

CENTRE FOR FINANCIAL MANAGEMENT

CFM QUARTERLY IN FINANCE

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ARTICLES /CASES

1. HOW SMART IS THE INDIAN RETAIL INVESTOR

S. Sunderarajan

First day, broker to his client “I have a hot new stock pick, what do you want to do?” Client – “Buy it, Buy it...” Next day, broker to his client “The stock price is up 5%, what do you want to do?” Client – “Buy more..., Buy more.....” Third day, broker to his client “Stock price is up another 5%, what do you want to do?” Client – “Buy even more, buy even more ...” Next day, broker to his client “Stock price is up another 10%, what do you want to do?” Client .. “Sell it..., Sell it...” Broker to client – “To whom?”

It is not difficult to imagine this conversation occurring with the average retail investor. It highlights aberrant behavioural traits of investors (including myself) that I have discovered through research I am undertaking as part of my Doctoral thesis. Furthermore, being a long time investor in mutual funds since 2003 it is gratifying to see experience and research resonate with each other. A key takeaway I’ve learnt common to both my experience and research findings is that “Excessive trading is hazardous to your Wealth”. This pithy statement, part of the title of a research article by Brad Barber and Terry Odean in 2000, succinctly captures the essence of what I wish to convey in this short article.

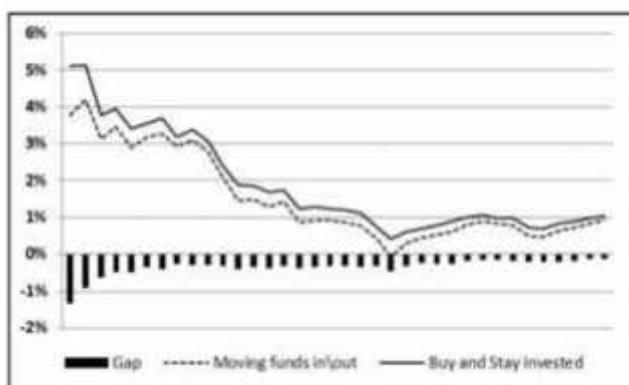
Let me first talk about my own research into Indian mutual funds. I’ve analysed thirty eight months of mutual fund investments from March 2014 to April 2017 in over 209 equity funds made by two different classes of investors - Retail (the average consumer) and Financial institutions (Foreign Institutional Investors and Banks). Every month since 2014 to 2017 I determined for each of the 200+ funds and for each class of investor how much of their money came in (fund units were purchased) and how much flowed out (fund units were sold). I calculated the past six months return performance of each fund for each of the thirty eight months and ranked them on a scale of 1 (lowest returns) to 10 (highest returns). This was to understand the relationship between an investor cash flows in\out of a fund and its performance.

The first pattern that emerged from my study was one of retail investors exhibiting cyclical investments putting money in and pulling it out of mutual funds throughout the year (the flows peak around March and September of every year coinciding with taxes and start of the festival season). Retail investors in aggregate irrespective of the market level seem to use mutual funds as a short term vehicle for making money rather than regarding them as the long term investments they were intended to be. This behaviour, on the other hand is absent for FIIs and Banks who exhibit changes in flows but in line with markets.

I found retail investors were likely to invest two times more in a fund that had performed well in the past 6 months (a rank of 8 or 9 or 10) than one that had performed poorly (ranks of 1, 2 or 3). So, did this naïve strategy prove beneficial in terms of returns? It appears not. The majority of cash flows of retail investors chased Sectoral, Large Cap and Multi-Cap funds all of which did worse than Index funds or Small cap funds which fared better but attracted less fund flows. Index funds invest in the market index such as the BSE Sensex or Nifty and the individual stocks within such funds move in line with the constituents of the corresponding market index.

I also looked at the impact of cyclical movements of cash in and out of funds on long term returns of a retail investor. To understand this, think of putting money into a fund on day one to find the next day its price has fallen. This means a loss on paper. Another investor pulls money out by selling units of a fund on day one to find the next day the fund price has risen, thereby losing out on potential gains. In both cases investors notionally lose money because of the timing of cash flows in and out. To understand this impact I compared the median monthly returns made by investors in each of the 200+ funds with cash flows in and out every month from 2014 to 2017 against the returns of a *hypothetical investor who invests in each fund in 2014 and then does nothing till 2017 (a la Warren Buffet)*.

