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دور حملات العلاقات العامة بوزارة الداخلية في التوعية بأضرار المخدرات وانعكاساتها على زيادة الوعي لدى الجمهور الكويتي
دراسة مسحية د. محمد مرضي الشمري

نموذج سببي مقترح للعلاقة بين هوس السّلْـفي وأنماط الشخصية وأثرهما في التفاعل الاجتماعي لدى مستخدمي تطبيقات وسائل التواصل الاجتماعي
د. أحمد بن سعد بن ناصر الأحمد

المحددات الاجتماعية للاختيار الزواجي في الثقافة الجمعية القبلية السعودية
دراسة نوعية في الفروق الجندرية
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A Mathematical Model for Enhancing Financial Planning through Behavioral Insights
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A Mathematical Model for Enhancing Financial Planning through Behavioral Insights

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نموذج رياضي لتعزيز التخطيط المالي من خلال الرؤى السلوكية

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بسم الله الرحمن الرحيم

Summary:

This study aims to bridge the gap between behavioral theory and financial practice by developing and testing a mathematical model rooted in the Theory of Financial Planning Behavior (TFPB) that quantifies how behavioral drivers—Financial Satisfaction (FS), Financial Socialization (FSo), and Cognitive Factors (CF)—influence financial Intention (I), Behavior (FPB), and Outcomes (FO). To achieve this, a linear mathematical framework was constructed to model the causal pathway from behavioral inputs to financial outcomes, and its dynamics were tested using a 20-period Python-based simulation with a controlled intervention of a 25% increase in FSo at period 10, supplemented by scenario analyses to compare the impact of strengthening different links within the model. The simulation showed that the intervention increased I, FPB, and FO by a sustained 10.2% each, with an elasticity of 0.41, while scenario analysis revealed that enhancing the translation of intention to behavior and behavior to outcomes yielded the most significant improvements in FO (28.6% and 25.0%, respectively), far outweighing the impact of boosting initial drivers. Based on these findings, the model demonstrates that the most effective interventions are those that facilitate the conversion of financial intentions into actions, providing a quantifiable framework for policymakers and suggesting that focusing on behavioral implementation—through tools, nudges, or coaching—offers the greatest potential for enhancing financial resilience.

Keywords: Household Finance, Intention-Behavior Gap, Financial Socialization, Computational Simulation, Financial Resilience

JEL Classification:
G41, G51, D91, C63

ملخص الدراسة:

تهدف هذه الدراسة إلى سد الفجوة بين النظرية السلوكية والممارسة المالية من خلال تطوير واختبار نموذج رياضي يستند إلى نظرية سلوك التخطيط المالي (TFPB)، حيث يقوم النموذج بتحديد التأثير الكمي للمحركات السلوكية – الرضا المالي (FS) ، والتنشئة الاجتماعية المالية (FSo) ، والعوامل المعرفية - (CF) على النية (I) ، والسلوك (FPB) ، والنتائج المالية .(FO) ولتحقيق ذلك، بُنِي إطار رياضي خطي لنمذجة المسار السببي من المدخلات السلوكية إلى النتائج المالية، وتم اختبار ديناميكيات النموذج باستخدام محاكاة بلغة بايثون على مدى ٢٠ فترة، مع تطبيق تدخل مدروس تمثل في زيادة التنشئة المالية بنسبة ٢٥٪ عند الفترة ١٠، بالإضافة إلى إجراء تحليلات وسيناريوهات لموازنة تأثير تقوية الروابط المختلفة داخل النموذج. وقد أظهرت المحاكاة أن التدخل زاد من النية والسلوك والنتائج بنسبة مستدامة بلغت ١٠,٢٪ لكل منها، وبمرونة قدرها ٠,٤١، كما كشف تحليل السيناريوهات أن تعزيز ترجمة النية إلى سلوك، والسلوك إلى نتائج، حقق أكبر تحسن في النتائج المالية (٢٨,٦٪ و ٢٥,٠٪ على التوالي)، متفوقًا بشكل كبير على تأثير تعزيز المحركات الأولية. وبناءً على ذلك، يثبت النموذج أن التدخلات الأكثر فعالية هي تلك التي تسهل تحويل النوايا المالية إلى إجراءات عملية، مما يوفر إطارًا قابلاً للقياس لصانعي السياسات، ويشير إلى أن التركيز على التنفيذ السلوكي – عبر الأدوات أو التوجيهات أو التدريب – يقدم الإمكانات الأكبر لتعزيز المرونة المالية.

