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Financial Impact of Consumption Tax Collection Point Shift in the Chinese Baijiu Industry—A Dynamic Simulation Based on DFSM and Stackelberg Game

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Abstract: The proposed shift of consumption tax collection from production to retail restructures fiscal policy in China's baijiu industry, altering tax timing, base, and subject. We examine whether deferred tax benefits offset profit erosion from tax base expansion and how brand heterogeneity mediates these impacts. A Dynamic Financial Simulation Model integrated with a Stackelberg supply chain game simulates four policy scenarios using 2019–2025 data from Kweichow Moutai, Shanxi Fenjiu, and Luzhou Laojiao. Results show that the implicit financing effect from deferred tax correlates positively with channel circulation time; Moutai captures RMB 1.39 billion in time-value savings under the channel-circulation basis. Tax base expansion disproportionately burdens high-markup brands, increasing Moutai's tax burden by 130.7% under retail-shift versus 33.2% for Fenjiu. Brand bargaining power positively moderates tax pass-through in the calibrated model: Moutai ($\theta = 0.85$) transfers 85% of incremental tax to consumers, whereas Laojiao ($\theta = 0.65$) absorbs 35% of the incremental burden, compressing its own margin. Retail compliance costs exhibit diseconomies of scale, threatening small distributors. The revenue-neutral mixed variant (S3') balances revenue neutrality with feasibility, limiting the ROE impact to marginally positive +0.17 to +0.35 percentage points, whereas the full retail shift (S2) imposes a −14.52 pp shock on Moutai. We provide the first unified framework combining cash-flow time-value theory, inventory valuation theory, and supply-chain game theory for consumption tax analysis, with policy recommendations for gradual reform.

Keywords: Consumption Tax Shift, Excise Tax, Tax Incidence, Tax Pass-Through, Implicit Financing, Tax Base Expansion, Bargaining Power, Stackelberg Game, Dynamic Financial Simulation, Baijiu Industry

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1. Introduction

The Chinese baijiu industry, characterized by a composite tax structure (20% ad valorem plus 0.5 RMB per 500 mL specific tax), ultra-long inventory cycles (base liquor aged for 3–5 years), and extreme channel markups (retail prices often double factory prices), offers an ideal setting for examining the financial consequences of shifting consumption tax collection points. In 2019, the Chinese government initiated a major reform to move consumption tax collection from production to retail, aiming to expand local revenue bases and better align tax incentives with consumption behavior (Zhang, 2022). This change does not merely reassign tax liabilities; it simultaneously alters four key parameters—tax timing, tax base, jurisdictional assignment, and taxpayer identity—with cascading effects on corporate cash flows, profit measurement, balance sheet valuation, and supply chain relationships.

In terms of policy scope, the shift affects a wide range of industries and carries substantial fiscal implications. According to Ministry of Finance data, China's consumption tax revenue exceeded 1.6 trillion RMB in 2023, with the baijiu industry contributing a notable share. A full move to the retail stage would not only reshape the industry's tax burden distribution but also impose structural impacts on firms' working capital management, profitability, and channel relationships. However, in contrast to the policy's significance, quantitative assessments remain scarce: most existing discussions are qualitative or policy-oriented, lacking systematic simulations or quantitative model-based analyses using firm-level data. This gap between policy advancement and research underscores the urgency of rigorously evaluating the financial effects of the collection point shift.

To address the limitations of prior studies, which often rely on static partial equilibrium models or single-theory perspectives, we integrate cash-flow time-value theory, inventory valuation theory, and supply-chain game theory into a unified analytical framework. Specifically, we develop a Dynamic Financial Simulation Model (DFSM) combined with a Stackelberg manufacturer-retailer

game, capturing four transmission mechanisms: (1) the implicit financing effect from deferred tax payments, (2) profit erosion from tax base expansion, (3) strategic redistribution of channel profits through bargaining, and (4) scale diseconomies in retail compliance costs. This framework moves beyond the conventional focus on price pass-through or tax incidence alone.

Using financial and operational data from three listed companies—Kweichow Moutai, Shanxi Fenjiu, and Luzhou Laojiao—covering 2019 to 2025, we simulate four counterfactual scenarios: S0 (baseline, production-stage taxation), S1 (shift to wholesale), S2 (shift to retail), and S3 (a mixed transition retaining the specific tax at production). The simulation indicates heterogeneous effects across firms with different brand power, such as the implicit financing effect tied to inventory days, the moderating role of brand bargaining power on tax pass-through, and the scale diseconomies in compliance costs. These results provide micro-level insights for policy design and gradual implementation, while also offering practical guidance for firms to adjust inventory management and channel strategies.

In summary, we address the practical question of how a collection point shift affects corporate finance, and clarifies the core mechanism—how the net effect of deferred tax benefits versus tax base expansion is determined. It offers a useful reference for the steady progression of consumption tax reform.

2. Literature Review and Theoretical Framework

2.1. Tax Incidence and Pass-Through: Empirical Evidence

The incidence of consumption and excise taxes has been a central topic in public economics for decades. Early theoretical contributions established the foundational partial equilibrium framework for analyzing tax burden distribution (Besley & Rosen, 1999; Fullerton & Metcalf, 2002). These models remain influential but are inherently static, treating tax shocks as instantaneous adjustments without accounting for the intertemporal financial consequences that arise when tax remittance is deferred across multi-year production cycles.

In the specific domain of alcoholic beverages, empirical research has produced mixed findings on tax pass-through. Shang et al. (2020) analyzed excise tax pass-through across 27 OECD countries and documented substantial heterogeneity: wine, Cognac, and liqueur exhibited robust overshifting, whereas beer and Scotch whisky yielded ambiguous results that could not reject exact pass-through. Bergman and Hansen (2019) examined Danish excise taxes and found that beer and liquor taxes were shifted to prices at rates between one and two, with a notable asymmetry that tax cuts were under-shifted relative to tax hikes. Conlon and Rao (2020) challenged conventional linear pass-through assumptions by demonstrating that discrete price points in U.S. distilled spirits markets create nonmonotonicities in tax incidence and excess burden. Thomas (2025) extended this line of inquiry by showing that retailer pricing strategies—specifically uniform versus flexible pricing—significantly moderate pass-through magnitude across six U.S. cities. Anderson (2025) further demonstrated how excise reform can nudge alcohol moderation in the Australian beer market. Laeza and Estrada (2024) provided evidence from the Philippines that tax-based price increases significantly reduced cigarette and fermented liquor consumption, highlighting the demand-side responsiveness to excise tax changes. These studies suggest that tax incidence is contingent on market structure, product differentiation, and pricing strategy, yet they focus almost exclusively on retail price adjustments rather than on the upstream financial consequences for manufacturers.

Chinese scholars have also examined indirect tax incidence using both partial and general equilibrium approaches. Meng (2013) estimated the incidence of cigarette, alcohol, automobile, and refined oil consumption taxes using supply-demand elasticity measurement, finding that consumers bear the majority of cigarette and alcohol taxes, while automobile and refined oil taxes are shared roughly equally between consumers and producers. Su et al. (2020) developed an indirect tax incidence model that relaxes the assumption of complete tax shifting, and found that Chinese enterprises bear approximately 70.29% of indirect taxes, with the remainder borne by final consumers. Qiao and Chen (2017) examined the impact of tax shifting capacity on the policy effects of China's VAT reform, demonstrating that firms with stronger bargaining power are better able to shift tax burdens along the supply chain and thus capture greater policy benefits. These studies highlight the importance of firm-level bargaining power in determining actual tax burdens.