I plotted the results in a graph and the picture that emerges says it all. Consistently retail investors were worse off by moving money around i.e. *by actively trading* (dotted line) than by buying funds and staying invested (solid line). This gap is as high as 0.8% and is higher for the best performing funds. *In other words investors lose out most with funds that have the best performance!!* In contrast FIIs and Banks, who also move money around, manage to get a positive return compared to the “buy and stay invested” strategy. So, clearly, their investment strategy is superior to that of retail investors. As a result the picture that emerges of the retail investor is not a flattering one compared to their institutional brethren: the former trade actively when they should not since they get timings of buys and sells wrong; they choose funds based on past performance which does not work out to be the best criteria since returns revert to means, so their fund selection process seems flawed; in terms of returns they would have been better off investing in an Index fund and then just letting the fund be (other than investing in it regularly) for as long as possible.



The key question that underpins all these findings is *“When mutual funds are run by professional managers, why do retail investors trade so much? Why do they not leave this to the fund managers, people who are far more qualified than themselves?”* Is it a misplaced over-confidence in one’s own ability to beat the market; is it lack of confidence and trust in fund management or a fund house; is it undue influence of agents and brokers seeking commissions resulting in indiscriminate sales of funds. Or are there other reasons?

My own experience since 2003 is that the market has seen multiple upheavals including the infamous 2008 crash and I have at many times been tempted to do what most retail investors would - exit the markets, book profits and re-enter when the situation looked healthier. What has kept me from doing so has been my investment advisor who would always dissuade me from any sudden movement. As a result I have seen the Sensex grow from 3000 to 30,000 levels and my own portfolio grow in line with a growing market.

To conclude in the words of Paul Samuelsson, Nobel prize winner in Economics in 1970, *“There is something in people; you might even call it a little bit of a gambling instinct... I tell people investing should be dull. It shouldn't be exciting. Investing should be more like watching paint dry or watching grass grow. If you want excitement, take \$800 and go to Las Vegas.”* So unless you are financial whiz kid or get an adrenaline high in winning\losing large sums of money, invest in a good mutual fund and then.....sit back and do nothing.

2. STUMBLING ON HAPPINESS

Prasanna Chandra

The key points of Daniel Gilbert's insightful book, *Stumbling on Happiness*, First Vintage, 2006, are as follows:

1. The human being is the only animal that thinks about the future. As Gilbert put it, "We think about the future in a way that no other animal can, does or even has, and this simple, ubiquitous, ordinary act is a defining feature of our humanity." As a philosopher observed, the human brain is an *anticipation machine and making future* is an important activity. The frontal lobe of the human brain is a time machine that allows us to experience the future before it arrives.
2. Why do our human brains think about the future when there is so much to think about the present situation? There are several reasons. First, thinking about the future can be pleasurable. As Daniel Gilbert put it, "We daydream about hitting a home-run at the company picnic, posing with the lottery commissioner and a door-sized cheque, or making snappy patter with the attractive teller at the bank, not because we expect or even want these things to happen, but because merely imagining these possibilities is itself a source of joy." Studies confirm that when people think about the future they generally imagine themselves achieving and succeeding rather than faltering or failing. Just the way we fill our photo albums with pictures of the happiest moments from our memory lane, we frolic in the best of all imaginary tomorrows when we stroll up the imagination avenue. Indeed, imagining the future can be so pleasurable that sometimes we would rather think about it than get there.

While imagining happy futures makes us feel happy, it can also cause trouble. Researchers have found that when people find it easy to do something, they tend to overestimate the probability of its occurrence.

3. We make lawful, regular, and systematic mistakes when we try to imagine our personal futures. The prospectiscope, through which we look forward in time or consider the future, is defective. The future turns out to be different from the way it appears through the prospectiscope. We experience illusions of foresight just the way we experience illusions of eyesight (optical illusions) and illusions of hindsight. All the three types of illusions are explained by the same principles of human psychology.

As Daniel Gilbert put it, "Because most of us get so much more practice imagining good than bad events, we tend to overestimate the likelihood that good events will actually happen to us, which leads us to be unrealistically optimistic about our futures."

Of course, the futures that we imagine are not always pleasant. They are often unpleasant or scary, and people tend to worry about the future rather than revel in it. We worry about our future for two reasons. First, anticipating unpleasant events can mitigate their impact. Second, worry and anxiety can motivate us to do the right things by exaggerating the unpleasant consequences of our behaviour.