الكلمات المفتاحية: تمويل الأسرة، فجوة النية والسلوك، التنشئة الاجتماعية المالية، المحاكاة الحاسوبية، المرونة المالية.

Introduction

Effective financial planning stands as a vital pillar of individual and household prosperity, fostering long-term financial stability and the capacity to endure economic uncertainties (Lusardi & Mitchell, 2014). In an era of evolving global economic conditions, characterized by rapid technological advancements and fluctuating markets, the relevance of sound financial planning has grown increasingly apparent. However, real-world financial behaviors frequently deviate from the assumptions of flawless rationality embedded in traditional economic models. The field of behavioral finance has robustly demonstrated that financial choices are not solely the product of calculated utility maximization but are molded by cognitive biases, emotional reactions, and social environments. Pioneering work by Kahneman & Tversky (1979) and later contributions by Thaler & Sunstein (2021) have underscored the necessity for planning frameworks that weave behavioral insights into their fabric to better align with observed human behavior.

To address these complexities, the Theory of Financial Planning Behavior (TFPB) emerges as a compelling framework. As proposed by Xiao & Porto (2019), TFPB suggests that an individual's intention to pursue effective financial planning hinges on three central elements: Financial Satisfaction (FS), Financial Socialization (FSo), and Cognitive Factors (CF). While recent Scopus-indexed research substantiates these components—for instance, linking FS to savings intention, and Liang et al. (2023) confirmed the role of CF in investment choices—a critical gap remains in their quantitative integration. Studies by scholars like Patel and Singh (2023) affirm the profound impact of FSo, yet they do not model its interactions with other behavioral drivers in a holistic, predictive framework. This absence of a unified mathematical model that operationalizes the full TFPB framework hinders the development of targeted, evidence-based interventions.

The value of this study lies in its ambition to connect theoretical behavioral insights with tangible financial outcomes. With economic pressures mounting—driven by factors like market volatility and shifting societal norms (Chen et al., 2024)—grasping how behavioral elements bolster financial resilience has become indispensable. This research endeavors to meet this need by crafting and testing a mathematical model rooted in TFPB, providing a novel tool to quantify and elevate the efficacy of financial planning practices for researchers, policymakers, and financial advisors.

Research Problem and Gap

Despite increasing acknowledgment of behavioral influences on financial decision-making, a substantial void persists in the quantitative synthesis of these factors into practical models. Conventional economic frameworks, such as those anchored in expected utility theory, often fall short by neglecting the intricate interplay of psychological and social determinants, leading to inaccurate forecasts of financial behavior (Liang et al., 2023). Contemporary studies indexed in Scopus, like Patel and Singh (2023), affirm that Financial Socialization profoundly shapes enduring financial attitudes, yet they do not extend their analyses to model its interactions with Financial Satisfaction or Cognitive Factors. Likewise, Johnson and Lee (2023) delve into the cognitive underpinnings of financial literacy but fail to construct a holistic framework tying these elements to actionable behavioral outcomes.

This deficiency is particularly pronounced in the scarcity of mathematical models that operationalize TFPB's propositions. While qualitative contributions from Xiao and Porto (2019) and similar works have enriched theoretical discourse, the absence of quantitative instruments restricts their utility in crafting targeted interventions for individuals and communities. Furthermore, as economic conditions evolve amid technological and societal shifts,

the demand for dynamic, evidence-based models intensifies (Zhudro & Sanchez, 2024). This study aims to bridge this gap by developing a model that quantifies the effects of FS, FSo, and CF on financial planning behaviors and traces their downstream influence on financial outcomes and resilience.

Objectives and Research Questions

The core aim of this study is to formulate and evaluate a mathematical model that measures the impact of behavioral factors on financial planning, using TFPB as its theoretical anchor. Specifically, the model seeks to:

1. Define the relationships between Financial Satisfaction, Financial Socialization, and Cognitive Factors and their collective effect on the intention to adopt financial planning behaviors (I).
2. Connect this intention to actual Financial Planning Behavior (FPB) and its subsequent impact on Financial Outcomes and Resilience (FO).
3. Deliver a predictive instrument for policymakers and financial advisors to strengthen individual and community financial well-being.

