

## Investors' Short Term Decision Making and Review of the Hindsight Bias Effect

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### Abstract

An important bias in the field of cognitive psychology describes a situation in which individuals are required, ex-post, to estimate the objective likelihood, ex-ante, for a particular event to take place. This psychological bias is called Hindsight Bias, and is the mistaken tendency to believe, after the fact, in one's ability to foresee an event in advance. This article explores the bias for data from the capital market, and in particular, it examines the decision-making ability for short-term investment based on the paper by Fischhoff (1975). In the experiment, subjects were given a sum of money which they were asked to invest in various financial assets, after having seen their historical returns charts. In this study, I examined three principal questions: (1) Whether a difference exists in the hindsight bias effect for younger subjects than for older ones. (2) Whether subjects with higher income are affected in their decision-making process in a similar way as do lower income subjects. (3) Whether a difference exists in the effect between solid investors and speculative investors with regards to their short-term decision making. Results from the first examination show strong evidence for hindsight bias for all types of events, although the effect impacts older subjects more strongly than it does younger subjects. Results from the second test indicate that higher income investors are more influenced by the effect for positive events, but for negative events the trend changes and they are less impacted by the effect. Results from the third test show strong evidence for hindsight bias for speculative investors, but no evidence of the effect is seen for solid investors.

**Keywords:** Behavioral finance, Investment behavior, Decision making, Financial psychology, Investment decisions, Investments, Investor bias.

### 1. Introduction

In recent years, the realization that psychology plays a significant role in the capital market has developed among those engaged in investments. The decisions these investors make are not always consistent and not always based on an ordered mathematical algorithm as many economists argue, but are based on emotions such as risks aversions and psychological biases such as the preference for the present than for the future.

A central problem in the investment world stems from the gap between the perception of investors to profit or loss, and their ability to cope with actual losses. In recent decades we have been witnessing more and more studies that examine the following question: whether the markets, and the investors operating in them, act rationally. Most of these studies focus on the non-rational decisions that investors have made, as the assumption is that the best option out of all alternative ones will be chosen. Classical economics cannot explain the problem, as it assumes that investors act rationally; behavioral economics, however, assumes that investors are not entirely rational, and that some of their activities arise out of psychological biases, for which reason the latter is better able to explain the phenomenon.

A behavioral explanation for this phenomenon was given by Kahneman and Tversky (1979) in their groundbreaking paper that explained the difference in investors' behaviors in situations of financial gain versus financial loss. Their primary conclusion was that the suffering caused by a financial loss was worse than the pleasure derived from a similar financial profit. They proposed the Prospect theory as an alternative description to the utility theory, the dominant normative theory of decision making under uncertainty.

Many studies in the fields of cognitive psychology and decision-making have shown how different psychological biases cause people to utilize simplistic strategies and rules of thumb to ease information processing during moments of choosing and decision-making.

An important bias in the field of cognitive psychology describes a situation in which individuals are required, ex-post, to estimate the objective likelihood, ex-ante, for a particular event to take place. According to this bias, individuals will assess that an event is more likely to take place if the event has happened in the past. This psychological bias is called hindsight bias, and is the mistaken tendency to believe, after the fact, in one's ability to foresee an event in

advance. Shiller (2006) defines the hindsight bias as the tendency to believe the ability to foresee the materialization of a scenario before it had taken place, granted that enough attention has been dedicated to it beforehand; a bias that encourages a simplistic view of the world and a sense that reality can be predicted early.

One of the most significant implications of hindsight bias is that it gives investors an incorrect sense of confidence when making investment decisions. Overrating the accuracy of past forecasts can lead to unwarranted risk taking and can lead investors to plan for results that may seem obvious, but that actually consist of much more uncertainty than they perceive. For example, an investor is interested in buying a stock, but due to various considerations and doubts decides not to acquire it. In the case that the stock's value increases, the investor will likely forget his earlier conflicts that caused him not to buy the stock and get a sense of confidence in his ability to predict market behavior.

