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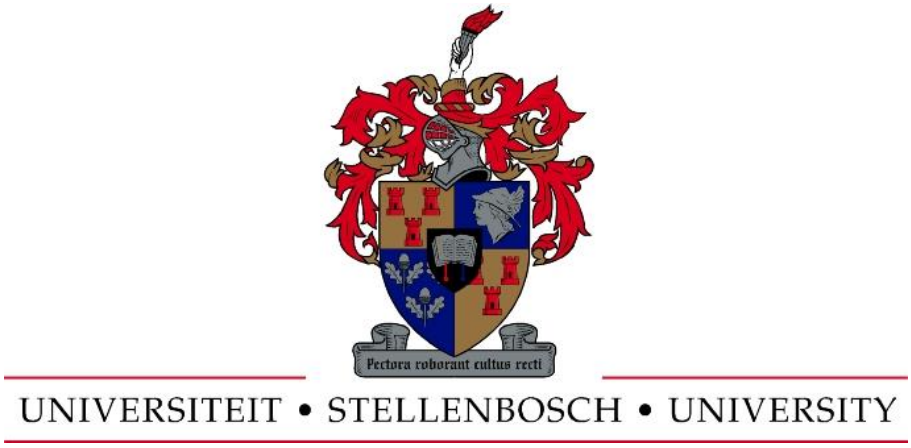
UNIVERSITY OF STELLENBOSCH



The Role of Positive Incentives in Facilitating behaviour changes of road users in South Africa

(First Draft)

Matlhogonolo Timothy Mashitisho

20903936

BA (UCT) BCom (SU)

Dr. FK Siebrits

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Table of Contents

Keywords:

Formal Intuitions: Written laws, policies, rights and regulations set by official authorities.

Informal Institutions: Social norms, customs or traditions set by people which shape thought and behavior.

Positive Incentives: Rewards that make people better off

Negative Incentives: Penalties that make people worse off

Abstract:

The Road Traffic Management Corporation reported that in the 2017 fiscal year, road crashes cost South Africa 3.4% of GDP. This paper aims to explore how the incentives structure in the South African Traffic Policy has been effective or ineffective in facilitating appropriate behaviour on South African roads. As the old adage goes, "incentives matter", and this paper looks into whether positive incentives ought to be a more prominent tool in the South African traffic management policy mix. Specifically, the paper asks the question; Are positive incentives significant tools in facilitating behaviour change? We interrogate a combination of theoretical and empirical literature as well as case studies to assess the effectiveness of positive incentives. We also analyse the incentive structure of the newly signed ARRTO legislation and observe how other countries with similar policy initiatives have performed. We conclude that positive incentives are significant tools but patience is needed for the newly AARTO demerit system to show its effectiveness before any further consideration.

Introduction:

Richer set of rewards and punishments such as social acceptance or as Tom Tyler (2006) argues, simply having authorities that treat them with respect play a significant role in the motivations of human behaviour. Fines and sanctions are the bedrock of the South African traffic road safety policy. The newly signed AARTO Act provides a fascinating opportunity for public economics to evaluate the use of positive incentives on effecting behaviour change. If enforced effectively, there is much to learn and add to the literature of using rewards to effect behaviour change. This paper explores positive incentives and aims to show whether or not positive incentives ought to be an increasing prominent tool in effecting appropriate behaviour change on South African roads.

Cost of Road Crashes and Interventions:

The Road Traffic Management Corporation reported that in the 2017 fiscal year, road crashes cost South Africa 3.4% of GDP (RTMC 2017). The impact of road crashes includes far reaching consequences beyond the direct costs of car crash's to the economy. Deaths from car crashes often leave behind families who are financially disadvantaged having lost their bread winners. The financial vacuum created in such families means that the state, or rather ultimately the tax payers will have to fill in this gap.

