FACULTY OF
MANAGEMENT & FINANCE
UNIVERSITY OF COLOMBO

Colombo Business Journal

INTERNATIONAL JOURNAL OF THEORY & PRACTICE

Vol. 16, No. 02, December, 2025

The Sooner, the Riskier: Temporal Psychological Distance and the Formation of Price Bubbles in Asset Markets

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Abstract

This study engaged 146 participants in asset-market activities, with each participant completing 10 rounds of trading. To encourage active participation, the study offered real currency rewards to those who increased their earnings. The investigation focused on the impact of "temporal psychological distance"—the time between market experiences—on price predictions and the formation of price bubbles in asset markets. The experiment recorded an overconfidence bias score for each participant, then investigated how the introduction of a time-distance treatment mediates participants' confidence. Treatment effects were elicited as behavioural outcomes by recording the participant's valuation judgement of the asset's fundamental value through their disclosure on Willingness to Sell. The findings revealed that lengthening the time gap reduced the influence of overconfidence and its ability to create price bubbles in the asset market. Essentially, the longer the temporal psychological distance, the weaker the impact of overconfidence in driving price bubbles, and vice versa.

Keywords: overconfidence, asset market, price predictions, price bubbles, psychological distance

Received:	Accepted revised version:	Published:
06 February 2025	27 October 2025	31 December 2025

Suggested citation: Samaranayake, D.I.J., Ariyarathna, U., Munasinghe, R., Fernando, T.S.S., Rathnayake, U. & Mithursan, A. (2025). The Sooner, the Riskier: Temporal Psychological Distance and the Formation of Price Bubbles in Asset Markets. *Colombo Business Journal, 16*(2), 38-60.

DOI: http://doi.org/10.4038/cbj.v16i2.211

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Introduction

This study introduces ‘psychological distance’ based on the time between participants’ market experiences as a potential influencer of a bidder’s confidence levels and their bidding behaviour in asset markets. While psychological distance is not a direct cause of bubbles, it is a significant psychological factor that can moderate the effect of overconfidence on price predictions. The concept of psychological distance, as explained in the Construal Level Theory (CLT) proposed by Trope et al. (2007), explains how physical and mental distance affect an individual’s relationship with events and influence their evaluations and behaviours. According to Trope et al. (2007), Soderberg et al. (2015), and Calderon et al. (2023), the temporal distance between an event and a bidder can shape mental interpretations and influence bidders’ predictions and decisions.

A price bubble occurs when the prices of financial assets increase irrationally and significantly, often driven by unrealistic or inconsistent beliefs about the future (Lehnert, 2020). The term ‘price bubble’ refers to an asset’s price rising beyond fundamental expectations (Lansing, 2007). The economist Milton Keynes (1936) acknowledged the potential for speculative bubbles and described how a prolonged rise in asset prices above their standard market value could result in a price bubble.

Empirical research has investigated the dynamics of price bubbles and their consequences across various markets. For example, Helbling and Terrones (2003) and Brunnermeier and Rother (2020) found that the bursting of a property market bubble has a more significant impact on the real economy than the stock market. Furthermore, Smith et al. (1988) pioneered a new direction in experimental research in economics by concentrating on property markets and price bubbles. The Rational Expectations Model examines the effects of price bubbles on diverse individual expectations, evaluating the risk-adjusted value of dividends on financial assets (Hommes et al., 2008; Marquardt et al., 2019).

Overconfidence is a significant psychological bias in financial markets and is often associated with excessive trading and asset market bubbles. Behavioural research indicates that high confidence in financial decision-making and the market’s functionality can lead to serious consequences (Benos, 1998; Daniel et al., 2001; Scheinkman & Xiong, 2003). Furthermore, under certain circumstances, investors can become overconfident and pursue riskier investments, resulting in increased trading activity (Hirshleifer et al., 1994; Gervais & Odean, 2001; Yeoh & Wood, 2011). Many studies have examined the influence of overconfidence on financial decisions using various indicators.

Research on overconfidence has underscored its economic impacts, particularly its influence on financial decision-making, market dynamics, and excessive trading volumes (De Bondt & Thaler, 1985; Shiller, 2000; Caballe & Sakovics, 2003; Karki et al., 2024). Kahneman and Riepe (1998) note that overconfidence is a well-documented psychological bias in financial decision-making, where individuals tend to overestimate their knowledge and ability to predict market outcomes. The existing literature highlights that overconfident individuals often engage in riskier investments and excessive trading, contributing to market inefficiencies and price bubbles (Benos, 1998; Daniel et al., 2001). However, while overconfidence has been studied in isolation, the role of psychological distance, particularly temporal distance, in influencing overconfidence has been largely overlooked.

