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DO DECISION-MAKING PROFESSIONALS COMMIT THE SUNK-COST FALLACY?

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Abstract
*Decision-making professionals, such as economists, accountants and business majors, are usually taught the general economic principle that when evaluating the costs of a decision, the decision maker should consider only those costs that are actually incurred as a result of making that decision, and that sunk costs should be ignored. However, there has been considerable anecdotal evidence that many of these decision-making professionals honour sunk costs in their decisions. Some studies have provided evidence in support of the anecdotal evidence while some have refuted the evidence. In order to shed more light on this topic, this paper, therefore, examines whether these decision-making professionals too are adversely influenced by sunk costs when making their decisions. By carrying out proportion tests on 156 respond*ents *and estimating a binary logit model for two decision-making vignettes, this study found that the selected professional decision makers committed the sunk cost fallacy, and that the amount (or size) of the sunk cost was a major significant determinant of the susceptibility to sunk-cost fallacy. The study also found that the proportion of professional decision makers who committed the fallacy differed according to the nature of the decision. These findings suggest that having background knowledge about sunk cost does not preclude individuals from committing the fallacy and that susceptibility of a decision maker to sunk-cost fallacy depends on the nature of the decision being made.*
Keywords: Decision making, Prospect theory, Sunk cost, Sunk-cost effect, Sunk-cost fallacy
JEL Codes: D01, D11, D12, D91

INTRODUCTION

Professional decision makers - economists, accountants and business majors—are usually taught the general economic principle that when evaluating the costs of a decision, the decision maker should consider only those costs that are actually incurred as a result of making that decision, and that sunk costs should be ignored. Sunk costs are those past, unsalvageable costs or expenditure of money, time and effort that have already been incurred and therefore cannot be recovered or avoided. In more technical terms, sunk costs

are the costs of durable assets which cannot be used for other purposes or be easily resold. Because such assets upon which the sunk costs have been incurred have no alternative use, they have no opportunity cost and so naturally should not enter into management decision-making. These decision-making professionals are indoctrinated that such costs should not influence the current decision because such costs do not vary according to different decisions. Failure to adhere to this principle is termed the *sunk-cost fallacy*.

An illustration of the fallacy is in order. Suppose you are a business owner and you have spent ₦500,000 on the development of a new product. However, when the product was launched, no consumer displayed interest in purchasing your new product. The ₦500,000 you have spent on the development of the product is considered a sunk cost since it cannot be recovered. Hence, it should not be considered in your decisions on the fate of the product. You should make this current decision without considering the already *sunk* investment cost because it is not relevant to the decision to abandon the product or to continue investing in it.

Economists, accountants, and business majors are usually told this anecdote and many others to teach them about the sunk-cost fallacy and its negative effects on decisions. Despite being indoctrinated that sunk costs should not be considered in current decisions, there has always been considerable anecdotal evidence that many of these decision-making professionals do honour sunk costs in the decisions they make. Doody (2020) remarked that economics and business majors also commit the sunk-cost fallacy with the same gusto as others. Having knowledge about the sunk-cost fallacy appears to have little effect on the propensity to commit the fallacy (Arkes & Blumer, 1985).

However, very few studies have provided empirical evidence in support of the anecdotal evidence while few others have refuted the evidence outright. Some evidence suggests that entrepreneurs and managers are also prone to sunk-cost fallacy (Staw et al., 1997; Brody & Frank, 1999; Doody, 2020). Arkes and Blumer (1985) found evidence that having taken prior courses in economics did not attenuate the sunk-cost effect. However, Tan and Yates (1995) found contrary evidence. These inconsistent findings could be due to the fact the most of these studies were conducted with classroom experiments with students as the participants.

In order to shed more light on this topic and thereby expand on the literature, this study sought to examine whether decision-making professionals in Nigeria too are adversely influenced by sunk costs when making their decisions. To achieve this objective, the study employed survey design and logistic regression. This approach expands on the studies

mentioned above in two ways. First, using this method would increase the external validity of the current study. Second, it validates the findings of the previous studies, which were conducted mostly with students in classroom experiments (Arkes and Blume, 1985; Arkes & Ayton, 1999). To my knowledge, no research has employed survey to investigate this phenomenon.

Although the select professionals are expected to be less susceptible to the sunk-cost fallacy given their education, training and experience, we predicted that non-rational behaviour that violates rational decision making would be observed among them when making decisions involving sunk costs.

LITERATURE REVIEW

Sunk Costs

A *sunk cost* is an expenditure that has been made and cannot be recovered no matter what decision is made, and thus does not vary according to different decisions. Once a sunk cost is incurred, it cannot be recouped if you walk away from a prior decision. It is thus an expenditure on a fait accompli. Hence, the expression *sunk costs are sunk*, meaning they are gone, ignore them. Whether a cost is considered sunk or not depends on the decision being made. Any costs that would change as a result of making a decision are the nonsunk costs while those costs that do not change no matter what decision is made are the sunk costs (Besanko and Braeutigam, 2014).

