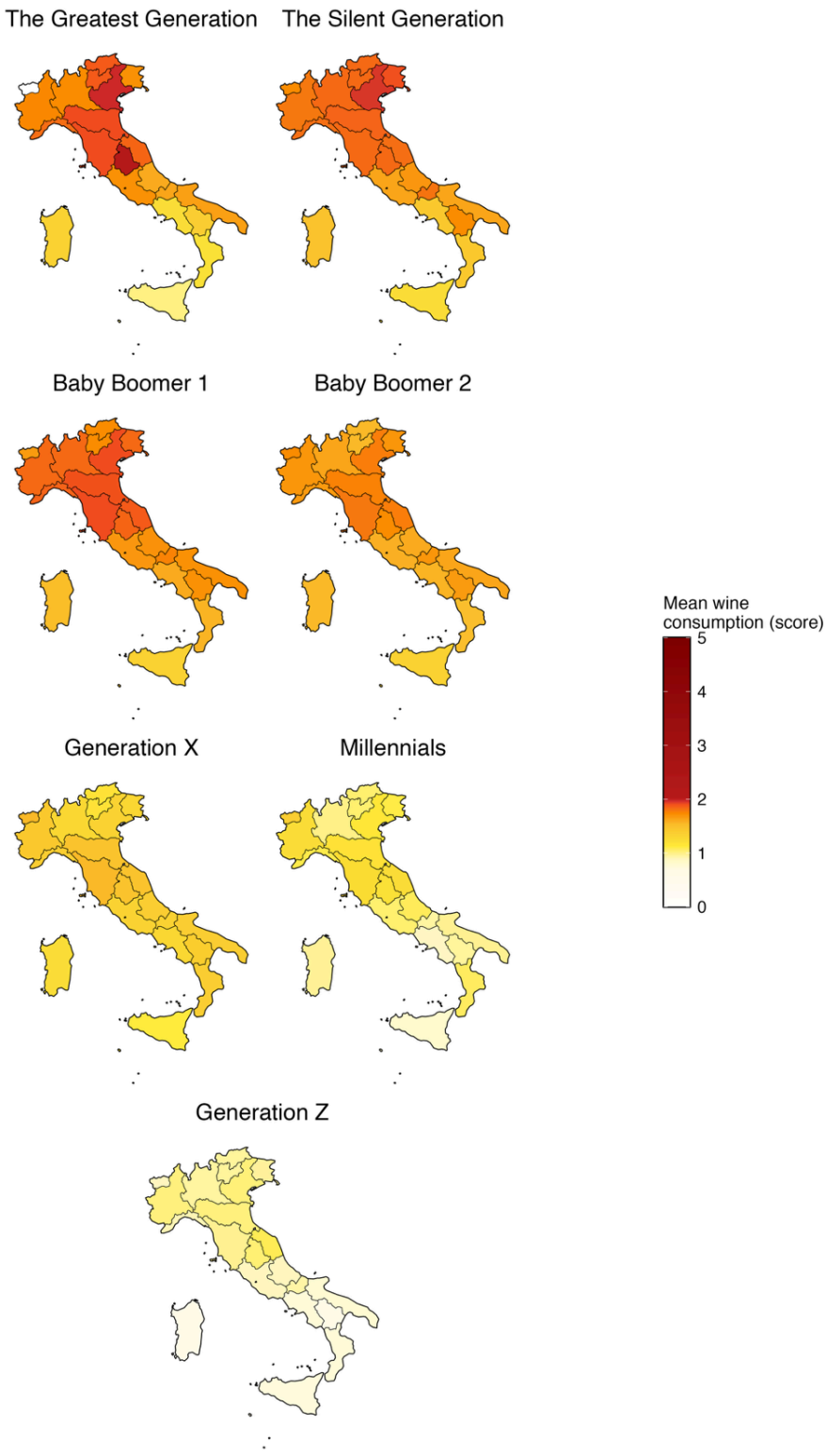


Figure 1

Spatial distribution of mean wine consumption frequency in Italy (1997-2023) by generation

Notes: The average cohort-level wine consumption frequency across Italian regions for successive birth cohorts is presented in the figure. Darker shades indicate higher consumption intensity. The scale ranges: 1-

Does not consume any; 2- Seasonally; 3- Less often; 4- 1-2 glasses per day (less than ½ litre); 5- From ½ litre to 1 litre per day; 6- More than 1 litre per day.

Supplementary Files

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- Appendix.docx