

# Predictions on the go: Prevalence of spontaneous spending predictions

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## Abstract

The present research examines the prevalence of predictions in daily life. Specifically we examine whether spending predictions for specific purchases occur spontaneously in life outside of a laboratory setting. Across community samples and student samples, overall self-report and diary reports, three studies suggest that people make spending predictions for about two-thirds of purchases in everyday life. In addition, we examine factors that increase the likelihood of spending predictions: the size of purchase, payment form, time pressure, personality variables, and purchase decisions. Spending predictions were more likely for larger, more exceptional purchases and for item and project predictions rather than time periods.

Keywords: predictions, forecasts, spending, financial planning, mere-measurement.

## 1 Introduction

The ability to predict the future accurately has obvious benefits. Knowing how well a job interview will go, how long a home renovation will take, or how much a vacation will cost can help people to make well informed choices and decisions. But how often do people even attempt to make predictions? For example, do we typically pause to consider how much a desired item will cost before going ahead with the purchase? Do we estimate in advance how much a dinner out with friends will set us back? In the present research we explore whether people generate spending predictions spontaneously in everyday life, and examine factors that might increase the likelihood of making these predictions.

### 1.1 Research on predictions

A body of research on behavioral prediction has examined people's ability to predict a wide range of future behaviors and outcomes (for reviews see Armor & Taylor, 1998; Dunning, 2007; Helzer & Dunning, 2012; Krizan & Windschitl, 2007). Recently, one branch of this work has focused on personal spending predictions—forecasts about how much money one might spend or save during an event, time period, or purchase (Karlán & Zinman, 2012; Koehler, White & John, 2010; Peetz & Buehler, 2009, 2012; Sussman & Alter, 2012; Tam & Dholokia, 2011; Ülkümen, Thomas &

Morwitz, 2008).

The research on prediction has focused primarily on identifying biases in prediction and testing interventions to make predictions more accurate. Research on spending predictions in particular suggests that they are optimistically biased. For example, people underestimated their actual weekly spending by about 30% (Peetz & Buehler, 2009), and 35% of forecasters fell short on their summer savings goal (Koehler et al., 2010). This optimism is reduced with high confidence about the prediction (Ülkümen et al., 2008), the degree to which a purchase is perceived as exceptional (Sussman & Alter, 2012), the goal to conserve money (Peetz & Buehler, 2009), and the mental unpacking of the prediction (Peetz, Buehler, Koehler & Moher, 2015).

### 1.2 Predictions matter

Even when predictions about the self are inaccurate (Armor & Taylor, 1998; Dunning, 2007), they can still be highly consequential. Generating optimistic predictions can help to facilitate a desired behavior. For example, participants randomly assigned to make optimistic project completion predictions actually completed the target project earlier than those assigned to make pessimistic predictions (Buehler, Peetz & Griffin, 2010). Optimistic predictions may act as a goal or standard that can motivate performance (Sackett, Wu, White & Markle, 2014).

Furthermore, simply asking people to predict whether they will engage in a behavior influences the likelihood of the behavior taking place, a phenomenon known as the mere-measurement effect (Greenwald, Carnot, Beach & Young, 1987; Fitzsimons & Morwitz, 1996; Morwitz & Fitzsimons, 2004; Morwitz, Johnson & Schmittlein, 1993). The very act of making a spending prediction might increase the likelihood that the item will be purchased: people were 37% and 18% more likely to purchase a car and personal

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computer, respectively, if their intent to do so had previously been measured in a survey than if they had not been asked to predict these purchases (Morwitz et al., 1993).

### 1.3 Do people make predictions spontaneously?

Research on behavioral prediction, including spending predictions, has typically solicited predictions from participants in questionnaires or interviews. To date, no empirical evidence shows that individuals actually make predictions about themselves spontaneously, in their daily lives—or showing that these predictions are generated in a fashion similar to predictions solicited during a study. The present studies examine how often self-predictions, in the form of spending forecasts, are generated spontaneously, and what factors might contribute to their frequency. Although this research is exploratory, we expect that people make spontaneous, unprompted spending predictions for their everyday purchases.

**Definition of spending predictions.** We define spending predictions as estimates of the cost of an upcoming purchase. Note that this is distinct from predictions about whether or not the purchase will be made. Arguably, one may estimate (or not) the cost of a purchase that is entirely hypothetical, or one might estimate (or not) the cost of a purchase that will certainly be made. Predictions are a subcomponent of planning, yet may not always occur together: one may be able to plan a purchase without estimating the cost (instead planning other incidental aspects of the act of purchasing) or make spending predictions without taking any further steps to plan.

**Types of spending predictions.** Any of the following might be a spending prediction: “How much will I spend on a new TV?”, “How much will I spend on my kitchen renovation?”, “How much will I spend this month?”. However, these predictions differ in the range of individual purchases they comprise: spending predictions for time periods aggregate more individual purchase than predictions for projects or events. Predictions of individual items are “unpacked” predictions, and these may be simpler and therefore easier to make than aggregate predictions (Kruger & Evans, 2004). Indeed, spending predictions for events tend to be less biased than time period predictions (Peez & Buehler, 2013). In the present investigation, we distinguish between spending predictions for specific items, projects or events, and time periods.

**Future-oriented thought.** Although spontaneous spending predictions have not been directly examined in previous research, some evidence suggest that they exist. Predic-

tion is a form of future-oriented thought, and spontaneous future-oriented thoughts make up a considerable proportion of thought content in every-day life (Berndtsen & Jacobsen, 2008; D’Argembeau, Renauld & Van der Linden, 2011; Klinger & Cox, 1987; Smallwood et al., 2011). For example, in an exhaustive thought diary over one day, participants recorded an average of 52 future-oriented thoughts. Half of these future-oriented thoughts concerned the planning of an action and 14%–28% of thoughts concerned decisions (D’Argembeau et al., 2011). Predictions of spending are likely to play a role in both planning actions (e.g., purchasing a gift in preparation for a birthday party) and making decisions (e.g., deciding on the gift).

Mind-wandering concerning the future is also linked with autobiographical planning (Baird, Smallwood & Schooler, 2011), which could also involve predictions of spending (e.g., when planning one’s own birthday celebration or the next vacation). Mental time travel into the future can even be involuntary at times. Participants recording their thoughts about the future in a diary reported about 1–10 involuntary future representations a day (Berndtsen & Jacobsen, 2008).