A sunk cost can be pecuniary or non-pecuniary. It could take the form of money, time, physical and mental effort as well as emotional energy (Arkes & Blumer, 1985). These are all resources that might be "sunk" into an activity. Therefore, taking a holistic view, sunk costs can be unrecoverable past investment of money, time or effort. Sunk costs can also be absolute or relative (Garland, 1990; Garland and Newport, 1991). The authors pointed out that the absolute amount of a sunk cost is less important than its relative, and that higher relative sunk cost can lead to greater willingness to continue with a failed activity than absolute sunk cost. The influence of relative costs is also consistent with prospect theory, reviewed in the next section.

Because a sunk cost cannot be recovered, it should not influence the current decisions, but they can. Sunk costs are excluded from economic and financial consideration because they are past costs that nothing we do now or in the future can affect. It is important to ignore sunk cost since they cannot be avoided even if the action is not taken. For instance, even if a flight ticket costs a sum of money, if it has already been bought and cannot be resold to

anyone else, the cost of the ticket is a sunk cost and should not influence the decision about whether to embark on the trip.

The tendency to consider sunk costs in making a new decision is called the *sunk-cost fallacy*. The sunk-cost fallacy is an erroneous, mistaken or faulty reasoning in which the sunk costs (past expenditures) of an activity are considered when deciding whether to continue with the activity. This reasoning leads to the *sunk-cost effect*—the influence on decision makers to continue with a failing or an unpleasant activity (and expending more resources on it) just because significant irrecoverable resources have already been invested in it (Thaler, 1980). In his words, "paying for the right to use a good or service will increase the rate at which the good will be utilized, *ceteris paribus"* (Thaler, 1980: 47), meaning past spending influences the current consumption decision. It refers to the desire to persevere, or the will to stay the course, once an investment of money, time, or effort has been made, even when its marginal costs exceed marginal benefits (Arkes & Blumer, 1985).

Empirical Studies

Being an interdisciplinary topic, several factors from the many disciplines have been attributed to why an individual, a business firm, an organisation or a government may commit sunk-cost fallacy and thus engage in escalation behaviour. Some of these factors are as follows:

The size of sunk cost

The size of sunk cost associated with activity has been found to be responsible for sunk-cost fallacy: the greater the sunk cost, the stronger the sunk-cost effect should be. Arkes and Blumer (1985), Garland (1990), Garland and Newport (1991) and Steinman (2019) have shown that the likelihood that a decision maker will fall victim to sunk-cost fallacy increases as the level of sunk cost increases. That sunk-cost effect is influenced by the size of the past sunk expenditures is consistent with prospect theory. However, Navarro and Fantino (2008) examined whether differences in the level of investment efforts mattered but found no differences in the outcomes.

Background knowledge of sunk cost

Doody (2020) reported that economics and business majors also commit the sunk-cost fallacy with the same gusto as others. Having knowledge about the sunk-cost fallacy appears to have little effect on the propensity to commit the fallacy (Arkes & Blumer, 1985). However, very few studies have provided empirical evidence in support of the anecdotal evidence while few others have refuted the evidence outright. Some evidence

suggests that entrepreneurs and managers are also prone to sunk-cost fallacy (Staw, Barsade, & Koput 1997; Brody & Frank 1999; Doody, 2020). Arkes and Blumer (1985) found evidence that having taken prior courses in economics did not attenuate the sunk-cost effect. However, Tan and Yates (1995) found contrary evidence.

Cost responsibility

Following self-justification theory, most of previous research considered sunk-cost effect an intrapersonal phenomenon, because theory posits that the phenomenon occurs because of one's own investments (Whyte, 1993). Whyte (1993) argued that sunk-cost fallacy was more common when the decision maker felt personally responsible for the negative consequences caused by the initial plan of action. For example, Wong (2005) found that having a personal stake in a decision increased the likelihood of committing the sunk-cost fallacy. Yoder et al. (2014) found that personal decisions were more susceptible to sunk-cost fallacy than decisions made on behalf of others. However, some researchers have considered sunk-cost fallacy as interpersonal, driven by other people's investments (Arkes and Blumer, 1985; Olivola, 2018). Yet, Arkes and Blumer found no correlation between sunk cost behaviour and whether oneself or a third party made the decision, Olivola (2018) found that people feel the need to honour other people's sunk cost in the same way that they feel the need to honour their own, even if the person who paid the cost is not a relative or close friend. The author argued that people still escalate commitments to a failing activity even when the sunk cost was incurred by other people, including relatives.

However, a number of other studies have shown that personal responsibility, or responsibility effect, for an initial investment is more likely to make the decision maker susceptible to sunk-cost effect than when the decision maker bears no personal responsibility for the initial investment decision (Davis & Bobko, 1986).

The desire to avoid wastefulness

Another factor identified as influencing the sunk-cost fallacy is the desire to avoid being wasteful. Arkes and Blumer (1985) identified the desire not to appear wasteful as a factor causing decision makers to commit the sunk-cost fallacy. This was supported by a number of experiments conducted by the authors. According to them, abandoning a failing course of action is a waste the resources already expended. In fact, the use of the "waste-not" rule to resist the abandonment of a failing project is an inappropriate overgeneralization of the rule, which is responsible for the sunk cost fallacy (Larrick, Morgan, & Nisbett, 1990, p. 363). Rather than adhere strictly to the cost-benefit principle making a rational decision, people are prone to apply the waste-not rule where it is not appropriate (Arkes and Ayton, 1999).

