



Revista Internacional de Ciencias Sociales y Humanidades, SOCIOTAM
Universidad Autónoma de Tamaulipas
hmcappello@yahoo.com
ISSN (Versión impresa): 1405-3543
MÉXICO

2005
Arvind Ashta
PSYCHOLOGY AND RISKY DECISION PROCESS FOR CORPORATE
INVESTMENTS
Revista Internacional de Ciencias Sociales y Humanidades, SOCIOTAM, julio-
diciembre, año/vol. XV, número 002
Universidad Autónoma de Tamaulipas
Ciudad Victoria, México
pp. 43-66

Red de Revistas Científicas de América Latina y el Caribe, España y Portugal

Universidad Autónoma del Estado de México

<http://redalyc.uaemex.mx>



PSYCHOLOGY AND RISKY DECISION PROCESS FOR CORPORATE INVESTMENTS

Arvind ASHTA

Burgundy School of Business, Groupe ESC, Dijon-Bourgogne, Francia

ABSTRACT

This paper looks at the role of psychology in the risky decision process for corporate investments. The influence of psychology is found in assessing the risk used in calculating the discount rate. The concepts reviewed include notions of time, impatience, inner tempo, future or past orientation, addiction, life expectancy, monetary illusion, loss aversion, risk aversion, stress, personality type, adverse selection, and different types of myopia. So, even numbers used for evaluating the project are subjective. Thereafter, the decision made on these numbers is also influenced by psychology.

Concepts reviewed for the risky decision making included certainty preference, loss aversion, framing, anchoring, endowments, cluster-attraction, confidence or hubris, past orientation, herd behaviour, use of heuristics, and incentives. Studying the influence of subjectivity is essentially useful for the manager to be aware of how he may make erroneous forecasts of expectations and risks and erroneous decisions.

Keywords: Economic psychology, decision-making, behavioural finance, project evaluation, risk.

LA PSICOLOGÍA Y EL PROCESO DE TOMA DE DECISIONES RIESGOSAS EN INVERSIONES CORPORATIVAS

RESUMEN

Este trabajo estudia el papel de la psicología en el proceso de decisión de riesgo en inversiones corporativas. La influencia de la psicología se percibe al evaluar el riesgo utilizado al calcular la tasa de descuento. Los conceptos revisados incluyen nociones de tiempo, impaciencia, tempo interno, orientación pasada o futura, adicción, esperanza de vida, ilusión monetaria, aversión a la pérdida, aversión al riesgo, estrés, tipo de personalidad, selección adversa y distintos tipos de miopía. De esta forma, incluso los números utilizados para evaluar el proyecto son subjetivos.

Los conceptos revisados para la toma de decisión riesgosa incluyen preferencia por la certidumbre, aversión a la pérdida, encuadre, anclaje, endeudamiento, atracción de grupo, agrupación de preferencias, confianza o hubris, exceso de orgullo, orientación pasada, comportamiento de masas, uso de la heurística e incentivos. La utilidad de estudiar la influencia de la subjetividad radica esencialmente en que el gerente hace consciencia de la forma en cómo puede predecir expectativas erróneamente y cómo puede tomar decisiones riesgosas equivocadas.

Palabras clave: psicología económica, toma de decisiones, comportamiento financiero, evaluación de proyectos, riesgo.

The traditional finance techniques used to evaluate risky projects are based on assumptions considered central to mainframe economics, that of utility maximization rationality and profit maximization. There is a growing literature on the influence of psychology on economics. This influence is largely as a result of problems linked to the rationality assumptions. This field—known as *behavioural economics*, and more specifically for us *behavioural finance*—would therefore have an influence on the use of traditional financial

techniques for project evaluation. This paper reviews the work done in behavioural finance and the implication for decision making for risky investment projects.

The first two parts are introductory: Part I introduces Behavioural Finance while Part II resumes the major project evaluation techniques used and notes that these all include a determination of risk, either explicitly or implicitly. The next two parts discuss the implications of behavioural finance on risky decision making. Part III looks at how psychology influences perception and measurement of risk. Part IV sees how the final risky decision, after the measurement exercise, could be influenced by psychology. Part V concludes.

I. INTRODUCTION TO BEHAVIOURAL FINANCE

Duncan (2002) indicates that the first work on Economic Psychology can be traced to Gabriel Tarde, a French criminologist¹ in a two volume book: *Economic Psychology* (1902), although Tarde started his work in the area as early as 1881.² Hosseini (2003) informs us that the school of Behavioural Economics has taken off mostly thanks to the works of George Katona and Herbert Simon. Since then, behavioural economics has taken many directions: The works of Kahneman and Tversky in risky situations; Dickens, *et al.* in consumer and job-safety issues; Debondt, Thaler, *et al.* have applied it to market finance; and some are now applying it to public policy (see Hosseini, 2003 for details). This paper is essentially interested in the streams pursued by risk and finance.