The institutional dimension of where taxes are collected has received growing attention. Guo and Wang (2025) quantified the profit erosion that petroleum refiners face when excise tax remittance moves downstream. Fang et al. (2025) examined the administrative burden of retail-level tax compliance in an era of digitalized collection. Mattos et al. (2026) provided evidence from Brazil that tax regime changes materially affect firm compliance behavior, with effects concentrated among large manufacturers and cross-state transactors. Park (2020) analyzed China's consumption tax and housing property tax reforms, highlighting the fiscal implications for local government revenue. Chen et al. (2025) proposed a comprehensive tax reform framework for China incorporating consumption enhancement and pension sustainability objectives. Gao et al. (2017) conducted a systematic field study of the baijiu production, distribution, and retail chain in Sichuan province and drew on international experiences to propose reform pathways for China's liquor consumption tax. Fei et al. (2021) specifically analyzed China's baijiu consumption tax, highlighting issues

in the tax base, rate structure, and collection point. Zhang (2024) further discussed consumption tax reform within the broader context of fiscal and tax system restructuring. Yue and Wang (2025) provided a comprehensive framework for consumption tax reform objectives and implementation paths, emphasizing the need for phased progression and institutional readiness. In the baijiu sector, prior studies have examined tax burden distribution across the value chain and channel pricing strategies under the existing production-stage regime. Nevertheless, these sectoral studies remain largely static and do not model the dynamic financial adjustments—particularly working capital effects and inventory valuation changes—that arise when tax payment is deferred over multi-year aging cycles.

2.2. Supply Chain Game Theory: Theoretical Foundations

The second stream of literature relevant to our study concerns supply chain game theory, particularly the Stackelberg manufacturer-retailer framework. When tax policy changes the unit cost structure, the division of incremental burden between upstream and downstream parties depends on relative bargaining power. The manufacturer, as Stackelberg leader, sets the factory price anticipating the retailer's optimal response, while the retailer, as follower, sets the retail price considering consumer demand elasticity. This strategic interaction determines not only the final price paid by consumers but also the distribution of profit along the value chain.

Weyl and Fabinger (2013) provided a comprehensive theoretical treatment of pass-through as an economic tool, developing a unified framework for incidence analysis under imperfect competition that encompasses monopolistic, oligopolistic, and monopolistically competitive market structures. Their work established the relationship between market conduct and tax incidence, showing that pass-through rates depend critically on demand curvature and the nature of competition. Ezimadu et al. (2024) provided a systematic review of Stackelberg game theory models applied to trade credit, synthesizing the theoretical developments and identifying key determinants of equilibrium outcomes in leader-follower supply chain relationships. Li (2025) examined the fiscal decentralization implications of shifting passenger-vehicle consumption tax to the retail stage in China, applying a game-theoretic lens to the strategic interactions between government levels.

Chinese scholars have extended Stackelberg game models to various supply chain contexts. Jian and Xu (2017) analyzed supply chain buyback contracts under Stackelberg game with risk-aversion assumptions, using conditional value-at-risk (CVaR) as the risk measure. They demonstrated that the supplier's optimal repurchase strategy depends on both parties' risk-aversion levels and the wholesale price interval, and that the risk-aversion assumption provides more realistic explanations for observed supplier behavior than risk-neutral models. Luo (2026) extended the classical single-leader single-follower Stackelberg model to multi-leader multi-follower settings using variational inequality methods and metric projection theory, establishing rigorous existence conditions for equilibrium solutions in compact strategy sets—a theoretical foundation that informs our modeling of multiple manufacturers competing in the baijiu market. Qiu and Zhou (2021) examined product supply chain game decisions considering lead-time compression and demand forecast information updating within a Stackelberg framework, revealing that equilibrium order quantities tend to be suboptimally low, resulting in supply chain service levels below 50% and inefficiently long lead times—insights that parallel our finding that decentralized decision-making may lead to suboptimal tax pass-through outcomes.

2.3. Dynamic Financial Simulation and Policy Counterfactual Analysis: Methodological Literature

The third stream of literature concerns methodological approaches to ex-ante policy impact assessment using dynamic simulation and counterfactual analysis. Traditional partial equilibrium models (Besley & Rosen, 1999; Fullerton & Metcalf, 2002) treat tax shocks as instantaneous adjustments without accounting for intertemporal financial consequences. While computationally tractable, these models cannot capture the multi-period cash flow effects, working capital adjustments, and balance sheet transformations that arise when tax payment is deferred over extended production cycles.

System dynamics and simulation methods have been applied to policy evaluation in various contexts. Zhou et al. (2018) developed a system dynamics model for China's energy conservation and emission reduction policies, demonstrating the value of simulation-based approaches for optimizing policy design under complex dynamic interactions. Tang and Xi (2023) used numerical simulation to evaluate the fiscal effects of shifting consumption tax collection to the retail stage and designing revenue-sharing mechanisms between central and local governments, providing a methodological precedent for our counterfactual scenario analysis. Duan (2023) estimated beta coefficients for baijiu-listed companies using the CAPM model with a 10-year sample, offering a reference for parameter calibration in financial simulation models applied to the baijiu industry.

More recently, scholars have begun integrating financial simulation with game-theoretic models to capture both the intertemporal and strategic dimensions of tax policy. Ghosh et al. (2026) examined how consumption taxes affect corporate product mix decisions, highlighting the role of tax timing and base design in shaping firm behavior. Huang et al. (2022) analyzed Kweichow Moutai's business model and financial performance, providing industry-specific context for understanding how premium baijiu manufacturers might respond to tax policy changes. Xia (2023) analyzed the development and prospects of the baijiu industry,

offering macro-level industry context. These studies point toward the need for integrated frameworks that can simultaneously model the dynamic financial adjustments and strategic supply chain responses triggered by tax policy changes.

2.4. Literature Gap and This Study's Contribution

Despite these advances, the literature contains two persistent gaps. First, there is unresolved disagreement over whether excise tax changes are fully passed through to consumers. Some studies find overshifting for premium products (Bergman & Hansen, 2019; Shang et al., 2020), while others document undershifting for mass-market goods (Čizmović et al., 2026; Thomas, 2025). This heterogeneity suggests that product positioning and channel structure matter, yet existing frameworks rarely model the strategic price-setting process between manufacturers and retailers explicitly. Chinese studies (Meng, 2013; Su et al., 2020) have partially addressed this by estimating tax incidence using elasticity measures, but these remain static and do not incorporate dynamic financial adjustments.

Second, and more fundamentally, no existing study integrates cash-flow timing effects, inventory valuation adjustments, and supply-chain bargaining into a unified framework. Most empirical analyses focus on retail price pass-through alone, without considering how deferred tax payments affect firms' working capital and investment capacity. This omission is particularly consequential in the baijiu industry, where inventory cycles exceeding 1000 days create time-value benefits that could partially offset profit erosion from an expanded tax base. Moreover, the strategic interaction between manufacturers and retailers in determining who bears the incremental tax burden has received limited analytical attention, despite its clear relevance for policy design.

This study addresses these gaps by developing a Dynamic Financial Simulation Model (DFSMS) integrated with a Stackelberg supply chain game. By exploiting the baijiu industry's unique structural characteristics—long inventory cycles and extreme channel markups—we cleanly distinguish the “tax timing” effect from the “tax base expansion” effect, providing clear quantification of each mechanism's magnitude while offering a transferable methodology for ex-ante policy impact assessment.

3. Research Materials and Methods

3.1. Sample Selection and Data Sources

This study selects three listed baijiu companies representing distinct market positions in China's liquor industry: Kweichow Moutai (600519.SH), representing the ultra-premium segment with the strongest brand power; Shanxi Fenjiu (600809.SH), representing the premium light-aroma segment with high growth momentum; and Luzhou Laojiao (000568.SZ), representing the mid-to-high tier with traditional channel dependence. These three firms exhibit systematically different inventory cycles, channel markups, and brand bargaining power, enabling a comparative analysis of heterogeneous policy impacts. Consistent with Yin's (2014) multiple-case design, we purposively selected three firms spanning the premium–value spectrum to enable cross-case comparison rather than statistical generalization.

