

Which heuristics can aid financial-decision-making?

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Abstract

We evaluate the contribution of Nobel Prize-winner Daniel Kahneman, often in association with his late co-author Amos Tversky, to the development of our understanding of financial decision-making and the evolution of behavioural finance as a school of thought within Finance. While a general evaluation of the work of Kahneman would be a massive task, we constrain ourselves to a more narrow discussion of his vision of financial-decision making compared to a possible alternative advanced by Gerd Gigerenzer along with numerous co-authors. Both Kahneman and Gigerenzer agree on the centrality of heuristics in decision making. However, for Kahneman heuristics often appear as a fall back when the standard von-Neumann-Morgenstern axioms of rational decision-making do not describe investors' choices. In contrast, for Gigerenzer heuristics are simply a more effective way of evaluating choices in the rich and changing decision making environment investors must face. Gigerenzer challenges Kahneman to move beyond substantiating the presence of heuristics towards a more tangible, testable, description of their use and disposal within the ever changing decision-making environment financial agents inhabit. Here we see the emphasis placed by Gigerenzer on how context and cognition interact to form new schemata for fast and frugal reasoning as offering a productive vein of new research. We illustrate how the interaction between cognition and context already characterises much empirical research and it appears the fast and frugal reasoning perspective of Gigerenzer can provide a framework to enhance our understanding of how financial decisions are made.

Keywords

Heuristics, behavioural finance, decision making, cognition.

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1. The debate

The publication of Daniel Kahneman's *Thinking fast and slow* (henceforth TF&S) gives occasion to evaluate the Nobel Prize-winner's contribution, often in association with his late co-author Amos Tversky, to the development of our understanding of financial decision-making and the evolution of behavioural finance as a school of thought within Finance.

While such an evaluation is a massive task, we constrain ourselves here to a more narrow discussion of Kahneman's vision of financial-decision making compared to a possible alternative advanced by Gerd Gigerenzer along with numerous co-authors.

Much of the teaching of Finance and financial advice is predicated on the idea that models, incorporating stylised rational behaviour, outperform received wisdom or professional rules of thumb. One of the essential texts of behavioural finance research Gilovich *et al* (2002) is entitled "Heuristics and biases" with the implication being conveyed that if you are smart you will avoid invoking heuristics. But is this true?

Could it be that the race goes to the conventional and naturally incurious rather than the calculative and all seeing "rational"/ Laplacean demon agent (Mcgrayne, 2011)? We believe the answer is yes, or at least it can be yes in a wide variety of environments/contexts we frequently encounter. This is because Kahneman and Tversky (henceforth K&T), and adherents to expected utility theory in general, may not have the monopoly on what is "rational".

Gigerenzer's definition of rationality is very much an ecological one not a procedural one. He advances tools for the making the best decision in a rapidly changing uncertain environment rather than some optimal decision-making tool for implementation in a risky environment when all the states and the probability of their outcome are known. A central element in the debate is the relative scope

of application in financial decision-making of risky, as opposed to truly uncertain, choice. Gigerenzer focuses on the latter, K&T the former.

In a lengthy program of research, yielding many papers in prestigious Journals, Gerd Gigerenzer, of the Max Planck Institute in Berlin, has developed the notion that the reason most of us regularly use heuristics, is simply because they work, i.e. produce better decisions (Gigerenzer and Goldstein, 1996, Gigerenzer and Brighton, 2009, Gigerenzer and Gaissmaier, 2011, Todd and Gigerenzer, 2003). This makes Gigerenzer call for a “heuristics revolution” in our understanding of human decision-making (Gigerenzer, 2014).

Gigerenzer's research shows that in decision-making often less is more and we really need to “keep it simple stupid”, or at least make it simple to avoid acting stupidly. But Gigerenzer's critique has rarely appeared in major Finance Journals or, more remarkably, even influenced discussion at all². A recent working paper by the Bank of England's Financial Stability Board (Aikman *et al*, 2014) suggests, however, that the appeal amongst economic policy makers of this view may be rising (see also Neth *et al*, 2014).