Even closer to current concerns, part of the time spent thinking about the future is used to consider future finances (Lynch, Netermeyer, Spiller & Zammit, 2010). Participants were prompted every two days to report if in the past hours they had made any plans about how to budget or how to complete other projects in their life. They reported making short-term financial plans (for the next 1–2 days) 22% of the times they were contacted, and long-term financial plans (for the next 1–2 months) 11% of the times they were contacted.

At the same time, however, existing work on future-oriented thought also suggests that people do not make predictions for all their future actions. The fact that asking people to generate self-predictions influence their behavior (i.e., the mere-measurement effect, Morwitz et al., 1993) suggests that they were not doing this otherwise and the number of financial plans or thoughts about the future were sizable but can only refer to a subset of all future actions.

### 1.4 Factors increasing spontaneous predictions

We expect that predictions about specific purchases, projects, and time periods do sometimes occur spontaneously. However, the prevalence of these predictions likely depends on both the purchase and the forecaster.

First, aspects about the purchase situation might matter. In particular, the price of the purchase may influence the frequency of spending predictions. Small expenses may be regarded as less important and thus may be predicted less often. They are experienced as less negative, with less “pain of paying”, so much so that the loss aversion principle may be

reversed for very small losses (Harinek, Van Dijk, Van Beest & Mersmann, 2007; Zellermayer, 1996). Another aspect of a purchase that may influence spontaneous prediction is the payment method. Purchases made by credit card are remembered less well than purchases made with cheques or cash (Soman, 2001); people spend money more freely when it was received in form of a gift card rather than in form of cash (White & Urminsky, 2012), and when using credit cards than other forms of payment (Raghubir & Srivastava, 2008; Roberts & Jones, 2001). Therefore, predictions might be less common for credit and gift card purchases than for cash or debit purchases. A third relevant aspect of purchases might be the degree to which they are routine or exceptional. More expensive purchases tend to be classified as more exceptional, and thus exceptional purchases might be more critical to people's budget (and are therefore budgeted for more carefully) than routine purchases. People also tend to evaluate exceptional expenses in isolation, considering them unique rather than part of a set of similar expenses—this can lead to more errors in forecasting expenses (Sussman & Alter, 2012) but might also lead to more spontaneous predictions about specific purchases.

Second, aspects of the forecaster might matter. Some people are generally more oriented towards the future (Shipp, Edwards & Lambert, 2009; Zimbardo & Boyd, 1999) and some tend to make more plans (Lynch et al., 2010). Most tellingly, the general self-reported propensity to plan was linked to the frequency of thoughts about financial plans (Lynch et al., 2010)—and such planning may also be linked to the frequency of spending predictions for specific purchases. Finally, forecaster's wealth might matter. On the one hand, expenses are less critical to a wealthier individual's budget and as such they might care less about budgeting for or predicting the cost of inconsequential purchases. On the other hand, wealthier individuals might be more financially literate (Van Rooj, Lusardi & Alessie, 2012) which might include more experience in budgeting and more frequent spontaneous cost predictions. Reflecting these mixed possible effects of personal wealth, wealth (more savings and higher net home equity) was linked to better financial management (e.g., paying bills on time) but less overview knowledge of one's finances (e.g., knowing one's bank balance) in a large-scale sample of Dutch consumers (Antonides, de Groot, & van Raaij, 2011).

Third, the type of spending prediction made (for a specific item, a project, or a time period) may influence the frequency of spontaneous spending predictions. Predictions are more biased for aggregate forecasts (Kruger & Evans, 2004; Peetz & Buehler, 2013). This may indicate they are more difficult to make, or participants are less experienced making such predictions (i.e., fewer spontaneous predictions outside the lab) for specific items than for aggregate purchases such as time periods.

## 1.5 Overview of studies

This set of studies explores the prevalence of spending predictions in everyday life. We assessed spontaneous spending forecasts via daily diary procedures (Study 1), retrospective reports (Study 2), and prospective reports (Study 3). We also examined situational factors (e.g., size of purchase in Study 1–3, routine vs. exceptionality in Study 1 and 3), person-specific factors (conscientiousness in Study 1, wealth in Study 3 and 4) as potential variables that may affect the prevalence of spontaneous spending predictions. While Study 1 and 2 examine predictions for specific items only, in Studies 3 and 4 we extend our examination of spending predictions to examine other types of spending predictions (e.g., for projects, time periods).

## 2 Study 1—Predictions for items

This study examined the prevalence of spontaneous, day-to-day spending predictions for individual purchases using a daily diary procedure. We examined several characteristics of the purchase that might affect the likelihood of making a prediction: size of purchase, whether the purchase was made under time pressure, whether the purchase was considered exceptional or common, and the form of payment. We expected that predictions would be more likely for larger, more expensive purchases than smaller, less expensive purchases, and more likely for cash (and debit) purchases than for credit card (and gift card) purchases. We also expected that predictions would be less likely under time pressure and for routinely made purchases.

In addition, we assessed three characteristics of the persons making the purchase that might affect the likelihood of making predictions: propensity to plan financially (Lynch et al., 2010), general future orientation (Zimbardo & Boyd, 1999), and trait conscientiousness (Costa, McCrae & Dye, 1991). We expected that all these tendencies might be linked to higher prediction frequency. Specifically, the number of long-term financial plans during Lynch and colleagues' diary study was related to both the propensity to plan long-term and the propensity to plan short term (Lynch et al., 2010). Since spending predictions may be considered part of financial planning, propensity to plan might also predict the number of specific spending predictions people make on a daily basis. Future-focused individuals might be more likely to make predictions, since these are one form of future thought (Zimbardo & Boyd, 1999). Conscientious individuals may be both more likely to plan and look towards the future than less conscientious individuals (Shipp et al., 2009) and might thus be more likely to make spending predictions for specific purchases. We also included a number of other exploratory scales (e.g., a money attitude scale, a big five personality trait scale, and a regulatory focus scale).

## 2.1 Method

**Participants.** Eighty-nine undergraduate students enrolled in introductory psychology classes were recruited for this study and were compensated with course credit. Of these, 70 completed the study (i.e., they returned the diary) and were included in the analyses. The final sample consisted of 54 female and 16 male students ( $M_{age} = 20.09$  years,  $SD = 3.48$ ). Gender and age were not related to reported frequency of predictions and will not be considered further.

