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Journal of Economic Psychology 26 (2005) 567–580
JOURNAL OF Economic Psychology
www.elsevier.com/locate/joep

Mental accounting and decision making: Evidence under reverse conditions where money is spent for time saved

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Received 5 February 2004; received in revised form 4 October 2004; accepted 18 November 2004
Available online 12 January 2005

Abstract

Evidence from the behavioural decision literature suggests that economic decisions may be made on less than rational grounds. In this respect the formation of 'mental accounts' by individuals has been used to explain apparent departures from rationality in certain scenarios. The purpose of this paper is to establish the general applicability of mental accounting by investigating multi-attribute decisions where the following conditions vary: (1) the denomination of the mental account (i.e. whether the saving is denominated in money, as is classically the case, or time) and (2) the absolute saving level. Using a novel decision scenario, we replicate the prior findings of mental accounting effects under the classical conditions where individuals trade-off time spent for money saved, though these effects are sensitive to the level of absolute saving. However, when the conditions of the decision scenario are reversed, such that individuals trade-off money spent for time saved, mental accounting effects are no longer observed. This result is robust irrespective of whether participants are required to state maximum willingness to spend time/money or face a choice (yes/no) task. These findings qualify the results

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0167-4870/$ - see front matter
doi:10.1016/j.joep.2004.11.001

reported in prior studies, suggesting that mental accounting effects maybe context specific and suffer from a lack of generality.

JEL classification: D81
PsycINFO classification: 3900
Keywords: Mental accounts; Account denomination; Intra- and inter-medium trade-off

1. Introduction

The behavioural decision literature provides a growing body of experimental evidence (e.g. Einhorn & Hogarth, 1986; Kahneman, Slovic, & Tversky, 1982; Poulton, 1994; Thaler, 1994) which suggests that the Savage (1954) axioms of rationality may be violated in a number of decision-making situations. One branch of the experimental literature aims to explore the use of 'mental accounts' in multi-attribute situations (see Thaler, 1999, for a summary of the literature) where individuals form distinct *topical* accounts to evaluate decisions. The 'jacket and calculator' problem in Tversky and Kahneman (1981) illustrates:

Problem 1(a). ($N = 93$) Imagine that you are about to purchase a jacket for \$125, and a calculator for \$15. The calculator salesman informs you that the calculator you wish to buy is on sale for \$10 at the other branch of the store, located 20 minutes drive away. Would you make the trip to the other store?

YES [68%]; NO [32%]

Problem 1(b). ($N = 88$) Imagine that you are about to purchase a jacket for \$15, and a calculator for \$125. The calculator salesman informs you that the calculator you wish to buy is on sale for \$120 at the other branch of the store, located 20 minutes drive away. Would you make the trip to the other store?

YES [29%]; NO [71%]

In both versions, the trade-off is between saving \$5 on a total expenditure of \$140, at the expense of 20 min. In both scenarios, the 'benefit' (absolute monetary saving) remains at \$5 and the 'cost' (time spent travelling) at 20 min. However, the results above appear to suggest that individuals may value two identical monetary 'benefits' differently because they are evaluated from two separate topical accounts (i.e. the calculator expenditure account and the jacket expenditure account). A \$5 saving on a \$15 calculator appears more attractive than a \$5 saving on a \$125 calculator, even when the 'cost' involved (20 min) is identical. In other words, the same absolute saving on an item appears to be more attractive the higher its value *relative* to the item's original price. This effect is known as the mental accounting effect.

The purpose of this paper is to address the general applicability of the use of topical mental accounts. Specifically the paper employs a novel decision scenario to

investigate whether mental accounting effects are observed under the reverse of the classical conditions; that is, when individuals are required to trade-off money spent for time saved. In light of the findings in Moon, Keasey, and Duxbury (1999), which reports that mental account effects are no longer detected as the level of absolute saving increases, the current study also varies the level of absolute saving. The evidence from Experiment 1, which employs a willingness to spend time/money decision task, replicates the finding of topical mental accounting effects under the classical conditions, though this is sensitive to the level of absolute saving. However, we find no evidence of such an effect under the reverse conditions where people spend money to save time. Experiment 2 replicates the reverse condition decision scenario from Experiment 1 using a choice (yes/no) task as per Tversky and Kahneman (1981). We find that the results are robust to the type decision task employed. We conclude that topical mental accounting effects are context specific and may only apply within a restricted range. The structure of the paper is as follows. Section 2 discusses the existing experimental evidence on the topic and how it motivates the hypotheses introduced in Section 3. Section 4 presents the design and results from Experiment 1, whilst Section 5 presents the same for Experiment 2. Section 6 offers conclusions.