Financial data for the period 2019–2025 were manually extracted from the annual reports of the three listed companies, publicly available through the Shanghai and Shenzhen Stock Exchange websites. The extracted items include: revenue, cost of goods sold (COGS), taxes and surcharges, consumption tax (separately identified from notes to financial statements), selling expenses, administrative expenses, net profit, shareholders' equity, inventory, and total assets.

Production and sales data—including annual output volume (tons), sales volume (tons), inventory volume (tons), ex-factory price (RMB/500 mL), primary wholesale price (RMB/500 mL), and retail price (RMB/500 mL)—were compiled from the same annual reports (specifically from the “principal operations by product” sections) and supplemented by industry channel surveys and publicly available market intelligence reports.

Model parameters were sourced as follows: beta coefficients were estimated from ordinary least squares (OLS) regressions of 60 monthly stock returns (January 2021–December 2025) on the CSI 300 index, using post-adjustment closing prices from the Wind database, with the resulting estimates (1.12 for Moutai, 1.33 for Fenjiu, and 1.64 for Laojiao) cross-validated against the levered betas reported by Wind to four decimal places; the risk-free rate from the Chinese 10-year government bond yield as of December 2025; the market risk premium from Damodaran (2024); and firm-specific equilibrium price elasticities (−0.8 for Moutai, −1.5 for Fenjiu, and −1.5 for Laojiao) calibrated in Section 3.2.2, using Gallet (2007) as the aggregate alcoholic-beverage benchmark and the baijiu-specific sources listed there. The brand bargaining power parameter θ was calibrated ex ante against independent pass-through evidence, with values set at 0.85 for Moutai, 0.75 for Fenjiu, and 0.65 for Laojiao (see Section 3.4 for the calibration protocol and its anchors). The ad valorem tax rate (20%) and specific tax (0.5 RMB per 500 mL) follow the Provisional Regulations of the People's Republic of China on Consumption Tax. All monetary values are expressed in constant 2025 RMB.

This study adopts a purposive multiple-case design rather than full-industry sampling. The Chinese baijiu industry comprises a large number of licensed producers of highly heterogeneous scale, and no three-firm sample could statistically represent the entire population. We therefore select three listed firms as archetypal cases spanning the premium-to-mid price spectrum, following three

explicit criteria. First, data availability and quality: all three firms have maintained uninterrupted, audited financial disclosure with separately identifiable consumption tax payments. Second, structural diversity: the three firms exhibit systematically different inventory cycles (days inventory outstanding of 1458, 156, and 239 days, respectively), brand bargaining power ($\theta = 0.85, 0.75$, and 0.65), and channel structures, enabling comparative inference on how these structural attributes moderate policy impacts. Third, market significance: the three firms are among the largest listed baijiu producers by revenue and profit, capturing the dominant share of the industry's economic value among listed companies. We explicitly do not claim that our findings generalize to all baijiu producers; rather, the simulations illustrate the differential financial impacts of a collection-point shift for firms with long versus short inventory cycles and strong versus weak brand power. Extending the framework to small regional producers would require additional data and is left for future research.

3.2. Model Architecture

The analytical framework integrates two complementary models: a Dynamic Financial Simulation Model (DFSMM) for forward-looking financial projection, and a Stackelberg supply chain game for tax pass-through analysis.

3.2.1. Dynamic Financial Simulation Model (DFSMM)

The DFSMM constructs a five-year forward-looking projection (2021–2025) with three-statement linkage. The effective sales volume is calibrated as:

$$Q_{\text{eff}} = \text{sales}_{\text{tons}} \times 2000 \quad (1)$$

where 2000 bottles per ton is the standard conversion for baijiu products ($500 \text{ mL} \times 2 \text{ bottles per kg} \times 1000 \text{ kg}$). The average factory price is:

$$P_{\text{avg}} = \text{revenue} / Q_{\text{eff}} \quad (2)$$

The income statement is specified as:

$$\pi_t = (P_w \times Q_t - c \times Q_t) \times (1 - \tau_{\text{vat}}) - T_{\text{excise},t} - FC_t \quad (3)$$

where P_w is the ex-factory price per bottle, Q_t is sales volume in bottles, c is unit COGS, τ_{vat} is the effective VAT rate (calculated from financial statements), $T_{\text{excise},t}$ is the consumption tax liability, and FC_t includes selling and administrative expenses.

$$CF_t = \text{EBIT}_t \times (1 - \tau_{\text{income}}) + D\&A_t - \Delta \text{NWC}_t - \text{CapEx}_t \quad (4)$$

The cash flow statement is:

Where EBIT is earnings before interest and taxes, τ_{income} is the corporate income tax rate (25%), $D\&A_t$ is depreciation and amortization (estimated from historical trends), ΔNWC_t is the change in net working capital, and CapEx_t is capital expenditure (estimated as a percentage of revenue based on historical averages).

The balance sheet incorporates the transition of inventory from a tax-inclusive asset under the current system to a tax-exclusive asset under the retail-stage scenario, with concurrent recognition of deferred consumption tax liabilities.

3.2.2. Stackelberg Supply Chain Game Model

The DFSMM's tax shock is embedded into a manufacturer-retailer pricing game. The manufacturer (leader) sets the factory price w anticipating the retailer's response, and the retailer (follower) sets the retail price p to maximize channel profit given w and tax obligations. The equilibrium solutions are:

$$w^* = \frac{a + b(c + \theta \Delta T)}{2b} \quad (5)$$

$$p^* = \frac{3a + b(c + (2 - \theta) \Delta T)}{4b} \quad (6)$$

where a and b are demand function parameters are calibrated firm by firm such that the demand curve passes through the observed price–quantity equilibrium and exhibits the firm-specific price elasticity at that point, c is unit COGS, θ is the brand bargaining power parameter, and ΔT is the incremental tax burden from the collection point shift.

The tax pass-through mechanism is further decomposed into:

$$\Delta w = -(1 - \theta) \times \Delta T_{\text{unit}} \quad (7)$$

$$\Delta p = \theta \times \Delta T_{\text{unit}} \times \frac{P_r}{P_w} \quad (8)$$

$$\frac{\Delta Q}{Q} = \varepsilon \times \frac{\Delta p}{P_r} \quad (9)$$

where ΔT_{unit} is the incremental tax per bottle, P_r and P_w are retail and ex-factory prices respectively, and ε is the price elasticity of demand (−0.8 for Moutai; −1.5 for Fenjiu and Laojiao).

Demand-system calibration note. Each firm's demand parameters are calibrated independently from its own observed price–quantity equilibrium; no demand intercept or slope is shared across firms. The only firm-specific behavioral input is the equilibrium price elasticity ε_i , anchored on two independent sources: aggregate baijiu demand elasticity of −0.34 (Meng, 2013, using 2003–2010 data) provides the low-responsiveness bound, and platform-level estimates for premium baijiu (−1.28 for Feitian Moutai, −2.84 for Wuliangye; Beijing Technology and Business University, 2018) establish that elasticity rises as brand tier falls. The calibrated values (−0.8, −1.5, −1.5) preserve this tier ordering and fall within the bracket formed by the two sources. Quantity responses to tax-induced price changes are computed with a point-elasticity rule evaluated at the current equilibrium, the standard approach in the pass-through literature (Conlon & Rao, 2020). As a robustness check, ε is swept over [−3.0, −0.5] for all firms (Figure 4); firm rankings and the direction of effects are unchanged across the entire range.

