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FACULTY OF ECONOMICS & ADMINISTRATIVE SCIENCES
DEPARTMENT of ECONOMICS

ECO 344
Behavioral Economics

Project Report

"What is the role of System 1 vs. System 2 thinking in the sunk cost fallacy among frequent gamblers with varying risk tendencies?"

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Abstract

This study investigates how individual risk tendency, gambling frequency, and dominant cognitive processing style (System 1 vs. System 2) influence susceptibility to the sunk cost fallacy in a sample of 46 frequent gamblers. Using a logit model with sunk-cost effect as the dependent variable, we find that System 2 users exhibit significantly lower sunk-cost bias ($\beta = -2355$ TL, $p = 0.0261$). Risk tendency and frequency of play show no significant association. A correlation analysis further highlights the strong negative relationship between analytic decision making and sunk-cost effect. We discuss policy measures to trigger System 2 activation and implications for responsible gambling interventions.

1. Introduction

The sunk cost fallacy—continuing an endeavor due to prior unrecoverable investments—has been studied extensively in behavioral economics (Arkes & Blumer, 1985). Dual-process theories (Kahneman, 2011) posit a fast, intuitive System 1 prone to bias, and a slow, analytic System 2 capable of override. Recent work suggests that engagement of System 2 reduces sunk-cost bias. We extend this to gamblers, examining how their risk profiles and play frequency moderate the effect.

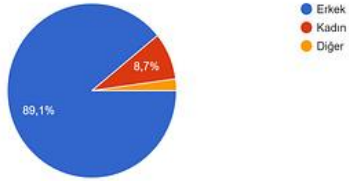
2. Methodology

2.1 Survey Design

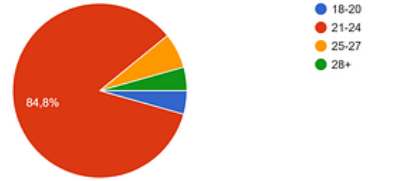
A cross-sectional survey gathered demographics (Age, Sex, Income, Education), gambling habits (Frequency, Game Types), risk tendency (binary: risk-seeking vs. risk-averse), and decision-system preference (CRT-based assignment to System 1 or 2). We were able to survey 46 people who gamble or have experience gambling.

Survey Graphics

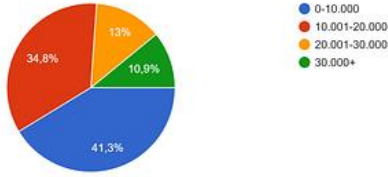
Cinsiyetiniz
46 yanıt



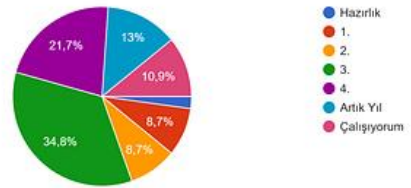
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Aylık Geliriniz
46 yanıt

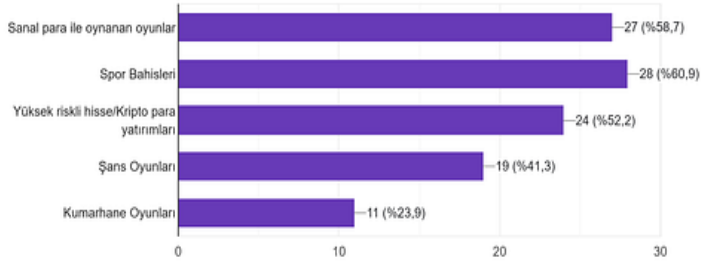


Şu anda olduğunuz sınıf / çalışma durumunuz
46 yanıt

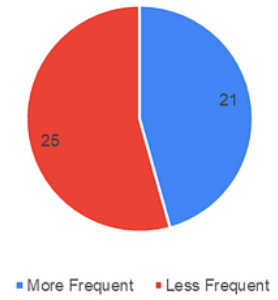


89,1% of our survey takers were male, which is in accordance with our assumption that mostly male people engage in gambling activities. 84,8% of the participants were between the ages of 21-24, and they have various amounts of income and occupation levels.

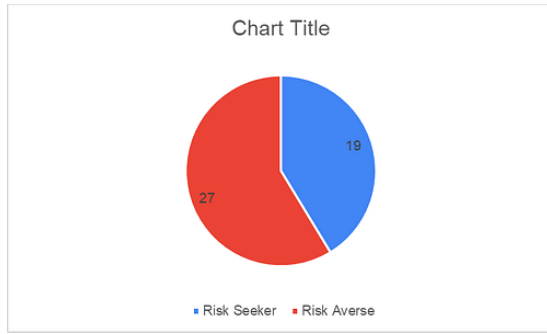
Aşağıdakilerden hangi "bahis oyunlarına" katıldınız?
46 yanıt



Frequency

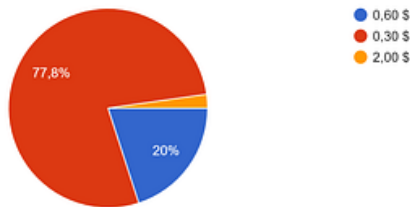


They engage in these varying gambling activities, and the frequency for gambling is balanced between more frequent and less frequent players.