Besides providing pleasure and preventing pain, prospection serves an even more important function. We want to know what is likely to happen so that we can do something about it. We want to control the experiences we are about to have. We find it gratifying to exercise control, not just for the future it creates, but for the exercise itself. As Gilbert put it, “Being effective—changing things, influencing things, making things happen—is one of the fundamental needs human brains seem to be naturally endowed, and much of our behaviour from infancy onwards is simply an expression of this penchant for control.” He added, “Our desire to control is so powerful, and the feeling of being in control so rewarding, that people often act as though they can control the uncontrollable.” That is why people feel more confident about winning a lottery if they can control the number on their tickets, and similarly they feel more confident about winning a dice toss if they can toss the dice themselves. Researchers believe that the feeling of control, whether real or illusory, is one of the wellsprings of mental health. As Gilbert says, “So if the question is ‘why should we want to control our futures?’ surprisingly right answer is that it feels good to do so. Impact is rewarding; mattering makes us happy. The act of steering one’s boat down the river of time is a source of pleasure, regardless of one’s port of call.”

4. The best way to understand the shortcomings of *imagination* (the faculty that enables us to see the future) is to understand the shortcomings of *memory* (the faculty that enables us to see the past) and perception (the faculty that enables us to see the present).
5. Our memory of an event is altered by information acquired after the event. Brains *reweave* their experience, rather than *retrieve* their experience. Similarly, perceptions are portraits, not photographs, and they reflect the artist’s hands as much as the things portrayed. As the renowned historian Will Durant put it, “The world as we know is a construction, a finished product almost; one might say, a manufactured article to which the mind contributes as much by its moulding forms as the thing contributes by its stimuli.”

As Daniel Gilbert put it, “We tend to forget that our brains are talented forgers, weaving a tapestry of memory and perception whose detail is so compelling that its inauthenticity is rarely detected.” He added, “In a sense, each of us is a counterfeiter who prints phony dollar bills and then happily

accepts them for payment, unaware that he is both the perpetrator and victim of a well-orchestrated fraud.”

6. The mistakes that we make in accepting the validity of our memories and perceptions are the same that we make in imagining our futures. While our imagination constructs the images of future with ease, it does not consciously supervise the construction of these mental images. It treats them the way it treats memories and perceptions, assuming initially that they are accurate representations of the objects being imagined.
7. When scientists want to establish the causal relationship between two things (say cholesterol and heart attacks), they compute a mathematical index based on co-occurrences (the proportion of sample that has high cholesterol and heart attacks) and non-co-occurrences (the proportion of same that has high cholesterol and no heart attack and the proportion of sample that has low cholesterol and heart attack). It is necessary to analyse all these quantities to assess the likelihood of a causal relationship between cholesterol and heart attack.
8. While scientists follow the rigorous methodology described above, ordinary people follow a naïve approach when they want to know whether two things are causally related. As Daniel Gilbert says, “They routinely search for, attend to, consider, and remember information about what *did* happen, and fail to search for, attend to, consider, and remember information about what *did not*.” Nearly four centuries ago, Sir Frances Bacon, philosopher and scientist, said that failure to consider absences was among the most serious errors of the human mind:

“By far the greatest impediment and aberration of the human understanding arises from (the fact that)...those things which strike the sense outweigh the things which, although might be more important, do not strike it directly. Hence, contemplation usually ceases with seeing, so much so that little or no attention is paid to things invisible.”
9. The way we think about future is influenced by our inattention to absences. As Gilbert put it, “Just the way we do not remember every detail of a past event, or every detail of a current event, so do we fail to imagine every detail of any future event.” He added, “But just as we tend to treat the details of future events that we do imagine as though they were actually going to happen, we have an equally troubling tendency to treat the details of future events *we don’t* imagine as though they were not going to happen.” Put differently, we fail to consider not only how much imagination fills in, but also how much it leaves out.
10. When our brains plug holes in their conceptualisations of yesterday, they rely on a material called today. This may be called the phenomenon of *presentism*.

This tendency to fill in the holes of past from the present is particularly pronounced when it comes to remembering our past.

Presentism applies to the past as well as future. A time-honored tradition is to underestimate the novelty of the future. When scientists make wrong predictions, they almost *always* err by predicting that the future will be mostly like the present.

Presentism in the future is even more pronounced. As Gilbert put it, “If the past is a wall with some holes, the future is a hole with no walls. Memory uses the filling-in trick, but imagination is the filling-in trick, and if the present lightly colours our remembered pasts, it thoroughly infuses our imagined futures.” He added, “More simply said, most of us have a tough time imagining a tomorrow that is terribly different from today, and we find it particularly difficult to imagine that we will ever think, want or feel differently that we do now.”

11. For almost a century, psychologists assumed that traumatic events, such as loss of a beloved one or violent crime, have a devastating and durable impact on those who experience it. Recent research, however, shows that most people are surprisingly resilient in the face of trauma. As a group of researchers observed, “resilience is often the most commonly observed outcome trajectory following exposure to a potentially traumatic event.”