South Africa is amongst the worst performers of road traffic safety outcomes. According to the National Road Safety Strategy Decade of Action and Arrive Alive 2011 – 2020 document, 3200 are killed on the roads around the world. South Africa contributes around 40 deaths per day and 15 000 annually per 100 000 citizens. Road car crashes is the largest unnatural killer of children in South Africa (Arrive Alive 2011). Plans and policies made by government to reduce road crashes and improve road safety have been plentiful. The most recent are the 2016 - 2030 National Road Safety Strategy which is included in the 2030 National Development Plan, the Arrive Alive 2011 – 2020 Decade of Action. According to the 2016 – 2030 draft National Road Safety Strategy the commitment set out includes saving 5 Million lives and contribute to the preventing up to 50 Million serious injuries by 2020 (SARF 2016). To achieve this metric, it was identified that 50% reduction of fatal crashes from 2010 baseline of 13 967 fatalities to 6984 fatalities by 2030 (SARF 2016). That means that in order to reach the above government would have to reduce fatalities at 4%. However, as pointed above ,the progress of road traffic safety goal attainment in South Africa has been challenging. Some factors that have been identified for the lack of goal attainment are that; strategies are far too broad in focus, priorities are not given "quick fix" solutions, and in some cases sufficient resources are not allocated to effect the implementation of strategies in all spheres of government (Arrive Alive 2011). "The 4 "E"s strategy has been dubbed a world best practise method for governing road management. Many countries, including South Africa have adopted this method. The 4 "E's" include; heavy and visible **Enforcement**, **Education** to support enforcement, involving low cost remediation in hazardous location and vehicle engineering standards i.e. **Engineering** and **Evaluation** which is research and data collection.

Some success were seen during the 2019 Easter period. In May 2019, Minister of Transport Blade Nzimande announced in a press conference that the number of fatalities over the Easter season of 2018 decreased by 48% from 309 in 2018 to 162 in 2019 (Arrive Alive, 2019). The Minister highlighted that over 177 182 vehicles were stopped over the Easter period 2019. The increase in visibility and enforcement was an increase of 27 079 from 150103 stops in Easter Period 2018. Interestingly, 1343 arrests were effected in 2019 as compared to 1598 in 2018. The Minister added that the successes were due to the embracing of disruptive innovative and technological methods presented by the Fourth Industrial Revolution. To maintain the progress, the Minister concluded his speech with a 13 point priority measures list to be implemented moving forward. These priorities included; the 24/7 shift, re-classification of road traffic

offences like drunken driving to Schedule 5 of the Criminal Procedure Act, and implementing the newly signed AARTO Amendment Bill by introducing the Points Demerit System.

AARTO Act:

The AARTO demerit system is the most recent structural addition to the South African National Traffic Policy. On the 19th March 2019 the Administrative Adjudication of Road Traffic Offences (AARTO) Amendment Act was voted into law and was sent to President Cyril Ramaphosa for signing. The AARTO demerit system functions as follows:
Drivers and the car start with no points on their license. When a road user breaks traffic laws, they get a demerit point based on the severity of the traffic offence. A motorists will only be allowed to drive with a maximum of 12 points at any given point in time. Every point over that limit (e.g. 13 demerit points) will cause their license to be suspended for three months. If a motorist's license is suspended three times the driver's license will be cancelled. For every three-month period where a driver doesn't accumulate any demerit points, one point will be deducted from their total number of demerits. Being a new system there is still much needed evidence to ascertain if indeed this new institution will indeed bring about the appropriate behaviours desired by policy makers.

The AARTO demerit system is not new. There are a few country that have adopted the system The Al Ain United Arab Emirates introduced a traffic demerit system on the 1 March 2008. In the UAE however if a driver accumulates 24 points in a given year their driver's license would be confiscated for 6 months (Mehmood, 2010). Interestingly however, the result of implementing this demerit system was that it had no significant impact on the speeding behaviours of drivers in Al Ain (Mehmood, 2010). The idea behind the AARTO system is that the demerit system aims to change road user behaviour in South Africa by primarily disincentivising violators towards appropriate behaviour. A demerit credit is offered if the driver and car is found to have not violated any laws for 3 months. However, if the driver and car have 0 demerits, the driver and the car can't accumulate positive demerit 'credits'. Great strides are evident in the AARTO system especially with the addition of some positive incentives in the form of the credit after 3 months. However, the addition of credits after a car and driver may serve beneficial in South Africa, given the difference in social dynamics compared to other nations. In this paper, begin this conversation with an understanding of positive incentives as a mechanism for behavioural change. Further papers will aim to model

the application of the demerit system in South Africa, given the unique social dynamics of South Africa.

It must be clarified that the demerit system is not replacing the issuance of fines. The demerit is assigned to a driver and the car when a driver is convicted for an a offense or receives a fine. Fines will still be issued, however, a demerit for the fine will be added to the driver and car. Below is an extract of the Traffic Law Enforcement Offence Code Book. This is the book used to assign traffic fines and sanctions on various violations of traffic laws.

Why consider positive incentives?