According to Rudiger (2007), hindsight bias affects different stages of designs, processes, contexts, and situations. Furthermore, a theory explaining, at least in part, what may cause hindsight bias has been put forth by researchers at the Max Planck Institute for Human Development's Center for Adaptive Behavior and Cognition (ABC). They propose that the bias is an intellectual mechanism that unclutters the human mind by sparing it inaccurate information and welcoming answers that seem more correct.

There are three different psychological explanations for the phenomenon hindsight bias.

- 1) The Just World theory - people feel safer when the world seems orderly and predictable; it is especially noticeable in the ability to foresee bad events.
- 2) Cognitive explanation - people naturally tend to connect a result with events that preceded it, to form a coherent story and plot. They relate the result to some of the circumstances that preceded it and by doing so, make the circumstances seem more important than the circumstances which were seen in foreseeing the future. Similarly, people give less weight to the circumstances found that could have brought about contrary results.
- 3) Impression management - according to this explanation, the fact that the phenomenon was found in studies conducted in the field, does not mean that the phenomenon also exists in practice. This explanation relates the bias to the tendency of people not to appear inferior to others. This way, subjects of experiments attempted to direct the outcome closer to what they were told had taken place. The main objective of this paper is to empirically analyze the effect of the hindsight bias on trading decisions made by investors when considering assets' past performances. The experiment process follows those presented in Camerer et al. (1989).

In this article, four events that took place in the past were considered, two positive events (one internal and one external) and two negative events (one internal and one external). For each event the subject was required to invest a virtual sum of money in 10 financial assets for one month, and not be able to change the details of the portfolio during the month. For this experiment, 204 economics students participated and were randomly divided into two groups: (1) Group C – a control group, was asked to invest the money without having been given information about the future returns of the asset, (2) Group H – a test group, was exposed to performance returns at the end of the month, and was asked to assess how participants in group C, on average, had invested their money. I divided the groups according to three socio-economic criteria:

- 1) Older subjects compared to younger ones,
- 2) Higher income subjects compared to lower income ones, and
- 3) Speculative subjects compared to solid subjects.

I examined whether the effect influenced one group more than the other for each type of characteristics. The results show that the hindsight bias effect does exist, but that the groups respond to it differently.

The rest of the paper is structured as follows: in Section 2, I assess the literature on hindsight bias, presenting the psychological aspects as well as its economic applications. In Section 3, I describe my experimental design and research methodology. Section 4 outlines my hypotheses and provides the empirical tests and the results. Section 5 concludes and offers a brief discussion.

## **2. Literature review**

Many investors tend to rely on past return data for predicting market behavior. One phenomenon explored in behavioral psychology literature, hindsight vision (hindsight bias), can explain this phenomenon, and is described as the misconceived tendency to believe, after the fact, that the investors can anticipate an outcome, and so carry with them excess confidence in their prediction.

The first studies in this field were conducted by Fischhoff (1975) and Fischhoff and Beyth (1975). In their research, five groups of test subjects were asked to read an article describing the events that led to the military confrontation between the British and the Gurkhas military units in Nepal in the 19<sup>th</sup> century. Based on this information alone, the test subjects were asked to list the probability for each possible result of the military conflict to occur (a British victory, a Nepalese victory, a cease-fire without a peace agreement, a cease-fire with a peace agreement). Each group was told that a particular outcome had occurred. A fifth group was a control group which was told nothing about the actual results of the conflict. The findings of the study revealed that all of the groups that have been given information about an event that had supposedly occurred, gave the occurrence of the same result a much higher ex-ante probability than the control group had given.

In their renowned work, Biais and Weber (2008) investigated the effect of the hindsight bias on financial markets using two experiments: one with students, the other with bankers. They examined whether the bias can be seen in forecasting financial variables, like the prices of stocks, currency exchange rates, and commodity prices. The respondents were asked to forecast price levels one week ahead, and to place boundaries around their projections, such that they were 90% certain the actual value would fall within the boundaries. When the true prices were revealed one week later, the respondents were asked to recall their forecasts and prediction intervals. Clear hindsight bias was shown in both cases.

