Doctoral Thesis

Article Based Thesis

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Thesis submitted to the University of Nottingham for the degree of Doctor of Philosophy

July 2020

Business School University of Nottingham

Acknowledgments

Throughout my doctoral research, I have received tremendous support and assistance. The current supervision team, Professor Lina Song and Dr. Pia Weiss, and the previous team, Professor Thorsten Chmura and Professor Roberto Hernan Gonzalez have provided the best environment for me to conduct my doctoral research. At the end of my long and invaluable PhD journey, I could not have imagined a better team to mentor me.

My sincere gratitude also goes to Dr. Hang Le, the Director of the PhD program, and internal examiner, who always gave constructive comments and support during my PhD. I also received constructive comments and inputs from the VIVA external examiner Dr Steven Pai Xu and internal examiner Dr Jing Zhang which really beneficial to furnish the final draft of the thesis.

I also want to thank the team behind any experiments I conducted in the lab: Dr. Jose Guinot Saporta from CEDEX and the administration team, Karen Maltby, Daniel Serotsky, Kelly Clayton and Elaine Jammali for keeping the CRIBS lab key for me. I am also grateful to my fellow PhD students, Dr. Thien Kim Nguyen and Dr. Tanvir Nabi Khan for bringing laughter to the journey, and all my Indonesian friends in the UK.

This journey would have been impossible without the sponsorship from the LPDP Republik Indonesia and all Indonesian taxpayers.

For the unconditional love that has been given to me endlessly, my Mamah, my wife and the two stars of my life, Hanarumai and Shiawase, thank you and thank you. There is not enough space here to express my gratitude, but it will always be in the depths of my heart.

Chapter 1 Introduction

This thesis covers two different topics. The first one is related to how institutions affect individual behaviour, and the second one is related to how inequality affects decision making. In this introduction, I will elaborate on the motivation of each topic and explain its importance.

In the first topic, I examine how institutional change affects the honesty behaviour of individuals. It has been recognised in economic and political literature that institutions play a crucial factor in economic development by reducing transaction costs and promoting efficiency (North, 1990). Moreover, many authors have pointed out that the differences in institutions (both formal and informal institutions) could explain why some countries thrive while others do not (Fukuyama, 2001; Acemoglu and Robinson, 2014). This argument seems plausible as most of the less developed countries exhibit a low (formal) institutional quality or a weak government, i.e. it lacks the power to enforce the law (Acemoglu, 2005). For example, in countries with low institutional quality, some government agents cannot find it in themselves to withstand the challenges from the non-state actors, i.e. corruption is rampant and the economy does not develop as it otherwise could.

When the government is powerless to fight unlawful behaviour such as corruption, society becomes more apathetic and accepting of this negative behaviour which feeds even more unlawful behaviour such as corruption. Individuals absorb shared values that will influence their actions, the way they judge people, and events (Licht, Goldschmidt and Schwartz, 2007).

In a situation where the (formal) institutions do not perform well, honesty could help. In a society where everyone is honest, a promise serves as a substitute for a contract. A promise between "honest businessmen" is seen by many to be critical for the successful economic development in early history through the gain from cooperation (Hugh-Jones, 2016). In the Industrial Revolution era, contracts could not be enforced due to the absence of formal institutions. An order was achieved by "self-enforcing behaviour" in which honesty played a crucial part (Mokyr, 2008).

Nevertheless, this path of interaction between (formal) institutions and honesty that historically occurred in developed countries does not happen in developing countries. Even with today's technological achievement to impose monitoring systems and the existence of formal institutions in developing countries, dishonest behaviour is still widespread.

Current literature about developing countries points out that weak (formal and informal) institutions and dishonesty form a vicious cycle, reinforcing each other. Institutions become ineffective because dishonest behaviour, such as corruption is ubiquitous (Rose-Ackerman, 2001). At the same time, dishonest behaviour is also shaped by institutions since individuals internalised the existing norm, which tolerates corruptive behaviour (Barr and Serra, 2010). In developing countries, this is problematic since policy-making becomes ineffective (Hors, 2000). The vital question is, can better institutions incentivise individuals to behave more honestly and thus break the vicious cycle?

In Indonesia, first attempts to eradicate corruption were made in the era of Soekarno and Soeharto. However, real efforts only started when the Corruption Eradication Commission was established in 2002 (Isra et al., 2017). It is an attempt to fight corruption by introducing a new institution (new laws and new organisation which specialises in combating corruption).

However, introducing a new government agency is a delicate operation. The institution needs to fit into the landscape of existing formal and informal institutions, i.e. the political system, the economy, the bureaucracy, and more importantly, the culture that rules day-to-day life. If the existing formal and informal institutions remain unchanged, there is little that a new agency can achieve. After years of the corruption eradication program, corruption remains prevalent, and Indonesia is still one of the world's most corrupt countries (Hosen, 2015). While attempts to combat corruption were fruitful in Singapore and Hong Kong, other emerging democratic countries such as Botswana, Croatia, Ghana, Latvia, Lithuania, Mauritius, and Slovenia have faced similar problems to the ones Indonesia did (Hope, 2017). So why do some countries succeed in fighting corruption while others do not?

The first topic of my work is connected to this question. Specifically, I investigate how individuals change their behaviour when they move to a different country and

are, therefore, exposed to entirely different (formal and informal) institutions in Chapter 2. I chose intrinsic honesty to measure individual behaviour, not least because the broader debate about corruption includes honesty. I want to understand more clearly, how much of individuals' behaviour is shaped by institutions. The results could help us devise better measures to break the vicious cycle between institutionalised corruption and individual condonation of corruption.

Unlike previous literature (Gächter and Schulz, 2016), I found that the honesty level of individuals who live in countries with higher quality institutions is not necessarily higher than individuals who live in countries with lower quality institutions. Other findings in Chapter 2 show that individuals learn and absorb the values embedded in the institutions of the new country through day-to-day interactions. When an individual arrives in a new country, the force of nurture (institutions in the new country) and nature (institutions that formed the individuals' personality) is always competing with each other. However, when the quality of institutions is not reflected in society and everyday life, this could lead to a perception gap of that institution that affects individuals' behaviour. The perception gap can widen if individuals are exposed to news and information that does not reflect institutions' real value. Sometimes it is even simpler: human beings are more interested in bad news (Martin, 2008); hence they propagate more negative news, which adds to the perception gap.

My investigation of the institution's perception index of the participants from the United Kingdom and Indonesia clarifies the prediction that although the British live in a country with a higher quality of institutions, their institutions' perception index is lower than that of Indonesians. This disparity indicates that the British participants' conformity to strong institutions is lower than the institutional quality index would otherwise suggest. This difference remains if one goes further and investigates perceptions of both formal and informal institutions.

The findings in Chapter 2 show that if one wants to understand how institutions affect individual behaviour fully, one also needs to understand how individuals perceive institutions. With the current development of online information platforms, perception can be misguided by incorrect or biased information, thereby creating a perception bias. Someone who lives in a country with high-

quality institutions which upholds fairness and equality for their citizens might easily have a negative perception of institutions due to the biased or contorted information. This fact opens up a huge question about whether there should be a global information governance, and it also suggests a new possible approach to corruption prevention effort. The role of citizen's perceptions of institutions matter a lot, and it could be exacerbated by misinformation. Hence, a holistic approach to fighting corruption should also consider the institutions' perception bias as one of the crucial factors.

The motivation for Chapter 3 is similar. Indonesia is unique in the sense that it (peacefully) shifted from an autocratic system to a democratic system not long ago. This fact allows me to study how this shift of (formal) institutions affects the honesty behaviour of individuals.

The existing literature predominantly investigates the relationship between institutions and honesty by using existing cross-country data on attitudes and beliefs and employing regression analysis to examine its relationship with corruption index data (see Montinola and Jackman, 2002; Seleim and Bontis, 2009; and Yeganeh, 2014). However, there are at least two problems with this approach. Firstly, it is difficult to overcome the reverse causality problem and the endogeneity problem, which can limit the reliability of any obtained results (Fernández, 2008). Another challenge is that data on intrinsic honesty that meets research standards is not available. In fact, it is almost impossible in real life to capture the level of intrinsic honesty of individuals. These obstacles can be more easily overcome by using an experimental approach.

I redesigned the mind game (Jiang, 2013; Kajackaite and Gneezy, 2017) that is more suitable to be conducted online and quickly understood by participants with varied backgrounds but simultaneously preserve the feature of non-observability and anonymity during the experiment. It is essential to keep such an environment so that subjects are not afraid of being caught when they act dishonestly (Weisel and Shalvi, 2015).

The artificiality of the experiment is also crucial when the topic relates to honesty behaviour, as the subject's decisions are susceptible to the design and game protocols. Most of the experiments in honesty emphasise this (Fischbacher and Heusi, 2013; Mazar et al., 2008; Barr and Serra, 2010; Holm and Kawagoe, 2010).

Furthermore, even the physical presence of the experimenter could distort subjects' behaviour because they fear the experimenter could observe them after all (Abeler et al., 2014). The design and arrangement of the mind game are discussed further in Chapter 2 and Chapter 3.

Chapter 3 found that a shift of political institutions from autocracy to democracy in Indonesia does not boost honesty. I found that subjects who were exposed to an authoritarian regime were more honest than subjects who were exposed to a democratic regime. However, the difference in behaviour does not come from fully dishonest behaviour but rather from fully honest and partially honest behaviour. The fully dishonest behaviour remains, but the number is persistently small in all treatment groups.

This finding reaffirms the hypothesis that participants face a trade-off between their self-image and financial rewards (Fischbacher and Föllmi-Heusi, 2013; Gneezy *et al.*, 2014). Therefore, most subjects choose not always to lie to preserve their self-image, but they also do not always report the truth to gain financial reward.

Interestingly, comparing the honesty behaviour between groups, the partially honest behaviour decreases and shifts to more honest behaviour the older participants are. I found that younger Indonesian participants mostly behave partially honest, and its share is significantly higher than in the older groups. The higher number of partially honest behaviour of the young generation might be caused by the fact that they still learn and internalise the competing behaviour of honesty and dishonesty in society. Once they get older, their partially honest behaviour might shift to either honest or dishonest behaviour (Inglehart and Baker, 2000) depending on what dominates in society. This finding highlights the importance of a young age as a crucial moment to shape future honesty behaviour.

This finding should be translated carefully since the difference in honesty behaviour might be caused by a different generation, and the young Indonesians will not necessarily follow the same pattern as the current older generation. This highlights the importance of securing and aligning young Indonesians' still malleable behaviour and swinging it to positive behaviour that currently exists in older subjects. The momentum is more profound since Indonesia is experiencing a demography bonus in which the number of young people exceeds the elderly.

This finding adds to the existing evidence that the fast-moving institutions such as political shifts do not influence the slow-moving institutions such as culture. The possible explanation for this is that democracy in Indonesia is superficial (Hadiz, 2004; Green, 2005; Lewis, 2010; Sjahrir, Kis-Katos and Schulze, 2014; Tomsa, 2015; Haryanto and Astuti S.A, 2017). Hence, the initial goal of democracy to promote "good behaviour" by penalising "bad behaviour" (Ertan, Page and Putterman, 2009), boost trust (Uslaner, 2003), and stimulate greater cooperation (Frey, 1998; Bardhan, 2000; Black and Lynch, 2001), and greater government accountability (Paxton, 2002) is not achieved. The norm and culture that support the corruptive behaviour still exist and can only be slowly corrected.

The second topic, which is presented in Chapter 4, asks whether inequality of endowment stimulates bubbles and bursts in asset markets. Although this chapter discusses a different topic from the previous one, both try to utilise the advantages of the experimental method to add to the existing literature.

This study incorporates the canonical asset market experiment (Smith, Suchanek, and Williams, 1988), which is well known as the standard experiment to capture bubbles and bursts in laboratory experiments.

Existing literature uses traditional methods to measure the impact of inequality on bubbles and bursts, either through a qualitative approach (Rajan, 2010) or by empirical methods (Krueger and Perri, 2006; Jappelli and Pistaferri, 2009; Blundell and Etheridge, 2010; Brzozowski et al., 2010; Treeck, 2014; Kumhof, Rancière and Winant, 2015; Perugini, Hölscher and Collie, 2015). However, these studies have been criticised for yielding inconclusive findings and failing to explain convincingly the underlying fundamentals of how inequality affects the incidence of bubbles and bursts through individual decision-making (Moss, Thaker, and Rudnick, 2013). Real-world settings never provide an opportunity for a scientist to capture such data (Powell and Shestakova, 2016), but utilising an experimental approach could potentially give the necessary input to the literature.

The experimental approach allows the investigation of inequality and links it to the occurrence of bubbles and bursts. Individual trading behaviour is also captured in the experiment, generating additional interesting information for research. This has been done in some canonical games such as Kuziemko et al. (2011) and Haisley et al. (2008) in the lottery game; Bagnoli and Mckee (1991), Rapoport

and Suleiman (1993) and Anderson et al. (2008) in the public goods game; Greiner et al. (2012) and Anderson et al., (2006) in the trust game; Armantier (2006) and Schmidt et al. (2015) in the ultimatum game; Guenther and Alicke (2010) in the trait rating experiment; and Loughnan et al., (2011) in their self-enhancement assessment method. However, to the best of my knowledge, no study has put attention on inequality in asset market experiment, and my study is the pioneer to do so.

Chapter 4 found that bubbles and bursts do not occur in a market where inequality is symmetric. I found that a market with an unequal symmetric endowment creates significantly lower average market prices than the equal endowment setting. The difference is mainly triggered by the difference in market price within phase 2 of the experiment, i.e. the phase where usually bubbles occur. The early phase and the later phase do not show significant differences. It seems that subjects need to learn the arrangement of the trading at the early phase; hence they still trade cautiously. While towards the late phase (phase 3), subjects might realize that they can only try to sell the assets they hold profitably.

Another important finding in the literature states that the saliency of inequality induces the low endowment group to take higher risks because of the social comparison effect. However, I was not able to confirm this result when looking at the market price data. This might be because the mere knowledge of inequality is not enough to trigger the social comparison effect. Different presentation of inequality might induce stronger saliency.

Chapter 4 not only provides evidence of how inequality market prices and, therefore, the formation of bubbles and bursts. In this chapter, I also look at the trading behaviour of participants which is rarely used in the asset market experiment literature. The trading behaviour shows the number of offers that a subject made without necessarily ending with a trade deal. Different from market price data that involve the decision making of two subjects (buyer and seller), the trading behaviour data could depict subject true willingness to trade which drive solely based on his or her motivation alone. This gives us a tool to link subject motivation and treatments.

Aside from the methodological contribution above, this study also gives a valuable insight that inequality seems to encourage the motivation of the low endowed

group to trade more. Eventually, the motivation seems to work for the low endowed group to gain more wealth. In fact, low endowed group outperform the normal endowed and high endowed group in creating more wealth in most of the treatments. However, it does not give enough impact on the market price. It seems that limited possession of wealth inhibits such impact.

The three chapters above use experiments to test the research question. This thesis aims to harvest the advantages of the experimental approach that could potentially fill in the research gap left by existing literature in institutions and behaviour and in inequality and decision making. Asides from the advantages and limitations mentioned above, it can be argued that the experimental approach offers a positive contribution to the literature. While it may not fully address the existing methodology problems, the interaction between theory, the traditional approach, and experiment undoubtedly enriches the discussion.

The organisation of this dissertation is as follows. Following this introduction, the theory regarding how institutions affect behaviour is presented in Chapter 2, discussing whether migration influences intrinsic honesty? Chapter 3 considers whether shifting from autocracy to democracy affects the Indonesians' level of intrinsic honesty? Finally, Chapter 4 is dedicated to testing how inequality affects the incidence of bubbles and bursts, using the experimental approach.

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Chapter 2 Does migration influence individual behaviour?

By Lury Sofyan

Abstract

I investigate how the perceived quality of different institutions influences individual behaviour. Here, individual behaviour is proxied by intrinsic honesty. To this end, I have proposed a new altered 'mind game' to measure intrinsic honesty of three different groups of individuals: Indonesians living in Indonesia, Indonesians living in the UK and British living in the UK who serve as the control group. While partial honesty is present in all treatments, I found that the level of honesty of Indonesian subjects who live in the UK was lower compared to Indonesian subjects who live in Indonesia suggesting that at least some individuals adjust their behaviour thereby integrating into their chosen country.

Keywords: Institutions, Honesty, Migration

2. 1 Introduction

The number of people living in a country other than that which they were born is increasing rapidly. In 2019, there were 272 million migrants compared to 51 million in 2010. Hence, for the first time, the migration issue has been placed 11th in the 17 Sustainable Development Goals (United Nations, 2020). No matter what the motivation of immigration is (e.g. to join family, economic driven or study, or fleeing conflict, persecution, terrorism or human rights violations), adapting to a new country is always challenging. The newcomer will always face a new environment, and this potentially causes cultural clashes and provokes social and political issues.

When one comes to a new country, they have two choices. First, they can follow the norm of the people living in the new country (nature) or, second, they can remain and adhere to their original behaviour (nurture). This debate of nature versus nurture has been studied extensively. The first element in this is known as the conformist transmission hypothesis (Bowles, 2004) and the second is the vertical transformation hypothesis, also known as the sticky behaviour hypothesis (Fisman and Miguel, 2007).

The conformist transmission hypothesis argues that institutions shape an individual's behaviour since institutions provide behavioural guidance for individuals to follow, and any divergence from the institutions is most likely condemned and punished. Institutions provide a fundamental framework for political, economic and social interaction, which consist of both informal rules, such as sanctions, taboos, customs, traditions and codes of conduct, and formal rules, such as constitutions, laws and property rights (North, 1990). Institutions affect behaviour through providing a wide range of incentives and penalties which influence preferences (Bohnet, 2013). When individuals interact with a new society, they internalise the new culture, their norms and values of behaviour such as, e.g. honesty into their beliefs as part of their day-to-day behaviour. The adoption process of culture itself can be triggered by economic pressure (Chiswick, 1978; Akerlof, 1980; Borjas, 1998; Cheung and Phillimore, 2014) and social pressure from the behaviour that is prevalent within society (Wilson and Kelling, 1982; Cialdini, Reno and Kallgren, 1990; Evans, Oates and Schwab, 1992; Glaeser, Sacerdote and Scheinkman, 2003; Bowles, 2004; Powell, Tauras and

Ross, 2005; Carrell, Malmstrom and West, 2008; Kremer and Levy, 2008; Gino, Ayal and Ariely, 2009).

While the conformist transformation hypothesis argues that behaviour is shaped by the institutions of the country where the individual lives, the sticky behaviour hypothesis perceives that the values and beliefs of an individual are transmitted vertically from generation to generation, which make them sticky and difficult to change (Fisman and Miguel, 2007). This is due to the early age exposition to cultures and norms, which is the most critical time to shape individuals' behaviour (Robins, 1978; Case and Katz, 1991; Cherlin, Kiernan and Chase-Lansdale, 1995; Inglehart and Baker, 2000; Knowles and Andrew, 2004; Talwar and Lee, 2011; Hays and Carver, 2014)[1] and family has a long-term effect on behaviour (Duranton et al., 2009; Uslaner, 2008; Barón et al., 2008; Wilhelm et al., 2008; Kim, Atkinson and Yang, 1999; Guiso, Sapienza and Zingales, 2004)[2].

The current study is aimed at revisiting this debate by focusing on how different institutions alter behaviour. I do this by focusing on intrinsic honesty in experiments. I test the competing theories of the sticky behaviour hypothesis (Fisman and Miguel, 2007), which predict that the individual will maintain their level of intrinsic honesty, and the conformist transmission hypothesis, which argues that the level of intrinsic honesty will change in accordance with the presence of new institutions (Bowles, 2004).

I use two countries which have a wide gap in the quality of institutions. Quality of institutions refers to the ability to enforce the law efficiently. A higher quality

[1] Other conforming studies of the important of childhood in shaping behaviour are, for example, Bacon et al. (1963), who also confirmed a pattern between child-rearing and personal crime. They explained that families which lack a male role model and apply a more authoritarian style of child-rearing create conditions for criminal behaviour. Hetherington (1972) also found that the absence of a father has a huge impact on females' interactions with males while Hoffman (1971) found that the effect of father absence on males is severe. Lesser & Kandel (1969) observed that different child-rearing patterns in Denmark and United States result in different adolescent independence. Coopersmith (1967) stated that children with high self-esteem have high self-esteem parents. Hoffman and Saltzstein (1967) also suggested that parental child-rearing styles, for example, applying discipline in the family, can explain children's moral development.

[2] There is more discussion on how family shapes individual behaviour and the these that where individuals come from can predict shirking behaviour (Putnam, 1993; Ichino and Maggi, 2000; Guiso, Zingales and Sapienza, 2008). Distant cultures have also been found to shape today's behaviour in terms of tax compliance (Torgler, 2003; DeBacker, Heim and Tran, 2015), land-ownership structures and farming technique (Salamon, 1992), income distribution (Luttmer and Singhal, 2011), fertility rates (Salamon, 1992; Fernandez and Fogli, 2006), saving behaviour (Carroll, Rhee and Rhee, 1999), trust (Tabellini, 2008; Grosjean, 2011; Nunn and Wantchekon, 2011), political flavour (Tabellini, 2008), bureaucracy efficiency (Becker et al., 2016) and violence behaviour (Miguel, Saiegh and Satyanath, 2011; Grosjean, 2014).

of institutions means that fewer rule violations occur and that the violations are dealt with efficiently and effectively. Conversely, lower quality of institutions is tantamount to more frequent rule violations and less effective persecution of these violations.

In particular intrinsic honesty, its degree is shaped by the quality of institutions since intrinsic honesty is originated from the absorption of the institutions that exist within the society (Barr and Serra, 2010).

To answer the question, I use the experimental method of a mind game (Jiang, 2013; Kajackaite and Gneezy, 2017; Potters and Stoop, 2016) to measure and compare the level of intrinsic honesty of individuals living in their home country A and citizens of country A living in country B. In particular, I conduct an online experiment using Indonesians who live in Indonesia and Indonesians who live in the UK. British living in the UK are forming the control group. The selection of Indonesia and UK as the study case is explained further in the experimental design and methodology section.

I calculate the lying at the group and individual level and compare the statistical differences between the treatment groups. I investigate how Indonesians who stay in the UK behave differently compared to the average Indonesian in Indonesia.

I found that despite the UK having higher quality institutions compared to Indonesia, the level of honesty of the British subjects is lower compared to Indonesians subject in the UK and much lower compared to Indonesians subject in Indonesia. I also found that Indonesian subjects have a higher positive perception of institutions compared to the British subjects. The conformist transmission hypothesis seems suited to explaining the finding that Indonesian subjects who live in the UK become less honest, converging to the level of the UK's subject. But it is only applied to a specific group of Indonesian.

I found evidence in the fully dishonest group of Indonesians subject who stay in the UK (T2 I-UK) that they merged their perceptions of institutions towards the British subject and moved away from the average Indonesian subjects. Their conformity towards strong institutions was lower than the average Indonesian subjects. This can be perceived as arising from the adaptation process experienced by the T2 (I-UK).

Our further investigation found that such adaptation in the fully dishonest group could have been triggered by their exposition to UK news and that they have similar cultural traits to the British subject compared to Indonesians subject.

Following this introduction, the literature review provides a discussion of how different studies approach the research question, how the literature has left a research gap and the possible contributions that have been made. In the experimental design and methodology chapter, I discuss how the experiment was designed and conducted. In the results and conclusion chapter, some findings and limitations are discussed.

2.2 Literature Review

Many studies have been dedicated to investigating how institutions influence beliefs, attitudes and behaviour. Some studies[3] use the term culture instead of institutions. I use the term institutions since, in real life, individuals are exposed not only to culture (informal rules) but also to formal rules; hence, both have the potential to influence one's beliefs, attitudes and behaviour. A common finding in the literature is that high-quality institutions shape more law-abiding citizens compared to low-quality institutions (Fisman and Miguel, 2007; Barr and Serra, 2010; Gächter and Schulz, 2016).

The classical approach to addressing this question is to use already available cross-country data of attitudes and beliefs and use regression analysis to reveal any relationship with a corruption index data (see for example Montinola and Jackman, 2002, Seleim and Bontis, 2009, and Yeganeh, 2014). Nevertheless, reverse causality and the endogeneity problem can limit the efficacy of such a method (Fernández, 2008).

To overcome this limitation, some studies have taken a different route by comparing immigrants who live in one country and who came from other countries. This technique allows the isolation of cultural variables that are shaped by a country's specific institutions (Barr and Serra, 2010).

Fisman and Miguel (2007) applied this technique by using a natural experiment in New York. With the absence of law enforcement, they found that diplomats who came from countries with a high score on the corruption index would more often violate parking rules compared to diplomats from countries low on the corruption index. This occurred even when these diplomats were exposed to higher quality institutions and were far away from their countries of origin ('sticky corruption' culture). It is still difficult to generalise this finding, however. It is difficult to replicate and test the study by Fisman and Miguel (2007) in a different environmental setting since they used unique and specific field data. Using diplomats as a sample also raises a question about whether the behaviour of a diplomat can represent society since foreign minister employees and civil

[33] See Barr and Serra (2010), Cameron, Chaudhuri, Erkal, & Gangadharan (2009) and Fisman & Miguel, 2007.

servants, in general, more represent high-ranking individuals within society (Neumann, 2008).

More recent studies have approached the research question by measuring behaviour using experimental methods. Using a bluffing game, Holm and Kawagoe (2010) suggested that subjects in Sweden and Japan lie less than fully rational agents would be expected to. Participants behave more honestly if there is a possibility that their actions can be monitored or traced. Although Holm and Kawagoe (2010) used ID-notes to cover their subjects identify, this still leaves a physical traceable document that could undermine a subject's dishonest behaviour.

Also related to the issue of honesty is the study by Cameron et al. (2009) in which they conducted a corruption game and found that tolerance of corruption correlates with the quality of institutions in two countries: India and Australia. However, they did not find such a correlation in the other two countries within their subject of study, Indonesia and Singapore.

Using the combination idea from Cameron et al. (2009) and Fisman and Miguel (2007), Barr and Serra (2010) used a bribery game to predict corrupt behaviour among international students in the Oxford University and found that corruptive behaviour decreased when the subject stayed longer in the UK.

Incorporating empirical data such as that used by Fisman and Miguel (2007) is difficult. The studies by Cameron et al. (2009), Barr and Serra (2010), and Robert and Arnab (2013) offer a new idea of conducting an experiment that constructs a similar environment, where people from different countries can be tested in the same environmental context. Nevertheless, the experimental designs used by Cameron et al. (2009) and Barr and Serra (2010) are not simple. For example, the bribery game involves three different roles – public servant, private citizen, and other members of the society – hence, it can potentially confuse the subject.

The above-cited studies provide solid ground for a new method of an experiment in investigating the relationship between institutions and honesty. Nevertheless, some research gaps still exist which need further investigation. For example, the above studies, except for Holm and Kawagoe (2010), do not capture the phenomenon of partial honesty. The theory of honesty suggests that honesty and dishonesty are not bipolar options; hence, the subject might choose not to lie fully

but, instead, they choose to lie partially (Fischbacher and Heusi, 2008; Gächter and Schulz, 2016; Mazar et al., 2008; Shalvi et al., 2011). Studying partially honestly gives us a better understanding of honesty behaviour than concentrating on fully honest or fully dishonest behaviour alone. I will elaborate on this in the experimental design section.

Gächter and Schulz (2016) addressed this issue by incorporating a roll dice experiment (Fischbacher and Heusi, 2008) in 23 countries, in which partially honest behaviour could be detected easily. Gächter and Schulz (2016) use the Prevalent Rule Violation Index (PRV Index) to measure the quality of institutions and found that weak institutions harm intrinsic honesty, i.e. individual intrinsic honesty is higher in low Prevalent Rule Violation Index (PRV Index) countries than in high PRV Index countries. However, their experimental design brought a different challenge. Such a design leaves a traceable document that can be used to detect lies; hence, one might leave subjects with a feeling of 'being detected' when they lie. As a result, observing lie behaviour through a roll-dice game (Fischbacher and Föllmi-Heusi, 2013) and a deception game (Gneezy, 2008) can lead to subjects' lie behaviour being underreported. A more careful experimental design is needed to address this issue and the experiment offers a new approach to this.

The above-cited studies have investigated the relationship between institutions and honesty. Nevertheless, the existing literature rarely focuses on investigating how different institutions affect individual behaviour (Robert and Arnab, 2013; Rosenbaum, Billinger and Stieglitz, 2014). Robert and Arnab (2013) stated that although there were conforming studies which find that honesty is influenced by norms, there are some questions that still need further investigation. In particular, they questioned: '…how does a subject's exposure to another country's norms affect his behaviour...?' (Robert and Arnab, 2013, p. 733), a question that remains unanswered. This research gap is also stressed by Rosenbaum et al. (2014), who noted that future research is needed to understand how different institutions influence levels of honesty.