3.3. Scenario Design

Four counterfactual scenarios are designed to evaluate the policy effects under different institutional arrangements (Table 1):

Table 1. Scenario Definitions and Model Operations.

Dimension	S0 (Baseline)	S1 (Conservative Shift)	S2 (Aggressive Shift)	S3 (Mixed Transition)	S3' (Revenue-Neutral Mixed Transition)
Tax liability trigger	Ex-factory sale to first-tier distributor	Primary wholesale sale to retailer	Retail sale to final consumer	Retail sale to final consumer (ad valorem); ex-factory sale (specific tax)	Retail sale to final consumer (ad valorem); ex-factory sale (specific tax)
Taxpayer (legal subject)	Manufacturer	First-tier wholesaler	Retailer	Retailer (ad valorem); Manufacturer (specific tax)	Retailer (ad valorem); Manufacturer (specific tax)
Ad valorem tax base	Ex-factory price × 20%	Primary wholesale price × 20%	Retail price × 20%	Retail price × 20%	Retail price × 20%
Specific tax (per 500 mL)	RMB 0.5, levied at production	RMB 0.5, levied at wholesale	RMB 0.5, levied at retail	RMB 0.5, levied at production	RMB 0.5, levied at production
Minimum price rule consideration	Current verification regime	Re-benchmarked to wholesale price	Re-benchmarked to retail price	Re-benchmarked to retail price (ad valorem only)	Re-benchmarked to retail price (ad valorem component only)
Parameters changed vs. S0	—	Trigger date + taxpayer + base price reference	Trigger date + taxpayer + base price reference + compliance subject	Ad valorem trigger + taxpayer + base; specific tax timing unchanged	Ad valorem trigger + taxpayer + base reference; specific tax timing unchanged

Source: Authors.

The revenue-neutral variant S_3' applies a scaled ad valorem rate

$$\tau' = \eta \times \tau_v \times \frac{p_w}{p_r}$$

where η is a brand-specific scaling factor (Moutai 0.546, Fenjiu 0.078, Laojiao 0.114), $\tau_v = 20\%$ is the statutory ad valorem rate, and p_w/p_r are the ex-factory-to-retail price ratios (Moutai 1169/2700, Fenjiu 660/880, Laojiao 770/1399). The proportional method uses the statutory minimum tax-price—not the terminal retail price—as the specific-tax base, correcting the flagship-price × full-portfolio-volume mismatch.

Two institutional features are held constant across all scenarios unless stated otherwise. First, the statutory rates are unchanged: the ad valorem rate remains 20% and the specific tax remains RMB 0.5 per 500 mL—the policy experiment concerns the collection point only, not the tax rate. Second, the minimum taxable price verification regime is assumed to be re-calibrated by the tax authority to the price benchmark of the new collection stage in each shifted scenario, preventing extreme base erosion; the verification ratio follows the unified 60% standard set in 2017 (State Administration of Taxation, 2017).

3.4. Parameter Calibration

Weighted Average Cost of Capital (WACC) is calculated using the Capital Asset Pricing Model (CAPM):

$$\text{WACC} = w_e \times (r_f + \beta \times \text{MRP}) + w_d \times r_d \times (1 - t_c) \quad (10)$$

where $r_f = 1.85\%$ (Chinese 10-year government bond yield, December 2025), $\text{MRP} = 6\%$ (Damodaran, 2024), $r_d = 4.5\%$ (estimated from interest expenses), and $t_c = 25\%$ (statutory corporate income tax rate). Beta coefficients are 1.12 (Moutai), 1.33 (Fenjiu), and 1.64 (Laojiao), estimated by OLS regression of 60 monthly post-adjusted stock returns on the CSI 300 market return (December 2020–December 2025) and cross-validated to four decimal places against Wind's independently published levered betas. Debt and equity weights are defined as $w_d = D/(D+E)$ and $w_e = E/(D+E)$. Given the firms' low leverage, w_d equals 1.0%, 0.1%, and 3.8% for Moutai, Fenjiu, and Laojiao respectively, yielding WACC of 8.5% for Moutai, 9.8% for Fenjiu, and 11.4% for Laojiao.

Inventory Days Outstanding (DIO) is calculated as:

$$\text{DIO} = (\text{inventory}_{\text{tons}} / \text{sales}_{\text{tons}}) \times 365 \quad (11)$$

when sales volume data are available, and as $\text{DIO} = (\text{inventory}/\text{COGS}) \times 365$ as a robustness check.

Implicit Financing Value from tax deferral is calculated as:

$$\text{PV}_{\text{saving}} = T_{\text{total}} \times (1 - e^{-\text{WACC} \times \text{DIO}/365}) \quad (12)$$

where T_{total} is the annual consumption tax payment and DIO is the deferral period, defined as the channel circulation time between ex-factory shipment and final retail sale (see the identification paragraph below).

Identifying the tax deferral period. Under the current regime the consumption tax liability arises at ex-factory sale; under retail-stage collection it would arise at final sale to the consumer. The incremental deferral period is therefore the calendar time a bottle spends in the distribution channel between leaving the manufacturer and reaching the consumer—the channel circulation time, not the manufacturer's own days inventory outstanding. Manufacturer DIO is not a valid proxy: for Moutai, DIO equals 1458 days, which primarily reflects base-liquor aging (roughly four years of cellaring) rather than pipeline time, and would overstate the deferral by an order of magnitude. We therefore adopt channel inventory days as the central metric—120 days for Moutai, reflecting scarcity-driven channel stockpiling, and 90 days for Fenjiu and Laojiao—consistent with industry evidence that channel inventory for leading brands has settled at 1.5–2 months (China Alcoholic Drinks Association, 2026) while secondary-premium brands run 3–6 months. Because distributor-level inventory is not publicly disclosed, the estimate is bracketed by a 60-day evidence-based floor and a conservative 180-day cap (see Section 4.2). The financing benefit is modest across the entire evidence-backed range, which underscores that the choice of deferral metric materially affects the magnitude of H1.

Brand bargaining power parameter (θ) calibration. The parameter θ denotes the share of an incremental tax burden that the manufacturer passes forward to consumers through retail price adjustment, holding channel structure fixed. θ is calibrated ex ante against three independent anchors: (i) Su et al. (2020), *Economic Research Journal*) estimate an average consumption-tax pass-through rate of approximately 0.772 for tax-intensive industries including alcohol; (ii) elasticity-based incidence formulas applied to baijiu imply a consumer burden share of approximately 73% (Meng, 2013); and (iii) the international evidence documents pass-through rates ranging from 24% to above 100% (Shang et al., 2020; Conlon & Rao, 2020; Thomas, 2025). The firm-level values—0.85 for Moutai, 0.75 for Fenjiu, and 0.65 for Laojiao (mean 0.75)—stratify around these anchors according to brand strength: Moutai's scarcity and pricing power justify the highest value, consistent with qualitative evidence that premium-brand pass-through capacity exceeds that of secondary brands (Liu, 2025). To address estimation uncertainty, θ is treated as random in a triangular distribution around each central value; a 10,000-draw Monte Carlo simulation (see Section 4.3.1) shows that firm rankings and the direction of effects are robust across the plausible range. The entire calibration is reproducible from published sources without proprietary data. Table 2 summarizes the firm-specific calibrated parameters, and Table 3 lists the common (firm-invariant) parameters.

Table 2. Core Parameter Summary.

Firm	θ (Bargaining Power)	Own-Price Elasticity ε (Source)	Deferral Days DIO (Channel Basis)	η (S3' Scaling)	Ad-Valorem Rate	Specific Tax
Moutai	0.85	−0.8 (Gallet, 2007)	120 days	0.546	20%	0.5 RMB/500 mL
Fenjiu	0.75	−1.5 (Gallet, 2007)	90 days	0.078	20%	0.5 RMB/500 mL
Laojiao	0.65	−1.5 (Gallet, 2007)	90 days	0.114	20%	0.5 RMB/500 mL

Source: Authors.