Therefore, the primary aim of this research is to explore the role of psychological distance, specifically temporal distance, in influencing overconfidence and its effect on asset price predictions in experimental asset markets. The study aims to investigate whether varying the time intervals between market experiences and price predictions will reduce or amplify the influence of overconfidence on market behaviour, particularly in the formation of price bubbles. The key objectives of the current study are:

1. To examine how overconfidence biases in financial decision-making are influenced by temporal psychological distance.
2. To investigate the relationship between psychological distance and the formation of price bubbles in asset markets.
3. To identify whether increasing the time gap between market experiences and asset price predictions leads to increased overconfidence and higher price volatility.

This paper is organised as follows. The next section, the literature review, critically evaluates relevant theoretical and empirical past studies to provide a foundation for the conceptualisation of predicted relationships. The section on methodology describes the elements of the research design of the study. The penultimate section, results and interpretations, explains the findings of the study, and the conclusion section details the accomplishment of the research objectives, limitations of the study and suggestions for future research.

Literature Review

Past studies have assessed the relationship between psychological distance and errors in human decisions (see, Ebert & Meyvis, 2009; Davis & Peterson, 2022; Franke & Groeppel-Klein, 2024). Ebert and Meyvis (2009) explored the connection between affective forecasting and psychological distance, emphasising the rather surprising effects of distant events. Their findings revealed that people often misjudge the emotional impact of temporally or spatially distant events. They found that individuals tend to overestimate the emotional intensity of distant future events, leading to distorted decision-making. It is essential that this phenomenon be investigated in relation to consumer behaviour, as it influences how individuals anticipate and react to future purchases.

More specifically, the concept of psychological distance—the perceived separation between individuals and events—has been extensively explored in decision-making research. Studies have demonstrated that psychological distance can significantly influence how individuals assess risks and make decisions (Ebert & Meyvis, 2009; Davis & Peterson, 2022). Ebert and Meyvis (2009) explored the relationship between affective forecasting and psychological distance, emphasising that individuals often overestimate the emotional intensity of distant future events. This misjudgement can lead to distorted decision-making processes, a phenomenon central to consumer behaviour and financial decisions. Davis and Peterson (2022) and Franke and Groeppel-Klein (2024) found empirical evidence that proves that when people make decisions about events or situations that are distant in time and space, their confidence in those judgements increases, even if the accuracy of those judgements is relatively low.

Additionally, overconfidence, a psychological bias that leads individuals to overestimate their ability to predict outcomes, is widely studied in the context of financial markets. Davis and Peterson (2022) and Franke and Groeppel-Klein (2024) showed that psychological distance increases confidence in decisions, even when their accuracy is relatively low. This relationship is especially relevant in asset markets, where overconfident investors often contribute to inflated asset prices. However, most studies have focused on exceptional distance (e.g., spatial or social) rather than temporal distance, which is the focus of the present study.

Past studies have concentrated more on the impact of exceptional distance than on the influence of temporal distance in decision-making. To examine the effect of temporal distance on decision-making accuracy, Shevinsky and Reinagel (2019) conducted experiments to determine how variations in elapsed time affect decision accuracy in humans and rats. They found that rats' decision-making accuracy increased with reaction time, while humans' accuracy decreased. In contrast, the existing literature on Mental Time Travel (MTT) indicates that a shorter temporal distance to an event worsens humans' ability to perceive it compared to more distant events (Casadio et al., 2024). MTT is a cognitive framework that helps explain how individuals perceive and mentally navigate between past and future events. In the context of financial decision-making, MTT helps us understand how people process time-related biases, especially when predicting asset prices. While MTT has primarily been discussed in psychology (Suddendorf & Corballis, 1997), its application to financial behaviour remains underexplored. Recent studies, such as Casadio et al. (2024), suggest that when individuals face distant events, they tend to make more abstract decisions. This framework is crucial for understanding how temporal distance, whether near or far, shapes confidence levels and decision accuracy in asset markets. However, while MTT offers valuable insights, it is not without its limitations, particularly when applied to decision-making under financial stress. Therefore, the present study aims to integrate MTT with the concept of psychological distance to better explicate the influence of temporal separation on overconfident market behaviour.

This insight is particularly relevant for financial decision-making and risk assessment, where subjective beliefs and their complexities play a crucial role in determining behaviour. We carried out this study to bridge the gap between the potential impact of psychological distance on individual overconfidence and the well-documented effect of overconfidence bias in generating price bubbles in asset markets. We consider psychological distance, defined by the time elapsed between market experiences of participants, as a potential influencer of a participant's confidence, since the specific impact of this difference has yet to be explored. Therefore, we designed a market experiment to investigate the role of psychological distance in manipulating judgement errors about an asset's fundamental value, driven by participants' overconfidence. We applied four different time intervals before participants reported their willingness to sell assets in a consecutive market session. The results indicate that increasing the time gap between simulated market experience and asset price predictions significantly reduced the impact of participants' overconfidence on the formation of price bubbles. The results of our experimental procedure will be discussed in detail in the following sections.