The current study is part of a growing body of research on the importance of how formal and informal rules affect individual behaviours. The previous sections have provided a brief discussion on how institutions affect individual honesty.

Nevertheless, as mentioned earlier, the existing literature rarely focuses on investigating how different institutions affect individual behaviour (Robert and Arnab, 2013; Rosenbaum, Billinger, and Stieglitz, 2014), and the current study is aimed at doing so.

The current study aims to fill in the research gap that is explained above by providing a game better suited to my research question. Compared to approaches in the literature, the altered mind game provides several advantages. First, it is designed to avoid complexity; hence, it is easy to replicate and enable it to reduce subject confusion. Second, the altered mind game enables the detection of partially honest behaviour. Third, the mind game can also eliminate subjects' risk perceptions of being caught since it is a simple form of decision-making that occurs inside the subjects' minds; thus, there is no possible way to monitor subjects' decisions (Jiang, 2013).

2.3 Experimental Design and Methodology

The current study design is an experiment that is close to those conducted by Fisman and Miguel (2007) and Barr and Serra (2010) as follows: Imagine individual 'A', due to migration, moves to a new country. Suppose they move from country '1', which has higher PRV index (lower quality institutions) than country '2', which has lower PRV Index (higher quality institutions). In the home country of '1', where institutions are weak, rule violations such as corruption, tax evasion and political fraud are ubiquitous while in the new country, institutions are strong and rule violations are rare. A mind game (Kajackaite and Gneezy, 2017) is used to measure and compare the level of intrinsic honesty of 'A' who lives in country '1' and 'A' who lives in country '2'.

The quality of institutions is defined using the Prevent Rule Violation (PRV) Index (Gächter and Schulz, 2016). The PRV Index is based on three sub-indexes, tax evasion, corruption level and political fraud. The PRV Index has a mean of 0 (s.d. = 1.46), and it ranges from −3.1 to 2.8, where higher values indicate a higher prevalence of rule violations (See Figure 1 for details).

The experiment was conducted with Indonesian students as a sample and the UK as the destination country. Taken from Gächter and Schulz (2016), the UK is among the countries that have a low PRV Index (-2.93); hence, it has a relatively higher quality of institutions while Indonesia is among the countries which have

high PRV Index (0.12); thus, it has a relatively lower quality of institutions. Using other institutions' quality indices show the same picture that Indonesia has lower quality institutions compared to the UK. Besides that, Indonesia was chosen because the access to data of both Indonesian students who study in Indonesia and the UK is available.[4]

I am aware that they are different ways of measuring the quality of institutions of a country. Besides the PRV index, there are other measures such as the Governance Index[5], the Corruption Index[6], and the World Institutional Quality Ranking (Kuncic, 2012)[7]. Each of the measurement focuses on slightly different areas of institutions. The Corruption index only focuses on the breach of corruption law hence it does not take into account other dimensions of institutions.

The Governance Index (Kaufmann, Kraay and Mastruzzi, 2011) captured a more holistic approach which covers six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The World Institutional Quality Ranking (Kuncic, 2012) aggregates even more than thirty institution measures which, in my opinion, is one of the most overarching approaches. One thing in common is that the above measurements always put the UK as a country that has higher institutional quality compare to Indonesia.

As previously mentioned, two possible hypotheses could hold. The first one refers to the sticky culture hypothesis (Fisman and Miguel, 2007); the level of dishonesty

[4] Access to 10,987 members of the Indonesia Endowment Scholarship Program (LPDP) is available through beasiswaLPDP@googlegroups.com. This is a private e-mail group setup by LPDP as a tool of communication and sharing for LPDP awardees. This group consists of master and doctoral programmes, domestic (54%) and abroad (46%) from 2011 to the present (it keeps growing since new members are automatically added to this group). LPDP awardees to the UK amount to the single largest segment, approximately accounting for 16% of total members.

[5] According to Kaufmann, Kraay and Mastruzzi (2011), Indonesia has a lower score of governance quality in all six dimensions compared to the UK. They use the term governance, which is equivalent to the institution definition that is used in this paper (North, 1990). It was explained: '*the traditions and institutions by which authority in a country is exercised. This includes (a) the process by which governments are selected, monitored and replaced; (b) the capacity of the government to effectively formulate and implement sound policies; and (c) the respect of citizens and the state for the institutions that govern economic and social interactions among them'* (Kaufmann, Kraay and Mastruzzi, 2011, p. 4).

[6] Corruption Perception Index (https://www.transparency.org) for the last four years, from 2015 to 2018 consecutively: UK (81, 81, 82, 80), Indonesia (36, 37, 37, 38)

[7] Combining more than thirty institutions quality index, Kuncic (2012) covers legal, political and economic institutions into World Institutional Quality Ranking and put UK within the highest rank group (rank group fifth out of five) while Indonesia is among the lower group (rank group second out of five)

for Indonesians who stayed in the UK remains equivalent to the Indonesian level. The second one supports the conformist transmission hypothesis (Bowles, 2004), that is, when honesty is more prevalent, the likelihood of the adoption of honesty is higher (see in Figure 2).

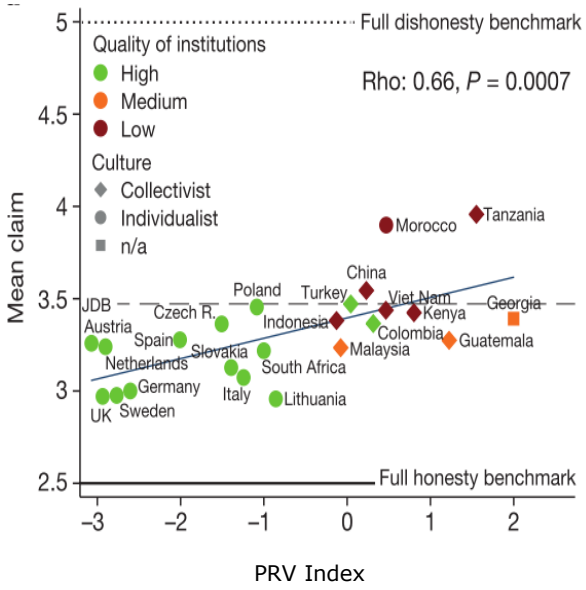


Figure 1 Various country mean claims[8]

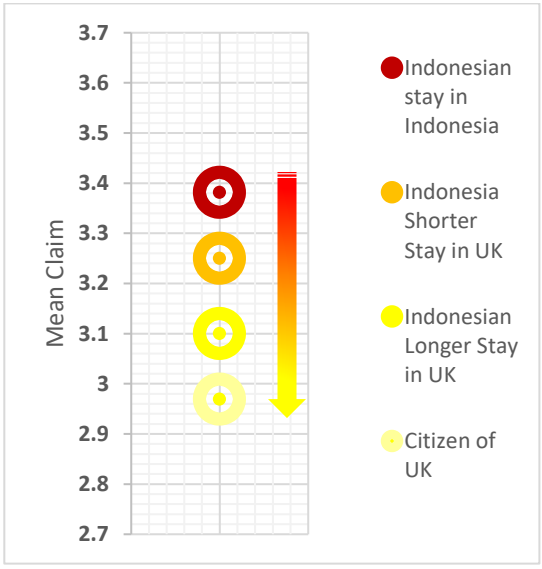


Figure 2 UK and Indonesia mean claims and hypotheses

The main potential contribution by current study compared to Barr and Serra (2010), is that the current study incorporated a simple experimental design – the altered mind game – which reduces the possibility of subject confusion. Subjects have to make decisions, and the simpler the game is, the lower is the probability that subjects make mistakes, which ultimately increases the quality of the results. This game is not only simple and easy to replicate but also suits the detection of the intrinsic honesty of the participants since there is no material incentive applied for being honest, just as with the roll-dice game (Fischbacher and Heusi, 2013).

Besides that, the mind game gives the advantage of non-observability. Since lying is undetectable, the true information is privately kept by the subjects, and there is no possibility of revealing the information (Jiang, 2013). More importantly, while the previous literature conducted experiments inside the lab, I conduct the experiment outside the lab. The physical existence of the experimenter might

[8] Gächter and Schulz (2016). The benchmarks are 2.5 for fully honesty and 5 for full dishonesty.

amplify the feeling of fear of detection and influence decision making in honesty behaviour.

In designing a game to capture intrinsic honesty, non-observability and anonymity are paramount. It is important to keep such an environment so that the subject does not feel afraid of being caught when they act dishonestly (Weisel and Shalvi, 2015). The lack of non-observability and anonymity would fail to capture real dishonest behaviour.

Different attempts have been made at incorporating anonymity and non-observability into experimental designs. In their roll dice game, Fischbacher and Heusi (2013) altered the payoff method, using envelopes to overcome the fear of detection.[9] Mazar et al. (2008) convinced the participants that their decisions in the lab were unobservable by telling the participants to shred all evidence. Barr and Serra (2010) used a privacy screen to convince subjects that their decisions were unobservable. Holm and Kawagoe (2010) used ID-notes to increase the anonymity of their subjects. Those designs might be useful; however, they still leave traceable proof that could be used to detect lies; hence, they might influence subjects' decisions.

Besides testing the generality of the findings by Fisman and Miguel (2007) and Barr and Serra (2010), another important contribution compared to these studies is that this experiment was designed to capture the partial honesty to the list of strategies used by subjects. This is an essential feature that neither the field study by Fisman and Miguel (2007) nor the bribery game by Barr and Serra (2010) has. It provides a better understanding of honesty behaviour.

Previously, economic theory assumed that people behaved as homo economicus, who 'suffer no cost when lying' (Fischbacher and Heusi, 2008, p. 533) since they are 'unconcerned about the well-being of others' (Gneezy, 2008, p. 384); hence, they will lie to the maximum extend. However, different experiments, for example, the public good game, the trust game, and the ultimatum game have shown that

[9] Fischbacher and Heusi (2008), for example, also emphasized several times in their paper that non-observability and anonymity were important. They explained: 'I made it as obvious as possible that it was impossible for the experimenter to find out what number a subject actually rolled' (Fischbacher and Heusi, 2008, p. 8) and 'I ran a treatment where it was not only impossible to tell who rolled what number, but additionally absolutely impossible to tell who reported what number' (Fischbacher and Heusi, 2008, p. 11).

this is not a suitable model to understand human behaviour hence a more realistic model is needed.

A later model, the bipolar model, which suggested that human behaviour is either honest or dishonest, has also been considered too simple and incomplete because experimental studies found that the majority of decisions taken by the participants was partially honest to balance between the benefit of lying and their self-esteem (Fischbacher and Heusi, 2008; Gächter and Schulz, 2016; Mazar et al., 2008; Shalvi et al., 2011).

In real life, people witness a wide range of honest and dishonest behaviours within their surroundings, ranging from the simple act of returning a dropped wallet on the street to a really serious scandal that involves a huge amount of money. Those behaviours shape the beliefs of the people who live in that area. However, not all values are internalised into beliefs; the internalization process might favour the more prevalent over the less (Bowles, 2004). This is because those prevalent behaviours have been accepted as the right thing to do within society and they become the standard behaviour that has to be followed by members of society. However, the temptation to swing between honest and dishonest behaviour always exists and this phenomenon cannot be captured by the old homo economicus approach or by the bipolar model of honesty and dishonesty.

In the case of this study, I measure the level of honesty of an individual who was exposed to two different values from two different institutions, one of which is the rule violation act (corruption, tax evasion, political fraud) is more rampant; hence, dishonest behaviour is more acceptable and the other one by which the rule violation act is less rampant; hence, dishonest behaviour is less acceptable.

Having faced these two values, the old belief that is shaped by previous institutions is challenged by the new value and it might end as one of three situations: the old belief is replaced, the old belief is maintained or somewhere in between. I believe that capturing partial honesty behaviour in this study is important for capturing the latest situation. Partial honesty behaviour can also be understood as part of the assimilation or acculturation process until at some time it reaches a stage of stability of being fully honest or fully dishonest (as is hypothetically depicted in Figure 2).

Procedures

I measure the level of intrinsic honesty using an altered mind game (Jiang, 2013; Kajackaite and Gneezy, 2017). The experiment was done online using Qualtrics from December 2017 to February 2018.[10] The online experiment consists of three main sections, which are the introduction, the altered mind game, and complementary sections. The sections last for 20 minutes approximately. Participants were recruited randomly through two different channels. British students were recruited through ORSEE (Greiner, 2015) and Indonesian students were recruited through a network of Indonesian students[11].

The first section provides an introduction to the experiment, explains the rules of the game and includes a consent research letter that had to be agreed on by the subjects before they joined the experiment (see Appendix I).

The second section is the mind game, which served as a tool to predict the honesty level. In this section, subjects have to think of an integer number from 0 to 9, and then a random integer number from the same range is chosen and shown on the screen to the subjects (Appendix I). The subjects then have to decide whether the random number shown on the screen is the same as the number in his/her mind. If the subject reports that it was the same number (reporting yes), they receive £0.50. If not, they receive nothing (reporting no). This report becomes the basis for calculating the payoff.

With this design, I can determine that the full honesty benchmark is when the reported number of yeses has a probability of 10% with an average payoff claimed of £0.50. The full dishonesty benchmark reports ten yeses with an average claim of £5. The report below 1/10 indicates underreporting and above 1/10 shows over-reporting. For example, if the number of yeses in a particular subject pool is more than 1/10, it shows that some of the subjects are partially dishonest.

[10] The duration of the experiment does not overlap with the month of Ramadan,which is considered a holy month. During this month, most Indonesian Muslims fast every day. An act of lying within that month is believed to undo the benefit of fasting; hence, conducting an experiment during Ramadhan might alter the experimental result. This view, however, does not apply for Friday. Although Muslims have a specific ritual every Friday, they do not view Friday as strictly during Ramadan.

[11] A group of Indonesian students under the Indonesia Endowment Scholarship Program and the Indonesia Student Association in the UK (PPI UK) were emailed. Each of Indonesian who are included in the database has the same chances to receive email hence to join the experiment

The design is different from Jiang's (2013) and Kajackaite and Gneezy's (2017) in that I use a computer to randomise instead of a die. This allows the setting of a higher number than six, which gave a better prediction of individuals lying.

Detecting a lie at the individual level is difficult. I aimed to give an alternative approach for detecting that. Using ten numbers with ten repetitions would result in a probability of ten times (having the number guessed ten times has a very low probability, 0.00000001%). Accordingly, I can give the highly likely prediction that the subject who reports the same number ten times (or ten times reporting yes) is dishonest.

Using a computer instead of dice also remove the perception bias towards the dice. This might occur to Moslem subject who might relate dice to gambling activity hence influencing their behaviour in the experiment. Knowing that the majority of Indonesian subject are Moslem, choosing a neutral tool in the experiment could be a critical point

I also wanted to test whether there were differences in the results when the game was conducted using an online method compared to an offline method (in the lab). The rationalisation of this is when the mind game is conducted in the lab, the experimenter is physically present, which can bring about a feeling of fear of detection and undermine the participant's lie behaviour. On the other hand, an indirect experiment in which the experimenter is not present minimises participants' fear of being observed; hence, better lie behaviour can be predicted (Abeler et al., 2014). Testing this gives an indication of the quality of non-observability within the mind game.

To understand this, I conducted an additional lab experiment and I compared it to the indirect experiment (the online experiment). I found that although on average, the subjects in the online experiment claimed more money compared to the lab experiment (see Figure 3), the mean difference was not significant[12]. This provides proof that the non-observability feature of the mind game was robust – with evidence that the participants still lie the same although the experiment was conducted inside a lab.

[12] Mean difference between Lab and Online experiment of British students show insignificant result (t test: P-Value 0,1478, while Mann-Whitney: P-Value 0.514)

Treatment and Methodology

Following on from Barr and Serra (2010), the current study uses two groups of Indonesians, consisting of Indonesians who live in Indonesia (T1 I-I)) and, secondly, Indonesians who live in the UK (T2 I-UK), plus one control group of UK student who study in the UK (T3 B-UK). I also conducted an additional process, using British people living in the UK, with an online method (T4 B-UK Lab), and Indonesians living in Indonesia(T5 I-I High).

Mean difference statistical testing was used to compare the results. Having a count data as a dependent variable and an over-dispersed data feature, a negative binomial regression model was appropriate for investigating how various factors influence lie behaviour.

To support the estimation model, in the third section, four different groups of questions were delivered, namely, institutions perception questions, a big five inventory, a cognitive reflection test (CRT), and socio-demographic questions (see Appendix I: Instructions and questions).

Institutions perception questions are designed to capture the perceptions of a subject towards institutions. I asked to what extent they agreed with some of the common formal and informal rules in daily life. For the formal rules, I used three questions, referring to the three aspects of the Prevalent of Rule Violation index (Gächter and Schulz, 2016) and adding two other questions that more coincide with the day-to-day behaviour of the subjects.[14] For the informal rules, I asked about the day-to-day norms in society that are not part of the formal rules and where there are no formal sanctions for violations.

It was of particular interest to see other factors outside institutions which could also determine individual honesty, such as a negative correlation between dishonesty and cognitive abilities (Williams et al., 2010); personality, conscientiousness and agreeableness, which are also negatively related to dishonesty (Giluk and Postlethwaite, 2015);[15] gender (Conrads et al., 2014); and major of study (Lewis *et al.*, 2012).

[14] Questions related to formal rules are that corruption is not acceptable, everybody should comply with tax rules, and political fraud is not acceptable. O put two additional questions about littering and plagiarism, which most student face in everyday life.
[15] Ramdhani (2012) was used for the translation of 44 big five questions into the Indonesian language.

2.4 Results

Summary Statistic

	Variable		Mean	Std. Dev.	Min	Max	Obs
T1 (ID)	Age		26.5	5.9	19	48	215
	CRT		2.4	1.9	0	6	215
	M	(%)					48
	F	(%)					52
T2 (IUK)	Age		31.6	6.2	20	53	201
	CRT		3.1	1.9	0	6	201
	M	(%)					54
	F	(%)					46
T3 (BUK)	Age		21.3	4	19	58	98
	CRT		4	2.2	0	7	98
	M	(%)					29
	F	(%)					71
T4 (BUK Lab)	Age		21.5	2.9	19	44	106
	CRT		3.4	2.2	0	7	106
	M	(%)					49
	F	(%)					51
T5 (ID High)	Age		28.8	9.1	18	67	100
	CRT		1.3	1.5	0	5	100
	M	(%)					42
	F	(%)					58

T1: Indonesian students who live in Indonesia, T2: Indonesian students living in the UK, T3: British students who study in the UK. I added two additional processes, which are T4: British students who study in the UK (Lab experiment) and T5: Indonesian students who live in Indonesia (high stake).[16]
CRT: Cognitive reflection test, M: Male, F: Female

Table 1 Summary statistic

Having a diverse sample helps to gain representativeness of the Indonesian and the British. The Indonesian population is very diverse, consisting of 31 dominant ethnic groups who live in 33 provinces spread across more than 17,000 islands (Badan Pusat Statistik, 2012). Less diverse compared to Indonesia, the UK consists of five major ethnic groups living in four different regions. Each ethnic group might have different characteristics and cultures that correlate to honesty behaviour; hence, a random technique to recruit participants is important to get a diverse sample.

[16] The payoff is in GBP except for T1 & T5 I use IDR with PPP calculation (OECD, 2018). See more comments on Age and CRT in Appendix III: Data Summary.

The recruitment process attracted 720 subjects, consisting of 516 Indonesians and 204 British people. The Indonesian subjects came from 29 provinces in Indonesia out of 33 provinces, of which the majority came from the island of Java (80%) (see Appendix III: Data Summary). In particular, for T2 (I-UK), the data show that almost the same number of Indonesians who study in the UK comes from the island of Java (81%). This figure is bigger if compared to the national statistics showing that only 57% of Indonesians live in Java (Badan Pusat Statistik, 2012). The most common explanation is that the sample consists of citizens who live in Java, who have better access to higher education. The sample represents 28 major ethnic groups out of 31, dominated by Java and Sunda, which account for more than half of the sample size (see Appendix III: Data Summary). This figure mimics the national statistics, which show the population is dominated by Javanese, at 40.,2%, and Sundanese, at 15.5% (Na'im and Hendry, 2011). This figure, therefore, overcomes any concerns about subject representativeness.

In the UK, some areas have higher crime rates compare to others. Those who live in these areas might get more exposure to negative behaviours, thereby crowding out their honesty levels. Having T2 (I-UK) and British subjects spread across the UK is beneficial for capturing this characteristic and differences that might exist.

I gathered 201 Indonesian students studying in the UK (T2 I-UK). These 201 students live in 35 wards, covering England, Wales, Scotland and Northern Ireland. The furthest south representative was from Exeter, the furthest north was from Aberdeen, the furthest west was from Belfast, and the furthest east was from Norwich (see Appendix III). Meanwhile, the British subjects came from 98 Wards, mostly dominated by white ethnic groups (64%).

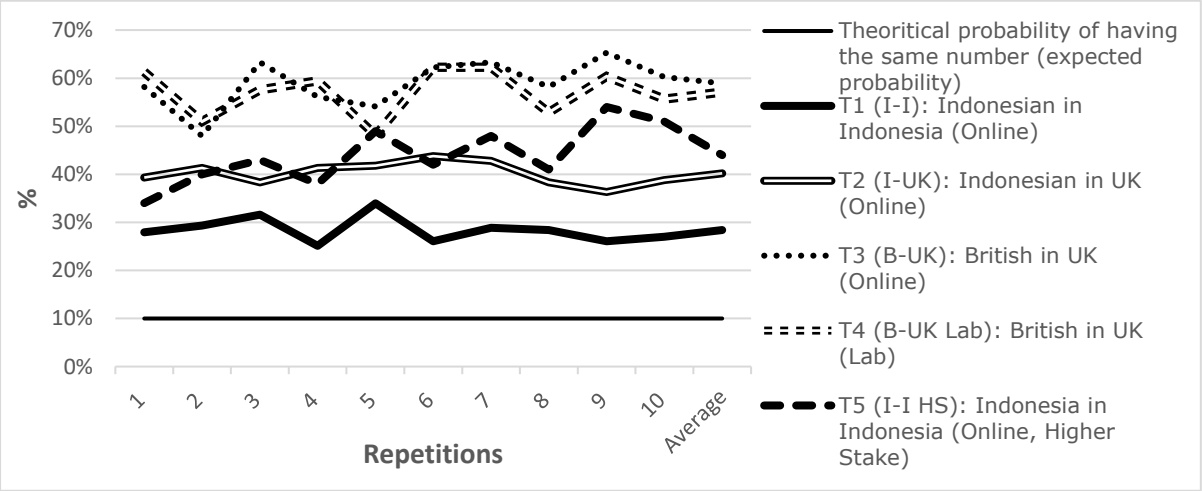
I also have a comparable sample in terms of age. I focus on the role of institutions in shaping behaviour; hence, a wider age gap between the Indonesian and British samples might distort the robustness of the results. Age is a good proxy for telling how often people get information about institutions. For example, older participants might get less information due to having less online interactions.

The Indonesian subjects were on average older than the British (the Indonesian and British mean age are, respectively, 28.9 years and 21.4 years. In general, the mean participants' ages in T2 (I-I) are the oldest. In T2 (I-UK), the majority of participants were graduate students (93%). This is because most Indonesian

students in the UK are financed by scholarship funds for graduate studies. The average age of T1 (I-I) is also older than T3 (B-UK) and T4 (B-UK Lab). One of the reasons is that the minimum age to enter a primary school in Indonesia is seven years old while in the UK, it is five years old, and most UK students enter university at the age of 18 (Universities UK, 2015). A more detailed discussion of the data is presented in Appendix III: Data Summary.

Experiment Results

In this section, I present the approach to observing honesty at the group level. The same approach was used by Fischbacher and Heusi (2008) and Gächter and Schulz (2016). A full honesty benchmark is when the reported number of yeses has a probability 1 in 10 with an average payoff claimed of £0.50. The full dishonesty benchmark reports ten yeses with an average claim of £5. Data below 1/10 indicates underreporting and above 1/10 shows over-reporting. For example, if the number of yeses in a particular subject pool is more than 1/10, it shows that some of the subjects are partially dishonest.



Binomial test for each repetition of T1 (I-I), T2 (I-UK), T3 (B-UK), T4 (B-UK Lab) and T5 (I-I HS) is significantly different (p-value<0.01) from the theoretical probability of 10%.

Figure 3 Share of subjects who reported 'yes' (dishonest)

	T2 (I-UK)	T3 (B-UK)	T4 (B-UK Lab)	T5 (I-I High)
T1 (I-I)	0.0002	0.0000	0.0000	0.0000
T2 (I-UK)		0.0000	0.0000	0.2456
T3 (B-UK)			0.719	0.0007
T4 (B-UK Lab)				0.0014

Two-sample Wilcoxon rank-sum (Mann-Whitney) test[17]

Table 2 p-value of mean differences for each treatment

Two possible hypotheses can hold when an individual is exposed to better institutions. If the sticky culture hypothesis was to be observed, the Indonesians in the UK (T2 I-UK) would behave the same as the Indonesians in Indonesia (T1 I-I) (Fisman and Miguel, 2007)). If, on the other hand, the conformist transition hypothesis was to be observed, the Indonesians in the UK (T2 I-UK) should behave more like the British in the UK (T3 B-UK) (Bowles, 2004).

I found that the level of intrinsic honesty from the highest to the lowest was consecutively T1 (I-I), T2(I-UK) and T3 (B-UK). This is shown by the average number of yeses claimed by each group, which is 2.8 (T1 I-I), 4.0 (T2 I-UK) and 6.5 (T3 B-UK), with all of these being significantly different (Mann-Whitney Test p-value<1%).

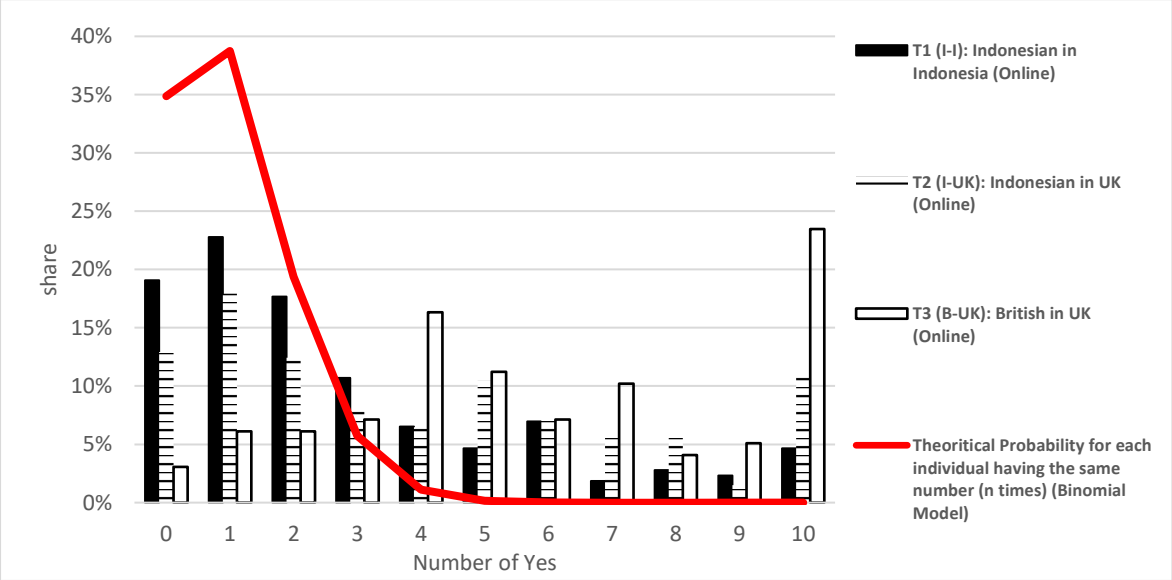
I further investigate the robustness of the above finding by introducing an additional treatment. I want to know whether the number of yeses reported by the Indonesians surpassed the British (T3 (B-UK) and T4 (B-UK Lab)) if the Indonesian subject faced a higher incentive to lie. I conducted an additional treatment (T5, I-I High) for Indonesians, in which I tripled the payoff for every yes. The result shows in Figure 3 that at the group level, the share of reporting yeses for T5 (I-UK High) is higher than T1 (I-I). When the stake is increased by 300%, the mean of reporting yes increases by 16 percentage points, from 28% to 44%. Nevertheless, this is still significantly lower compared to both T3 (B-UK) and T4 (B-UK Lab) (Mann-Whitney Test p-value<1%).