1.1 Gigerenzer's critique.

Gigerenzer and Todd (1999) cast doubt on the development of “dual process” characterisation of cognition. An example of such a characterisation is TF&S's System 1 and 2 schemata, which sees the mind as flipping between superior and inferior modes of thought. Hence for Gigerenzer and Todd

“The unquestioned assumption behind these [dual process] theories is that more laborious, computationally expensive and non heuristic the strategy the better the judgements to which it gives rise. The more-is-better ideology ignores the ecological rationality of cognitive strategies.” (and Gigerenzer and Todd, 1999, p 20)

² According to Google Scholar accessed in June 2015 the work of Kahneman is cited almost 20 times more than that of Gigerenzer in Finance Journals but only about 5 times more often across all fields.

here a heuristic is just a means “to find or discover” (Gigerenzer and Todd, 1998, p 25) and is not clear that the most tortuous mode of discovery is the best.

Indeed Gigerenzer (see Gigerenzer and Goldstein, 1996) has questioned whether some of even the most basic axioms of “rational” choice, like transitivity and compensation across choice characteristics, have much predictive value.

“there seems little empirical evidence for the view of the mind as a Laplacean Demon equipped with the computational powers to perform multiple regressions. But this need not be taken as bad news. The beauty of the nonlinear satisfying algorithms is that they can match the [Laplacean] Demon's performance with less searching, less knowledge and less computational might.” (Gigerenzer and Goldstein, 1996, p 26)

So this paper outlines a path to pass beyond the mere chronicling of how heuristics and biases are manifest in financial markets, a task brilliantly performed by K&T and those influenced by them, towards the question of when and where heuristics are most strongly made manifest and when is their influence abated.

Gigerenzer's research programme aims to correct a common, and perhaps convenient for some, misunderstanding of Herbert Simon's bounded rationality. This is the view that bounded rationality asserts economic agents are simply incompetent or irrational. Quite conversely bounded rationality envisages decision-makers responding to both their cognitive limitations and the priorities of their environment in a resourceful and adaptive way when the decision-making context itself is constantly changing.

Lockton (2012) shows how Simon's “behavioural scissors”, by capturing the interlocking of cognition and context, can be applied for behavioural modelling in designs aiming to induce behavioural change within the built environment and elsewhere. Applications to financial decision-

investors simply vary the fraction of their portfolios made up of the riskless asset?" Canner *et al* (1997), p182.

However, Canner *et al.* (1997) also report a puzzle in that financial advisors use a heuristic in advising their clients that is not consistent with the MFST. Many advisors give guidance consistent with the idea that the more risk averse a client is the higher should be the ratio of bonds to stocks in their portfolio. It has proved a largely fruitless task to try and reconcile such asset allocation advice to standard portfolio theory.

Keasey and Hudson (2007) show that when the reasoning of the advisors is investigated it can be shown that for the worst case scenarios (analogous to Value at Risk) the heuristic financial advisors use frequently outperforms the MFST, given the prevailing non-normal distribution of returns we observe.

3.5 Earnings quality.

A central issue in capital market research in accounting is the quality of announced earnings, this has been measured by earnings persistence, the relative stability of accruals and cash--flows as elements in overall earnings, the information content of accruals, the avoidance of restatements or sanctions by regulatory authorities and other metrics. Initial debate focussed on whether companies with publicly or privately held equity reported higher quality earnings. The relative ranking of earnings quality was unclear because two *opposing*, yet credible, theorisations of the determinants of earnings quality exist (Givoly *et al*, (2010) these are

1. a theory that greater *demand* for high quality earnings ensures public companies report more informative earnings, and so distort accruals less,
2. a theory that public companies have more *opportunity* to mislead investors and for that reason take these opportunities.