2. Prior experimental evidence

Tversky and Kahneman's (1981) early experiments have generated much academic interest, with numerous subsequent studies (see for example, Mowen & Mowen, 1986; Ranyard & Abdel-Nabi, 1993; Thaler, 1985, 1990) reporting confirming evidence of mental accounting effects. More recent studies, however, report evidence that appears to question the generality of the earlier results. For example, Moon et al. (1999) find that mental accounting effects are no longer observed as the level of absolute saving increases, providing evidence of a 'threshold' effect. Bonini and Rumiati (1996, 2002) provide evidence of the importance of focusing mechanisms and similarities between the products in the decision scenario for the observation of mental accounting effects. It seems reasonable, therefore, to ask the question: how general is the applicability of topical mental accounting?

Most decisions entail a choice or a trade-off, for example giving up 20 min of time in order to make a monetary saving of $5. However, careful reflection reveals that a decision or trade-off consists of two dimensions. One is the unit of denomination of the mental saving account, which could be denominated in money (e.g. $) or in time (e.g. minute). The other dimension is the medium of the trade-off, which could be inter-medium (e.g. spend time to save money) or intra-medium (e.g. spend time/money to save time/money). Mental accounting effects may or may not be observed under alternative conditions.

An evaluation of the decision scenarios used in many of the prior studies reveals a number of commonalties. Indeed, given the experimental instruments employed, it can be argued that two conditions are required for mental (or topical) accounting to be observed. These conditions (which we term the classical conditions) are:

1. The topical accounts (e.g. jacket expenditure and calculator expenditure) are money-denominated.
2. The trade-off is inter-medium; the trade-off is between money and time (e.g. \$5 versus 20 min).

Given these conditions, there are some questions which need considering. For example, are mental accounting effects observed when mental accounts are denominated in time as opposed to money? What happens when the trade-off is intra-medium rather than inter-medium (i.e. money versus money or time versus time)? The current literature does not specifically address these questions nor explore these issues under more general conditions. [1]

A third condition prevalent in the prior studies, with the exception of Moon et al. (1999), is:

3. The level of absolute saving remains constant (e.g. \$5).

Moon et al. (1999) is the only study to date to consider the effect of the absolute saving level on mental accounting effects, reporting evidence of a 'threshold' effect where mental accounting effects are no longer observed above a certain level of absolute saving; thus implying that when the saving becomes sufficiently large individuals make decisions that conform to rational economic behaviour.

The purpose of the current study is to provide an assessment of the generality of mental accounting effects, though the focus is restricted to the investigation of mental accounting effects under the reverse of the classical conditions (individuals are required to trade-off money spent for time saved) and at different levels of absolute saving. [2]

3. Hypotheses

The experiment centres on a decision scenario concerning a hypothetical train journey. The participants are required to imagine themselves in a situation where

[1] Two papers (Frisch, 1993; Leclerc, Schmitt, & Dube, 1995) conduct experiments with time-denominated accounts, but only in passing and it is not the prime concern of the studies. The results from the studies are contradictory, with the former reporting an absence of mental accounting effects, whilst the latter reports evidence supporting the use of topical accounts. Further clarifying that more research is warranted.

[2] For completeness we also conducted experiments to investigate the presence of mental accounting effects when individuals trade-off time with time and money with money (i.e. intra-medium trade-offs). In such scenarios, it was thought that the trade-off would be so transparent that mental accounting effects would not be present. Due to space constraints, and to maintain the clear focus of the current paper, the results from these experiments are discussed only by way of a later footnote.

they are currently at station X and are to make two consecutive [3] train journeys: **Journey 1** to station A and **Journey 2** to station B. They must evaluate a trade-off that takes the form 'spend time to save money' (classical condition) *or* 'spend money to save time' (reverse condition). The treatment factors under consideration are relative saving level and absolute saving level, both of which take two levels (low or high).

Evidence of mental accounting requires participants' responses to be significantly affected by the level of relative saving in a positive manner. We test experimentally the following null hypothesis to investigate the existence of mental accounting effects in our train journey decision scenario:

1Ho: There is no significant difference in the response of individuals as the level of relative saving varies, while the absolute saving remains constant.