The definitions of behavioural finance and the classification of its behavioural elements vary with the author. Shefrin (2002) states that *Behavioural Finance is the application of Psychology to financial behaviour – the behaviour of practitioners*. He treats themes such as why losers don't sell their shares quickly, gambler's fallacy and stock market prediction, self-control and the preference for dividends, loss aversion, and risk premium of stocks. We could also describe it by saying that behavioural finance is the name given to studies of "irrationality" in market finance, to distinguish it from the rationality assumption of economics, although we know this is a rather limitative

definition, because behavioural finance also encompasses the parts linked to inefficient markets (Shleifer, 2000). This would include themes such as why closed-end funds trade as a discount to their underlying portfolio.

According to Ritter (2003), Behavioural Finance has two building blocks: Cognitive psychology and limits to arbitrage. Under the first, cognitive biases, he lists heuristics, over-confidence, mental accounting, framing, representativeness, conservatism, and disposition effect.³ All these psychological factors are related to financial markets to explain why they do not behave as traditional financial theory requires. Behavioural Finance is therefore an alternative explanation of financial market behaviour.

Much of all this would go against the proponents of the rational school advocating rational expectations and the efficient markets hypothesis. However, as the Arbitrage Pricing Theory (Ross, 1976) points out: Market only requires one large rational player acting swiftly to correct the anomalies produced by irrationality. The proponents of behavioural finance have a difficult task justifying their study in the wake of criticism from efficient market and rational expectation theorists, and this has induced much debate as to whether market does move fast to correct anomalies of irrationality or not.

The "limits to arbitrage" is the second building block of Behavioural Finance, as pointed out above by Ritter (2003). He says that arbitrage is possible in short-term frequently recurring situations, but long-term mispricings are found only post-facto and cannot be corrected. We are ignoring this debate.

Even if market moves efficiently to correct the prices of shares, this does not necessarily mean that market moves efficiently to correct the individuals' decisions within the companies whose shares are being quoted. This follows the rationale that decision-makers in organizations are human beings with subjective biases. They are locked in the organization, at least in the short run. Although there may be a market for Chief Executive Officers (CEO) determined on the demand side by shareholder representatives —especially institutional shareholders—, this market cannot correct their errors with

the same swiftness as in the financial markets. For example, only time will let shareholders know if an approved project is not viable (Type 2 error), because eventually the project will make losses and a post-audit may discover the faulty evaluation criteria, or that a project which has not been approved should have been approved (Type 1 error) because the rational competitor will then go ahead with it and win market-share.

However, at the time of evaluating the project, shareholders or their representatives may suffer from asymmetric information and even if they have access to the financials for the approved project, they would rarely be informed of all the projects which are evaluated but discarded. As a result, we can assume that decision-making in organizations is not subject to the same swift checks and controls as financial markets and that there is scope for subjectivity in decision-making. Moreover, legal mechanisms such as labour laws may constrain decision-makers from reacting rapidly. As a result, inefficiency may continue inside an organization and the market price is efficient only in reflecting this inefficiency.

We are therefore studying an aspect of inefficient or irrational decision-making in business organizations. This is the risky project evaluation decision.

II. RISKY PROJECT EVALUATION

Projects can be evaluated by various financial techniques: Graham and Harvey (2001) find that Internal Rate of Return (IRR) and Net Present Value (NPV) are the most popular, followed by Hurdle Rate, Payback Period, Sensitivity Analysis, Price Earnings Multiples (P/E multiples), Discounted Payback, Real Options, Book Rate of Return, Simulation Analysis, Profitability Index, and Adjusted Present Value (APV) (in order of importance). Some of these techniques use similar or related concepts (for example, IRR, NPV, APV use Discounted cash flow concepts). We note the influence of psychology on the calculation of risk within this field. We are arguing that psychological factors would make project evaluation a subjective exercise based on the psychology of the analyst or decision-

maker as opposed to an objective exercise, which would be independent of the evaluator.

To limit our focus, we exclude other strategy based non-financial criteria such as Strategic Advantage. We also do not look at common mistakes in the application of NPV techniques due to error (see Fernández, 2004), although it could be argued that such "mistakes" are caused by the psychological make-up. We also exclude socially altruistic projects such as government projects where the empathy profile, for example, of the evaluator may become important (McCue, 1999).

Another problem is that project evaluation is not a maximization technique, it is a sufficing technique. It merely states whether the project adds value (for example, if $NPV > 0$). It may even be used to order projects of identical size. However, it does not provide a guide for choosing between many positive NPV projects given budget constraints. This limitation is shared with many other project evaluation techniques and reflects actual practice in many organizations (Cyert, *et al.*, 1958). We are not looking at this aspect of the problem.

What we are presenting here is that in fact the project evaluation decisions allow the influence of psychology when calculating the expected risk, making even the number crunching exercise a subjective affair. And after numbers have been calculated, the final decision taken could also be influenced by the decision-maker's psychology. For example, numbers may be crunched using a Discounted Cash Flow (DCF) technology, but in fact, they may not be using this technique but simple heuristic (rules-of-thumbs) or other rules such as those indicated above (Graham and Harvey, 2001). For example, those using a short payback period as a project approving criteria are fixing a high discount rate for cash flows beyond this period because they do not matter.

