

FINANCIAL BEHAVIORAL BIASES (PRESENT BIAS AND OVERCONFIDENCE) ON CONSUMER DEBT DECISION MAKING AMONG MANUFACTURING WORKERS IN BATAM

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Abstract

This study investigates the influence of present bias and overconfidence on consumer debt decision-making among manufacturing workers in Batam, Indonesia, incorporating financial literacy as a moderating variable. Batam, a strategic free trade zone and major industrial hub, faces a growing phenomenon of consumer over-indebtedness fueled by the rapid expansion of digital lending platforms and online loans among its workforce. A quantitative cross-sectional survey design was employed, with a sample of 215 manufacturing workers drawn from Batam's major industrial estates through purposive sampling. Data were collected via validated Likert-scale questionnaires and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4.0. The findings reveal that: (1) present bias exerts the strongest positive and significant effect on consumer debt decisions ($\beta = 0.387$; $p < 0.001$); (2) overconfidence positively and significantly affects consumer debt decisions ($\beta = 0.294$; $p < 0.001$); (3) financial literacy significantly weakens the relationship between present bias and consumer debt decisions ($\beta = -0.168$; $p < 0.01$); however, (4) financial literacy does not significantly moderate the relationship between overconfidence and consumer debt decisions ($\beta = -0.074$; $p > 0.05$). These findings reveal an asymmetric moderation effect, indicating that conventional financial education is effective in mitigating present bias but insufficient in reducing overconfidence, which requires fundamentally different intervention approaches targeting metacognition rather than knowledge acquisition. The study contributes to behavioral finance literature by extending the application of hyperbolic discounting and overconfidence theories to consumer debt contexts in developing-country industrial zones and offers practical implications for financial regulators and corporate financial wellness programs.

Keywords: *present bias, overconfidence, consumer debt, financial literacy, manufacturing workers*

1. INTRODUCTION

Indonesia's economic growth of 5.11% in 2025 presents a paradox for household financial well-being (Coordinating Ministry for Economic Affairs, 2026). While rising incomes expand opportunities for wealth accumulation, the simultaneous proliferation of easily accessible digital credit has fueled impulsive borrowing behavior that threatens individual financial health. This phenomenon is best understood through the lens of behavioral finance, which recognizes that financial decisions frequently deviate from the rationality assumed by classical economic theory (Kahneman, 2011; Thaler, 2015). Batam, a free trade zone and one of Indonesia's largest manufacturing hubs, presents a uniquely compelling context for examining the behavioral underpinnings of consumer debt. Investment realization in Batam reached IDR 54.47 trillion through September 2025, with 51,939 new jobs created in the manufacturing sector alone (Media Center Batam, 2025). The city's minimum wage of IDR 4,989,600 per month in 2025—the highest in the Riau Islands province—gives manufacturing workers relatively strong purchasing power. However, Batam's geographical proximity to Singapore, exposure to aspirational consumption patterns, and the rapid penetration of online lending platforms (pinjol) create psychological pressures that drive irrational debt decisions (OJK Kepri, 2026). The Financial Services Authority (OJK) of the Riau Islands province has identified manufacturing workers in Batam's industrial estates as particularly vulnerable to illegal online lending schemes (OJK Kepri, 2026). The head of OJK Riau Islands has emphasized that illegal online loan entrapment not only damages individual finances but also triggers

psychological distress that undermines workplace productivity and may even increase the risk of internal fraud within companies. Nationally, online lending disbursements in Indonesia grew by over 29% between 2023 and 2024, reaching IDR 77.02 trillion with more than 18 million active borrowers (OJK, 2024). This phenomenon signals the presence of systematic behavioral biases in debt decision-making. Within the behavioral finance framework, two cognitive biases are most salient to consumer debt decisions: present bias and overconfidence (Hamid, 2025; Erta et al., 2023). Present bias refers to the tendency to disproportionately weight immediate gratification over long-term consequences (O'Donoghue & Rabin, 1999; Laibson, 1997). In the context of debt, present bias drives individuals to take on consumer credit to satisfy current desires without adequately considering future repayment burdens. Overconfidence—an inflated belief in one's financial capability—causes individuals to underestimate default risk and borrow beyond their repayment capacity (Cwynar et al., 2020; Lusardi & Tufano, 2015).

