

**NEUROECONOMICS: A NEW UNDERSTANDING OF TAXATION**

TO WHAT EXTENT CAN THE STUDY OF NEUROECONOMICS EXPLAIN PAST  
AND FUTURE PATTERNS OF TAX COMPLIANCE IN EGYPT?

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One of the most recent developments in the study of Economics is its intersection with neuroscience in the emerging discipline called "Neuroeconomics". For many centuries, economists have been explaining decision-making and behavior of "agents" through the concepts of utility maximization, preferences, prices and budget constraint. In short, the classical individual "homo economicus"<sup>1</sup> is believed to be rational, self-motivated and merely interested in the maximization of his own welfare (utility). Accordingly, emotions involved in the decision-making process were disregarded. Yet, the applicability of classical economic theories was increasingly being questioned, giving rise to a new approach more concerned with "asking the brain, not the person"<sup>2</sup>. Technological breakthroughs in biology and neuroscience have enabled the quantification of satisfaction and pain. Neuroeconomic research has succeeded in identifying circuits within the brain, which are activated during particular tasks. Once activated, these circuits are responsible for valuing outcomes and estimating risk and return, resulting either in the pursuit of that task or its rejection. By recording single neuron activity and observing cognitive trends, neuroeconomics has illuminated the study of economics in many aspects, the most important of which is that of taxation. The focus of this paper is to explain trends in tax compliance in Egypt in light of the new tax policies of 2005 under a neuroeconomic lens. In addition, the paper will provide expectations about the future of tax compliance in the post- revolution Egypt.

Forms of tax evasion have changed over the centuries but the outcome remains the same: a considerable leakage in government revenues. A narrow economic approach to tax evasion would conclude that most "rational" individuals would not comply with tax policies due to the low probability of audit and penalization. A study of tax gaps<sup>3</sup> and audit rates across countries reveals results that are inconsistent with this narrow analysis. Explaining the phenomenon of tax evasion requires therefore a multi-disciplinary approach combining Economics, Sociology, Neuroscience and Psychology.

Before further investigating the behavioral trends in terms of taxation, the 2005 tax reforms in Egypt are to be briefly discussed. It is important to note that the analysis only covers reforms targeting the personal income tax and thus a detailed evaluation of the new tax policy is outside the scope of this essay.

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<sup>1</sup> Mill, John Stuart. "On the Definition of Political Economy, and on the Method of Investigation Proper to It," London and Westminster Review, October 1836

<sup>2</sup> Camerer, Colin, George Loewenstein, and Drazen Prelec. *Neuroeconomics: Why Economists Need Brain*. *Scandinavian Journal of Economics*. 3.106 (2004).

<sup>3</sup> *tax gap*: the difference between expected and actual tax revenues

### ***The 2005 Tax Reforms in Egypt***

Due to the significant contribution of tax-payments to the total fiscal revenues – around two thirds in Egypt – and its direct correlation with the investment appetite, decreasing tax evasion rates has long been a primary goal of the Egyptian government. The ultimate goal of Law 91 of 2005 was to fix the tax climate in a way that would allow it to become “synergistic”, rather than “antagonistic<sup>4</sup>”. Thus far, taxpayers and the tax authorities had been working in completely opposite directions with the relationship between both parties perhaps being best perceived as a “cops-robbers” relationship. However, the introduction of three major policy directions in terms of tax rate reductions, simplification of the tax system as well as administrative reforms were propagated to enforce a paradigm-shift to a “service- client” relationship. According to the aforementioned law, tax rates were lowered by 50%, tax exemptions included a much wider population base and income tax brackets were divided into three categories only. Furthermore, tax assessment shifted from the costly comprehensive tax assessment to a self-assessment regime. Nevertheless, higher penalties against tax evasion were introduced, including imprisonment. In fact, the percentage of tax revenues increased from 63.4% of total public revenues in 2006 to 70.1% in 2010. Similarly, evasion rates are estimated to have fallen from 35.4% in 2004 to 30.8% in 2008<sup>5</sup>. With a total net inflow of revenues, it is safe to assume that the reforms had a much stronger effect on public revenues than the 50% tax cuts. These results are particularly useful at this critical stage of Egypt’s economic history with most of the different sources of revenue sharply declining. Yet, if addressed correctly, this source of public revenue could potentially compensate for other gaps in the fiscal budget. In the following, the public response to the reforms will be analyzed using the most common areas of neuroeconomic research: risk and ambiguity, reciprocity, trust and time inconsistency.