To give a deeper understanding of the above finding, I postulate that the approach to understanding lies at the individual level for each treatment. Although a lie at the individual level cannot be detected, can give the best guess of who is honest and who is not. The subject is categorised as fully dishonest (fully honest) if the

[17] I try to compare the result if the older participants are excluded. There are 10 participants that are 50 years old or above (consecutively from T1 to T5:0,2,5,0,3). The result remain the same.

subject reports ten yeses (zero yes). This is because the subject is very unlikely to give ten yeses in a row[18]. Figure 4 depicts the distribution.

It is clearly shown that the British in T3 (B-UK) who reported ten yeses (fully dishonest) were the highest of all the treatments while those British in T3 (B-UK) who reported zero yeses were the lowest of all the treatments. Both are statistically significantly different compared to the Indonesian groups (T1 (I-I) and T2 (I-UK)) (Mann-Whitney Test p-value<1%).



All treatments are significantly different (Mann-Whitney Test, p-value<0.01)

Figure 4 Share of the subjects reporting yes

The previous literature has found that strong institutions are in line with high levels of intrinsic honesty (Gächter and Schulz, 2016). The above experimental results, however, show a different result. I conducted further analysis to derive some possible explanations. First, I investigated the data in T3 (B-UK) and T4 (B-UK Lab) to measure the level of honesty among different ethnic groups. I have explained in Section 1 that there is an extensive literature supporting the view of a vertical transformation of culture – that immigrants still adhere to their ancestral culture although they live in a new country (in terms of a correlation between parents and children on risk and trust attitudes see Dohmen et al. (2006), Uslaner

[18] In this case, success is defined as the number of yes decisions given by the subject that is the same as is randomly chosen by the computer. Hence, following a binomial distribution, the probability of having zero success (yes) in the case of the probability of success of 0.1 in 10 repetitions is 35%. The same cases for one to ten success (yes) are, consecutively, 39%, 19%, 6%, 1%, 0.15%, 0.014%, 0.00088%, 0.000036%, 0.0000009%, and 0.00000001%.

(2008), and Barón et al., (2008), and on how family shapes young people's attitudes and welfare (Wilhelm et al., 2008)). Hence, there could be a possibility that a lower level of honesty in T3 (B-UK) and T4 (B-UK Lab) could be caused by some of the participants still having a strong adherence to their ancestral culture because they have a closer relationship to their roots.

The analysis shows that the honesty levels for participants' ethnicity in T3 (B-UK) and T4 (B-UK Lab) are not significantly different, indicating that the above possibility is irrelevant. In addition to that, I asked the subjects their age and the number of years spent in the UK and found that those two variables are mostly equivalent, suggesting that the participants born in the UK and have spent most of their lives in the UK.

Partial Honesty

As previously stated, the experiment was designed to be able to capture the partial honesty strategy that was used by the subjects. This is a feature that the previous literature in this area is lacking (e.g. Fisman and Miguel, 2007, Cameron et al., 2009, Barr and Serra, 2010). I found that some subjects chose not to maximise their report by reporting 10 yeses but also obviously did not report the truth. These subjects were categorised as partially honest and this group of subjects accounts for the highest share compared to the fully honest and fully dishonest groups in all treatments (see the results in Table 3). In line with Fischbacher and Heusi (2008), the share of the partially honest subject increases when the amount of payoff is increased (see the detail in Figure 5).

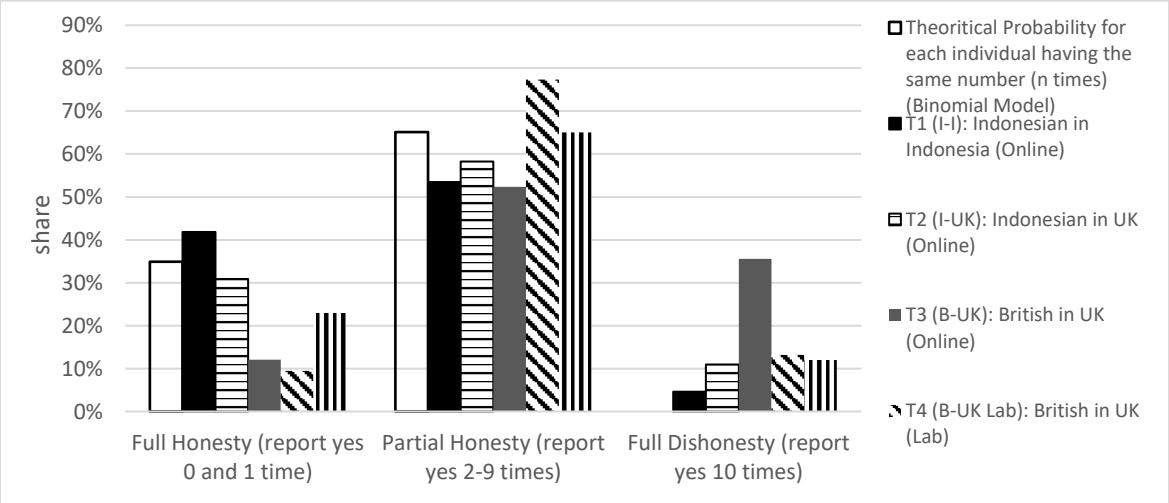


Figure 5 Partial Honesty

	T2 (I-UK)	T3 (B-UK)	T4 (B-UK Lab)	T5 (I-I High)
T1 (I-I)	0.0079	0.0004	0.0000	0.089
T2 (I-UK)		0.3303	0.0049	0.6980
T3 (B-UK)			0.0796	0.2021
T4 (B-UK Lab)				0.0084

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Table 3 P-values of the mean differences of partial honesty

Having said that, I am interested to know how this partially honest act is incorporated by T2 (I-UK). I found that the mean of partial honesty in T2 (I-UK) was significantly larger than T1 (I-I) (Mann-Whitney Test p-value<1%) but has no significant difference compared to T3 (B-UK). This might show the process of adaptation.

This phenomenon of partial honesty can be understood as an act of balancing between maintaining financial reward and positive self-image (Fischbacher and Heusi, 2008; Gächter and Schulz, 2016; Mazar et al., 2008; Shalvi et al., 2011). They explained that besides financial rewards, internal rewards were also an important input when an individual had to choose between honest or dishonest decisions, suggesting a trade-off between financial reward and internal reward. When people choose to lie, they get the financial reward at the cost of their honest self-image. On the other hand, if people choose not to lie, they retain their honest self-image, which is related to self-identity and reputation.

In general, the honesty behaviour of T2 (I-UK) does not entirely converge to the T3 (B-UK) as can be seen that the difference still exists (see Table 2). However, the converging of partial honesty of T2 (I-UK) to the T3 (B-UK) is evidence and can be understood as the result of compromising between the force of nature and nurture. The Indonesians in T2 (I-UK) start to adopt new behaviour that is prevalent in the new environment (nature) but at the same time still maintaining the old one which mainly descent from their parents (nurture).

Perceptions of institutions

The previous literature has found that strong institutions are in line with a high level of intrinsic honesty (Gächter and Schulz, 2016). The results show that although Indonesia has weaker institutions compare to the UK, Indonesian participants reported a smaller number of yeses. I predicted that perceptions of institutions might explain this finding.

As an early indication, I found that the correlation between the Institutions Perception Index and dishonesty was negatively significant (Spearman's rho -0.2, p-value<1%). It shows that a higher (lower) conformity towards strong institutions correlates with a lower (higher) level of dishonesty.

People can live in a strong-institution country but their perceptions towards the institution can also be influenced by a lot of things, such as day-to-day experiences and the news from the media. Hence, perceptions can play a crucial role in explaining the different honesty behaviours among T1 (I-I), T2 (I-UK) and T3 (B-UK).

I analysed the above hypothesis by measuring the subjects' perceptions of institutions. This was done by asking to what extent participants agreed with both formal and informal institutions. There were four questions about informal institutions and five questions about formal institutions.[20] From those questions, I calculated both the informal and the formal rule perception index and the perception institutions index to describe the perceptions towards all the institutions (see Table 4).

Descriptions	T1 (I-I)	T2 (I-UK)	T3 (B-UK)	Diff T1 (I-I) & T2 (I-UK)	Diff T2 (I-UK) & T3 (B-UK)	Sig Diff T1 (I-I) & T2 (I-UK)	Sig Diff T2 (I-UK) & T3 (B-UK)
(1) Not acceptable to jump a queue	1.8	1.8	1.4	0.0	0.4	-	***
(2) Not polite to be late for an appointment	1.4	1.4	1.6	0.0	0.1	-	*
(3) Saying 'please', 'thank you', and 'sorry' is a common practice	1.7	1.7	1.7	0.0	0.1	-	-
(4) It is customary to give your seat to the elderly in the bus/train	1.8	1.8	1.4	0.0	0.4	-	***
Informal Rule Perception Index	1.7	1.7	1.5	0.0	0.2	-	**
(5) Littering is against the law	1.5	1.6	1.4	0.1	0.1	-	*
(6) Plagiarism is unacceptable	1.6	1.8	1.4	0.1	0.4	**	***
(7) Corruption is not acceptable	1.9	1.9	1.5	0.0	0.4	-	***
(8) Everybody should comply with the tax laws	1.6	1.4	1.4	0.1	0.0	-	-
(9) Political fraud is not acceptable	1.7	1.6	1.7	0.1	0.1	-	-
Formal Rule Perception Index	1.7	1.7	1.5	0.0	0.2	-	**
Institutions Perception Index	1.7	1.7	1.5	0.0	0.2	-	***

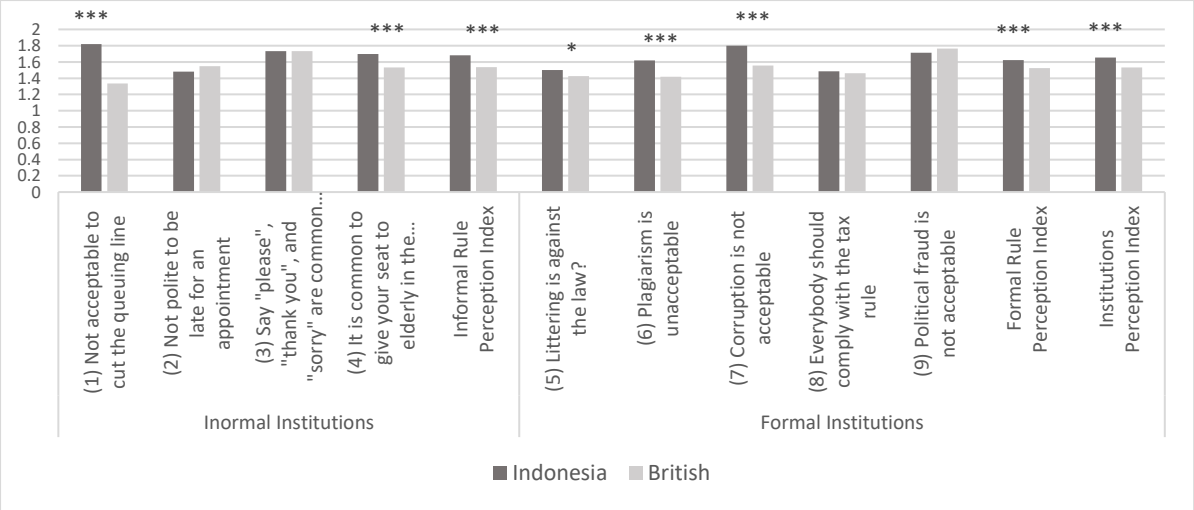
Two-sample Wilcoxon rank-sum (Mann-Whitney) test

* $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$

Table 5 Perceptions of the institutions among the treatment groups

[20] Three of which were taken from Gächter and Schulz's (2016) prevalent rule violation (PRV) index.

This index allowed me to grasp the level of conformity of subjects towards institutions. I assume that, for example, the subject who said, 'strongly agree' to the statement 'littering is against the law', has higher conformity to not littering compared to the subject who said 'strongly disagree'.[21]



Two-sample Wilcoxon rank-sum (Mann-Whitney) test

$^{*}\ p < 0.05,\ ^{**}\ p < 0.01,\ ^{***}\ p < 0.001$

Figure 6 Perceptions of Indonesian and British institutions

Descriptions	T1 (I-I)	T2 (I-UK)	T3 (B-UK)	Diff T1 (I-I) & T2 (I-UK)	Diff T2 (I-UK) & T3 (B-UK)	Sig Diff T1 (I-I) & T2 (I-UK)	Sig Diff T2 (I-UK) & T3 (B-UK)
(1) Not acceptable to jump a queue	1.8	1.8	1.4	0.0	0.4	-	***
(2) Not polite to be late for an appointment	1.4	1.4	1.6	0.0	0.1	-	*
(3) Saying 'please', 'thank you', and 'sorry' is a common practice	1.7	1.7	1.7	0.0	0.1	-	-
(4) It is customary to give your seat to the elderly in the bus/train	1.8	1.8	1.4	0.0	0.4	-	***
Informal Rule Perception Index	1.7	1.7	1.5	0.0	0.2	-	**
(5) Littering is against the law	1.5	1.6	1.4	0.1	0.1	-	*
(6) Plagiarism is unacceptable	1.6	1.8	1.4	0.1	0.4	**	***
(7) Corruption is not acceptable	1.9	1.9	1.5	0.0	0.4	-	***
(8) Everybody should comply with the tax laws	1.6	1.4	1.4	0.1	0.0	-	-
(9) Political fraud is not acceptable	1.7	1.6	1.7	0.1	0.1	-	-
Formal Rule Perception Index	1.7	1.7	1.5	0.0	0.2	-	**
Institutions Perception Index	1.7	1.7	1.5	0.0	0.2	-	***

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

$^{*}\ p < 0.1,\ ^{**}\ p < 0.5,\ ^{***}\ p < 0.01$

Table 5 Perceptions of the institutions among the treatment groups

[21] The Cronbach's alpha test score is 0.8448

These results (Figure 6) indicate that despite Indonesian participants living in a country which has lower quality institutions, they have higher a conformity to higher-quality institutions compared to the British subject. I also found that the difference in institutions perception between the Indonesians and the British is statistically significant (Mann-Whitney Test p-value<1%). This still holds even if the index of institutions is broken down to formal and informal rule institution indices.

I dug further to see the differences of perceptions of institutions among the treatment groups (see Table 5). I wanted to find out whether Indonesian subject who has lived in the UK (T2 I-UK) have shifted their perceptions of institutions closer to the British (T3 B-UK) as the proxy of the adaptation process. The statistical test found that in general there was still a significant difference (a difference in the informal rule perception index and the formal rule perception index: Mann-Whitney Test p-value < 5%, difference in institutional perception index: Mann-Whitney Test p-value <1%).

Despite the level of honesty of T2 (B-UK) getting closer to the British (B-UK), I could not find convincing proof that the adaptation process of T2 (I-UK) had occurred since I still found a significant gap in the perceptions of institutions between the Indonesian who lived in the UK (T2 I-UK) and the British (T3 B-UK). The gap in perceptions of institutions was only getting closer in three ways (the informal rule of saying thank you, the formal rule of tax compliance, and political fraud).

However, such evidence of adaptation is more vivid when one looks at the perceptions of institutions at group level based on their level of honesty (see Figure 5). As has been explained earlier, the game provides the best guess of who is lying, who is not and who is in between. I used this data to further analyse the perception levels of institutions of the participants in T2 (I-UK) based on those three groups. I compared the level of perceptions of institutions for those who belong to the fully honest group, partially honest group and the fully dishonest group, to the average of T1 (I-I) and T3 (B-UK).

Descriptions		Informal Rule Perception Index	Formal Rule Perception Index	Institutions Perception Index
Comparison of T2 (I-UK) for each group of honesty level to the average honesty of T1 (I-I)	Fully Honest to Average T1 (I-I)	0.0	0.1	0.1
	Partially Honest to Average T1 (I-I)	0.0	0.0	0.0
	Fully Dishonest to Average T1 (I-I)	0.2	0.3	0.3
	Sig Fully Honest to Average T1 (I-I)	-	**	-
	Sig Partially Honest to Average T1 (I-I)	-	-	-
	Sig Fully Dishonest to Average T1 (I-I)	**	-	**
Comparison of T2 (I-UK) for each group of honesty level to the average honesty of T3 (B-UK)	Fully Honest to Average T3 (B-UK)	0.2	0.3	0.2
	Partially Honest to Average T3 (B-UK)	0.2	0.2	0.2
	Fully Dishonest to Average T3 (B-UK)	0.0	0.1	0.1
	Sig Fully honest to Average T3 (B-UK)	***	***	***
	Sig Partially Honest to Average T3 (B-UK)	***	***	***
	Sig Fully Dishonest to Average T3 (B-UK)	-	-	-

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

* $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$

Table 6 Difference in perceptions of institutions based on each group's honesty level

I found that the perceptions of institutions by Indonesians in the UK (T2 I-UK) who reported being fully dishonest converged to the level of the British (T3 B-UK). All three indices of perceptions of institutions (formal, informal, and both) show that there is no significant difference between the fully dishonest participants of T2 (I-UK) compared to the average T3 (B-UK) (Mann-Whitney Test p-value>10%). The results also depict how the perceptions of institutions by the fully dishonest participants of T2 (I-UK) moved away from T1 (I-I) (Mann-Whitney Test p-value>10%) indicating the adaptation process. This proof of an adaptation process, however, cannot be found in the fully honest and partially honest participants.

Exposure to information

From here I can highlight that the difference in honesty behaviour between T1 (I-I), T2 (I-UK), and T3 (B-UK) can be explained by the difference in the level of perceptions of institutions. In particular, I found strong evidence that of those Indonesians who stayed in the UK (T2 I-UK), those who reported being fully dishonest converged their level of perceptions of institutions towards the British (T3 B-UK); hence, they reported higher yeses that were closer to the British (T3 B-UK) and moved away from the average Indonesian T1 (I-I) perceptions.

I predict that the perceptions of institutions might be influenced by participants' exposure to information, which can be sourced from online interactions (social media and online news), and offline interactions in daily life. Here, I investigate how subject perception of institutions is correlated with some of those sources of information. Focusing on Indonesians who stayed in the UK (T2 I-UK), I found that

both online and offline interactions had a negative correlation with the perceptions of institutions, except for offline interactions with people from western countries. I found no significant correlation of social media with perceptions of institutions (see Table 7).

Interestingly, I found a correlation if I investigated the data for the level of honesty groups further. While I found no correlation for fully honest subjects, the partially honest subjects' perceptions of institutions correlated with social media as follows: Indonesia (Spearman Rho P-value<5%) and Asia (Spearman Rho P-value<1%). On the other hand, the fully dishonest group's perception of institutions is positively correlated with UK social media and social media from western countries but negatively correlated with reading news about UK and western countries (all Spearman Rho P-value<5%).

	All Subject	Fully honest	Partially honest	Fully Dishonest
Social Media, Indonesia	0.0630	-0.0484	0.2112**	0.1385
Social Media, UK	-0.0882	0.0348	0.1207	0.4611**
Social Media, Asia	0.0392	-0.0776	0.2476***	0.0930
Social Media, West	0.0814	0.0311	0.0820	0.4798**
News Indonesia	-0.1167*	0.1782	0.0324	-0.0306
News UK	-0.1990***	-0.1585	0.1013	-0.4470**
News Asia	-0.2216***	-0.0461	0.0700	-0.2777
News West	-0.1465**	-0.1826	0.7454	-0.4383**
Interactions, Indonesia	-0.1569**	0.0688	0.0138	-0.3553
Interactions, UK	0.0871	0.1484	-0.0200	0.2296
Interactions, Asia	-0.1188*	-0.0989	0.1259	-0.2131
Interactions, West	0.1188*	0.0989	-0.1259	0.2131
General Interaction	-0.0889	0.1506	-0.1288	-0.1754

Spearman Rho. $^{*}\ p < 0.1, ^{**}\ p < 0.5, ^{***}\ p < 0.01$

Table 7 Correlation of the Institutions Perception Index with online information (news, social media (number of friends or account followed on Facebook, Instagram and Twitter)), and offline interactions of T2 (I-UK)

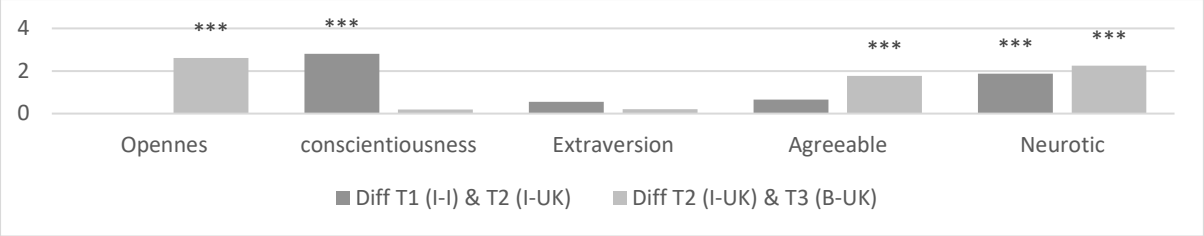
Personality

The above section has provided some evidence of how adaptation has occurred in T2 (I-UK), which is the group of participants who reported being fully dishonest. The previous literature has found that the relationship between adaptation and personality has inconsistent results (Kosic, 2006); hence, this section is not meant to exhaustively investigate the role of personality traits in the adaptation process experienced by T2 (I-UK). This section only highlights some differences in

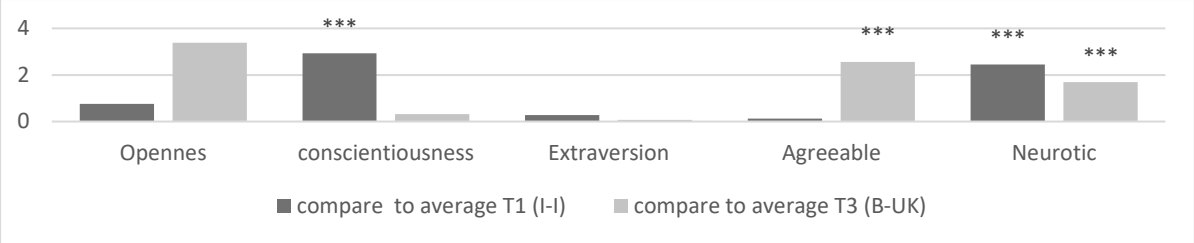
personality traits among participants at the treatment group level based on the level of honesty.

First, I found that Indonesian participants in T1 (I-I) and in T2 (I-UK) on average have the same big five scores except for T2 (I-UK), which has a higher score in conscientiousness[22] and neurotic[23] (Mann-Whitney Test p-value<1%). On the other hand, the participants in T2 (I-UK) in general were significantly more open[24] and agreeable[25] compared to the British T3 (B-UK) but significantly less neurotic (Mann-Whitney Test p-value<1%) (see Figure 7).

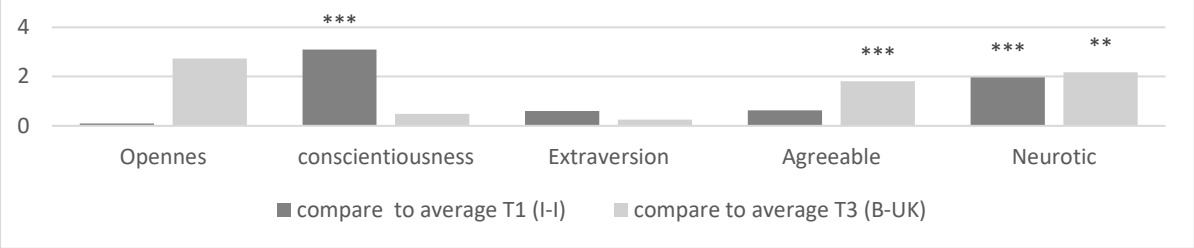
[22] 'Conscientiousness is the tendency to be planful, organized, goal-directed, to delay gratification, and to follow norms and rules' (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009) (Giluk and Postlethwaite, 2015, p. 61).
[23] 'Neurotic individuals have a tendency to experience negative emotional states such as anxiety, guilt, insecurity, and self-pity. Their moods also tend to be volatile and their behavior impulsive' (Giluk and Postlethwaite, 2015, p. 60).
[24] 'Individuals high in openness to experience ''actively seek out experience and are apt to be particularly reflective and thoughtful about the ideas they encounter''(McCrae & Costa, 1997, pp. 829830)' (Giluk and Postlethwaite, 2015, p. 61).
[25] 'Agreeable individuals are likeable, warm, trusting, and concerned with the welfare of others' (Giluk and Postlethwaite, 2015, p. 61).



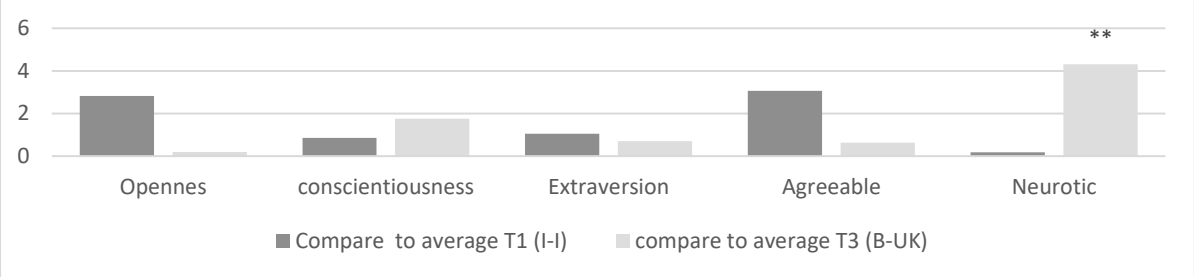
(a) All subjects



(b) Fully honest T2 (I-UK)



(c) Partially honest T2 (I-UK)



(d) Full Dishonest T2 (I-UK)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

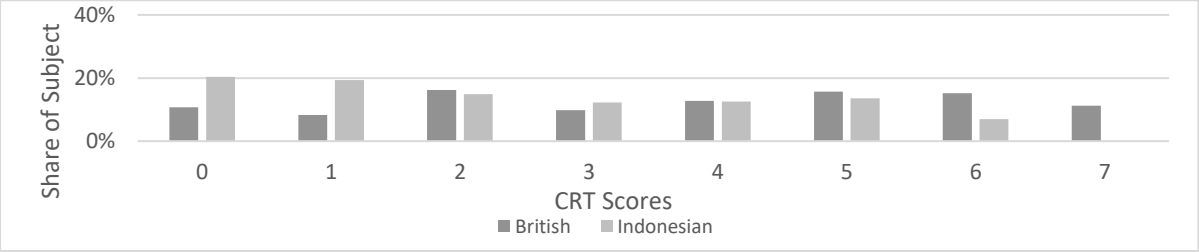
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 7 Difference on personality traits

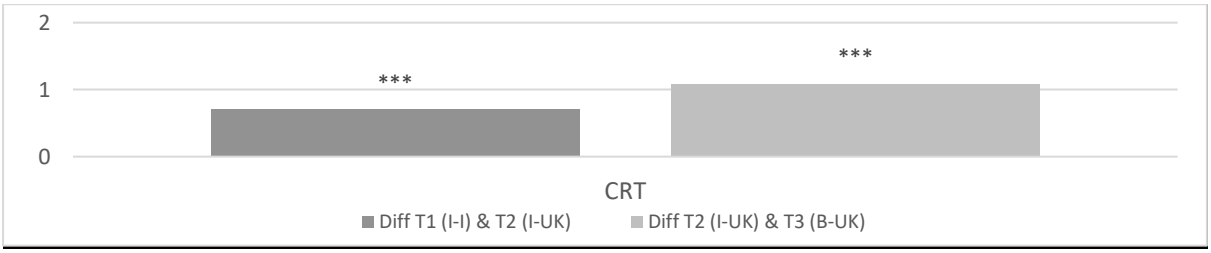
Interestingly, when the participants in T2 (I-UK) are grouped based on their honesty level and compared to T1 (I-I) and T3 (B-UK), I found that those participants in T2 (I-UK) who are fully dishonest had more similar of personalities to the British compared to the fully honest and partially honest group (see Figure 7)

Cognitive abilities

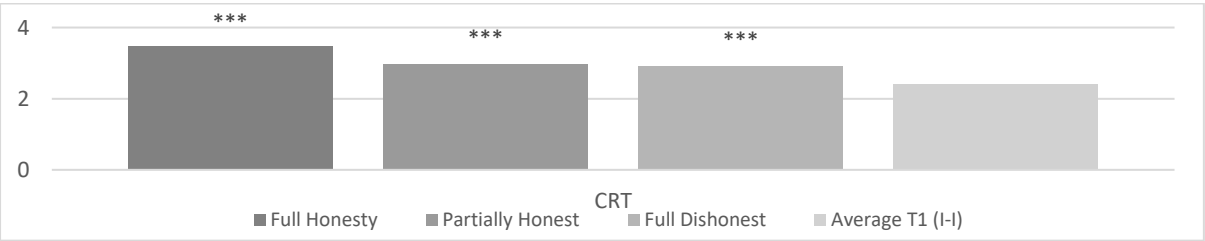
Previous literature found that there is a link between cognitive ability and lie behaviour (Williams, Nathanson and Paulhus, 2010). In this section, I want to look at the difference of cognitive ability among participants and how that correlates with the adaptation process. CRT scores show that the British subjects have a better cognitive ability compared to the Indonesians (the British average CRT score is 3.69, while the Indonesians' is 2.45). I found a significant difference in cognitive ability between T1 (I-I) and T2 (I-UK), T2 (I-UK) and T3 (B-UK) (Mann-Whitney Test p-value<1%) (see Figure 8).