Prior studies have examined the influence of behavioral biases on financial decisions, yet the majority focus on investment decisions (Almansour et al., 2023; Adil et al., 2022; Wibowo et al., 2023) rather than consumer debt. Hamid (2025) analyzed the relationship between behavioral biases and over-indebtedness among consumer loan holders in Malaysia, finding that overconfidence significantly increases over-indebtedness probability. However, research specifically examining present bias and overconfidence in consumer debt decisions among manufacturing workers in industrial zones remains sparse, particularly in the Indonesian context. This study further integrates financial literacy as a moderating variable. The literature suggests that financial literacy can serve as a buffer against behavioral biases (Lusardi & Mitchell, 2014; Hastings et al., 2013), yet its effectiveness in moderating different types of bias remains contested. Several studies find that financial education effectively reduces present bias but is less effective against overconfidence, because overconfident individuals already believe they possess sufficient knowledge (Cwynar et al., 2020; Moore & Healy, 2008). Accordingly, this study aims to: (1) analyze the effect of present bias on consumer debt decisions among manufacturing workers in Batam; (2) analyze the effect of overconfidence on consumer debt decisions; (3) examine the moderating role of financial literacy on the present bias–consumer debt relationship; and (4) examine the moderating role of financial literacy on the overconfidence–consumer debt relationship. The study contributes to behavioral finance literature by extending theory application to consumer debt contexts in developing-country industrial zones and provides practical implications for financial regulators and corporate financial wellness programs in Batam.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Theoretical Foundations: Prospect Theory and Dual-Process Framework

The theoretical architecture of this study rests on two complementary pillars: Prospect Theory (Kahneman & Tversky, 1979) and Dual-Process Theory (Kahneman, 2011). Prospect theory posits that individuals evaluate gains and losses asymmetrically—losses are felt more acutely than equivalent gains. In the debt context, this asymmetry explains why individuals tend to underweight the “loss” of future interest payments (abstract and temporally distant) relative to the “gain” of immediate product ownership (concrete and salient). Dual-process theory distinguishes between System 1 (automatic, fast, and intuitive) and System 2 (analytic, slow, and deliberative) decision-making (Kahneman, 2011). Consumer debt decisions driven by present bias and overconfidence predominantly operate through System 1, where individuals rely on heuristics and cognitive shortcuts rather than rational calculation.

2.2 Present Bias and Consumer Debt Decisions

Present bias, rooted in hyperbolic discounting theory (Laibson, 1997), describes temporally inconsistent preferences—individuals discount future benefits at a rate that diminishes more steeply for near-term delays than for equivalent delays further in the future. Unlike exponential discounting in standard economic models, hyperbolic discounting produces preference reversals: individuals plan to save and limit borrowing, yet when confronted with immediate consumption opportunities, they opt for instant gratification (O'Donoghue & Rabin, 2015). In the consumer credit domain, present bias manifests through several mechanisms. First, individuals neglect total long-term interest costs and focus instead on seemingly affordable monthly installments. Second, frictionless digital credit access amplifies present bias by compressing the temporal gap between desire and action (Kumar et al., 2024). Kumar et al. (2024) demonstrated that Buy Now Pay Later (BNPL) availability increases average spending by 6.4%, indicating that temporal separation between consumption and payment fuels overspending. Third, the World Bank (2024) identifies hyperbolic discounting as a key behavioral driver of digital over-indebtedness in developing economies, where consumers prioritize immediate consumption smoothing over

long-term debt management. Rahayu and Musdholifah (2023), in the Indonesian context, found that present bias significantly predicts impulsive borrowing behavior among digital loan users. Based on these arguments:

H1: Present bias has a positive and significant effect on consumer debt decisions among manufacturing workers in Batam.