To sum up, in this paper, we are looking at the role of psychology when calculating the discount rate for risk in Part III and its role in decision making process in Part IV. This paper is based on a literature review of research by other researchers.

III. THE INFLUENCE OF PSYCHOLOGY ON RISK APPRECIATION AND THE USE OF DISCOUNT RATE

Normally, financial theory suggests that the discount rate for projects should be the Weighted Average Cost of Capital (WACC) applied to free cash flows. Assuming only debt and equity capital, this would depend on the cost of equity and the after-tax cost of debt. The cost of equity itself would not depend on firm specific factors since these can be diversified away. Therefore, only market risk would be taken into account, adjusted by the covariance of the project's return with the market return (Beta) and the financial leverage of the project (reflected in the Equity Beta).

In short, all factors should be objective and none should be subjective. As a result, given the expected cash flows, all managers should use the same discount rates and accept or reject the project. But do they? There is evidence that even wealthy investors in financial markets, who are not influenced by need to sustain themselves for current consumption, do not necessarily use quantitative risk measures.⁴ If this is the case in financial markets, the use of Beta and precise "rational" risk measurement in corporate analysis could be even more suspect, although one could argue that corporate managers may be better educated to use appropriate risk measurement techniques.

In treating the influence of psychology on the discount rates for a project, we will start out by decomposing two aspects of discount rates: One is the time value of money, which exists even in a risk-free environment and, the second, the different notions of risk added on to this base rate.

Nominal time value of money corresponds to the risk-free rate, usually taken as treasury bonds rates. There is divergence between academics on the appropriate rate. It is true that the short-term rate is more risk-free because the United States government, for example, is unlikely to go bankrupt in the next few months. At the same time, if the project has a longer life-time, some authors prefer using a long-term rate (Fernández, 2004) while others suggest also the pos-

sibility of using the future short-term rate (Brealey and Myers, 2003). Irrespective of this debate based on appropriate proxies for the risk-free rate, there is a concept of time value of money based on inflation, on the one hand, and the real time value of money, abstracting from inflation, on the other.

Real time value of money is based on the degree of substitution of future consumption for present consumption. The general discussion on discounting for the real time value of money provides two reasons: Impatience and the decreasing marginal utility of consumption. Some people are impatient and need to consume now. They would have high personal discount rates. Impatient decision-makers may be short-term focused and could increase the discount rates beyond WACC to ensure that only very high value added projects get selected. The logic for the decreasing marginal utility of consumption is that people expect to consume more in the future because of expected growth. As a result, when they have more, their marginal utility from consumption will be less than if they consume now. According to Schelling (2000), this second component of real time value of money could be negative if people are pessimist and expect to have less in the future.

Although the above discussion captures two elements of the notion of time, Poole (2000) reviewed the literature on time in social sciences and found other elements. She finds that different cultures may have diverse views on time and that not all cultures accept the western linear concept of time. As exceptions, she finds that the Bantu tribe of South Africa has a spiral concept, that Hindus have a circular concept and Hopi Indians and people of the Trobriand Islands have an interwoven fabric view where present time is indistinguishable from past and future. Therefore, using discount rates assuming that past won't come back may not always be appropriate.⁵ In a study of the causes of Preference Reversal, Tversky, Slovic, and Kahneman (1990) find that time preferences are also reversible due to a lack of scale compatibility. They found that even if decision-makers evaluate the payoff from a Long-Term project as higher than a Short-Term (ST) project, they may still opt for the ST project.

Even among those who view time linearly, Poole (2000) indicates that there are various psychological factors which may lead to different kinds of people viewing the duration of time differently. People with a fast inner tempo, consider that the external clock is slow. Time is valuable to people with high-achievement orientation. People who have made progress to a goal find time has passed quickly. With extra pressure, time may stand still. Time moves slowly for depressive people and quickly for maniacs. Environmental factors like temperature change can also influence the perception of duration of time. Historically, people seem to have become more impatient and the heightened pressure on efficiency over the last two hundred years may have had an influence on cultural pace. Geographically, there may be differences and research has found that people in Switzerland, Ireland, Germany, and Japan are on a fast pace and El Salvador, Brazil, Indonesia, and Mexico have a slow pace.

Poole (2000) also looks at the succession of time: Differences between past, present, and future. She indicates that individuals could be past-oriented or future-oriented. This time orientation could vary from country to country. Past-oriented people may be uninterested in planning for the future. A strong past-orientation could also be due to depression and a feeling of hopelessness. Discount rates being used by those who do not look into the future are in fact very high.

As a result, they are not taking part in any projects because all projects seem to have a negative NPV. In general, present-oriented or past-oriented persons could discount future more highly than those future-oriented. Becker and Murphy's (1988) work on addiction could therefore have some relation to all this. Addicts are living in the present and therefore do not look at risks associated with their behavior. They are thus discounting future very highly because they want to consume now. Such persons would therefore evaluate any project more harshly than non-addicts.

We may also find that just as an option loses value as it approaches maturity, people may be interested in projects which will create positive returns before a certain date: For example, before they retire

or, for those who are ill or old, before their estimated life expectancy. One can say that the time value of money takes a huge step increase beyond such dates. It may not necessarily rise to infinity because they may want to leave some succession values.