Table 3. Common (firm-invariant) parameters.

Parameter	Value	Source
Ad-valorem consumption tax	20%	Provisional Regulations on Consumption Tax
Specific tax	0.5 RMB/500 mL	Provisional Regulations on Consumption Tax
Risk-free rate (10Y CGB, Dec 2025)	1.85%	—
Market risk premium	6%	Damodaran (2024)
Cost of debt	4.5%	estimated from interest expenses
Statutory corporate tax rate	25%	—
Simulation window	2019–2025	annual reports

Source: Authors.

3.5. Research Hypotheses

Based on the theoretical framework in Section 2, we formally state four working hypotheses, each derived from a specific theoretical pillar and tested by the DFSM–Stackelberg simulation in Section 4.

H1 (Implicit Financing Effect). Deferring tax payment from the production stage to the retail stage generates a time-value benefit for manufacturers, and the magnitude of this benefit is positively associated with the length of the tax-deferral period. Theoretical basis: cash-flow time-value theory. Test: present value of financing savings across firms (see Section 4.2). Prediction: Moutai, with the longest channel deferral, captures the largest financing benefit.

H2 (Tax Base Expansion Effect). Shifting the ad valorem tax base from ex-factory prices to retail prices expands nominal tax liability for all firms, and the expansion is proportionally larger for brands with higher channel markups. Theoretical basis: tax incidence and tax base theory. Test: tax burden changes from S0 to S2 across firms (see Section 4.1.1). Prediction: Moutai, with the highest retail-to-factory price ratio, experiences the largest proportionate tax increase.

H3 (Pass-Through and Brand Bargaining Power). Brand bargaining power θ positively moderates tax pass-through: firms with higher θ pass a larger share of the incremental tax to consumers, thereby protecting their own margins. Theoretical basis: Stackelberg supply chain game theory. Test: producer versus consumer burden shares across firms under the calibrated θ values (see Section 4.3.1). Prediction: the consumer burden share is ordered Moutai > Fenjiu > Laojiao, conditional on the ex-ante calibrated θ .

H4 (Compliance Cost Diseconomies). Retail-stage collection imposes compliance costs exhibiting diseconomies of scale: small distributors face proportionally higher compliance costs than large national chains, creating a consolidation incentive. Theoretical basis: tax administration and compliance cost literature. Test: illustrative compliance cost ratios for small versus large distributors (Section 4.4). Prediction: small distributors face proportionally higher compliance costs. H4 is exploratory and relies on illustrative scenarios rather than systematically collected data.

Data limitation for H4. H4 is treated as illustrative and exploratory rather than a formally tested structural prediction. We do not estimate an exit-threshold or lognormal compliance-cost distribution at the distributor level, because distributor-level accounting data are not publicly disclosed in China and no authoritative channel-census data are available. The cost ratios reported in Section 4.4 are therefore stylized scenarios: small distributors face proportionally higher fixed compliance costs than large national chains, and the magnitudes should be interpreted as order-of-magnitude magnitudes rather than point estimates. Formalizing H4 would require proprietary dealer-level data and is left for future research.

3.6. Generative AI Use Disclosure

During the preparation of this study, we used DeepSeek and ChatGPT for literature search assistance, gap identification, and language polishing. We reviewed all AI-generated output and takes full responsibility for the content. No AI tools were used in data collection, model construction, numerical analysis, or result interpretation.

4. Results

This section reports the simulation results across four scenarios (S0–S3) for the three sample firms, organized around the four hypotheses: implicit financing (H1), tax base expansion (H2), pass-through and channel redistribution (H3), and compliance cost diseconomies (H4).

4.1. Scenario Simulation Results

4.1.1. Tax Burden Comparison Across Scenarios

Table 4 presents the 2025 consumption tax burden across scenarios for the three firms. Under the baseline S0 (production-stage taxation), Moutai bears the largest tax burden (RMB 21.80 billion), followed by Fenjiu (RMB 5.80 billion) and Laojiao (RMB 3.10 billion).

Table 4. Tax Burden Comparison Across Scenarios.

Firm	S0 Baseline	S1 Wholesale	S2 Retail = S3 Mixed	S3' Revenue-Neutral	Neu- tral Rate τ'
Moutai	217.97	309.33	502.84	217.97	4.72%
Fenjiu	58.02	64.16	77.29	58.02	1.17%
Laojiao	31.05	35.47	56.32	31.05	1.25%

Note: Values in RMB 100 million (亿元). Sources: authors' calculations based on 2019–2025 annual reports.

Identical total tax burden under S2 and S3. In S2, both the ad valorem and specific taxes are collected at the retail stage; in S3, only the ad valorem component moves to retail, while the specific tax remains at production. Because the statutory rates are identical in both scenarios—20% on the retail price and RMB 0.5 per 500 mL—the total consumption tax liability is identical by construction:

$$T = 0.2 \times P_{\text{primary}} + 0.5 \quad (13)$$

where p_r is the retail price per 500 mL and q is the sales volume. The difference between S2 and S3 is therefore not the amount of tax but only the timing of the specific-tax payment, which produces the small financing differential shown in Table 4.

Under the aggressive retail-stage shift (S2), Moutai's tax burden expands by 130.7% to RMB 50.28 billion, reflecting its extreme channel markup (retail price $2.31 \times$ factory price). Fenjiu's tax burden increases more modestly by 33.2% to RMB 7.73 billion, while Laojiao's expands by 81.4% to RMB 5.63 billion. The mixed transition scenario (S3) yields identical total tax burdens to S2 due to the unchanged overall tax base (specific tax + ad valorem tax = same total), but differs in implementation feasibility and compliance burden, as discussed in subsequent sections.

Under the maintained assumptions—unchanged statutory rates, a specific tax of RMB 0.5 per 500 mL, and an ad valorem base defined as the retail price in both scenarios—the total consumption tax liability under the retail-stage shift (S2) and the mixed transition (S3) is identical:

$$T = \tau_v \times p_r \times q + \tau_s \times q \quad (14)$$

where $\tau_v = 20\%$ is the ad valorem rate, $\tau_s = \text{RMB } 0.5 \text{ per } 500 \text{ mL}$ is the specific rate, p_r is the retail price per 500 mL, and q is the sales volume. Because the specific tax is a fixed per-unit levy independent of the collection stage, moving its collection point between production and retail alters only the timing and the paying entity, not the amount; and because the ad valorem component is assessed on the same retail-price base in both scenarios, $T_{S2} = T_{S3}$. The two scenarios differ in implementation—the taxpayer identity (the retailer under S2 versus the manufacturer and retailer jointly under S3), the payment timing of the specific tax, and the compliance subject—not in total burden. The identity is verified numerically in the simulation ($T_{S2} - T_{S3} = 0.0$ for all three firms).

Because S_2 and S_3 coincide in total tax burden by Proposition 1, neither isolates the pure timing effect of the collection-point shift. We therefore add a revenue-neutral variant, S'_3 , which retains the specific tax at production while shifting the ad valorem component to retail at a reduced rate τ' , calibrated firm by firm so that the per-bottle ad valorem liability equals its current effective level:

$$\tau' \times p_r = \eta \times \tau_v \times p_w \quad (15)$$

where η denotes the firm's effective collection ratio under the current minimum-price verification regime. The resulting rates are 4.72% for Moutai, 1.17% for Fenjiu, and 1.25% for Laojiao, holding each firm's total tax burden at the S_0 baseline ($T_{S'_3} - T_{S_0} = 0.0$ in the simulation). S'_3 thus isolates the payment-timing (financing) effect of the reform from the tax-base expansion effect, and provides a politically feasible benchmark in which the modernization of collection imposes no additional burden on manufacturers.