Givoly *et al* (2010) study a unique database of companies to resolve this issue. They examine a matched sample of relatively large companies where each company with publicly traded equity is matched to one with publicly traded debt. Of course both these sort of companies face an active demand for high-quality earnings by outside investors. The authors find on a number of commonly employed metrics companies with publicly traded debt, but no traded equity, exhibit higher earnings quality. This finding is striking as it appears to contradict earlier findings by Ball and Shivakumar (2005) that companies traded on stock markets have higher quality earnings in the sense of being more “conservative” by recognising future losses more quickly and thus forewarning equity investors.

This patchwork of contradictory findings depending on the method of sample construction and the measure of “earnings” quality used shows that context is all. Earnings quality is many faceted and the most useful definition of that elusive trait will depend on the demands placed on auditors and their opportunities to circumvent those demands.

This contextual nature of earnings quality is important as financial reporting is harmonised by International Reporting Standards (see Soderstrom and Sun (2007) and Barth *et al* (2008)).

Dechow *et al* (2010) after reviewing the various empirical proxies available to capture earnings quality conclude they

“can reach no single conclusion on what earnings quality is because “quality” is contingent on the decision-context.” Dechow *et al*, (2010), p 344.

investors' cognitive perception of quality is formed within a context from which it cannot be separated.

It seems unreasonable to expect the demands made for earnings quality and the opportunities to circumvent providing it to remain constant across the 28 states constituting the European Union³ which have adopted IFRS standards wholesale. If we accept this, could less earnings quality be more

³ Even before Albania, Serbia and Macedonia join.

informative for investors, or at least not noticeably less informative, from an investors' perspective in some member states?

3.6 Overreaction, mean-reversion.

Within Finance perhaps the most conclusively documented bias is the failure of investors to recognise regression to the mean, "trees don't grow to the sky." This inability to recognise that extreme outcomes reflect luck, as well as skill, underpins the overreaction anomaly (Debondt and Thaler, 1985, and 1990). While all of us know $\text{Success} = \text{Talent} + \text{Luck}$ (TF&S, p 177), we nonetheless still prefer to build up our heroes and stigmatise slackers. Indeed it appears much of sports and business commentary is haunted by attempts to rationalise luck. To say Steve Jobs was quite a lucky bunny is just never enough it seems.

Here too both the degree and timing of market overreaction/mean--reversion seems highly context dependent. Lee and Swaminathan, (2000) supply evidence to support the operation of a "Momentum Life Cycle" in which high volume, often glamorous, stocks attract investor attention and thus unsustainable gains/losses while less heavily traded, often value, stocks are set to enter periods of price--correction.

In their representation of the phenomena (see Figure 4 of their paper) momentum is clustered amongst high volume winning stocks and low volume loser stocks. The high volume winner stocks are propelled by a rising tide of "me too" dumb-money investors. Momentum amongst low volume losers is driven by the last of the dumb-money investors quietly closing the door as they depart. All this happening prior to smarter, contrarian, investors re-entering the stock to correct its price to something closer to fundamental value.

In both cases the pattern of momentum/reversion the stock exhibits depends less on its true/intrinsic value and more of the extent of its recent exposure to investor attention and thus trading activity. Once again context is all for overreaction to manifest itself in any particular stock.

This should not be too surprising as it is far from clear we would want to issue predictions that recognise regression to the mean even if we were capable of doing so. Hugely successful serial entrepreneurs often seem to be those who can accept the improbable, if not downright delusional, as a basis for intense commitment (Lewis, 1999).

3.7 Bank failure

In his recent work with the Financial Stability Board (Aikman *et al* 2014) Gigerenzer considers the use of heuristic tools in evaluating a bank's capital adequacy and the related problem of bank failure. Figure 2 illustrates a fast and frugal tree the authors present for assessing the vulnerability of systemically important banks to failure. It assesses a bank's fragility over four key variables which are used to generate four red flags to warn a regulator to intervene and two green flags to suggest no intervention is required.

So any bank with less than 4.1% of equity to cover its debts raises an immediate red flag initiating a possible investigation. Similarly, a bank whose equity covers less than 84% of the market value of its equity raises a second red flag. If the bank's whole funding falls below 177 \$bn, or if it has a loan to deposit ratio of above 1.47, then intervention is immediately required. The precise number of red/green flags required for the regulator to act is for experimentation/discussion, but these trigger measures provide an easily followed prudential banking protocol.