The other component of the risk-free rate is inflation. Inflation perception and inflation expectation can both be plugged in by managers in their subjective discount rates. The rational expectations model would say that if inflation is expected, managers have already accounted for it. So, only unexpected inflation should impact any major decisions.

However, Thaler, *et al.* (1997) have found that people prefer to have inflation with positive nominal returns rather than no inflation and losses. In an experiment where subjects were given an option between bonds and stocks, and 200 monthly portfolio allocation decisions to be made on the basis of experience in each previous trial, 59% chose to invest in bonds. Nevertheless, if all returns were "inflated" by 10% for both bonds and stocks, thus eliminating any loss-making experiences for both bonds and stocks, people preferred to invest only 28% of the portfolio in bonds. What this shows is that although managers can objectively take inflation into account in discount rates, they still suffer from a monetary illusion. The reason for this monetary illusion may be the monetary loss-aversion reaction to risky projects in stable price environments. Thus, discount rates need to be modified to reflect the one-sided higher risk aversion to nominal losses and risk-preference for nominal gains. This is developed further below.

We now turn to risk premium's different elements and how psychology has contributed in this. Classical theory states that people are risk averse. As a result, it is necessary to discount more highly for risky projects. This is done explicitly or implicitly by most project evaluation techniques. In addition to time value of money, according to the Capital Asset Pricing Model (CAPM), the only relevant risk is the project's market risk, which is based on its WACC, as if it was financed by a pure-play company to which firm-specific financial leverage adjustments could be made. The model ignores the

firm-specific risk. However, for a specific company evaluating a project, the firm-specific risk is important because it may affect the firm's survival. The influence of psychology on some of these risk factors is discussed.

We start with market risk and we introduce loss aversion. According to traditional financial theory and the CAPM, market risk factor is based only on the covariance of the company's return with that of the market, adjusted for the variance of the market. The focus is on variance which is a bi-directional measure of risk used by economists. However, psychologists take risk as a loss and are thus only concerned with downside variance and indicate that individuals are loss averse rather than variance averse (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986; Duxbury and Summers, 2004). They are variance-averse in profitable situations and variance-seeking in loss-making situations (Tversky and Kahneman, 1986).

According to CAPM and Mutual Fund Theorem, all efficient portfolios would offer the same mix of risky assets (*e.g.* equity and bonds) which would be the market portfolio and different investors would align their risk preferences by the appropriate mix of the risk-free asset. However, Ackert, Church, and Englis (2002) find that the percentage of equity *vis-à-vis* bonds changes with age. They also find that risk aversion and the relation of equity to other assets is a function of various other factors such as gender, home ownership, net worth, and personality type.

For the latter they consider Values and Lifestyles and use eight personality types (Actualizers, Fulfilled, Achievers, Experiencers, Believers, Strivers, Makers, Strugglers) based on resources (high, low) and self-orientation (principle, status, action). If private investors in financial markets are recognized to have varying degrees of risk-taking attitude based on psychology and demographics, it is evident that the same individuals would also have a different risk taking profile in respect to investment decisions made for their organizations. For example, an individual manager's risk assessment would change as she approaches retirement. All projects culminating in positive NPV's after retirement age may be discounted heavily to give preference to short-term.

Since the equity beta would depend upon the project's proposed capital structure, and this capital structure would depend upon the level of debt the firm takes for the project, and the level of debt may depend upon the risk the decision-maker is willing to take, there is a role for behavioral studies in this field. It is well recognized that debt puts stress on managers and that managers cope and respond differently to stress. As a result, different managers would propose different capital structures for their project. This would then impact on WACC calculations.

Factors which influence operational risk are linked to organizations, as well as the individuals within the organization. CAPM says that the individual investor in market finance can diversify these away thanks to covariance, and therefore they are not important. However, the Agency Theory (Jensen and Meckling, 1976) recognizes that the manager and decision-maker in the organization have a substantial stake in the organization in which they are working. He thus has limits to the extent he can diversify. If in addition, he has to keep a minimum share-holding or he has non-vested options, he is indeed concerned with the operational or firm-specific risk.

In fact, Kahneman and Lovallo (1993) find that managers are overly-cautious to risk. This comes from evaluating projects in isolation and thus ignoring the statistical aggregation or covariance effect in mitigating risk. Actually, a project gives rise to other projects as well as synergies to other parts of the company and their aggregate results should be analyzed. Thus, centralized decision-making may be better in this respect.

Another firm-specific subjectivity is linked to the adverse selection effect (Akerlof, 1970). The seller of a used car knows his asset and knows what it is really worth. The buyer does not know whether the used car is worth more than the average or less than the average. Since he is taking a risk that the seller is not, he will discount the expected value more highly. In an organization, knowing that their projects are based on lesser information on past than insiders, outsiders would consider their own projections more risky, and therefore use higher discount rates than insiders.⁶ As a result, although

the average expectations may be the same due to compensating upside and downside errors, the present value of the discounted cash flows would be less.