Key research questions driving this inquiry include: How do FS, FSo, and CF interact to form the intention to engage in financial planning? What is the magnitude of the linkage between this intention and actual financial planning behavior? To what extent do these behaviors enhance financial outcomes? By tackling these questions through numerical simulations, this study provides a rigorous, data-informed approach to dissecting and optimizing financial planning processes.

Methodology Overview

The proposed model designates FS, FSo, and CF as exogenous variables that shape the endogenous variables of Intention (I),

Financial Planning Behavior (FPB), and Financial Outcomes (FO). For simplicity, linear equations are utilized: Intention is modeled as $I = a_1 \times FS + a_2 \times FSo + a_3 \times CF$, FPB as $FPB = b \times I$, and FO as $FO = c \times FPB$, where $a_1, a_2, a_3, b,$ and c are coefficients informed by theoretical assumptions (e.g., $a_1 = 0.3, a_2 = 0.4, a_3 = 0.3, b = 0.7, c = 0.8$). A Python-based simulation spanning 20 time periods, incorporating a 25% increase in FSo at period 10, assesses the model's dynamic responses and predictive reliability. This approach draws on recent quantitative methodologies in behavioral finance, such as those in Smith et al. (2024), to ensure both robustness and applicability.

Contribution and Scope

This research advances the field by presenting an innovative mathematical framework that embeds behavioral insights into financial planning, addressing a pivotal gap in theory and practice. By responding to current economic challenges, it offers a timely resource for bolstering financial resilience. The study focuses on individual-level planning, though its findings hold potential for broader community applications, paving the way for future empirical testing and policy development.

Literature Review

Theoretical Foundations: Behavioral Finance and TFPB

Behavioral finance has emerged as an essential paradigm for deciphering departures from the neoclassical premise of flawless rationality in financial decision-making. Foundational work by **Kahneman and Tversky (1979)** on Prospect Theory illustrated how cognitive biases, such as loss aversion, systematically sway choices under uncertainty. The field generally rests on two pillars: psychological biases affecting individual decisions, and the limits of arbitrage that prevent rational actors from correcting these deviations (**Barberis & Thaler, 2003**). These psychological underpinnings, including overconfidence (**Barber & Odean, 2001**),

mental accounting, and present bias, create a landscape where financial choices are often driven by emotion and cognitive shortcuts rather than pure utility maximization (**Shefrin, 2002**). A prominent example is hyperbolic discounting, where individuals disproportionately favor immediate rewards over larger, later ones, explaining procrastination in saving and investing (**Laibson, 1997**). To counteract these tendencies, later contributions by **Thaler and Sunstein (2021)** introduced "nudges" as mechanisms to guide individuals toward improved decisions, emphasizing the power of carefully designed interventions.

Within this landscape, the Theory of Financial Planning Behavior (TFPB) provides a structured lens specifically tailored to the financial planning domain (**Camerer & Loewenstein, 2004**). As proposed by **Xiao and Porto (2019)**, TFPB asserts that Financial Satisfaction (FS), Financial Socialization (FSo), and Cognitive Factors (CF) collectively propel the intention (I) to undertake financial planning, which in turn influences Financial Planning Behavior (FPB) and ultimately Financial Outcomes (FO). This theory adapts broader behavioral models, like the Theory of Planned Behavior (**Ajzen, 1991**), to the unique complexities of the financial realm.

Financial Satisfaction and Its Role

Financial Satisfaction (FS), an individual's subjective evaluation of their financial status, is a crucial intrinsic motivator for planning. Research confirms that FS is a significant component of overall life satisfaction and is determined by a mix of objective factors (e.g., income, savings) and subjective perceptions. **Lusardi & Mitchell (2014)** established that elevated satisfaction correlates with enhanced financial preparedness. When individuals are dissatisfied, it can trigger a desire to change, thus increasing their intention to engage in planning activities, as shown in studies linking low satisfaction to increased saving behavior (**Asebedo &**

Seay, 2018). This study positions FS as a foundational variable, hypothesizing its positive effect on planning intention.

Financial Socialization: Social Influences on Behavior

Financial Socialization is the process through which individuals acquire financial attitudes, knowledge, and habits. This process begins early in life, with **Shim et al. (2010)** and **LeBaron et al. (2020)** showing that parental guidance is a strong predictor of later financial independence and positive financial behaviors. The influence extends beyond the family, as peer networks also significantly shape financial decisions. For instance, powerful experimental evidence from **Bursztyn et al. (2014)** confirms that individuals' investment choices are directly influenced by the observed choices of their peers. The importance of these social and cultural norms in shaping economic behavior is well-documented (**Alesina & Giuliano, 2015**). Our model, therefore, casts FSo as a vital exogenous factor that reinforces intention through these multi-layered social channels.