Humans have tremendous resilience to recover from adversity. We are equipped with what Daniel Gilbert calls a “psychological immune system.” We somehow expect things to be worse than they generally turn out to be, so it is easier to recover from them. As Jason Zweig put it, “Because we imagine that our reactions to bad events will never fade, our own powers of recuperation rake us by surprise. On the flip side, we also adjust to good things much faster than we anticipate.”

According to Daniel Gilbert, “A healthy psychological immune system strikes a balance that allows us to feel good enough to cope with our situation but bad enough to do something about it.” He added, “We need to be defended, not defenseless or defensive, and thus our minds naturally look for the best view of things while simultaneously insisting that those views stick reasonably close to facts.”

12. The psychological immune system does its job using processes that may be described as tactics or strategies. These terms should not persuade us to think of people as schemers who are consciously trying to put a positive spin on their experience. On the contrary, research suggests that people are typically unaware of what they are doing and why they are doing. However, when asked for a reason, they readily supply one.

Positive views, to be credible, must be based on facts that we honestly believe in. How do we do this? Gilbert explains, “We accomplish this by unconsciously cooking the facts and then consciously consuming them. The diner is in the dining room, but the chef is in the basement. The benefit of all this unconscious cookery is that it works; but the cost is that it makes us strangers to ourselves.”

13. Because of our ignorance of our psychological immune system, we tend to mispredict the circumstances under which we will blame others and also mispredict the circumstances under which we blame ourselves.
14. In the long run, people of every age and every walk of life, regret inactions more than actions. This may be because our psychological immune system has greater difficulty in creating positive and credible views of inactions than those of actions
15. A defensive system is effective if it responds to threats, and it is practical if it responds to only those threats that exceed some critical threshold. This means that unlike large threats, small threats are not detected by the radar. Like any defensive system, the psychological immune system obeys this principle. Paradoxically, this means that it is easier to achieve a positive view of a very bad experience than of a bad experience. As Gilbert put it, “When experiences make us feel sufficiently unhappy, the psychological immune system cooks facts and shifts blame in order to offer a more positive view. But it doesn’t do this every time we feel the slightest tingle of sadness, jealousy, anger or frustration.” He added, “Intense suffering triggers the very processes that eradicate it, while mild suffering does not, and this counterintuitive fact can make it difficult for us to predict our emotional futures.”
16. People are likely to find a positive view of the things they are stuck with than of things they’re not. People find silver linings only when they must. As Gilbert put it, “Inescapable, inevitable and irrevocable circumstances trigger the psychological immune system, but as with the intensity of suffering, people do not always recognise that this will happen.” Our failure to anticipate how inescapability triggers our psychological immune system, that promotes our happiness, can lead us to some painful mistakes.
17. Seeing in time is similar to seeing in space. However, there is one important difference between spatial and temporal horizons. When we see a distant elephant, our brains are aware that the elephant looks smooth and vague and lacks in detail because it is spatially far away, and so we do not mistakenly conclude that the elephant itself is smooth and vague. But when we remember or imagine an event which is temporally distant, our brains perceive the distant events as smooth and vague as we imagine remembering them, overlooking the fact that details disappear with temporal distance.

18. When we have unpleasant experiences, we explain them in ways that makes us feel better. The mere act of explaining helps the impact of unpleasant events. As Gilbert put it, “The eye and the brain are conspirators, and like most conspiracies, theirs is negotiated behind closed doors, in the backroom, outside of our awareness. Because we do not realise that we have generated a positive view of our current experience, we do not realise that we will do so again in the future.”
19. Our memory stores an idiosyncratic synopsis of our experience and not a feature-length film of our experience. Infrequent or unusual experiences and final scenes are often the most memorable and this impairs our ability to learn from experience. As Gilbert put it, “The fact that the least likely experience is often the *most likely memory*, can break havoc with our ability to predict future experiences.” He added, “The more ambiguous the subject is, the more license the artist takes, and few subjects are more ambiguous than emotional experience. Our memory for emotional episodes is overly influenced by unusual instances, closing moments and theories about how we must have felt way back then, all of which gravely compromise our ability to learn from experience. Practice, it seems, doesn’t always make perfect.”
20. Since retrospection is a poor guide to prospection, you should be better off by simply asking others, who are currently having the experience you are contemplating, as to how they feel. While this idea sounds simple, you may not accept it. You may say, as Gilbert put it, “I am a walking, talking idiosyncrasy, and thus I am better off basing my predictions on my somewhat fickle imagination than on the reports of people whose preferences, tastes and emotional proclivities are so radically different from mine.”
21. One of the most reliable scientific facts is that average person does not see himself as an average. As Gilbert put it, “Most students see themselves as more intelligent than an average student, most business managers see themselves as more competent than an average business manager, and most football players see themselves as having better ‘football sense’ than their teammates. According to one research team, “most of us appear to believe that we are more athletic, intelligent, organised, ethical, logical, interesting, fair minded, and healthy—not to mention more attractive—than an average person.”
22. What makes us think that we are so special or unique? There are at least three reasons. First, while we experience our own thoughts and feelings, we must infer what others are experiencing. Second, we simply enjoy thinking of ourselves as special and we prize our unique identities. Third, we tend to overestimate our uniqueness because we overestimate everyone’s uniqueness. As Gilbert put it, “Our mythical belief in the variability and uniqueness of individuals is the main reason why we refuse to use others as