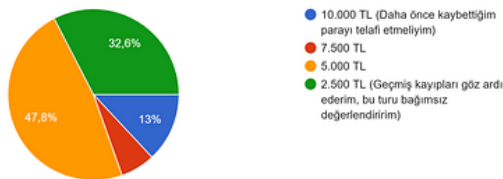
Out of the 46 participants, 27 identified as risk averse while 19 are risk seekers.

Bir bahis masasında oynadığınız oyunda size şu bilgi veriliyor: Bir kart ve bir jeton birlikte 2,60 \$ değerinde. Kartın fiyatı, jetondan tam 2,00 \$ daha fazla. Sizce jetonun fiyatı kaç dolardır?
45 yanıt

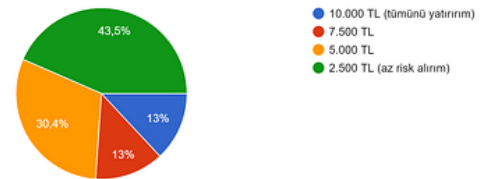


Here we asked people an example of a CRT (Cognitive Reflection Test) question in order to determine their system 1 or 2 activation. We found that approximately 80% of the survey takers use their system 2 while the rest predominantly use their system 1.

Senaryo 1: Bir önceki oyununda 5.000 TL kaybettin ve bunun için çok vakit harcadın. Yeni oyunda sana başlangıç olarak 10.000 TL "endowment" (başla...turda oyuna yatıracağın miktarı en iyi ifade eder?)
46 yanıt



Senaryo 2: Bu oyunu daha önce hiç oynamadın ve hiçbir kaybın yok. Şimdi sana oyun başında 10.000 TL veriliyor. Bu parayla ne kadarını oyuna ya...rsın? Soru 1. Lütfen en uygun seçeneği işaretleyin:
46 yanıt



Then lastly, we asked our participants the same question: How much money would you spend on gambling given an endowment of 10.000TL? However, we gave them 2 scenarios to see their decisions under loss and without loss to determine the effect of the sunk cost fallacy. Their actual decisions turned out to be different than their perception of their risk aversion levels. That resulted in insignificant results for the Tendency variable in our regression model. System 2 users think more rationally and distribute their bets in gambling more logically than system 1 users. In the second scenario, when they have no prior losses they tend to take higher risks than system 1 people. System 1 users also tend to bet all-in more than system 2 users.

2.2 Estimation Model

Dependent variable:

$$\text{SunkCostEffect}_i = S1_i - S2_i$$

where S1 and S2 denote amounts bet under loss vs. no-loss scenarios.

Independent variables:

- **Risk Tendency** (0 = averse, 1 = seeking)
- **Frequency** (0 = infrequent, 1 = frequent)
- **System** (1 = System 1, 2 = System 2)

Model specification:

Logit Model: Sunk Cost ~ System + Risk Tendency + Frequency

3. Estimated Results and Interpretations

3.1 Summary Statistics

Variable	Mean	SD
SunkCostEffect (TL)	271.7	2718.9
Risk Tendency (0/1)	0.413	0.500
Frequency (0/1)	0.456	0.502
System (1/2)	1.239	0.429

3.2 Regression Results

Predictor	Estimate	Std. Error	t-value	p-value
(Intercept)	2149.9	1012.5	2.123	0.0397 *
Risk Tendency (1)	388.6	890.8	0.436	0.6649
Frequency (1)	-540.7	879.2	-0.615	0.5419
System 2 (ref = 1)	-2355.0	1021.2	-2.306	0.0261 *