2.3 Overconfidence and Consumer Debt Decisions

Overconfidence bias refers to the systematic tendency to overestimate one's knowledge, abilities, or the precision of one's predictions about future outcomes (Moore & Healy, 2008). In the financial domain, overconfidence is operationalized as the gap between subjective self-assessment of financial capability (subjective debt literacy) and actual demonstrated competence (objective debt literacy) (Lusardi & Tufano, 2015; Cwynar et al., 2020). Hamid (2025) found that overconfidence significantly increases the probability of over-indebtedness among consumer loan holders in Malaysia. Overconfident individuals tend to underestimate default risk, accumulate debt from multiple sources, and spend less time comparing credit options before committing (Akin & Akin, 2024). Among manufacturing workers, overconfidence may be reinforced by the perceived stability of regular salary income, creating an illusion of repayment capacity that exceeds actual financial resilience (Bouteska et al., 2023). Gödker et al. (2025) demonstrate that repeated positive experiences—such as consistent salary receipt—strengthen overconfidence through the disposition effect mechanism, where individuals readily recall financial successes while discounting potential risks. Based on these arguments:

H2: Overconfidence has a positive and significant effect on consumer debt decisions among manufacturing workers in Batam.

2.4 The Moderating Role of Financial Literacy

Financial literacy—the ability to process economic information and make informed financial decisions (Lusardi & Mitchell, 2014)—theoretically functions as a deliberative mechanism that activates System 2 processing in decision-making. Individuals with higher financial literacy are better equipped to critically evaluate the long-term implications of borrowing, thereby dampening the impulses generated by present bias. However, the relationship between financial literacy and overconfidence is paradoxical. Cwynar et al. (2020) demonstrate that individuals with moderate financial literacy scores exhibit the highest overconfidence—they know enough to feel confident but not enough to recognize the limits of their knowledge. Salas (2024) confirms this finding in the consumer credit context, showing that financial education successfully reduces present bias but fails to mitigate overconfidence. This asymmetry is consistent with the Dunning-Kruger effect in the financial domain: partial knowledge acquisition without adequate metacognitive development may actually inflate rather than correct overconfidence (Moore & Healy, 2008). Based on these arguments:

H3: Financial literacy negatively moderates the effect of present bias on consumer debt decisions.

H4: Financial literacy negatively moderates the effect of overconfidence on consumer debt decisions.

3. RESEARCH METHODOLOGY

3.1 Research Design and Population

This study employs a quantitative approach with a cross-sectional survey design. The population comprises manufacturing sector workers in Batam's industrial zones. Batam hosts several major industrial estates—Batamindo Industrial Park, Kabil Integrated Industrial Estate, Panbil Industrial Estate, and Tunas Industrial Estate—that collectively employ tens of thousands of workers across the electronics, shipbuilding, automotive components, and medical devices sectors.

3.2 Sample and Sampling Technique

Purposive sampling was employed with the following inclusion criteria: (1) active worker in the manufacturing sector within Batam's industrial zones; (2) aged 18 years or older; (3) currently holds or has held consumer debt (credit card, online loan, unsecured personal loan, or installment plan) within the past 12 months; (4) minimum employment tenure of one year. Sample size determination follows Hair et al. (2021), who recommend a minimum of 10 times the largest number of structural paths directed at a particular construct in the PLS-SEM model. Given a model comprising four latent variables with six structural paths, the minimum sample is 60 respondents. To enhance statistical power and meet robustness standards, 230 questionnaires were distributed, yielding 215 valid responses after eliminating incomplete data and outliers (response rate: 93.48%).

3.3 Variable Operationalization

All variables were measured using 5-point Likert scales (1 = Strongly Disagree to 5 = Strongly Agree), except for objective financial literacy, which used true/false knowledge questions. The operationalization of each variable is presented in Table 1.