Construal Level Theory (CLT) posits that individuals interpret distant events in more abstract terms than those that are temporally or spatially close. This theory has been widely applied in psychology to explain how distance influences decision-making processes (Trope et al., 2007). While CLT has been explored in various domains, its application to financial decision-making remains underdeveloped. Findings of Casadio et al. (2024) indicate that temporal distance impacts individuals' decision accuracy, especially in asset markets, where decisions become more abstract as time intervals lengthen. While the literature on psychological distance and overconfidence is extensive, a critical gap remains in understanding how temporal distance influences overconfidence in asset markets, particularly in the formation of price bubbles. Furthermore, there is limited empirical evidence from Asian markets regarding the effects of psychological distance on financial decision-making. Hence, the present study aims to bridge these gaps by exploring how varying time intervals between market experiences and asset price predictions influence overconfidence and contribute to the formation of price bubbles in asset markets.

Methodology

This study was conducted on a sample of 146 undergraduates selected from the registered pool of 212 participants in the Behavioural and Experimental Research Group [BERG], Faculty of Management, University of Peradeniya, Sri Lanka. To register participants, an online form was shared, and the sub-sample for each market simulation was filled on a first-come, first-served basis. Then, the selected participants were notified via email to verify their availability for the experimental sessions. The study expected 40 participants per session, to make up a total of 160 participants, but the unavailability of a few participants reduced the final sample size to 146.

All participants were undergraduates studying at the University of Peradeniya, and most had no prior experience in asset markets. Although they had some theoretical knowledge gleaned from their undergraduate degree curriculum, we ensured that all participants received comprehensive information sessions about asset markets and their functioning before the experiment. The experiment was conducted in four stages to collect essential participant data. Most tasks were timed, with a total duration of 60 minutes allocated for all activities. Each participant was compensated with Sri Lankan Rupees (LKR) 500 for their involvement, with the potential to earn additional payoffs that could increase their total compensation up to a maximum of LKR 1,000 by the end of the session.

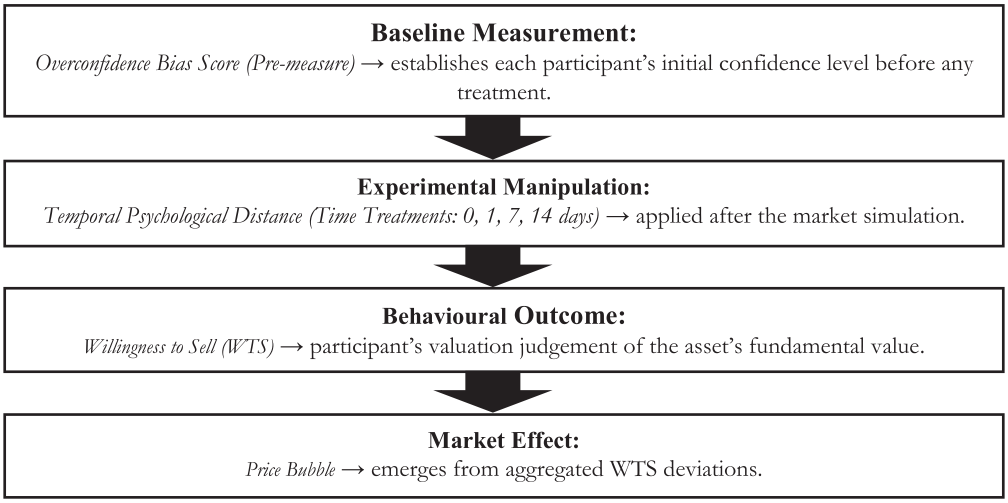
All four market sessions shared common characteristics, materials, protocols, and instructions. In the initial phase of the experiment, we assessed participants' confidence levels using a specialised instrument. This instrument consisted of eight questions of varying difficulty: two hard, three of medium difficulty, and three easy. Participants had 10 minutes to answer these questions which were not related to finance, economics, numerical reasoning, or cognitive ability. After each question, participants indicated their confidence level on a scale from 33% (complete uncertainty) to 100% (complete certainty), as described by Michailova and Schmidt (2016). We calculated the confidence bias score as the ratio of the mean confidence level across all questions to the mean proportion of correct answers. A negative bias score indicated low confidence, a score of zero signalled a neutral level of confidence, and a positive score reflected overconfidence.

The participants bought and sold assets in a simulated market during the second stage of the experiment. They were required to assume the role of an active participant and indicate the prices at which they would be willing to buy and sell assets using hypothetical funds. After the market simulation, we calculated total earnings using the following formula.

