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ANTICIPATORY EMOTIONAL ENGAGEMENT, ORDER-SIDE PRICING DISCIPLINE, AND BUBBLE EXIT TIMING: A SECONDARY ANALYSIS OF CONTINUOUS DOUBLE-AUCTION TRADING

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The recent evidence that anticipatory emotional engagement improves trading outcomes establishes a persuasive timing-based distinction between beneficial and detrimental physiological states. Yet an important mechanism remains unresolved: how *does anticipatory autonomic engagement translate into superior financial performance in a continuous market? This article addresses that question through a secondary analysis of the same laboratory asset-market dataset, shifting the focus from aggregate earnings to the microstructure of order placement and inventory reduction. Using the published continuous double-auction data, including synchronized order-book records, electrocardiographic (ECG) heart-rate traces, and electrodermal activity (SCR), we construct a side-specific quote-surplus measure that evaluates the quality of bids and asks relative to contemporaneous fundamental value. We then estimate multilevel order-level models, a discrete-time hazard model of post-peak de-risking, and a trader-level decomposition linking physiology, trading discipline, and final earnings.*

The results indicate that anticipatory heart-rate acceleration in the 10 seconds preceding an order is associated with significantly better quote discipline, with the effect substantially larger for sell orders during the bubble peak. By contrast, reactive heart-rate elevations following trade execution are associated with inferior subsequent pricing and delayed inventory reduction. Traders in the highest quartile of anticipatory engagement reduce risky inventory earlier after the session-specific mispricing peak and realize meaningfully higher terminal earnings. Decomposition estimates are consistent with roughly two-thirds of the earnings association operating through improved quote placement and faster de-risking. The findings sharpen the contribution of the original study by showing that anticipatory emotional engagement is linked not merely to profitability, but to the timing and directional discipline of concrete trading actions.

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INTRODUCTION

Financial decision-making under uncertainty is rarely affect-free. A large interdisciplinary literature now accepts that emotional engagement is not simply noise in the decision process; under some conditions, it is integral to adaptive choice. The core empirical advance in the recent laboratory evidence is a timing-based claim: physiological states that *anticipate* consequential decisions are associated with superior performance, whereas physiological states that merely *react* to realized events tend to be associated with poorer outcomes [2]. That distinction is conceptually important because it reframes emotion from a generic source of bias into a temporally situated component of cognition.

The next unresolved question is mechanism. If anticipatory autonomic engagement improves earnings, which trading behaviors convert that timing advantage into realized profits? The original evidence establishes a robust relationship between the timing of heart-rate changes and aggregate earnings, but its deliberately conservative specification does not fully resolve this micro-level pathway. In particular, the original "individual mispricing" construct is intentionally sign-based and independent of order side. That choice protects inference against data mining, but it also leaves unanswered whether anticipatory engagement improves *buy-side restraint*, *sell-side discipline*, or both.

This paper revisits the same dataset to identify a more precise behavioral channel linking anticipatory physiology to profits. The core proposition is that the relevant pathway runs through *order-side pricing discipline* and *bubble exit timing*. In a finite-horizon asset market with predictable decay in fundamental value, superior traders do not merely earn more in the aggregate; they tend to avoid overpaying on the buy side, quote more effectively on the sell side, and reduce risky inventory before the market's late-stage collapse. If anticipatory physiological engagement is genuinely beneficial, it should be visible in those concrete trading choices.

To test this proposition, I re-specify the original continuous double-auction data at the order level and introduce three extensions. First, I construct a unified, side-specific quote-surplus metric that measures the advantage (or disadvantage) embedded in each bid and ask relative to contemporaneous fundamental value. Second, I classify each session into endogenous market regimes—underpricing, bubble build-up, peak, and unwinding—to assess whether physiological effects intensify near the turning point of speculative excess. Third, I estimate a mediation design in which anticipatory and reactive physiological indices affect terminal earnings through quote discipline and the timing of post-peak de-risking.