Table 1. Variable Operationalization

Variable	Operational Definition	Indicators	Adapted From
Present Bias (X1)	Tendency to disproportionately weight immediate gratification over long-term consequences	5 items: temporal preference, consumption impulsivity, hyperbolic discounting, financial procrastination, plan inconsistency	O’Donoghue & Rabin (2015); Meier & Sprenger (2010); Rahayu & Musdholifah (2023)
Overconfidence (X2)	Inflated belief in one’s financial management ability and debt knowledge beyond actual competence	5 items: repayment overestimation, illusion of control, debt knowledge overestimation, risk dismissal, optimistic future projection	Lusardi & Tufano (2015); Cwynar et al. (2020); Moore & Healy (2008); Hamid (2025)
Financial Literacy (M)	Ability to comprehend basic financial concepts and apply them to financial decisions	6 items: compound interest, inflation, diversification, credit interest, debt management, financial planning	Lusardi & Mitchell (2014); OJK (2022); Hastings et al. (2013)
Consumer Debt Decision (Y)	Propensity to take on debt for non-productive consumer expenditures	6 items: debt frequency, debt-to-income ratio, multiple source borrowing, lifestyle-driven debt, ease of borrowing, inability to decline credit	Hamid (2025); Gathergood (2012); Lusardi & Tufano (2015)

Source: Compiled from various sources (2025)

3.4 Data Analysis

Data analysis employed Structural Equation Modeling–Partial Least Squares (SEM-PLS) using SmartPLS 4.0 software. PLS-SEM was selected for several reasons: (1) it is well-suited for predictive and theory-exploratory models (Hair et al., 2021); (2) it does not require normally distributed data (Sarstedt et al., 2022); (3) it offers flexibility in handling moderation models (Henseler et al., 2015). Model evaluation proceeded in two stages: the outer model (measurement model) was assessed for convergent validity ($AVE \geq 0.50$), reliability (Cronbach’s Alpha and Composite Reliability ≥ 0.70), and discriminant validity (HTMT criterion < 0.90); the inner model (structural model) was assessed for coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and path significance via bootstrapping with 5,000 subsamples (Hair et al., 2021).

4. RESULTS AND DISCUSSION

4.1 Respondent Profile

Of the 215 valid respondents, the majority were female (58.6%), reflecting the predominance of female workers in Batam’s electronics manufacturing sector. The age distribution was dominated by the 25–34 cohort (47.9%), followed by 18–24 (23.7%), 35–44 (21.4%), and above 44 (7.0%). Educational attainment was

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predominantly senior high school/vocational (54.0%), followed by diploma (26.0%) and bachelor's degree (20.0%). Monthly income was concentrated in the IDR 4–6 million range (52.1%), consistent with Batam's minimum wage. The most prevalent form of consumer debt was online loans/BNPL (61.4%), followed by credit cards (22.3%), unsecured personal loans (10.7%), and marketplace installments (5.6%). Notably, 43.7% of respondents reported holding debt from more than one source, signaling potential over-indebtedness.

4.2 Outer Model Evaluation (Measurement Model)

4.2.1 Convergent Validity and Reliability

The outer model evaluation results are presented in Table 2. All indicators exhibited outer loadings above 0.708, confirming that each indicator explains more than 50% of its construct's variance (Hair et al., 2021). Average Variance Extracted (AVE) values for all constructs exceeded the 0.50 threshold, establishing adequate convergent validity. Both Cronbach's Alpha and Composite Reliability values surpassed the 0.70 minimum, confirming satisfactory reliability. Additionally, all Variance Inflation Factor (VIF) values remained below 3.3, ruling out multicollinearity concerns (Kock, 2015).

Table 2. Measurement Model Evaluation Results

Construct / Indicator	Loading	Cronbach's α	CR	AVE	VIF
Present Bias (X1)		0.872	0.907	0.662	
PB1	0.821				1.847
PB2	0.836				2.103
PB3	0.798				1.762
PB4	0.812				1.934
PB5	0.807				1.856
Overconfidence (X2)		0.884	0.915	0.683	
OC1	0.845				2.214
OC2	0.819				1.968
OC3	0.838				2.087
OC4	0.803				1.823
OC5	0.826				2.156
Financial Literacy (M)		0.891	0.918	0.652	
FL1	0.789				1.734
FL2	0.817				1.923
FL3	0.831				2.056
FL4	0.798				1.812
FL5	0.812				1.896
FL6	0.803				1.845
Consumer Debt (Y)		0.898	0.922	0.664	
CD1	0.827				2.178
CD2	0.834				2.245
CD3	0.809				1.956
CD4	0.793				1.834
CD5	0.818				2.067
CD6	0.802				1.912

Source: Primary data processed with SmartPLS 4.0 (2025)

Note: CR = Composite Reliability; AVE = Average Variance Extracted; VIF = Variance Inflation Factor

4.2.2 Discriminant Validity

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) criterion as recommended by Henseler et al. (2015). The results in Table 3 show that all HTMT values fall below the conservative 0.90 threshold, confirming that each construct is empirically distinct from all others.