(a) All subjects



(b) Among treatments



(c) Fully honest, partially honest and fully dishonest participants T2 (I-UK) compared to T1 (I-I)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 8 Cognitive differences

Focusing on T2 (I-UK), I investigated further whether cognitive ability differs among participants at group level based on their level of honesty. Comparing each group in T2 (I-UK) based on their honesty level to the average of T1 (I-I), I found the same consistent significant differences (Mann-Whitney Test p-value<1%) (see Figure 8). I also found significant differences in cognitive ability between Indonesians in the UK (T2 I-UK) who were fully honest compared to those who were partially honest (Mann-Whitney Test p-value<10%). I did not find a significant difference in cognitive ability when I compared fully dishonest participants to other participants in T2 (I-UK).

This finding is in line with Williams, Nathanson and Paulhus (2010) that lower cognitive ability correlates to higher dishonesty. In general, I also found this strong correlation exists between T1 (I-I) and T2 (I-UK) (Spearman rho -0.16, p-value<1%), but this result does not hold for the British (T3 B-UK).

Conclusion

This study revisited the long debate on how different institutions affect behaviour. Two competing theories try to explain this phenomenon. The first one is the conformist transmission hypothesis (Bowles, 2004) and the second is the vertical transformation hypothesis (sticky behaviour hypothesis) (Fisman and Miguel, 2007).

This study focusses on how different institutions affect the level of intrinsic honesty by comparing Indonesians who live in Indonesia – as the representative country which has lower quality institutions (T1 I-I) – and Indonesians who live in the UK – as the representative country which has higher quality institutions (T2 B-UK).

I have presented a mind game experiment to understand how institutions affect intrinsic honesty levels. Compared to approaches in the literature, the altered mind game provides several advantages. First, it is designed to avoid complexity; hence, it is easy to replicate and enable it to reduce subject confusion. Second, the manipulated mind game enables the detection of partially honest behaviour. Third, the mind game can also eliminate subjects' risk perceptions of being caught since it is a simple form of decision-making that occurs inside the subjects' minds; thus, there is no possible way to monitor subjects' decisions (Jiang, 2013).

How institutions affect intrinsic honesty is more complex than the previous literature has argued. For example, an experiment within 23 countries by Gächter and Schulz (2016) found conclusive evidence that individuals who live in stronger institutions country are more honest compared to individuals in weaker institutions country. I found that this does not hold when I compared Indonesians (T1 I-I and T2 I-UK) and the British (T3 B-UK) via the mind game.

Unlike Gächter and Schulz (2016), I found a counterintuitive result that the honesty level of individuals who live in countries with stronger quality institutions are lower compared to individuals who live in countries with lower quality institutions. The honesty level of the British (T3) is lower compare to Indonesians who live in Indonesia T1 (I-I) and Indonesians who live in the UK T2 (I-UK). This is true even if the payoff for Indonesians is tripled (T5 I-I High).

It might be the case that although people live in stronger institution countries, they do not internalise such an environment in their behaviour and beliefs since

such strong institutions are not clearly reflected in society and day-to-day life. Hence, there is a gap between strong institutions and the perceptions that people have towards these institutions. This might explain why the honesty level of the British (T3) is lower compared to Indonesians (T1 (I-I) and T2 I-UK).

The investigation of the institution's perception index clarifies the prediction that although the British live in a country which has a higher quality of institutions, their institutions' perception index is lower compare to the Indonesians. This indicates that the British participants' conformity to strong institutions is lower. This difference is also true if one goes further and investigates perceptions of both formal and informal institutions.

I found that the conformist transmission hypothesis (Bowles, 2004) explains the degradation of the honesty behaviour of Indonesians who live in the UK (T2 I-UK). On average, the T2 (I-UK) claims more yeses compared to the T1 (I-I) but is still lower compared to T3 (B-UK). I found that participants in T2 (I-UK) merged their perceptions of institutions with the British and move away from the Indonesian average. Their conformity with strong institutions became lower than the average Indonesian. This can be perceived as an adaptation process that was experienced by the T2 (I-UK). However, it is found in the fully dishonest group of T2 (I-UK) only and no evidence was found for the other two groups of T2 (I-UK) – the fully honest and the partially honest groups.

In addition to that, the adaptation process that is found in the dishonest group of T2 (I-UK) might also be explained them having similar personality traits to the British in four aspects: openness, conscientiousness, extraversion and agreeableness. The difference only exists in neurotic aspects.

Often perceptions differ from reality because of misinformation. I found that the perceptions of institutions were significantly correlated with some sources of information such as online and offline sources. In particular, among the dishonest participants in T2 (I-UK), I found that their exposure to the news from the UK was negatively correlated to their perceptions of institutions.

Current research shows that an understanding of how institutions affect behaviour needs to be taken into account an understanding of the perceptions of the institutions themselves. With the current development of online information platforms, perception can be misguided by wrong information, thereby creating

perception bias. Someone who lives in a strong institutions country which upholds fairness and equality for their citizens might easily have a negative perception of institutions due to the wrong information. This opens a huge question about whether there should be a global information governance.

In the case of the Indonesians T1 (I-I), they reported fewer yeses compared to the British and they also had a higher perception index of institutions. I could not find evidence of sources of information correlating with their perceptions of institutions. However, the ongoing institutional improvement that has happened in Indonesia might influence Indonesians' behaviour and beliefs, making them become more honest. In a corruption experiment, Cameron et al. (2009) found an unexpected result that Indonesians were less tolerant of corruption compared to people in Singapore. They argue that institutional change might have an influence on people's perception of corruption. This argument is consistent with the increasing scores of the corruption perception index in the last five years.

This justification needs further investigation. The current experimental studies use the sample of Indonesian and British students. Although the process of recruitment is random, the representativeness of the sample might have limitation. This study should not be generalized as Indonesian and British people as a whole. There is also another concern about whether this finding can still be valid if a different country other than the UK is used. The future direction of research might want to incorporate the honesty behaviour of Indonesian in various countries. This could clarify whether the perceptions of institutions also matter in shaping honesty behaviour in another institutional setting. Understanding how the uniqueness of Indonesia in terms of ethnicity and religion open a wider discussion of the determinant of honesty behaviour that is not yet discussed in this paper.

Supplementary Materials

Appendix I: Instructions and questions

Start of Block: INTRODUCTION

Welcome to the online experiment!

Please read carefully.

You will be asked to answer some questions. It will take approximately 20 minutes. You will receive money after completing this survey. The money that you receive will depend on the decisions that you make. You will be asked to provide an email address that links to a PayPal account through which the money will be transferred. You can COMPLETE THIS EXPERIMENT ONLY ONCE and ONLY FINISH participation will be paid. Any additional attempts will not be counted. If you have any questions regarding this study, please send email to lury.sofyan@nottingham.ac.uk

By choosing option yes below, you confirm that:1. You are the person whose name is registered in this experiment2. You have read and understood the information of the study. You have had the opportunity to ask questions and have had these answered satisfactorily;3. You understand that your participation is voluntary and you are free to withdraw at any time, without giving any reason, without medical care or legal rights being affected.4. You agree to take part in this study.

- ❍ Yes
- ❍ No

Please click continue.

End of Block: INTRODUCTION

Start of Block: CeDex Attendance

We need to keep a record of which participant who fails to join the experiment. Please input your student ID as a proof of your participation.

_____

End of Block: CeDex Attendance

Start of Block: Part 1: started

-PART I-

In this part, you will be asked to think of an integer number from 0 to 9. Once you have thought about the number, the computer will randomly choose an integer number from 0 to 9 and this number will be shown on the screen. If the number you have in mind is the same than the number displayed on the screen, then you will have to click 'YES' and you will receive £0.50. If the number you have in mind is NOT the same than the number displayed on the screen, then you will have to click 'NO' and you will receive £0. You will play this game 10 times. In each of repetition, you are free to think a different integer number as long as it is from 0 to 9. Your total payoff will be determined by the sum of your earnings in all 10 repetitions.

End of Block: Part 1: started

Start of Block: m1-q

(1) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m1-q

Start of Block: m1-a

(1) The computer has randomly chosen this number: **${rand://int/0:9}** Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m1-a

Start of Block: m2-q

(2) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m2-q

Start of Block: m2-a

(2) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m2-a

Start of Block: m3-q

(3) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m3-q

Start of Block: m3-a

(3) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m3-a

Start of Block: m4-q

(4) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m4-q

Start of Block: m4-a

(4) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m4-a

Start of Block: m5-q

(5) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m5-q

Start of Block: m5-a



(5) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m5-a

Start of Block: m6-q

(6) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m6-q

Start of Block: m6-a



(6) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m6-a

Start of Block: m7-q

(7) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m7-q

Start of Block: m7-a



(7) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m7-a

Start of Block: m8-q

(8) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m8-q

Start of Block: m8-a

(8) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m8-a

Start of Block: m9-q

(9) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m9-q

Start of Block: m9-a

(9) The computer has randomly chosen this number: ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m9-a

Start of Block: m10-q

(10) Think of a number from 0 to 9!
Please continue when you are ready!

End of Block: m10-q

Start of Block: m10-a

(10) The computer has randomly chosen this number ${rand://int/0:9} Is this the same number that you thought of?

- Yes (You will get £0.50)
- No (You will get £0)

End of Block: m10-a

Start of Block: Part II - British Q

-PART II-

Please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
1. Littering is against the law	❍	❍	❍	❍	❍
2. It is not acceptable to cut the queuing line	❍	❍	❍	❍	❍
3. It is not polite to be late for an appointment	❍	❍	❍	❍	❍
4. Say "please", "thank you", and "sorry" are common practices in daily conversations and interactions	❍	❍	❍	❍	❍
5. It is common to give your seat to elderly in the bus/train	❍	❍	❍	❍	❍
6. Corruption is not acceptable	❍	❍	❍	❍	❍
7. Everybody should comply with the tax rule	❍	❍	❍	❍	❍
8. Political fraud is not acceptable	❍	❍	❍	❍	❍
9. I understand the day to day rules and culture in the UK	❍	❍	❍	❍	❍
10. I will move to a different country in the next 3 years	❍	❍	❍	❍	❍
11. I am happy to live where I am now	❍	❍	❍	❍	❍
12. Plagiarism is unacceptable	❍	❍	❍	❍	❍

End of Block: Part II - British Q

Start of Block: PART III - 7 questions

-PART III-

Please answer the following question carefully:

A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?

_____

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

_____

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

_____

If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how long would it take them to drink one barrel of water together?

_____

Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are in the class?

_____

A man buys a pig for £60, sells it for £70, buys it back for £80, and sells it finally for £90. How much has he made?

_____

Simon decided to invest £8,000 in the stock market one day early in 2008. Six months after he invested, on July 17, the stocks he had purchased were down 50%. Fortunately for Simon, from July 17 to October 17, the stocks he had purchased went up 75%. At this point, Simon has:

- Broken even in the stock market
- Ahead of where he began
- Lost money

End of Block: PART III - 7 questions

Start of Block: PART IV - big5

-Part IV-

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
1. Is talkative	❍	❍	❍	❍	❍
2. Tends to find fault with others	❍	❍	❍	❍	❍
3. Does a thorough job	❍	❍	❍	❍	❍
4. Is depressed, blue	❍	❍	❍	❍	❍
5. Is original, comes up with new ideas	❍	❍	❍	❍	❍
6. Is reserved	❍	❍	❍	❍	❍
7. Is helpful and unselfish with others	❍	❍	❍	❍	❍
8. Can be somewhat careless	❍	❍	❍	❍	❍
9. Is relaxed, handles stress well	❍	❍	❍	❍	❍
10. Is curious about many different things	❍	❍	❍	❍	❍
11. Is full of energy	❍	❍	❍	❍	❍

End of Block: PART IV - big5

Start of Block: Big5 - 1

-Part IV-

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you

are someone who likes to spend time with others? Please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
12. Starts quarrels with others	❍	❍	❍	❍	❍
13. Is a reliable worker	❍	❍	❍	❍	❍
14. Can be tense	❍	❍	❍	❍	❍
15. Is ingenious, a deep thinker	❍	❍	❍	❍	❍
16. Generates a lot of enthusiasm	❍	❍	❍	❍	❍
17. Has a forgiving nature	❍	❍	❍	❍	❍
18. Tends to be disorganised	❍	❍	❍	❍	❍
19. Worries a lot	❍	❍	❍	❍	❍
20. Has an active imagination	❍	❍	❍	❍	❍
21. Tends to be quiet	❍	❍	❍	❍	❍
22. Is generally trusting	❍	❍	❍	❍	❍

End of Block: Big5 - 1

Start of Block: Big5 - 2

-Part IV-
Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
23. Tends to be lazy	❍	❍	❍	❍	❍
24. Is emotionally stable, not easily upset	❍	❍	❍	❍	❍
25. Is inventive	❍	❍	❍	❍	❍
26. Has an assertive personality	❍	❍	❍	❍	❍
27. Can be cold and aloof	❍	❍	❍	❍	❍
28. Perseveres until the task is finished	❍	❍	❍	❍	❍
29. Can be moody	❍	❍	❍	❍	❍
30. Values artistic, aesthetic experiences	❍	❍	❍	❍	❍
31. Is sometimes shy, inhibited	❍	❍	❍	❍	❍
32. Is considerate and kind to almost everyone	❍	❍	❍	❍	❍
33. Does things efficiently	❍	❍	❍	❍	❍

End of Block: Big5 - 2

Start of Block: big5 - 3

-Part IV-

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
34. Remains calm in tense situations	❍	❍	❍	❍	❍
35. Prefers work that is routine	❍	❍	❍	❍	❍
36. Is outgoing, sociable	❍	❍	❍	❍	❍
37. Is sometimes rude to others	❍	❍	❍	❍	❍
38. Makes plans and follows through with them	❍	❍	❍	❍	❍
39. Gets nervous easily	❍	❍	❍	❍	❍
40. Likes to reflect, play with ideas	❍	❍	❍	❍	❍
41. Has few artistic interests	❍	❍	❍	❍	❍
42. Likes to cooperate with others	❍	❍	❍	❍	❍
43. Is easily distracted	❍	❍	❍	❍	❍
44. Is sophisticated in art, music, or literature	❍	❍	❍	❍	❍

End of Block: big5 - 3

Start of Block: PART V - General

-PART V-

Please answer the following questions carefully:

What is your year of birth?

_____

What is your gender?

- ❍ Male
- ❍ Female

What is your marital status?

- ❍ Single, never married
- ❍ Married
- ❍ Cohabiting (not married)
- ❍ Widowed
- ❍ Divorced
- ❍ Separated

How many children do you have?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ More than 3



What is your belief (religion)?

- ❍ Islam
- ❍ Christianism
- ❍ Catholicism
- ❍ Buddhism
- ❍ Hinduism
- ❍ Confucianism
- ❍ Atheist
- ❍ Other (please specify) _____



How often do you practice your faith?

- ❍ Never
- ❍ Once a year
- ❍ Twice a year
- ❍ Several times a year
- ❍ About once a month
- ❍ Every week
- ❍ Several times a week
- ❍ Everyday



How religious would you describe yourself?

- ❍ extremely non-religious
- ❍ very non-religious
- ❍ fairly non-religious
- ❍ neither religious nor non-religious
- ❍ fairly religious
- ❍ very religious
- ❍ extremely religious



Please specify your ethnicity.

- ❍ White
- ❍ Hispanic or Latino
- ❍ Black or African American
- ❍ Native American or American Indian
- ❍ Asian / Pacific Islander
- ❍ Other



The highest level of education completed?

- ❍ Less than a High School degree
- ❍ High School diploma
- ❍ Vocational training
- ❍ Attended college
- ❍ Bachelor's degree
- ❍ Master degree
- ❍ Doctoral Degree
- ❍ Unknown

How long have you been living in the UK?

- ❍ Year _____
- ❍ Number of months _____

Please specify your UK postcode where you currently reside?

_____

Please specify your UK postcode where you spend most of your life?

_____

How often have you travelled abroad?

- ❍ Ones
- ❍ Two to Five times
- ❍ Five to Ten times
- ❍ More than Ten times
- ❍ Never

Have you ever lived abroad?

- ❍ Yes
- ❍ No

Display This Question:
If Have you ever lived abroad? = Yes

Please select below the country in which you have lived the longest period of time (outside of the UK)

▼ Afghanistan ... Zimbabwe

Display This Question:
If Have you ever lived abroad? = Yes

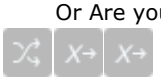
How long did you live in that country?

- ❍ 0 - 3 months
- ❍ Above 3 months - 6 months
- ❍ Above 6 months - 1 year
- ❍ above 1 year - 2 years
- ❍ Above 2 years - 5 years
- ❍ Above 5 years - 10 years
- ❍ More than 10 years

Are you currently…?

- ❍ Employed for wages
- ❍ Self-employed
- ❍ Out of work and looking for work
- ❍ Out of work but not currently looking for work
- ❍ A homemaker
- ❍ A student
- ❍ Military
- ❍ Retired
- ❍ Unable to work

Display This Question:
If Are you currently…? = Employed for wages
Or Are you currently…? = Self-employed



Where are you employed?

- PRIVATE-FOR-PROFIT company, business or individual, for wages, salary or commissions
- PRIVATE-NOT-FOR-PROFIT, tax-exempt, or charitable organization
- Local GOVERNMENT employee (city, county, etc.)
- State GOVERNMENT employee;
- SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm
- SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm
- Working WITHOUT PAY in family business or farm

Display This Question:
If Are you currently…? = Employed for wages



How many employees work in your company/institution?

- 1-4
- 5-9
- 10-19
- 20-49
- 50-99
- 100-249
- 250-499
- 500-999
- 1000 or more

Display This Question:
If Are you currently…? = A student

What is your area of study?

- ❍ Agriculture/Environmental Studies
- ❍ Architecture
- ❍ Business
- ❍ Communications/journalism
- ❍ Education
- ❍ Engineering/computer science
- ❍ General Studies
- ❍ Health sciences
- ❍ Humanities
- ❍ Law
- ❍ Military/naval science
- ❍ Performing and Fine Arts
- ❍ Science/Math
- ❍ Social sciences/psychology
- ❍ Other

End of Block: PART V - General

Start of Block: PART V Politic & Peer exposure

When it comes to politics do you usually think of yourself as:

- ❍ extremely liberal
- ❍ liberal
- ❍ slightly liberal
- ❍ moderate or middle of the road
- ❍ slightly conservative
- ❍ conservative
- ❍ extremely conservative
- ❍ I haven't thought much about this

Please state your opinion of the following:

	Very unfavourable	Mostly unfavourable	Mostly favourable	Very favourable
Free market	❍	❍	❍	❍
Capitalism	❍	❍	❍	❍
Socialism	❍	❍	❍	❍
Government managed	❍	❍	❍	❍

Approximately, how many hours a day you spend on average interacting with other people?

▼ 1 ... 24

Considering the time you spend interacting with other people, what percentage you spend with people from the following countries? (Total must be 100)

China : _____
India : _____
Indonesia : _____
Europe : _____
UK : _____
US : _____
Other Asians : _____
Others : _____

Total : _____

How many friends you have/follow in the following? Input 0 if you don't have the account.

	Number:
Facebook	……
Twitter	……
Instagram	……

Display This Question:
If How many friends you have/follow in the following? Input 0 if you don't have the account. Facebook - Number: Is Greater Than 0



Approximately, what percentage of your Facebook friends are from the following countries? (the total percentage must be 100)

China : _____
India : _____
Indonesia : _____
Europe : _____
UK : _____
US : _____
Other Asians : _____
Others : _____

Total : _____

Display This Question:
If How many friends you have/follow in the following? Input 0 if you don't have the account. Twitter - Number: Is Greater Than 0



Approximately, what percentage of Twitter accounts you follow are from the following countries? (the total percentage must be 100)

China : _____
India : _____
Indonesia : _____
Europe : _____
UK : _____
US : _____
Other Asians : _____
Others : _____

Total : _____

Display This Question:
If How many friends you have/follow in the following? Input 0 if you don't have the account. Instagram - Number: Is Greater Than 0



Approximately, what percentage of Instagram accounts you follow are from the following countries? (the total percentage must be 100)

China : _____
India : _____
Indonesia : _____
Europe : _____
UK : _____
US : _____
Other Asians : _____
Others : _____

Total : _____



Approximately, how often do you read news about the following countries?

	Always	Often	Quite often	Sometimes	Never
China	❍	❍	❍	❍	❍
India	❍	❍	❍	❍	❍
Indonesia	❍	❍	❍	❍	❍
Europe	❍	❍	❍	❍	❍
UK	❍	❍	❍	❍	❍
US	❍	❍	❍	❍	❍
Other Asians	❍	❍	❍	❍	❍
Others	❍	❍	❍	❍	❍

Please indicate your last year annual income (before taxes):

- ❍ Less than £10,000
- ❍ £10,000 to £11,999
- ❍ £12,000 to £13,999
- ❍ £14,000 to £15,999
- ❍ £16,000 to £17,999
- ❍ £18,000 to £19,999
- ❍ £20,000 to £21,999
- ❍ £22,000 to £23,999
- ❍ £24,000 to £25,999
- ❍ £26,000 to £ 27,999
- ❍ £28,000 to £ 29,999
- ❍ £30,000 or more

End of Block: PART V Politic & Peer exposure

Start of Block: Payment

Your total earnings are £${ (q://QID61/SelectedChoicesRecode + q://QID71/SelectedChoicesRecode + q://QID62/SelectedChoicesRecode + q://QID39/SelectedChoicesRecode + q://QID64/SelectedChoicesRecode + q://QID74/SelectedChoicesRecode + q://QID77/SelectedChoicesRecode + q://QID79/SelectedChoicesRecode + q://QID81/SelectedChoicesRecode + q://QID83/SelectedChoicesRecode) / 2 }

For your payment, **please provide below your email address that links to your PayPal account**.

Please note that your email address will be deleted after the money has been transferred.

_____

Please verify your email address:

_____

Please continue to the last part of the survey.

End of Block: Payment

Appendix II: Data Library

Variable Names	Description	Source
t	Treatment Code (1: Indonesian in Indonesia (I-I), 2: Indonesian in Indonesia with high stake (I-I_High), 3: Indonesian in UK (I-UK), 4: British in UK using lab experiment (B-UK Lab), 5: British in UK (B-UK)	Survey
Nat	Nationality (0=Indonesian, 1=British)	
I-1	1st answer to mind game question	Survey
I-2	2nd answer to mind game question	Survey
I-3	3rd answer to mind game question	Survey
I-4	4th answer to mind game question	Survey
I-5	5th answer to mind game question	Survey
I-6	6th answer to mind game question	Survey
I-7	7th answer to mind game question	Survey
I-8	8th answer to mind game question	Survey
I-9	9th answer to mind game question	Survey
I-10	10th answer to mind game question	Survey
number_yes	Number of "yes" answer	Survey
Honesty_level	0=Full Honest (define by zero Yes), 1=Lie in disguise (define by 1 to 9 Yes), 2=Homo economicus or full dishonest (define by 10 Yes)	Survey
Crime_ City_3items	Crime rate related to 3 items: Burglary in a dwelling, Robbery, Violence against the person – with injury. Based on three-year rolling average of crime per 1,000 population.	https://www.thecompleteuniversityguide.co.uk/preparing-to-go/staying-safe-at-university/how-safe-is-your-city/
UK_Crime_street_total		https://www.police.uk
UK_Avg_Crime_Postcode		Crime per Postcode (except Scotland): https://www.checkmystreet.co.uk/indepth/crimerate/ Crime rate calculation: http://ukcrimestats.com/blog/faqs/ for aberdeen: https://crime-statistics.co.uk/Postcode/Archive/AB24%203RY
CRT	Cognitive Reflection Test	Survey
Big5_O	Openness to experience	Survey
Big5_C	Conscientiousness	Survey
Big5_E	Extraversion	Survey
Big5_A	Agreeableness	Survey
Big5_N	Neuroticism	Survey
Highest Big5	http://onlinelibrary.wiley.com/doi/10.1002/9781118638279.app1/pdf 0=1, c=2, e=3, a=4, n=5	Survey
Lowest Big5	http://onlinelibrary.wiley.com/doi/10.1002/9781118638279.app1/pdf 0=1, c=2, e=3, a=4, n=5	Survey
Ins_Throw_Rubish	-2,-1,0,1,2 : strongly disagree, Disagree a little, neither agree nor disagree, Agree a little, Strongly agree	Survey

Ins_Queue	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Ins_Late		Survey
Ins_Say_Thanks		Survey
Ins_Give_seat		Survey
Ins_Corruption_Unacceptable		Survey
Ins_Should_pay_tax		Survey
Ins_Polfraud_Unacceptable		Survey
Ins_Understand_dailyculture		Survey
Move_abroad		Survey
Happyincurrent country		Survey
InsPlagiarisme_unacceptable		Survey
ins_perception	gen ins_perception=Ins_Throw_Rubish + Ins_Queue + Ins_Late + Ins_Say_Thanks + Ins_Give_seat + Ins_Corruption_Unacceptable + Ins_Should_pay_tax + Ins_Polfraud_Unacceptable + Ins_Plagiarisme_unacceptable	
Gen_Age	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Gender	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Marital	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_NoChildren	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Religion	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_oftenpray	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_levelofreligiolity	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Etnic	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Prov_origin	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Educationlevel	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_yearspendinUK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_yearspendinUK_grouping5	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_yearspendinUK_grouping3	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_timeswhenabroad	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_live_abroad	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_country_lived_abroad	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_how_long_liveabroad	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Occupation	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_employer	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_N0Employee	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_major	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Politic_view	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_market	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Capitalist	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey

Gen_Socialist	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_gov_rule	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_intertaction_time	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_china	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_India	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_Indonesia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_Europe	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_UK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_US	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_OtherAsia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Interact_Others	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_Friends	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_twitter_Follow	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_instag_Follow	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_China	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_India	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_Indonesia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_Europe	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_UK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_US	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_OtherAsia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_FB_Others	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_China	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_India	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_Indonesia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_Europe	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_UK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_US	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_OtherAsia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Tw_Others	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_China	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_India	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_Indonesia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_Europe	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_UK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_US	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Insta_OtherAsia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey

Gen_Insta_Others	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_China	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_India	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_Indonesia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_Europe	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_UK	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_US	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_OtherAsia	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_readnews_Others	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Gen_Income	See more detail in Supplementary Materials Appendix I: Instructions and questions	Survey
Index_provcorrupt_F	Index Corruption per Province	Index Corruption per Province
Index_provGrat_KPK	KPK Index Gratification Per Province	KPK Index Gratification Per Province
Index_provCorrupt_KPK	KPK Index Corruption Per Province	KPK Index Corruption Per Province
Index_GovInstQual	Index Government and Institution Quality per Province	Indonesia Provincial Competitiveness Ranking and Score: Sub-environment 2: Government and Institutional Setting (Asia competitiveness institute (ACI) :https://lkyspp.nus.edu.sg/aci)
CrR_ASocBehav	Crime rate per hectare: Anti-Social Behaviour	https://ukcrimestats.com/
CrR_Burglary	Crime rate per hectare: Burglary	https://ukcrimestats.com/
CrR_Rob	Crime rate per hectare: Robbery	https://ukcrimestats.com/
CrR_Vehicle	Crime rate per hectare: Vehicle Crimes	https://ukcrimestats.com/
CrR_Violent	Crime rate per hectare: Violent Crimes	https://ukcrimestats.com/
CrR_PubDisorderWeap	Crime rate per hectare: Public Disorder and Weapons	https://ukcrimestats.com/
CrR_Shoplift	Crime rate per hectare: Shoplifting	https://ukcrimestats.com/
CrR_CrimDamArson	Crime rate per hectare: Criminal Damage and Arson	https://ukcrimestats.com/
CrR__OtherTheft	Crime rate per hectare: Other Theft	https://ukcrimestats.com/
CrR_Drugs	Crime rate per hectare: Drugs	https://ukcrimestats.com/
CrR_OtherCr	Crime rate per hectare: Other Crimes	https://ukcrimestats.com/
CrR_BikeTheft	Crime rate per hectare: Bike Theft	https://ukcrimestats.com/
CrR_Weap	Crime rate per hectare: Weapons Possession	https://ukcrimestats.com/
CrR_Order	Crime rate per hectare: Order	https://ukcrimestats.com/
CrR_TheftFromPerson	Crime rate per hectare: Theft from Person	https://ukcrimestats.com/
CrR_Total Crime and ASB	Crime rate per hectare: Total Crime and Anti-social behaviour	https://ukcrimestats.com/
Propertysold_Num	Number of property sold (From Jan 2013 to Jan 2018)	https://ukcrimestats.com/
Propertysold_avgP	Average price of property sold (From Jan 2013 to Jan 2018)	https://ukcrimestats.com/
Index_MulDep_Rank	Index of Multiple Deprivation Rank 2015:The Indices of Deprivation 2015 provide a set of relative measures of deprivation for small areas (Lower-layer Super Output Areas*) across England, based on seven domains of deprivation (• Income Deprivation (22.5%) •	http://imd-by-postcode.opendatacommunities.org/

	Employment Deprivation (22.5%) • Education, Skills and Training Deprivation (13.5%) • Health Deprivation and Disability (13.5%) • Crime (9.3%) • Barriers to Housing and Services (9.3%) • Living Environment Deprivation (9.3%))	
Inc_Rank	Index of Multiple Deprivation Rank 2015: Income Rank	http://imd-by-postcode.opendatacommunities.org/
Inc_Score	Index of Multiple Deprivation Rank 2015: Income Score	http://imd-by-postcode.opendatacommunities.org/
Employ_Score	Index of Multiple Deprivation Rank 2015: Employment Score	http://imd-by-postcode.opendatacommunities.org/
EduSkill_R	Index of Multiple Deprivation Rank 2015: Education & Skills Rank	http://imd-by-postcode.opendatacommunities.org/
HealthDisability_R	Index of Multiple Deprivation Rank 2015: Health and Disability Rank	http://imd-by-postcode.opendatacommunities.org/
Crime_Rank	Index of Multiple Deprivation Rank 2015: Crime Rank	http://imd-by-postcode.opendatacommunities.org/
Barriersto_HousServ_R	Index of Multiple Deprivation Rank 2015: Barriers to Housing and Services Rank	http://imd-by-postcode.opendatacommunities.org/
Liv_Env_R	Index of Multiple Deprivation Rank 2015: Living Environment Rank	http://imd-by-postcode.opendatacommunities.org/
IDACI_Score	Index of Multiple Deprivation Rank 2015: IDACI Score: The Income Deprivation Affecting Children Index	http://imd-by-postcode.opendatacommunities.org/
IDAOPI_Score	Index of Multiple Deprivation Rank 2015: IDAOPI Score: The Income Deprivation Affecting Older People Index	http://imd-by-postcode.opendatacommunities.org/

Appendix III: Data Summary

Indonesian Students Sample Outlook
Origin of Province

Province Name	Share of subjects
Jawa Barat	23%
DKI Jakarta	22%
Jawa Tengah	11%
Jawa Timur	10%
Banten	8%
Daerah Istimewa Yogjakarta	6%
Sulawesi Selatan	3%
Sumatera Utara	3%
Sumatera Barat	2%
Riau	2%
Sumatera Selatan	2%
Nangro Aceh Darussalam	1%
Jambi	1%
Sulawesi Tenggara	1%
Kalimantan Timur	1%
Nusa Tenggara Barat	1%
Nusa Tenggara Timur	1%
Kalimantan Selatan	1%
Others (11 Provinces: Kepulauan Riau, Bali, Kalimantan Barat, Sulawesi Tengah, Bangka Belitung, Bengkulu, Lampung, Sulawesi Utara, Sulawesi Barat, Maluku Utara, Papua)	3%

Table 8: T1 Origin of Province

Ethnicity
Our sample consists of 28 major ethnics in Indonesia out of 34.