In the 2nd Chapter of Advances in Economics by Cambridge University press titled: *The theory of incentives: an overview*, Jean-Jacques Laffont and Eric Maskin (1983) argue that the incentive problem is faced by planners or policy makers when their own objectives do not coincide with those of the members of society. However, they emphasize that for an incentive problem to arise, not only is it because of the noncoincidence of goals but also that the planner needs to decide what is more important. That is the planner must decide whether the target agent's information set is important or whether it is important on how the agent behaves (Laffont and Maskin 1983). Practically, this means that if the planner is focused on what the information set then the planner's objective would be interested in figuring out the agents' preferences and endowments in order to implement appropriate policy. If the objective is pure behavioural in nature, the planner is only interested in the outward behaviour would need to be displayed by the agent. The distinction between using incentives to elicit information or to change behaviour is crucial to understand because the structure of the incentives in policy need to be aligned with the goal. The Traffic Management policy in South Africa aims to change behaviour, as is evident in the vision of the RTMC. Given this choice of objective, the incentive structure is a double maximization problem which includes maximizing the planner's payoff (the objective behaviour), subject to the constraint that given this incentive scheme, social agents will maximize their own objective functions (Laffont and Maskin 1983).

Within the current South African traffic management policy, it seems then that the policy maker positions the road user to maximize their payoffs by having them choose whether to face a penalty or not, that is, behave well or face a fine and demerit. The payoffs of the agent are negative or neutral and if at zero or neutral, the agent cannot accumulate demerit credits. This

structure of negative incentives often creates the problem of avoiding the entire payment of fines or encourages bribery of officials in attempt to slow down or limit the loss after non-compliant behaviour.

There is a large body of literature related to whether or not rewards are better mechanisms to influencing and changing behavior. In the article *A fine is a price by* Gneexy and Aldo Rusichini they show that a financial fine in particular was actually not effective in changing the behaviour of parents to pick their children up on time at a day care centre. According to the authors this is completely out of line with the popular deterrence hypothesis which predicts that the introduction of a penalty that leaves everything else unchanged will reduce the occurrence of that behaviour subject to the fine. They did however find that this was the case because penalties are usually introduced into an incomplete contract in which they may change the information that agents have and therefore the effect on behaviour may be opposite to what is expected. Perhaps this is the reason why road safety outcomes have been so poor in South Africa. The authors highlight that a punishment is most effective in reducing a behaviour when it is certain and immediately follows that behaviour (Gneezy and Rustichini 2000). Thus perhaps if using the AARTO system, it could be that instantaneously sending violators immediate demerits when the violation has happened, would create the required behaviour. As violators will see the consequences of their actions and change behaviour. However, the authors point another interesting point in their research. They find that adaptation tends to manifest to the punishment itself. Therefore if the severity and other parameters of the punishment are left unchanged, its effectiveness tends to decrease over time (Gneezy and Rustichini 2000).

So them how could policy makers sustainably change behaviours. Using the theory of planned behaviour Icek Ajzen examines the relationship between intentions and action in trying to determine if perhaps it is at the level of intentions that we ought to interrogate, in order to influence behaviour. The theory of planned behaviour argues that goals and plans guide behaviour. The determinants of intentions are twofold, that is; one personal in nature and the other reflecting social influence (Ajzen, 1985). The personal factor is the individuals positive or negative evaluation of preforming the behaviour also named attitude toward the behaviour. (Ajzen 1985). The theory of reasoned action is concerned with attitudes towards behaviours and not with the more traditional attitudes toward objects, people or institutions (Ajzen 1985). The second determinant of intention is the person perception of the social pressures put on

them to perform or not perform the behaviour, also known as subjective norm. Generally speaking, it seems that people intend to perform a behaviour when they evaluated it positively and when they believe that others think they should perform the behaviour (Ajzen 1985). Furthermore he argues that the behaviour of the individual depends on the weight that they place on either factor. Actions are controlled by intentions but not all intentions are carried out. Some intentions are abounded altogether while others are revised to fit the changing circumstances. Ajzen further argues that successful performance of social behaviours was shown to depend on the degree of control a person has over internal and external factors that may interfere with the execution of an intended action. In South Africa, the intention to not violate is personal and is due to the avoidance of a punishment. It is still not yet socially viewed as a societal issue to behave well on the roads.

