

The Introduction and Applications of Representativeness Heuristics

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Abstract. Representativeness heuristic is one of the major cognitive shortcuts behaviours that instead a question of probability on one of similarity. Individuals are good at using representativeness method to solve problems since it is easier and faster to evaluate how closely the problem corresponds to a similar one. However, the customary use of representativeness heuristic may generate severe biases and errors by mental shortcuts, especially on judgements and probability estimations processes. Nowadays, the study of representativeness heuristic has practical significances and widely influences on residential daily activities and commercial operations from decision-making perspective. This paper will continue on analysing the representativeness heuristic further regarding to its fundamental theory, connotation, and applications on different fields to explain how representativeness heuristic to affect people's decision-making processes and other behaviours imperceptibly through a qualitative research method. By means of analysing three cases in stock market, political behaviours, and medical diagnosis, this paper finds that it is possible to avoid the biases and errors caused by representativeness heuristic mental shortcuts through practicing systematically and increasing awareness effectively.

Keywords: Representativeness Heuristic; Behavioural Finance; Investment Decision-making; Citizen Governance.

1. Introduction

From investigating the micro individual reactions and the psychological motivation of such behaviours to generate the development and internal essence of financial market has become prevailing and necessary recently, which is known as behavioral finance research. Behavioural finance advocates "descriptive" which is how people actually behave based on human psychology during making decision process while people usually make cognitive errors such as heuristics and biases by using mental shortcuts or rules of thumbs instead of considering the actual situation details. By analyzing the financial market deviations, heuristics and anomalies from decision maker behaviour tendencies, behavioral finance aims to establish a descriptive model that is able to accurately reflect the actual practitioners behaviours of market disciplines and the market operation, which is of great significance to the innovation and development of classical financial or economic theories. Traditional finance or economics assume that market behaviour is mainly driven by material motives and hypothesize people are rational for maximizing own profit while behaviour economics challenge the traditional view and try to understand how psychological process influences economic decisions.

One of the most contradictory mechanisms between behavioral finance and traditional finance is the efficient market hypothesis (EMH), since Ackert and Deaves (2009) mentioned that early judgements of market efficiency were generally favorable; but, more recent empirical research has shown a number of anomalies of EMH applications. Also, Shefrin (2002) illustrated that behavioral finance holds opponent perspective with traditional finance on rules of thumb which can be viewed by traditional finance as predicting stocks' future performance based on previous records. In contrast, behavioral finance points out that people who hold biased errors but often commit errors using rules of thumb called heuristics to process data (Shefrin, 2002). Basically, heuristics are experienced-based approaches to come up with a solution that may not be optimal but is adequate for the purpose at hand. This paper will introduce representativeness heuristic which is one of the noted behaviour financial heuristic theories.

The main contribution of this study firstly is on providing people a basic understanding on representativeness heuristic and applying to their daily or career lives for increasing effective productivity. Secondly, as an emerging area, behavioral economics has not yet been diffusely seen in the public and applied in different levels, most previous and traditional academics on representativeness heuristic established on quantitative researching models, there are still lots of knowledge blanket in this subject and this paper devotes to make up the representativeness heuristic mechanism from its structure and decision-making process from investor, politician and diagnostician perspectives by a qualitative researching approach.

2. Literature Review

2.1 What is Representativeness Heuristic

Representativeness heuristic is one of the noted behaviour financial heuristic theories and reveals people how to use fixed patterns and mind-sets to make decisions and grasp the essence of the problem quickly and effectively to infer the problem's outcome, which is a cognitive reliance on intuition and dependance on experiences or precedents that people are familiar with. Intuition may assist the decision maker in cross-mapping possibly competing analogies, but overconfidence increases the search time and costs and changes the halting and decision rule (Galavotti, Lippi & Cerrato, 2021). The definition "representativeness" was first formulated by Tversky and Kahneman in 1971, and it is characterized as the "[E] valuat [ion] of the probability of an uncertain event, or sample, by the degree to which it is: (1) similar in essential properties to a parent population, or, (2) reflects the process by which it is generated" (Kahneman & Tversky, 1972). In other words, the likelihood of an event, or sample, is based on how correctly it represents the population from which it was chosen or the process that generated it (Kahneman & Tversky, 1982). Similarly, as Shefrin (2002) demonstrates that representativeness refers to inferences from stereotypes which could affect decision-makings in different fields such as finance. However, according to the statement by Sunder and Jamal (2000), for the adjustment process, the representativeness heuristic simply offers a biased starting point. The significance of the beginning point gradually decreases and eventually vanishes as the algorithm adapts to new observations (Sunder & Jamal, 2000). Even though the representativeness rule can be a productive tool for helping people to understand the core of an issue and infer an answer soon, whereas it can also introduce significant bias, particularly when it neglects the base-rate including unconditional probability and sample size and use related information to asses deviant probabilities. As Lee et al. (2016) states that using heuristics tends to instead more reliable approaches of calculating potential consequences, which causes to some pivotal deficits in decision-making, including stereotypes, misleading on sample size, and base-rate fallacy.