FINAL VALUE = THE TOTAL OF EARNINGS DURING PERIODS 1−10 + 360* INVENTORY OF *X* AT THE END OF PERIOD 10 + THE TOTAL AMOUNT OF CASH AFTER PERIOD 10 + 5000

The market simulation comprised 10 rounds, with the initial selling price set at 200 ECUs for each round. We introduced a time-distance treatment for 15 randomly selected participants in each market simulation when reporting their 'willingness to sell (WTS).' In our baseline simulation, we asked the chosen participants to report their WTS immediately after the market simulation. Subsequently, in Treatment I, we requested all participants to attend the lab simultaneously on the following day (24 hours after the simulation) and record their WTS. Treatments II and III entailed conducting the same survey after 7 and 14 days, respectively. The recorded WTS values reflected participants' perceived selling prices for their assets and served as our primary data source for detecting potential price bubbles. Our objective was to investigate whether increasing psychological distance — by extending the time between participants' market experiences —would influence their overconfidence bias in price predictions and lead to changes in price bubbles in asset markets. The following framework outlines the flow of this experiment.

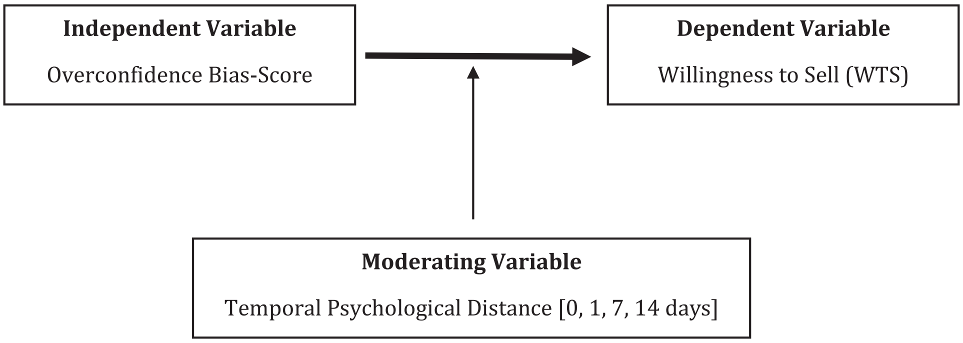
Figure 1: Experimental Design



Source: Authors' preparation

The experimental design exhibits the flow of the key stages in this market experiment. The experiment starts with a pre-measure of each participant's overconfidence bias score, and then we observe how the introduction of a time-distance treatment mediates participants' stated confidence. We elicit this as a behavioural outcome by recording the participant's valuation judgement of the fundamental value of the asset through their disclosure on Willingness to Sell (WTS). Thus, comparing the aggregate WTS of bidders across 10 market rounds in four treated simulations allowed us to identify potential effects.

Figure 2: Conceptual framework



Source: Authors' preparation

The flow of the experiment, as depicted in the experimental design (Figure 1), provides benchmarks for constructing the conceptual framework of this study. This experiment focuses on a specific independent variable —the participants' overconfidence bias score—and assesses its impact on the dependent variable: reported WTS values for assets at each trading round in the market simulation. Importantly, this experiment uses temporal psychological distance as the moderating variable, with a baseline and three treatments. Thereafter, it investigates whether treatments generate differences in reported WTSs relative to their fundamental value. Thus, this leads to a development and test of two direct hypotheses and a moderation hypothesis as follows.

There are ample theoretical and empirical studies highlighting this direct effect of variations in bidders' confidence on the price volatility and the generation of bubbles in asset markets (Kahneman & Riepe, 1998; Benos, 1998; Daniel et al., 2001; Scheinkman & Xiong, 2003; Yeoh & Wood, 2011; Michailova & Schmidt, 2016; Karki et al., 2024).Consequently, we test this main effect by forming the following hypothesis.

H_1: Higher overconfidence bias-scores increase WTS deviation from its fundamental value

This hypothesis was tested to verify the empirical findings in the literature and to assess the fitness of our market simulations. Subsequently, we formulated the second hypothesis based on the findings by Davis and Peterson (2022) and Franke and Groeppel-Klein (2024). These researchers highlight the potential relationship between overconfidence and psychological distance, as Davis and Peterson (2022) and Franke and Groeppel-Klein (2024) found empirical evidence to support the fact that when people make decisions about events or situations that are distant in time and space, their confidence in those judgements increases, even if the accuracy of those judgements is relatively low. Also, the findings by Casadio et al. (2024) highlight these connections by showing that temporal distance affects individuals' decision accuracy, especially in asset markets, where decisions become more abstract as time intervals lengthen. However, the moderating effect of psychological distance and its potential influence on the WTS and price volatility in asset markets have not been empirically tested.

Therefore, this study introduced an alternative explanation for the direct effect of overconfidence on WTS, accounting for temporal psychological distance as a moderating variable, and formulated the following moderation hypothesis.

H_2: The effect of the confidence level on WTS is moderated by temporal psychological distance. The increase in WTS deviation due to temporal psychological distance is more substantial among 'Highly Confident' bidders than among 'Less Confident' bidders.