Hurst (1980) argues that it is inherently difficult to blame policy makers for only focussing on negative incentives in facilitating behavioural change. He pleads that we take a tolerant view of the politicians and bureaucrats who have failed to include positive incentives into policy. He argues that it is hard to use reward to teach a person not to do something (Hurst 1980). Furthermore, because politicians are often viewed as the enemy, how can they implement rewards into the policy mix? According to the law of effect, any act or behaviour that tends to produce a reward is likely to be repeated and tends to be habitual (Hurst 1980). However, by the disqualified driver effect, Hurst argues that the joy of simply not being caught or avoided punishment can be of in itself a positive incentive.

Hurst (1980) proposes an interesting way on how to reward good driving. He argues that if we assume people are non-compliant, a way to have people behaviour compliantly to road rules is to introduce restrictions. However the restrictions will be put in such a way that non-compliant drives will hopefully violate the restrictions and drive well in hopes of not being caught. For example, a young driver could be only be allowed to drive during the day. But being young, they would want to drive at night. So when doing so, they will drive obeying the laws so as to not be caught. This idea could for be extended to include older violators of traffic laws, were they are restricted for bad driving to only drive at certain times. Knowing fully well that the violator will likely violate the restriction, they will end up teaching themselves how to drive better to avoid being caught violating again. This Machiavellian approach to policy making could be an interesting one however it will need to be aimed at particular target group, perhaps repeat violators. The disqualified drivers, will effectively be teaching themselves to drive better

by virtue of them contravening the restrictions set on them. However this policy will require that policy makers believe that the target group will react in the manner set above in fear of being caught. Also there are some issues of enforcement here in that if the drivers gather the social experiment being conducted on them, they may likely want to find ways to circumvent the system even further by purposefully being non-compliant knowing full well that the threat of being caught.

Rewards do not necessary need to be distributed in the form of subsidies. Mazureck and Hattem argue that using technology to show that driving well could actually bring about benefits to the driver. Using the Belonitor system, the were able to show participants that they could save their fuel consumption Participants also were positive about the effect of driving behavior changes on fuel consumption. The Belonitor system and improved driving behaviour reduced fuel consumption by 5.5%, on average. They showed with good driving that the percentage of kilometres travelled within the speed limit increased from 68% to 86%, and that the number of kilometres driven from a safe distance from the car in front (normal headway time 1.3 s) rose from 58% to 77% (Mazureck and Hattem 2006). However, as soon as the feedback and reward system ended, most drivers returned to their old habits. Most participants acknowledged that the combination of feedback and reward had a strong positive effect. Furthermore, participants found that the Belonitor system promoted a more relaxed driving style. They began driving more smoothly, with less abrupt braking: from an average of 2.6 times to 2.1 times per kilometre travelled. Interestingly However, drivers reverted to previous habits after the Belonitor system was removed.

Let us imagine a society where it is publicly known who the most well behaved drivers based on their social demerit driving credit. One in which the credit score is linked to the driver who must use the credit in that year to either reduce their fuel levy or income tax. However, in an unequal society like South Africa, could using financial incentives truly work or would adding positive incentives give the Karl Marx termed ‘bourgeoisie’ a licence to behave as they wish.

Samuel Bowles in his book *The Moral Economy* argues that our basic human goodness is more effective in decision making than that of financial incentives and that focusing on self-interest and amoral attitude aren’t as such effective in real life. He further argues that incentives work and often affect behaviour almost exactly as conventional economic theory predicts. That is, by assuming that the target of the incentive cares only about his/her material gain. However,

in his book, Bowles argues that economic incentives and legal constraints alone do not produce a compliant society because good , morally motivated people are simply indispensable Bowles convincingly argues that economic incentives and legal constraints alone will not produce a flourishing society because good, morally motivated, people are often part of the society.

What of other policy options?

Nudges

Nudging is the new libertarian paternalistic or preserving popular policy option proposed Robert Thaler and Cass Sunstein (2009). Nudging is using choice architecture (the way that choices are presented) to change behaviour in a predictable manner that does not force an option onto someone or significantly changes their economic incentives (Thaler and Sunstein 2009). Nudging influences peoples choices whilst still proving them with freedom to make those choices. A GPS is a classic example of a nudge in that it makes it easy to choose the best option but gives you the freedom to either listen or comply (Sunstein 2014). There is however various arguments on the use of nudges. Researchers have pointed out that there is still yet to be said about the sustainability of nudging on long term behaviour. Another thorny issue is that of whether nudging works on a wide spectrum of cultures.