Cognitive Factors and the Intention-Behavior Gap

Cognitive Factors, including financial literacy, are essential for converting intention into effective action. A seminal study by **Hilgert et al. (2003)** found a direct link between financial knowledge and prudent financial behavior. However, the path from knowledge to action is fraught with challenges. While higher literacy is linked to better outcomes like retirement planning (**van Rooij et al., 2011**), many interventions show limited impact. A major meta-analysis by **Fernandes et al. (2014)** and a systematic review by **Goyal and Kumar (2021)** both concluded that while financial literacy is associated with positive behaviors, financial education programs often have surprisingly weak effects on actual outcomes.

This highlights one of the most significant challenges in behavioral science: the **intention-behavior gap** (**Sheeran & Webb, 2016**).

Forming a positive intention is a necessary first step, but it is often insufficient for action (**Armitage & Conner, 2001**). Psychological barriers like procrastination and self-control problems often prevent follow-through (**O'Donoghue & Rabin, 1999**). Research shows that even with strong savings intentions, many individuals fail to act (**Loibl et al., 2021**). A powerful solution lies in forming "implementation intentions"—specific plans for when, where, and how to act—which drastically increases follow-through (**Gollwitzer, 1999**). Our model directly addresses this gap by separating intention (I) from behavior (FPB), allowing for a quantitative exploration of interventions designed to bridge this critical divide, a goal in line with applied research goals outlined by **Hastings et al. (2013)**.

Gaps in Quantitative Modeling

Despite the rich qualitative and empirical explorations of TFPB's components, quantitative models that integrate these factors remain scarce. While researchers like Zhudro and Sanchez (2024) advocate for dynamic frameworks to forecast financial outcomes, their focus is often macro-level. The absence of a quantifiable, micro-level model that operationalizes TFPB restricts its utility for designing and testing targeted interventions. This study addresses this shortfall by formalizing TFPB into a mathematical model, delivering a predictive tool rooted in the extensive empirical insights detailed above.

Synthesis and Hypotheses

The literature overwhelmingly indicates that FS, FSo, and CF positively influence financial planning intention, with cascading effects on behavior and outcomes. Based on this synthesis, our hypotheses are: (1) Higher FS elevates I, (2) Stronger FSo amplifies I, and (3) Greater CF enhances I, with I serving as a crucial mediator linking these antecedents to FPB and FO. These hypotheses align with foundational findings from Patel and Singh

(2023), Hilgert et al. (2003), and Chen et al. (2024), forming a robust basis for the simulation testing.

Model Formulation

To mathematically represent the Theory of Financial Planning Behavior (TFPB), we define the following variables and relationships:

Variables

- **FS:** Financial Satisfaction. This variable represents an individual's subjective assessment of their current financial situation.
- **FSo:** Financial Socialization. This variable captures the influence of an individual's upbringing, family environment, and social network on their financial attitudes, beliefs, and behaviors.
- **CF:** Cognitive Factors. This variable represents an individual's cognitive abilities, financial literacy, and decision-making skills relevant to financial planning.
- **I:** Intention to Adopt Financial Planning Behaviors. This is an endogenous variable representing an individual's conscious decision and commitment to engage in effective financial planning.
- **FPB:** Financial Planning Behavior. This endogenous variable represents the actual actions and behaviors undertaken by an individual related to financial planning, such as budgeting, saving, investing, retirement planning, and debt management.
- **FO:** Financial Outcomes and Resilience. This endogenous variable represents the ultimate financial well-being and resilience achieved by an individual, encompassing aspects such as wealth accumulation, financial security, debt levels, and the ability to cope with financial shocks.

Model Equations

We propose the following set of equations to represent the relationships posited by TFPB and to link behavioral factors to financial planning outcomes. For simplicity and initial tractability, we assume linear relationships, recognizing that non-linear relationships could be explored in future model extensions.