surrogates.” He added, “The irony, of course, is that surrogation is a cheap and effective way to predict one’s future emotions, but because we don’t realise just how similar we all are, we reject this reliable method and rely instead on our imaginations, a flawed and fallible as they may be.”

3. KEY LESSONS LEARNT IN INFRASTRUCTURE MANAGEMENT

Padmanabhan Nair

Performance of infrastructure has a significant bearing on GDP. Some believe that improving infrastructure management can potentially contribute 2 to 3 percent to GDP growth.

Some Shortcomings in Infrastructure Management in Management

Infrastructure has become a “thorn in development flesh” particularly in South Asia. This was primarily due to the following factors.

1. *A rigid bureaucracy* Many bureaucrats believed that infrastructure is the absolute monopoly of the government.
2. *A lack of ability or willingness to pay for good infrastructure* This view is shared by the public as well as the authorities at large.
3. *A lack of understanding of how to create a “viable infrastructure model”* A viable infrastructure model is a model that gives the investor (including the Government) a reasonable return and at the same time does not overcharge the users.
4. *The unwillingness to pay for specialised knowledge* There has been very little appreciation that better technologies and expertise bring enormous improvements and these have to be adequately compensated.
5. *Inadequate training of operating personal* While it is common for the top brass of infrastructure projects (who usually have a short tenure) to receive some training, the middle and lower level executives who do the actual work day after day hardly receive any training.
6. *Lack of process and method* Proper manuals of operation and structured process for running infrastructure projects are rarely developed.
7. *Inappropriate sharing of risks* Infrastructure projects usually carry twice as many risks as industrial projects. These risks have to be properly shared by the government and various parties involved in the infrastructure project.

Some Solutions

Here are some solutions to address the problems mentioned above:

1. *Focus on utilising existing projects rather than announcing new projects*
This option is generally not explored because of the political compulsion to unveil new projects and an unwillingness to let the private sector or foreign player in for technology and operation.
2. *Handover public assets on long term lease* Using a system of transparent tendering or bidding, lease out public assets to private sector players, while retaining the ownership with the government.
3. *Build management capacity* The managerial and operating staff of infrastructure projects must be trained regularly. In addition, more courses on infrastructure management must be introduced in engineering colleges and business schools.
4. *Create public awareness to pay for good infrastructure* The government, media, academic institutions, civic society, and others must educate the citizenry about the need to pay for good infrastructure.
5. *Strengthen the regulatory structure* A regulatory structure must be created that provides a satisfactory return to the investor while protecting the users.
6. *Deepen the debt market* While the government provides “viability gap funding” by way of equity to strategically important projects, infrastructure requires huge amounts of debt financing. There is an urgent need to deepen the debt market

4. VALUATION OF IRB SURAT DAHISAR TOLLWAY PRIVATE LIMITED **Prasanna Chandra**

IRB Infrastructure Developers Limited (IRB) is a listed infrastructure development company that develops infrastructure projects in the toll road sector under the Public Private Partnership (PPP) model.

IRB has sponsored an Infrastructure Investment Trust named IRB InvIT Fund, registered under the SEBI (Infrastructure Investment Trusts) Regulations, 2014.

IRB InvIT acquired stakes held by IRB and its wholly owned subsidiaries (as the case may be) in the following Special Purpose Vehicles; to form part of the initial portfolio of IRB InvIT.

- IRB Surat Dahisar Tollway Private. Limited
- IDAA Infrastructure Private. Limited
- IRB Jaipur Deoli Tollway Private. Limited
- IRV Tumkur Chitradurga Tollway Private. Limited.
- IRB Talegaon Amravati Tollway Private. Limited

- MVR Infrastructure & Tollway Private. Limited

Walker Chandiok & Co LLP (WC, hereafter) were appointed as an independent valuer for valuing the six SPVs to be transferred to IRB InvIT as on 30 September 2016 (the "Valuation Date") in accordance with the SEBI (Infrastructure Investment Trusts) Regulation, 2014.