As in the earlier example of using earnings forecasts and recommendations in investment, this fast and frugal method of reasoning ignores the numerical variation in these key ratios beyond their trigger points. But accepting this bias might be preferable to attempting to find a model with sufficiently stable coefficients to convert good in-sample explanatory power into good out-of-sample predictions of which banks will fail.

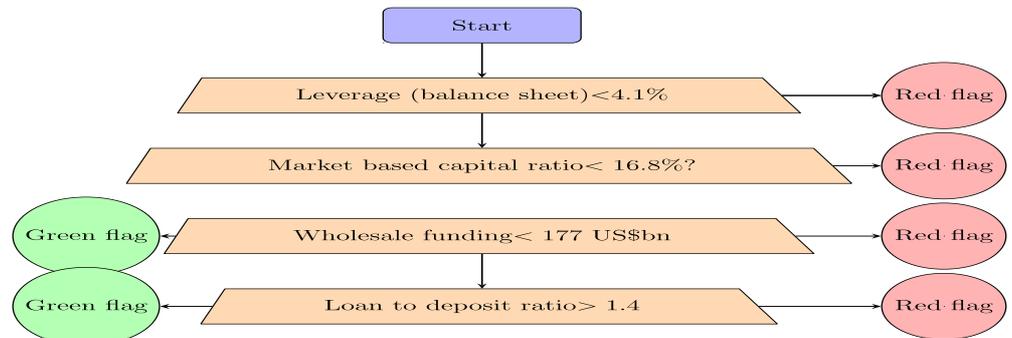


Figure 3: An example of a fast and frugal tree for assessing bank vulnerability. Note: Based on Figure 3 on page 19 of Aikman *et al*, 2014.

3.8 Heuristic tools in financial decision-making.

3.8.1 Technical Analysis.

Practitioners have long used technical analysis to predict future price movements on the basis of past price movements, a practice directly at odds with weak-form stock-market efficiency. The associated trading rules can be regarded as heuristics as they are often simple and loosely defined and certainly are not based on any notion of rational optimisation. The historical evolution of technical analysis is traced by Lo and Hasanhodzic (2010). It was used in 18th century Japan where a form of technical analysis known as candlestick charting was used (Park and Irwin, 2007). In the West, Dow Theory which was developed in the late 1800s by Charles Dow, the Editor of the *Wall Street Journal*, and was used in an effort to develop profitable trading strategies (Lo and Hasanhodzic, 2010). Thus technical analysis pre-dates by a wide margin all modern financial economics.

context-dependent when Boyd (2001) repeated the study during a subsequent recession and obtained almost completely opposing results.

Note the “recognition heuristic” can only help those with a little knowledge, a professional investor who recognises all the stocks in the S&P 500 or DAX cannot use it. In the same way the utterly clueless, who have not heard of a single stock, cannot rely on the recognition heuristic. For Goldstein and Gigerenzer (2002) the recognition heuristic is a powerful tool in the context of gaps in knowledge. It works best in structured environments where inference from partial knowledge seems worthwhile. Here recognition emerges as a powerful tool of adaptive rationality.

“the recognition heuristic is a cognitive adaptation. In cases of extremely limited knowledge, it is perhaps the only strategy an organism can follow. However, it is also adaptive in the sense that there are situations... in which the recognition heuristic results in more accurate inferences than a considerable amount of knowledge can achieve.” Goldstein and Gigerenzer, (2002, p 88).

Hence it appears a little knowledge may be a wonderful thing for investors. The fact that experts were at a disadvantage in forming a portfolio for purchase based on their recognition of the stock suggests even quite a lot of ignorance maybe no bad thing in investment. Certainly, experimental evidence reported by Weber *et al* (2005) confirms that familiarity with a stock lowers the perceived risk of holding it in an investor's portfolio. Indeed this underestimate of the risks of the familiar may account for the persistence of observed home bias in investor's portfolios.