Avoidance of waste is consistent with both self-justification theory and prospect theory. While self-justification theory suggests that decision makers commit sunk-cost fallacy because they would want to justify that their initial decision was not wasteful, prospect theory suggest that people generally are averse to waste of resources—time, effort, or money—and to decide not to continue spending these resources on something is tantamount to an admission of waste of those resources already invested (Arkes and Blumer,1985; Nash, 2017).

Gender

It has been established in the literature on gender differences in risk perception that males are more likely to take risks than females, hence more likely to honour sunk cost (Byrnes et al., 1999).

Age

Some previous research have indicated that older adults are less susceptible the sunk-cost fallacy than younger adult (Strough, et al., 2011; Bruine de Bruin et al., 2014; Strough et al., 2016). However, other researchers (Rego et al., 2016) have found the opposite. They have found that young children were less susceptible than older children. Klaczynski and Cottrell (2004) found that young children were susceptible to the sunk-cost effect but that the effect did not differ across age groups. Thus the age-related difference in sunk-cost effect susceptibility is mixed.

METHODOLOGY

Theoretical Framework

A major explanation for the sunk-cost fallacy is *prospect theory* (Kahnemann & Tversky, 1979). Prospect theory attributes sunk-cost fallacy to the framing of decisions—the way the decision is presented or perceived. That is, susceptibility to sunk-cost fallacy depends on the way the decision problem is framed. It is this "wrong" information processing and unbalanced perception that leads to sunk costs being considered in decisions as against the rational choice theory (Falchetta, 2015). Prospect theory posits that the framing of decision situations affects decision-making behaviour, and that people evaluate outcomes of a decision in terms of gains and losses. It explains that people are more risk averse in gain situations and more risk seeking in loss situations (Whyte, 1986). When a decision (e.g., disregarding a sunk cost) is framed as a loss, people would be more willing to take risks (investing more) to recover or avoid the loss, thereby committing the sunk-cost fallacy. In other words, people tend to be more risk-seeking if the decision situation (e.g., discontinuing a failed activity in which previous investments are involved) is framed as a loss.

Prospect theory assumes that individuals in the context of sunk costs experience themselves to be in the domain of losses. Given loss aversion, and given the convex value function in the domain of losses, individuals will be risk seeking (i.e., they will prefer to continue a failing activity with a view to recovering the past investment) rather than accepting the past spending as a sure loss (Whyte, 1986; Brockner, 1992). People perceive sunk cost as an option between discontinuing an activity already invested in (accepting a sure loss) and continuing to invest in it (accepting an unsure loss) hoping that persisting may offer a chance for the sunk cost to be recovered (Kahneman & Tversky, 1979; Garland & Newport, 1991; Soman, 2001). Accordingly, people would become risk seeking when faced with the *prospect* of a sure loss and risk averse when presented with (the prospect of) a sure gain (Kahnemann & Tversky, 1979). When people invest in a project and it is obvious that a decision needs to be made to stop or continue, they would weigh up the costs and benefits (or gains and losses) of each option. If a large amount of resources has been invested, the decision to abandon the project would constitute a sure loss of those previously invested resources, and since people are averse to sure losses, they are likely to continue investing as a gamble for a positive outcome (Nash, 2017).

Another tenet of the prospect theory is that the higher the size of a sunk cost of an activity, the higher the sure loss associated with the activity and thus the higher the tendency to consider or honour the sunk cost in the decision. As withdrawal from a course of action may lead to the sunk costs being viewed as a certain loss, the decision makers become more reluctant to withdraw as sunk costs increase. In other words, large amounts of sunk spending increase the likelihood of committing the sunk-cost fallacy. The likelihood that a decision maker will fall victim to sunk-cost fallacy increases with the level of sunk cost (Brockner, 1992).

The Model

In order to increase the external validity of the current study and validate the findings of the previous studies, which were conducted mostly with students in classroom experiments (Arkes and Blume, 1985; Arkes & Ayton, 1999), this study employed survey design and logistic regression.

Since the response variable is dichotomous—committing or not committing the sunk-cost fallacy—a binary logit model was employed. The theoretical binary logistic distribution function is given by

$$P_i = E\left(Y = \frac{1}{X_i}\right) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_{1i} + \beta_2 X_{2i} + \ \ldots + \beta_k X_{ki})}} \quad (1)$$

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By logit transformation, Equation (1) becomes

$$L_i = \log(odds) = \log(\frac{P_i}{1-P_i}) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ ... \ + \beta_k X_{ki} + \mu_i \qquad (2)$$

where $P_i = E(Y=1/X_i)$ gives the probability that a respondent would commit sunk-cost fallacy given the explanatory variables (X), $\frac{P_i}{1-P_i}$ is the odds ratio in favour of committing sunk-cost fallacy, L_i represents the natural log of the odd ratios, and μ is an identically and independently distributed error term with mean 0 and variance 1.