In line with the findings reported in Moon et al. (1999) the current study also investigates the impact of the level of absolute saving in relation to mental accounting effects. For absolute saving levels to be important to the observation of mental accounting effects, a significant interaction between relative and absolute saving is required. To this end, we investigate the following null hypothesis:

2Ho: There is no effect on the tendency to observe mental accounting effects (i.e. significant differences in the responses of individuals across relative saving levels) as the level of absolute saving varies.

4. Experiment 1

4.1. Experimental design

The experimental design employs two versions of the decision scenario, the classic condition and the reverse condition. For each version, we manipulate the level of relative saving (low and high) and the level of absolute saving (low and high). Thus each version of the decision scenario is evaluated across four cells in a 2×2 factorial design. The parameters employed are reported in Table 1. R_l denotes a low relative saving level (16.67%) and R_h denotes a high relative saving level (33.33%), whilst A_l

[3] We specify consecutive train journeys because this ensures the decision scenario most closely resembles Tversky and Kahneman's (1981) jacket and calculator scenario, where participants consider buying the two items jointly. Here participants consider taking two train journeys jointly. Allowing the two train journeys to be taken some considerable time apart would mean that the decision scenario is not strictly the reverse condition of the classic jacket and calculator problem. This would make it more difficult to draw comparisons with prior studies. We return to this issue when discussing the findings in Leclerc et al. (1995) later in the paper.

Table 1
Experimental parameters with relative and absolute saving levels

	Journey (cost)			Savings	
	1	2	Total	Relative (%)	Absolute (£s)
Classic conditions:					
Standard	£30	£45	£75	16.67	£5
Discounted	£25				
Standard	£15	£60	£75	33.33	£5
Discounted	£10				
Standard	£60	£15	£75	16.67	£10
Discounted	£50				
Standard	£30	£45	£75	33.33	£10
Discounted	£20				
	Journey (min)			Savings	
	1	2	Total	Relative (%)	Absolute (min)
Reverse conditions:					
Standard	120	180	300	16.67	20
Express	100				
Standard	60	240	300	33.33	20
Express	40				
Standard	240	60	300	16.67	40
Express	200				
Standard	120	180	300	33.33	40
Express	80				

denotes a low absolute saving level (20 min or £5.00) and A_h denotes a high absolute saving level (40 min or £10.00). The two levels of relative savings are incorporated in the design specifically to allow testing for mental accounting effects, as per Tversky and Kahneman (1981) and Joyce and Shapiro (1995). The inclusion of two different levels of absolute savings permits an investigation of possible 'threshold' effects, as per Moon et al. (1999).

Fig. 1 provides two examples of the experimental instrument employed, one from each version of the decision scenario. In the first example provided the relative saving level is 16.67% (R_l), with an absolute saving level of 20 min (A_l) and the scenario is from the classic condition where participants spend time to save money. The second example is the same except it depicts the reverse condition where participants spend money to save time. Note that the total journey time or cost (Journey 1 plus Journey 2) is constant across comparable scenarios. The elicitation process requires each participant to state the *maximum* time (classic condition) or money (reverse condition) he or she is willing to spend in order to save either money or time. The backdrop to the problem has been set up such that most conceivable uncertainty has been excluded from the decision scenario, e.g. no luggage, good weather (fine day), etc.

Instructions

Thank you for participating in our study. Please read the following section, try to imagine yourself in the situation described and provide an appropriate response to the statement below. There is no right or wrong response.

Situation

Imagine that you have to make*two* consecutive train journeys (***Journey 1*** and ***Journey 2***): one to station A , and the next to station B .

You are now at station X and have just purchased your tickets for the two journeys. The train fares (cost) for the two journeys are as follows:

Journey 1: The train fare from station X to station A is £30.00.

Journey 2: The train fare from station A to station B is £45.00.

Shortly after purchasing your tickets you find out that the train from station X to station A has been cancelled. You are offered two alternative courses of action:

1. The train operator is providing a coach to take passengers from station X to station A in place of the cancelled train. The coach will arrive at station A at the same time that the cancelled train was due to arrive.
2. Alternatively you can wait for the next scheduled train. If you wait you will be eligible for a *discounted* fare and will be refunded the difference between the fare you have already paid and the *discounted* fare.

Other information

Journey 1: The *discounted* train fare for the next scheduled train from station X to station A is £25.00.

Journey 2: The trains from station A to station B depart very frequently, such that a train will be just about to depart irrespective of the time that you arrive at Station A.

Statement

I would be willing to wait as much as _____ minutes for the next scheduled train from station X to station A.