**Procedure.** Participants completed an intake survey in the lab and then completed a daily diary over the next seven days. All materials are included in the Supplement.

**Intake session.** Participants completed a demographic survey (age, gender). Spending predictions were first defined for participants: spending predictions are estimations of how much money one will spend, whether it is on a single item or a prediction for a time period. For example, one might estimate how much a specific item will cost before going out to shop for it, or when picking it up in a store.

Then participants reported how often they make spending predictions in daily life, on a scale ranging from Never (1) to Always (5). They also responded to a number of other exploratory variables, such as a description of the prediction process, that are beyond the scope of the current paper (see supplemental materials for a full list of variables).

Participants also completed scales assessing attitudes and personality traits. First, participants completed the Money Attitude Scale (Yamauchi & Templer, 1982) which includes subscales assessing Power and Prestige (e.g., “I must admit that I purchase things because I know they will impress others”, 9 items,  $\alpha = .77$ ), Retention (e.g., “I keep track of my money”, 7 items,  $\alpha = .84$ ), Distrust (e.g., “I hesitate to spend money even on necessities”, 7 items,  $\alpha = .79$ ), and Anxiety (e.g., “I worry that I will not be financially secure”, 6 items,  $\alpha = .67$ ) on scales ranging from Never (1) to Always (5). Next, participants completed the Ten Item Personality Inventory (Gosling, Rentfrow & Swann, 2003) on scales ranging from Disagree strongly (1) to Agree Strongly (7). Participants then reported their propensity to plan using the two financial planning subscales of the Propensity to Plan Scale (Lynch et al., 2010). These two subscales include short-term planning (e.g., “I decide beforehand how my money will be used in the next few days”, 6 items,  $\alpha = .80$ ) and long-term planning (e.g., “I actively consider the steps I need to take to stick to my budget in the next 1–2 months”, 6 items,  $\alpha = .88$ ), on scales ranging from Strongly disagree (1) to Strongly agree (6). Next, participants completed the Conscientiousness subscale of the Neo Personality Inventory (Costa et al., 1991). This 60-item scale is completed on scales ranging from Very inaccurate (1) to Very accurate (5).

We aggregated across the five subscales of Self-efficacy, Ductility, Self-discipline, Cautiousness, and Achievement-striving ( $\alpha = .91$ ). Participants also completed a scale assessing regulatory focus (Higgins et al., 2001), from which we computed a promotion orientation score (6 items,  $\alpha = .68$ ) and a prevention orientation score (5 items,  $\alpha = .82$ ). Finally, participants completed the Future Time Orientation subscale (e.g., “I make lists of things to do”, 13 items,  $\alpha = .75$ ) of the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) on scales from Very untrue (1) to Very true (5).

**Diary.** Participants were given spending diaries to track their purchases and predictions for seven days. Participants were given an envelope with seven pre-printed diary cards and an exit survey. Each card was labelled with a day of the week and included brief instructions on the front. On the back, the cards provided space to list each purchase made that day, the cost of the purchase, whether a spending prediction was made (yes, no), whether the purchase cost more or less than predicted, when the prediction was made (before going in the store, while browsing, while selecting, while waiting at check-out, when reaching for money), whether participants felt any time pressure at the time of purchase (yes, no), and the form of payment they used (credit card, debit card, cash, gift card). See the Supplement for a sample diary card. Participants were instructed to keep the envelope with them and to fill out a new line for each purchase they made during the week as soon as possible after the purchase.

**Exit survey.** The diary envelope also contained an exit survey examining whether participants were able to accurately recall the number of purchases they made throughout the week. The number of purchases reported on the exit survey and the summed purchases reported on the diary cards were not significantly different from each other ( $M_s = 11.02$  and  $9.74$ , respectively,  $t(65) = 1.00$ ,  $p = .322$ ). Most participants (92%) reported that they completed the diary cards immediately after the purchases or at the end of the day. The remaining 8% reported that they completed all the diary cards at the end of the week. Excluding these potentially problematic participants did not change the results; they were retained in the analyses below. Participants returned the envelope to a locked mailbox on the eighth day.

## 2.2 Results

**Descriptors of predictions.** Of the 420 predictions, the vast majority were made before even going to the store ( $n = 243$ , 57.9%) rather than while looking around in the store ( $n = 43$ , 10.2%), when selecting the item ( $n = 47$ , 11.2%), while waiting at the cash register ( $n = 59$ , 14.0%), or when paying for the purchase ( $n = 21$ , 5.0%). Seven predictions remained unspecified. Most purchases were made with debit



cards ( $n = 276, 41.0\%$ ) or cash ( $n = 222, 33.0\%$ ) rather than credit cards ( $n = 105, 15.0\%$ ) or preloaded gift cards ( $n = 60, 9.0\%$ ).

On average, predictions were \$2.88 ( $SD = 19.60$ ) lower than the actual price, which was significantly different from zero,  $t(419) = 3.01, p = .003$ . Therefore, participants exhibited an underestimation bias in their spontaneous predictions, similar to that observed for predictions elicited in lab research (Peetz & Buehler, 2009). Exploratory analyses revealed that the further removed from the purchase the prediction was, the less accurate it was (going to the store and looking around in the store: actual price was \$3.36 and \$4.23 more than predicted; when selecting the item and waiting at the cash: actual price was \$1.23 and \$1.50 more than predicted; when paying for the purchase: actual price was \$0.02 more than predicted). Thus, one of the contributing factors for spending prediction bias found in lab studies might be the timeframe—predictions generated for a research study tend to be temporally removed from the actual purchase. On the other hand, the exploratory finding that more than half of participants made their prediction before going to the store lends validity to predictions elicited far in advance of the purchase in a lab setting.

**Frequency of predictions.** During the intake session, participants reported making spending predictions “Sometimes” to “Often” ( $M = 3.50, M = .91$ ). According to the diaries, 663 purchases were made across all participants, ranging from \$0.60 to \$670.00 ( $M = \$27.80, SD = 63.40$ ). Unless otherwise noted, analyses are performed using the purchase as the unit of analysis (rather than the participant). Participants reported making a prediction for 420 of these purchases (61.6%). Participants’ overall report of prediction frequency during the intake session correlated with the percentage of predictions they reported making across all purchases in the diary,  $r = .34$ .