Figure 1 illustrates the 7-year trends (2019–2025). The S2 retail tax burden for Moutai shows a steep upward trajectory, driven by both volume growth and price appreciation. Fenjiu and Laojiao exhibit more moderate trends, with Fenjiu's 2023 spike reflecting its Qinghua 20 premiumization strategy, which temporarily elevated its average retail price.

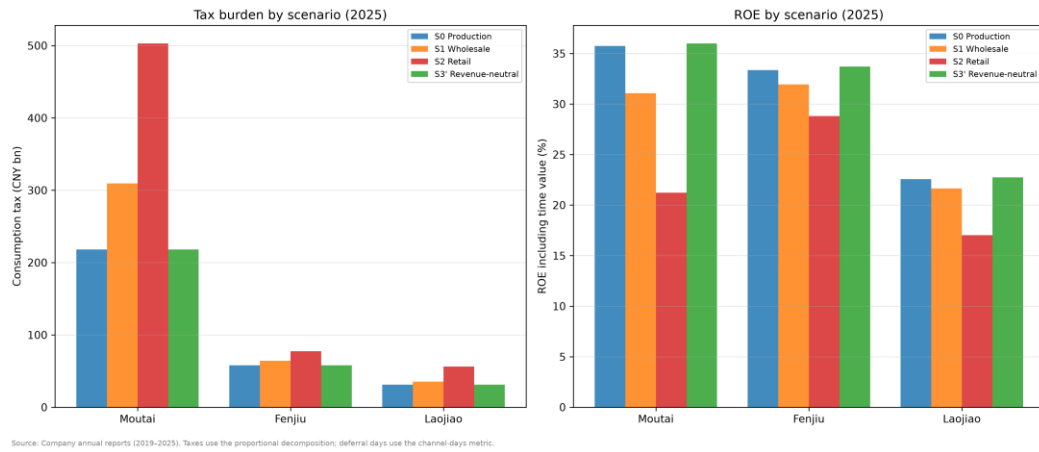


Figure 1. Tax burden comparison across scenarios (2025) and 7-year S2 retail tax trends (2019–2025). Source: Authors.

4.1.2. ROE Impacts Across Scenarios

Table 5 compares ROE impacts across scenarios, measured as percentage point changes relative to S0. Under S2 (and identically under S3), Moutai experiences the largest decline (−14.52 percentage points), followed by Laojiao (−5.55 pp) and Fenjiu (−4.54 pp). The relative ordering (Moutai > Laojiao > Fenjiu) does not monotonically follow brand power theta, because absolute tax burden scale also matters—Moutai’s RMB 28.49 billion incremental tax dwarfs Fenjiu’s RMB 1.93 billion, overwhelming the bargaining power advantage. Under the revenue-neutral variant S3’, by contrast, ROE impacts are marginally positive (+0.25, +0.35, and +0.17 pp), reflecting the pure financing benefit of payment deferral with an unchanged tax base.

Table 5. ROE Impact Comparison Across Scenarios (Percentage Point Change Relative to S0).

Firm	S1 Primary	S2 Retail	S3’ Revenue-Neutral
Moutai	−4.66	−14.52	+0.25
Fenjiu	−1.40	−4.54	+0.35
Laojiao	−0.93	−5.55	+0.17

Source: Authors.

Figure 2 decomposes the ROE change from S0 to S2 using a waterfall chart. For Moutai, tax base expansion erodes −8.73 percentage points, revenue erosion from Stackelberg pass-through costs subtracts −6.35 percentage points, while implicit financing gains recover +0.57 percentage points, yielding a net decline of −14.52 pp and an S2 ROE of 21.22%. For Fenjiu, the corresponding decomposition is −3.65 pp (tax base), −1.36 pp (revenue erosion), and +0.47 pp (financing), netting to −4.54 pp. For Laojiao, the components are −3.81 pp, −2.05 pp, and +0.31 pp, netting to −5.55 pp. Across all three firms the structural pattern is identical: the financing gain is substantial in absolute terms but an order of magnitude too small to offset the dual erosion from tax base expansion and channel price adjustments.

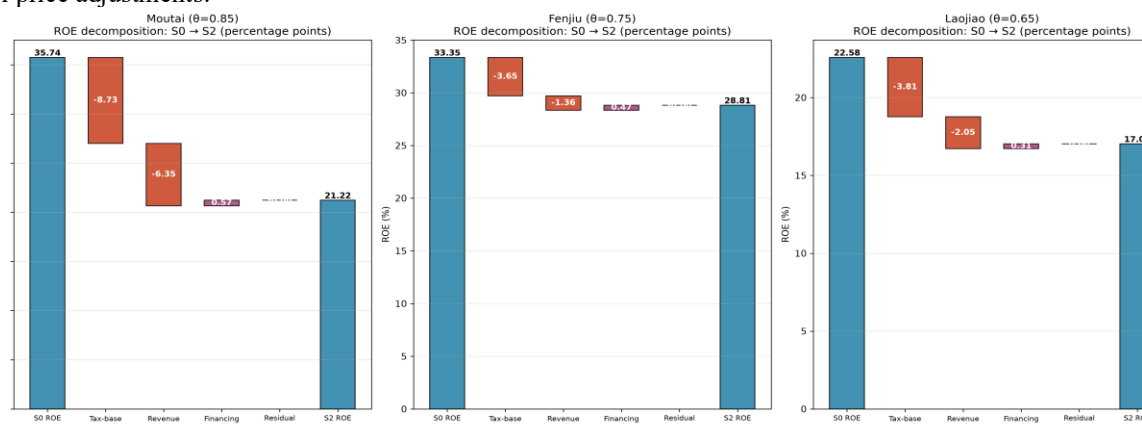


Figure 2. ROE decomposition waterfall chart from S0 to S2 for Moutai, Fenjiu, and Laojiao. Source: Authors.

4.2. Implicit Financing Effect (HI)

Table 6 reports the present value of implicit financing from tax deferral across scenarios. Moutai captures the largest time-value savings: RMB 1.39 billion under S2 (retail-stage deferral), compared with RMB 0.43 billion under S1 (wholesale-stage) and

RMB 0.60 billion under S3' (revenue-neutral partial deferral). Fenjiu's savings are RMB 0.18 billion under S2, and Laojiao's RMB 0.16 billion.

Table 6. Implicit Financing Value (PV_{saving}) Across Scenarios (RMB 100 million).

Firm	S1 Wholesale	S2 Retail = S3 Mixed	S3' Revenue-Neutral
Moutai	4.27	13.88	6.01
Fenjiu	0.77	1.85	1.38
Laojiao	0.49	1.56	0.86

Source: Authors.

The magnitude of these savings is proportional to the deferred tax amount and the channel circulation time. Moutai's savings (RMB 1.39 billion) are 7.5 times Fenjiu's and 8.9 times Laojiao's, reflecting both its larger deferred tax and its longer scarcity-driven channel stockpiling (120 versus 90 days). Across the evidence-backed range of 60–180 days, the financing benefit remains modest for all three firms (Table 6), consistent with the directional prediction of H1 while indicating that the timing effect alone is second-order relative to the base-expansion effect.

However, even Moutai's substantial financing gain (RMB 1.39 billion) covers only 4.9% of its incremental tax burden (RMB 28.49 billion), leaving net ROE still negative. This suggests that while tax deferral provides meaningful working capital benefits, it cannot fully offset the profit erosion from tax base expansion—a key insight for policy evaluation.