Discounted Cash Flow (DCF) Method

To arrive at fair value of the SPVs, WC used the DCF method. The DCF method requires the following inputs: projected future free cash flows to firm (FCFF) and the weighted average cost of capital (WACC).

Free Cash Flows to Firm The FCFF has been calculated for each individual SPV as on the valuation date based on the financial projects of SPVs under Indian Accounting Standards (IND AS) provided by the management of IRV (Management, hereafter). The projections are based on the best judgement of the Management of the future cash flows supported by the traffic surveys conducted by GMD Consultants, an independent traffic consultancy firm.

The Management provided inputs relating to:

Traffic Volumes The growth in traffic volumes for each SPV were provided to us by the Management supported by the traffic consultant's reports (prepared by GMD Consultants) for the 6 SPVs. As confirmed by the Management, the traffic volumes for each SPV has been estimated by the traffic consultant after considering overall structure and condition of the projects including analysis of demand and supply and strategic geographical locations of the individual road projects.

Toll Rates The current toll rates provided by the Management have been validated based on the site visits carried out by the Firm. The toll rates have been projected to grow in the manner stipulated in the individual concession agreements of the SPVs. The variable determinant supporting the toll rate forecast is "Wholesale price Index" (WPI) and is projected to grow 5% annually by the Management.

Operations & Maintenance ("O&M") O&M expenditures estimated by the Management over the Projected Period are based on the future estimates provided by the contractor of each SPV.

Amortisation The toll collection rights, (including premium payable and negative grant to NHAI as applicable) for the 6 SPVs have been amortised over the period of concession, using revenue based amortisation as per exemption provided in IND AS 101.

Debt Repayment The Management has provided us with the debt repayment schedule of each individual SPV based on the agreements with various banks.

Non-Cash Net Working Capital As per the nature of the business of operating toll road projects, there is no requirement of working capital to run the business and hence the Management has considered it to be nil for the entire projected period.

Weighted Average Cost of Capital (WACC) The WACC for an SPV as on the valuation date was derived as follows:

$$WACC = K_e \times W_e + K_d \times (1-t) \times W_d$$

where W_e is the weight of equity in the capital structure, W_d is the weight of debt in the capital structure, K_e is the cost of equity, K_d is the cost of debt, t is the effective tax rate.

Cost of Equity The cost of equity (K_e) was computed using the CAPM as shown below.

$$K_e = R_f + S (R_M - R_f)$$

where K_e is the cost of equity, R_f is the risk-free rate, S is the measure of relative volatility, R_M is the return on the market portfolio, and $(R_M - R_f)$ is the equity market risk premium.

R_f was estimated at 7.69% which reflected the 10 years Wholesale Debt Market Zero Coupon Bond Yield as of the Valuation Date β was computed by re-levering the average asset beta of companies in the construction and engineering segment and having more than 50% revenues from the road infrastructure. Beta has been considered based on 5-year trailing Beta of comparable companies, re-levered for each of the SPV specific debt-to-equity ratio and effective taxes. $(R_M - R_f)$, the equity risk premium was considered at 7.40% for each SPV based on Grant Thornton research for India.

Cost of Debt The marginal cost of raising debt for each SPV was based on the was based on the prevailing interest rate as on the Valuation Dated.

The effective tax rate (t) was determined after considering 80IA benefits and applicable MAT credit (if any) in the projected period as confirmed by the Management for each SPV.

Weights To get the weights, W_e and W_d , the debt-equity ratio (DER) is required. The DER was calculated as the average debt-to-equity ratio for each individual SPV over the projected period.

Valuation of IRB Surat Dahisar Tollway Private Limited (IRBSD)

IRBSD project covers the Surat and Dahisar section of NH- 8 from 263.0 km to 502.0 km. The project has been awarded to IRBSD on a revenue sharing basis with the National Highways Authority of India (“NHAI”).

The project highway passes through two states namely Gujarat and Maharashtra. Approximately 120 km of stretch lies in the state of Gujarat and the balance 120 km lies in the state of Maharashtra. The project is joined and/ or intersected by number of State Highways, Major Distinct Roads and Other District Roads.

IRBSD project which has been awarded for a concession period of 12 years starting from 20 February 2009 has been commissioned and is currently in the operation/ maintenance phase.