It is certainly true that recognition of a stock reflects both its glamour and market capitalisation which are known to be related to investment performance, as demonstrated by their appearance in the ubiquitous Fama and French asset pricing model (1993). But this to some degree makes their outperformance of mutual fund portfolios and national indices more, not less, difficult to understand, because large (presumably well recognised) stocks actually tend to perform poorly, even though glamour (also well recognised) stocks do tend to perform well.

3.8.5 Derivatives valuation.

The standard rational approaches to derivatives valuation are based on the principle of no-arbitrage. The most celebrated model is the Black-Scholes-Merton (BSM) model for option valuation originally developed in papers by Black and Scholes (1973) and Merton (1973). This model is often regarded as the break-through model in financial economics and was certainly a technical tour-de-force, using differential calculus to solve a dynamic hedging problem and yet producing a tractable formula ready for use by those incapable of understanding its derivation.

The BSM formula is ubiquitous in financial markets and so would seem a clear triumph for the rational approach. In reality things are not so clear cut, with some high profile practitioners strongly dissenting from this viewpoint. Haug and Taleb (2011) forcefully argue that, in practice, option traders use heuristics not the BSM formula. They state:

“Option hedging, pricing and trading are neither philosophy or mathematics, but an extremely rich craft with heuristics with traders learning from traders (or traders copying other traders) and tricks developing under evolutionary pressures, in a bottom-up manner.” Haug and Taleb, 2011, 97.

The BSM valuation equation assumes that returns have a Gaussian distribution with a variance that is independent of the strike price of the option and the time to expiry of the option. The assumption of variance independence clearly cannot be supported empirically and if uncorrected leads to very significant option mis-pricing, to the extent that using the pure unadjusted BSM is very likely to lead to financial disaster. Goldstein and Taleb (2007) present evidence that professional traders may not even display a coherent understanding of what volatility measures.

In practice, participants in the options markets use the “volatility smile” a somewhat crude adjustment to the BSM model by which volatility can be adjusted to vary by strike price and time to expiry. The volatility smile is inconsistent with the theory used in the derivation of the BSM model (see Haug and Taleb, 2011, p105) although generally, allowing for this adjustment, practitioners can still be said to be using the BSM model. Given the volatility smile adjustment is very ad hoc it might be more

appropriate to say that they are actually using heuristics to value the option and then relate this back to the BSM model.

Millo and MacKenzie (2009) note that the popularity of the BSM model showed no diminution after the 1987 stock market crash when huge surges in stock volatility meant the BSM model implied prices of equity call options well above the stock price of the underlying asset. The reason for its continued appeal was the model offered a common language for traders, clearing houses and regulators to discuss and dispute the impact of shared risks in the markets they jointly inhabited. As such the model was a more of a rhetorical device than the predictive tool it was initially marketed as. It allowed those in the market to communicate fears/hopes concerning an uncertain future they all faced rather than acting as a “risk-management” tool as such.

4. What the dispute implies for finance research.

Few can doubt the importance of K&T in the establishment of behavioural finance as it is currently understood, taught and researched. Both Kahneman and Gigerenzer agree on the centrality of heuristics to decision-making, including financial decisions.

For K&T heuristics often appear as a fall-back once the von-Neumann-Morgenstern axioms of rational decision-making do not describe investors' choices. Heuristics are then a patch-up, or repair job, on the standard financial decision-making model. But for Gigerenzer heuristics are simply a more effective way of evaluating choices in the rich and changing decision-making environment investors must face.

Gigerenzer challenges Kahneman to move beyond substantiating the *presence* of heuristics towards a more tangible, testable, description of their *use* and disposal within the ever changing decision-making environment financial agents inhabit. Here we see the emphasis placed by Gigerenzer on how context and cognition interact to form new schemata for fast and frugal reasoning as offering a

productive vein of new research. We have illustrated above how the interaction between cognition and context already characterises much empirical research and it appears the fast and frugal reasoning perspective of Gigerenzer can provide a framework to enhance our understanding of how financial decisions are made.

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