4.3. Tax Pass-Through and Channel Profit Redistribution (H2 and H3)

4.3.1. Stackelberg Pass-Through Analysis

Table 7 details the Stackelberg pass-through analysis under S2 (2025). The results support H3: brand bargaining power positively moderates tax pass-through rates, conditional on the ex-ante calibrated.

Table 7. Stackelberg Pass-Through Analysis Under S2 (2025).

Indicator	Moutai $\theta = 0.85$	Fenjiu $\theta = 0.75$	Laojiao $\theta = 0.65$
Q_{eff} (100 million bottles)	1.70	5.38	1.72
Average factory price (RMB/bottle)	991.95	71.94	149.44
Incremental tax ΔT (100 million RMB)	284.86	19.27	25.28
Unit incremental tax (RMB/bottle)	167.36	3.58	14.68
Factory price reduction (RMB/bottle)	-25.10	-0.90	-5.14
Retail price increase (RMB/bottle)	328.57	3.58	17.34
Sales volume change	-9.74%	-0.61%	-1.86%
Revenue adjustment (100 million RMB)	-207.10	-7.18	-13.63
Producer burden $(1 - \theta)\Delta T$ (100 million RMB)	42.73	4.82	8.85
Consumer burden $\theta\Delta T$ (100 million RMB)	242.13	14.45	16.43

Source: Authors.

For Moutai ($\theta = 0.85$), factory price declines by only 25.10 RMB/bottle (2.1% of P_w), while retail price surges by 328.57 RMB/bottle (12.2% of P_r). Consumers bear 85% of the incremental tax (RMB 24.21 billion), and channel profits remain largely intact. The 9.7% volume decline is moderate and manageable given Moutai's scarcity positioning and pre-existing supply constraints.

For Fenjiu ($\theta = 0.75$), factory price declines by 0.90 RMB/bottle (1.3% of P_w), retail price increases by 3.58 RMB/bottle (0.4% of P_r). The minimal volume decline (-0.61%) reflects Fenjiu's diversified portfolio—the unit tax increase of 3.58 RMB/bottle is diluted across mass-market products (Bofen at ~50 RMB) and premium products (Qinghua 30 at ~800 RMB). The producer-consumer burden split is 25%–75%, with both parties sharing the adjustment.

For Laojiao ($\theta = 0.65$), factory price declines by 5.14 RMB/bottle (3.5% of P_w), retail price increases by 17.34 RMB/bottle (1.2% of P_r). The producer burden (35% of ΔT) is the highest among the three firms, forcing significant channel concessions. The 1.86% volume decline, while modest, occurs in a more competitive mid-tier segment where brand loyalty is weaker.

4.3.2. Value Chain Redistribution

Figure 3 visualizes the value chain redistribution under S2 relative to S0. For Moutai, the tax share of retail value expands from 8.1% to 18.6%, producer share contracts from 43.3% to 37.4%, channel share compresses from 33.7% to 28.4%, and consumer surplus shrinks from 14.9% to 15.6% (relatively stable due to price increases being passed through). The redistribution is most pronounced for Moutai due to its extreme markup, while Fenjiu's more balanced structure shows greater resilience.

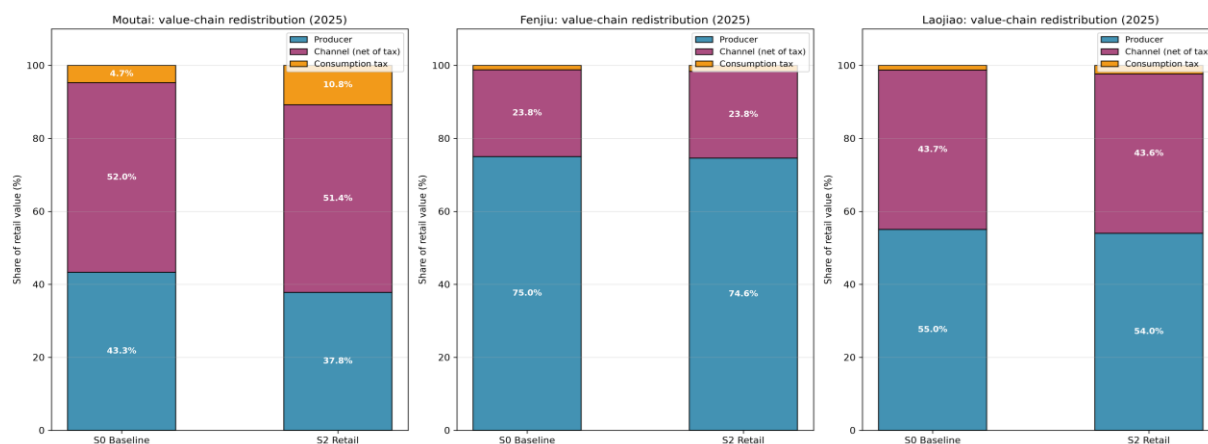


Figure 3. Value chain redistribution across producer, channel, tax, and consumer surplus shares under S0 (baseline) and S2 (retail-stage taxation) for Moutai, Fenjiu, and Laojiao. Source: Authors.

These findings support H2: tax base expansion disproportionately impacts high channel-markup brands, but the magnitude of ROE impact does not monotonically follow θ because absolute tax burden scale dominates.

4.4. Retail Compliance Costs (H4)

While our primary model focuses on manufacturer financial impacts, the channel-level implications warrant attention. Based on publicly reported industry cost structures and regulatory cost estimates:

Small distributors (annual revenue < 1 billion RMB) face compliance costs of 6–8% of administrative expenses, including IT system upgrades (0.5–1.0 million RMB), dedicated tax personnel (2–3 FTEs at 150K RMB/year each), and cross-region audit risks.

Large chain distributors (e.g., [JD.com](#), [1919.com](#)) incur marginal IT costs near zero due to existing ERP integration, with shared tax personnel across product lines and compliance costs <2.5% of administrative expenses.

This diseconomy creates a consolidation incentive. Under S2, small distributors face a “compliance tax” that erodes already-thin margins (typical baijiu distributor net margin: 3–5%). Using an illustrative calibration based on reported provincial distributor attrition, the scenario analysis suggests that 15–20% of regional distributors would exit or merge within 3 years post-reform (scenario exercise, not a formal forecast), concentrating channel power in national chains. This unintended consequence may reduce market access for smaller brands dependent on local distribution networks, potentially reinforcing the dominance of Moutai and other top-tier brands.

H4 receives indicative support: compliance costs exhibit scale diseconomies and may accelerate consolidation; the distributional impact remains exploratory and requires further investigation.

4.5. Sensitivity Analysis

Figure 4 presents sensitivity analyses for three core parameters: brand power θ , WACC, and price elasticity of demand. The ROE impact is most sensitive to brand power θ (steep slope for all firms), moderately sensitive to WACC, and relatively insensitive to demand elasticity within the tested range. Moutai’s curve is the steepest, reflecting its high dependence on brand premium extraction.