Thaler, *et al.* (1997) talk about the link of myopia or short horizon to risk taking. They find that more frequent evaluations lead to a focus on the short-term and to lower risk-taking behavior because of myopia.⁷ In fact, if we evaluate managers frequently, we do not give time for cancellation effects of good and bad surprises. Therefore, if bad surprises weigh more heavily (loss aversion), then the manager gets discouraged faster if the evaluation horizon is short.

There are also projects not traded in the market and as a result, it is difficult to diversify them and use market covariance based risk factors. One such example would be investments in human capital such as training for a corporation's employees. Although Lev and Schwartz (1971) suggest that we should use the cost of capital as the appropriate discounting rate, which beta would we use for this project? The one of the training organizations? Would we find a pure play whose only objective is to have its own employees trained? Thus, there are projects where all discount based risk factors fail and idiosyncratic risk becomes all important.

However, how to measure this idiosyncratic risk and form discount rates would be another story, because training projects contain two sources of risks: First, the uncertainty that workers learn or the degree of learning from the training; and second, the uncertainty that workers apply, or the degree of application, of what is learnt from training. Judd (1998) finds that labor wages have a positive covariance with profits but is less cyclical than market. As a result, using cost of equity would be inappropriate. Yet he cites Becker (1975) to indicate that education and corporate equity give the same returns. This seems to be a puzzle, to be explained by under-investment in education, liquidity constraints for education, political inefficiency, imperfect altruism or, perhaps, differential taxation.

The above discussion has looked at the influence of psychology in calculating the various components of statistical risk measures such as time value of money, inflation, market risk, operational risk,

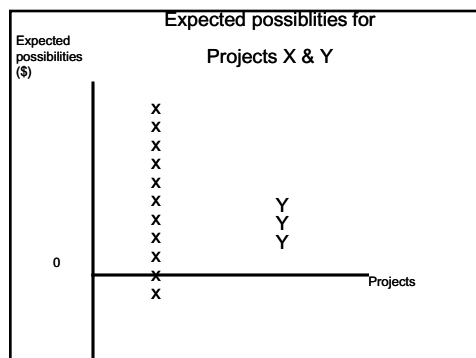
and financial risk. In the next part, we see how psychology further influences risky decision-making once numbers have been punched-in.

IV. PSYCHOLOGY AND RISKY DECISION-MAKING

Once all numbers have been punched-in based on expectations and risk, the final decision has to be taken. It should be based on calculating expected returns and perceived risk. The rational project evaluator would be a mean-variance optimiser and would thus maximise returns for a given degree of risk. However, decision-making is done by individuals who do not always behave rationally. They are influenced by their own individual psychology as well as by the organizational psychology. These two aspects are successively discussed.

Managers may perceive different levels of risk based on different levels of information and the risk of adverse selection. In all this various psychological factors intervene. The following discussion brings out some of the effects noted in literature.

Kahneman and Tversky (1979) find that individuals prefer certain events to non-certain events. Thus, an individual may prefer a sure gain of 2,400 dollars to the same gain but with a chance of variance. Managers would then prefer projects with sure gain, than those with high returns subject to some risk.



Since managers are subject to loss aversion rather than risk aversion in comparing profitable projects, managers may be tempted to go in for less optimal projects where there is no chance of making losses, rather than higher profits where there could be some chance of making losses. Thus, although project X in the figure may have higher expected returns, but with a small possibility of loss, the manager may prefer project Y, which has only positive prospects.

The decision of individuals depends on how choice is framed (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986). Experiments show that if an option on taking a medicine is presented in terms of survival rates, it does not yield the same results as if the same choice is framed in terms of mortality rates. This is perhaps because mortality rates are taken as losses and magnified compared to survival rates, which are taken as gains. Thus, the same decision presented in a different way may not lead to the same result. A possible implication is that cost saving projects would more likely to be adopted if they indicate that losses would not be incurred, rather than if they are termed as improvement of profitability.

If a choice is presented in a manner where one outcome is clearly dominant, it is invariably preferred (Tversky and Kahneman, 1986). However, if the same choice is presented in a manner where it is not easily seen that one outcome clearly dominates the other, then different people make different decisions, violating the axiom of invariance. One possible way to reduce error is to present outcomes in a way which clearly presents the domination of one over the other. As a result, we could imply that a manager's decision on the approval of the same project may differ if it is presented in a different way. This violation of invariance could be expensive and may merit extra information and presentation costs to avoid bad decisions. After all, while these would be undertaken for large projects, for marginal projects the extra effort may not be taken, and the manager may take wrong decisions.

Tversky and Kahneman (1991) indicate that choice is also based on the initial endowment. Thus, two projects may both require sacrifice of some resources to gain in other dimensions. However, since loss aversion is magnified, the manager will prefer the situation

closer to the initial endowment in terms of lower losses but also lower gains. This logic also explains why sellers of an object may value it higher than buyers: the sale entails a loss of something, valued more highly by sellers, than the corresponding gain is valued by buyers. Thus, two managers with different perceptions of the initial endowment may make different decisions for the same project. Also, two organizations may react to the same project differently depending on their initial endowment position.

