Behavioural Economics in the Fight Against COVID-19: BOMA Framework

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Abstract: *As the world grapples with the COVID-19 pandemic, measures such as social distancing and lockdowns have been implemented across the world. India is at a crucial juncture of the spread of the disease where there is considerable uncertainty about the transmission trajectory and stringent measures such as the 21-day national lockdown have been put in place in its fights against the pandemic. As the confirmed cases grow exponentially, it is critical to 'flatten the curve' as soon as possible given the over-burdened public health infrastructure, demographic composition, and epidemiological transition. I present four important lessons from behavioural economics that can be implemented by policy makers to allay the fears of the masses and soften the coercion: (i)* ***B****ase rate neglect (ii)* ***O****ver-reaction to low probability events (iii)* ***M****yopic loss aversion (iv)* ***A****vailability bias. The acronym based on the first alphabets of these biases –* ***BOMA*** *– that translates to 'bomb' in Odia, is not only an apt metaphor for a bomb that is waiting to explode unless prompt public action is undertaken but also offers a new framework for policy communication in the times of disasters such as COVID-19.*

Introduction

As COVID-19 wreaks havoc across the globe after killing thousands and infecting hundreds of thousands in China, the strategy of 'flattening the curve' has become a popular response to the containing and managing the pandemic. The concept of 'flattening the curve', which in fact is 'flattening the epidemiological curve' refers to slowing the rate of infection by several measures such as aggressive quarantining, 'social distancing', and lockdowns (Gourinchias, 2020). It provides a pragmatic approach to combatting the pandemic as it emphasizes the capacity constraints of public health system.

The pandemic has resulted in considerable uncertainty about the turning point. Governments worldwide including India have adopted drastic measures such as contact tracing, lockdowns, travel restrictions, and curfews. In this context, there may be a need for hard paternalistic policies such as extended lockdowns as part of mitigation or suppression (of disease) strategies to combat the spread of COVID-19. At the same time, soft paternalism in the form of "nudge" can be employed by policy makers (Gaurav, 2019). Irrespective of the blend of different shades of paternalism, behavioural economics offers several insights into the foundations of decision-making in the time of pandemics.
In this policy brief, I present four behavioural biases; BOMA framework – based on the first alphabets of the four biases of interest – that contribute to people's perspective about the pandemic. Policy makers can use this framework to create awareness about behavioural biases that hold the key to allaying fears and panic response in society. Such behavioural insights for risk communication and popular communication of science should also become an important element of disaster management and crisis response in the time of pandemics.

Base rate neglect (B)

It is a cognitive fallacy in which individuals ignore 'base rate' information and focus on specific case-specific information when presented with both (Kahneman and Tversky 1973; Bar-Hillel, 1980). Base rate implies how often something being described occurs in the population – the likelihood of

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occurrence of something.[2] The following experiment illustrates how base rate neglect occurs. Kahneman and Tversky (1973) informed participants in their study that they had selected a person randomly from a group of 70 lawyers and 30 engineers, and then read a personality profile of that person – depicting a stereotypical engineer. In this case, the base-rate information was that most people out of 100 were lawyers but the case-specific information seemed more 'engineer-like'. Most participants gave 'engineer' as the answer.

False positives are also an example of base rate fallacy. If a population has low prevalence rate of a condition, and false positive rate is higher than the true prevalence rate, false positive tests are more probable than true positive tests. During a pandemic, if people believe that they are more likely to die of the pandemic than dying from cancer or a car accident, base rate neglect is at work. In India, there is a 1 in 15 chance of dying of cancer, and around 17 in 1,00,000 chance of traffic collision fatality. These probabilities are considerably higher than those from falling prey to the deadly virus.