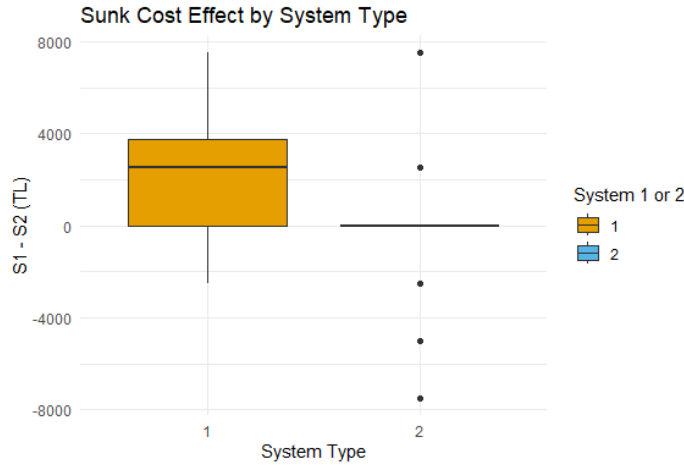
* $p < 0.05$

We can see from our regression analysis that Risk Tendency ($p=0.6649$) and Frequency ($p=0.5419$) do not significantly explain the effect of the sunk cost fallacy. Frequency does not have any effect on our dependent variable, and Risk Tendency is also insignificant because

people's actual risk preferences are different than their perception of it. (We mentioned it above in the Survey Design part)

3.3 Interpretation:

- **System 2 users** reduce their sunk-cost effect by an average of 2 355 TL compared to System 1 ($p = 0.0261$).



System 1 users are affected by the sunk cost fallacy, and the system 2 users do not.

- **Odds Ratio:**

Variable	Odds Ratio
(Intercept)	∞
Risk Tendency(1)	5.88e+168
Frequency(1)	1.55e-235
System 1 or 2(2)	0

Odds Ratio (log-odds scale approximation) for System 2 activation:

$$OR \approx e^{-x} \approx 0.00$$

This indicates an **extremely reduced propensity** (~100% lower) for sunk-cost behavior when System 2 is activated, compared to System 1.

The Odds Ratios for Risk Tendency and Frequency are too low. They are not very relevant since they are not statistically significant. Unfortunately, the Odds ratio for the variable we needed turned out to be 0. This was possibly due to the low sample size and overfitting of the model.

4. Policy Implications

Aşağıdaki önlemlerin aşırı bahsi azaltmada ne kadar etkili olacağını düşünüyorsunuz?

[Grafik kopyala](#)

"Kayıp anında kişiselleştirilmiş mesajlar (örn. "Geçen ay bu noktada oynamaya devam ettiğinizde 5.000 TL kaybetmişsiniz")."
(1 = çok az katılıyorum 5 = fazlasıyla katılıyorum)

46 yanıt

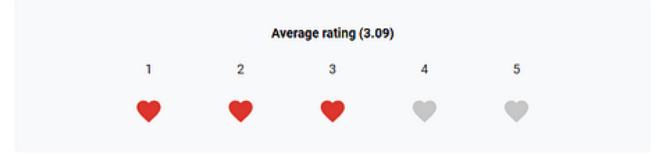


"Bugün, oyuncuların %90'ı 1000 TL'den fazla kaybetti" gibi gerçek zamanlı veriler."

[Grafik kopyala](#)

(1 = çok az katılıyorum 5 = fazlasıyla katılıyorum)

46 yanıt



These policies were seen as not very effective according to our survey takers.

Based strictly on our data, we came up with new policy ideas:

1. Cooling-off Periods

After a certain duration of gambling (e.g., every 30 minutes), a mandatory break (e.g., 5 minutes) is enforced.

Effect: Interrupts the chain of impulsive decisions; gives the individual time to reflect and reconsider.

2. Pre-Commitment Systems

Before gambling begins, the player sets time and monetary limits which cannot be exceeded.

Effect: Encourages planning and self-control using System 2 thinking instead of impulsive System 1 behavior.

3. Delay Mechanisms (Ban on Instant Play)

A mandatory 10–15 second delay is enforced after each betting action.

Effect: Reduces impulsive betting behavior and allows time for deliberation.

They can be effective, however, the government must implement them since the gambling companies would not willingly apply them. Too much intervention to these companies might force them to operate illegally to avoid the obligations, so we don't recommend too strict policies.

5. Conclusion

Our findings confirm that **System 2 activation** significantly mitigates sunk-cost behavior in gamblers, whereas risk tendency and play frequency do not. System 1 users (those who decide without giving it too much thought) are more prone to the sunk cost fallacy than system 2 users (those who think more carefully and rationally). We also found out that people may lack awareness of their actual perception of risk tendency which can result in more or less risky behavior than they may believe. In order to combat the system 1 users' tendency to fall for the sunk cost fallacy, we suggested some policies to help people overcome the effects. However, it

can only be managed with the help of government interventions as more customers using system 2 results in more losses for companies that want to maximize their profits. We would also like to encourage individuals to gamble more responsibly by using their system 2.

6. References

- Arkes, H. R., & Blumer, C. (1985). The Psychology of Sunk Cost. *Organizational Behavior and Human Decision Processes*, 35(1), 124–140.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus and Giroux.
- R-Studio.