If all positive NPV projects cannot be implemented, a choice between projects needs to be made and the attraction effect or the cluster-attraction effect may come in (Schwarzkopf, 2003). As a result, projects may be chosen because the decision set is focused on a group of related projects attracting attention.

The hubris hypothesis advanced by Roll (1986) suggests that mergers and take-overs are undertaken by managers who value their target higher than the market, and are so overconfident that they feel their expectations will definitely materialise. In other words, they feel that there is little risk in their forecasts. As a result, they apply very low discount rates and would pay more for their prey. More recently, Ashta, Patil, and Seguin (2005) have applied this hypothesis to listing and delisting decisions of companies, indicating that managers list if they feel that the market worth is more than the book value and they delist if they find that market is not valuing their company shares high enough.

Inversely, we could suggest that under-confident managers may be downside risk averse. As a result, they would find reasons to refuse any risky projects rather than rock the boat. This is in line with the Agency theory to the extent that managers are looking out for their personal interests and not for the company's interests. To incorporate this into theory would mean that managers use very high discount rates and would accept projects only if the chance of destroying value was low. Thus, projects are not accepted just because the expected return exceeds WACC, but also if the distribution of expected returns predominantly exceeds WACC. One reason why managers may be under-confident, or why they inflate dis-

count rates, could be that they look at projects in isolation and do not take aggregative effects on covariance into account (Thaler, *et al.*, 1997).

Negative past experiences may serve as a reminder of risk and prompt risk-adverse behaviour. If the person is past-oriented, the loss may be recalled more easily. At the other extreme, if a person is focussed too far into the future, he may lose connection with reality.

The Status Quo Bias means that individuals prefer to stay in the same situation rather than have a marginal change. Tversky and Kahneman (1991) gave mugs and chocolates to two groups of students with the possibility to exchange. Few undertook the exchange, in spite of the difference in the goods' value. Similarly, new employees accept a new social security contribution more easily than existing employees. So, even if NPV is positive, managers may have a status quo bias around small positive NPV projects and not implement them. This means that projects should have sufficiently large profitability for investors to invest in them. This Status Quo Bias may be related to loss aversion. At marginal positive levels, the probability of falling below zero NPV is high and needs to be given greater weight than profits.

The organization or group may also introduce biases in the project approval decision. We look at the impact of herding, the introduction of hurdle rates higher than those of the market and the impact of compensation and incentive plan.

Human beings are subject to herd instinct. The origin of herd behaviour with its strong emotional group impulses may be the hunters who banded together to hunt mammoths (Hormats, 2004). This theory has been used in different contexts. Lux (1995) identifies herd behaviour or mimetic contagion as responsible for bubbles and crashes in market finance. This herd behaviour of noise traders can be exploited by smart money (Shleifer, 2000). Similarly, there is a tendency by managers to copy and imitate catchy ideas. Ashta, *et al.* (2005) identify herd behaviour as a possible factor in corporate financing and report that a firm's listing and delisting decisions were influenced largely because many other firms happened to be listing

or delisting at that time. This could also explain why entrepreneurs and venture capitalists made such a wild rush into Internet projects.

Many companies introduce hurdle rates on rules-of-thumbs based on a certain manager's view of the world. For example, they may require a 15% return and they don't change this in a context of changing interest rates. Thus, positive NPV projects may seem unprofitable because the organization's social dynamics has modified the discount rate.

Normal economic rationality indicates that if a person is not rewarded for taking risks, he will not take them. Therefore, if one wants a manager to pursue positive NPV projects, he too must gain from such ventures. Incentive compensation, however, is often geared one-way: Rewards if the project works out. This is a kind of profit-sharing. However, if behavioural theory is right, if rewards include pay-raises which would be lost if the project turns out to be loss-making, then, according to behavioural theories, loss averse managers would not invest in positive NPV projects (Wiseman and Gómez-Mejía, 1997). They suggest that any contingent pay therefore has to be large enough to compensate for the raises lost by pursuit of risky strategy (project implementation). If, however, the pursuit of risky projects may even lead to termination of services (example Jean-Marie Messier of *Vivendi*, or Michel Bon of *France Telecom*), then contingent compensation should be large enough to compensate for opportunity loss of termination of services.

Ross (2004) has further investigated if compensation structure may affect risk-taking behaviour. He finds that for even a particular manager, based on whether he is near the top of his pay-packet or near floor, risk-taking may be different. If he does not expect higher earnings, he may not take risks. This risk-averseness is equivalent to a high discount rate being applied to projects. In specific circumstances (agents with decreasing absolute risk-aversion), the fact of having call options does not necessarily gear managers to risk-taking. In fact, increasing call options of a manager does not necessarily impact his risk-averseness. What influences managers is down-side

risk. This could be influenced by giving managers put options plus shares, so they don't lose money.

Thaler, *et al.* (1997) talk about the link of myopia or short horizon to risk-taking. They find that more frequent evaluations lead to a focus on the short-term and to lower risk-taking behaviour because of myopia. Haigh and List (2005) reinforce this and indicate that professionals are more prone to myopic loss aversion than students. In fact, if we evaluate managers frequently, we do not give time for cancellation effects of good and bad surprises. Therefore, if bad surprises weigh more heavily —loss aversion—, then the manager gets discouraged faster if the evaluation horizon is short.