Assuming that there will be one million cases by May (and assuming it to attain steady state), around 0.08% of the population would get infected. Assuming a fatality rate of 3.4% (Rukmini, 2020), the probability of dying of COVID-19 in India becomes 0.003%. For a comparative perspective, the probability of being infected by COVID-19 in China was around 0.006% whilst the probability of dying of COVID-19 in China was 0.0002%, with a 4% case fatality rate (as on March 24, 2020).[3]

Moreover, from the perspective of testing, it is important to communicate to people that the probability of testing positive is determined by the characteristics of the sample as well as the accuracy of the test. If the proportion of population infected (say 0.08%) is lower than the false positive rate (wrongly tested positive) of the diagnostic tests (say 5%), there will be more people who test positive for COVID-19 who in fact are not infected than those who test positive and are in fact infected.

There is a need to communicate to the masses that even very high accuracy rates for diagnostic tests (say 99%) does not necessarily imply that people who get positive results are indeed infected. Viral awareness campaigns can highlight the base rates and relevant comparisons with other forms of mortality that will go a long way in allaying the fears of the masses.

Over-reaction to low probability events (O)

It is well established in prospect theory (Kahneman and Tversky 1979) that humans are loss averse, that is, a unit of loss hurts much more than the joy from the same unit of gain. Prospect theory posits that humans behave different in the context of gains and losses. There is a tendency to be risk seeking in the domain of losses and risk averse in the domain of gains. In addition, decision makers assign decision weights to outcomes.[4] An important feature of these decision weights is that people have difficulties in understanding and evaluating probabilities at extremes. Events that are judged to be certain or impossible (near endpoints) are weighted heavier than others. An important property of decision weights is that people overweight small probabilities and underweight medium probabilities. For instance, in India, there are nearly three times more suicides than homicides, but most people

[2] Not be confused with the floor rate set by the Reserve Bank of India, below which banks cannot lend to its customers.

[3] Age and gender-based incidents and mortalities from these averages but the underlying mechanisms of how these biases play out, remain unchanged. Also, see Mishra (2020) for some insights on mortality in China.

[4] Prospect theory describes several deviations from predictions of traditional economic theory when it comes to decision-making under risk – when probabilities of outcomes are known. It posits that people make decisions relative to a reference point and calculate expected value of losses and gains. There are several phases in prospect theory, and the concepts under consideration are part of 'evaluation phase'. It encompasses the value function and weighting function. Reference points, S-shaped value curve, and asymmetry of the value curve are important features of the value function. Values of outcomes are multiplied by the decision weights that decision makers assign to each outcome. Decision weights indicate how people make sense of the likelihood instead of how probabilities are used in expected utility theory.

would consider murder as more likely or be more afraid of the possibility of murder than suicide in society.[5]

Such a characterization results in a 'four-fold pattern of risk attitudes' when people make decisions under risk that suggests that in a 'low probability, loss scenario' people would rather pay a premium to avoid a risky scenario. For example, one is likely to demonstrate risk aversion, and avoid a 5% chance to lose Rs.10,000 and go for sure loss of Rs.501. It is expected that people will overweight COVID-19 in their risk assessment even though it is a low probability event. Whether or not this overreaction is normatively good or wrong is not of concern. Rather as a positive description of how people make decisions in this context is of relevance. With availability bias and base rate neglect at work in the context of COVID-19, the representations are vivid and very likely to amplify the overweighting. An implication is that risk-aversion is likely to set in, and people will be willing to pay a premium to avert the possibility of large loss. In other words, they would demand insurance for COVID-19. However, under expected utility theory, this would be normatively flawed. Nonetheless, it would not be a surprise if insurance policies go viral than the virality of the virus itself in certain parts of the world.

Myopic loss aversion (M)

There is considerable evidence from financial market investment behaviour that there is a tendency to be biased toward the short term and react too negatively to recent losses at the expense of long-term benefits (Thaler et al., 1997). As discussed, loss aversion – the fact that a unit of loss hurts disproportionately more than the joy from the same unit of gain is an important attribute of decision making under risk. In conjunction with loss aversion, myopia (short sightedness) results in an intriguing bias that is called myopic loss aversion (Benartzi and Thaler, 1993). Myopic decision makers frequently evaluate their payoffs (e.g. an investor frequently evaluating his or her portfolio or assets in the portfolio). Consequently, the odds of finding losses is higher, and due to loss aversion, the decision maker behaves in a risk averse manner. By contrast, if decision-makers check less frequently, the odds of registering gains are much higher. This bias has in fact been put forward as an explanation for a famous puzzle in finance – the equity-premium puzzle.