Details of IRBSD

Parameters	Details
Length of the project	239 km
Project Cost	INR 25,285.74 Mn
Concession Period- Start	20 February 2009
Concession Period- End	14 January 2022
Tolling Start Date	20 February 2009
Date of Inspection	4 December 2015
IRB and its wholly owned Subsidiaries' Stake	100%

Source : Management

The FCFE for IRBSD has been calculated based on the financial projections provided by the Management for the period *FY17 through FY22*.

The base cost of equity for IRBSD is considered to be 11.60% based on the factors mentioned above in Section VI. The pre-tax cost of debt is considered to be 9.75% based on the prevailing interest rate of the SPV. An Effective tax rate of 21.34% has been considered as applicable throughout the projected period, resulting in a post-tax cost of debt of 7.67%.

Based on an average DER of 0.31 over the projected period for IRBSD, the WACC arrived at for the purpose of valuation is 10.68%.

As on the Valuation Date, we have discounted the free cash flows of IRBSD using the WACC leading to a Gross Enterprise Value (“GEV”) of INR 14,602.62 Mn.

The GEV has then been adjusted for cash, net current assets, net cash impact of long term assets and liabilities, net dues from/to related parties including interest free subordinate debt based on the balance sheet of IRBSD as on 31 March 2016 provided by the Management. The GEV is further adjusted for the outstanding net

debt estimated by the Management as on the Valuation Date to arrive at the Fair Value of Equity of INR 5,638.41 Mn.

Refer Appendix II for the detailed Discounted Cash Flow workings of IRBSD.

The detailed DCF workings if IRBSD are given in Exhibit .1

Exhibit .1 DCF Workings of IRB Surat Dahisar Tollway Private Limited

DISCOUNTED CASH FLOW ANALYSIS (Free Cash Flows to Firm or FCFF Model)		Financial Year Ending 31 March					
		FY17	FY18	FY19	FY20	FY21	FY22
No of days operational		183	365	365	366	365	365
Net Sales (a)		1,816.3	3,939.6	4,370.2	4,852.8	5,311.9	4,125.9
Growth Rate			116.9%	10.9%	11.0%	9.9%	-22.6%
Earnings Before Interest, Depreciation & Amortization and Tax (a)		1,411.3	3,309.6	3,470.2	3,852.8	4,711.9	3,668.6
Margin		77.7%	84.0%	79.4%	79.4%	89.7%	88.9%
Less: Depreciation & Amortization		1,121.0	2,431.5	2,697.3	2,995.1	3,290.1	2,546.5
Earnings Before Interest and Tax		290.3	878.1	773.0	857.7	1,491.1	1,122.1
Income Tax (b)		61.95	187.4	165	183	318.2	239.5
Gross Free Cash Flows to Firm		228.3	690.7	608.0	674.7	1,172.9	882.6
Add: Depreciation & Amortization		1,121.0	2,431.5	2,697.3	2,995.1	3,290.8	2,546.5
Less/(Add): Increase/(Decrease) in Working Capital		0.0	0.0	0.0	0.0	0.0	0.0
Net Free Cash Flows to Firm		1,349.4	3,122.2	3,305.2	3,669.8	4,463.7	3,429.1
Present Value Periods in Years (Mid Year Discounting)							
Present Value Factors (c) 10.7%		0.9750	0.9035	0.8163	0.7376	0.6664	0.6085
Present Value of Free Cash Flows to Firm		1,315.6	2,820.9	2,698.2	2,706.7	2,974.6	2,086.6
Gross Enterprise Value		14,602.6					
Add: Cash balance (d)		366.5					
Add/Less: Net current assets (including investments) (e)		(258.0)					
Add/Less: Net cash impact of long term assets and liabilities (e)		(2.6)					
Less: External bank debt (f)		(8,016.9)					
Add/Less: Net dues from / (to) related parties (e)		(1,053.1)					
Equity Value of Surat-Dahisar (INRMns.)		5,638.4					

Footnotes:

INR: Indian Rupees; Mns.: Millions; FY: Financial Year; Surat-Dahisar Surat Dahisar Tollway Pvt. Ltd.

Projections for the Financial Years of FY17 to FY22 based on the expected tenure of the project, as provided by the management of IRB Infrastructure Private Limited ("Management").

Effective tax rate has been applied after considering 80IA benefits and applicable MAT credit (if any) in the projected period as confirmed to us by the Management.

Present Value factors have been considered based on the WACC of the Project. Please refer to Exhibit 3 for detailed calculation.

Based on the audited balance sheet as on the 31 March 2016 and adjusted for the debt repayment for the period 1 April'16 to 30 September'16 as provided by the Management.

Based on the audited balance sheet as on the 31 March 2016 as provided by the Management.