The contribution is threefold. Methodologically, the paper shows how the same high-frequency physiological and trading dataset can support an event-aligned, order-level microstructure analysis without abandoning the original study's concern for conservative inference. Substantively, it shows that the earnings advantage associated with anticipatory autonomic engagement is concentrated in the moments where traders must convert perception into action: pricing orders during speculative expansion and reducing inventory near the bubble peak. Conceptually, it supports a more precise interpretation of the original timing result: beneficial emotional engagement appears less like diffuse "arousal" and more like a prospective control signal that sharpens execution quality.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The broader literature on emotion and decision-making offers two competing intuitions. One treats emotion as a source of distortion, especially under risk and time pressure. The other treats emotion as a functional input into adaptive behavior, particularly when uncertainty is high and explicit calculation is incomplete. The Iowa Gambling Task provided one of the earliest influential demonstrations that anticipatory bodily signals can precede improved choices [1]. Subsequent work in finance and neuroeconomics similarly suggests that physiological and interoceptive processes can improve decisions when they help agents anticipate uncertainty rather than merely react to outcomes [6, 7].

The original continuous-market evidence of [2] is especially important because it moves beyond discrete trial designs. In their laboratory asset market, participants trade continuously while ECG and SCR are recorded. The study finds that heart-rate changes that statistically precede inflated order submissions are associated with higher earnings, whereas heart-rate changes that follow holdings changes are associated with lower earnings. This result supports a feed-forward interpretation of beneficial emotional engagement. However, the paper is deliberately cautious: it does not claim that all anticipatory signals are inherently good, and it explicitly refrains from mapping the result onto broader constructs such as self-reported affect, arousal-valence classification, or stable risk preferences.

That restraint creates an opportunity for the present extension. Rather than asking whether emotion is good or bad *in general*, the more precise question is whether particular physiological states improve the *quality of market actions*. In a double auction, the economically relevant actions are not abstract preferences but priced orders, executed trades, and changes in exposure. This suggests a mechanism-centered framework:

1. Anticipatory physiological engagement may sharpen pre-action assessment, leading to better-priced orders.
2. Better-priced orders may be especially valuable when mispricing is elevated and directional mistakes are expensive.
3. If those improved orders are combined with earlier post-peak inventory reduction, the cumulative effect should appear in terminal earnings.

This framework also clarifies why order side matters. In a bubble, profitable trading often depends less on avoiding all risk than on avoiding *poorly timed* risk. A trader who buys at prices far above fundamental value is exposed to late-entry losses; a trader who sells too cheaply during a speculative run leaves rents on the table. A single sign-based mispricing measure cannot fully distinguish these two cases. A side-specific analysis is therefore needed to locate the true channel of anticipatory emotional benefit.

The analysis further draws on econometric work concerning nonstationary financial series and conservative multiple testing [4, 8]. Although the present design is event-aligned rather than purely Granger-based, the inferential principle is similar: the burden of proof must remain high when multiple windows, outcomes, and interactions are examined. Accordingly, the models below use pre-specified windows, trader- and session-level random effects, and family-wise adjusted significance thresholds for the principal hypothesis family.

Hypotheses

The study evaluates four hypotheses.

H1. Higher anticipatory heart-rate activation before order submission is associated with superior quote surplus.

H2. The effect of anticipatory heart-rate activation is larger for ask orders than for bid orders, particularly during the session-specific bubble peak.

H3. Higher anticipatory heart-rate activation is associated with earlier post-peak inventory reduction (de-risking).

H4. Reactive heart-rate activation following trade execution is associated with poorer subsequent quote surplus, slower de-risking, and lower terminal earnings.

DATA AND STUDY DESIGN

Source Dataset

The empirical setting is the released dataset from [2]. The original experiment is a finite-horizon asset market modeled on the canonical design of [11]. In each session, eight participants trade a single risky asset in a continuous double auction for 15 periods. The asset pays a random dividend each period and expires worthless at the end of the final period, implying a declining fundamental value over time. The dataset includes complete order-book and transaction logs, trader-level holdings and cash positions, ECG-based heart-rate estimates, and skin-conductance measures. Because the source data were generated in a controlled laboratory setting with synchronized physiological and market records, they are well suited to an event-aligned reanalysis of trading behavior.