Ethnicity	Share of Subjects
Jawa	46%
Sunda	12%
Batak	7%
Minangkabau	7%
Betawi	3%
Tionghoa	3%

Bugis	3%
Memilih untuk tidak menjawab	2%
Suku asal Sumatera Selatan	2%
Melayu	2%
Makasar	2%
Suku asal Aceh	2%
Suku asal Lampung	1%
Suku asal Sulawesi lainnya	1%
Bali	1%
Banjar	1%
Suku asal sumatera lainnya	1%
Suku asal Jambi	1%
Cirebon	1%
Madura	1%
Suku asal Nusa Tenggara Timur	1%
Others (7 ethnics: Sasak, Suku Nusa Tenggara Barat Lainnya, Suku asal Maluku, Suku asal Banten, Dayak, Suku asal Kalimantan lainnya, Minahasa)	2%

Table 9: T1 Ethnicity

Living City in the UK

No	City	Number of Subjects
1	Nottingham	32
2	Birmingham	24
3	London	21
4	Leeds	19
5	Manchester	15
6	Aberdeen	11
7	Bristol	8
8	Leicester	6
9	Edinburgh	5
10	Lancaster	5
11	Newcastle	5
12	Portsmouth	5
13	Sheffield	5
14	Colchester	4

15	Liverpool	4
16	Oxford	4
17	Bedford	3
18	Southampton	3
19	Belfast	2
20	Cardiff	2
21	Coventry	2
22	Derby	2
23	Glasgow	2
24	Bath	1
25	Cambridge	1
26	Canterbury	1
27	Cheshire East	1
28	Durham	1
29	Exeter	1
30	Gloucester	1
31	Huddersfield	1
32	Liverpool	1
33	Norwich	1
34	Reading	1
35	York	1

Indonesians who live in the UK are distributed in the following UK Map:



Table 10: T2 Living City in The UK

Age

Outliers

Some subjects have the age that is moving away from the average distributions and considered as outliers such as shown in Figure **9** Outliers below. Excluding the outliers, however, do not change the p-value of our estimation.

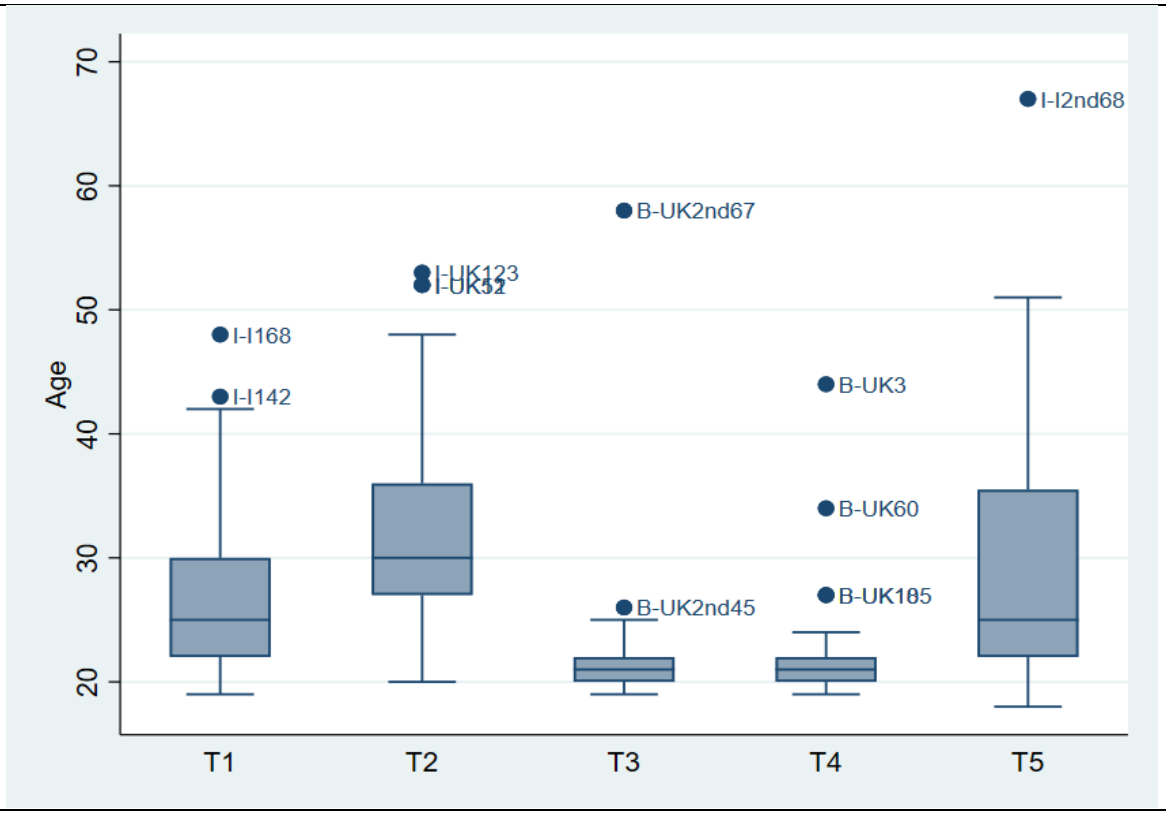


Figure 9 Outliers

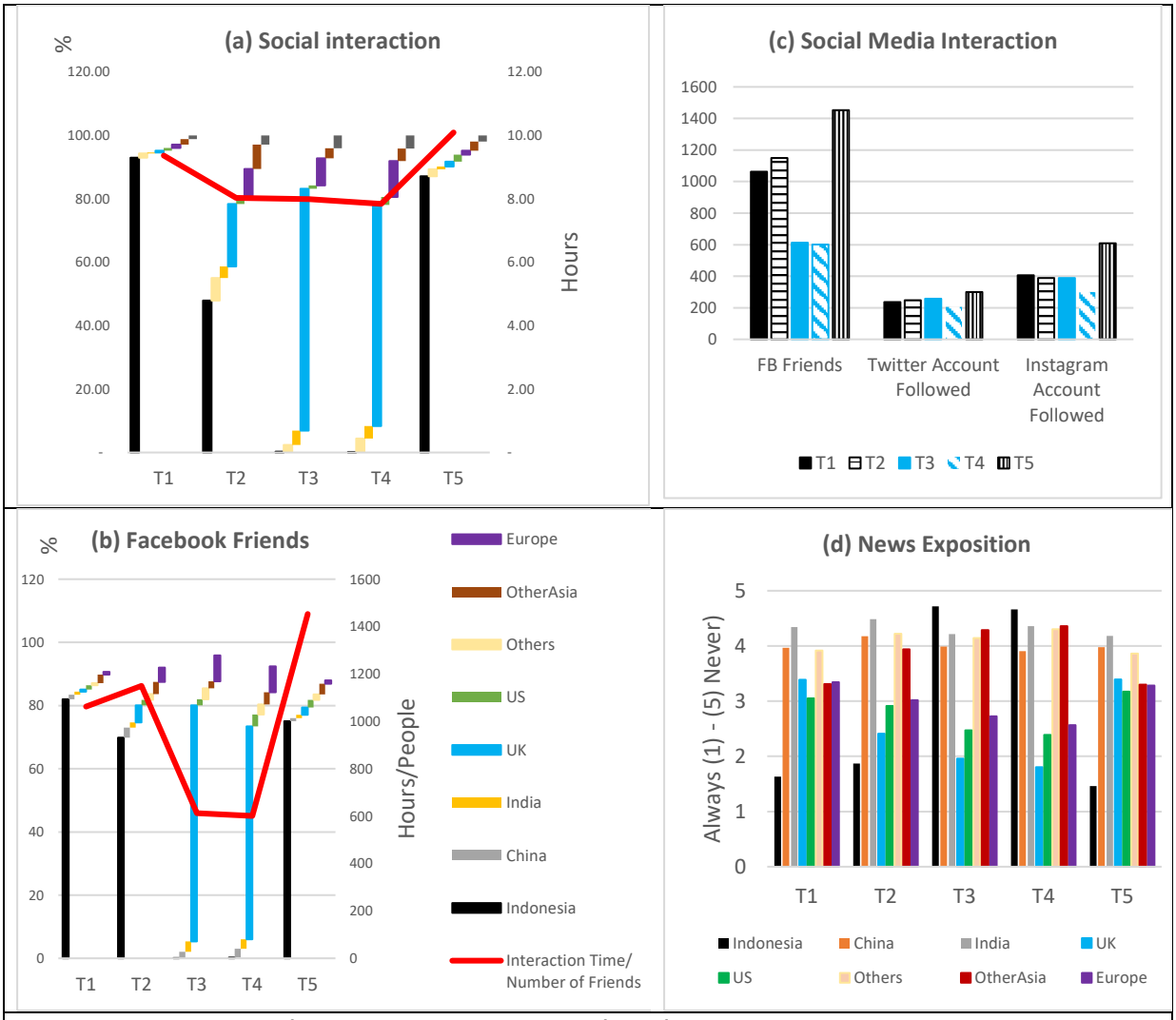


Figure 10: Social Interaction Time, Social Media Interaction, & News Exposition

The data is recapped from the following questions:

(a) Considering the time you spend interacting with other people, what percentage you spend with people from the following countries? For example, the graph shows that Indonesian on T1 & T5 on average spend almost 10 hours engaging in social interaction while British (in T3 & T$) only spend 8 hours on average.

(b) How many friends you have/follow in the following? Input 0 if you don't have the account.

(c) Approximately, what percentage of your Facebook friends are from the following countries? (the total percentage must be 100)

(d) Approximately, how often do you read news about the following countries?

Appendix IV: Perception on institutions

Scale: -2,-1,0,1,2 (Strongly disagree to strongly agree)	Indonesian in Indonesia	Indonesian in the UK	British in the UK
(1) Not acceptable to cut the queuing line	-0.0513	-0.1612 **	-0.0311
(2) Not polite to be late for an appointment	0.0391	-0.0747	-0.1788 **
(3) Say "please", "thank you", and "sorry" are common practices	-0.0794	-0.0953	0.0285
(4) It is common to give your seat to elderly in the bus/train	-0.0642	-0.1543 **	0.1604 **
Informal rule perception index (average point 1 to point 4)	0.0157	-0.0624	-0.0801
(5) Littering is against the law?	-0.0568	-0.1934 ***	-0.1339 *
(6) Plagiarism is unacceptable	0.0700	-0.1573 **	-0.0445
(7) Corruption is not acceptable	0.0456	-0.1825 ***	-0.1906 ***
(8) Everybody should comply with the tax rule	0.0352	-0.0285	0.0217
(9) Political fraud is not acceptable	0.0744	-0.1512 ***	-0.1165 *
Formal rule perception index (average point 5 to point 9)	0.0647	-0.1188 *	-0.2739 ***
Institutions perception index (average point 1 to point 9)	0.0513	-0.1979 ***	-0.1068

Spearman correlation test $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 11 Correlation of Institution perception Index to honesty level

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Chapter 3 Does the shift from autocracy to democracy in Indonesia change people's behaviour?

By Lury Sofyan

Abstract

This study aims to see whether the shift from autocracy to democracy in Indonesia influences individual behaviour. Existing literature stresses how the changing of political institutions in Indonesia, from the kingdom era to the colonial period and subsequent independence, has not changed corrupt behaviour. This paper revisits the question in the context of the political shift from autocracy to democracy that occurred in Indonesia in 1998, by measuring individual behaviour through intrinsic honesty. The altered mind game (Jiang, 2013; Kajackaite and Gneezy, 2017), was used to compare the level of intrinsic honesty of Indonesian people who, due to their age in 1998, could not have been influenced by the autocratic regime, with that of the older generations who for part of their lives were exposed to the autocratic regime. Consistent with the findings in corruption literature, it was found that democracy did not boost the level of intrinsic honesty. The lying behaviour at the individual level of both groups is discussed.

Keywords: Indonesia, Democracy, Behaviour

3.1 Introduction

I have seen the phenomenon of institutional change in politics throughout modern society, from democracy to autocracy and vice versa. The most recent change was the 'Arab Spring' which brought some of the Middle Eastern and North African (MENA) countries to move from authoritarian regimes to building more democratic political institutions. While political leaders in Algeria, Saudi Arabia, and Yemen pledged to reform their institutions to avoid revolution, other countries suffered swift upheaval, and their despotic dictators such as Zine El-Abidine Ben Ali, Gaddafi and Mubarak were forced to step down (Danju, Maasoglu, and Maasoglu, 2013). There have been three waves of this political institutional change (Huntington, 1991). The first wave started from the early 19th century, marked by the adoption of the modern parliamentary system by the UK and lasted for one century bringing some 29 democracies. Later on, the first reverse wave started in 1922 and reduced the number of democratic states in the world to 12. The second wave of democratisation was triggered by the outcome of World War II when the Allies won the war. It reached a peak in 1962 with 36 countries operating a democratic system but then started to decline to 30 countries in the period of 1960-1975 as a sign of second wave reverse. The third wave occurred between 1974 and 1990 when at least 30 countries made the shift to democracy.

This institutional change in politics is a major influence on the course of human life. Studies have found that the shift from autocracy to democracy influences economic performance and human behaviour. Democratisation in Britain led to rapid growth. On the other hand, only limited impact occurred in Latin America (Acemoglu and Robinson, 2008). Cross-country studies also yielded mixed findings. Some studies found a significant impact of political institutions on economic development: for example, democratic countries did better in coping with the financial crisis (Rodrik, 1999a and 1999b); democracy stimulates economic growth (Persson and Tabellini, 2003 and 2006); and democracy and life expectancy is associated with prosperity (Besley et al., 2006).

Institutional change in politics was also found to have a mixed impact on behaviour studies. In the area of tax behaviour, Torgler (2003) found that political institutional change in the reunification of East and West Germany did not affect tax compliance behaviour. Evidence of how institutional political change can curb corrupt behaviour is mixed. Higher levels of decentralisation do not reduce

corruption (Fisman and Gatti, 2002), though Goel and Nelson (2005) suggest that greater economic and political freedom yields a 'cleaner society'. However, an inverted U shape of corruption level also occurs in democracy (Mohtadi and Roe, 2003).

On the other hand, how institutional change in politics affects intrinsic honesty is still under-researched and the current study aims to fill this gap. Previous literature asserted that democracy brings positive value into a society. For example, democracy promotes productivity, participation and cooperation (Fehr and Goette, 2005; Black and Lynch, 2001). Democracy also creates higher levels of government accountability (Paxton, 2002) and hence could boost citizens' trust (Grosjean, 2011; Nunn and Wantchekon, 2011; Ljunge, 2014) and increase individual obedience to the rules (Bardhan, 2000), for example lowering tax evasion (Frey, 1998). A democratic system also creates a more efficient reward and punishment system (Ertan, Page and Putterman, 2009). There is less evidence, however, of how democracy influences intrinsic honesty.

This area of study is part of a wider discussion seeking to understand the interaction between fast- and slow-moving institutions. Some studies above, for example, address the important issue of how the fast-moving institutions such as political institutions, might influence corruptive behaviour. Similar to non-corruptive behaviour, intrinsic honesty is also a crucial aspect within a society that could deter people from cheating, especially where institutions are not working effectively (Gächter and Schulz, 2016).

Measuring intrinsic honesty using empirical data is difficult and the current study implements an experimental approach to overcome this challenge. An altered mind game (Jiang, 2013; Kajackaite and Gneezy, 2017) is used to compare intrinsic honesty between Indonesian people who, due to their age in 1998, could not have been influenced by an authoritarian regime, with the older generation who were exposed to the authoritarian regime for much longer. I test the hypothesis which argues that while the change in political institutions may be fast, it will not affect other institutions that tend to change gradually such as culture, beliefs and social norms (Roland, 2004; Tabellini, 2008). If this hypothesis holds, there will be no difference in the intrinsic honesty of these two groups, despite the change in political institutions. Indonesia was chosen for the case study because

Indonesia has experienced a change in political institutions, and also the researcher has access to conduct the study.

In general, it was found that the shift from autocracy to democracy has not boosted the level of intrinsic honesty in Indonesia. In fact, it was found that the subject group who live in the democratic era lie more. However, it is not fully dishonest behaviour that accounts for the difference in lying across the age groups, but rather both fully honest and partially honest behaviour that does. We found a shift from partially honest to fully honest behaviour when subjects grow older which then stabilises after. We found no clear evidence to link the change in perception of institutions with lying behaviour.

Following this introduction, the discussion of how fast- and slowing-moving institutions interact is discussed in the literature review section. Section 3.3 is dedicated to the discussion of how traditional Indonesian culture remains intact within today's society. Subsequently, Section 3.4 discusses how the mind game is designed and conducted to capture the level of intrinsic honesty. In Section 3.5, I present the results and explore a potential explanation of how different political institutions affect intrinsic honesty. Finally, some unanswered questions and directions of future research are discussed.

3.2 Literature Review

Following the demise of the authoritarian Soeharto regime, Indonesia entered a new reform era and chose to adopt a democratic political system, decentralising power to the local government, and supported by free and fair direct elections and free media (Freedman, 2006; World Bank, 2008, 2011).

A democratic system is associated with positive behaviour such as higher cooperation (Bardhan, 2000; Frey, 1998; Black and Lynch, 2001), high trust (Grosjean, 2011; Nunn and Wantchekon, 2011; Ljunge, 2014), and higher government accountability (Paxton, 2002). Nevertheless, counterfactual to the above evidence that democracy promotes positive behaviour, existing literature states that the democratic system in Indonesia still provides a channel for corruptive behaviour (Robison and Hadiz, 2004; Mcleod, 2005). Evidence that democracy has failed to inhibit corruptive behaviour is also found in the case of other Asian countries such as Thailand (Phongpaichit and Baker, 1998; Rock, 2000; Hicken, 2001; Case, 2002).

Political institutions are examples of institutions that can change rapidly, sometimes even overnight, whereas other institutions such as culture, beliefs and social norms are slow-moving and tend to change only gradually (Roland, 2004). Hence, the underlying premise is that the shift from democracy to autocracy or vice versa might not in reality influence culture, beliefs and social norms. In the same vein, Tabellini (2008) suggested that current institutional arrangements might not actually matter in shaping existing values and beliefs, as these are mostly shaped by distant political history. This hypothesis is supported by Grosjean (2011) who argued that recent influences from new institutions do not have a significant impact on trust, as trust in a society is shaped by common institutions from centuries ago. Other studies found a similar conclusion.

Although an individual may be exposed to new institutions, their behaviour remains unchanged. Fisman and Miguel (2007) called this the 'sticky-behaviour hypothesis'. They conducted a study on diplomats' behaviour in the United States and found that diplomats from highly corrupt countries accumulated more unpaid parking tickets compared to those who came from less corrupt countries. The same evidence of sticky behaviour is also found in intergenerational studies. For

example, the descendant's behaviour is not shaped by the existing institutions but rather by the distant institutions of their ancestors[1].

This paper investigates how the change in political institutions in Indonesia affects the level of intrinsic honesty. I assume that intrinsic honesty shapes people's behaviour and collectively forms a culture within a society. Intrinsic honesty constructs the culture as a part of slow-moving institutions which are difficult to change. Intrinsic honesty is an example of intrinsic motivation which can be defined as an internal desire to do something (Benabou and Tirole, 2003). It is an internal preference to choose an honest decision regardless of the financial consequences of doing so (Gneezy et al., 2014). Here I propose a more specific definition of intrinsic honesty which is the honest behaviour that is triggered by self-motivation, in the absence of any kind of monitoring or observation. I follow the definition of institutions as the rules that constrain and structure political, economic and social interaction either informally (through sanctions, taboos, customs, traditions, and codes of conduct), or formally (through constitutions, laws, property rights) (North, 1990).

The level of intrinsic honesty is difficult to measure in real life and there is no empirical data available on how it evolves. Below, I elaborate one of the most prominent examples of dishonest behaviour, corruption, to depict the historical aspect of the environment that shaped the intrinsic honesty of Indonesians. Corruption is selected not only because the literature on corruption is widely available throughout Indonesian history, but also because the legacy of corruption in Indonesia is an appropriate example for this study. It should be noted that corruption is a kind of rule violation that has a robust negative link to intrinsic honesty (Gächter and Schulz, 2016). Equally important, the corruption legacy is a perfect example of a slow-moving institution that remains unchanged despite many alterations in Indonesia's political institutions. It represents a good indicator of how intrinsic honesty is influenced by the shifting of political institutions.

[1] For further reading see: Salamon (1992), Ichino and Maggi (2000), Guiso et al. (2004), Duranton et al. (2009), DeBacker et al. (2015), Kim et al., (1999), Tabellini (2008), Nunn and Wantchekon (2011), Miguel et al. (2011), and Simpser (2016).

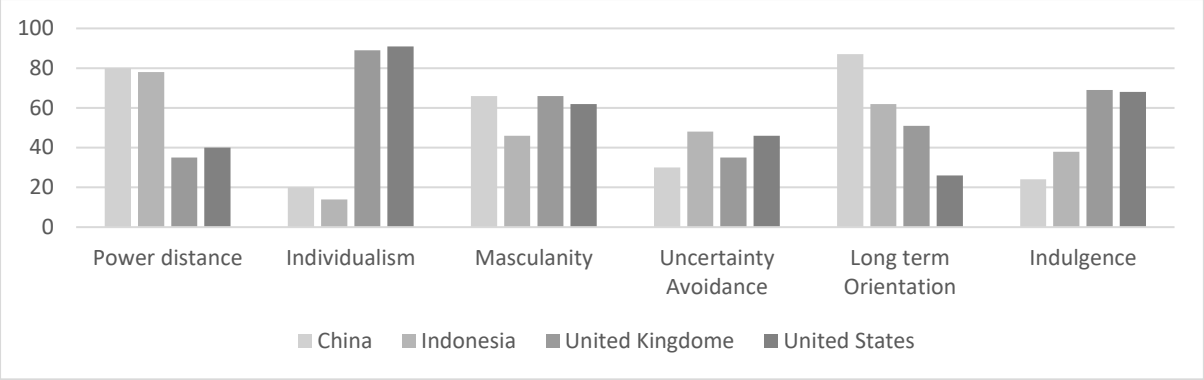


Figure 1 Hofstede Culture Comparison (Hofstede, 1984)

Indonesian culture is depicted by Hofstede (1984, 2011) in Figure 1 Hofstede Culture Comparison (Hofstede, 1984) that Indonesia is among countries that have a high score of power distance and a low score of individualism. High power distance indicates that a less powerful member of the society in Indonesia has a greater acceptance of unequal power distribution. In other words, the inequality of power is not perceived as something that hurts society's fairness and is viewed as something common.

Less individualism, or in other words more collectivism, shows that Indonesians have a higher degree of individual conformity within the society. These two characteristics of Indonesia are closely related to the rapid corruption, and below we examine why the shift in political institutions apparently has little bearing on corruptive behaviour[2].

3.3 Understanding traditional Indonesian behaviour

The age of the kings

Some studies in political science have highlighted the possible explanation that corruptive behaviour in Indonesia was shaped by distant political institutions as early as the age of the kingdom, before the late sixteenth century when the Dutch occupation commenced. The Javanese population has dominated the Indonesian population, accounting for more than half of the population and being the most dominant in politics (Irawanto et al., 2011). Written documents of Javanese kings show evidence of how Javanese culture was ingrained in the early development of Indonesia (Ibid.). This is also proven by the fact that while different kingdoms

[2] More discussion of the construction of Hofstede culture dimension can be found in Hofstede (2011)

thrived in the course of Indonesian history, the biggest ones, such as Suharto and Majapahit, were Java-centred kingdoms.

This fact has underpinned the hypothesis that Javanese customs could explain the prevalence of Indonesia corruptive behaviour (Robertson-Snape, 1999). For example, bribery can be explained by the Javanese tradition of offering a gift to the ruler. Collusion and nepotism can be linked to the perception in Javanese culture that every individual owes their life to the family. Hence, when they reach a certain position in life - when an individual becomes a successful person or "Orang" (Wijayanto, 2011) - they have an obligation to pay back by giving their family and community top priority in economic and employment opportunities. Family comes first and state comes after (Robertson-Snape, 1999). This way of thinking has been preserved until the present time hampering any attempts to introduce fair competition and good corporate governance.

Javanese culture is also close to an authoritarian paternalistic form of political leadership (Mulder, 1996) which puts the father (Bapak) at the centre of the power and providing citizen supports while depriving others of rights and responsibility (Irawanto and Ramsey, 2011). Javanese society, for example, embraces the philosophy of Kawulo Gusti which reflects the unity of the Kawulo (the servant) and the Gusti (the lord) (Irawanto, Ramsey and Ryan, 2011). In modern life, this relationship of authoritarian paternalistic leadership style is still deep-rooted in civil servant management style, suggesting that the inferior ride on the leader's coattails (Irawanto et al., 2012).

The concept of power in Javanese culture is also vividly different from the West and has been encapsulated in corruptive political structures and behaviours in the Indonesian state (Anderson, 1990). The Javanese conceive power as 'something concrete, homogeneous, constant in total quantity, and without inherent moral implications … '. Hence the Javanese mostly "…deal with the problem of concentrating and preserving the power" rather than considering how to use power properly (Anderson, 1990, p. 23).