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	PB	OC	FL	CD
Present Bias (PB)	—			
Overconfidence (OC)	0.634	—		
Financial Literacy (FL)	0.412	0.387	—	
Consumer Debt (CD)	0.721	0.658	0.489	—

Source: Primary data processed with SmartPLS 4.0 (2025)

4.3 Inner Model Evaluation (Structural Model)

The structural model was evaluated after confirming valid and reliable measurement. The R² value for the consumer debt decision variable was 0.476 (moderate), indicating that present bias, overconfidence, financial literacy, and their interaction effects collectively explain 47.6% of the variance in consumer debt decisions. The Q² predict value of 0.312 (> 0) confirms that the model possesses adequate predictive relevance (Shmueli et al., 2019). Hypothesis testing results using bootstrapping with 5,000 subsamples are presented in Table 4.

Table 4. Hypothesis Testing Results (Bootstrapping 5,000 Subsamples)

Hypothesis / Path	β	SE	t-value	p-value	f²	Decision
H1: PB → CD	0.387	0.058	6.672	0.000	0.198	Supported
H2: OC → CD	0.294	0.061	4.820	0.000	0.114	Supported
H3: PB×FL → CD	-0.168	0.054	3.111	0.002	0.042	Supported
H4: OC×FL → CD	-0.074	0.057	1.298	0.194	0.008	Not Supported
FL → CD (control)	-0.213	0.055	3.873	0.000	0.068	—

Source: Primary data processed with SmartPLS 4.0 (2025)

Note: R² = 0.476; Q² = 0.312; *significant at α = 0.05

4.4 DISCUSSION

4.4.1 The Effect of Present Bias on Consumer Debt Decisions

The analysis confirms that present bias is the strongest predictor of consumer debt decisions (β = 0.387; t = 6.672; p < 0.001) with a medium-to-large effect size (f² = 0.198). This finding is consistent with hyperbolic discounting theory (Laibson, 1997) and aligns with the empirical results of Rahayu and Musdholifah (2023) and Kumar et al. (2024). In the context of Batam’s manufacturing workforce, present bias manifests through several context-specific mechanisms that warrant detailed examination.

First, the monthly salary cycle creates uneven consumption patterns. Manufacturing workers earning near the Batam minimum wage (IDR 4,989,600) frequently experience end-of-month cash flow crunches, driving them toward online loans and BNPL platforms as short-term liquidity solutions. The finding that 61.4% of respondents carry online loan/BNPL debt corroborates the World Bank’s (2024) observation that frictionless digital credit access amplifies present bias by eliminating the psychological friction between desire and consumption action. Within the dual-process framework, instant credit access activates System 1 (intuitive and impulsive) before System 2 (deliberative and analytic) can evaluate long-term consequences.

Second, Batam’s geographical proximity to Singapore creates an elevated consumption reference point. Exposure to Singaporean living standards and consumption patterns—through routine cross-border visits, social

media, and interaction with expatriates in industrial zones—shifts workers’ aspirational consumption upward. Present bias interacts with this social comparison effect: the desire to match a higher standard of living is immediate and emotional, while the costs of debt to be borne in the future are abstract and hyperbolically discounted. This finding extends the present bias literature, which has predominantly examined developed-country contexts (O’Donoghue & Rabin, 2015), by demonstrating that in border-area industrial zones of developing countries, present bias is amplified by a contextual proximity effect to more advanced economies.