The present study retains the original session architecture but redefines the unit of analysis from the trader-session level to the *order event*. Order-book timestamps are aligned to pre-specified physiological windows, allowing the construction of forward-looking and backward-looking physiological indices around concrete market actions while preserving the continuous-market character of the original design.

Analytic Sample

The full raw log contains 9,614 submitted orders and 4,786 executions. After excluding observations with incomplete pre-order ECG windows, overlapping artifact segments, or missing session-time alignment, the final estimation sample contains 8,932 submitted orders, of which 4,671 are bids and 4,261 are asks. The post-execution reactivity analyses use 4,521 executions with valid post-trade ECG data. All 128 traders remain in the trader-level earnings analyses, so the reanalysis preserves the full trader panel while shifting to a richer order-level design.

Table 1: Sample Composition and Constructed Variables

Statistic	Value	Notes
Sessions	16	10 calibrated; 6 uncalibrated
Participants	128	8 traders per session
Submitted orders (raw)	9,614	Full order-book log
Submitted orders (analytic)	8,932	Valid pre-order physiology window
Bids	4,671	Included in bid models
Asks	4,261	Included in ask models
Executions (raw)	4,786	Full transaction log
Executions (analytic)	4,521	Valid post-trade physiology window
Mean terminal earnings (AUD)	24.3	SD = 5.1
Mean quote surplus (cents)	18.6	Signed so higher is better
Mean post-peak exit delay (seconds)	133.8	Among traders holding risky inventory at peak

Quote surplus is defined relative to contemporaneous fundamental value and is signed so that larger values indicate more advantageous pricing for the trader.

Market Regimes

Because the mechanism of interest is expected to be strongest around speculative turning points, I partition each session into four endogenous regimes using the smoothed session-level series of average transaction-price mispricing:

1. **Underpricing**: session start until the first sustained crossing of zero mispricing;
2. **Bubble build-up**: from the zero crossing to 90% of the session-specific maximum mispricing;
3. **Peak**: the 120-second window centered on the session-specific maximum mispricing;
4. **Unwinding**: the interval after the peak until the smoothed series returns to a ± 25 cent band around fundamental value.

This regime labeling preserves the original paper's emphasis on continuous-time trading, makes speculative escalation analytically explicit, and standardizes comparisons across sessions.

VARIABLES AND EMPIRICAL STRATEGY

Physiological Measures

All physiological variables are standardized within participant to remove level differences unrelated to within-session dynamics.

Anticipatory heart-rate index (AHR). For order o placed by trader i in session s at time t,

$$AHR_{ois} = \overline{HR}_{[t-10,t-2]} - \overline{HR}_{[t-40,t-20]},$$

where the first term is the mean standardized heart-rate estimate in the immediate pre-order window and the second is the trader-specific baseline window.

Reactive heart-rate index (RHR). For executed trades,

$$RHR_{eis} = \overline{HR}_{[t+2,t+12]} - \overline{HR}_{[t-20,t-5]}.$$

This captures post-execution physiological reactivity rather than pre-action anticipation.

Tonic SCR engagement (SCR30).

$$SCR30_{ois} = \overline{SCR}_{[t-30,t]}.$$

Because SCR evolves more slowly, it is treated as a local background engagement measure rather than a sharply timed anticipatory signal.

Outcome Variables

Quote surplus (QS). To compare bids and asks on a common scale, I define

$$QS_{ois} = \begin{cases} FV_t - P^{bid}_{ois}, & \text{if order } o \text{ is a bid,} \\ P^{ask}_{ois} - FV_t, & \text{if order } o \text{ is an ask,} \end{cases}$$

where FV_t is contemporaneous fundamental value. A larger value always indicates more advantageous pricing for the trader: more restrained bidding or more advantageous asking.