According to Goodwin (2010), the result obtained from the article by Biais and Weber (2008) is very disturbing. The reason being that stock brokers, who are supposed to be impervious to behavioral effects, responded in a similar manner as did the students.

The hindsight bias effect has significant implications for learning disorders, which may lead to over-confidence. Camerer et al. (1989) argued in their ground-breaking paper that the hindsight bias narrows the gap between an individual's forecast and the actual result. They also coined the term "the curse of knowledge" to explain why the sales agents who possess better information about their products are at a disadvantage when selling. In a similar article, Baron and Hershey (1988) state that the curse of knowledge proposes that outcome information will be overused; where a manager will tend to think that ex-ante optimal decisions with negative outcomes were non-optimal and that non-optimal decisions with good outcomes were optimal.

Many people subconsciously block memories of poor investment decisions and instead, only recall successful decisions. They do it at a rate far surpassing their actual results. To become better investors, investors first must acknowledge their susceptibility and then focus on objectively evaluating all their investment decisions, both good ones and bad ones (Pompian, 2006). Pezzo et al. (2007) attempt to explain this bias as well. They note that following negative results, people tend to view themselves as caught up in unforeseeable situations, and to conclude that they are not the culprit: so as to avoid accepting blame. Such a process is called defensive processing. They may also view the situation as inevitable, such that nothing could have been done to prevent it: this process is called retroactive pessimism.

The hindsight effect was observed in a plethora of other fields disciplines<sup>1</sup>. For example, Mangelsdorff and Weber (1998) and Madarasz (2008) show that in a principal-agent relation, the hindsight bias thwarts the principal from correctly assessing an agent's performance.

### 3. Experimental design

In this study, I will examine the hindsight bias for virtual short-term investments, with an experimental design consistent with that of Camerer et al. (1989). For the experiment, I engaged 204 students of economics and business administration. Each student was given a virtual sum of 100,000 NIS that they were requested to invest in 10 different financial assets, divided by different risk levels (from 1 to 5, where 1 represents a very low risk); half of the offered assets are local and the rest come from the US.

The following table shows the financial assets presented in the experiment.

Risk degree	1 - Low risk	2	3	4	5 - High risk
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<sup>1</sup> Visual information (Roese and Vohs, 2010), disappointment (Pezzo and Beckstead, 2008), surprise (Mueller and Stahlberg, 2007; Nestler and Egloff, 2009), auditing (Lowe & Reckers, 2000), legal decisions (Anderson, Jennings, Lowe and Reckers, 1997), clinical psychology cases (Gilibert & Banovic, 2009), police deception (Wasieleski, Whatley, and Murphy, 2009), medical safety (Annunziata, 2009), and business ethics (Sligo and Stirton, 1998) and effort (Wallace, Chang, Carroll, and Grace, 2009).

<b>Type of financial asset</b>	Government bonds for 10 years	Corporate bonds	Stocks index	Large stock	Small stock
<b>Industry</b>		Communication Services		Pharmaceutical Industries	Medical Devices
<b>Israel</b>	CPI-Linked, Gov.	Bezeq	TA100	TEVA.TA	GIVN.TA
<b>USA</b>	U.S. Treasuries	AT&T	S&P 500	TEVA	GIVN

**Table 1:** A description of the financial assets offered in the experiment

In the experiment, four events were presented to test subjects: two positive events and two negative events. (1) A local positive event - Israel's joining the OECD on May 10<sup>th</sup> 2010. (2) An external positive event - entry of the euro into circulation on January 1<sup>st</sup> 2002. (3) A local negative event - the Second Lebanon War, taking place on July 12<sup>th</sup>, 2006, and (4) A negative external event - the economic collapse of Greece on December 16<sup>th</sup>, 2009.

The asset prices from the year before the event were presented during the experiment (10 charts for each event). In order to test the effect of the hindsight bias, students were randomly divided into two groups: (1) the control group (group C): participants in this group were asked to best invest their virtual money for all occasions considering the historical charts presented, but with no information about the performance of the assets following the event, (2) the hindsight group (group H): participants in this group were also given charts of asset returns one month after the event, and were asked to assess, on average, how participants from group C would invest their money for each event.