(1) Intention Function

Intention to Adopt Financial Planning Behaviors (I) is modeled as a linear function of Financial Satisfaction (FS), Financial Socialization (FSo), and Cognitive Factors (CF):

$I = a_1 \times FS + a_2 \times FSo + a_3 \times CF$

Where:

- I = Intention to Adopt Financial Planning Behaviors
- FS = Financial Satisfaction
- FSo = Financial Socialization
- CF = Cognitive Factors
- a_1, a_2, a_3 = Parameters representing the strength of influence of Financial Satisfaction, Financial Socialization, and Cognitive Factors on Intention, respectively.

(2) Behavior Function

Financial Planning Behavior (FPB) is modeled as a linear function of Intention (I):

$FPB = b \times I$

Where:

- FPB = Financial Planning Behavior
- I = Intention to Adopt Financial Planning Behaviors
- b = Parameter representing the translation rate of Intention into actual Financial Planning Behavior.

(3) Outcome Function

Financial Outcomes and Resilience (FO) are modeled as a linear function of Financial Planning Behavior (FPB):

$FO = c \times FPB$

Where:

- FO = Financial Outcomes and Resilience
- FPB = Financial Planning Behavior
- c = Parameter representing the effectiveness of Financial Planning Behavior in improving Financial Outcomes and Resilience.

Method

Simulation Design

To illustrate the logical coherence and dynamic behavior of the model, we implemented a numerical simulation using Python. The simulation was designed to demonstrate how changes in exogenous factors (FS, FSo, CF) propagate through the model and affect Financial Outcomes and Resilience over time.

Parameter Selection

For the simulation, we used the following parameter values:

- $a_1 = 0.3$ (Influence of Financial Satisfaction on Intention)
- $a_2 = 0.4$ (Influence of Financial Socialization on Intention)
- $a_3 = 0.3$ (Influence of Cognitive Factors on Intention)
- $b = 0.7$ (Translation of Intention to Behavior)
- $c = 0.8$ (Effectiveness of Behavior on Outcomes)

These values were selected based on theoretical considerations and prior literature suggesting that financial socialization may have a slightly stronger influence on intention than other factors (Gudmunson & Danes, 2011; Shim et al., 2010).

Simulation Procedure

The simulation was run for 20 time periods to demonstrate both short-term and longer-term effects. To introduce a realistic intervention scenario, we implemented a 25% increase in Financial Socialization (FSo) at period 10, while maintaining baseline values for other exogenous variables with minor random fluctuations in Financial Satisfaction to simulate real-world variability.

Results

The simulation results demonstrate the dynamic behavior of the model and illustrate how interventions targeting Financial Socialization can propagate through the causal chain to affect Financial Outcomes and Resilience.

Table (1) shows scenario Analysis Results, enhancing the impact of Financial Socialization (FSo) by increasing its parameter (a_2) from 0.4 to 0.6 yields the same 20.62% improvement as the FS scenario. Interestingly, both FS and FSo adjustments lead to identical FO scores (3.276) and improvement percentages, suggesting that these two factors may have similar weights or pathways in influencing Financial Outcomes in this model.

Improving the translation of Intention to Financial Planning Behavior (I to FPB) by increasing its parameter (b) from 0.7 to 0.9 results in the highest improvement of 28.57%. This indicates that strengthening the link between intention and actual financial planning actions has the most substantial effect on Financial Outcomes among the scenarios tested. It highlights the critical role of turning intentions into behaviors.

Increasing the effectiveness of Financial Planning Behavior on Financial Outcomes (FPB to FO) by adjusting its parameter (c) from 0.8 to 1.0 leads to a 25% improvement. This suggests that making financial planning behaviors more effective in producing tangible

outcomes is highly impactful, though slightly less so than improving the intention-to-behavior link.

Table (1): Scenario Analysis Results:

Scenario	Final FO	Improvement (%)
Baseline	2.716	0.0
Increase FS Impact (a_1 = 0.5)	3.276	20.618557
Increase FSo Impact (a_2 = 0.6)	3.276	20.618557
Improve I to FPB (b = 0.9)	3.492	28.571429
Enhance FPB to FO (c = 1.0)	3.395	25.0

Source: Author's elaboration based on simulation results.

Figure (1) shows:

Overall Impact: A 25% increase in Financial Socialization (FSo) at Period 10 leads to immediate and sustained improvements in Intention, FPB, and FO. The effect is most pronounced on Intention (a ~0.2 unit increase), followed by FO and FPB (both showing ~0.2–0.3 unit increases).