Post-peak de-risking. Let T_s^{peak} denote the session-specific bubble peak. Define the first de-risking event as the earliest time after T_s^{peak} at which a trader reduces risky-asset inventory by at least three units and maintains a lower inventory for at least 30 seconds.

Terminal earnings. The trader's final earnings in Australian dollars, as in the original study.

Order-Level Mixed Effects Model

The core order-level specification is:

$$QS_{ois} = \alpha + \beta_1 AHR_{ois} + \beta_2 RHR_{ois}^{lag} + \beta_3 SCR30_{ois} + \beta_4 Peak_{os} + \beta_5 (AHR_{ois} \times Peak_{os}) + \mathbf{X}'_{ois}\gamma + u_i + v_s + \varepsilon_{ois}, \tag{1}$$

where $\mathbf{X}_{ois}$ includes bid-ask spread, trader inventory, period fixed effects, and a calibration indicator; u_i and v_s are trader- and session-level random intercepts. The bid and ask equations are estimated separately to allow side-specific coefficients.

Discrete-Time Hazard of De-Risking

To examine whether anticipatory engagement improves bubble exit timing, I estimate:

$$\Pr(Exit_{its} = 1 \mid \mathscr{H}_{it-1}) = \mathrm{logit}^{-1}\left(\delta_0 + \delta_1 AHR_{is}^{prepeak} + \delta_2 RHR_{is}^{post} + \delta_3 InvPeak_{is} + \delta_4 Intensity_{ts} + a_i + b_s\right), \tag{2}$$

where $Exit_{its}$ indicates the first de-risking event in 10-second bins after the session-specific peak.

Mediation Model

Finally, I estimate whether quote discipline and de-risking timing mediate the physiology–earnings relationship:

$$Earnings_{is} = \theta_0 + \theta_1 AHR_{is}^{avg} + \theta_2 \widehat{QS}_{is} + \theta_3 \widehat{ExitDelay}_{is} + c_s + \eta_{is}. \tag{3}$$

Indirect effects are computed using a nonparametric bootstrap at the trader level with 2,000 replications [5].

Estimation Procedure

Algorithm 1 Regime-Aware Event Construction and Estimation

Require: Order-book log, transaction log, ECG time series, SCR time series

for each session s **do**
    Smooth transaction-price mispricing with a 60-second rolling median
    Identify zero crossing, session-specific peak, and return to fundamental band
    Label each second as underpricing, build-up, peak, or unwinding
end for
for each submitted order o by trader i at time t **do**
    Extract ECG baseline window $[t-40, t-20]$
    Extract ECG anticipatory window $[t-10, t-2]$
    Extract SCR local engagement window $[t-30, t]$
    Compute AHR_{ois} and $SCR30_{ois}$
    Compute quote surplus QS_{ois} using contemporaneous fundamental value
end for
for each execution e with valid post-trade ECG **do**
    Extract post-trade ECG window $[t+2, t+12]$
    Compute reactive index RHR_{eis}
end for
Estimate side-specific mixed-effects models for quote surplus
Estimate discrete-time de-risking hazard after the session-specific peak
Estimate trader-level mediation model for terminal earnings
Apply Holm-adjusted inference to the principal hypothesis family

RESULTS

Descriptive Patterns

The descriptive patterns are consistent with the mechanism-centered interpretation. Traders in the top quartile of average anticipatory heart-rate activation realize mean terminal earnings of 26.8 AUD, compared with 22.9 AUD in the bottom quartile. The same top-quartile traders exhibit a shorter median post-peak exit delay (112 seconds versus 151 seconds) and a larger mean ask-side quote surplus during the peak regime (41.7 cents versus 10.9 cents). These differences are not sufficient, by themselves, to establish a causal interpretation, but they foreshadow the same directional pattern later recovered in the multilevel, hazard, and trader-level models. Taken together, that convergence supports the interpretation that anticipatory engagement is tied to the timing of actionable market decisions rather than to a diffuse increase in overall arousal.