#### 4. Results

The main research objective is to examine the effect of the hindsight bias from a different angle. For the purposes of the study, the ability of investors to make short-term investment decisions in various events is examined. The study also examines whether a difference exists in the effect among subjects categorized by different socio-economic characteristics.

##### 4.1 Descriptive statistics

In this section I will present the socio-economic characteristics of the respondents for each of the two groups, C and H, and show how the respondents distribute their property in the various investment channels and at different levels of risk, as can be seen in Table 2 and Figure 1.

Variable		Group C			Group H		
		Mean	Median	Std.	Mean	Median	Std.
Gender		0.47	0	0.501	0.49	0	0.502
Age		2.284	2	0.586	2.441	2	0.587
Family status		0.147	0	0.356	0.206	0	0.406
Income		2.118	2	0.722	2.078	2	0.699
Investment percentage in various financial assets	<i>Capital market</i>	88.2%	86%	3.6%	89.4%	85%	4.2%
	<i>Real Estate</i>	0.0%	0%	0.0%	2.5%	2%	0.8%
	<i>Forex</i>	11.8%	11%	1.2%	8.1%	8%	1.4%
Investment percentage in various sectors in the capital market	<i>Stocks and options</i>	52.3%	51%	7.3%	49.7%	48%	6.4%
	<i>Corporate Bonds</i>	24.2%	22%	2.5%	26.8%	25%	3.6%
	<i>Treasury bond and fixed deposit</i>	23.5%	47%	4.1%	23.50%	50%	3.2%

**Table 2:** A description of the descriptive statistics of the experiment

Table 2 describes the socio-economic variables in the experiment for both group C and group H. As seen, there is no significant difference between the two groups with respect to the variables examined. The number of women in both groups was slightly higher than that of men, the average age of the respondents lies in the range of 20 to 25, there are

more single than married respondents, and the average monthly income ranges between 2000 NIS to 4000 NIS. Considering their choice of investments, both groups invest about 89% of their funds in the capital market, and 11.8% of the money from group C and 8.1% of group H is invested in the Forex - there is almost no investment in real estate. When examining the distribution of the type of investments made in the capital market by the two groups, it can be seen that about 50% is invested in risky assets, i.e. stocks and options, and the remaining 50% is divided almost identically between corporate bonds and fixed income assets.

## 4.2 Testable hypotheses and results

To examine the effect, I will divide the participants by three characteristics: age, income, and investment, and check whether there are differences in the hindsight bias for these characteristics.

### 4.2.1 First Hypothesis

In the first experiment, I will divide the control group, group C, and the hindsight bias, group H, into two sub-groups based on the age of the respondents, such that the first sub-group contains all subjects younger than 23, and the second group contains those older than 23. Group C contains 43 subjects that belong to the first sub-group and 59 subjects that belong to the second one. Group H contains 37 subjects that belong to the first sub-group and 65 subjects that belong to the second one.

An article which examines the degree of risk-aversion of households shows that young participants prefer a lower-risk portfolio than do older ones, who trust their greater experience in the field (Guiso and Paiella, 1999). I therefore expect that the older participants will have a harder time attempting to ignore the actual results than will the younger participants and will thus try as best as possible to reach the optimal investment. The hypothesis in this case is then:

#### Hypothesis H<sub>1</sub>:

H<sub>0</sub>:  $H_{0,k} = H_{y,k}$  (similar degree of hindsight bias for older and younger participants)

H<sub>1</sub>:  $H_{0,k} > H_{y,k}$  (strong degree of hindsight bias for older than for younger participants)

Table 3 and Figures 1 and 2 show a statistical survey of  $H_{p,k}$  for younger participants and older ones in for both positive events and negative events, as well as the statistical test of the H<sub>1</sub> hypothesis for these events.