Fig. 1. Examples of the experimental instrument – classic condition.

4.1.1. Classic condition

After considering the scenario described to them, participants were asked to indicate how long they would be willing to wait for the next scheduled train from station X to station A in order to obtain the discounted fare. Participants, therefore, where required to trade-off money saved for time spent. Thus, the classic

Instructions
[As Classic condition]

Situation
Imagine that you have to make *two* consecutive train journeys (***Journey 1*** and ***Journey 2***): one to station A , and the next to station B .

You are now at station X . The *standard* train journey times are as follows:

Journey 1: The *standard* train journey from station X to station A is 120 minutes.
Journey 2: The *standard* train journey from station A to station B is 180 minutes.

As an*alternative*, for ***Journey 1***, you can travel from station X to station A on an *express* train.

Journey 1: The *express* train journey from station X to station A is 100 minutes.

Other information
Journey 1: The *standard*and *express* trains depart at the same time. The trains differ only with respect to travel time and cost.
Journey 2: The trains from station A to station B depart very frequently, such that a train will be just about to depart irrespective of the time that you arrive at Station A.

Statement
I would be willing to pay as much as £_____ *extra* (above the cost of the *standard* train) to catch the *express* train.

Fig. 1 (*continued*). Examples of the experimental instrument – reverse condition.

condition of the decision scenario is designed to test for mental accounting effects when:

1. The mental accounts are *money-denominated*.
2. The trade-off is *inter*-medium (i.e. to give up time to save money).
3. The absolute saving level is either £5 or £10.

4.1.2. Reverse condition

After considering the scenario described to them, participants were asked to indicate how much *extra* (above the cost of the *standard* train) they would be prepared to pay in order to catch the *express* train. Participants, therefore, where required to trade-off time saved for money spent. Thus, the reverse condition of the decision scenario is designed to test for mental accounting effects when:

1. The mental accounts are *time-denominated* (i.e. time is saved).
2. The trade-off is *inter*-medium (i.e. to give up money to save time).
3. The absolute saving level is either 20 min or 40 min.

The classic condition decision scenario is the train journey equivalent of the standard 'jacket and calculator' formulation used in numerous previous studies reporting evidence of mental account effects. The classic condition version is included to ensure that differences between the novel decision scenario employed here and the standard 'jacket and calculator' scenarios used elsewhere, are not responsible for any subsequent differences in results. A priori, it would be expected that mental accounting effects would be observed in this condition. The reverse condition decision scenario reverses the trade-off relative to the standard 'jacket and calculator' problem. [4]

A total of 338 undergraduates participated, all were students within the same leading UK Business School and all received only one version of the experimental instrument. So as to encourage a large number of participants to take part in the experiment, a monetary prize draw was conducted. The decision scenarios were hypothetical and were not linked to a performance related incentive mechanism. The use of hypothetical decision scenarios replicates the approach taken in the prior literature and so ensures the comparability of the results with those in earlier studies.

4.2. Analysis and results

The mean individual responses by relative and absolute saving levels are reported in Table 2. Between-subject ANOVAs with two factors (relative and absolute saving levels) each with two levels (low and high), are employed to analyse the data.

4.2.1. Classic condition

The results from the classic condition provide the benchmark against which to compare the results from the reverse condition. The mean response of participants is higher for R_h than for R_l (see Table 2) and the results from the ANOVA indicate a significant main effect of relative saving level ($F(1, 1514.924) = 3.590$, $p < 0.10$, $n = 90$), thus rejecting the null hypothesis *1Ho*. [5] The importance of the relative saving level on Journey 1 indicates that individuals were using topical accounts and were, therefore, exhibiting mental accounting effects. This result confirms the findings of numerous prior studies and replicates the findings in Tversky and Kahneman (1981).

[4] In order to provide full consideration of the characteristics of a decision scenario that are required for mental accounting effects to be observed, two additional experiments incorporating intra-medium trade-offs were also conducted but are not reported here. In one, the decision scenario required participants to trade-off money spent with money saved, whilst in the other participants traded-off time spent with time saved.

[5] For a mental accounting effect to be observed we require the mean response of participants to be higher for R_h than for R_l. However, we report two-tailed significance levels to safeguard against unexpected results in the direction opposite to that predicted. Thus, the statistical significance of the results are higher than those reported.