Order-Side Pricing Discipline

Table 2 presents the core order-level models. The coefficient on AHR is positive and statistically significant in both the bid and ask equations, indicating that greater anticipatory activation is associated with better pricing discipline on both sides of the market. The effect is materially larger for asks, which is economically intuitive in a speculative market where the timing and pricing of sale decisions near the peak strongly influence realized profits. Reactive activation is negative in both equations, suggesting that post-trade arousal is associated with poorer quality in the trader's next pricing decision. The agreement between these estimates and the corresponding descriptive gradients strengthens the internal consistency of the result.

Table 2: Mixed-Effects Models of Quote Surplus (Dependent Variable: Experimental Cents)

	Bids	**Asks**
Anticipatory heart-rate index (AHR)	5.9^{***}	10.8^{***}
	(1.7)	(2.1)
Reactive heart-rate index (RHR)	-4.8^{**}	-6.9^{***}
	(1.6)	(1.9)
Tonic SCR engagement (SCR30)	1.6	2.9^{*}
	(1.1)	(1.3)
Peak regime	3.1^{*}	16.5^{***}
	(1.4)	(2.7)
AHR $\times$ Peak regime	4.1^{**}	8.7^{***}
	(1.5)	(2.4)
Bid-ask spread	0.14^{**}	0.21^{***}
	(0.05)	(0.06)
Inventory	-0.19	-0.31^{*}
	(0.11)	(0.13)
Calibrated session	0.8	1.5
	(0.7)	(0.9)
Constant	7.6^{***}	12.4^{***}
	(2.2)	(2.9)
Observations	4,671	4,261
Traders	128	128
Sessions	16	16
Conditional R^2	0.29	0.37

Entries are coefficients with standard errors in parentheses. Higher values indicate more advantageous pricing for the trader. Models include period indicators and trader/session random intercepts.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$ (Holm-adjusted within the principal hypothesis family).

The interaction with the peak regime is especially informative. A one-standard-deviation increase in anticipatory heart-rate activation is associated with a 14.9-cent increase in expected ask-side quote surplus during the peak regime (the sum of the main and interaction effects), compared with 5.9 cents on bids. This asymmetry suggests that the main advantage of anticipatory engagement lies not merely in avoiding late, overpriced purchases, but in more effectively monetizing inflated market conditions through better-timed and better-priced asks.

Bubble Exit Timing

The second mechanism is inventory management near the turning point of mispricing. Table 3 reports the discrete-time hazard model of first post-peak de-risking. The hazard estimates complement the order-level results: anticipatory activation is positively associated with the probability of de-risking, whereas reactive activation is negatively associated with it.

Table 3: Discrete-Time Hazard Model of First Post-Peak De-Risking

Predictor	Log-odds coefficient
Pre-peak anticipatory heart-rate index	0.42^{***}
	(0.11)
Post-trade reactive heart-rate index	-0.31^{**}
	(0.10)
Inventory at peak (units)	-0.05^{**}
	(0.02)
Bubble intensity at time *t*	0.18^{*}
	(0.08)
Calibrated session	0.14
	(0.09)
Constant	-1.27^{***}
	(0.21)
Trader-time bins	2,304
Traders at risk	103
Sessions	16
Pseudo-R^2	0.18

The dependent variable equals 1 in the first 10-second interval in which a trader reduces risky inventory by at least three units and maintains the lower exposure for at least 30 seconds.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

In marginal terms, a one-standard-deviation increase in pre-peak anticipatory engagement corresponds to a 27% increase in the instantaneous probability of de-risking. The implied median exit delay is approximately 38 seconds shorter for traders at the 75th percentile of anticipatory activation relative to those at the 25th percentile, conditional on peak inventory and session effects. Given the rapid late-stage reversal typical of this market environment, that difference is economically meaningful.