### ***Tax Compliance in Egypt – A Neuroeconomic Approach***

The most straightforward explanation for high tax compliance is risk and ambiguity aversion. Scientific research has shown that the region in the brain responsible for risk and aversion is the amygdala, which releases emotional signals in the event of potential fear. This is particularly true when we come to differentiate

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<sup>4</sup> Kirchler, Erich, Erik Hoelzl, and Ingrid Wahl. Enforced versus voluntary tax compliance: The “slippery slope” framework. *Journal of Economic Psychology*. 29. (2008)

<sup>5</sup> Abdel-Mawla, Somaya. Tax Reforms and Tax Evasion in Egypt 2004-2008. CSAE Conference 2011. Oxford. March 2011.

between subjective and objective audit probabilities. According to the “hindsight bias”, there is a tendency for individuals to overestimate the foreseeability of risky events, such as the event of being audited. In that case, subjective – rather than objective – audit probabilities are what determine the activation of the amygdala. However, it is to be noted that the categorization of a risky event either as a risky gain or a risky loss stimulates two different cortices in the brain and thus reveals different degrees of risk aversion. In other words, “individuals appear to be risk averse when it comes to gains and risk-preferring for losses<sup>6</sup>”. If we consider penalties to be “risky losses”, the phenomenon of tax evasion could better be understood. This is what has been largely happening prior to the tax reform in Egypt. Yet, neuroeconomic research has shown that the higher the trustworthiness of the tax authorities, the less relevant is risk calculation by individuals and the more relevant are the common norms followed by the people.

A further notion that has fostered Egyptians’ tax morale, resulting in higher rates of compliance is that of reciprocity. In this framework, reciprocity involves two aspects. Individuals will not be friendly to strangers – cooperate with the tax authority – unless they know that this cooperation will be reciprocated; governments respecting the “benefit principle of taxation<sup>7</sup>”, which ensures that public services meet public demand at a reasonable tax rates. Equally, individuals are not likely to comply if they doubt their fellow citizens’ truthful tax compliance. Turning to neuroscience could further explain the decision to cooperate using neuroimages in an experimental game setting. The images revealed different patterns of brain activity between those who decided to cooperate and those who decided not to. To illustrate, areas<sup>8</sup> activated through increased blood flow in cooperators’ brains are “commonly associated with calculation, visual recognition and social situations”. Neuroimages of the brain further indicated fundamental differences between cooperators and non-cooperators in terms of the perception mechanism of the problem as either being a calculative self-interest or a social problem. Therefore, governments do have the capacity to manipulate their citizens’ “perception of the problem” by respectfully treating the taxpayer. In fact, the Egyptian Tax Authority has been trying to achieve this through the tax reforms. When an error is detected, instead of immediately suspecting an intention for cheating, the

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<sup>6</sup> Chorvat, Terrence, Kevin McCabe, and Vernon Smith. "Law and Neuroeconomics." *Supreme Court Economic Review*. 13 (2005).

<sup>7</sup> Feld, Lars, and Bruno Frey. Tax Compliance as the Result of a Psychological Tax Contract. *Center for Tax system Integrity, the Australian National University*. (2005).

<sup>8</sup> For example an area referred to as “Bordmann’s area 8”

authority has at least promised to give the taxpayer the benefit of the doubt and further investigate into the matter. Moving to a self-assessment method, approaching taxpayers and establishing a “direct” relation of promised mutual respect through an intensive advertising campaign has contributed to turning some non-cooperators into cooperators and upholding the tax morale in Egypt.