**Purchase characteristics.** Because purchases were not independent (each participant made several purchases), in all analyses below we conducted multilevel model analyses accounting for the within-participant variation, with prediction (1 = yes, 0 = no) as the dependent variable. Purchase cost affected prediction likelihood,  $F(1, 659) = 15.48, p < .001$ . Participants were more likely to make predictions for more expensive items. For example, predictions were made for 59% of items that might be considered small (less than \$20,  $n = 476$ ), compared to 72% of medium purchases (\$21–\$99,  $n = 152$ ) and 85% of large purchases (more than \$100,  $n = 34$ ).

Whether or not a purchase was marked as exceptional by the participants was also significantly linked to making predictions,  $F(1, 660) = 7.44, p = .007$ . Participants were more likely to have made predictions for exceptional purchases (78%) than routine purchases (22%).

Table 1: Correlations of personality variables with the percent of predictions made for all purchases listed in the week-long diary ( $N = 70$ ) (\*  $p < .05, + p < .10$ ).

		Predictions (%)
Money attitudes	Power and Prestige	-.20 <sup>+</sup>
	Retention	.40*
	Distrust	.14
	Anxiety	.14
Ten-item personality inventory	Conscientiousness	.02
	Agreeableness	-.20
	Extraversion	-.07
	Neuroticism	-.11
	Openness	-.10
Propensity to plan	Short term	.27*
	Long term	.28*
NEO R	Conscientiousness	.31*
Regulatory focus	Promotion	.16
	Prevention	-.05
ZTPI	Future Orientation	.09

Prediction likelihood was not affected by whether participants reported having been under time pressure,  $F(1, 661) = 0.80, p = .373$ , and the form of payment for the purchase,  $F(1, 659) = 1.27, p = .285$ .

**Consumer characteristics.** Table 1 presents the correlation between each assessed personality variable and the percentage of predictions made during the diary, conducted in analyses by participant (rather than by purchase). The percentage of spontaneous predictions was higher for participants higher in propensity to plan short-term,  $r = .27$ , higher in propensity to plan long-term,  $r = .28$ , and higher in conscientiousness,  $r = .31$ , and for participants reporting a money retention attitude,  $r = .40$ .

### 2.3 Discussion

Participants did report making spending predictions spontaneously in their daily lives when reporting on a purchase-by-purchase basis. This study also shed light on some of the factors affecting the likelihood of spontaneous predictions. Predictions were most frequently made by conscientious people with a propensity to plan, and most frequently made before even going to a store rather than in the purchase situation. Characteristics of the purchase—namely, the size of expense and the degree of exceptionality—also mattered.

Predictions were more frequent for larger, exceptional purchases than smaller, routine ones.

### 3 Study 2—Predictions for small, medium, large items

In the next study we examined the frequency of spontaneous spending predictions for purchases varying in size, given the finding that size of expense mattered in Study 1. We also examined both purchases that consumers decided to make and those they considered but did not make. It stands to reason that not every spending prediction leads to a purchase. Are spontaneous spending predictions more or less frequent in situations where consumers consider a product but decide not to make the purchase? We first asked participants to define small, medium, and large purchases subjectively, to nominate three purchases they made in the past week (or considered but did not make) that fit each of these categories, and then to indicate whether they made a prediction for each purchase.

#### 3.1 Method

**Participants.** Ninety-nine North American participants were recruited with the online tool, CrowdFlower and were compensated with a nominal amount of money (US\$0.50). The sample consisted of 51 female and 48 male participants ( $M_{age} = 38.23$  years,  $SD = 12.70$ ). Gender and age were not related to reported frequency of predictions and will not be considered further.

**Procedure.** After completing a brief demographic survey, participants were first asked to specify a price they considered a small purchase, a medium purchase, and a large purchase. Then, participants were randomly assigned to either think about purchases they actually made in the last week or to think about purchases they considered by did not make in the last week. They were asked to think about three specific purchases that fit these criteria (made vs. considered), one for each of the three expense size categories (small vs. medium vs. large). For each purchase, participants wrote down a keyword describing the purchase and the cost of the purchase.

For each purchase, participants then indicated whether they encountered this purchase opportunity in a store or online, and how they paid or would have paid for it (e.g., cash; credit card; debit card; other). Next, spending predictions were defined (as in the previous studies) and participants were asked if they had made a spending prediction for the purchase (yes, no). Note that not every participant made or considered three purchases in the last week that fit the small, medium, and large categories, and that these missing

Table 2: Frequency of spontaneous spending predictions (Study 2).

	Purchases made	Purchases considered
Small expense	76%	44%
Medium expense	79%	76%
Large expense	81%	79%

data accounts for the difference in degrees of freedom between analyses (e.g., in 31 cases participants did not make a purchase of the respective size in the past week and in 7 cases they did not specify whether or not they had made a prediction).

#### 3.2 Results

**Expense definitions and purchases.** An examination of participants “typical” price indicated that the average cost of items considered small was \$12.70 ( $SD = 18.10$ ), compared to items considered a medium expense ( $M = \$84.88$ ,  $SD = 149.42$ ), or large expense ( $M = \$1,084$ ,  $SD = 5,475.67$ ). Purchases that were actually made and purchases that were only considered did not differ in cost in any of the three price categories,  $t_s < 1.28$ ,  $p_s > .203$ .

**Frequency of predictions.** In total, 259 purchase items were listed across all participants. Participants reported making a spending prediction for 187 of these purchases (72%). Analyses below are performed using the purchase as the unit of analysis. Because purchases were not independent (each participant made several purchases), we conducted multilevel model analyses accounting for the within-participant variation. A 2 (decision: bought vs. considered) by 3 (purchase: small vs. medium vs. large) mixed model test of fixed effects revealed a significant main effect of size of purchase,  $F(2, 253) = 5.28$ ,  $p = .006$ , a main effect of decision,  $F(1, 253) = 5.03$ ,  $p = .026$ , and an interaction effect,  $F(2, 253) = 3.19$ ,  $p = .043$ . Participants reported making fewer spending predictions for small items than medium or large items, but this effect was more pronounced for purchases that were only considered than those that were actually made (Table 2). Predictions were equally common across online and in-store purchases,  $F(1, 254) = .14$ ,  $p = .712$ , and equally common across the four forms of payment,  $F(4, 254) = .27$ ,  $p = .895$ .