2.2 How Sample Size Misdirects People

People to neglect errors. Lee et al. (2016) highlights a larger sample may have less variance and more reliable instead of a smaller sample which could lead more variance and is easier to make deviations or errors. Even though some experienced researchers are able to be influenced by this bias, in which small samples are assumed to be representative of the populations as a greater sample, causing an assumption that a population will be expressed by a statistically meaningful outcome in even the smallest sample (Kahneman, 2011). Actually, the probability would be closer to the real probability in the larger sample. However, people contend that both small and large sample sizes are subject to the law of large numbers. This negligence behaviour causes gambler's fallacy arisen since the general misinterpret the law of averages, sometimes known as the "law of large numbers" (Shefrin, 2002). This type of representativeness bias may generate improper outcome or derive inaccurate insights due to insufficient sample size, and people intend to deduce probabilities from current sample situation rather than believing reality.

2.3 The Importance of Considering Base Rates

Secondly, when faced with complex and general problems, people tend to take shortcuts and make decisions based on current descriptive information rather than considering base rates, which violates the Bayes rule. As Shefrin (2008) states that representativeness entails an excessive reliance on preconceptions, which causes people to consistently make judgements in violation of the Bayes rule. Stone (2013) explains the Bayes rule is that when the analysis sample is large enough to be close to the population, the probability of events occurring in the sample will be close to the probability of events occurring in the population. Moreover, Grether (1980) demonstrates that the representativeness bias from tested theory occurs when people disregard prior or base-rate information in modifying their beliefs, which is against the Bayes Rule. Due to the existence of psychological deviation, people are not absolutely rational in decision-making and judgment, which enable to cause behavioral deviation and affect an inaccurate result.

2.4 Individuals vs. Groups

Furthermore, it has been discovered that both individual and group judgements are susceptible to this bias and groups in particular frequently experience process losses like groupthink, free-riding, conformance pressure, etc. (Lim & Benbasat, 1997). Argote, Seabright and Dyer (1986) found base-rate fallacy is more pronounced in group evaluations than in individual judgements, indicating a clear requirement for assistance with some kind of. Consistent with these findings, Brightman, Lewis, and Verhoeven (1983) states that the nominal group act more like Bayesian information processors indicated greater bias than individuals. Although there are plenty of studies type is embedded within group tasks, the actual situation used may not occur in organisations or groups, which is the limitation of the current representativeness bias study (Lim & Benbasat, 1997).

3. Applications

3.1 Application on Stock Investment

In the stock market, both high ability and inexperienced investors may be prone to several behavioral biases and behave overconfidence, which might cause them to think erroneously. Heuristics simplification can cause investors to make predictable, suboptimal conclusions when faced with tough and ambiguous alternatives (Chen et al., 2007). Chen et al. (2007) analysed investors believe that recent performance is indicative of future results and they will regard a company's good characteristics including high expected growth, good quality products, and capable executors as good signs to make investments, which are typical representativeness bias implications to investment decision making. Particularly, there are more Chinese individual investors frequently purchase prior successful stocks while underperforming overall than US investors; this conduct is best characterized as a representativeness bias (Chen et al., 2007). According to Chart 1, the proportion of gains realized (PGR) and proportion of loses realized (PLR) study by Chen et al. (2007), the result of a great PGR relative to PLR which means investors prefer to sell their winners than losers shows Chinese individual investors are reluctant to accept their losses. Similarly, based on the study of Tunisian investors, Boussaidi (2013) mentions that the representativeness heuristic is able to influence the sentiment of investors by instilling a feeling of optimism or pessimism which can lead to an overreaction to earnings announcement. Sometimes, investors assume that a past record of impressive performance by a particular company is a representative sign of the overall performance that the firm will keep generating in the future when there is an uncertainty existing. Therefore, it is unnecessary for investors to overreact to the history of a remarkable performance since this behavior is a reaction caused by representativeness heuristic and people should focus more on further technical analysing and company's current issue rather than making mental shortcuts during trading decision making process.