This concept of power allowed patrimonial values to grow in Indonesia from the era of the Kingdom until the era of the modern state of Soekarno and Soeharto (Anderson, 1990; Webber, 2006). Under patrimonial values, public and private affairs are mixed (Wijayanto, 2011), there is an absence of mutual obligation

between the ruler and the ruled (Anderson, 1990), and the ruler can exploit property based on his interest (Theodore, 1971). For example, Maurer (1994) explains the structure of rural bureaucracy where the village official (Pamong Desa) belongs to the highest social status which links to both high political and economic power. The patrimonial value system is deeply rooted, allowing the village official to exploit a service land (Tanah Bengkok) for their interest. The system, which still exists in today's villages in Indonesia, is a legacy of the old feudal appanage system of pre-colonial Java (Maurer, 1994). Raillon (1996) asserted that this feudal value system including gotong royong (mutual help) is different from western values, whereby it might be seen as harmful to business. In the more general case of developing countries, Khan (2005) used the term new-patrimonial state to describe the persistent use of power to exploit the state's wealth.

The Dutch colonial era

The root of corruption can be observed in the Dutch administration era. The native ruling class, mostly Javanese aristocrats (Priyayi) who accounted for 90% of civil servants in 1928 (Anderson, 1983), were deeply involved in running the colonial state. When the benefit for the aristocrat was revoked by the Dutch, the aristocrat had no choice but to use illegal ways to maintain their lifestyle (Theodore, 1971). This corruptive behaviour was passed on to the post-independence generation (Mackie, 1970; Hanna, 1971; Quah, 1982).

After the ending of Dutch colonisation, the 'colonial period mentality' still existed and has become the root cause of corruption (Monica and Dharma, 2015). Quah (1999) explained that the Dutch colonial period faced the problem of corruption and it was ubiquitous among the Dutch East India Company's staff because they received low salaries. Moreover, Quah (1982) challenged the general opinion that it was the Japanese who were responsible for the corruption culture in Indonesia, as incorrect. He referred to Theodore (1971) who rejected this general view and argued that the Dutch East India Company transmitted examples of corrupt behaviour to Indonesia. Furthermore, he explained how a weak monitoring system and high exposure to financial opportunity, allowed Indonesians who worked for the company to gain substantial wealth, even though they were underpaid.

Post-Independence

Soekarno was the first president to lead Indonesia in the post-Independence era (1945-1966). Political instability gave Soekarno the excuse to use a more authoritarian approach[3]. Nonetheless, the corruption of the Dutch colonial era was still prevalent during the rule of Soekarno. The same culprits underpinned corrupt behaviour as in the VOC (Vereenigde Oostindische Compagni): the wage of a public official – eroded by high inflation - was too low to provide them with a good standard living which forced them to find informal sources of income from the corruption (Mackie, 1970; Quah, 1982; Robertson-Snape, 1999).

In the Soeharto era (1966-1998), corruption became institutionalised (Hanna, 1971) and was characterised by a large-scale structural pattern of cronyism (Kuncoro, 2006). The bold business interests of Soeharto and his family were backed by their political power, allowing them to get privileged access to government contracts (Girling, 1997). Mcleod (2005) used the term 'franchise' to depict the corruption of the Soeharto era, which involved not only the executive but also the legislature and the judiciary. He also explained that this franchise system allowed public officials to exploit their positions by imposing various forms of informal retribution, to supplement the low salary they received. This system is consistent with the patrimonial values that existed in the Dutch colonial era (Anderson, 1990; Webber, 2006) and it is used by the new order to distribute the benefits of corruption throughout the bureaucracy (Robertson-Snape, 1999). One thing to keep in mind is that the culprit for corruptive behaviour from the Dutch colonial era to the post-independence era is the low wage rate of public officials, which allowed the patrimonial value system to bloom (Theodore, 1971; Anderson, 1990; Robertson-Snape, 1999).

After the fall of Soeharto, Indonesia entered a new reform era which leant towards a more democratic political system. This has been supported by free and fair direct elections and free media (Freedman, 2006; World Bank, 2008, 2011). This shift from an authoritarian to a democratic regime was previously perceived as a way of Indonesian achieving a better standard of living (Bhakti, 2004). However,

[3] 'This instability provided Sukarno with the impetus and excuse gradually to become more authoritarian, until in 1959 he suspended parliamentary democracy altogether, abandoned the liberal constitution of 1950 and reinstated the 1945 constitution which vests 'all power and responsibility in the hands of the President'. This enabled him, and General Suharto after him, to create a highly personalised system of rule' (Robertson-Snape, 1999, p. 591).

the shift towards democracy has coexisted with a continued patronage system (Blunt et al., 2012), undermining institutions. The actors in the authoritarian regime have successfully reinvented themselves as democratic figures in the parties and parliament (Hadiz, 2004). Khan (2005) elucidates how patron-client politics are effective in attracting voters in developing countries, and hence are difficult to change through democratization. These patron-client politics construct the new-patrimonial state that allows corruptive behaviour to thrive, destroying good governance practice. An example of patron-client political practice is explained by Gonschorek et al. (2018). They found that the allocation of grants in Indonesia is determined by political considerations rather than by need, as a means of rewarding the support received in the election.

The shift to a more democratic system is also strengthened by the decentralisation of power to local government, which has become a global phenomenon of the political transition process (Hadiz, 2004). Seven years after the fall of Soeharto, Indonesian citizens began to elect the district executive directly, and by the end of 2010, nearly all districts had followed suit (Sjahrir et al., 2014). However, corruption in Indonesia remains entrenched and various theoretical and empirical works support this finding (Green, 2005; Lewis, 2010; Sjahrir, Kis-Katos and Schulze, 2014; Tomsa, 2015; Tolo, 2016; Haryanto and Astuti, 2017; Suprayitno and Pradiptyo, 2017). A key factor in this failure is that decentralization in Indonesia does not push transparency and accountability as the priority (Hadiz, 2004) and the democratic institutions have been compromised by old figures in the authoritarian regime (Hadiz, 2003).

The above section provides both theoretical and descriptive discussion of how chronologically distant institutions have left a mark in the behaviour of the current population. Corruption is still a crucial issue that remains prevalent in most developing and underdeveloped countries. In the case of Indonesia, previous research suggests that corruption is shaped by distant institutions going back to the age of the Kingdom. The changes in political institutions throughout Indonesian history - from the era of colonisation to the post dependence era under an authoritarian regime, followed by the reformation era which brought the democratic system into the place - do not impact corruptive behaviour.

How fast-moving and slow-moving institutions interact with one another has attracted abundant research. The change in political institutions is considered as a phenomenon of fast-moving institutions as the change is rapid. Yet it does not affect other institutions that tend to change gradually over a longer period, such as culture, beliefs and social norms (Roland, 2004; Tabellini, 2008). Existing literature in this area mainly investigates the effect of change in political institutions on corruption[4] and trust[5] as examples of slow-moving institutions. How the change in political institutions affects intrinsic honesty, however, remains unexplored.

This research seeks to contribute to the literature on how slow and fast-moving institutions interact with each other, in particular when the shift in political institutions from autocracy to democracy occurs. Previous literature asserted that democracy promotes higher cooperation (Bardhan, 2000; Frey, 1998; Black and Lynch, 2001), high trust (Grosjean, 2011; Nunn and Wantchekon, 2011; Ljunge, 2014), and higher government accountability (Paxton, 2002). However, there is no evidence of how democracy influences intrinsic honesty.

Investigating how intrinsic honesty is affected by different political institutions is important. Just as non-corruptive behaviour and factors such as trust, cooperation, and accountability are key aspects within a society, intrinsic honesty is also crucial, as it underpins the positive culture and norms which uphold the functionality of the society's institutions. Intrinsic honesty derives solely from the internal belief that one should act honestly in whatever situations one faces. One who has higher intrinsic honesty will remain honest even when no monitoring system exists and when such an honest decision may be costly. Intrinsic honesty is the system within one's belief that guards an individual against violating rules.

In the context of developing countries in which institutions are weak and any attempt to curb corruption has been considered as failing to promote a cleaner society, it is important to understand how intrinsic honesty evolves through time and through different political institutional arrangements.

[4] Fisman and Gatti (2002), Goel and Nelson (2005), Mohtadi and Roe (2003), Mcleod, (2005), Robison and Hadiz (2004), Case (2002), Hicken (2001), Phongpaichit and Baker (1998), Rock (2000)).
[5] Grosjean (2011), Nunn and Wantchekon (2011)

The focus of the current study is to measure the intrinsic honesty of Indonesian people who, due to their age in 1998, could not have been influenced by the authoritarian Soeharto Regime, compared to the older generations who were exposed to the authoritarian Soeharto Regime.

To the best of my knowledge, this is the first study that investigates the impact of institutional change in politics on intrinsic honesty. One possible reason for this is because it is difficult, if not impossible, to measure intrinsic honesty using empirical data. The current study aims to fill this research gap by introducing an experimental approach to explore the impact of the change in political institutions on intrinsic honesty. In particular, it seeks to answer the research question: Does the shift from autocracy to democracy influence intrinsic honesty?

Current research not only enriches the literature in the area of institutions and behaviour but also identify how institutions affect different generations. Understanding how intrinsic motivation evolves through time is important, as intrinsic honesty is crucial for a well-functioning society, particularly in countries where the institutions are not working, in ensuring that people do not cheat and break the rules (Gächter and Schulz, 2016).

3.4 Experimental Design, Procedure and Methodology

The level of intrinsic honesty is measured using the altered mind game (Jiang, 2013; Kajackaite and Gneezy, 2017). The experiment was conducted online using Qualtrics from December 2017 to February 2018 and was part of several research projects. Participants were recruited through a network of Indonesian students[6], and the subjects were clustered into three groups: first, Indonesian people who, due to their age in 1998, could not have been influenced by the authoritarian Soeharto Regime (henceforth G1). This group consists of Indonesian subjects who were born in 1998 or later. Of course, subjects will have been exposed to their parents' behaviour which has been formed by the Soeharto regime. Nevertheless, subjects in this group do not have direct experience of the Soeharto regime, and therefore cannot be directly influenced by it.

[6] Email group of Indonesian students under Indonesia Endowment Scholarship Program and Indonesia student association in University. Some of the members are alumni but still become the member of the email group.

The next group consists of Indonesian subjects who were born from 1984 to 1997 and were between 1 and 14 years old when the political shift happened in 1998 (henceforth G2). The cut-off point at age 14 was chosen because this is the age at which some Indonesians enter secondary school and it is also perceived as the crucial age for girls to have menarche (Batubara et al., 2010) as a sign of reaching adulthood life.

The last group consists of Indonesians aged 15 or above when the political shift happened in 1998, i.e. they were born before 1984 (henceforth G3). This group serves to accommodate the 18 year old cut-off point at which Indonesians have a legal right, as independent citizens, to get a national identity apart from their parents. It is a mark of becoming an individual with legal standing of their own.

At the beginning of the experiment, the rules of the game are presented and a research consent letter has to be approved before the subject is able to continue to the next section. The second section is the main section in which the mind game is presented. In this section, the subject is told to think of an integer number from 0 to 9. The computer then chooses and shows a random integer number from the same range on the subject's screen. Subjects must report whether the random number shown on the screen is the same as the number in his/her mind. When subjects report yes, they will receive IDR 3.200. Otherwise, the subject receives nothing. This report will become the basis to calculate the payoff.

This mind game is designed in such a way that the unobservability feature stands out. The subject has the freedom to make a decision without fear of being monitored or caught being dishonest because the true information is held privately in the subject's mind and no physical proof could be traced to detect that. This unobservability is an important feature of any lie game since any possibility of observation would underrate the result of dishonest behaviour (Weisel and Shalvi, 2015). There is no need to add an extra procedure in the game to eliminate the fear of detection. For example, to overcome the fear of detection, in their roll dice game, Fischbacher and Heusi (2008) used envelopes to give the payoff to the subject, while Barr and Serra (2010) used a privacy screen to convince subjects that their decision was unobservable.

The current study aims to give an alternative approach to detect lies at the individual level. While this is challenging in the real world, an experimental approach gives the opportunity to do so. Unlike Fischbacher and Föllmi-Heusi (2013), Jiang (2013) and Kajackaite and Gneezy (2017) who used a six-sided dice as the randomisation tool, here the computer is used. It is simpler and removes the suspicion of an unbalanced dice. This approach also allows us to extend the usage of numbers from 6 in the roll dice game to 10 numbers (0 to 9). By doing so, I set the probability of having the same number ten times as very unlikely (0.00000001%). Hence, this design gives a better guess that anyone who reports ten times the same number (or ten times reporting yes) is dishonest.

Subjects are classified as honest if the number of 'yes' reports is equal to or lower than the theoretical probability of 10%, which is one or zero yes responses. Any report above one yes but still below 10 is considered to be partially honest.

The experiment consists of three treatment groups. First, the treatment group of Indonesians (henceforth TI) consists of Indonesians who receive a normal payoff. The second treatment group (henceforth TB) consists of the British as the control group. I use the British as a control group since there is no change in political institutions in the UK, specifically, shifting from democracy to autocracy or vice versa during the subject's life. The British subjects are recruited through ORSEE (Greiner, 2015).

3.5 Results

	TI		TB	
	Observation	Average Age	Observation	Average Age
Total	215	26.5	149	26.6
G1	123	22.3	104	21.1
G2	57	29.5	12	29.1
G3	35	36.7	33	43

TI: Indonesian, T3: British. The payoff is in IDR except for T3 I use GBP with PPP calculation (OECD, 2018).

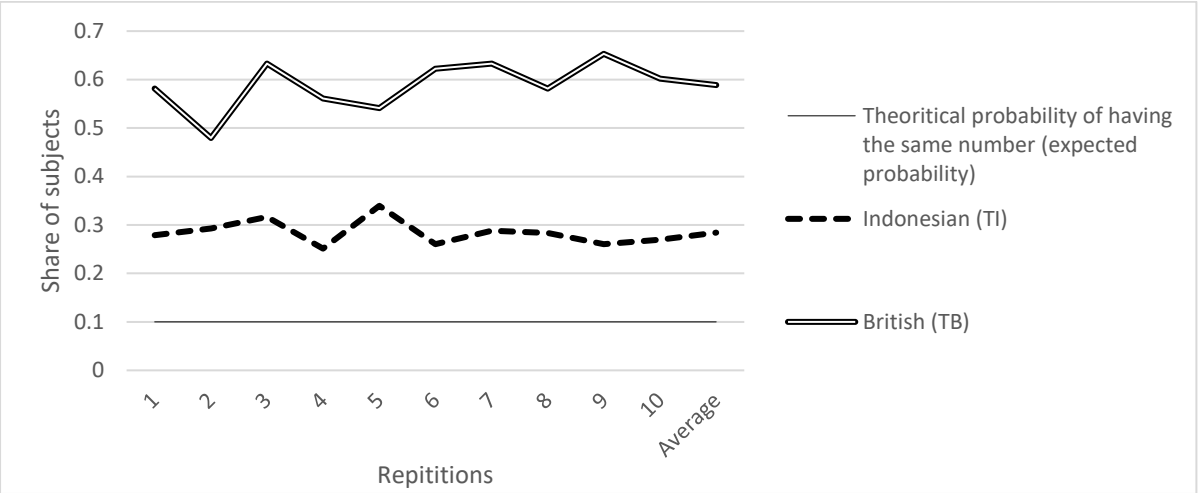
Table 1 The Treatment

Sample representativeness is important in this study, as different cultural characteristics and ethnicity might play an important role in lying decisions. I managed to recruit 315 Indonesian students. Subjects were from 24 of Indonesia's 33 provinces and comprised 26 of the country's 34 ethnicities. Within the same period of time, I also used ORSEE (Greiner, 2015) to recruit 149 British

students who came from across the UK. On average, all participants were of a similar age, only slightly higher in TI-High.

Lie behaviour

We calculate the level of honesty at the group level to compare the general tendency of lying between treatments. This is done by comparing the average number of yeses claimed by each treatment group. The higher the yeses reported, the more dishonest participants are.



Binomial test for each repetition of TI and TB is significantly different (p-value<0.01) from theoretical probability 10%.

Figure 2 Share of subjects that report 'yes' (Dishonest)

As previously explained, the chance of getting one number correct out of ten is 10%. Hence the number of participants who report 10% or below is considered to be fully honest (see Figure 2). Although subjects could choose to lie maximally to get the maximum payoff, some subjects choose not to do so and report below 100%, but still above the fully honest benchmark (10%). Those subjects are classified as partially honest subjects.

At the treatment group level, it was found that on average the share of British subjects who report a higher number of yeses is higher than for Indonesian subjects (Mann-Whitney Test p-value<1%). This holds even if I triple the stakes for Indonesian subjects (Mann-Whitney Test p-value<1%).

Next, the lying behaviour among different groups as classified by age group is compared. This is to address the research question as to whether there is a significant difference between groups who have different exposure to different

political regimes. Here the cut-off point for the classification of groups of subjects is crucial. The shift from an authoritarian to a democratic regime happened in 1998. Hence, the safest way to measure the impact of the shift on the honesty level of Indonesians is to group subjects who born in 1998 and after as one group (G1), and compare their honesty level to a different group of older subjects with higher exposure to the authoritarian regime.

It was found that Indonesians born after the shift in political institutions – namely those born and growing up under a democratic regime - lie more compared to other groups.

Previous literature has asserted that democracy brings positive values to society. For example, it is argued that democracy promotes productivity, participation and cooperation (Fehr and Goette, 2005; Black and Lynch, 2001). Democracy also creates higher government accountability (Paxton, 2002) and hence could boost citizens' trust (Grosjean, 2011; Nunn and Wantchekon, 2011; Ljunge, 2014) and increase individual obedience to the rules (Bardhan, 2000) leading, for example, to lower tax evasion (Frey, 1998). Democratic systems also create more efficient reward and punishment mechanisms (Ertan, Page and Putterman, 2009).

Such positive values associated with introducing a democratic system into society should have changed the behaviour of Indonesians to become more honest, as intrinsic honesty is constructed by the process of internalisation of the norms that exist within a society (Barr and Serra, 2010).

On the contrary, it was found that the subjects in G1 who were only exposed to a democratic system had lower intrinsic honesty compared to both the older groups, G2 and G3, who were exposed to an authoritarian regime for some period of their lives (Mann-Whitney Test p-value<1%). Interestingly, I found that the level of intrinsic honesty stabilised when Indonesians became older. This can be seen by fact that the difference between G2 and G3 was only weakly significant (Mann-Whitney Test p-value<1%) showing that the levels of honesty are relatively similar.

	G1 (born 1998 and above)	G2 (Born 1984-1997)	G3 (Born before 1984)	Sig Diff G1 and G2	Sig Diff G2 and G3	Sig Diff G1 and G3
British (TB)	5.1	6.9	6.2	***	-	-
Indonesian (TI)	4.8	2.7	1.8	***	*	***
Diff TB and T1	-	***	***			

Two-sample Wilcoxon rank-sum (Mann-Whitney) test, * p < 0.1, ** p < 0.5, *** p < 0.01

Table 2 Honesty level among age groups

On the other hand, evidence for the British (TB) was different. Given that there were no changes in political institutions, I predicted that there would be no difference in lying between G1 and other groups. It was found, however, that the youngest British participants (TB–G1) were more honest compared to the older ones (TB-G2 and TB-G3). The difference in lying is only evident in comparisons between G1 and G2 (Mann-Whitney Test p-value<1%). In other words, there is no significant difference in lying between the older groups of British subjects (TB).

Further investigation was conducted comparing the behaviour of young British (TB) and Indonesian (T1) people. Interestingly, no difference in lying was found between G1 (Mann-Whitney Test p-value<1%) but differences are evident among older age groups – G2 and G3. It seems that lying behaviour in young people is the same, although they are exposed to different institutions.

Investigating lying behaviour at the treatment group level is valuable in giving us the broad tendency of lying between treatments. To understand in more detail, lying behaviour was further investigated at the individual level. In particular, I wanted to explore the difference in lying behaviour between those who are fully honest, partially honest, and fully dishonest.

The literature on lying emphasises that although people could be fully dishonest (ten yeses), few take the opportunity (Fischbacher and Föllmi-Heusi, 2013; Gächter and Schulz, 2016). Some choose to be fully honest (no or one yes) and some are in the middle (between 1 and 10 yeses) to balance the advantage from financial rewards and at the same time maintain a positive self-image (Mazar, Amir and Ariely, 2008).

Comparing the lying behaviour among groups and treatments provides the information shown in Table 3 below.

	G1 (born 1998 and above)	G2 (Born 1984-1997)	G3 (Born before 1984)	Sig Diff G1 and G2	Sig Diff G2 and G3	Sig Diff G1 and G3
TI - Fully honest	8%	44%	62%	***	*	***
TI - Partially honest	88%	51%	35%	***	-	***
TI - Fully dishonest	4%	5%	4%	-	-	-

Two-sample Wilcoxon rank-sum (Mann-Whitney) test, * p < 0.1, ** p < 0.5, *** p < 0.01

Table 3 Share of subject in TI based on honesty behaviour

In general, it was found that the majority of Indonesian subjects chose to partially lie. The difference is only in G3, where most people are fully honest (62%) whereas most of the subjects are partially honest in G2. What is interesting is that the share of very young subjects who are partially honest is extremely high at 88%, as opposed to 51% in G2 and 35% in G3. Here I found that the difference in partially honest behaviour of G1 compared to G2 and G3 is statistically significant (Mann-Whitney Test p-value<1%) but partially honest behaviour between the older generation - the G2 and G3 - is insignificant (Mann-Whitney Test p-value>10%).

It could be concluded that the partial honesty behaviour gradually decreases as Indonesians get older, the cut-off point being when the subject in the G1 gets older, leaves G1 and enters G2. More importantly, it was found that the proportion of fully honest behaviour increases throughout the age group while fully dishonest behaviour remains the same. This shows that those younger subjects in G1 who chose to be partially honest shift their behaviour to become fully honest when they grow older, leave G1 and enter G2. This honesty behaviour remains stable when the subject gets older, leaving G2 and entering G3.

Now I continue by comparing the honesty behaviour among groups in different treatments. Within the treatment group of Indonesians (TI), it was found that subjects in G1 claim more yeses compared to G2 and G3. This means that subjects in G1 lie more compared to the two other groups. However, scrutinising honesty at an individual level, it was found that the share of dishonest subjects in G1 compared to G2 and G3 was not significantly different (Mann-Whitney Test p-value>10%).

Previously I found that honesty behaviour is different among the treatment groups (see Table 2). Here it was found that the difference was attributable not to the fully dishonest behaviour, but rather to the differences in fully honest and partially honest behaviour. For example, the share of fully honest subjects in G1 (8%) is the lowest compared to G2 (44%) and G3 (62%) (Mann-Whitney Test p-value<1%) and by contrast, the share of partially honest subjects is the highest among all (88%) and significantly different compared to G2 (51%) and G3 (35%) (Mann-Whitney Test p-value<1%).

In more detail, Table 4 compares the average number of yeses that is reported by fully honest and partially honest subjects. I do not report the fully dishonest behaviour because the average of yeses is the same (10 yeses).

	G1 (born 1998 and above)	G2 (Born 1984-1997)	G3 (Born before 1984)	Sig Diff G1 and G2	Sig Diff G2 and G3	Sig Diff G1 and G3
Fully honest	0.50	0.54	0.56	-	-	-
Partially honest	4.95	3.86	3.22	**	-	**

Two-sample Wilcoxon rank-sum (Mann-Whitney) test, * p < 0.1, ** p < 0.5, *** p < 0.01

Table 4 Average yeses reported

I found no significant difference in fully honest behaviour among groups. This is because the classification of fully honest has only two options, either zero or one yes and hence there should not be a huge difference.

It seems that the main cause of the difference in honesty behaviour between G1 and the older groups (G2 and G3) is triggered by the different scale of partially honesty behaviour. As previously explained, a decision is considered to be partially honest when subjects report the number of yeses between two and nine. Partial honest subjects try to balance the benefit from lying by reporting higher yeses compared to the theoretical probability (one yes) but remain considerate to their self-image and hence do not lie fully (report 10 yeses). In G1, the partially honest subjects gravitated more to fully dishonest behaviour and hence reported more yeses compared to G2 and G3.

Perception differences

The impact of different political institutions on behaviour merits further investigation. I predict that subjects who are exposed to different political institutions might have different perceptions of those institutions, which might potentially influence lying behaviour.

As explained previously, the grouping of the subjects into G1, G2, and G3 is designed to represent different generations of Indonesians who are exposed to different regimes. For example, G2 and G3 were respectively 14 years and 18 years old when the regime changed and hence they have direct interaction with the public services provided by the Soeharto regime and experienced how their political freedom and that of the media were curbed. Equally important, during their lives, they might also have heard and seen from day-to-day interaction with the society the real ambience of living under the regime. This exposure to the regime might have influenced their perception of institutions or, much further than that, been internalised into the subject's beliefs, thereby influencing subjects' lying behaviour.

On the other hand, such exposure would not be experienced by G1. There is no possibility that G1 had a direct experience of the Soeharto regime, as this group of Indonesians were born in 1998 or later. Inevitably, this group of subjects live in the post Soeharto era, where political institutions have shifted to democracy. Throughout their lives, this group of subjects have only experienced a democratic system, providing a different socio, political and economic environment compared to the Soeharto era. Although secondary sources of information, later on, could give them views on the autocratic institutions which might influence their behaviour, a first-hand experience might still give a different scale of influence.

Existing literature reveals that democratic institutions affect behaviour in many ways. For example, democracy boosts productivity, participation and cooperation (Fehr and Goette, 2005; Black and Lynch, 2001), it increases individual obedience to the rules (Bardhan, 2000) for example by reducing tax evasion (Frey, 1998) and creates a more efficient reward and punishment system (Ertan, Page and Putterman, 2009).

More importantly, democratic institutions create greater government accountability (Paxton, 2002) and hence boost trust (Grosjean, 2011; Nunn and Wantchekon, 2011; Ljunge, 2014). Trust is higher within democratic institutions as they allow both political freedom (Knack and Zak, 2003) and less surveillance (Jacob and Tyrell, 2012). Democratic institutions also bring more community involvement (Algesheimer, Fehr and Goette, 2012) and more economic freedom (Berggren and Jordahl, 2006; Aghion et al. 2010).

To test this, first I compare different groups' conformity to a specific political view of Indonesia (TI), establishing whether there is a difference of political flavour among groups of subjects. To this end subjects were asked their political views ranging from extremely liberal to extremely conservative. If political institutions influence the subject then I would expect that G1 would have more liberal views compared to G2 and G3.

Surprisingly, it was found that although subjects in G1 never had first-hand exposure to the autocratic regime, they had the same political view as the subjects in G2 and G3 (Mann-Whitney Test p-value>10%) (see Table 5 Political view). An important note here is that not all of the subjects answered this question. Amongst the options, 'I haven't thought much about this' gave subjects freedom not to declare their political view and 22.8% of subjects in TI chose this option.

Another factor that has to be taken into account in interpreting the results is that asking political views is an abstract question that is difficult to understand and hence answers might not perfectly represent subjects' political perceptions.

	G1 (born 1998 and above)	G2 (Born 1984-1997)	G3 (Born before 1984)	Sig Diff G1 and G2	Sig Diff G2 and G3	Sig Diff G1 and G3
Political View	4.72	4.87	4.92	-	-	-

I ask the question 'When it comes to politics do you usually think of yourself as' and subjects have to choose an option that ranges from 1 that is 'extremely liberal' to 7 that is 'extremely conservative'.

Table 5 Political views of Indonesians (TI)

Up to this point, there is no clear explanation of why the subjects in G1 behave differently to subjects in G2 and G3. In pursuit of clarification, attention shifted to the institution's perception index, which depicts subjects' perceptions of the whole range of institutions from formal, such as constitutions, laws, and property rights, to informal institutions such as sanctions, taboos, customs, traditions, and codes of conduct (North, 1990).

Rather than asking an abstract question, as above in the case of political views, I asked a simple day-to-day behavioural question that is easier to understand. I asked four questions regarding whether the subject agreed with informal institutions such as queuing in line, being on time for a meeting, saying polite words in interaction with people such as 'please', 'thank you', and 'sorry', and giving up a seat to the elderly. I also asked questions regarding subjects' attitudes

to informal institutions, for example, whether littering, plagiarism, tax evasion and political fraud are unacceptable.

The institution's perception index is constructed from the questions above to grasp a subject's conformity to any given rule. Subjects with a higher institutions perception index indicated that they were more likely to abide by the rules. There is a process of internalisation here and hence I argue that the more the subject respects the institutions, the more honest they are.