#### 3.3 Discussion

As in Study 1, cost seemed to be a determinant of spontaneous spending predictions - participants recalled making

more spending predictions for more expensive items. In addition, this study showed that it was more likely that consumers would have made a prediction about the cost of an item for those items that were actually purchased than those that were not purchased. It might be more difficult to remember thoughts involving a negation experience (i.e., *not* buying something) than an actual experience, just as it is more difficult to imagine future negation experiences (Levav & Fitzsimons, 2006). It may also be that a prediction is an indicator of greater commitment or interest in the item, which is also driving the decision to buy. Alternatively, the very act of making a spending prediction might lead to a greater likelihood to buy an item (especially if this decision is not perceived as too costly; i.e., small purchase sizes), a pattern similar to the mere measurement effect (Morwitz et al., 1993).

## 4 Study 3—Predictions for routine vs. exceptional purchases

Another factor besides cost that mattered in Study 1 was the degree to which the purchase was routine or exceptional. In the next study we examined the likelihood of spontaneous spending predictions for purchases varying in the degree of exceptionality. We selected items most frequently marked as routine purchases by participants in Study 1 (cup of coffee, book) and items most frequently marked as exceptional (shoes, CD/DVD). We asked participants to think back to the last time they had bought each of these items and then to indicate whether they made a spending prediction for each purchase.

So far, the past studies focused on one type of spending predictions: predictions for specific items. In the next study, we also wanted to examine another type of spending prediction: predictions for events, i.e., purchases that include several items but that might be perceived as one unit of purchase nonetheless. We chose two events that might be considered routine (grocery shopping, dinner out) and two events that would be less frequent and therefore more exceptional (a short trip, a home renovation). We asked participants to think back to the last time they had experienced such an event and then to indicate whether they made a spending prediction for each event. We also examined the third type of spending prediction: Whether people spontaneously consider the amount they will spend during a specified time period (i.e., a day, a week, or a month). These time periods could not be classified into routine/exceptional purchases, but are considered separately.

In addition to examining different types of predictions, we also examined an additional personal characteristic that might be linked to the likelihood of spontaneous spending predictions: wealth (annual income). Finally, we attempted to learn more about people's reasons for not making predic-

tions by asking them to explain instances where they did not make predictions.

### 4.1 Method

**Participants.** One-hundred and forty North American participants were recruited from CrowdFlower and were compensated with a nominal amount of money (US\$0.50). The sample consisted of 56 female and 80 male and one gender-unidentified participants ( $M_{age} = 34.10$  years,  $SD = 12.09$ ).

**Procedure.** Participants were randomly assigned to recall 4 purchased items, 4 past events, or 3 time periods. In the item condition, they were asked to recall either the last time they'd bought a cup of coffee, a book, a pair of shoes, and a phone (counterbalanced order). In the event condition, they were asked to recall the last time they went grocery shopping, out to dinner, went on a short trip, and did a small home renovation (counterbalanced order). Coffee, book, groceries and dinner were chosen to be routine; shoes, phone, trip, and renovation were chosen to be exceptional. For each purchase, they reported when this occurred (1 = last week, 2 = last month, 3 = last year, 4 = more than a year ago). In the time period condition, participants were asked to think about yesterday, last week, or last month.

Next, participants were asked if they had made a spending prediction for the item, event, or time period (yes, no). If they had not made a prediction, they were asked to briefly describe their reasons. A research assistant coded participants' responses. Participants in the item and event conditions also reported when they had made the prediction (before visiting the place of purchase/starting the project, while in the place of purchase (during the project), just before paying (at the end of the project), and the frequency with which they usually buy similar items or engage in similar events on a scale from Never (1) to Very frequently (7). All participants reported the final cost in dollars.

Finally, participants completed a brief demographic questionnaire assessing age, gender, and income. Participants reported personal income and household income (annual) on 10-point scales from 0–30000 (1), 30000–40000 (2), (...), 90000–100000 (9), more than 100000 (10). Income was approximately normally distributed.

Because time period predictions assessed only some of the reported variables and did not vary between routine or exceptional purchases, they will be considered separately in the analyses. Note that some participants did not make some of the specified purchases.

### 4.2 Results

**Purchase exceptionality.** Items and events construed to be more routine (coffee, book, groceries, dinner; mean fre-

Table 3: Frequency of spontaneous spending predictions and purchase characteristics (Study 3).

	Items		Events		Time period		
	Routine	Exceptional	Routine	Exceptional	Day	Week	Month
Frequency of purchase (s.d.)	4.12 (1.72)	3.60 (1.30)	5.26 (1.53)	3.57 (1.29)			
Average cost in \$ (s.d.)	11.43 (14.84)	35.32 (32.87)	76.54 (79.56)	494.47 (439.46)	45.42 (92.84)	170.75 (225.58)	1124.71 (1193.43)
Last purchase (scale 1-4) (s.d.)	2.22 (1.06)	2.76 (0.89)	1.32 (0.61)	2.65 (.88)			
[ Spending predictions	65%	74%	62%	79%	51%	45%	50%

quency of 4.71 on the 1–7 scale) were, as expected, purchased more frequently than those that were construed to be more exceptional (shoes, smartphone, trip, renovation; 3.55;  $t_{137} = 2.29, p = .024$ , across participants; see Table 3). All four of the routine purchases were purchased more frequently than each of the exceptional purchases.

**Frequency of predictions.** Participants reported making a spending prediction for 111 (69%) of the items, 117 (70%) of the events, and 74 (49%) of the time periods. Time periods were significantly less common than both predictions for events and items ( $p < .005$  for both, by  $t$  test). Events and items did not differ.

Predictions were more frequent for exceptional items (67%) than routine items (57%;  $t_{137} = 2.29, p = .024$ ; see Table 3). The correlation across the 8 items between frequency of purchase and frequency of predictions was  $-.83$  ( $p = .011$  with 6 df).

The cost of the purchase did not correlate significantly with the frequency of prediction for purchased items,  $r(154) = .14, p = .08$ , or purchased events,  $r(161) = .11, p = .15$ , or time periods,  $r(145) = .09, p = .300$ .

**Consumer characteristics.** We next examined how aspects of the participant affected the likelihood of predictions of each type. We entered age, gender, personal income and household income as predictors (controlling purchase exceptionality) and frequency of predictions as dependent variable in multilevel model analyses accounting for the within-participant variation. None of these predictors had a significant effect on spending predictions for items ( $\beta < .12, p > .16$ ) or spending predictions for events ( $\beta < .02$ ). Note that this was unchanged when entering the predictors separately. Age, gender, or personal income were not linked to spending predictions for time periods ( $\beta < .12, p > .25$ ), but greater household income was possibly linked

to fewer spontaneous spending predictions for time periods ( $\beta = -.22, p = .038$ ).