Third, the greater magnitude of present bias relative to overconfidence ($\beta = 0.387$ vs. 0.294) carries important theoretical implications. This finding suggests that in the consumer debt context of manufacturing workers, the problem of temporal preference (prioritizing immediate gratification) dominates the problem of confidence miscalibration. This contrasts with Hamid’s (2025) finding in Malaysia, where overconfidence was the stronger predictor of over-indebtedness. The divergence can be attributed to sample characteristics: manufacturing workers with predominantly high school education (54%) may exhibit lower overconfidence in the financial domain compared to middle-class consumer loan holders in Malaysia, yet are more susceptible to present bias due to limited resources for delayed gratification.

4.4.2 The Effect of Overconfidence on Consumer Debt Decisions

Overconfidence significantly affects consumer debt decisions ($\beta = 0.294$; $t = 4.820$; $p < 0.001$) with a medium effect size ($f^2 = 0.114$). This finding aligns with Hamid (2025), Cwynar et al. (2020), and Lusardi and Tufano (2015), who consistently find that overconfident individuals accumulate more debt. Among Batam’s manufacturing workers, overconfidence operates through specific mechanisms that merit detailed exposition. The primary mechanism is the illusion of income stability. Workers with regular employment contracts and consistent salary receipt develop overconfidence in their future repayment capacity. They project current income conditions linearly into the future without adequately accounting for risks such as layoffs, contract non-renewal, or macroeconomic shocks. Gödker et al.’s (2025) work on the disposition effect illuminates this phenomenon: repeated positive experiences (on-time salary receipt, successful installment payments) reinforce overconfidence because individuals more readily recall successes than anticipate failures. In the Batam context, this is compounded by the volatility inherent in manufacturing sectors that are highly dependent on global supply chains and export demand fluctuations.

The most prominent overconfidence dimension among respondents was debt literacy overconfidence. Approximately 67.4% of respondents rated their understanding of interest and installments as “good” or “very good,” yet only 38.1% could correctly calculate the total interest cost of a term loan when objectively tested. This gap between subjective and objective debt literacy is consistent with Cwynar et al.’s (2020) findings and constitutes a critical pathway linking overconfidence to suboptimal debt decisions. Individuals who perceive themselves as financially knowledgeable exercise less caution in evaluating credit terms and conditions, because they believe their existing knowledge is adequate (Akin & Akin, 2024).

The finding that overconfidence exerts a smaller effect than present bias ($\beta = 0.294$ vs. 0.387) indicates a hierarchy of biases in the consumer debt context of manufacturing workers. While present bias operates at the affective and temporal level (emotional desire prioritizing immediate satisfaction), overconfidence operates at the cognitive level (systematic misestimation of capabilities and risks). In situations where debt decisions are frequently triggered by emotional impulses and urgent needs—as is common among manufacturing workers with constrained cash flows— affective bias (present bias) tends to dominate cognitive bias (overconfidence). This enriches Kahneman’s (2011) perspective on System 1–System 2 interaction in the specific domain of debt decisions in developing economies.

4.4.3 The Asymmetric Moderating Role of Financial Literacy

The most novel and theoretically significant finding of this study is the asymmetric moderating effect of financial literacy across the two types of behavioral bias. Financial literacy significantly weakens the effect of present bias on consumer debt decisions ($\beta = -0.168$; $t = 3.111$; $p = 0.002$) but does not significantly moderate the overconfidence–debt relationship ($\beta = -0.074$; $t = 1.298$; $p = 0.194$). The effectiveness of financial literacy in moderating present bias can be explained through the cognitive override mechanism. Individuals with sound financial understanding are better equipped to activate System 2 (deliberative) processing to evaluate the long-term consequences of borrowing, thereby attenuating System 1’s impulse toward instant gratification. Knowledge of compound interest, for instance, enables individuals to recognize that “affordable” monthly installments in fact

accumulate substantial total costs. This finding is consistent with Lusardi and Mitchell (2014), who demonstrate that financial literacy helps individuals make better intertemporal decisions.