To arrive at the empirical model for this study, relevant factors identified in the previous studies, such as Arkes and Blumer (1985) and Tan and Yates (1995), were integrated with control variables that were considered to be possible influences on the likelihood of committing the fallacy. Given the objective of this study, the principal explanatory variables in the model are the respondent's discipline (course of study) and pre-existing background knowledge of sunk costs. The latter variable is represented by *KNOW*, indicating whether or not the respondent had already stumbled upon the notion of sunk costs. Following Falchetta (2015), it was hypothesized that previous background knowledge about sunk costs influences the decision maker's susceptibility to the sunk-cost fallacy. A decision maker who is aware of the danger of falling victim to the sunk cost fallacy would be eager to avoid it. The other principal explanatory variable, the respondent's discipline (*DISC*), was proxied by three dummy variables: *DISCE* if the respondent was an economist, *DISCA* if the respondent was an accountant, and *DISCB* if the respondent was a business major.

Following Friedman et al (2007) and Strough et al. (2008), the model was specified as:

$$SCF_i = \beta_0 + \beta_1 SIZE_i + \beta_2 DISCE_i + \beta_3 DISCA_i + \beta_4 DISCB_i + \beta_5 KNOW_i + \beta_6 INCOML_i + \beta_7 GENDM_i + \beta_8 AGEY_i + \mu_i$$

The definitions and measurement of these variables are contained in Table 1

Table 1 Definition and Measurement of Variables

Variable	Definition/Measurement	Source
SCF_i	Dummy variable for sunk-cost fallacy = 1 if the respondent chose to pay the remaining ₦*80,000* in Vignette 1 (SCF1) or chose ₦20,000 trip in Vignette 2 (SCF2), each indicating the fallacy occurred; 0 if otherwise.	Strough et al. (2008)

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$SIZE_i$	Dummy variable for the effect of size of sunk cost = 1 if the respondent selected "₦40,000 trip" in Question 2 in Vignette 2.	Arkes and Blumer (1985); Garland (1990); Garland and Newport (1991); Steinman (2019).
$KNOW_i$	Dummy variable = 1 if the respondent had stumbled on the concept of sunk costs; 0 if otherwise.	Arkes and Blumer (1985); Doody (2020)
$DISCE_i$	Dummy variable for discipline = 1 if the respondent was an economist; 0 if otherwise.	Doody (2020)
$DISCA_i$	Dummy variable for discipline = 1 if the respondent was an accountant; 0 if otherwise.	Staw et al. (1997)
$DISCB_i$	Dummy variable for discipline = 1 if the respondent was a business major; 0 if otherwise.	Brody and Frank 1999
$INCOML_i$(–)	Dummy variable income = 1 if the respondent earned a low income (income less than ₦100,000); 0 if otherwise.	Skognes and Noste (2020); Ronayne et al. (2021)
$GENDM_i$ (±)	Dummy variable for gender = 1 if respondent was male, 0 if otherwise.	Skognes and Noste (2020); Ronayne et al. (2021).
$AGEY_i$	Dummy variable for age = 1 if the respondent was younger than 30 years; 0 if 30 years or older.	Skognes and Noste (2020); Ronaysne et al. (2021).

The inclusion of *SIZE* is justified on the grounds that the higher the amount of the sunk-cost involved in a decision, the higher the tendency to commit the fallacy. The variable *INCOML* (income of the respondent) is introduced into the model to postulate that low-income people are more likely to honour sunk costs than high-income people. This is because the affluence of the latter group would cushion or neutralise the impact of the size of the sunk cost on them, resulting in their lower tendency to fall victim of the sunk-cost fallacy. In other words, it is easier for the high-income people let go of the past costs and let bygones be bygones.

The reference groups for the dummy variables *KNOW*, *DISC*, *INCOML*, *GENDM*, *AGEY*, and *SIZE* are respectively those who never stumbled on the concept of sunk cost,

disciplines other than economics, accounting or business, high income (income equal or higher than ₦100,000), female, 30 years or older, ₦5,000 trip.

Estimation Techniques

Due to the dichotomous and nonlinear nature of the response variable (*SCF*), the method of maximum likelihood was employed to estimate the parameters of the logit model. Because heteroscedasticity in var(y/x) is automatically accounted for by the method of maximum likelihood, it is a robust technique commonly used for estimating discrete response models (Wooldridge, 2006).

The statistical significance of each coefficient of the explanatory variable was assessed using the p-values of Wald test (Z^2 test) and the overall significance of the model was evaluated by the p-values of likelihood ratio (LR) statistic χ^2 and Wald χ^2. Stata was used to estimate the logit coefficients, log-odds and marginal effects were estimated and interpreted.

Data and Data Sources

The data for this study were collected from two groups of respondents. Group 1 consisted of respondents whom were lecturers and postgraduate students from two universities in Nigeria. Members of this group, henceforth referred to as *professional respondents*, were considered to be decision-making professionals who were presumed to have had knowledge of the concept of sunk costs. Group 2, whose members were henceforth referred to *nonprofessional respondents*, was composed of respondents whose educational background was neither economics, accounting nor business.