**Why not make a prediction.** A research assistant coded participants’ responses to the open ended question probing for reasons why they had not made a prediction. Participants who did not make a prediction reported reasons such as the price being too small to be considered significant (16.3%), there having been too little information to make an informed prediction and prices vary too much (28.8%), the expense being routine and therefore unnecessary to predict (10.9%), and that it was an impulse purchase (9.2%). Other responses mainly included participants saying they don’t usually make predictions, because they “don’t need to” or “didn’t think of it”.

Mentioning routine as a reason for not making a prediction was not linked to the frequency of the purchase item or event, however,  $\text{textit}(99) = .07$  and this reason was mentioned equally often for the routine purchases (17%) as for the exceptional purchases (11%),  $F(1, 125) = .84, p = .361$ . Mentioning routine was most common among people who did not make a spending prediction for items (21.3%) compared to projects (7.6%) or time periods (10.9%),  $\chi^2 = 10.79$  ( $N = 184, df = 2$ ),  $p = .005$ . The expense being too small to bother with a prediction was mentioned equally often across types of prediction,  $\chi^2 = .13$  ( $N = 184, df = 2$ ),  $p = .938$ . There having been too little information to make an informed prediction was mentioned equally often across types of prediction,  $\chi^2 = 1.17$  ( $N = 184, df = 2$ ),  $p = .557$ .

### 4.3 Discussion

In this study we distinguished between types of predictions, specifically estimates of costs for concrete items, events, or time periods. Spontaneous spending predictions were less common for time periods than for events or items. This is particularly notable because time periods are most com-



monly studied in lab experiments (Ülkümen, et al., 2008; Peetz & Buehler, 2009), although items (Sussman & Alter, 2012) and events (Peetz & Buehler, 2013) have also been studied. We also examined a characteristic of purchases that mattered in Study 1 (purchase exceptionality) more closely, finding again that spontaneous predictions were more frequent for exceptional purchases than routine purchases. We also examined an additional characteristic about the consumer (wealth). Income was related to fewer spontaneous spending predictions for time periods, but did not seem to matter to the frequency of item or event spending predictions. It may be that subjective wealth (how wealthy people feel) is more predictive of their budgeting behavior than their objective wealth.

## 5 Study 4—Prospective predictions for items, events, time periods

So far, our studies relied on recall (i.e., retrospective reports of spending predictions for purchases that had already been made). Although this method has the advantage of capturing spending predictions at all stages of the process, up to right before the purchase, it may be biased in a number of ways. For instance, people's memory could be biased by their knowledge of the price after buying an item—which may be mis-attributed to knowledge before the purchase. Thus, retrospective estimates of prediction frequency might be inflated. On the other hand, people might forget spending predictions that occurred a long time ago (i.e., well before a purchase), leading to an under-reporting of spending predictions. Thus, intercepting people before a purchase to assess whether spending predictions have already been made should shed more light on the frequency of spontaneous spending predictions.

In the next study we examined the frequency of spontaneous spending predictions for purchases that had not yet been made (i.e., prospective purchase predictions). We again examined three types of spending predictions: items, events, and time periods (a day, a week, a month). Items and events were nominated by participants themselves. As in Study 2, we distinguished between small, medium, and large expenses to match the structure of three time periods. As in Study 3, we assessed the rated exceptionality of the purchases, to examine this purchase characteristic as potential predictor of spending prediction frequency.

We again examined wealth as a consumer characteristic that might affect the frequency of spontaneous spending predictions. In addition to annual income, however, we also assessed subjective wealth (the subjective feeling of being financially well off) which may be more directly linked to people's behavior and may be independent from their objective wealth. Finally, we assessed the likelihood of purchasing the item (or engaging in the event) to how closely this

was related to making a spending prediction.

### 5.1 Method

**Participants.** Two-hundred and eighty-two North American participants were recruited from CrowdFlower and were compensated with a nominal amount of money (US\$0.50). The sample consisted of 165 female and 117 male and nine gender-unidentified participants ( $M_{age} = 35.47$  years,  $SD = 12.83$ ).

**Procedure.** Participants considered three upcoming expenses they were considering in the “near future” and answered the same questions about each of them. The three expenses each participant was asked to consider were randomly selected from a total of nine expenses in a 3 (type of prediction: item, event, time period) by 3 (expense size: small/tomorrow, medium/next week, large/next month) design. For each of the three expenses, participants specified the actual purchase they were considering by writing down a keyword (items), a description (event) or a date-range (time period). They then reported whether they had already made a prediction of how much money they might spend on the purchase/event/during-the-time-period (yes, no) and, if answering no, were asked whether they would still make a prediction before the purchase would be completed (yes, no). If answering no again, they were asked to explain why they would not make a prediction. If answering yes to either question, they were asked to explain why they had made or would make a prediction. These explanations were coded by a research assistant for common themes as in Study 3.

Participants were then asked to rate the degree to which the expense is exceptional or routine, on a scale ranging from “This expense [event, tomorrow/next week/next month] is routine” (1) to “This expense[event, tomorrow/next week/next month] is exceptional” (7). Then they estimated how much the expense/event/time period would cost (in \$) and estimated the probability of actually purchasing the item or going through with the event (this question was not asked for the time period predictions).

Finally, participants completed a demographic questionnaire. In addition to age, gender, personal and household income (as in Study 3), we also assessed subjective wealth. Participants were instructed that “Sometimes people feel financially well off or strained—regardless of the actual dollar amount they own.” and were asked to indicate their own feelings on two 10-points scales with the endpoints “Feel very financially strained” to “Feel very financially well-off” and “Feel very financially insecure” to “Feel very financially secure”, respectively. These two scales correlated highly,  $r(278) = .84$ , and were averaged into an index of subjective wealth. Subjective wealth was positively correlated with personal income,  $r(276) = .25$ , and household income,  $r(278) = .16$ .

## 5.2 Results

**Frequency of predictions.** Participants reported having made a spending prediction for 251 (88%) of the items, 222 (78%) of the events, and 180 (62%) of the time periods. Thus, overall, predictions for events were more frequent than predictions for items,  $\chi^2 = 10.96$ ,  $p = .001$ , and predictions for both items and events were more frequent than predictions for time periods,  $\chi^2 > 51.01$ ,  $p < .001$ .