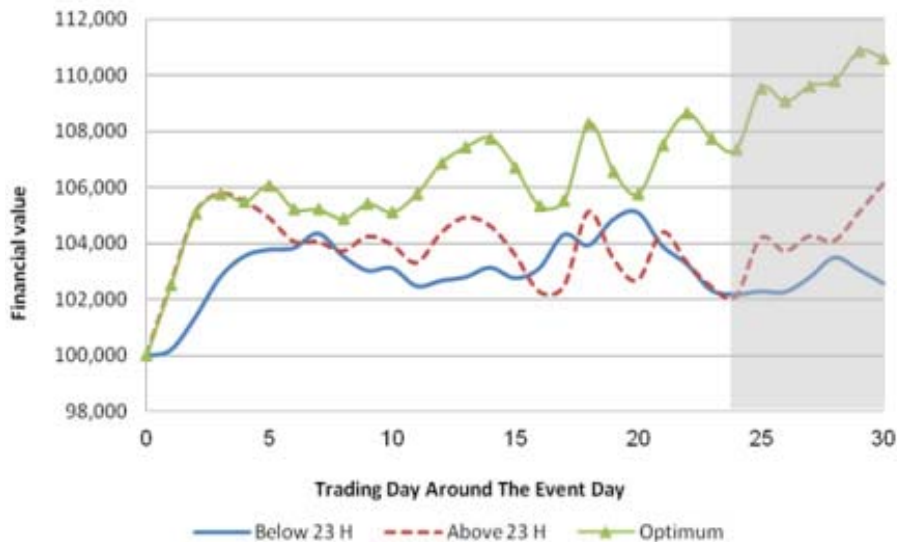
Event	AFV <sup>C</sup>	AFV <sup>H</sup>	Hindsight bias measure by age			t – statistic
			Mean	Median	Std.	
Positive						
<i>Total</i>	101,123.03	104,045.53	0.03	0.04	0.01	11.59
<i>Below 23</i>	99,175.25	102,591.77	0.029	0.037	0.014	5.906
<i>Above 23</i>	102,542.59	106,130.26	0.036	0.042	0.009	9.958
Negative						
<i>Total</i>	96,613.02	98,516.72	0.02	0.03	0.01	4.59
<i>Below 23</i>	94,275.96	96,219.47	0.018	0.018	0.003	3.566
<i>Above 23</i>	97,772.33	100,560.05	0.027	0.019	0.001	6.801

**Table 3:** The hindsight measure statistics for younger and older people.

The table shows evidence that the hindsight bias for positive events (0.03) is greater than that for negative events (0.02). The reason is that participants are less careful in these events, and so trust their ability to predict the market in such a way that their return would be closest to the optimal one.

The influence of the effect on older and younger participants shows that the Mean Hindsight Bias (MHB) of older participants (0.0315) is higher than that of younger ones (0.0235) for the average of the two types of events. This result is consistent with the articles of Guiso and Paiella (1999). Looking at the performance of the investment portfolio for the different groups, we can see that the best case performance was that of the older participants of group H, with an average monetary value of 106,130.26 NIS, while the worst investment portfolio was that of the younger subjects of group C, with an average monetary value of 94,275.96 NIS. Another result obtained from the comparison between older and younger participants is that in the transition from a positive event to a negative event there is a stronger influence on younger participants with a MHB decrease of 0.011, compared with a decrease of 0.009 for older participants. This can be explained by a stronger decline in confidence for the younger participants.

After calculating the hindsight bias effect as seen in Table 3, we can see the trend of the effect using Figures 1 and 2. These figures examine the behavior of an optimal portfolio, the average portfolio of the younger participants (under age 23) and the average portfolio of the older participants (over age 23) for both positive events (Figure 1) and negative events (Figure 2) throughout the testing period. As explained in the methodology section, the optimal portfolio is obtained by investing in the assets that generate the highest return at the end of the 30 days, without considering the risk level.