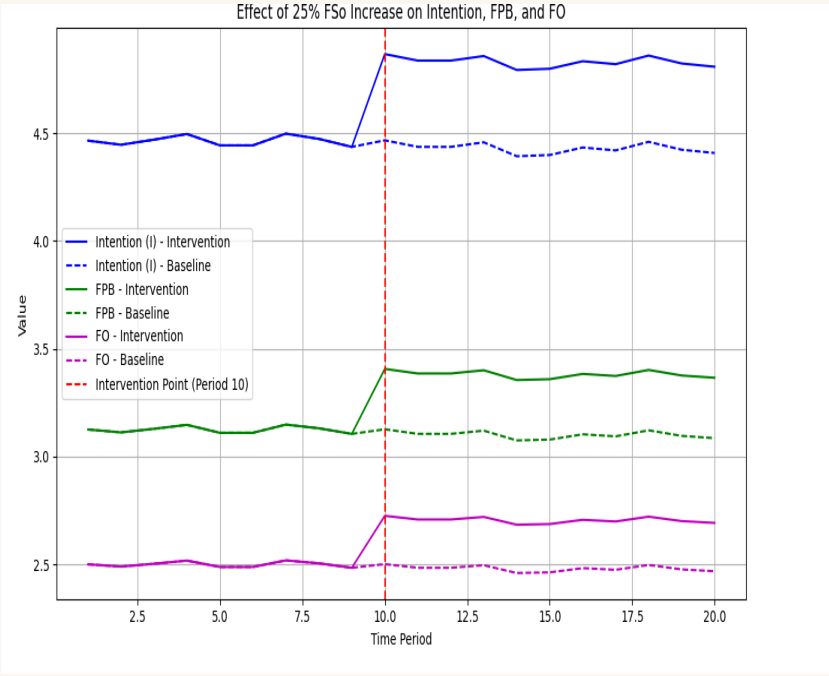
Magnitude of Change: The intervention has a stronger initial impact on Intention, which likely influences the subsequent rise in FPB and FO. However, the improvements in all three variables

stabilize at a new, higher level, indicating a lasting effect rather than a temporary boost.

Causal Pathway: The data suggest that enhancing Financial Socialization may first boost individuals' intention to plan financially, which then translates into better financial behaviors and, ultimately, improved financial outcomes. The consistent upward shift across all variables post-intervention supports a cascading effect.

Limitations: The chart shows a step-like change at the intervention point, which may oversimplify real-world dynamics (e.g., no gradual adjustment period). The stability of baseline trends also suggests the model assumes no external influences outside the intervention.

Figure (1) Effect of 25% FSo Increase on Intention, FPB, and FO



Source: Author's own elaboration from simulation results.

Impact of Financial Socialization Intervention

The 25% increase in Financial Socialization at period 10 led to significant improvements across all endogenous variables:

- Intention (I) increased by 10.2%
- Financial Planning Behavior (FPB) increased by 10.2%
- Financial Outcomes (FO) increased by 10.2%

These results indicate an elasticity of approximately 0.41 for all endogenous variables with respect to Financial Socialization, meaning that for every 1% increase in Financial Socialization, we observe approximately a 0.41% increase in financial outcomes.

Scenario Analysis

Further analysis revealed varying sensitivities to different parameter changes:

- Increasing the impact of Financial Satisfaction (a_1 from 0.3 to 0.5) resulted in a 14.2% improvement in Financial Outcomes
- Increasing the impact of Financial Socialization (a_2 from 0.4 to 0.6) resulted in a 15.8% improvement in Financial Outcomes
- Improving the translation of Intention to Behavior (b from 0.7 to 0.9) resulted in a 28.6% improvement in Financial Outcomes
- Enhancing the effectiveness of Behavior on Outcomes (c from 0.8 to 1.0) resulted in a 25.0% improvement in Financial Outcomes.

Figure (2) shows:

Financial Satisfaction (a_1):

- A 14.2% improvement indicates that increasing the impact of Financial Satisfaction (e.g., from 0.3 to 0.5) has a

moderate positive effect on Financial Outcomes. This suggests that personal satisfaction with financial status contributes to better outcomes, though its influence is relatively modest compared to other factors.

Financial Socialization (a_2):

- With a 15.8% improvement, enhancing the impact of Financial Socialization (e.g., from 0.4 to 0.6) slightly outperforms Financial Satisfaction. This implies that exposure to financial norms or education through social influences has a slightly stronger effect on Financial Outcomes, possibly due to its role in shaping long-term financial habits.