This study relied on primary data collected from two online questionnaires, one for each group. The questionnaires were pretested with ten respondents each, after which minor changes were made. The final questionnaires were sent to the respondents via WhatsApp platform. The questionnaires were directly sent to each respondent's WhatsApp contact phone number. Besides, the questionnaire for the nonprofessional respondents was also broadcast through various WhatsApp groups to which they belonged. The survey was conducted in March 2022.

The population for this study consisted of the economist, accountants and business majors in Nigerian universities and the sample consisted of 156 respondents classified into two groups: Group 1 (professional group) and Group 2 (nonprofessional group). The data collected for analysis were respondents' self-reported decisions on two decision-making vignettes presented to them on the questionnaire. Since the sampled respondents could not

be drawn with a probability sampling technique, convenience sampling was employed to elicit the required information from the respondents.

Procedure for Data Collection

Two vignettes, contained in a questionnaire, were employed to generate the response variable—the sunk-cost fallacy. Vignettes 1 was adapted from Hehner (2018) while Vignette 2 from Arkes and Blumer (1985). In Vignette 1, the respondents were presented with a scenario in which they were asked to select the supplier from whom they would buy their phone. The same respondents were presented with Vignette 2 in which they were asked to select a trip between two trips. The two vignettes are as follows:

The Vignette 1

Suppose you want to buy a phone, and you find a phone supplier who offers phones at a reasonable price, but an order will take a week. You put down a nonrefundable ₦20,000 deposit and will pay the remaining ₦80,000 on delivery. Halfway through the week, you find another supplier who will sell you the phone (with the same quality) for a total sum of ₦70,000 for immediate pick-up.

1. What would you do now?

Buy from the new supplier for ₦70,000
Pay the remaining ₦80,000 on delivery

Vignette 2

Assume that you have spent ₦20,000 on a ticket for a weekend trip to a state in Nigeria. A week later, you buy a ₦5,000 ticket for a weekend trip to another state in the country. You think you will enjoy the ₦5,000 trip more than the ₦20,000 trip. As you are putting your just-purchased ₦5,000 trip ticket in your pocket, you notice that the ₦20,000 trip and the ₦5,000 trip are for the same weekend. It is too late to sell either ticket, and you cannot return either one. You must use one ticket and not the other.

1. *Which trip would you go on? ₦20,000 trip or ₦5,000 trip. Why?*
2. *If the amount you paid for the first trip is ₦40,000 while that of the second trip is still ₦5,000, on which trip would you go? ₦40,000 trip or ₦5,000 trip. Why?*

As contained in Table 1, sunk-cost fallacy (*SCF*) was committed if the respondent chose to pay the remaining ₦*80,000* in Vignette 1 or chose ₦20,000 trip in Vignette 2. The model was estimated separately for each vignette. The SCF1 stands for the sunk-cost fallacy with respect to Vignette 1 while SCF2 represents the sunk-cost fallacy vis-à-vis Vignette 2.

RESULTS AND DISCUSSION

The professional group consisted of 82 respondents while the nonprofessional group was composed of 74 respondents. About 60%, 29%, and 11% of the professional group had a background in economics, accounting, and business, respectively. About 82% of the professional respondents were male, whereas roughly 64% of the nonprofessional respondents were male. In the professional group, about 16% were younger than 30 years of age, whereas approximately 27% of the nonprofessional respondents aged less than 30 years (see Table 2). Approximately 33% of the professional group earned low income (income lower than ₦100,000) while 43% of the nonprofessional group earned low income. This and further information on the characteristics of the sample are contained in Table 2.

Close to 74% of the professional respondents had background knowledge of the concept of sunk cost whereas 35% of the nonprofessional group never stumbled on the notion of sunk cost. This implies that some decision-making professionals never came across the concept of sunk cost in their courses of study and, hence, not knowledgeable about it; Meanwhile, some of the so-called nonprofessional decision makers were even knowledgeable about the concept. This result agrees with the findings reported by Arkes and Blumer (1985), Staw et al. (1997), Brody and Frank (1999), and Doody (2020). This finding could be due to the fact that some textbooks or courses in accounting, economics and business in which the concept of sunk costs is supposed to be discussed make only fleeting reference to the concept. For example, despite my background in economics, I was never taught about sunk costs during my undergraduate and postgraduate programmes in economics. It was only in the course of studying further as a researcher that I stumbled upon the concept in a microeconomics textbook and became interested thenceforth. I discovered that many relevant economics textbooks take only a cursory and divergent look of the concept. Most of them discuss the concept without pointing out the sunk-cost effects—the negative effects of incorporating sunk cost in decision-making process.

Table 2 Descriptive Statistics of the Professional and Nonprofessional Respondents

Variable	Total(P)[a]	Total (N)	% (P)	% (N)
SCF1	15	22	18.29	29.73
SCF2	49	46	59.76	62.16
KNOW	61	26	74.39	35.14
DISCE	49	–	59.76	–
DISCA	24	–	29.27	–
DISCB	9	–	10.96	–
INCOML	27	32	32.93	43.24

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GENDM	67	47	81.71	63.51
AGEY	13	20	15.85	27.03
SIZE	54	46	65.85	62.16

P = professional group, and N = nonprofessional group; SCF1 = susceptibility to the sunk-cost fallacy in Vignette 1; SCF2 = susceptibility to the sunk-cost fallacy in Vignette 2.