As shown in Table 4, predictions were more frequent for events and items than for time periods regardless of whether the expense size was small, medium or large, whether the category was an item or event, or whether the time period was a day, week or month (matched pairs  $t = 5.46$ ,  $p < .001$ , across the 211 participants who did at least one item in each group; Fisher test  $p = .012$  for the three time periods all greater than the six other conditions).

**Purchase characteristics.** We examined whether the perceived exceptionality of expenses differed by type or expense size. A 3 (type of prediction: item vs. event vs. time period) by 3 (size: small vs. medium vs. large) mixed model test of fixed effects revealed a significant main effect of type of prediction,  $F(2, 843) = 75.94$ ,  $p < .001$ , a main effect of expense size,  $F(2, 843) = 43.68$ ,  $p < .001$ , and an interaction effect,  $F(2, 843) = 6.51$ ,  $p < .001$ . Events and items were rated as more exceptional than time periods, and larger expenses were rated as more exceptional than smaller expenses (Table 4). This difference in the degree of exceptionality mattered: the greater number of spending predictions that were already made for time periods compared to items or events was partly due to time periods being perceived as more routine, as suggested by a mediation analysis (Preacher & Hayes, 2004). The indirect effect of type of prediction (time periods vs. events) on prediction frequency via exceptionality was significant [ $CI: -.42; -.10$ ]. Similarly, the indirect effect of type of prediction (time periods vs. items) on prediction frequency via exceptionality was significant [ $CI: -.38; -.06$ ].

Next we examined the cost of the intended purchases by condition. A 2 (type of prediction: item vs. event) by 3 (expense size: small vs. medium vs. large) mixed model test of fixed effects revealed no main effect of type of prediction,  $F(1, 507) = 1.44$ ,  $p = .232$ , and no interaction effect,  $F(2, 507) = .88$ ,  $p = .418$ , only a main effect of expense size,  $F(2, 507) = 46.34$ ,  $p < .001$ , with larger purchases being more expensive than smaller purchases (Table 4). The frequency of predictions already made or total predictions was weakly unrelated to purchase cost,  $r = .06$ , and  $r = .08$ , respectively.

Next we examined the likelihood of purchasing the nominated item or engaging in the nominated event. A 2 (type of prediction: item vs. event) by 3 (expense size: small vs. medium vs. large) mixed model test of fixed effects revealed

no main effect of type of prediction,  $F(1, 549) = 0$ ,  $p = .995$ , and no interaction effect,  $F(2, 549) = .40$ ,  $p = .418$ , only a main effect of expense size,  $F(2, 549) = 8.82$ ,  $p < .001$ , with larger purchases being judged to be less likely to be actually purchased than smaller purchases (Table 4). The frequency of predictions already made or total predictions was unrelated to purchase likelihood for items,  $r = -.10$ , and events,  $r = -.12$ .

**Consumer characteristics.** We next examined how aspects of the participant affected the frequency of predictions of each type. We entered age, gender, personal income and household income and subjective wealth as predictors (controlling purchase size) in multilevel model analyses accounting for the within-participant variation. For items and events, none of these predictors had a significant effect on frequency of spending predictions,  $F_s < .99$ ,  $p_s > .322$ . For events, only subjective wealth and household income predicted the likelihood of spending predictions,  $F_s > 7.46$ ,  $p_s < .007$ , with greater income and greater subjective wealth being linked to fewer predictions. For time periods, only subjective wealth predicted the likelihood of spending predictions,  $F = 7.78$ ,  $p = .006$ , with greater subjective wealth being linked to fewer predictions.

**Reasons for making or not making a prediction.** Participants who did not make a prediction reported reasons such as the price being too small to be considered significant (17.3%), there having been too little information to make an informed prediction (because prices vary too much, 29.7% or because the purchase is too far in the future, 20%), the expense being routine and therefore unnecessary to predict (10.3%), and that it was an impulse purchase (2.7%). Other reasons (20%) included reasons such as “Because I do not want to think about having to spend money” or “I don’t have money to spend right now.”

Participants who did make a prediction or reported wanting to make a prediction in the future reported reasons such as using the prediction to stay on budget (choose a purchase that fits their budget, 24.9%) or using the prediction to adjust their budget (choose a budget that fits the intended purchase, 36%), to make the decision of whether or not to buy the item or do the project (4.4%), and that they knew the price already (e.g., “Because I know what I need and how much it costs”, 10.3%). Other responses (10.5%) included responses such as “Because I always do it.” An additional 4.4% of participants mentioned that they made a prediction only because of the survey itself.

Table 4: Frequency of spontaneous spending predictions already made for upcoming purchases (Study 4).

	Type of prediction								
	Items			Events			Time Period		
	Small	Medium	Large	Small	Medium	Large	Day	Week	Month
Predictions already made	84%	85%	96%	74%	81%	77%	52%	73%	62%
Made and expected predictions	93%	94%	97%	83%	81%	88%	64%	80%	73%
Expectationality (s.d.)	3.60 (1.96)	4.99 (1.52)	5.95 (1.50)	4.20 (1.82)	5.21 (1.50)	5.45 (1.76)	3.01 (2.10)	3.40 (1.89)	3.52 (1.85)
Purchase cost in \$ (s.d.)	41.67 (101.52)	157.70 (439)	1858 (3550)	49.82 (81.89)	257.12 (682)	2457 (4231)			
Likelihood of purchase (s.d.)	9.01 (2.22)	8.94 (1.99)	8.34 (2.09)	9.19 (1.99)	8.99 (2.03)	8.08 (2.88)			

### 5.3 Discussion

This study examined prospective spending predictions for future purchases. Again, spending for time periods (days, weeks, months) was less likely to be predicted than spending for specific items or events. This finding falls in line with previous research documenting biases in forecasts: as predictions are more biased for aggregate forecasts (Kruger & Evans, 2004; Peetz & Buehler, 2013) than “unpacked” or concrete forecasts, this may indicate aggregate forecasts are more difficult to make and participants are less experienced making such predictions. Additionally, some preliminary evidence in this study suggests that time periods are perceived as more routine and less exceptional than specific items or concrete events, which also contributes to fewer spending predictions.