Thus, we assume that highly-confident participants are more prone to overconfidence bias, and that psychological distance worsens it. As in the analytical strategy for testing these hypotheses, this study used Stata statistical software to analyse data. It utilised analytical techniques such as Simple Ordinary Least Squares (OLS) regressions, and sample *t*-tests. The study also used descriptive statistics to summarise the data of variables and graphical presentations to visualise the projected prices.

Results and Interpretations

Our study involved four simulated asset market scenarios using undergraduate students from the University of Peradeniya, Sri Lanka. Most participants were female and had no prior experience in the asset market. Although they had theoretical knowledge drawn from their undergraduate degree curriculum, we ensured that all groups participated in comprehensive information sessions about asset markets and their functioning before the market simulations. We assessed the impact of overconfidence on asset price predictions by regressing each bidder's confidence bias score on their asset price predictions.

Table 1: Impact of overconfidence on the predicted selling price of assets

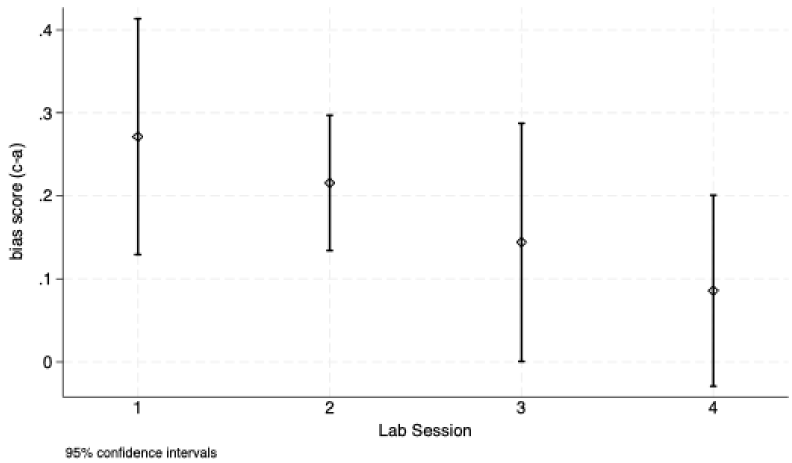
Dependent variable: Predicted selling price for assets			
Variable	Model (I)	Model (II)	Model (III)
Overconfidence Bias-Score	3.881*** (1.140)	3.883*** (1.155)	3.745*** (1.197)
Total Earnings	No	-0.014 (0.036)	0.002 (0.040)
Percentage of Dividends	No	1.711 (1.449)	1.962 (1.613)
Controls	No	No	Yes
Constant	2.615*** (0.329)	2.554*** (0.402)	4.980*** (1.434)
R^2	0.167	0.188	0.406
Model Significance (p)	0.00***	0.01***	0.02**
Sample Size (n)	60	60	60

Source: Authors' preparation using regression outputs

Our findings revealed a positive linear relationship between the confidence bias scores and the predicted asset prices (see Table 1), which indicates that a higher confidence bias score is associated with a higher expected asset price. This aligns with the fact that overconfidence is linked to risk aversion and an increase in the velocity of the stock market. Brunnermeier and Oehmke (2013) state that excessive risk-taking contributes to financial bubbles. Overconfidence is a primary cause of stock market bubbles and is exacerbated by the self-attribution bias it engenders (Daniel et al., 2001). Furthermore, this supports the first hypothesis (H_1) and the fact that the student sample we used in this market experiment aligns with broader market behaviour and is fairly representative of the behaviour of an average bidder. In addition, this study did not observe significant effects of earnings and dividends received on the expected asset sale prices in the predictions. The participants in our study were fully aware of their total revenues and profits at each bidding round. However, this awareness did not significantly affect their predictions.

We assessed the level of overconfidence of each participant using the methodology outlined by Michailova and Schmidt (2016). Participants with a confidence bias score above zero are overconfident, and those below zero are underconfident. We found that 80% of the participants we selected for the asset price predictions were overconfident.

Figure 3: Comparison of confidence bias scores between the four market simulations