While answering questions vis-à-vis Vignette 1, about 18% of the professional group committed the sunk-cost fallacy (chose to pay the remaining ₦80,000). This is as shown in Table 2 and Figure 1. They declared that they would buy from the initial supplier and pay the remaining ₦80,000 on delivery. Meanwhile, approximately 60% of the same group committed the fallacy (chose ₦20,000 trip) in Vignette 2 (Table 2 and Figure 2). They selected the more expensive but less enjoyable ₦20,000 trip, instead of the cheaper and more enjoyable ₦5,000 trip. It seems that the sunk cost of ₦20,000 was more important to them than getting greater enjoyment from the less expensive ₦5,000 trip that they had paid for. This shows that the fallacy is at work. However, when the ticket for the first trip was supposedly ₦40,000, roughly 66% of the professional respondents committed the fallacy. This is not surprising given the result in the preceding paragraph, where some professional decision makers were not even knowledgeable about sunk costs. The result is consistent with that of Arkes and Blumer (1985), Staw et al. (1997), Brody and Frank (1999), and Doody (2020) who found that having taken prior courses in relevant fields of study did not attenuate the sunk-cost effect.

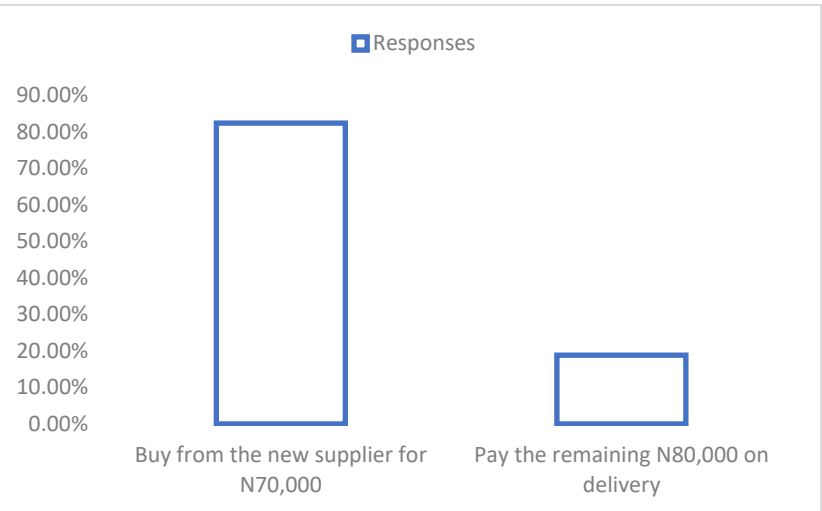


Figure 1 Percentage of Professional Respondents Who Committed the Sunk-Cost Fallacy (Chose to Pay ₦80,000) in Vignette 1

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Meanwhile, about 30% of the nonprofessional group committed the sunk-cost fallacy when answering questions in Vignette 1 (see Figure 2). Meanwhile, approximately 62% of the same group committed the fallacy in Vignette 2. However, when the ticket for the first trip was supposedly ₦40,000, the same percentage (about 62%) of the professional respondents committed the fallacy in Vignette 2. This result indicates some of the nonprofessional respondents, too, make rational decisions. Two factors could be responsible for this. One, probably, some of the nonprofessional respondents applied ingenuity in making their choices. Two, they could have dealt with sunk costs in their various fields of study. No study was found to have reported this result.

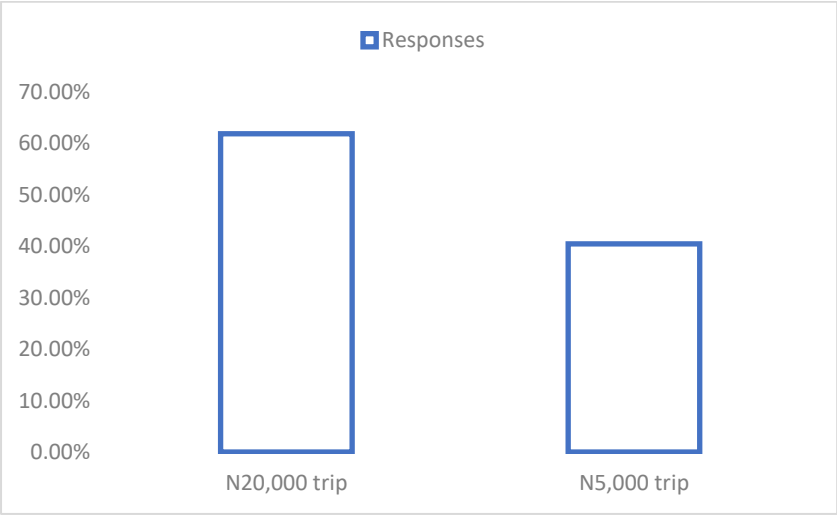


Figure 2 Percentage of Professional Respondents Who Committed the Sunk-Cost Fallacy (Chose ₦20,000 trip) in Vignette 2