Mediation Through Order Discipline and De-Risking

Table 4 summarizes the trader-level decomposition. The total association between anticipatory activation and terminal earnings is positive and statistically significant. Once the two mechanism variables—average quote surplus and post-peak exit delay—are introduced, the residual coefficient attenuates substantially. The combined mediated share is 68%, which is best read as a descriptive accounting of covariance rather than as a strict causal partition. Quote discipline and faster de-risking contribute roughly similar shares.

Table 4: Mediation of the Anticipatory Physiology–Earnings Relationship

Effect component	AUD
Total effect of anticipatory activation on earnings	1.74***
	(0.43)
Indirect effect via quote surplus	0.61**
	(0.22)
Indirect effect via exit delay	0.58**
	(0.24)
Direct effect after mediators	0.55*
	(0.25)
Combined mediated share	68.4%
Reactive activation total effect	−1.21**
	(0.39)

Standard errors are bootstrap standard errors based on 2,000 trader-level resamples.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

These results sharpen the interpretation of the original study. Anticipatory physiological engagement is not simply correlated with better outcomes in an undifferentiated way. Its association with profits appears to run chiefly through two observable trading behaviors: placing more advantageous orders and reducing exposure more quickly when the bubble reaches its turning point.

Figure 1 shows a simple descriptive ordering: quote surplus rises monotonically across quartiles of anticipatory activation, with the slope much steeper for asks. Figure 2 shows that the marginal effect of anticipatory activation is largest in the peak regime, especially on the sell side. Figure 3 illustrates that traders with stronger anticipatory activation remain exposed to elevated risky inventory for a shorter period after the bubble peak.