**Figure 1:** Investor portfolio behavior following *positive* events for variable age

Figure 1 shows that throughout the entire testing period, the value of the optimal portfolio is higher than those of both groups. A comparison of the charts between the younger group and the older group shows that during the first five days, the older group performed better than did the younger group, but in the period until the twenty-fourth day there is no significant difference between the charts, the relationship between the groups is then irregular. Over the final six days, however, the monetary value of the older group grows and becomes greater than the monetary value of the younger group; and whereas the trend is positive for the older group's chart, the trend of the younger group remains unchanged: I conclude that the older participants have invested their money better than did the younger ones.

But the most important result is obtained by examining the last six days, during which the chart of the older group behaves in a similar manner as does the optimal value chart and is the opposite trend to the chart of the younger group. This behavior shows the effect that the hindsight bias has on the older group. Since the respondents in this group believe they can predict the market better than do the respondents in the younger group, the further on the timeline one departs from day thirty and approaches day zero, the value obtained from the received information diminishes; in such a way, the greatest effect should be seen close to the end of the period.

Figure 2 (below) shows similar results for negative events. The value of the optimal portfolio is higher than those of both groups for almost the entire time. A comparison of the charts yields that during the first ten days, the monetary value of the older group is higher than that of the younger group, and their trends are irregular. The next five days see the younger group's monetary value rising higher than that of the older group, with an irregular trend, but during the final 15 days, the trend is again reversed: the older group's monetary value becomes higher and is accompanied by an opposite trend between the charts – while the trend of the older group is positive, that of the younger one becomes negative.

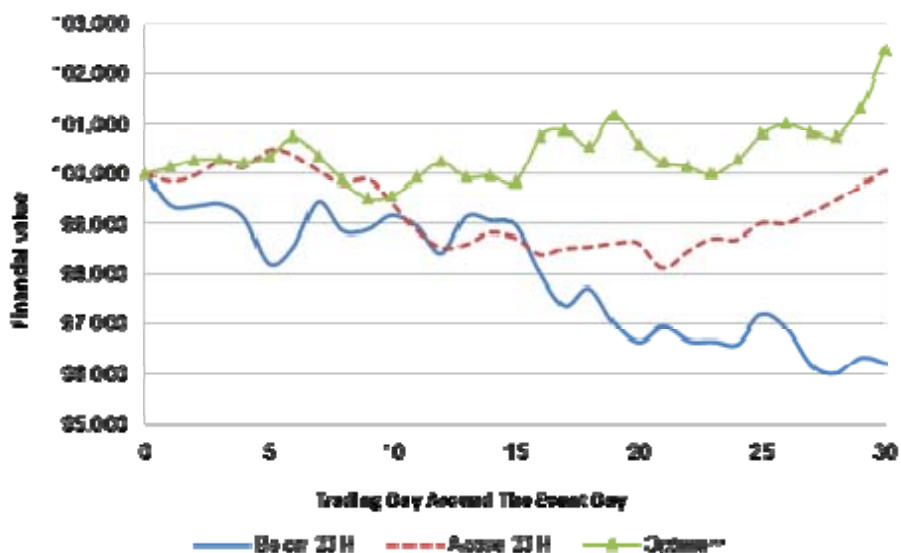


Figure 2: Investor portfolio behavior following *negative* events for variable age

Examining the hindsight bias, it can be seen that during the last seven days, the older group's chart acts in the same direction as the optimal value chart, and is opposite from the behavior of the younger group's chart. This result is significantly more evident than in the case of positive events.

To conclude, the hindsight bias effect seems to affect older respondents more strongly than younger ones. A possible explanation is that older respondents believe they can predict the market better, due to their additional experience in the capital market, and are therefore less able to ignore future market-data presented to them.

#### 4.2.2 Second Hypothesis

Academic studies have found that higher income investors tend to take greater risks when building their portfolios. In the second analysis, I will divide the sample into two groups according to their members' income level, and test whether there is a difference in the short-term decision-making between the two types of respondents. In the first group are lower income respondents (with incomes less than 4,000 NIS) and in the second are higher income respondents (with incomes greater than 4,000 NIS).