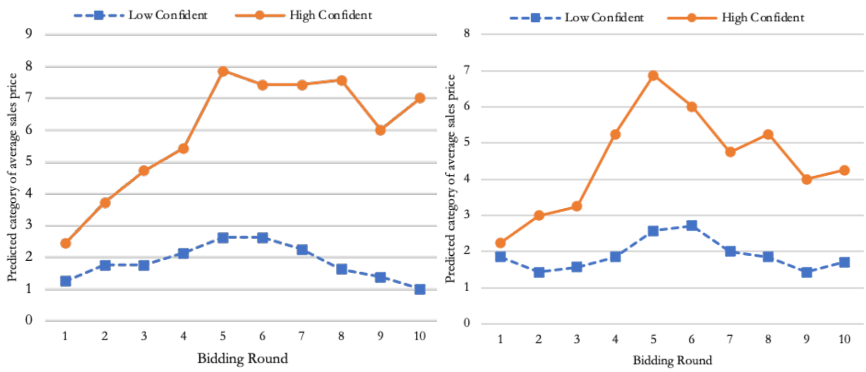


Source: Authors' preparation

Figure 3 illustrates the distribution of confidence bias scores across the four market simulations. The distributions are not uniform, and we observed heterogeneity in confidence intervals across the treatment groups. To account for the heterogeneity in confidence bias scores when analysing treatment effects, we classify the bidders as 'Highly Confident' or 'Less Confident' based on the average bias score recorded in each market session. Thus, bidders with a confidence bias score equal to or greater than the average of a specific market session are labelled 'Highly Confident.' In contrast, those with a below-average bias score are classified as 'Less Confident.'

Our primary interest lies in examining the impact of 'psychological distance' — the time between market experiences — on participant price predictions and the degree to which their pre-estimated confidence levels influence the formation of price bubbles. The regression output presented above supports a positive linear relationship between overconfidence and asset price predictions. Figure 4 illustrates the impact of overconfidence on asset price predictions, with the base price set to 200 ECUs at the baseline and in treatment 1.

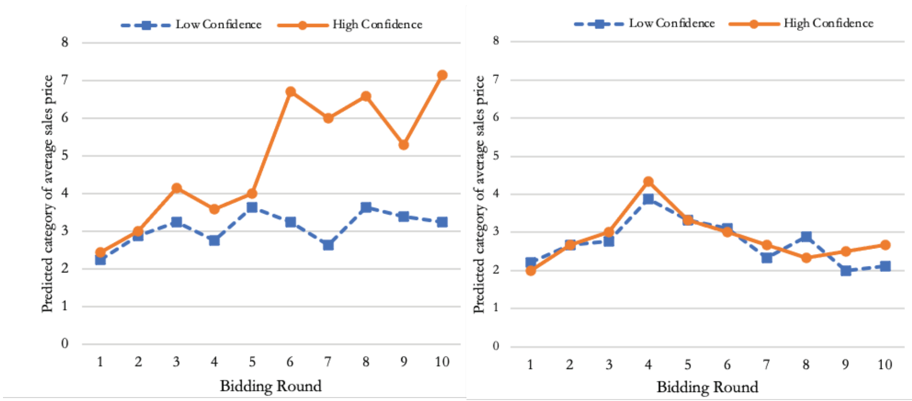
Figure 4: Impact of overconfidence at the baseline (baseline and treatment 1)



Source: Authors' preparation

A comparison of the above graphs reveals a significant disparity in asset price predictions across participants with varying levels of overconfidence. Participants exhibiting high confidence bias scores forecast asset prices considerably higher than those with confidence bias scores below the average. Additionally, it is evident that both price bubbles reached their peaks at the fifth market round, and the predictions following the market simulation yielded the largest bubble, with the highest range of predicted values falling within the 1400-1600 ECU category. On the other hand, participants with low confidence in both markets made predictions within narrower price ranges for their assets, with the highest reported price range averaging 200-400 ECUs during the price bubbles. Moreover, Figure 5 illustrates the predicted asset prices by participants after 7 and 14 days, respectively, in the market simulation.

Figure 5: Impact of overconfidence in treatments 2 and 3

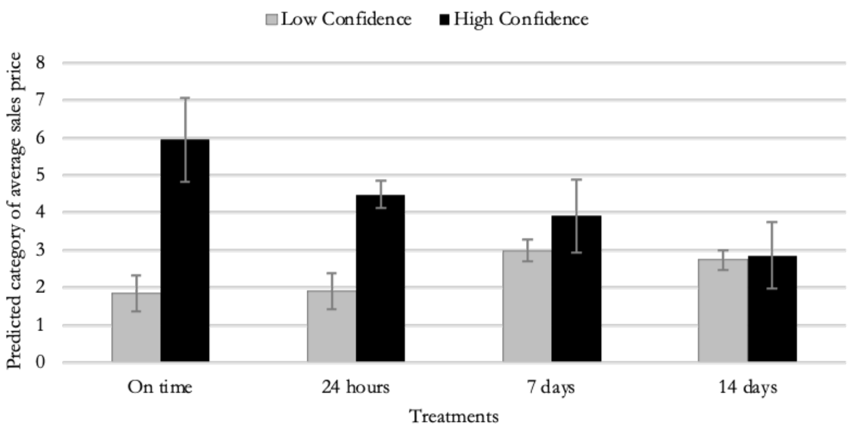


Source: Authors' preparation

In the initial and subsequent market rounds, highly-confident and less-confident participants made similar price predictions. However, as the rounds progressed, participants with high confidence bias scores began reporting higher prices, although the variance from the predictions of less-confident participants was insignificant. The highly-confident participants tended to believe in higher selling prices in the latter half of the market, with their average price predictions peaking at 1200-1400 ECUs by the 10th market round. In contrast, the predictions of less-confident participants persisted across the 400-600 ECU price range until the final round. However, after 14 days, a different outcome was observed in the asset price predictions: there was no significant difference between the prices predicted by highly- and less-confident participants. The price bubbles ranged from 400 to 600 ECUs, suggesting that the predictions made after 14 days were unaffected by participants' confidence levels.