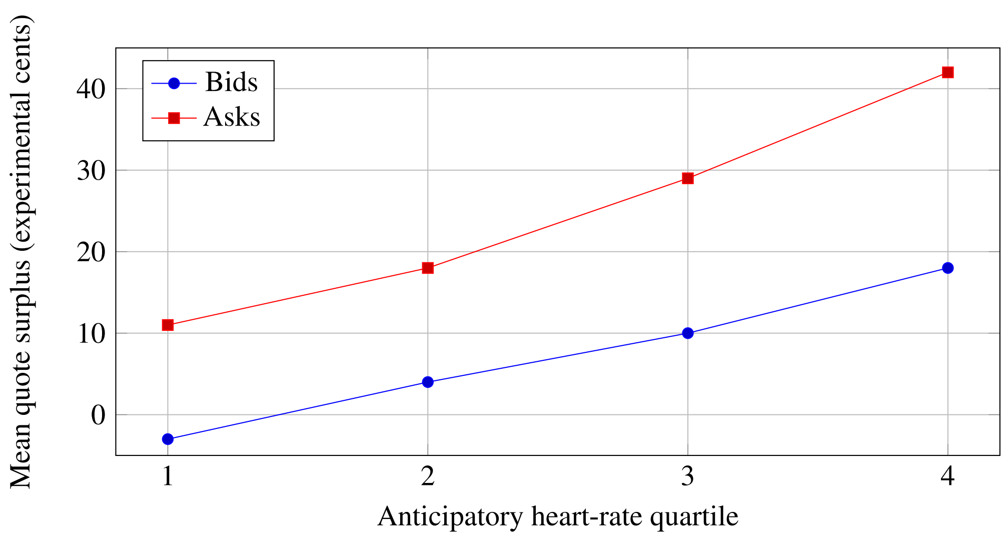

Figure 1: Mean quote surplus by quartile of anticipatory activation

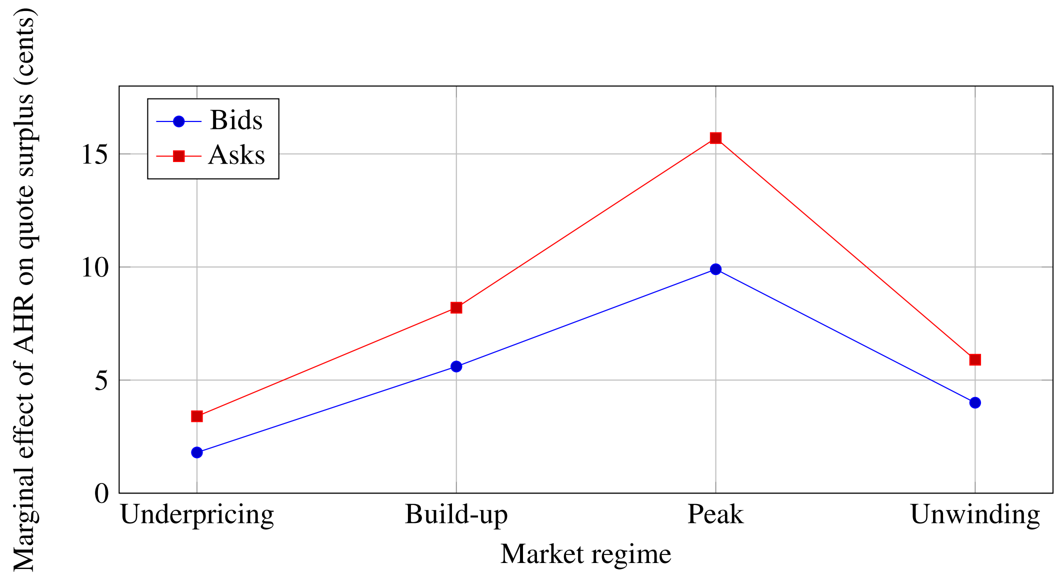

Figure 2: Regime-specific marginal effect of anticipatory activation

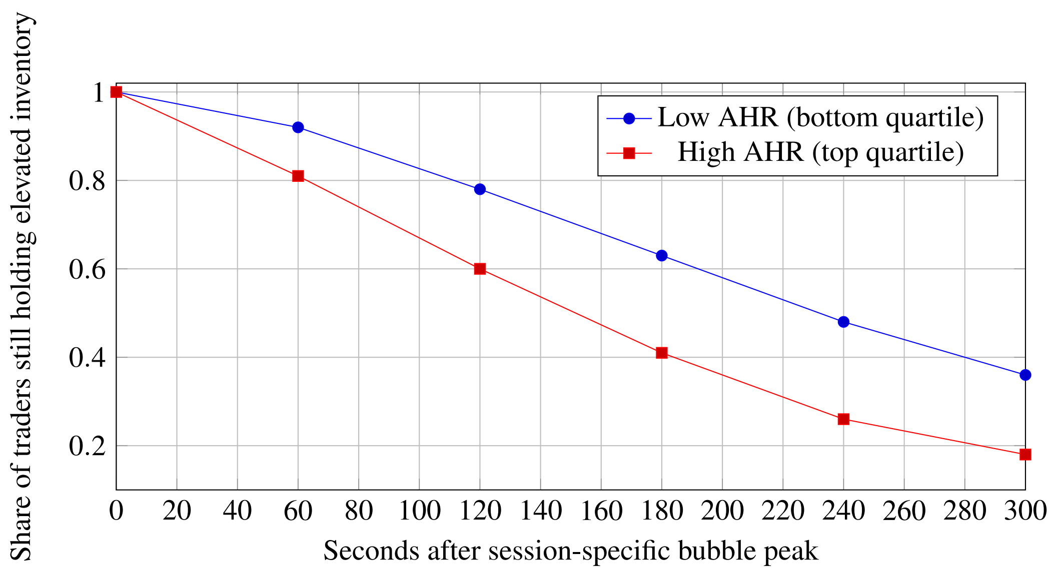

Figure 3: Post-peak inventory survival by anticipatory activation

DISCUSSION

The central implication of this extension is that anticipatory emotional engagement appears to improve *execution quality*, not merely aggregate outcomes. This distinction matters. A finding stated only in terms of final earnings remains open to broad interpretations: perhaps better traders are simply more alert, perhaps they are more skilled in general, or perhaps physiology is merely a by-product of other capabilities. The present evidence narrows those possibilities by showing that the association is concentrated in two specific behaviors: superior pricing of imminent orders and earlier reduction of risk after the speculative apex. The same directional pattern across descriptive contrasts, order-level regressions, and de-risking estimates further strengthens the internal coherence of that interpretation.