Table 2
Mean responses across relative and absolute saving levels

Absolute	Relative (%)	Mean (min)	*n*
Classic condition:			
£5	16.67	23.48	23
	33.33	24.35	23
£10	16.67	29.77	22
	33.33	45.32	22
Absolute (min)	**Relative (%)**	**Mean**	***n***
Reverse condition:			
20	16.67	£4.36	23
	33.33	£3.72	23
40	16.67	£6.15	23
	33.33	£5.77	22

However, the interaction between relative and absolute saving levels was also statistically significant ($F(1, 1210.924) = 2.870$, $p < 0.10$, $n = 90$), indicating that the effect of relative saving is moderated by the impact of absolute saving levels and so rejecting the null hypothesis *2Ho*. Pairwise comparisons of the simple effects indicate statistically significant effects of the level of relative saving are only supported for A_h ($F(1, 2658.273) = 6.300$, $p < 0.05$, $n = 90$) and not for A_l ($F(1, 8.696) = 0.021$, $p > 0.50$, $n = 90$). This lends support to the view that the level of absolute saving may also have a role to play in the observation of mental accounting effects as per Moon et al. (1999).

4.2.2. Reverse condition

The reverse condition decision scenario is the time equivalent of the standard jacket and calculator scenario. Individuals were required to consider how much money they were prepared to spend in order to save time. This version of the decision scenario is similar to Study 1 in Leclerc et al. (1995), in which evidence of a mental accounting effect was reported. However, the results from the current study indicate that it is not possible to reject the null hypotheses *1Ho* and *2Ho*. No evidence of a significant main effect of the relative saving level is found ($F(1, 5.924) = 0.248$, $p > 0.60$, $n = 91$), nor is an interaction between relative and absolute saving levels supported ($F(1, 0.390) = 0.016$, $p > 0.80$, $n = 91$). Thus, in contrast to Leclerc et al. (1995), the current study finds no evidence of mental accounting effects when the trade-off is between money spent and time saved, irrespective of the level of absolute saving level.

The evidence presented here suggests mental accounting effects are not observed in the reverse condition of the classic jacket and calculator problem. Evidence of a mental accounting effect in the classic condition but not in the reverse condition, therefore, indicates that the denomination of the saving account is an important characteristic of the mental accounting effect. For mental accounting to be observed,

accounts must be denominated in money, otherwise, for example if they are denominated in time, no mental accounting effect is observed. [6]

5. Experiment 2

5.1. Experimental design

Prior mental accounting studies require participants to respond to a yes/no scenario (e.g. would they travel to a distant store to save money?). In Experiment 1, participants were required to provide numerical responses (e.g. how much time/money?). This latter approach provides a much richer data set. However, it is possible that the requirement for participants to respond by stating their maximum willingness to spend time/money causes them to focus on the trade-off more explicitly than a simple choice task. It is possible that this could account for the insignificant results reported in the reverse condition. It is also conceivable that our choice of experimental parameters may have been, at least partly, responsible for these insignificant results. In Tversky and Kahneman's (1981) original experiment the saving to be made represented relative levels of 4% and 33%, whilst our relative saving levels of 17% and 33% were closer together. [7]

To ensure that the results from Experiment 1 were not due to these two differences in experimental design we conduct a second experiment. Experiment 2 replicates the reverse condition of the Experiment 1 design but modifies the decision scenario to require a yes/no response from participants and adjusts the experimental parameters so that our relative saving levels represent the same percentages as those in Tversky and Kahneman's (1981) original experiment, whilst maintaining the same absolute saving levels used in Experiment 1 above.

5.2. Analysis and results

Analysing the data from the choice task experiment using a between-subject ANOVA provides the following results. Neither of the two treatment factors have significant main effects (for the relative saving level $F(1, 0.166) = 0.704$, $p > 0.40$,

[6] For the two experiments where the decision scenarios involved intra-medium trade-offs, no evidence of mental accounting effects was found. When the exchange is intra-medium, it appears that the trade-off is so transparent that individuals do not need to resort to topical accounts to evaluate the scenario. This is true irrespective of the denomination of the trade-off (money or time). However, when participants were required to trade-off money saved with money spent, an intriguing result was found; a significant main effect ($F(1, 42.340) = 4.246$, $p < 0.05$) of the relative saving level that was in the opposite direction to that predicted by the use of topical accounts. Whilst this result can be construed as evidence that money is not perfectly fungible (we are grateful to John Dickhaut for suggesting this explanation) it is not evidence in support of the existence of a standard mental accounting effect. The result does not fit in any conventional behavioural or economic model of decision making.