Scooley et al. (1996) examined the risk-aversion of investors based on the composition of their portfolios. They concluded that the greater the investor's wealth, the higher the presence of risky elements in their portfolios. Davis and Willen (2000) showed a similar result in their study. Looking at seminars held by investment institutions in the U.S, they studied the relationship between increasing labor income and degrees of risk-aversion. Their results showed a positive correlation between higher income and risk taking. Another article examining profiles of risk-aversion in Amsterdam have found that higher income is positively correlated with risk taking (Hartog, Carbonell and Jonker, 2002). Based on the academic studies, I expect that higher income respondents will find it more difficult than lower income respondents to ignore the actual result and try as much as possible to choose the optimal investment. The hypothesis in this case is therefore:

##### Hypothesis $H_2$ :

$H_0$ :  $H_{h,k} = H_{l,k}$  (Similar degree of hindsight bias for higher and lower incomes)

$H_1$ :  $H_{h,k} > H_{l,k}$  (strong degree of hindsight bias for higher incomes than for lower ones)

Table 4 and Figures 3 and 4 show a statistical survey of  $H_{p,k}$  for lower and higher income earners, both for positive events and negative events, as well as the statistical test of hypothesis  $H_2$  for these events.

Event	AFV <sup>C</sup>	AFV <sup>H</sup>	Hindsight bias measure by <i>income</i>			<i>t</i> – statistic
			Mean	Median	Std.	
Positive						
<i>Total</i>	101,123.03	104,045.53	0.03	0.04	0.01	11.59
<i>Low income</i>	100,039.78	102,535.80	0.026	0.031	0.009	9.153
<i>High income</i>	103,568.17	107,623.80	0.040	0.041	0.011	13.380
Negative						
<i>Total</i>	96,613.02	98,516.72	0.02	0.03	0.01	4.59
<i>Low income</i>	97,394.96	99,743.38	0.025	0.017	0.02	4.231
<i>High income</i>	94,991.97	95,876.75	0.010	0.009	0.03	1.967

**Table 4:** The hindsight measure statistics for lower and higher incomes

The table shows strong evidence to MHB in all of the tests, albeit a difference does exist between the two types of events. Positive events result in a higher MHB for higher income respondents (0.04), as opposed to (0.026) for lower income ones. This result supports the conclusions of the studies cited in the beginning of the chapter regarding the confidence of higher income participants, who find it more difficult to ignore the actual result, thereby increasing their MHB. The trend changes, however, in negative events, where the effect is stronger than it is for lower income respondents (.025), as opposed to 0.01 for higher ones. This result is contrary to hypothesis 2, but can be explained by the Prospect theory interpretation, given by Kahneman and Tversky (1979): whereas during positive events, higher income participants are less risk-averse than are lower income participants, during negative events, these same higher income earners become more risk-averse, and invest their money in a way similar to that of the lower income participants.

### 4.2.3 Third Hypothesis

In the third analysis, I will divide the sample into two groups, based on the degree of risk found in the real investment portfolios of the respondents, and check whether there is a difference in short-term decision-making between the two types of respondents. The first group consists of solid investors (investors who invested over 60% of their portfolios in solid assets) and the second group consists of speculative investors (investors who invested over 40% of their portfolios in risky assets).

Speculative investors are overly confident investors that operate primarily in the short-term and I shall therefore expect their average portfolio values to be closer to that of the optimal portfolio: these investors will be more affected by the hindsight bias effect. The hypothesis in this case is therefore:

**Hypothesis H<sub>3</sub>:**

*H<sub>0</sub>*: H<sub>sp,k</sub> = H<sub>so,k</sub> (similar degree of hindsight bias for speculative and solid investors)

*H<sub>1</sub>*: H<sub>sp,k</sub> > H<sub>so,k</sub> (strong degree of hindsight bias for speculative rather than solid investors)

Table 5 and Figures 5 and 6 show a statistical survey of H<sub>p,k</sub> for solid investors and speculative investors in lieu of positive events and negative events, as well as the statistical test of hypothesis H<sub>3</sub> for the events.