V. CONCLUSION

We can therefore say that there is a vast amount of literature indicating that psychology influences risk calculation as well as the risky decision-making process. The usefulness of studying the influence of subjectivity is essentially for the manager to be aware of how he may make erroneous forecasts of expectations and risks and erroneous decisions. With research, more sophisticated modelling may reduce some of the subjectivity errors. However, it may also be possible that the psychological errors are at least subconscious and managers simply prefer some projects to others and err in the calculations to give the desired results. Perhaps new psychometric research techniques would then be invented which permit managers to know what projects are interesting to them, before they evaluate them objectively. Bounded rationality would take on a new meaning.

NOTES

1. There is a *Gabriel Tarde Prize* for French criminology created by the Ministry of Justice in 1972 (see <http://www.afc-asoc.org/GTreg.html>).
2. Tarde is also credited to have been in advance of Schumpeter on ideas on the role of creative innovation in development by a decade (Taymans, 1950).
3. Others come up with similar lists. Hilton (2001) lists confirmation bias, optimism bias, and illusion of control, overconfidence in predictions, mistaken beliefs, risk aversion along with disposition effect and framing of choices, mental rigidity, and mental accounting biases. Baker and Nofsinger (2002) classify the psychological biases of investors in three categories: mental biases, emotional biases, and social biases. The mental biases they list are non-representativeness, cognitive dissonance, familiarity bias, mood and optimism, overconfidence, endowment effect, status quo bias, reference points and anchoring, law of small numbers, and mental accounting. The emotional biases they consider are disposition effect (pride and regret), attachment bias, and changing risk preferences. The social biases they point out are the media, social interaction, and the Internet. Daniel, *et al.* (2002) reclassify factors as heuristic simplification, framing effects, and mental accounting.
4. In a survey of 80 wealthy investors, Evans (2004) found that only 35 used beta; 49 used standard deviation, and 39 used sharpe ratio. Overall, 57 used either a quantitative measure (these three or some other). The others used peer comparisons or other qualitative measures of risk assessment.
5. However, if past comes back after millions of years, as in the Hindu concept of the God of creation —Brahma— recreating the world, then for the relatively infinitesimally small relative life-time of an individual, linear approximations would serve as well.
6. However, lenders would get the benefit of covariance if they are lending to many different firms. So, the firm-specific risk may be less important to bankers even if they have less information.
7. Haigh and List (2005) reinforce this and indicate that professionals are more prone to myopic loss aversion than students.

REFERENCES

- ACKERT, L.F.; CHURCH, B.K., and ENGLIS, B. (2002). "The Asset Allocation Decision and Investor Heterogeneity: A Puzzle?", *Journal of Economic Behavior and Organization*, 47(4), pp. 423-433.
- AKERLOF, G.A. (1970). "The Market for «Lemons»: Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics*, Vol. 84 (3), pp. 488-500.
- ASHTA, A.; PATIL, S., and SEGUIN, G. (2005). "Behavioral Finance Issues in Listing and Delisting in the French Wine Industry: Lessons from the Case of Grands Vins Boisset", *Bachhus in Bourgogne*, conference, Beaune.
- BAKER, H.K. and NOFSINGER, J.R. (2002). "Psychological Biases of Investors", *Financial Services Review*, 11 (2), pp. 97-116.
- BECKER, G.S. and MURPHY, K.M. (1988). "A Theory of Rational Addiction", *Journal of Political Economy*, Vol. 96 (4), pp. 675-700.
- BREALEY, R.A. and MYERS, S.C. (2003). *Principles of Corporate Finance*, 7th edition, New York, McGraw Hill/ Irwin.
- CYERT, R.M.; DILL, W.R., and MARCH, J.G. (1958). "The Role of Expectations in Business Decision Making", *Administrative Science Quarterly*, Dec., Vol. 3 (3), pp. 307-340.
- DANIEL, K.; HIRSHLEIFER, D., and TEOH, S.H. (2002). "Investor Psychology in Capital Markets: Evidence and Policy Implications", *Journal of Monetary Economics*, 49 (1), pp. 139-209.
- DUNCAN, D.C. (2002). "Gabriel Tarde – The First Economic Psychologist: A Review of Psychologie Economique by Gabriel Tarde (1902), F. Alcan, *Paris Journal of Economic Psychology*, 23 (1), pp. 149-156.
- DUXBURY, D. and SUMMERS, B. (2004). "Financial Risk Perception: Are Individuals Variance Averse or Loss Averse", *Economic Letters*, 84 (1), pp. 21-28.
- EVANS, J.L. (2004). "Wealthy Investor Attitudes, Expectations, and Behaviours towards Risk and Returns", *The Journal of Wealth Management*, Vol. 7 (1), pp. 12-18.
- FERNÁNDEZ, P. (2004). "75 Common and Uncommon Errors in Company Valuation", *IASTED Conference on Alliances, Mergers, and Acquisitions*, Cambridge, MA.