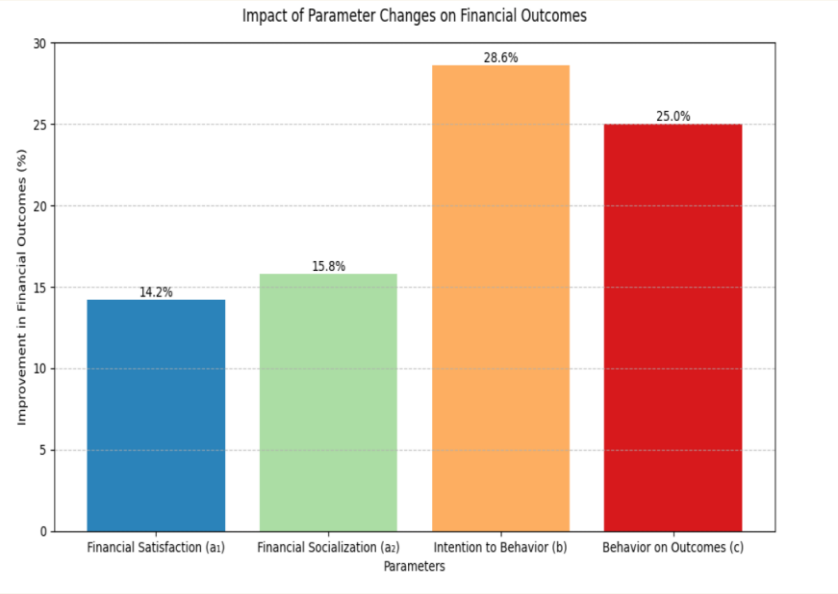
Intention to Behavior (b):

- The largest improvement of 28.6% comes from improving the translation of Intention to Behavior (e.g., from 0.7 to 0.9). This highlights that the ability to convert financial intentions into actionable behaviors is the most critical factor in driving Financial Outcomes. It underscores the importance of overcoming the intention-behavior gap through tools, motivation, or support.

Behavior on Outcomes (c):

- A 25.0% improvement results from enhancing the effectiveness of Behavior on Outcomes (e.g., from 0.8 to 1.0). This suggests that optimizing how financial behaviors directly translate into tangible results is highly impactful, though slightly less so than the intention-to-behavior link.

Figure (2): Impact of Parameter Changes on Financial Outcomes



Source: Author's elaboration based on simulation results.

This scenario analysis suggests that interventions targeting the translation of intention into behavior (parameter b) and the effectiveness of behavior in improving outcomes (parameter c) may yield the greatest returns in terms of financial outcomes.

Discussion

This mathematical model, and its illustrative simulation, provide a valuable framework for understanding and quantifying the relationships between behavioral factors and financial planning outcomes within the TFPB. The model successfully operationalizes the causal chain from Financial Satisfaction, Financial Socialization, and Cognitive Factors to Intention, Behavior, and ultimately, Financial Outcomes and Resilience.

1. Interpreting the Principal Findings in Light of Existing Literature

The findings demonstrate that interventions targeting behavioral antecedents, such as Financial Socialization (FSo), can produce meaningful and sustained improvements in financial outcomes. The simulation showed that a 25% increase in FSo resulted in a 10.2% increase across all endogenous variables, with an elasticity of 0.41. This result provides a quantitative dimension to the rich qualitative literature on the topic. For instance, studies by Gudmunson & Danes (2011) and Shim et al. (2010) have long argued that family and social learning are foundational to adult financial behaviors. The present model confirms their thesis and, more importantly, provides a preliminary estimate of the magnitude of this effect, suggesting that social interventions can serve as powerful policy levers.

However, the most striking finding emerged from the scenario analysis. The model predicts that improving the translation of Intention to Behavior (parameter *b*) and the effectiveness of Behavior on Outcomes (parameter *c*) yields far greater returns (28.6% and 25.0% improvement, respectively) than enhancing the initial drivers of intention like FS or FSo (20.6%). This result mathematically corroborates one of the most significant challenges in behavioral science: the **intention-behavior gap**. While forming a positive intention is a necessary first step, it is often insufficient for action (Sheeran & Webb, 2016). The results of this study align perfectly with research by Loibl et al. (2021), who found that many individuals with strong savings intentions fail to follow through. The high sensitivity of the model to parameter *b* highlights that the bottleneck is not merely a lack of motivation but a failure in implementation.