In the context of COVID-19, an implication is that if people frequently check COVID-19 statistics, they are more likely to be 'anchored' to the loss (e.g. deaths).[6] This will not only result in availability bias, they are likely to commit base rate neglect and overweight low probability events. The concoction of these behavioural biases will result in irrational decision making, add to anxiety, fear, and panic – the consequences of which may be more severe than that of the virus that is at the root of the pandemic itself.

Availability bias (A)

It is a heuristic (mental short cut or rule of thumb) that individuals use to estimate the number of cases or likelihood of something by how easily instances or examples could be recalled (Tversky and Kahneman, 1973). Due to availability bias, recency of information and immediacy of events outweighs facts. Consequently, individuals perceive something to be more likely the easier it is for them to recall that. For example, news about social conflict affects individuals' perception of actual state of conflict in society.

Studies have shown that recall about drug advertisements influence perceptions of prevalence of disease (An, 2008). Even doctors are prone to availability bias as their recent experience of a certain

[5] Based on latest available data from National Crime Records Bureau (NCRB), in 2018, there were around 29,000 murders in India while there were around 1,34,516 suicides in the same year.

[6] Anchoring bias is a cognitive bias in which people are anchored to or focused heavily on initial information in their decision-making. For instance, social distancing seems to be the anchor in strategies to flatten the curve.

disease could lead to diagnostic errors (Poses and Anthony, 1991; Mamede et al., 2010). In the context of COVID-19 pandemic, due to availability bias; mostly on account of barrage of media reporting, individuals are likely to perceive consequence of contracting COVID-19 to be more severe than what it is because it is easier for them to recall these adverse consequences of COVID-19. In order to address the state of panic or widespread anxiety, cases of recovery can be presented much more than the cases of infection and mortality. In fact, data suggest that recovery rates are considerably higher than that of case mortality rate or prevalence of the disease.

Concluding Remarks

I have presented four behavioural biases whose first alphabets form an acronym – BOMA – that means bomb in Odia, an apt metaphor for the COVID-19 bomb waiting to explode. At this juncture, a deeper understanding of these biases could not only be used to nudge people to 'flatten the curve' but also be the basis of behavioural designs to deal with panic and operationalize services at the time of lockdowns. It could also be made an integral part of risk communication and popular communication of science at times of crises in case paternalistic approaches to mitigate or suppress the disease are undertaken.

This is particularly important in the context of the delays in testing that India has experienced, and what it is likely to extend with considerable public-private cooperation. A better understanding these biases is also at the root of informed decision making where costs and benefits are evaluated judiciously, and policy makers inform citizens about the basis of decision making. Behavioural insights have the potential to improve design of programmes and schemes that are aimed at allaying fears or impacting the lives of people.

Although there are several other biases that are likely to be present in the way we perceive and respond to pandemics (e.g. time inconsistent preferences, status quo bias, endowment effect, confirmation bias, hindsight bias, self-serving bias, fundamental attribution error, conjunction fallacy), I have focused on four biases that I believe are fundamental to policy response in the context of COVID-19. An interesting irony comes to mind. There is an interesting problem in decision-making under risk, namely the "Asian Disease Problem" (Tversky and Kahneman 1981, p.453) in which choices of participants revealed reversal of preferences that contradicted prediction of traditional economics.[7] Tversky and Kahneman (1981, p.453) also commented that "the frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision-maker." Therefore, norms and the local context of decision making should be paid heed to as 'when in Rome, do as the Romans do', may well not be a sensitive adage in the context of fighting against COVID-19 today.