Notably, the prevalence of spending predictions was generally much higher in this prospective study than in the previous studies which relied on retrospective reports. Retrospective studies may result in an under-reporting of spontaneous predictions to the extent that the cognitive processes surrounding an upcoming event (i.e., predictions concerning the event) become less accessible after the event has transpired. It is also conceivable, however, that the prospective design led people to over-report making spontaneous predictions. For instance, social desirability concerns (i.e., being financially responsible and budgeting for expenses) may exert more influence when the period for making predictions is not over yet, and it may be easier to convince oneself that predictions will still be made. Thus we cannot be certain that the prevalence data from this study are necessarily more accurate than those of previous studies. The study does provide convergent evidence, however, that people frequently generate predictions of their upcoming expenses, and that the likelihood of doing so varies meaningfully as a function of purchase and consumer characteristics.

## 6 General discussion

Major life decisions (e.g., whether to have a child, when to retire) as well as everyday choices (e.g., where to buy lunch, which shirt to buy) may—and arguably should—involve a consideration of future expenses. Failing to make predictions about potential costs could result in choices that are later regretted or unwise. Indeed, there is some evidence that those who actively budget and make financial plans are more likely to be financially stable (Beutler & Mason, 1987; Lusardi & Mitchell, 2007; Lynch et al., 2010).

The present research suggests that spontaneous spending predictions occur quite frequently—people appear to forecast the cost of many, if not most, of the purchases they contemplate. The prevalence of spending predictions varied considerably across studies, and thus it would be premature to propose a specific numerical value of the likelihood of these cognitions. However the studies are the first to provide empirical evidence that people sometimes do generate predictions, even when not asked to do so.

Such evidence addresses a potential concern with existing research. Research on behavioral prediction in general, and spending predictions in particular, has studied predictions solicited by researchers but, to date, had not documented whether people, left to their own devices, would ever spontaneously generate predictions. Our work suggests that, indeed, they do, and thus affirms the value of ongoing research on behavioral prediction.

The studies also identified several factors that may influence the likelihood of a spontaneous prediction. Spending predictions were more likely for concrete items or specific events than for time periods, both when predictions were reported retrospectively or prospectively. Spontaneous spending predictions were also more likely when the purchases were more expensive and more exceptional, rather than rou-

tine, and when the purchaser was conscientious and generally prone to planning. More expensive purchases may be more likely to prompt predictions, perhaps because of their greater significance and impact on one's financial situation. This would suggest that predictions may also be less frequent among more wealthy individuals. Indeed, income was linked to fewer time period predictions in one study—but income and subjective feelings of wealth were linked to more event and time period predictions in another study. Future studies might tease apart the different ways in which wealth may affect predictions or financial planning more generally. If purchases matter less (because individual purchases are relatively inconsequential for one's overall budget if one is wealthy) people might be less concerned about cost and cease making spending predictions. On the other hand, wealth might lead to better budgeting and financial literacy (Van Rooj et al., 2012), part of which may be frequent forecasts of costs for everyday expenses.

**Future directions.** Spending predictions may serve many functions. According to participants' self-reflections, the main reason to make a prediction is to stick to a budget or ensure that they don't spend too much. On the other hand, reasons not to make a spending prediction included not having enough information yet to make a meaningful prediction, not bothering to make a prediction about small inconsequential purchases—this reflects the result across studies that larger purchases received more predictions—and not making a prediction because they already know what the price will be. Future research might examine whether the reason to make a prediction affects the quality of predictions and whether it reflect functional or dysfunctional budgeting over longer time periods.

The present investigation focused on the prevalence of spontaneous spending predictions. Future research might also examine exactly how spending predictions are made when they are made spontaneously (rather than in the lab). For instance, thought protocols might shed light on the steps taken to estimate costs for different types of spending predictions—concrete items, events, and time periods. People may arrive at spontaneous cost estimates in different ways (e.g., via past experiences or scenario construction), and some might include an estimate of purchase likelihood alongside a purchase cost estimates. Thus, spontaneous predictions reported by our participants might represent an aggregate of several divergent cognitive processes that are considered to be “spending predictions”.

It is also important to note that throughout our studies, we relied on participants' self-report. We attempted to increase the accuracy of the self-report through greater immediacy (e.g., diary study, Study 1), by considering both retrospective and prospective (Study 4) purchases, and by considering both purchases that were actually made and those that

were only considered (Study 2). Regardless, self-report is prone to a host of biases including memory biases and social desirability (estimating costs might be seen as desirable and responsible). Because spending predictions are internal thought processes it would be a challenge to assess them in an unbiased manner—one possibility for an indirect measure of spending predictions might be to assess people's surprise at learning about the price of a purchase. Surprise implies a form of expectation or forecast. Such a method may also capture spending predictions that are formed implicitly, without deliberation.

**Implications.** It is perhaps no surprise that people sometimes try to forecast the future—there are entire industries based on people's desire to know tomorrow's weather or next year's investment returns. However, the present research makes a novel contribution by testing the prevalence of forecasts empirically for a specific type of forecast. Our focus on specific purchase predictions extends and supports research that has examined the prevalence of financial planning (Lynch et al., 2010) and the prevalence of general thoughts about the future (Berndtsen & Jacobsen, 2008; D'Argembeau et al., 2011). Indeed, prevalence of thoughts about the future might vary along the dimension of abstraction, with general future oriented thoughts on one end of the spectrum and predictions about specific purchases on the other end—and intermediate levels of abstractions such as spontaneous financial plans or spontaneous spending predictions for more general events or time periods.

We would like to emphasize that the present research does not allow us to advocate for interventions that increase prediction frequency. Spontaneously generated predictions—like predictions prompted by study instructions—varied in terms of accuracy. At least in Study 1 there was a marked tendency towards optimism in predicted purchase prices. Since the benefit of predictions might be tied to their accuracy, simply making more predictions might not improve people's budgeting. However, the knowledge that spending predictions happen spontaneously in people's daily life might spur the development of interventions to improve these unprompted predictions. There is already a bulk of evidence on how to make predictions in general more accurate (e.g., Buehler, Griffin & MacDonald, 1997; Preetz et al., 2015; Ülkümen et al., 2008). But it might also be important to develop interventions to encourage people to make predictions at all. The present exploratory studies identified some preliminary factors that might contribute to the frequency of spontaneous spending predictions, but it stands to reason that there are many more factors that may affect prediction prevalence. Ultimately, this information may be used to assist individuals in making better financial decisions and improve their financial well-being.



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