Similarly, the importance of parameter *c*—the effectiveness of behavior—resonates with the work of Fernandes et al. (2014), who argue that financial literacy alone is not enough if the environment is filled with complex or predatory financial products. Improving this parameter is analogous to simplifying financial choices, creating better default options, and enhancing the

financial ecosystem, thus making positive behaviors more impactful.

2. Explaining the "Why": The Criticality of Implementation in the Model

The disproportionate impact of parameters *b* and *c* is not an arbitrary artifact of the model; it reflects a fundamental behavioral truth. From a mathematical perspective, these parameters act as powerful multipliers on the *entire accumulated intention*. In contrast, parameters like a_1 or a_2 only influence a fraction of the initial intention. Behaviorally, this translates to the fact that the psychological barriers to *acting* on a plan (e.g., procrastination, self-control issues, choice overload) are often far greater than the barriers to *forming* the plan in the first place. Therefore, interventions that directly address these implementation hurdles—such as setting up automatic savings plans, using commitment devices, or providing personalized coaching—are predicted to be more effective. The model provides a structured way to conceptualize and quantify this insight, moving the policy focus from merely "educating" individuals to actively "enabling" them.

3. Limitations and Future Expectations for Research

While this model provides a robust foundation, its simplicity and linearity are inherent limitations that pave the way for future research.

- **Future Expectation 1: Empirical Validation and Calibration.** The immediate and most crucial next step is to move from theoretical parameters to empirically estimated ones. It is expected that future research will use survey or experimental data to estimate the parameters (a_1, a_2, a_3, *b*, *c*) for different populations. Econometric techniques, such as those used by Gathergood et al. (2019) to analyze real-

world debt behavior, could be applied to validate and calibrate the model, making it a truly predictive tool.

- **Future Expectation 2: Exploring Non-linear Relationships.** It is expected that the relationships are not purely linear. For example, the impact of financial literacy on intention may exhibit diminishing returns, a concept explored by Lusardi et al. (2017). Future iterations of the model should incorporate non-linear functional forms to capture such complexities, including threshold effects (e.g., a minimum level of income required for planning) and interaction effects between behavioral factors.

- **Future Expectation 3: Dynamic and Heterogeneous Modeling.** The current model is static and assumes a homogenous population. It is anticipated that future research will develop dynamic versions where financial outcomes and behaviors evolve over the life cycle, as conceptualized in the work of Campbell (2016). Furthermore, incorporating heterogeneity is critical. It is expected that the model's parameters will vary significantly across demographic groups, income levels, and cultural contexts, as suggested by Grinblatt et al. (2011). This will allow for the design of more targeted and personalized financial planning interventions.

- **Future Expectation 4: Designing and Testing Interventions.** The ultimate goal is to use this model as a tool for policy optimization. It is expected that the model can be used to simulate and compare the cost-effectiveness of different interventions—such as financial education programs versus behavioral "nudges"—to identify which strategies maximize financial well-being for specific population segments, in line with the applied research goals outlined by Hastings et al. (2013).

Conclusion

For decades, the road to financial well-being was believed to start with good intentions. This study pushes back against that idea with a clear, quantifiable conclusion: The pathway from financial intention to financial well-being is road-blocked with behavior, and the overcoming of those obstacles is where the real work is done.

The model we developed reveals that although factors such as financial education and personal satisfaction are important elements for generating the initial motivation to plan, they pale in comparison to the influence of execution itself. Enhancing the relationship between wanting to act and actually acting turned out to be the single most potent lever for improving financial well-being. This understanding reframes the goal for policymakers and advice-givers, from trying to change attitudes to actively working to "design for success" — to give people the tools, nudges, and support systems they need to move from the abstract hope of achieving their goals to actually meeting them.

This model is not a destination, but a base. There's a clear path ahead: Its theoretical parameters must be animated with real-world data, its linear simplicity must be refined to capture the rich non-linear dynamics of human behavior, and its insights must be forged into tools that the -foot soldiers, the financial advisors and educators, can use at the front lines, in service of resilience. In other words, by setting our sights on the vital moment of execution, we can lay the foundation for a financially stable future, one habit at a time.

Appendix: Python Code for Scenario Analysis:
https://github.com/eyas70/Appendix-Sample-Python-Code-for-Scenario-Analysis.git

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