Limitations of study and suggestions for further study:

The lack of data is ultimately the constraint for this study in understanding the effect of positive incentives on the behaviour of the South African road user. An element of positive incentive has been added to the AARTO demerit system were agents can reduce their demerit with good behaviour. However, a new system or institution applied such as AARTO to a country in South Africa comes with it the challenge of not being able to clearly predict outcomes. The South African society is distinctly diverse and without data it may prove difficult to make any predictions of outcomes. However, a wonderful opportunity is nigh as keen observation of the change in behaviour from the demerit system should bare interesting results for the keen observer.

We suggest patience be exercised as the AARTO demerit system presents a possible stepping stone forward towards achieving the goals set out in the 2016 - 2030 National Road Safety Strategy which is included in the 2030 National Development Plan and the Arrive Alive 2011

– 2020 Decade of Action. If the new policy does not work or shows meagre, then perhaps argument can be made to add a credit point after reaching zero demerits. Furthermore, it may be that the current positive incentive addition maybe enough to achieve the goals outlined by the Ministry of Transport. Only time will tell.

Conclusion

Traffic management policy in South Africa is an extremely delicate issue. Attempting to change people's behaviour is a tough. The AARTO Act presents an opportunity for policy makers to observe a policy that has the newly added incentive framework to incentivise and to disincentivise. There is rich body of literature suggesting that incentives or rewards are credible tools in facilitating behaviour change. There is also an equal body of literature that argues otherwise. This paper explored the a pinch of literature available on the subject of positive incentives. The issue is far complicated as the issue of what sort of positive incentives should be provided lingers. However, the South African Ministry of Transport is well positioned to truly gain strides if strict adherence to data collection on the behaviour of road users given the AARTO demerit system adoption.

Reference:

1. Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. *Action Control*, [online] pp.11–39. Available at: https://link.springer.com/chapter/10.1007/978-3-642-69746-3_2.

2. Alive Alive. (2019). *Statement By Minister Nzimande on the Release of the Preliminary Easter 2019 Road Safety Report*. [online] Arrive Alive. Available at: https://www.arrivealive.co.za/news.aspx?s=1&i=40352&page=Statement-By-Minister-Nzimande-on-the-Release-of-the-Preliminary-Easter-2019-Road-Safety-Report [Accessed 15 Aug. 2019].

3. Arrive Alive. (2011). Decade of Action for Road Safety 2011 - 2020. [online] Available at: https://www.arrivealive.co.za/Decade-of-Action-for-Road-Safety-2011-2020 [Accessed 16 Aug. 2019].
4. Bates, L., Soole, D. and Watson, B. (2012). The Effectiveness of Traffic Policing in Reducing Traffic Crashes. *Policing and Security in Practice*, [online] pp.90–109. Available at: https://link.springer.com/chapter/10.1057%2F9781137007780_6 [Accessed 14 Aug. 2019].
5. Gneezy, U. and Rustichini, A. (2000). A Fine is a Price. *The Journal of Legal Studies*, [online] 29(1), pp.1–17. Available at: https://rady.ucsd.edu/faculty/directory/gneezy/pub/docs/fine.pdf [Accessed 14 Aug. 2019].
6. Hurst, P.M. (1980). Can anyone reward safe driving? *Accident Analysis & Prevention*, 12(3), pp.217–220.
7. Mehmood, A. (2010). Evaluating impact of demerit points system on speeding behavior of drivers. *European Transport Research Review*, 2(1), pp.25-30.

8. Plant, B., Irwin, J. and Chekaluk, E. (2017). The effects of anti-speeding advertisements on the simulated driving behavior of young drivers. *Accident Analysis & Prevention*, 100, pp.65-74.

9. South African Road Federation - SARF. (2016). National Road Safety Strategy 2016 - 2030 - South African Road Federation - SARF. [online] Available at: https://sarf.org.za/road-safety/national-road-safety-strategy-2016-2030/

10. Sunstein, C.R. 2014. Nudging: A Very Short Guide. *Journal of Consumer Policy*. 37(4):583–588.
11. Thaler, R.H. and Sunstein, C.R. (2009). Nudge : improving decisions about health, wealth and happiness. New York: Penguin.
12. Verster, T. and Fourie, E. (2018). The good, the bad and the ugly of South African fatal road accidents. South African Journal of Science, 114(7/8).
13. Tyler, T. (2006). *Why people obey the law*. Princeton: Princeton University Press.