Panel A: Univariate results			
	PGR	PLR	PGR-PLR (t-stat)
Individual investors	0.5190	0.3098	0.2092*** (82.60)
Institutional investors	0.6870	0.5990	0.0877*** (3.977)

Fig. 1 The disposition effect: the propensity to realize gains and losses (Chen *et al.*, 2007)

3.2 Application on Political Decision-Making

Politicians often use representativeness heuristic to manipulate citizens making choices on political decisions such as voting, lobbying and petitioning because representativeness bias typically works effectively and offers valid likelihood inferences. Political scientists contend that voters do not need to be informed of all the positions and acts taken by politician candidates because citizens can use indicators of a candidate’s performance and attitude on issues, such as their party affiliation, polling position, and if they act or appear presidential, to decide who to vote for (Stolwijk, 2019). Most people vote depends on whether the candidate fit their image of a successful president from appearance, age, gender, speech proficiency, party preference, etc. instead of analysing history details of each candidates, which means every candidate is able to pretend to be what citizens like until he/she wins the competition. To identify this problem caused by representativeness bias, John (2009) noticed that it is practicable to implement citizen governance in eliminating political participation’s representativeness bias and challenging bureaucracy. John (2009) demonstrates that a more collaborative approach to public administration would account for the historically existing relationship between social and economic status (SES) and political engagement, which refer to the citizens directly making public decisions strive to reflect a greater range of social group since they draw on service users and actively seek out underrepresented populations. This behavior can not only redress representativeness bias of political participation during decision-making process as far as possible but also evade some people who are the privileged are frequently in a better position to advance their interests since they tend to make greater salaries and more spare time at their disposal.

3.3 Application on Medical Diagnostic Process

The representativeness heuristic is a subconscious reaction to doctors who often forms a diagnostic pattern and process regarding to symptoms, but there are numerous exceptions to prototypical presentations of diseases just like stereotypes. Howard (2019) states that the diagnostician is motivated by the representativeness bias to seek for symptoms that are characteristic of the disease. Also, atypical variants have always been missed if decision-making along with these pattern-recognition lines is restrained (Howard, 2019). Under the pressure of saving life and time, the diagnostician is required to make decision as soon as possible from patient’s symptoms, so plenty of medical diagnoses instantly bring to clinician’s mind with an involuntary impression of the disease pattern of manifestation. Given the intricacy of the diagnostic process and the potentially life-or-death consequence for the patient, clinical decision-making is a very complex procedure, which may trigger the representativeness heuristic (Fernández-Aguilar *et al.*, 2021). So, stereotypes caused by the representativeness bias can be simply wrong during diagnostic process.

Triplet (1992) showed how stereotypes could lead therapists astray through a study. As influenza, leukemia, AIDS, meningitis, and appendicitis have similar symptoms, a patient with hazy symptoms including fatigue and recurrent infections was asked to determine the most likely diagnosis. Subjects who were informed that a female patient was homosexual judged her as having a higher likelihood of having AIDS than a heterosexual woman with the same symptoms. Even though lesbians are in fact less likely than heterosexual women to develop AIDS, but since they were mistakenly grouped into the higher risk category of “homosexuals”, it was incorrectly assumed that they were at higher risk (Triplet, 1992).

In sum, a diagnostician may be severely biased by extra-symptom features. It is clinicians' duties to make efforts to pay attention on potential unusual presentations instead of the stereotypes example of a disease.

4. Conclusion

The representativeness bias is a widely used bias, and numerous academics think people's reliance on classifications can quickly lead prejudice or mind short cuts, even if it is difficult for us to recognize it. The representativeness bias might assist people to estimate the likelihood of an event occurring and make judgements quickly since there is an existing stereotype formation that already appears in our minds, which is a dual-effect during discretion and reveal people's overconfidence and overreaction under the rules of thumb law. Specifically, people frequently overestimate the similarity between two objects and create approximation outcomes as people neglect severe factors that also act a part in shaping events. Under the negative influences by representativeness heuristic, people can lead to poor decisions and cause serious consequences in different fields including daily and career lives. Fortunately, representativeness bias can be avoided by practicing. To avoid this bias as more as possible, it is feasible for people to increase awareness of this inclination, improve logical thinking processes, and reflect on judgements continuously to check for biases. At last, there are few limitations on this paper following by lacking complex mathematical models or statistics to dissert from a qualitative perspective and to support related inferences. Also, some theories from dated literatures may not catch up with the changing times and adapt the current market development, which may limit some executives to make judgements from a corporate dimension.

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