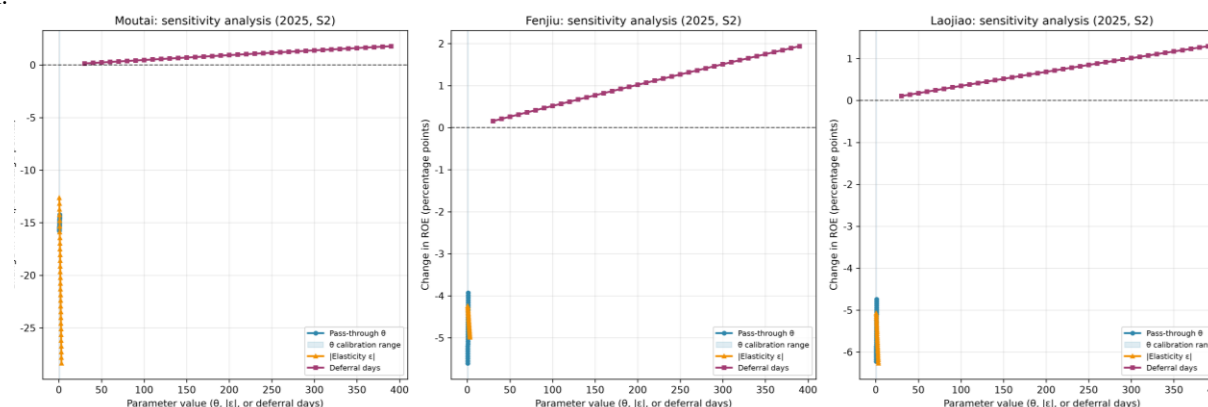


Figure 4. Sensitivity analysis of ROE impact to brand power θ , WACC, and price elasticity of demand for Moutai, Fenjiu, and Laojiao. Dots indicate baseline parameter values. Source: Authors.

Even with θ reduced to 0.60 (the weakest plausible value for a listed baijiu firm), all three companies still experience negative ROE impacts under S2, indicating that collection point shift is not a zero-sum transfer but a genuine profit compression mechanism. The sensitivity results show that our core findings are robust to parameter perturbations.

5. Discussion

The simulation results provide model-based support for all four working hypotheses, though with important nuances that merit discussion.

5.1. Support for H1 (*Implicit Financing Effect*)

The collection point shift generates time-value savings from tax deferral, and the magnitude is proportional to the deferred tax and the channel circulation time. Moutai captures RMB 1.39 billion under S2—7.5 times that of Fenjiu and 8.9 times that of Laojiao. However, even for Moutai, the financing gain covers only 4.9% of the incremental tax burden, suggesting that the time-value benefit, while economically meaningful, cannot offset the profit erosion from tax base expansion.

5.2. Support for H2 (*Tax Base Expansion and Profitability Erosion*)

The expansion of the tax base from factory prices to retail prices imposes disproportionately large burdens on high-markup brands. Moutai's nominal tax burden increases by 130.7% under S2, compared with 81.4% for Laojiao and 33.2% for Fenjiu. This variation is driven primarily by channel markup ratios, challenging the conventional wisdom that premium brands are “immune” to tax increases—they are, in fact, more exposed in absolute terms.

5.3. Support for H3 (*Tax Pass-Through and Channel Redistribution*)

In the simulated equilibrium, brand bargaining power θ positively moderates tax pass-through rates, conditional on the ex-ante calibrated θ . Moutai ($\theta = 0.85$) transfers 85% of incremental taxes to consumers via retail price increases, while Laojiao ($\theta = 0.65$) absorbs 35% of the burden, compressing its own margin. This exhibits the Stackelberg game prediction that manufacturer-retailer bargaining power shapes the distribution of tax incidence and underscores the strategic importance of brand equity.

5.4. Support for H4 (*Retail Compliance Cost Diseconomies*)

This 6–8% compliance-cost burden on small distributors—versus under 2.5% for large chains—creates a consolidation incentive that may accelerate the exit of small distributors, reducing channel diversity.

5.5. Comparison with Prior Studies

The finding that premium products exhibit higher pass-through rates is consistent with Shang et al. (2020), who documented substantial heterogeneity in alcohol excise tax pass-through across OECD countries. Thomas (2025) found that retailer pricing strategies significantly affect pass-through magnitudes, resonating with our finding that brand bargaining power shapes tax incidence. Conlon and Rao (2020) demonstrated that discrete price points create nonmonotonicities in tax incidence; our Stackelberg framework offers a complementary theoretical explanation for such heterogeneity. While prior studies have focused primarily on rate changes (Shang et al., 2020; Bergman & Hansen, 2019) or tax base design (Ghosh et al., 2026), our study examines a different policy lever—the collection point shift—extending the work of Mattos et al. (2026) by quantifying the financial consequences of such reforms. Our findings also challenge static partial equilibrium models (Fullerton & Metcalf, 2002; Besley & Rosen, 1999), which assume instantaneous pass-through and ignore the dynamic financial adjustments captured by our DFSM framework.

5.6. Broader Implications

The revenue-neutral variant S3'—retaining the specific tax at production while shifting only the ad valorem component to retail at a reduced rate—offers a politically feasible reform path that maintains revenue neutrality while reducing implementation friction. The findings also highlight the strategic importance of brand power as a buffer against tax shocks and the need for targeted support to small distributors to mitigate unintended consolidation effects.

5.7. Future Research Directions

Future work could incorporate non-linear demand and learning-by-doing cost reductions, use natural experiments (e.g., regional tax pilot programs) to identify θ econometrically, extend the sample to second-tier brands and unlisted firms, and apply the DFSM framework to other excise-taxed products to assess generalizability.

6. Conclusions

We examine the financial impact of shifting China's consumption tax collection point from production to retail in the baijiu industry, using a DFSM-Stackelberg simulation framework calibrated with 2019–2025 data from three listed firms: Kweichow Moutai, Shanxi Fenjiu, and Luzhou Laojiao.

Four key findings emerge. First, the reform generates an implicit financing effect from tax deferral, whose magnitude varies with the deferred tax and channel circulation time: Moutai captures RMB 1.39 billion in time-value savings—7.5 times that of Fenjiu and 8.9 times that of Laojiao—yet this gain covers only 4.9% of Moutai's incremental tax burden. Second, tax base expansion from factory to retail prices disproportionately impacts high-markup brands: Moutai's nominal tax burden increases by 130.7% under the retail-stage shift (S2), versus 33.2% for Fenjiu and 81.4% for Laojiao. Third, in the calibrated model, brand bargaining power θ positively moderates tax pass-through efficiency: Moutai ($\theta = 0.85$) transfers 85% of the tax burden to consumers via retail price increases, while Laojiao ($\theta = 0.65$) absorbs 35% of the burden, compressing channel profits. Fourth, retail compliance costs exhibit diseconomies of scale—small distributors face costs of 6–8% of administrative expenses versus less than 2.5% for large chains—which may accelerate industry consolidation.

The revenue-neutral mixed variant (S3') provides a revenue-neutral policy benchmark, retaining the specific tax at production while shifting the ad valorem component to retail at a reduced rate. This design limits the ROE impact to marginally positive +0.17 to +0.35 percentage points for Fenjiu and Laojiao (and +0.25 pp for Moutai). Under the full retail shift (S2), Moutai still faces a –14.52 pp ROE shock, but the revenue-neutral design avoids imposing additional burden on manufacturers.

The study contributes to the literature by integrating cash-flow time-value theory, inventory valuation theory, and supply-chain game theory into a unified analytical framework for consumption tax analysis; developing a replicable DFSM methodology for ex-ante policy impact assessment; and separately identifying the tax timing effect from the tax base expansion effect, providing clear quantification of each mechanism's magnitude.

Policymakers should adopt a phased implementation approach (2026–2028), provide targeted support for small distributors, and recognize that brand power investments become critical under the reformed system. For firms, inventory cycle management offers partial mitigation, but brand-building and channel strategy remain the primary determinants of resilience to the tax shock.

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Data Availability Statement: The financial data used in this study are derived from the publicly available annual reports of Kweichow Moutai (600519.SH), Shanxi Fenjiu (600809.SH), and Luzhou Laojiao (000568.SZ) for the period 2019–2025. All annual reports can be accessed through the Shanghai and Shenzhen Stock Exchange websites. Processed data and simulation code are available from the corresponding author upon reasonable request.

Conflicts of Interest: We declare no conflicts of interest.

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