Having estimated the descriptive statistics, a z-test was conducted to determine if the proportion of the nonprofessional respondents who committed the fallacy was significantly greater than that of the professional respondents in Vignettes 1 and 2. In Vignette 1, results of the test showed that the proportion of the professional respondents who committed the fallacy (P = 18.29%) was significantly less than that of the nonprofessional respondents (P = 29.73%) at the 0.05 level of significance (z = –1.6770, p = 0.0468). This implies that having prior knowledge about sunk cost attenuated the sunk-cost effect on the professional respondents, a finding that contradicts that of Arkes and Blumer (1985) and Doody (2020) that both professional and nonprofessional decision makers commit the sunk-cost fallacy with the same gusto. In Vignette 2, however, the results showed that the proportion of the nonprofessional respondents who committed the fallacy (P = 62.16%) was not

significantly different from that of the professional respondents (P = 59.76%) at the 0.05 level of significance (z = –0.3075, p = 0.3792). This result corroborates the finding reported by Arkes and Blumer (1985), Staw et al. (1997), Brody and Frank (1999), and Doody (2020).

Another z-test was conducted to determine whether the proportion of the professional respondents who committed the sunk-cost fallacy differed across the vignettes. The test revealed that there was a significant difference between the proportion of the professional respondents who committed the fallacy in Vignette 1 (18.29%) and that of Vignette 2, 59.76% (z = –5.4427, p = 0.0000). Considering the varying percentages of the professional respondents that committed the fallacy across the two vignettes, this result indicates that the susceptibility of a professional decision maker to sunk-cost fallacy depends on the nature of the decision being made. This result is consistent with prospect theory (Kahnemann & Tversky, 1979), which attributes sunk-cost fallacy to the framing of decisions. However, no research was found to have reported the same finding.

Logit-Model Estimation Results

Logit model does not require many of the assumptions of linear regression. However, it requires the assumption of multicollinearity and large sample size (Schreiber-Gregory & Bader, 2018). The data obtained on each of the groups of the respondents were pooled together to have a large sample size of 156 respondents. Using the tolerance and variance inflation factor (VIF) test, the hypothesis of multicollinearity among the explanatory variables was rejected, for VIF < 10 and tolerance > 0.1 in all cases (mean VIF = 1.52). This implies that the model is devoid of severe multicollinearity. Besides, the correlation coefficients between each pair of the explanatory variables are less than 0.5, not so high. This implies that multicollinearity was not a problem in estimating the logit model.

Results of the binary logit model estimation for Vignettes 1 and 2 are contained in Tables 3 and 4, which present the logit coefficients, odd ratios, marginal effects as well as standard errors, Wald's Z-statistic and its p-values of the marginal effects, estimated over 156 respondents. All the figures were obtained from the Stata output of the logit regression of SCF on the set of explanatory variables—*SIZE*, *DISC*, *KNOW*, *INCOML*, *GENDM*, and *AGEY*.

Overall test of significance indicates that all the regressors together had a statistically significant effect on the probability of committing sunk-cost fallacy (for Vignette 1, LR statistic = 18.55 with a p-value = 0.0175; for Vignette 2, LR statistic = 82.68 with a p-value = 0.0000). This suggests that at least one of the coefficients of each model differs

significantly from zero, and hence an important determinant of susceptibility to sunk-cost fallacy.

Next is the analysis of the performance of the explanatory variables in the model. Tables 3 and 4 show that only the explanatory variable, SIZE, was highly statistically significant with the expected signs while other variables were not. The coefficient of *SIZE* was positive and significantly related to the probability of committing the sunk-cost fallacy at the 1% level of significance. The marginal effects of SIZE of 0.1875 and 0.7233 for Vignettes 1 and 2, respectively, indicate that the amount of the sunk cost increased the probability of committing the fallacy by about 19% and 72% in Vignettes 1 and 2, respectively. This result is consistent with prospect theory, which postulates that the higher the size of a sunk cost, the higher the tendency to commit the sunk-cost fallacy. Arkes and Blumer (1985), Garland (1990), and Garland and Newport (1991) have also shown that the likelihood that a decision maker will fall victim to sunk-cost fallacy increases as the size or level of the sunk cost increases.

Table 3: Logit Model Estimation Results for Vignette 1

Sunk-cost fallacy (SCF1)	Coef.	Odds Ratio	Marg. Effects	Std. Error	Z	p-val
SIZE	1.2858	3.6176	0.1875	0.0626	2.99	0.003
DISCE	–0.7607	0.4673	–0.1132	0.0700	–1.62	0.106
DISCA	–0.5197	0.5947	–0.0754	0.0883	–0.85	0.393
DISCB	–0.0823	0.9210	–0.0130	0.1217	–0.11	0.915
KNOW	–0.0102	0.9899	–0.0016	0.0761	–0.02	0.983
INCOML	0.6754	1.9647	–0.1147	0.0790	1.45	0.147
AGEY	–0.4965	0.6086	–0.0737	0.0736	–1.00	0.317
GENDM	–0.7358	0.4791	–0.1309	0.0872	–1.50	0.133
Constant	–1.4735					
No. of Observation	156					
LR $chi^2(8)$	18.55					
prob> chi^2	0.0175					
Pseudo R^2	0.1085					
Log likelihood	–76.1830					

Note: Reference categories: High income (income equal or higher than ₦100,000) for INCOML; those who never stumbled on the concept of sunk cost for SUNK, females for GENDM; disciplines other than economics, accounting or business for DISC; 30 years or older for AGEY; ₦5,000 trip for SIZE.