To further validate these observations, Figure 5 shows statistical differences in the average price categories reported by highly-confident and less-confident participants across four market simulations, using two-sample *t*-tests (see Appendix 1).

Figure 6: High-confidence vs Low-confidence at each asset market simulation



Source: Authors' preparation using t-test statistics (see Appendix 1)

The comparison of average expected asset prices between less-confident and highly-confident participants revealed an intriguing pattern. Following the market simulation, a notable and statistically significant difference was observed between the predictions of less-confident and highly-confident participants, as highlighted in Appendix 1. On average, highly-confident participants predicted price ranges of about 1000-1200 ECU, while less-confident participants predicted an average range of 200-400 ECU. This substantial difference in predictions is also evident in the data presented in Figure 4. Furthermore, a statistically significant difference was observed in the selling prices of the assets predicted at 24-hour intervals. Highly-confident participants predicted prices averaging 600-800 ECUs, whereas less-confident participants predicted an average of 200-400 ECUs. This further validates the patterns illustrated in Figure 4, suggesting that high confidence may affect the size of the price bubble, though to a lesser extent than initially predicted soon after the market simulation.

In our analysis, we found that although participants' average price predictions differed, these differences were not statistically significant according to t-test statistics (see Appendix 1). Participants with high overconfidence predicted prices ranging from 600 to 800 ECUs, while those with low confidence predicted prices in the 400-600 ECU range. After seven days, the gap between the high- and low-confidence predictions narrowed, mainly because prices were similar in the first half of the market simulation (see Figure 5).

Notably, the average predictions of less-confident - and highly-confident participants fell within the same range of 400-600 ECUs, with no statistically significant difference. This suggests that participants with high confidence did not predict higher asset prices after the 14 days following the market simulation. Figure 6 illustrates that the predictive power of high confidence in predicting higher asset prices diminishes over time after the market simulation. This experimental evidence highlights the impact of time variance as a proxy for 'psychological distance' on the power of overconfidence in generating price bubbles. Our findings indicate that the larger the psychological distance, the weaker the effect of overconfidence becomes in generating larger price bubbles, and vice versa. These results have been contrary to the assumptions we made under the moderation hypothesis (H2), and overconfident participants benefit more from psychological distance in correcting themselves, and thus, generate smaller price bubbles in the market. The findings and their effects on our hypotheses related to the temporal time-distance treatment will be extensively elaborated on in the conclusion of the paper.

Conclusion

We conducted four asset market simulations in a laboratory setting to examine how psychological distance affects the formation of larger price bubbles. We specifically examined the impact of confidence levels (low and high) on perceived asset prices of participants in the presence of time distance treatments. Our goal was to determine if increasing the psychological distance between participants' market experiences and price predictions influences changes in price bubbles. When comparing the predicted asset prices across the different time intervals, we found clear price bubbles when predictions were made immediately or 24 hours after the market simulation. Predictions made after 7 days showed inconsistencies, whereas those made after 14 days led to an immediate market crash without a price bubble.

Regression estimates revealed a positive linear relationship between confidence bias scores and predicted asset prices. The higher the confidence bias score, the higher the predicted asset price. Therefore, the sample of randomly selected participants demonstrates the steering effect of overconfident participants on their price predictions (Ebert & Meyvis, 2009; Bhamra et al., 2022; Davis & Peterson, 2022; Franke & Groeppel-Klein, 2024), which is consistent with the literature in the area.

Participants with high confidence levels consistently made higher asset price predictions than those with low confidence, except for those made 14 days after the market simulation. Those with high confidence forecasted significantly higher asset prices immediately after the simulation than those with low confidence. This further supports our first hypothesis and the literature on the impact of overconfidence on price bubbles (Daniel et al., 2001; Yeoh & Wood, 2011; Michailova & Schmidt, 2016; Marquardt, 2019). This trend persisted across multiple trading rounds following the baseline condition in which the participants made predictions soon after the simulation. Even 24 hours after the boom, overconfident participants continued to predict higher asset prices, although the price bubble eventually burst. Even after the burst, a notable difference persisted between the predicted asset prices of individuals with low and high confidence levels.