[7] Tversky and Kahneman (1981, p.453) asked one group of participants (N=152) the following scenario: "Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows: If Program A is adopted, 200 people will be saved. If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. Which of the two Programs would you favor?" They presented another group of participants (N=155) with the same introductory information but presented them with a different choice problem: "If Program C is adopted: 400 people will die. If Program D is adopted, there is a 1/3 probability that nobody will die, and 2/3 probability that 600 people will die."

In the first group, 72% chose programme A (28% chose B) whilst in the second group, 78% preferred programme D (22% chose C). The finding is fascinating because programme A and C are identical whereas programme B and D are identical. Mere change in framing of the gambles resulted in reversal of preferences. When a positive framing was used, that is, programmes were presented in terms of prospect of saving lives, participants preferred the secure program, A. However, when a negative framing was used, that is, programmes were presented in terms of prospect of loss of lives, participants chose the gamble D. This experiment, and several other established that individuals are prone to framing effects in decision making.

References

An, S. (2008). Antidepressant direct-to-consumer advertising and social perception of the prevalence of depression: Application of the availability heuristic. *Health Communication*, 23(6): 499-505.
Bar-Hillel, M. (1980) The base-rate fallacy in probability judgments. *Acta Psychologica*, 44: 211-233.
Benartzi, S. and Thaler, R.H. (1993) Myopic loss aversion and the equity premium puzzle. NBER Working Paper No. 4369. National Bureau of Economic Research, Washington D.C.
Gaurav, S. (2019) Policies need a cautious nudge. *Economic & Political Weekly*, 52(39): 13-16.
Gourinchas, Pierre-Olivier (2020). Flattening the pandemic and recession curves. In Richard Baldwin and Beatric Weder di Mauro (eds.) Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes, pp.31-40. London: CEPR Press VoxEU.org eBook.
Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47: 263-291.
Kahneman, D., Knetsch, J.L., & Thaler, R.H. (1991) Anomalies: The endowment effect, loss Aversion, and status quo bias. *The Journal of Economic Perspectives*, 5: 193–206.
Mamede S, van Gog, T., van den Berge, K. et al. (2010) Effect of availability bias and reflective Reasoning on diagnostic accuracy among internal medicine residents. *Journal of American Medical Association,* 304:1198–203.
Mishra, S. (2020) COVID-19 Incidences across countries and provinces of China: Some observations. Policy Brief 12. Nabakrushna Choudhury Centre for Development Studies, Bhubaneswar. Available at http://ncds.nic.in/sites/default/files/PolicyBriefs/PB12NCDS.pdf
Poses, R. M., & Anthony, M. (1991). Availability, wishful thinking, and physicians' diagnostic judgments for patients with suspected bacteremia. *Medical Decision Making*, 11(3): 159-168.
Rukmini, S. (2020) At current rate, India can see 30,000 COVID-19 deaths by May, no hospital bed by June: Data. 23 March, 2020. The Print. Available at https://theprint.in/opinion/current-rate-india-30000-covid-19-deaths-may-no-hospital-bed-june-data/385386/
Simon, H. A. (1956) Rational choice and structure of the environment. *Psychological Review*, 63: 129–138.
Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5: 207-232
Tversky, A. and D. Kahneman. (1973) Availability: A heuristic for Judging Frequency and Probability. *Cognitive Psychology*, 5: 207–232.
Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185: 1124-1131.
Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, (4481): 453-458.

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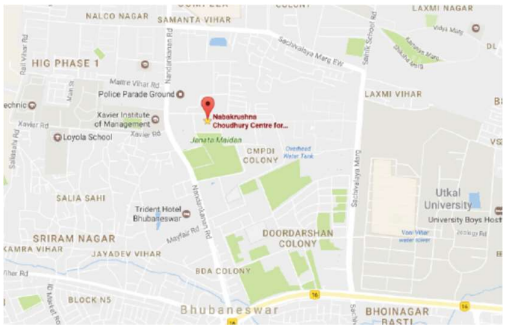

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