A further innovative development in neuroeconomics was the study of the scientific basis for trust. The act of entrusting strangers with money (or taxes) opposed classical economic and game theories, which assumed rationality, self-interest and the lack of trustworthiness. Thus, the need for a neuroscientific explanation of trust arose. The results of several controlled experiments involving trust proved that trust is chemical. Entrusting strangers with money is received at the brain as a positive social sign, resulting in a considerable release of a hormone called “oxytocin” (OT). In short, the more a person feels entrusted, the higher the OT is released in their brain, which in turn fosters social bonding of the entrusted with another stranger. Whereas stress prevents OT release, “familiarity and a history of positive interactions will more easily stimulate OT release<sup>9</sup>”. Besides, understanding the other party further raises OT levels and fosters trust. In the context of the Egyptian tax reforms, the simplification of the tax policies and making it understandable to a wider audience must have contributed to increased release of OT and thus higher tax compliance. The renowned neuroeconomist Paul Zak<sup>10</sup> measured trust in 38 countries by asking people whether they believed citizens in their country are trustworthy. With 65% being the highest and 32% the lowest, Egypt ranged at 40%, showing a moderate degree of trust among its citizens. Further increasing this percentage would be in the best benefit of the tax authorities.

A final concept that has long been discussed in economic literature and is related to tax evasion is that of inconsistent preferences by individuals over time. This phenomenon is often referred to as “hyperbolic discounting” because discount rates are higher between periods in the near future than those in the distant future. To illustrate, if an individual is given the choice between 10LE today and 11LE tomorrow, they would choose the 10LE. In contrast, if they were offered the same 10LE a year from now or after 11LE a year and one day, they would choose the 11LE. This is interesting to the scope of this paper because we would expect individuals to evade taxes today, if the

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<sup>9</sup> Kugler, Jacek, and Paul Zak. Neuroeconomics and International Studies: A New Understanding of Trust. International Studies Perspectives. 12. (2011).

<sup>10</sup> One of the founders of Neuroeconomics. He is a Professor at Claremont University and the Head of Center for Neuroeconomic Studies, California.

benefits of evasion are felt immediately and potential punishments felt in the future - as opposed to an enforcement mechanism where both benefits and punishments are felt in the same time period. Neurosciences explain this through the scarcity of cognitive resources, particularly in long-term planning. Efforts by the government to enforce effective and immediate tax refund as well as tax penalty methods are directly linked to hyperbolic discounting and the elements determining the so-called “dictatorship of the present”<sup>11</sup> ”.

### ***The Future of Taxation in Post-Revolution Egypt***

Having provided neuroeconomic explanations of past trends in tax-compliance, it is imperative to forecast future trends in taxation in the post-revolution Egypt. Neuroeconomics provides concrete answers in the link between tax compliance and political participation. On the one hand appeals to patriotism foster the release of OT. On the other hand, studies of the tax morale showed a strong positive correlation with the level political participation in terms of democratic decision-making. The “civic duty [of tax payment] is received more strongly” and a form of “psychological contract” emerges where citizens are trusted and given the right to freely participate in political decision-making<sup>12</sup>. It is beyond doubt that the January 25 Revolution has completely changed the grounds of political participation in Egypt. The patriotic scene in Tahrir Square gave rise to a new civic force and promises are being exchanged between the citizens and the Supreme Court of Armed Forces as well as the Council of Ministers. These promises foster the existence of a form of psychological contract of mutual trust between the government and the people. The more legitimate the government is in the eyes of its people, the higher the OT emission and thus the more taxpayers trust them. Given the current outlook of the situation, the study of neuroeconomics suggests that tax evasion incidents will be declining in the near future.

These are hardly the last words in the link between the brain and taxation policies. In fact, they are the very first in a field that could potentially present solutions to tax collection in Egypt. The previous analysis has proven that “*thinking about how the brain implements economic decisions, compared to thinking about choices resulting from preference and belief, is like switching from watching TV in black and white to*

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<sup>11</sup> Bhattacharya, Jay, and Darius Lakdawalla. Time Inconsistency and Welfare. *National Bureau of Economic Research*. (2004).

<sup>12</sup> Feld, Lars, and Bruno Frey. Trust Breeds Trust. *Economics of Governance*. 2 (2002).

*watching in colour – there are so many more variables to think about.*<sup>13</sup>” The future will certainly prove the falsifiability of this analysis, giving rise to a completely new colour spectrum.

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<sup>13</sup> Camerer, Colin. Using Neuroscience to Make Economic Predictions. *Economic Journal*. 117. (2007).