- GRAHAM, J.R. and HARVEY, C. R. (2001). "The Theory and Practice of Corporate Finance: Evidence from the Field", *Journal of Financial Economics*, May/June, Vol. 60 (2/3), pp. 187-243.
- HAIGH, M.S. and LIST, J.A. (2005). "Do Professional Traders Exhibit Myopic Loss Aversion? An Experimental Design", *Journal of Finance*, 60 (1), pp. 523-534.
- HILTON, D.J. (2001). "The Psychology of Financial Decision-Making: Applications to Trading, Dealing, and Investment Analysis", *Journal of Psychology and Financial Markets*, 2 (1), pp. 37-53.
- HORMATS, R.D. (2004). "Born to Herd", *Harvard Business Review*, 82 (12), pp. 16-18.
- HOSSEINI, H. (2003). "The Arrival of Behavioural Economics: From Michigan, or the Carnegie School in the 1950s and the Early 1960s?", *The Journal of Socio-Economics*, 32 (4), pp. 391-409.
- JENSEN, M.C. and MECKLING, W.H. (1976). "Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure", *Journal of Financial Economics*, 3 (4), pp. 305-360.
- JUDD, K.L. (1998). "Tax and Human Capital Policy – Taxes, Uncertainty, and Human Capital", *AEA Papers and Proceedings*, 88 (2), pp. 289-292.
- KAHNEMAN, D. and LOVALLO, D. (1993). "Timid Choices and Bold Forecasts: A cognitive Perspective on Risk Taking", *Management Science*, Jan., Vol. 39, Issue 1, pp. 17-31.
- KAHNEMAN, D. and TVERSKY, A. (1979). "Prospect Theory: An Analysis of Decision under Risk", *Econometrica*, March, 47 (2), pp. 263-291.
- LEV, B. and SCHWARTZ, A. (1971). "On the Use of Economic Concept of Human Capital in Financial Statements", *The Accounting Review*, 46 (1), pp. 103-112.
- LUX, T. (1995). "Herd Behaviour, Bubbles, and Crashes", *The Economic Journal*, 105, pp. 881-896.
- McCUE, C.P. (1999). "The Impact of Objective and Empathic Dispositions on Local Government Budget Analysts' Spending Preferences", *Public Budgeting and Finance*, 19 (1), pp. 89-114.

- POOLE, B. S. (2000). "On Time: Contribution from the Social Sciences", *Financial Services Review*, 9 (4), pp. 375-387.
- RITTER, J.R. (2003). "Behavioural Finance", *Pacific-Basin Finance Journal*, 11 (4), pp. 429-437.
- ROLL, R. (1986). "The Hubris Hypothesis of Corporate Takeovers", *Journal of Business*, 59 (2), pp. 197-216.
- ROSS, S.A. (1976). "Return, Risk, and Arbitrage", in I. Friend and J. Bicksler (eds.), *Risk and Return in Finance*, Cambridge, Mass., Ballinger, 1977.
- _____. (2004). "Compensation, Incentives, and the Duality of Risk Aversion and Riskiness", *The Journal of Finance*, 59 (1), pp. 207-225.
- SHELLING, T.C. (2000). "Intergenerational and International Discounting", *Risk Analysis*, 20 (6), pp. 833-838.
- SCHWARZKOPF, D.L. (2003). "The Effects of Attraction on Investment Decisions", *The Journal of Behavioural Finance*, 4 (2), pp. 96-108.
- SHEFRIN, H. (2002). *Beyond Greed and Fear: Understanding Behavioural Finance and the Psychology of Investing*, Oxford University Press.
- SHLEIFER, A. (2000). "Inefficient Markets: An Introduction to Behavioral Finance", *Clarendon Lectures in Economics*, Oxford University Press.
- STIGLITZ, J.E. and WEISS, A. (1981). "Credit Rationing in Markets with Imperfect Information", *American Economic Review*, 71(3), pp. 393-410.
- TAYMANS, A.C. (1950). "Tarde and Schumpeter: A Similar Vision", *Quarterly Journal of Economics*, 64 (4), pp. 611-622.
- THALER, R.H.; TVERSKY, A.; KAHNEMAN, D., and SCHWARTZ, A. (1997). "The Effect of Myopia and Loss Aversion Risk Taking: An Experimental Test", *Quarterly Journal of Economics*, 112 (2), pp. 647-661.
- TVERSKY, A. and KAHNEMAN, D. (1986). "Rational Choice and the Framing of Decisions", *Journal of Business*, Vol. 59 (4), pp. S251-S278.
- _____. (1991). "Loss Aversion in Riskless Choice: A Reference Dependent Model", *Quarterly Journal of Economics*, Nov., Vol. 106 (4), pp. 1039-1061.

ASHTA, A.

- TVERSKY, A.; SLOVIC, P., and KAHNEMAN, D. (1990). "The Causes of Preference Reversal", *The American Economic Review*, March, 80 (1), pp. 204-217.
- WISEMAN, R.M. and GÓMEZ-MEJÍA, L. (1997). "Reconsidering Executive Compensation from a Behavioural Perspective", *Academy of Management Proceedings*, pp. 50-54.