Conversely, financial literacy's inability to moderate overconfidence confirms the Dunning-Kruger paradox in the financial domain (Cwynar et al., 2020; Salas, 2024). Overconfident individuals already perceive their financial knowledge as adequate—irrespective of its actual level. Even when exposed to additional financial education, new information may actually reinforce rather than correct their inflated self-assessment. This phenomenon represents a “knowledge calibration failure”: partial knowledge acquisition without adequate metacognitive development inflates rather than corrects overconfidence (Moore & Healy, 2008). In the manufacturing worker context, brief financial training sessions delivered by employers or OJK may provide sufficient information to increase perceived competence but insufficient depth to build the reflective capacity needed to correct overconfidence.

The implications of this asymmetry are substantial. Theoretically, it demonstrates that financial literacy is not a universal remedy for all types of behavioral bias in financial decision-making. Each bias operates through distinct cognitive mechanisms and requires tailored interventions. Practically, financial education programs designed by OJK and companies in Batam's industrial zones must differentiate their intervention strategies: for present bias, conventional financial education (enhancing knowledge about debt consequences) proves effective; for overconfidence, fundamentally different approaches are needed—such as structured feedback mechanisms, financial failure simulations, or nudge-based interventions targeting metacognition rather than information acquisition.

5. CONCLUSIONS AND IMPLICATIONS

5.1 Conclusions

This study yields four principal findings. First, present bias is the strongest predictor of consumer debt decisions among manufacturing workers in Batam, exerting a positive and significant effect with medium-to-large practical significance. Second, overconfidence also positively and significantly predicts consumer debt decisions, albeit with smaller magnitude than present bias. Third, financial literacy significantly moderates (weakens) the effect of present bias on consumer debt decisions, confirming the efficacy of financial education in mitigating temporal preference bias. Fourth, financial literacy does not significantly moderate the effect of overconfidence, revealing a paradox in which increased financial knowledge does not necessarily reduce inflated self-assessment in the debt domain.

5.2 Theoretical Contributions

This study advances behavioral finance literature in three respects. First, it extends the application of hyperbolic discounting and overconfidence theories from investment contexts to consumer debt decision-making in developing-country industrial zones, an underexplored empirical setting. Second, the discovery of a bias hierarchy—where present bias dominates overconfidence in workers' debt decisions—enriches understanding of how affective and cognitive biases interact differently depending on socioeconomic context and decision domain. Third, the finding of asymmetric financial literacy moderation challenges the prevailing assumption that financial literacy universally buffers behavioral biases and opens a research agenda on bias-specific interventions.

5.3 Managerial and Policy Implications

For manufacturing firms in Batam, these findings suggest integrating financial wellness programs into human resource management strategies. Such programs should encompass: (a) behavior-based financial education that not only enhances knowledge but also trains metacognition and self-awareness regarding biases; (b) commitment device mechanisms such as automatic savings deductions to help workers overcome present bias; (c) partnerships with licensed financial institutions to provide healthier credit alternatives than illegal online lending platforms.

For OJK and financial regulators, the findings imply the need for differentiated financial education strategies. Conventional financial literacy programs are effective against present bias but must be supplemented with behavioral interventions—such as warning labels on credit products, extended cooling-off periods for online loans, and real-time debt accumulation feedback systems—to address overconfidence. The finding that overconfidence requires metacognitive rather than informational interventions has direct implications for the design of consumer protection regulations in the digital lending space.

5.4 Limitations and Future Research Directions

This study has several limitations. First, the cross-sectional design precludes strong causal inference; future research may employ longitudinal or experimental designs to test causal relationships. Second, measuring present bias and overconfidence through self-report questionnaires introduces potential social desirability bias; choice experiments or revealed preference methods could enhance measurement validity. Third, the sample is limited to manufacturing workers in Batam, so generalization to other industries and regions requires caution. Fourth, future studies could integrate additional variables such as financial anxiety, peer influence, and digital financial literacy as mediators or moderators to achieve a more comprehensive understanding of consumer debt decision mechanisms in the digital age. Fifth, comparative studies across different industrial zones in Indonesia (e.g., Cikarang, Surabaya) would help determine whether the present bias dominance and asymmetric moderation findings are context-specific or generalizable to the broader Indonesian manufacturing workforce.

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