The treatment effects on prices, predicted 7 and 14 days after the simulation, demonstrate outcomes that are largely inconsistent with the moderation hypothesis. For instance, although the hypothesis assumed a positive effect of time-distance treatment on the WTS deviation from fundamental values, the results showed the opposite. Even the average treatment effects depicted in Figure 6 highlight that greater temporal psychological distance leads to convergence of predicted WTS values toward the fundamental value of assets in the market.

The price predictions recorded seven days after the simulation show that the less-confident - and highly-confident participants did not differ significantly in their price predictions up to the fifth trading round. However, overconfident individuals began to predict higher prices after the fifth trading round. At the same time, those with low confidence consistently maintained a flat rate of asset predictions throughout the simulation. This behaviour suggests that the passage of time after the simulation may have had a psychological impact, reducing overconfidence in price predictions. The psychological distance led participants to initially overestimate potential selling prices, which then reverted to their natural levels, prompting them to predict prices closer to the assets' fundamental values in the latter part of the market simulation.

After 14 days, the pattern of price predictions becomes particularly intriguing, as participants with both high and low confidence levels report similar price prediction ranges throughout the simulation. Notably, those with high overconfidence levels consistently underestimated their asset values throughout the period, contrary to the assumption of the moderation hypothesis. This further supports our finding that the longer the time gap between market exposure and price predictions, the more negatively it affects participants' beliefs about selling prices, and neutralises the likelihood that overconfident participants will create larger price bubbles. This finding does not align with that of Davis and Peterson (2022) and Franke and Groeppel-Klein (2024), who found that psychological distance increases confidence but reduces decision accuracy. An aggregate comparison across four market simulations in this experiment reveals that confidence in accurate predictions increases, though not the potential for highly overconfident participants to set extreme market prices. The gap in the reduction in WTS deviation due to temporal psychological distance is more substantial among 'Highly Confident' participants than among 'Less Confident' participants. In conclusion, this empirical evidence suggests that the psychological distance of an individual from their market experience has a weakening impact on overconfidence and its ability to generate larger price bubbles in experimental asset markets.

These observations suggest that overconfident participants benefit more from psychological distance in correcting their biases and generate smaller price bubbles in the market. Even though such wind-tunnel tests in the experimental asset market require additional data from larger samples and lab-in-the-field setups, these findings have significant implications for both financial decision-making and market regulation.

First, understanding how psychological distance influences overconfidence can inform investor education programs, helping individuals recognise how time-related biases may affect their judgement and decision-making. By educating investors about the role of psychological distance, these programs can foster more rational decision-making and reduce the likelihood of their engaging in irrational market behaviours, such as speculative bubbles. Additionally, such wind-tunnel experiments can provide insights into the design of broader regulations that account for the influence of psychological distance on market behaviour, thereby ensuring that financial markets remain more stable and less prone to overconfidence-driven crashes. Finally, trading algorithms can be enhanced by incorporating time-sensitive adjustments to account for psychological distance, improving the accuracy of price predictions, and reducing the risk of algorithm-driven market bubbles. This approach would lead to more effective financial tools that can better serve investors, regulators, and market participants.

Despite providing valuable insights into how temporal psychological distance shapes overconfidence and price bubble formation, this study has several limitations that should be highlighted. First, laboratory-based simulations of the asset market may limit the ecological validity of the findings, as real-world investors operate in more complex environments influenced by additional market signals, emotions, and institutional constraints. Second, the relatively small and homogeneous sample may restrict the generalisability of results to diverse populations. Third, dimensions other than temporal psychological distance, such as social and hypothetical distances, may also interact with the confidence levels of bidders. Future research could address these limitations by employing larger, more heterogeneous samples, conducting longitudinal or field-based market experiments, and incorporating multiple forms of psychological distance simultaneously.

Conflict of Interest Statement

The authors declare no conflict of interest.

Funding Statement

This study is funded by the University Research Council, University of Peradeniya, Sri Lanka.

Acknowledgement

We acknowledge the University Research Council at the University of Peradeniya, Sri Lanka, for funding the laboratory experiment. We also thank the Dean and non-academic staff of the Faculty of Management for their support in conducting the laboratory sessions. Additionally, we thank the organising committee of the 19th International Research Conference on Management and Finance (IRCMF) at the Faculty of Management and Finance, University of Colombo, Sri Lanka, for selecting us and granting us an opportunity to present our working paper (Ariyarathna et. al, 2024) at the conference.

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Appendix 1

Appendix 1: High confidence vs low confidence at each asset market simulation

Simulation	Low confidence	High confidence	Difference	Sig.
Market I [On time]	1.838	5.957	3.76	***
Market II [24 hours]	1.9	4.488	3.28	**
Market III [7 days]	2.988	3.914	3.42	-
Market IV [14 days]	2.733	2.85	2.78	-

Note: 2-Sided t-tests *p<0.1, **p<0.05, ***p<0.01

Source: Authors' preparation