Event	AFV <sup>C</sup>	AFV <sup>H</sup>	Hindsight bias measure by <i>investment</i>			<i>t</i> – statistic
			Mean	Median	Std.	
Positive						
<i>Total</i>	101,123.03	104,045.53	0.03	0.04	0.01	11.59
<i>Solid investment</i>	100,067.83	100,727.24	0.008	0.009	0.007	1.603
<i>High risk investment</i>	103,064.05	107,956.74	0.048	0.045	0.015	11.675
Negative						
<i>Total</i>	96,613.02	98,516.72	0.02	0.03	0.01	4.59
<i>Solid investment</i>	95,049.77	95,781.28	0.009	0.007	0.003	1.309
<i>High risk investment</i>	98,326.65	100,891.09	0.027	0.031	0.008	11.496

**Table 5:** The measure of the hindsight statistics for solid and speculative investors



The table shows strong evidence to MHB for speculative investors with an average of 0.0375, while solid investors show no significant influence of the effect: their average MHB being equal 0.0085. A comparison of the two events, positive and negative, yields that solid investors invest similarly in both types of events, but speculative investors are affected more strongly by the effect on positive events (0.048) than on negative events (0.027). From such results, it can be assumed that for positive events, such investors are overconfident about their performance and their portfolios are therefore closer to the optimal portfolio.

## 5. Conclusion and Discussion

This article explores the phenomenon of the hindsight bias for capital market data, and in particular, examines the ability to make short-term investment decisions.

In the experiment, participants were given a virtual amount of cash to invest in ten different assets for a period of one month in various scenarios. For each investment opportunity, they were presented with the historical charts of the various assets, and based on these charts and types of events, they were asked to make decisions. Participants in the experiment were randomly divided into two groups; the first, a control group and the second, the experimental group; this latter group was exposed to the results on the assets one month following the event and were asked to predict how, on average, the control group would invest their funds.

In the study, I conducted three principal experiments: in the first experiment, I examined whether a difference in the hindsight bias effect exists between older and younger subjects. In the second experiment, I explored whether such a difference exists between higher income subjects and lower income subjects, and whether it would affect their behavior. In the third experiment, I explored whether such a difference exists between solid investors and speculative investors, and whether such a difference might affect their short-term investment decisions.

The results of the first experiment show strong evidence that the hindsight bias effect is present in all types of events, but that it affects the older group more strongly than it does the younger group. A possible explanation is that subjects of the older group trust their ability to better predict the capital market, due to their longer experience, and therefore find it more difficult to ignore the results of future earnings that have been presented to them. It has also been observed that a negative event affects subjects of the younger group more strongly than it does the older group.

The results of the effect, for both positive and negative events, have also been demonstrated using charts that describe the average values of the investment portfolios in the experimental groups and for the case of the optimal portfolio. The charts show that for the last days of the experiment, the chart of the older group behaved similarly to that of the optimal portfolio, and are both opposite to that of the younger group. This demonstrates the strong hindsight bias effect affecting the older group.

The results of the second test show a difference in the investment decision-making between the two types, positive and negative, events. In positive events, higher income investors are greater risk takers and are therefore affected by the hindsight bias effect more strongly, as I had assumed in the hypothesis. The trend changes, however, when negative events are presented, contrary to the hypothesis, and these investors are then less affected by the hindsight bias effect than are lower income investors. An explanation for this is given by the Prospect theory interpretation, given by Kahneman and Tversky (1979). While for positive events, higher income participants are less risk-averse than are lower income participants, for adverse events these participants become more risk-averse, so they invest their money more carefully than do other participants.

The results of the third experiment show strong evidence for hindsight bias for speculative investors. A possible explanation is that investors act strategically in the short-term and therefore trust their abilities to better predict the market. There was no evidence of the effect for solid investors, which shows that these investors are better able to identify the behavior of all investors.

To conclude, investors who are experienced, older and more powerful, who trust their abilities to make good decisions, are more affected by the hindsight bias and are unable to predict well the behavior of all other investors

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