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From both Tables 3 and 4, variables such as DISCE, DISCA, DISCB, KNOW, INCOML, GENDM, and AGEY were not statistically significant, for p-values were greater than 0.05. This seems to suggest that these variables did not exert significant influence on the probability of committing the sunk-cost fallacy. It thus suggests that susceptibility to sunk-cost fallacy does not depend on the decision-maker's discipline, knowledge about sunk cost, income, gender, and age. The results are not consistent with the findings of previous studies such as Byrnes et al. (1999) who have found that male decision makers are more susceptible to sunk-cost fallacy than females, and Bruine de Bruin et al. (2014) and Strough et al. (2016) who have found that older adults are less susceptible to sunk-cost fallacy than younger adults. However, the age-related difference in susceptibility to sunk-cost fallacy is mixed, for other researchers, such as Rego et al. (2016), have found the opposite.

The fact that the null-hypothesis concerning *KNOW* and *DISC* cannot be rejected implies that having a background knowledge of sunk costs does not seem to be sufficient to prevent individuals from committing the sunk cost fallacy. This result corroborates that of Falchetta (2015) and Doody (2020). This raises a doubt about the theory of sunk cost being a positive theory rather than a normative one.

Table 4: Logit Model Estimation Results for Vignette 2

Sunk-cost fallacy (SCF2)	**Coef.**	**Odds Ratio**	**Marg. Effects**	**Std. Error**	**Z**	**p-val**
SIZE	3.6649	39.0539	0.7233	0.0617	11.73	0.000
DISCE	–0.3785	0.6849	-0.0878	0.1337	-0.66	0.512
DISCA	–0.1787	0.8363	-0.0414	0.1778	-0.23	0.816
DISCB	–0.4534	0.6354	-0.1083	0.2542	-0.43	0.670
KNOW	–0.4098	0.6638	-0.0925	0.1216	-0.76	0.447
INCOML	–0.2537	0.7759	-0.0583	0.1293	-0.45	0.652
AGEY	–0.6801	0.5066	-0.1615	0.1476	-1.09	0.274
GENDM	–0.0519	0.9494	-0.0118	0.1259	-0.09	0.925
Constant	–1.0577					
No. of Observation	156					
LR $chi^2(8)$	82.68					
prob> chi^2	0.000					
Pseudo R^2	0.3960					
Log likelihood	–63.0584					

CONCLUSION AND RECOMMENDATIONS

This study investigates whether professional decision makers—economists, accountants, and business majors—commit the sunk-cost fallacy. It was hypothesized that given their background training and knowledge of sunk cost, the selected decision makers should not fall victim to the sunk-cost fallacy. However, by estimating a binary logit model for each of the two decision-making scenarios or vignettes, the study found that professional decision makers, too, commit the sunk cost fallacy. Therefore, having background knowledge about sunk cost does not preclude individuals from committing the fallacy. What matters is the amount of the sunk cost involved, for this study has established that the amount of the sunk cost involved (size of the sunk cost) is a major significant determinant of the susceptibility to sunk-cost fallacy.

Furthermore, this study found that some decision-making professionals never stumbled upon the concept of sunk cost in their courses of study and, hence, not knowledgeable about it. This finding corroborates the finding in the preceding paragraph and partly explains why some decision-making professional do fall victim to the sunk-cost fallacy. Another factor that also determines whether one commits the fallacy or not is the type or nature of the decision involved. The proportions of both the professional and nonprofessional decision makers who commit the fallacy differ according to the nature of the decision. The nature of the decision being made is, therefore, another important factor that influences the chance of committing the sunk-cost fallacy.

To mitigate the chance of falling victim to the fallacy in the future, educators in the relevant disciplines, such as accounting, economics, and business should raise their students' awareness of the concept of sunk cost and its effects. Equally, authors of accounting, economics and business textbooks should include an in-depth analysis or treatment of sunk costs in their books. Making the usual fleeting or cursory reference to the concept would not do justice to it. Both the instructors and the authors should point out the sunk-cost effects, which includes escalation of commitment to a failing activity. Adhering to these recommendations would increase knowledge about sunk costs and, as a result, reduce unnecessary losses due to irrational decisions.

Two limitations of this study are identified—convenience sampling and small sample size. Because the sample of people interviewed were drawn with convenience sampling—a nonprobability sampling technique—and the sample size was not sufficiently large, the results may not be generalizable beyond the population of the study. These results are simply meant to build case study and check the consistency of the logistic regression results with the results of experimental studies obtained by previous studies. Given this limitation,

it is suggested that future research with larger sample size, selected if possible by a probability sampling technique, be carried out in other universities in Nigeria or other countries so as to generalize the findings and hence increase the validity of the prospect theory which forms the theoretical basis for this study.

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