Based on the debt repayment schedule provided by the Management as on the Valuation Date.

1. CONSILIENCE

Many disciplines focus on human behaviour. The important ones are:

- Anthropology
- Biology
- Computer science
- Economics
- Neuroscience
- Organisational behaviour
- Political science
- Psychology
- Sociology

The common denominator of these disciplines is homo sapiens. While these disciplines do not study the same aspects of homo sapiens, there are certainly some overlaps among the aspects studied by them. To the extent they overlap, they better argue. If they don't, one of the two or both the fields are mistaken. This was the message of E.O. Wilson, the great evolutionary biologist, in his seminal book *Consilience*. As he put it, "The Consilience of Inductions takes place when an Induction, obtained from one class of facts, coincides with an Induction, obtained from another different class. This Consilience is a test of the truth of the Theory in which it occurs." The word consilience was first coined by William Whewell, a British philosopher, scientist, and polymath in his book *Philosophy of the Inductive Sciences* published in 1840.

2. WHAT MAKES A HEALTHY COMPANY

What makes a healthy company? According to Ian Davis, Worldwide Managing Director of Mckinsey, the following are the generic components of a healthy company.

- A robust and credible strategy.
- Productive, well maintained assets
- Innovative products, services, and processes
- A fine reputation with customers, regulators, government, and other stakeholders.
- The ability to attract, retain, and develop high- performing talent.

3. BEHAVIOURAL FINANCE AND VALUATION

Although there is substantial evidence documenting investor irrationality, its implications for valuation are not so obvious. Perhaps we can regard DCF valuation as the antithesis of behavioural finance and look at the findings of behavioural finance in two ways:

1. Investor irrationality may explain why prices diverge from value (as per DCF model). This divergence provides an opportunity for rational investors, who use the DCF model, to earn excess returns. Here the implicit assumption is that market prices converge to intrinsic values in the long run.
2. It may explain why DCF values and relative values (estimated using multiples) can differ. After all, relative values are estimated on the basis of how the market prices similar assets and the irrationality of investors will be baked into those prices.

4. HOW NORDIC BOARDS CREATE EXCEPTIONAL VALUE

Since 1999, Boston Consulting Group (BCG) has published annual rankings of top value creators based on total shareholder return (TSR) over the previous five years.

In the BCG's annual study of value creation, Nordic companies have consistently outperformed the global average, whether we look at annualized returns over time periods of 5,10, or 15 years.

An important contributor to Nordic companies' superior returns, according to BCG, is their unique model of corporate governance. In their article, "How Nordic Boards Create Exceptional Value," Lars Faeste et.al of BCG observed, "The Nordic model establishes a board of directors that does not include any of the company's executives. This non-executive board's responsibilities include appointing and monitoring the CEO, approving the corporate strategy, and overseeing legal compliance and risk management."

PART C: WIT AND WIDSOM

1. HUMOUR

- A lawyer is seated next to a blonde on a long flight from London to New York. To pass time, the lawyer asks the blonde whether she would play a fund game with him. Keen on taking a nap, the blonde declines. Persisting, the lawyer says that the game will be a lot of fun and explains how it works: "I will ask you a question, and if you don't know the answer you will have to pay me \$ 10 and vice versa." The blonde declines. To motivate her, the lawyer says "If you don't know the answer you pay me \$ 10, but if I don't know the answer I will pay you \$ 100." Realising that the lawyer will pester her endlessly, the

blonde relents. The lawyer asks “What is the population of Alaska? The blonde gives him \$ 10. The blonde asks, “Which is that animal that goes on two legs up the hill but while returning comes on three legs?” and takes a nap. The lawyer searches for the answer on the internet on his laptop for half an hour but can’t get the answer. So he gives \$ 100 to the blonde. He then asks the blonde, “Out of curiosity, I want to know what is the answer.” The blonde gives him \$ 10 and goes back to sleep.

- Seven year old John went to his mother and asked a philosophical question: “Mama, where have we come from.” His mother replied, “God created the earth. Then he created Adam and Eve. We are the descendants of Adam and Eve.” Somewhat unconvinced, John asked his scientist father, “Dad, where have we come from.” His father replied, “We have evolved over millions of years, and our ancestors were monkeys.” Confused, John went back to his mother and said, “You said that we descended from Adam and Eve, but Dad says that we descended from monkeys. What is the truth?” John’s mother said, “I told you about my side of the family, and Dad told you about his side of the family

2. WISE SAWS

- “When all think alike, no one thinks very much.”

Walter Lippmann

- Every thought you release becomes a permanent part of your character.