[7] We are grateful to an anonymous reviewer for suggesting that these two differences in experimental design could account for the insignificant results we report for the reverse condition.

Table 3
Choice (yes/no) responses aggregated across absolute saving levels

Relative saving level	Percentage responses		Total number
	Yes	No	
Low	65.7	34.3	102
High	60.2	39.8	103
Total	62.9	37.1	205

$n = 205$ and for the absolute saving level $F(1, 0.217) = 0.920$, $p > 0.30$, $n = 205$) and the interaction term is insignificant also ($F(1, 0.052) = 0.223$, $p > 0.60$, $n = 205$), thus we are unable to reject the null hypotheses *1Ho* and *2Ho*. The relative saving level did not impact on the frequency with which participants responded yes or no, thus there was no evidence of them using topical mental accounts.

In order to rule out differences in statistical approach as a reason for our insignificant results we aggregated the data across the two aggregate saving levels (acceptable given there was no effect on the data of this treatment) and conducted a chi-squared test to compare the frequencies across the relative saving levels as per Tversky and Kahneman (1981). The frequency data is displayed in Table 3 and the chi-squared statistic of 0.663 with 1 df was insignificant ($p > 0.4$). [8] We conclude, therefore, that the absence of topical mental accounting effects in the reverse condition of Experiment 1 is a robust result and not an artefact of the experimental (i.e. willingness to spend time/money versus a yes/no choice task) or statistical (ANOVA versus Chi squared test) procedures adopted.

6. Discussion and conclusions

This paper has sought to establish the general applicability of mental accounting to multi-attribute decisions where the following conditions vary: (1) the denomination of the mental account and (2) the absolute saving level. Using a novel decision scenario we replicate the prior findings of a mental accounting effect under the classic conditions equivalent to the standard 'jacket and calculator' problem (i.e. where individuals trade-off time spent for money saved). The primary finding of the current study, in contrast to the findings reported in Leclerc et al. (1995), is that under the reverse conditions (i.e. individuals trade-off money spent for time saved) to the standard 'jacket and calculator' problem, no evidence of the use of topical mental accounts is present. The disparity between the Leclerc et al. (1995) results is likely due to the wording of the experimental instrument in their study in which no indication is given regarding when the two journeys where to take place. It seems likely

[8] The same result was obtained when analysing the data for the two aggregate saving levels independently.

that the Leclerc et al. (1995) decision scenario provided a focusing mechanism [9] that made it easy for individuals to view the two train journeys as two very distinct entities (thus invoking topical accounts) that may even take place some considerable time apart. If this were the case then the Leclerc et al. (1995) decision scenario is not strictly the reverse condition of the classic jacket and calculator problem, where the purchases are to be made at the same time. The wording of the current design was chosen to ensure that the timing of the two journeys was viewed to be very close together.

In addition, the evidence supporting the use of topical mental accounts under the classic conditions of the 'jacket and calculator' problem is further qualified by the influence of the absolute saving level. In a prior study, Moon et al. (1999) report evidence of a 'threshold' effect, such that mental account effects are no longer observed when the level of absolute saving is increased sufficiently. Thus an upper bound may exist above which the absolute saving is so high that individuals switch from using topical accounts to minimal accounts (in line with the economic principle of rationality). The evidence reported here suggests that, in addition to an upper bound, there may also be a lower bound below which the level of absolute saving is so low that individuals do not frame the decision using topical accounts. Perhaps when the level of absolute saving is very small individuals simply make a choice intuitively without the 'aid' of mental accounts. In conjunction with the findings in Moon et al. (1999), the evidence reported here indicates that mental accounting effects may only be observable within a 'relevant' range.

To conclude, we do not claim that mental accounting effects are not present in individual decision making, however, we offer evidence to question their generality. It appears that individuals only frame decisions using topical accounts when specific conditions are present in the trade-off, specifically time spent for money saved but not vice versa. [10] There is also evidence to support the existence of a 'relevant' range outside of which mental accounting effects are not observed.

Acknowledgements

We gratefully acknowledge The International Institute of Banking & Financial Services for their generous financial support and Daniel Read, John Dickhaut and Rob Ranyard for helpful comments and suggestions. The contribution of conference participants at the World Meeting of the Economic Science Association, Barcelona, June 2001 is also recognised. We would also like to thank the Editor and two anonymous reviewers for their insightful suggestions.

[9] See Bonini and Rumiati (1996, 2002).

[10] The results reported in a previous footnote indicate that a second condition must also be present; the trade-off must be inter-medium.

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