	G1 (born 1998 and above)	G2 (born 1984-1997)	G3 (born before 1984)	Diff G1 and G2	Diff G2 and G3	Diff G1 and G3
Indonesia (TI):						
Informal Institutions	1.74	1.66	1.82	*	**	-
Formal Institutions	1.83	1.63	1.75	***	-	*
Institutions	1.79	1.64	1.78	***	**	-
British (TB):						
Informal Institutions	1.54	1.50	1.49	-	-	-
Formal Institutions	1.43	1.49	1.67	-	*	*
Institutions	1.48	1.50	1.59	-	-	-

The Likert scales are used: -2,-1,0,1,2 (Strongly disagree to strongly agree). Higher number means higher conformity to the institutions. Two-sample Wilcoxon rank-sum (Mann-Whitney) test, * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$

Table 6 Institutions perception index (T1)

As previously explained, I predicted that subjects who were exposed to different political institutions might have different perceptions regarding institutions, potentially influencing lying behaviour. In the absence of any political-institutional shift, the perceptions of institutions among groups are relatively similar for the British (TB), with only a weakly significant difference informal institutions for G3 (Mann-Whitney Test p-value<1%). The finding is different, however, compared to Indonesians (TI).

The political institutional shift in Indonesia seems to affect the Indonesian subjects' perception of institutions. It is clearly seen by the drop in the institution's perception index in G2.

In contrast to the British (TB), who showed a steady institutions perception index among age groups, older Indonesians (G2) had a lower institutions perception index compared to both the youngest group (G1) (Mann-Whitney Test p-value<1%) and the oldest group (G3) (Mann-Whitney Test p-value<5%). This

group of subjects were aged 14 to 17 years old when they experienced the political shift.

Interestingly, the difference is less clear in a comparison between the youngest group (G1) and the oldest (G3). In fact, no difference in perceptions of institutions overall was found (Mann-Whitney Test p-value>10%). The only slight difference is within the perceptions of formal institutions (Mann-Whitney Test p-value<10%). Although G1 and G3 have different exposure to political institutions, their perceptions are relatively similar.

More importantly, although both G2 and G3 have experienced living under an authoritarian regime at some point in their lives, a difference in their respective institution's perception index was evident.

3.6 Conclusion

I have presented a discussion of how fast-moving institutions, such as a political institutional shift, interacts with slow-moving institutions such as culture, belief, and social norms (Roland, 2004; Tabellini, 2008). The existing literature mostly stressed that corruptive behaviour in Indonesia was shaped by long distant institutions which remained intact in everyday life despite the change in political institutions. I revisit the research question, whether the political shift from autocracy to democracy in 1998 changed people's behaviour.

Focusing on intrinsic honesty, the research question was tested by comparing two groups: first, Indonesian people who, due to their age in 1998, could not have been influenced by the authoritarian Soeharto regime (G1); and second, the older generations who were exposed to the authoritarian Soeharto regime for some period of their lives (G2 and G3).

In general, it was found that G1 were more dishonest compared to G2 and G3. No proof that the shift from autocracy to democracy boosted intrinsic honesty was found. On the contrary, the younger the subjects, the more dishonest they were.

Three different lying strategies could be adopted by the subjects: fully dishonest, partially honest, and fully honest. Partially honest behaviour is the middle area in between fully dishonest and fully honest. It shows a wide spectrum of lying rather than binary behaviour of fully honest or fully dishonest. Interestingly, differences in lying behaviour between the age groups were found to be attributable not to the fully dishonest behaviour, but rather to fully honest and partially honest behaviour.

It should be noted that the shift in lying behaviour can be clearly seen throughout the age groups; the proportion of subjects who chose to be partially honest in the youngest group (G1) decreased gradually if compared to older group subjects, G2 and G3. It seems that partially honest behaviour shifts to fully honest behaviour when a subject get older, leaves G1 and enters G2 and then remains the same when the subject gets older and enters G3.

Nevertheless, explanations of how a political shift could influence honesty (dishonesty) provide only an incomplete picture. The prediction that the shift in political institutions will influence subjects' perceptions of institutions and later potentially correlate with honesty behaviour is not proven. Although it was found

that the political shift affected the perception of institutions amongst G2, there was no evidence of a correlation with honesty levels.

Going forward, there are two further points to discuss. First, as previous literature has argued, democracy in Indonesia has not boosted intrinsic honesty. The transition from autocracy to democracy has not brought a huge difference in terms of punishing bad behaviour. Corrupt behaviour remains a feature of Indonesian culture and this compromises intrinsic honesty (Gächter and Schulz, 2016). The birth of democracy has not given birth to new promising political figures in the parties and parliament, as the old figures still exist and dominate (Hadiz, 2003) maintaining the old patronage system (Blunt et al., 2012). Democracy in Indonesia has developed only at the formal level. It has not spurred transparency and accountability (Hadiz, 2004). Power decentralisation has also been used to distribute more corruptive behaviour rather than to create a more balanced power to distribute wealth. (Green, 2005; Lewis, 2010; Sjahrir, Kis-Katos and Schulze, 2014; Tomsa, 2015; Tolo, 2016; Haryanto and Astuti S.A, 2017; Suprayitno and Pradiptyo, 2017).

This finding supports previous literature on Indonesian history that the corruption culture was already shaped from the age of the Kingdom and has never been altered, despite changes in the country's political institutions.

Other variables could also contribute to the improvement of institutions such as the economic and human capital development. Those variables are important but do not discuss in this paper.

This study took advantage of the real-world phenomena of political shifting which is not a case that occurs frequently hence it makes the study become unique at the same time bring a difficult challenge since it is difficult to find a perfect control group.

The second point concerns how to understand the practice of honesty behaviour. The adoption of a specific behaviour is usually driven by economic incentives, as in the case of immigrants in the US who have to assimilate US culture (Borjas, 1998) or to narrow the wage gap (Chiswick, 1978) or as in the UK where employment is the key driver for immigrant adoption of new behaviour (Cheung and Phillimore, 2014). However, social pressure is also important. Independent of the economic pressure, the adoption of behaviour is mainly driven by the dominant

behaviour that exists in a society which creates pressure for conformity (Bowles, 2004). The nature of Indonesian culture which is more into collectivism society put higher conformity pressure to its individual compare to an individualist society (Hofstede, 1984).

This is where the role of institutions comes into the equation as institutions, in particular democratic ones, initially promote good behaviour by penalising bad behaviour (Ertan, Page and Putterman, 2009) and hence boost trust (Uslaner, 2003), greater cooperation (Bardhan, 2000; Frey, 1998; Black and Lynch, 2001), and greater government accountability (Paxton, 2002). It should have also boosted the honesty behaviour although no supportive evidence was found for this.

A different school of thought might provide an alternative explanation as to why democracy itself does not boost intrinsic honesty, by highlighting the directionality of institutions and social capital. Extensive literature emphasises that instead of the institution shaping the social capital and other positive behaviours, rather an effective institution requires that social capital exists in the first place to overcome the collective action dilemma (Breuskin, 2012). In other words, social capital and positive behaviour are prerequisites rather than outcomes of better institutions (Tavits, 2006; Ruck, Matthews and Kyritsis, 2019).

This study found no evidence that the shift from authoritarian institutions to democracy boosted honest behaviour. Future research could investigate the following questions. Firstly, if democracy does not promote honesty, what institutional political arrangement can tackle this problem? Secondly, how do honesty and other social capital promote democracy? In the case of Indonesia, which is endowed with rich demography, a huge population, unique geographical conditions, and the biggest Muslim population in the world, how could these factors shape honesty and how are they related to the process of democratisation?

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Chapter 4 Asset Market Experiments: Does Inequality of Endowment Stimulate Bubbles and Bursts?

By Lury Sofyan

Abstract

Bubble and burst patterns are evident in the asset market experiment. They violate the efficient market hypothesis which states that market price always indicates the true value. Extensive studies have been dedicated to reducing bubbles and bursts and to making asset markets more efficient. Contributing to the literature, this study found that bubbles and bursts disappear in a market where inequality of endowment is symmetric and are low in a market where inequality is skewed high or low. I also found that saliency of inequality endowment does not make a significant difference in bubble formation. The trading behaviour of subjects with low, normal, and high endowments are discussed.

Keywords: Inequality, Asset Market Experiment, Bubbles

4.1 Introduction

Throughout human history, the incidence of bubbles and bursts has been recorded dating back as far as the Dutch tulip mania bubble in 1434-1637, the Mississippi bubbles in 1719-1720, the South Sea bubble (1720) (Garber, 2000) and, more recently, the Dot Com bubble in the early 1990s and the housing bubble in 2008.

In theory, the bubbles and bursts show a violation of the efficient market hypothesis. According to the hypothesis, market price should not deviate from the fundamental value, yet the bubbles and bursts listed above show the reverse is true. More importantly, the incidence of bubbles and bursts in real life has caused severe damage to the economic system. For example, the last housing bubble in 2008 destroyed large amounts of wealth and put the global economy into financial crisis; household net worth dropped by 18 percent, or more than US$10 trillion, the largest loss of wealth in the fifty years (Jacobsen and Mark, 2010) and approximately 30 million individuals lost their jobs (Şahin et al., 2014). In response to these events, extensive research from both the theoretical and practical realms has been dedicated to understanding bubbles and bursts.

The formation of bubbles, also called the run-up phase, is an early phase of a financial crisis. It is followed by the second phase which starts after the bubble bursts (Brunnermeier and Oehmke, 2013). The asset market experiment (Smith, Suchanek and Williams, 1988)(hereafter SSW) is well-known to snapshot incidents at the run-up phase of the financial crisis when bubbles and bursts occurred. SSW has been thoroughly studied using numerous variations to understand the determinants of bubbles and bursts (Sunder, 1995; Palan 2013). Typical SSW asset market experiments use equal endowments at the beginning of the period to give the subject the same power to influence the hypothetical market[1]. Existing literature shows that the incidence of bubbles and bursts is influenced by many factors such as the market structure, asset properties, and trader characteristics (Powell and Shestakova, 2016). The main finding in the equal endowment treatment is that at the beginning of the period, the market price is below fundamental value and gradually increases beyond fundamental

[1] See sample studies of the asset market experiment: Eckel and Füllbrunn, 2015; King, Smith, Williams and van Boening, 1993; M. Kirchler, Huber and Stockl, 2012; Kose, 2013; N. Smith, 2012; van Boening, Williams and LaMaster, 1993).

value reaching the hump which shows the existence of a bubble. Near the end of the period, the bubble bursts and the market price drops drastically.

Literature shows that under an equal endowment setting, subjects trade below the fundamental value at the beginning of the experiment. The market price starts to increase beyond fundamental value when it reaches the middle part of the experiment, indicating the occurrence of a bubble. Near the end of the period, the bubble bursts (Powell and Shestakova, 2016). The experiment under an inequality of endowment setting, however, has attracted less attention and this paper aims to fill this research gap.

On the other hand, a strand of literature on decision making has found that inequality could impact on individual-level behaviour and decision making (Clark and D'Ambrosio, 2015; Mishra, Son Hing and Lalumie`re, 2015). Inequality could stimulate the self-perception that leads to behavioural bias, such as the better-than-the-average effect (Helweg-Larsen and Shepperd, 2001) and self-enhancement (Loughnan et al., 2011) which observe the tendency for people to evaluate themselves more favourably than others. Inequality also influences consumption and saving behaviour according to the relative income hypothesis (Duesenberry, 1949) and cascading effect behaviour (Frank, Levine and Dijk, 2010). Risk preference is also influenced by inequality through the last place aversion effect (Kuziemko et al., 2011; Haisley, Mostafa and Loewenstein, 2014) which pushes low-income groups to take more risks to avoid becoming the loser.

This paper connects two strands of literature, the SSW and the inequality and decision-making literature, and seeks to investigate how inequality influences decision making in the SSW. To the best of my knowledge, there is no study of asset markets that incorporates inequality of endowment in the treatment and this study aims to fill this research gap. The research questions of this study are as follows: Does the market characterised by inequality of endowment experience more bubbles? Do low-endowed subjects behave differently in trading compared to normal-endowed subjects? How do different inequality settings affect trading behaviour?

It is shown that the unequal setting could trigger the wealth comparison effect stimulating low-endowed subjects to trade more frequently and at greater risk due

to the last-place aversion effect (Kuziemko et al., 2011), and creating more competition in the market hence higher the intensity of bubbles and bursts in the market.

Contrary to my prediction, no proof was found that inequality of endowment stimulates bubbles/bursts. The market with unequal symmetric endowment creates a significantly lower average market price (AMP) compared to an equal endowment setting. This finding is robust in the case where endowment information is kept private and where inequality is distributed asymmetrically (skewed-low endowment and skewed-high endowment).

While there is no proof that inequality of endowment stimulates bubbles and bursts, it is evident that the low-endowed group trades more frequently compared to normal- and high-endowed subjects, indicating the last-place aversion effect. Nevertheless, evidence that different inequality settings affected the selling and buying frequency of the low-endowed group was unconvincing. When comparing the willingness to take risks in buying shares, however, I found consistent evidence that both low- and high-endowed groups were willing to put a higher bidding price in all comparable treatments.

Following this introduction, the Literature Review section discusses in more depth how inequality affects decision making and pinpoints the gap in the existing literature on bubbles and bursts. In particular, I assert the need to incorporate an inequality setting in the well-known asset market experiment. Regarding Experimental Design and Methodology, I discuss how various inequality treatments are designed and how the experiment is conducted. In the Results section, I discuss how inequality affects the incidence of bubbles and bursts and how it affects the trading behaviour of differently endowed subjects. My findings are summarised, limitations noted and future research avenues identified in the concluding section.

4.2 Literature Review

While inequality of endowment has not been studied within the asset market experiment, many other studies initiate a deeper enquiry into the effect of inequality on decision making. Moss, Thaker and Rudnick (2013) classify these studies into four different categories.

The first concerns inequality and self-perception, such as the study by Guenther and Alicke (2010) which stated that top-income groups suffered from a behavioural bias such as the better-than-average effect (Helweg-Larsen and Shepperd, 2001), optimistic bias (Helweg-Larsen and Shepperd, 2001), and self-enhancement (Loughnan et al., 2011), each showing the tendency for people to evaluate themselves more favourably than an average peer.

The second group concerns inequality and consumption/savings, such as the study by Duesenberry (1949) with his relative income hypothesis that individual utility consumption is influenced by one's status relative to others. Frank, Levine and Dijk (2010) also argue that wealth concentration in the top income group has stimulated a cascading effect so that the lower income group disburse additional expenditure.

The third category relates to inequality and working hours, such as the study by Bowles and Park (2005), which found that people are willing to work longer hours if inequality is induced. The final group concerns inequality and risk, such as Kuziemko et al. (2011) who posited Last Place Aversion that pushes low-income groups to be greater risk takers. Studying risk preference in playing a lottery Haisley et al. (2008) also found that poor people take more risks. They explained *'implicit comparisons with other income classes lead low income individuals to view playing the lottery as one of the few means available to attempt to 'correct' for their low relative income status'* (Haisley et al, 2008, p. 283).

Some studies utilised an experimental approach to understanding how inequality affects decision making. Bagnoli and Mckee (1991), Rapoport and Suleiman (1993), Anderson et al. (2008) are among studies who incorporate inequality in a public goods game and find that inequality hinders cooperation, thus reducing contributions to the public good. In the trust game, Greiner et al (2012) found

that in an equal endowment treatment, trust is initially high. However, in an unequal endowment treatment, trust is lower. On the other hand, incorporating inequality by varying the show-up fee reduces trust when the show-up fee is awarded privately (Anderson, et al. 2006). Utilizing empirical data, Zmerli and Castillo (2015) found that inequality negatively affects political trust in Latin America.

In the ultimatum game experiment, Armantier (2006) used unequal endowment and found that rich subjects are more selfish whereas the poor are more tolerant. A contrasting result was proposed by Schmidt et al. (2015) using a field experiment: they found that inequality makes rich subjects take higher risks whereas poor subjects' decisions are not affected.

Although these studies have not provided a solid conclusion as to whether inequality affects decision making, these studies lay a promising ground of experimental methodology for future development.

Much has been done to understand how inequality affects decision making. However, this research area has not explored how inequality affects the incidence of bubbles and bursts. While a growing number of studies have investigated how inequality affects bubbles and bursts, these have mainly been non-experimental based studies, which so far have not reached a solid conclusion.

Non-experimentalists, however, mostly consider broader so-called financial crises, extending the discussion beyond the incidence of bubbles and bursts to include periods before and afterwards[2]. Nevertheless, conclusions are conflicting as to whether inequality stimulates financial crises or not. For example, some studies found that inequality stimulates bubbles and bursts (Rajan, 2010; Fitoussi and Saraceno, 2010; Perugini et al. 2014; Kumhof, 2015; Krueger and Perri, 2006; Blundell and Etheridge, 2010; Brzozowski et al., 2010; and Jappelli and Pistaferri, 2009). Most of these studies endorse the view that increased inequality stimulates low-income groups to follow the consumption behaviour of high-income groups, thus incurring debts. This contagious phenomenon is termed expenditure cascade

[2] These papers investigate the effect of inequality in a broader sense as a part of a financial crisis (Brunnermeier and Oehmke, 2013).

(Frank et al., 2010), trickle-down behaviourism (Stiglitz, 2012), or trickle-down consumption (Morse, 2013).

Opposing studies, which are in the minority, argue that there is no strong support for the hypothesis that rising inequality stimulates financial crises. Atkinson and Morelli (2010) asserted that results were mixed and failed to give strong support to the hypothesis that rising inequality stimulates financial crisis. They argued that financial crises were preceded by rising inequality in ten cases and by falling inequality in seven. Bordo and Meissner (2012) also found very little evidence linking credit booms and financial crises to rising inequality.

Apart from these findings, the existing literature leaves some gaps and unexplored areas that need further investigation.

The relative income hypothesis in the run-up period[3] of the financial crisis has not been examined more extensively in a way that it can be tested, for example, in the experimental lab study. The relative income hypothesis assumes that the consumption and savings behaviour of individual reference groups (such as friends, co-workers, or relatives) has a very large impact on individual behaviour (for example Frank et al (2010) used the term expenditure cascade, Stiglitz (2012) expounds the trickle-down behaviourism hypothesis, and Bertrand and Morse (2013) used the term trickle-down consumption hypothesis). It remains untested whether individuals in low-income groups who are exposed to higher inequality seek to maintain their consumption rate and take on more debt in a period of stagnant wages. Further tests are needed to establish whether a low-income individual would mimic higher-income individuals' financial decision-making behaviour, as the relative income hypothesis argues.

Secondly, although non-experimental studies give some macroeconomic insight into how low-income groups respond to increasing inequality, they fail to explain in depth how the mechanism operates at an individual level in the run-up and crisis phases. However, while non-experimental studies might suffer from internal

[3] Several studies such as Rajan (2010) and Fitoussi and Saraceno (2010) indicate that financial crises are initially ignited by bubbles and bursts. Brunnermeier and Oehmke (2013) explain that there are two phases of a financial crisis; the run-up phase in which bubbles occur and the crisis phase after the bubble bursts.

validity in explaining individuals' financial decision-making behaviour, experimental studies are not entirely convincing in filling this gap. Studies in the lab show that inequality could influence individual decision making in a wide range of areas (Moss et al., 2013), but it remains unclear whether this conclusion is also validated in an asset market experiment. The latter offers a solid and established experimental model to understand bubbles and bursts. However, this experimental tool has not been explored to incorporate inequality in the treatment.

Thirdly, existing literature has not provided sufficient discussion of how bubbles appear when the market is exposed to a different level of inequality, or how different individuals in different income groups behave and affect asset markets.

Decision making at the individual level is important. This should be the focus of the discussion, which both non-experimental and experimental literature has overlooked. Many experimental studies focus on individual decision making from an inequality perspective. Although substantiation is needed, studies of inequality and decision making have the potential to shed light on the discussion.

The study of inequality focusing on individual behaviour in the lab is developing. Some canonical lab experiments that were initially designed to have equal endowment have started to incorporate inequality in their treatment by setting up an unequal endowment. This modification allows the researcher to compare individual decision making within the controlled environment of both equal and unequal endowment. Moss et al., (2013) provide a thorough discussion of the development of inequality in the lab experiment. They reviewed a range of studies of inequality and self-perception, inequality and consumption/savings, inequality and working hours, inequality and risk, inequality and social capital/trust, and financial crises. They concluded that the nature of inequality might influence individual decision making in a wide range of areas.

All these experimental lab studies could act as stepping stones to understanding inequality and financial crises at the individual level. Furthermore, they could enable us to investigate a deeper question, that has not been addressed before, in particular concerning individual behaviour in the run-up and crisis phases of bubbles and bursts. This could pinpoint the so-called behavioural distortions that might cause bubbles to occur (Brunnermeier and Oehmke, 2013). Accordingly, I

argue that further investigation of inequality through the SSW asset market experiment could be one of the most effective ways of addressing this knowledge gap.

Existing literature suggests that in a situation of inequality, a subject faces social comparisons of wealth which potentially affect individual-level behaviour and decision making[4]. This research aims to investigate the impact of inequality on trading behaviour and the formation of bubbles and bursts through an asset market experiment. The research is aimed to answer these research questions: Does the market characterised by inequality of endowment experience more bubbles? Do low- and high- endowed subjects behave differently in trading compared to the normal-endowed subject? How do different inequality settings affect trading behaviour?

It is expected that inequality of endowment leads to social comparison or wealth effect which influences subjects' behaviour in the low-income group to trade more and take more risk to gain profit and increase wealth. This eagerness to trade more frequently is predicted to increase market prices and hence stimulate more bubbles and bursts.

[4] Kuziemko et al. (2011) and Haisley et al. (2008) in the lottery game; Bagnoli and Mckee (1991), Rapoport and Suleiman (1993) and Anderson et al. (2008) in the public goods game; Greiner et al (2012) and Anderson et al., (2006) in the trust game; Armantier (2006) and Schmidt et al. (2015) in the ultimatum game; Guenther and Alicke (2010) in the trait rating experiment; and Loughnan et al., (2011) in their self-enhancement assessment method.

4.3 Experimental Design

Procedure and Market Design

A subject participates in 15 periods of double auction market using z-tree software (Fischbacher, 2007). At the beginning of the experiment, the subject receives an endowment in the form of cash and shares. The subject can post to sell their shares or buy shares in the market, assuming they have enough cash. Each subject sees a trading screen that contains information, as can be seen in the appendix.

Following SSW, the market only consists of one share and the fundamental value of the shares is informative for the subject. Fundamental value shows expected dividend value (EDV) times the remaining period of the experiment, hence, the fundamental value of a share in period t is EDV x (16-t). Each share receives dividend value 0, 8, 28, 60 ECU with equal probability. The expected dividend value is 24 per period and is paid at the end of every period. Accordingly, at the beginning of period 1, the fundamental value is 360 ECU. It decreases by 24 ECU per period until, in period 15, the fundamental value reaches 24 ECU. When the experiment is finished, the fundamental value is 0. In the experiment, there is no interest in holding cash, no explicit transaction cost, and no cash borrowing. The subject's payoff is their final cash position after period 15 is ended, converted to GBP at an exchange rate of 1 GBP = 130 ECU and no show-up fee is provided. This is given in cash after the experiment is ended.

The subject is recruited through ORSEE (Greiner, 2015), University of Nottingham. In the experiment, the subject sits in an individual cubical with a client computer that connects to the server computer and is given oral and written instruction (see Supplementary Materials

Appendix A: Instruction and the experiment)

The Treatment

The current study is interested in investigating the effect of inequality endowment in an asset market experiment on bubbles and bursts. The current study compares equal endowment as a baseline treatment to unequal endowment treatment. The treatment design is as follows:

	T1 (Equal)	T2 (Unequal, Symmetric, Salient)	T3 (Unequal, Symmetric, Non-Salient)	T4 (Unequal, Skewed-High, Salient)	T5 (Unequal, Skewed-Low, Salient)
Number of Subjects	8				
Market Structure	Total Asset and Liquidity Level (cash to share ratio) in the market are the same across treatment: 10.440 ECU and 21%				
Endowment	Equal	Unequal	Unequal	Unequal	Unequal
Saliency	Yes	Yes	No	Yes	Yes
Endowment Distribution	endowment 1.305 ECU (Cash 225 ECU and 3 Shares)	High Endowment Group (4 Subjects): endowment 1,790 ECU (Cash 350 ECU and 4 Shares)	High Endowment Group (4 Subjects): endowment 1,790 ECU (Cash 350 ECU and 4 Shares)	High Endowment Group (6 Subjects): endowment 1,350 ECU (Cash 270 ECU and 3 Shares)	High Endowment Group (2 Subjects): endowment 1.500 ECU (Cash 600 ECU and 3 Shares)
		Low Endowment Group (4 Subjects): endowment 820 ECU (Cash 100 ECU and 2 Shares)	Low Endowment Group (4 Subjects): endowment 820 ECU (Cash 100 ECU and 2 Shares)	Low Endowment Group (2 Subjects): endowment 1.170 ECU (Cash 90 ECU and 3 Shares)	Low Endowment Group (6 Subjects): endowment 1.240 ECU (Cash 100 ECU and 3 Shares)
Number of Session	6	6	6	6	6

Table 1 Treatment Design

Across the treatment, I use standard SSW by adjusting the number of subjects from nine to eight, to keep the experiment design simple and comparable. Having an even number of participants makes the wealth distribution to the high- and low-endowed groups in unequal treatment easier.

For the baseline treatment (T1-Equal), subjects receive the same amount of endowment. The subjects in this group as referred to as the Normal Endowment Group (henceforth NEG). T2 (Unequal, Symmetric, Salient) is designed to investigate whether asymmetric inequality of endowment would also lead the market to experience bubbles. In T2, eight subjects are clustered into two groups of four; the high-endowment group (henceforth HEG) and the low-endowment group (henceforth LEG).

This research also seeks to test the effect of the saliency of inequality on the incidence of bubbles and bursts. Previous literature found that saliency of inequality influences behaviour (Anderson et al., 2006; Anderson et al., 2008; Loughnan et al., 2011). Accordingly, I introduce T3 (Unequal, Symmetric, Non-Salient) in which the subjects only have access to their own amount of endowment. They do not have access to information about the endowment of other subjects.

Different settings of inequality are also tested. T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) are designed to investigate this.

In T4 (Unequal, Skewed-high, Salient), the percentage of subjects who receive high endowment is larger while in T5 (Unequal, Skewed-low, Salient) the number of subjects with a lower endowment in larger.

All treatments should be comparable. Previous literature found that market structure, as denoted for example by the cash to asset ratio, impacts on the occurrence of bubbles (Caginalp et al., 1998; Haruvy and Charles N., 2006). Hence, I set the same market structure for all five treatments; the total asset and the liquidity level are the same. Total assets are the sum of shares and cash. Liquidity level is the ratio between cash and total assets. This is to control such that any result differences are caused by the different treatments applied and not the different market structure.

The subject is assigned to a group randomly. This is done by giving a random number from 1 to 8 to subjects. Before subjects enter the lab, each subject has to pick a piece of paper in the box that contains a subject number which also corresponds to a computer number.

For complementary analysis, it is of interest to test whether the cognitive ability and risk preference of each subject relate to their decisions. The subject's cognitive ability and risk preferences are found to influence the occurrence of bubbles/burst (Powell and Shestakova, 2016). To measure a subject's risk preference, the lottery game by Holt and Laury (2002) is conducted. Following Frederick (2005) and Toplak et al. (2014), the subject is asked seven questions through a Cognitive Reflection Test (CRT) to measure their cognitive ability. CRT scores range from 0 to 7 which corresponds to the number of correct answers. At the end of the experiment, the subject is asked to fill in general information such as age, sex, income, and nationality.

4.4 Results

In total 240 subjects joined the 60 sessions of the experiment. The experiments were held in the Centre for Research in the Behavioural Sciences (CRIBS) the University of Nottingham between December 2018 and February 2019. Of the participants, 43% were male, 57% were female, and the average age of the subject was 22.5 years. Each session lasted for 1.5 hours and the average payoff was £13.

This section first presents the general findings of all treatments and goes on to compare the incidence of bubbles and bursts among treatments. Three comparisons are made. First I compare T1 (equal) to T2 (Unequal, Symmetric, Salient) to see whether inequality of endowment caused more bubbles and bursts. Next, I compare T2 (Unequal, Symmetric, Salient) to T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) to see how different distributions of inequality affect the market price. Lastly, I compare T2 (Unequal, Symmetric, Salient) to T3 (Unequal, Symmetric, Non-Salient) to test the effect of saliency on inequality.