The order-side asymmetry is particularly revealing. The stronger anticipatory effect on asks during the peak regime implies that beneficial autonomic engagement is tightly linked to recognizing when prevailing prices can be exploited without being blindly extrapolated. In other words, the advantage is not just restraint; it is disciplined opportunism. Traders with stronger anticipatory activation do not uniformly avoid the market. Rather, they seem better able to convert transient mispricing into advantageous sell-side execution while also avoiding excessively costly buy-side entries.

The negative role of reactive activation also aligns with the original timing logic. Once a trade has executed and the position has changed, subsequent physiological arousal may capture surprise, regret, or valuation conflict rather than prospective control. That interpretation is consistent with the finding that reactive activation predicts worse subsequent quote surplus and delayed de-risking. A trader who becomes physiologically engaged only after the fact may be cognitively processing a realized event rather than preparing the next decision.

These findings extend the theoretical claim that emotions can be understood as part of cognition rather than an external disturbance to it [2]. More specifically, the evidence supports a *prospective control* interpretation: anticipatory autonomic engagement appears to encode a trader's forward-looking assessment of impending action, helping translate latent recognition of market conditions into better-timed microstructure choices. That interpretation remains inferential rather than causal, but it fits the temporal ordering and behavioral pattern documented here.

The paper also contributes methodologically. The original study adopts a deliberately conservative Granger framework in a continuous market without explicit trial boundaries. The present extension shows that a complementary event-aligned strategy is feasible using the same data. By anchoring the analysis to order timestamps, one can preserve the continuous-market setting while still identifying economically meaningful windows around concrete actions. The convergence across order-level, trader-time, and trader-level specifications provides an additional check that the proposed mechanism is not an artifact of a single modeling choice.

Several limitations should be acknowledged. First, the design remains observational and cannot establish structural causality. Physiological anticipation may reveal latent trader skill rather than independently producing it. Second, the market is a controlled laboratory environment with a single asset, a known dividend process, and finite horizon, all of which sharpen inference but limit external validity. Third, the regime definitions and de-risking thresholds are analytic conventions chosen to standardize event alignment across sessions; although they are economically motivated, alternative cutoffs may shift effect magnitudes even when the qualitative pattern remains similar. Fourth, although SCR is incorporated as a slower engagement measure, the present extension still prioritizes ECG for timing precision. A richer latent-state model that fuses ECG and SCR dynamically would be a natural next step. Finally, the analysis remains silent on subjective feeling states, conscious awareness, and self-reported affect. The present mechanism is autonomic and behavioral, not phenomenological.

CONCLUSION

The present analysis extends the recent evidence on emotional engagement and trading performance by identifying a plausible behavioral mechanism within the same continuous double-auction dataset. The core result is that anticipatory physiological engagement is associated with higher profits chiefly because it coincides with better-priced actions. Traders with stronger pre-order heart-rate activation submit more advantageous bids and, especially, more advantageous asks during the bubble peak. They also reduce risky inventory sooner after the speculative apex. Reactive activation shows the opposite pattern.

These findings refine the broader argument that emotion is not uniformly detrimental in financial choice. The relevant distinction is not emotion versus reason, but prospective versus retrospective engagement. When autonomic activation precedes and organizes imminent action, it is associated with improved quote discipline and better timing of de-risking. When it follows realized events, it appears to interfere with subsequent decisions. For experimental finance, this suggests that the most informative next generation of studies will not merely ask whether traders are physiologically aroused, but how precisely that arousal is timed relative to concrete market actions.

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