In general, the market price in each treatment is described in Figure 3. Overall, the market price in the middle period is higher compared to the first and last period, mimicking a hump shape. The T1 (Equal) result supports the general finding of SSW that in some periods subjects trade at a higher price than the fundamental value. At the beginning of the period in T1 (Equal), the market price is below the fundamental value, it gradually increases and reaches the culmination point in period 9. From that point, the price starts to decrease but is still higher than the fundamental value. In T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient), the graph shows only small bubbles towards the end of the period while in T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) the bubble occurs on a smaller scale compared to T1 (Equal).

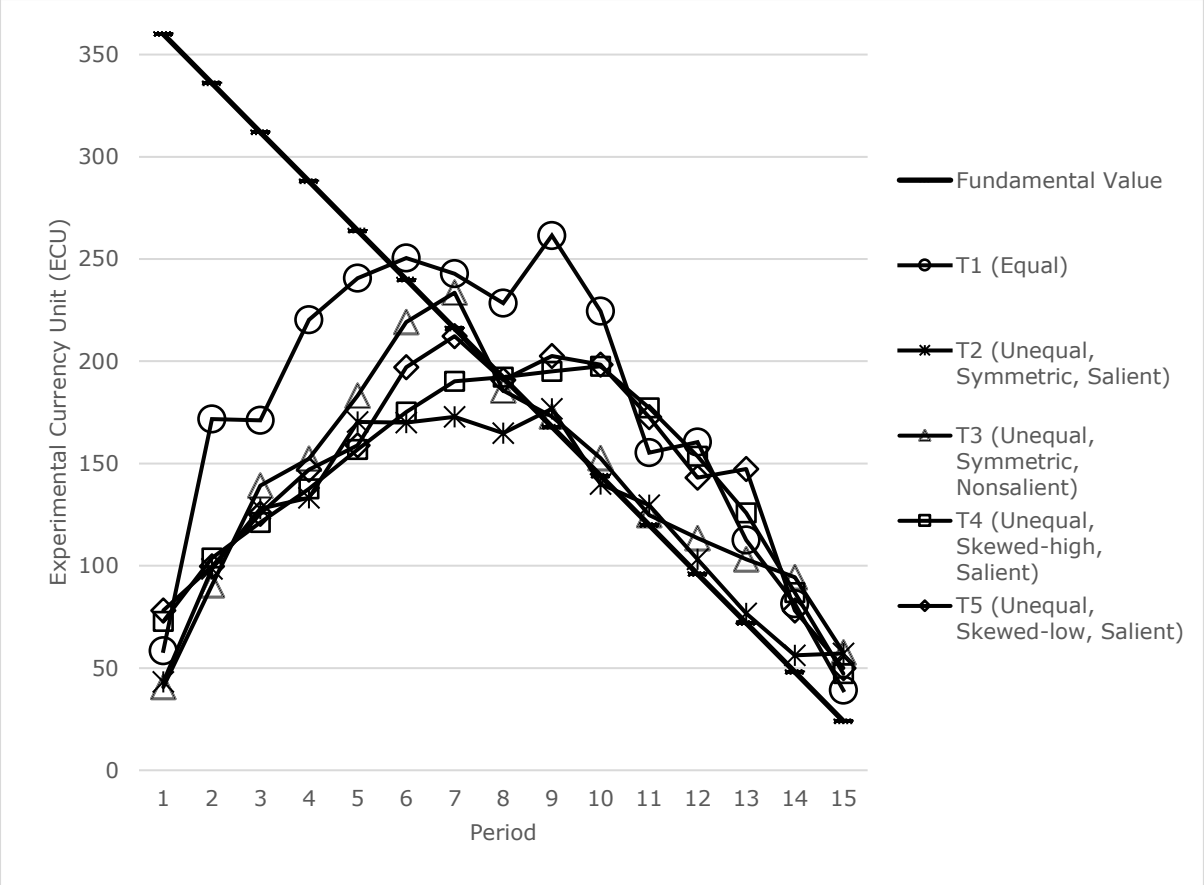


Figure 1 Asset Market Price Summary

I compare the market price in each treatment by using the measurement of mispricing (Stöckl, Huber and Kirchler, 2010; Chmura, Bai and Bauder, 2019). Each of the bubble measurements captures unique information which helps understand more thoroughly the difference in bubbles and bursts in each of the treatments[5]. For example, RD Relative Deviation[6]

$$\boldsymbol{RD} = \frac{\frac{\mathbf{1}}{\boldsymbol{N}}\sum_{\boldsymbol{P=1}}^{\boldsymbol{N}}\left(\overline{\boldsymbol{p}}_{\boldsymbol{p}} - \boldsymbol{FV}_{\boldsymbol{p}}\right)}{|\overline{\boldsymbol{FV}}|}$$

is more appropriate to measure the bubbles independent of the number of periods and the absolute value of FV. Amplitude can be expressed as

$$\boldsymbol{A} = \max_{\boldsymbol{p}} \frac{\overline{\boldsymbol{p}}_{\boldsymbol{p}} - \boldsymbol{FV}_{\boldsymbol{p}}}{\boldsymbol{FV}_{\boldsymbol{p}}} - \min_{\boldsymbol{p}} \frac{\overline{\boldsymbol{p}}_{\boldsymbol{p}} - \boldsymbol{FV}_{\boldsymbol{p}}}{\boldsymbol{FV}_{\boldsymbol{p}}}$$

[5] For more discussion of bubble measurement tools see Chmura et al., (2018)

[6] Notes: $\overline{\boldsymbol{p}}_{\boldsymbol{p}}$= mean price of period p; $\boldsymbol{FV}_{\boldsymbol{p}}$ = fundamental value of period p; $\boldsymbol{FV}$= mean fundamental value, *N* = total number of periods

and measures the widest gap between the largest and smallest deviation. The bubbles' Duration (BD) captures the time variable of the length of the bubble. Number of Bubbles (NBB) and Number of Bursts (NBS) provide information on how often the bubbles (bursts) occur. Number of Bubbles (NBB) is calculated from the number of humps where the average price is above FV and market price in the previous period is below FV. The Number of Bursts (NBS) indicates the number of dips where the average market price is below FV and market price in the previous period is above FV[7]. The results are presented in each corresponding subsection below.

Symmetrical Inequality

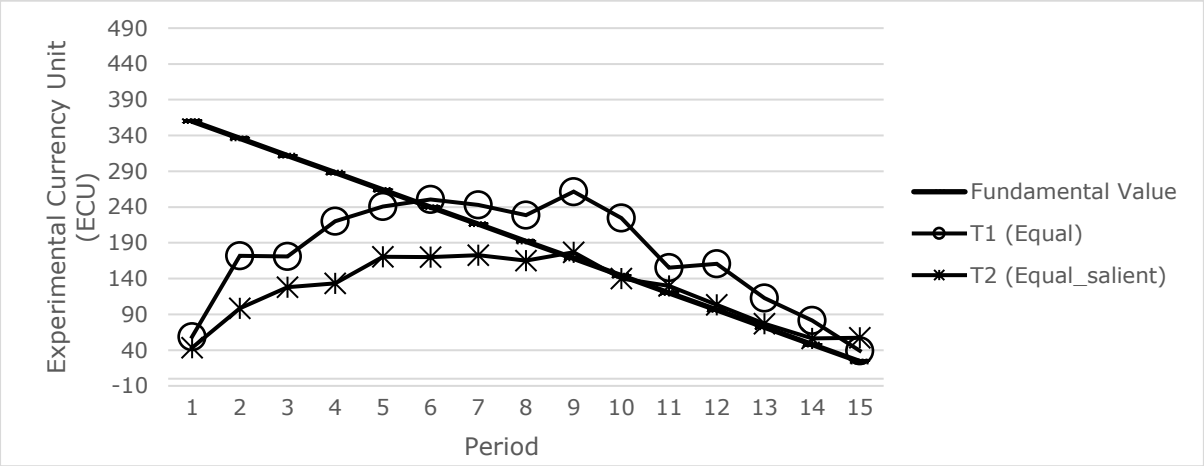


Figure 2 Asset Market Price T1 (Equal) and T2 (Unequal, Symmetric, Salient)

Bubbles and bursts measurements	T1 (Equal)	T2 (Unequal, Symmetric, Salient)	Sig Diff
MP all periods	177.7	122.7	**
RD all periods	-0.01	-0.03	*
MP Phase 2	247.6	168.3	*
MP Phase 2a	181.8	126.4	*
RD Phase 2	0.01	-0.02	**
RD Phase 2a	0.01	-0.01	**

Notes:
(a) MP: Market price, RD: Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of Bubbles, NBS: Number of Bursts. (b) Phase 1: periods 1 to 5, phase 2: periods 6 to 10, phase 3: periods 11 to 15, phase 2a: periods 6 to 15. (c) Mann Whitney U test compare to the baseline treatment (T1-Equal): *** significant at 1%, ** significant at 5%, * significant at 10% (d) the full report can be seen in Appendix B: Bubbles and bursts in T1 (Equal) and T2 (Unequal, Symmetric, Salient).

Table 2 Average Bubbles and Bursts Measurements T1 (Equal) and T2 (Unequal, Symmetric, Salient)

[7] The definition and calculation of bubbles (bursts) is different from Chmura et al., (2018). I am more interested in counting the occurence of bubbles (bursts) that are preceded by a period where price is below (above) fundamental value. P: mean price, FV: Fundamental Value.

In general, as shown in Figure 2, the average market price in T1 (Equal) is higher compared to T2 (Unequal, Symmetric, Salient) (Mann-Whitney Test p-value<5%). In fact, the market price in T2 (Unequal, Symmetric, Salient) is below fundamental value in most of the period and is only slightly higher near to the end of the experiment. My prediction that bubbles will occur more intensely in T2 (Unequal, Symmetric, Salient) is not proven. The relative deviation measurement in T2 (Unequal, Symmetric, Salient) also shows a higher negative figure which indicates more undervaluation (Mann-Whitney Test p-value<1%). I also found that T2 (Unequal, Symmetric, Salient) experienced higher amplitude, shorter bubble duration, and a higher number of bubbles and lower number of bursts. Nevertheless, the last four measurements do not differ statistically compared to T1 (Equal) (see Table 2).

To get the full picture of how big the difference in the occurrence of bubbles is, I investigate the mispricing in several phases. Following Chmura et al., (2018), I examine the mispricing measurement in three different phases: phase 1 (periods 1 to 5), phase 2 (periods 6 to 10) and phase 3 (periods 11 to 15). Additionally, phase 2a is the aggregation of phase 2 and phase 3 (periods 6 to 15). This technique will help us to answer the research question more thoroughly.

It was found that the average market price difference is weakly significant in phase 2 where the humps of the bubbles usually occurred (Mann Whitney U test, $p < 10\%$). Relative Deviation (RD) measurement confirmed this result that RD for T1 (Equal) and T2 (Unequal, Symmetric, Salient) shows a significant difference only in phase 2. RD in T2 (Unequal, Symmetric, Salient) shows a negative sign persistently in phase 1 and 2 indicating undervaluation. There was not enough evidence to suggest that the amplitude (A), the duration of bubbles (DB), the number of bubbles (BB) and the number of bursts (BS) in T2 (Unequal, Symmetric, Salient) was different compared to T1 (Equal).

Earlier literature asserts that inequality influences individual-level behaviour and decision making. Schoenberg (2008) explained that bubbles could also be stimulated by other motives, such as the social comparison of the wealth effect that could influence subjects to trade more to avoid poor performance. In this asset market experiment, however, there is no strong evidence to support the

argument that the unequal endowment treatment creates a higher average market price compared to the basic treatment.

Skewed Inequality

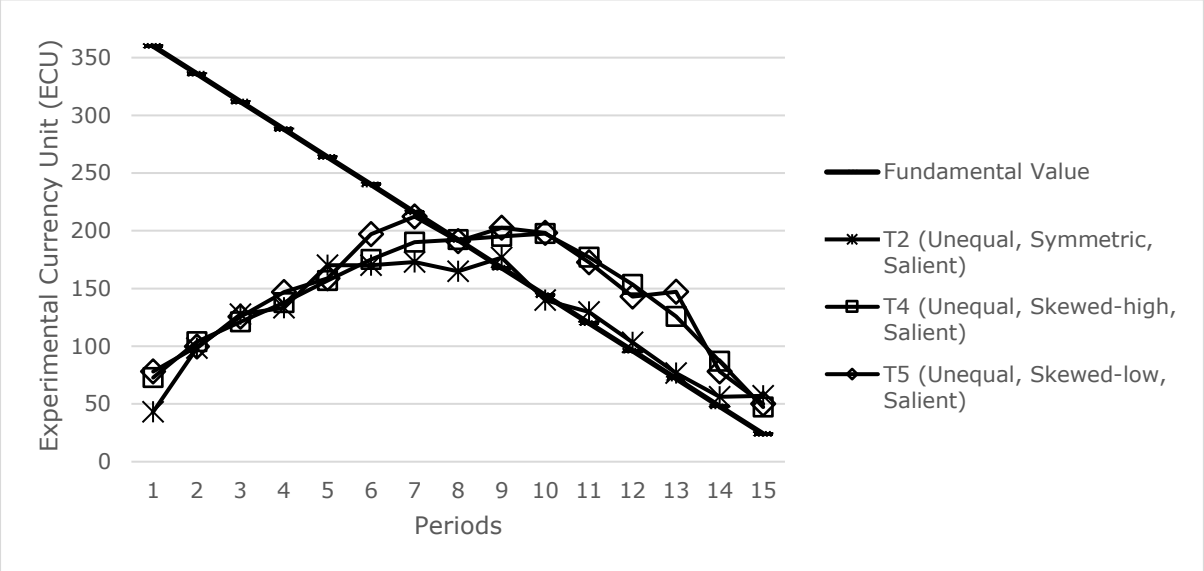


Figure 3 Asset Market Price T2 (Unequal, Symmetric, Salient), T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

Bubbles and bursts measurements	T2 (Unequal, Symmetric, Salient)	T4 (Unequal, Skewed-high, Salient))	T5 (Unequal, Skewed-low, Salient))	Sig Diff T2:T4	Sig Diff T2:T5	Sig Diff T4:T5
RD all periods	-0.03	-0.02	-0.02	*	-	-
MP Phase 2a	126.4	153.7	159.2	*	*	-
RD Phase 2	-0.02	-0.00	0.00	-	*	-
RD Phase 2a	-0.01	0.01	0.01	*	**	-
NBB Phase 2a	1.67	2.00	3.00	-	*	-

Notes:
(a) MP: Market price, RD: Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of bubbles, NBS: Number of bursts. (b) Phase 1: periods 1 to 5, phase 2: periods 6 to 10, phase 3: periods 11 to 15, phase 2a: periods 6 to 15. (c) Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10% (d) the full report can be seen in Appendix C: Bubbles and bursts in T2 (Unequal, Symmetric, Salient), T4 (Unequal, Skewed-high, Salient), and T5 (Unequal, Skewed-low, Salient).

Table 3 Average Bubbles and Bursts Measurements T2 (Unequal, Symmetric, Salient), T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

To give a broader view of the effect of inequality of endowment on the occurrence of bubbles, two additional treatments were conducted: T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient). These two treatments are different from T2 (Unequal, Symmetric, Salient) in that the amount of endowment is distributed asymmetrically. In T4 (Unequal, Skewed-high, Salient), subjects who receive high endowment outnumber subjects who receive low endowment

while in T5 (Unequal, Skewed-low, Salient) the distribution is set inversely. Figure 3 shows the mean price of T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) compared to T2 (Unequal, Symmetric, Salient)

The mean price of both T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) was found to be higher but not significantly different compared to the market price in T2 (Unequal, Symmetric, Salient). There was a weak and mildly significant difference mostly in phase 2a in both treatments (see Table 3).

Using the same technique adopted previously, I further investigated the mispricing in several phases, in particular the mispricing measurement that showed significant differences in all 15 periods, to pinpoint at which phase the difference occurred.

For T4 (Unequal, Skewed-high, Salient), I found only a weakly significant difference in market price and RD in phase 2a (Mann Whitney U test, $p<10\%$). In T5 (Unequal, Skewed-low, Salient), more differences were found. For example, it was found that although at the aggregate level there was no difference in RD between T5 (Unequal, Skewed-low, Salient) and T1 (Equal), the RD in phase 2 (Mann Whitney U test, $p<10\%$) and 2a (Mann Whitney U test, $p<5\%$) is statistically different. The same case also occurs in many bubbles in phase 2a (Mann Whitney U test, $p<10\%$).

I also compare T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient). Having a different endowment distribution, resulted in no differences in all bubbles and bursts measurements.

Saliency Effect

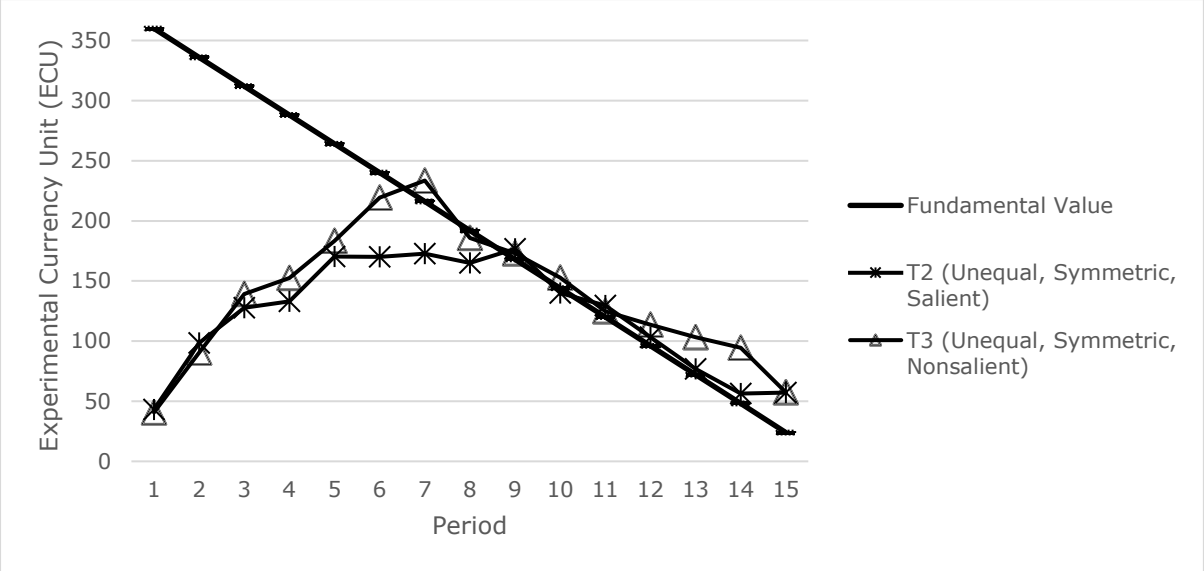


Figure 4 Asset Market Price T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

Bubbles and bursts measurements	T2 (Unequal, Symmetric, Salient)	T3 (Unequal, Symmetric, Non-Salient)	Sig Diff
MP Phase 2a	126.4	147.5	*
NBB Phase 3	1.33	2.00	*

Notes:
(a) MP: Market price, RD: Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of bubbles, NBS: Number of bursts. (b) Phase 1: periods 1 to 5, phase 2: periods 6 to 10, phase 3: periods 11 to 15, phase 2a: periods 6 to 15. (c) Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10% (d) the full report can be seen in Appendix D: Bubbles and bursts in T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient).

Table 4 Average Bubbles and Bursts Measurements T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

After investigating the different occurrences of bubbles and bursts in the symmetric and skewed inequality treatments, this section explores the effect of inequality saliency on the bubbles and bursts.

The saliency of inequality is found to influence decision making. Anderson et al., (2008) found that when inequality is salient in the public good game, it affects the subject's behaviour by reducing their contribution. Loughnan et al., (2011) also found that when the social status of wealth is salient, individuals are more motivated to be standing among the crowd which may trigger more competition. Conversely, in a more equal society, the feeling of superiority of being above average is weakened. This effect of social comparison of inequality is also stressed by Kerbo (2011) and Wilkinson and Pickett (2010).

I conduct T3 (Unequal, Symmetric, Non-Salient) to test whether the absence of saliency influences a subject's decision making in the asset market experiment. All treatment settings of T3 (Unequal, Symmetric, Non-Salient) are the same with T2 (Unequal, Symmetric, Salient) except that in T3 (Unequal, Symmetric, Non-Salient) the information about the subject's wealth is kept private. The hypothesis is that saliency (non-salience) would stimulate more (less) competition and hence trigger more (less) bubbles.

I found that overall saliency of inequality does not stimulate more bubbles (Mann Whitney U test, $p>10\%$) compared to the equal endowment setting. While other mispricing measurements do not show evidence of difference, I found that the market price in T3 (Unequal, Symmetric, Non-Salient) is higher only in phase 2a (Mann Whitney U test, $p<10\%$) and the number of bubbles (NBB) in phase 3 (Mann Whitney U test, $p<10\%$).

Trading Behaviour

Besides measuring how bubbles and bursts occurred in different treatments, this research seeks to investigate the trading behaviour of subjects who belong to different endowment groups.

The treatments of the experiment are designed to capture various inequality settings. Each of the inequality settings reflects different wealth distribution this, in turn, constructs different social comparisons. When the distribution of wealth in the population is accessible to all subjects, subjects will compare each other's wealth and locate their position in the hierarchy. This is when the social comparison exerts influence on behaviour. I argue that the higher the inequality and the salience, the higher the subject's exposure to social comparison.

In this section, I investigate how the social comparison effect that is channelled through various inequality settings affects trading behaviour. Schoenberg (2008) explained that other trading motives such as the social comparison of the wealth effect could influence subjects to trade more to avoid poor performance. This is in line with the literature on inequality and decision making that low-endowed subject groups take more risks to avoid being placed in the game (Kuziemko et al., 2011; Haisley, Mostafa and Loewenstein, 2014).

I predict that different inequality settings give different scales of the social comparison effect, which could lead to different intensity of motivation to gain wealth from trading. For example, those subjects belonging to T1 (Equal) and T3 (Unequal, Symmetric, Non-Salient) do not experience the social comparison effect from wealth (Schoenberg, 2008) since in T1 (Equal), all subjects receive the same endowment and in T3 (Unequal, Symmetric, Non-Salient) the amount of endowment each subject has is not known. In such situations, the motivation that subjects in the T1 (Equal) and T3 (Unequal, Symmetric, Non-Salient) have to gain wealth might come from reasons other than social comparison.

On the other hand, subjects in the other three treatments experience the social comparison effect, on different scales. The social comparison effect that is experienced by the low-endowed group in T4 (Unequal, Skewed-high, Salient) might be higher compared to the same group in T5 (Unequal, Skewed-low, Salient) since the low-endowed subjects are the minority in T4 (Unequal, Skewed-high, Salient) but they are the majority in T5 (Unequal, Skewed-low, Salient). The social comparison effect experienced by the same group in T2 (Equal, Symmetric, Salient) might be in-between as the number of low- and high-endowed subjects are the same. The intensity of social comparison that subjects face will influence how much effort they put into acquiring wealth to fix their position and avoid becoming the loser in the game.

I also investigate two different sets of trading data to understand how different forms of inequality affect a subject's motivation to gain new wealth and escape from being the loser in the game (the last place aversion).

The first one is the frequency of trading. The frequency of trading consists of how many times the subject initiates a transaction. I use data on the intention of buying and selling to represent the subject's behaviour, based solely on their own decision making. I do not use the data frequency where the sale or purchase has already occurred in the market as those decisions involve not only the decision making of the subject of interest but also others. I assume that higher activity in intentions to buy and to sell shows higher motivation to gain wealth from trading. Conversely, lower engagement in trading shows less motivation to improve wealth.

Comparing only the frequency of trading does not grasp the whole picture of trading behaviour. Therefore, besides measuring the frequency of trading, I also measure the subject's willingness to take a risk in trading. I do this by measuring the gap between the share bidding price and share fundamental value. I assume that subject who ask to buy shares (bid share) above fundamental value is willing to take more risk. The higher the gap, the higher the risk that the subject takes to increase their wealth.

I calculate and compare both the frequency of trading and the subject's willingness to take risks in trading for the normal-endowed group (NEG), low-endowed group (LEG) and high-endowed group (HEG) for all treatments. I expect that those who are exposed to the social comparison effect have more motivation to improve their wealth by trading more frequently, taking more risk by bidding at a higher price, or both.

To start with, the overall picture of trading frequency among all different endowment group is discussed. Figure 5 shows the average buying and selling frequency of each endowment group within all five treatments. In general, buying frequency is high in phase 1 and gradually decreases. Conversely, the selling frequency is low in phase 1 and gradually increases towards phase 3. This behaviour is exactly what was predicted as the expected value of the dividend from the share is higher at the beginning of the period and hence it gives an incentive to the subject to buy more shares. The subject is also expected to sell more at the end of the period as the expected value of the dividend is getting smaller, and at the end of the period the value of the share is zero. There is no incentive to keep the share at this stage.

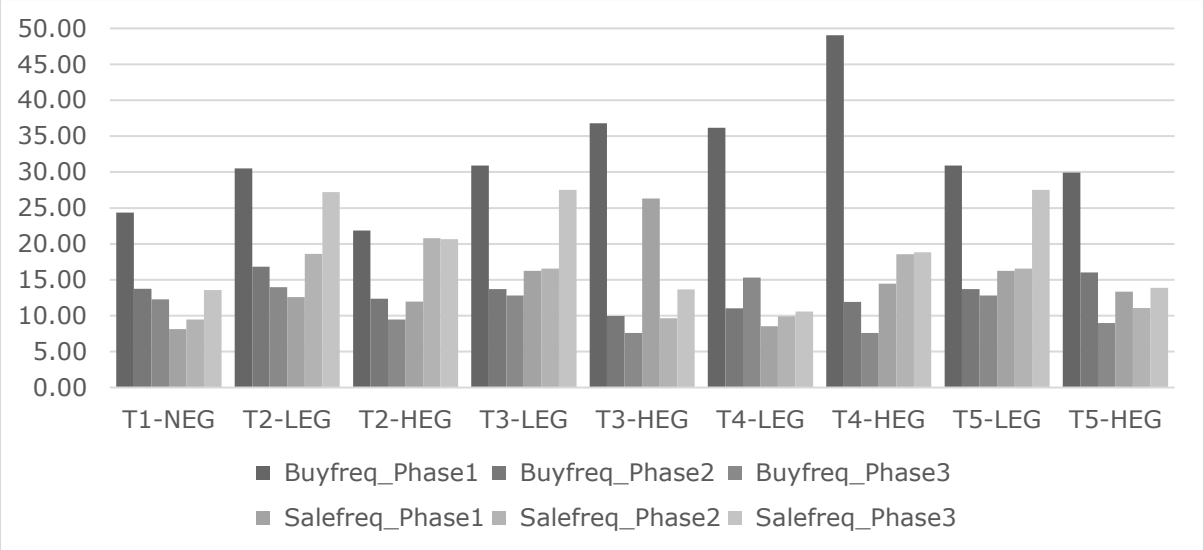
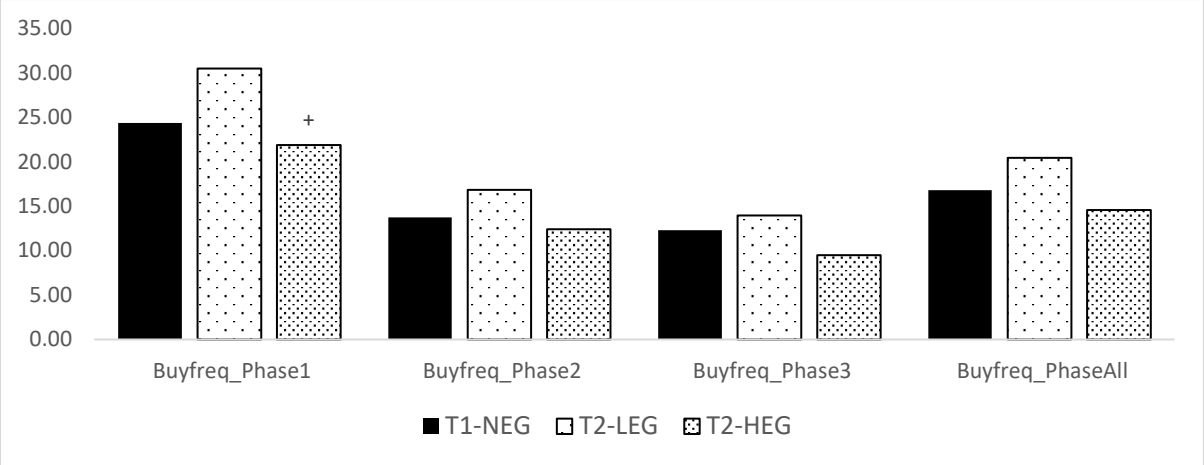


Figure 5 Average Trading Frequency

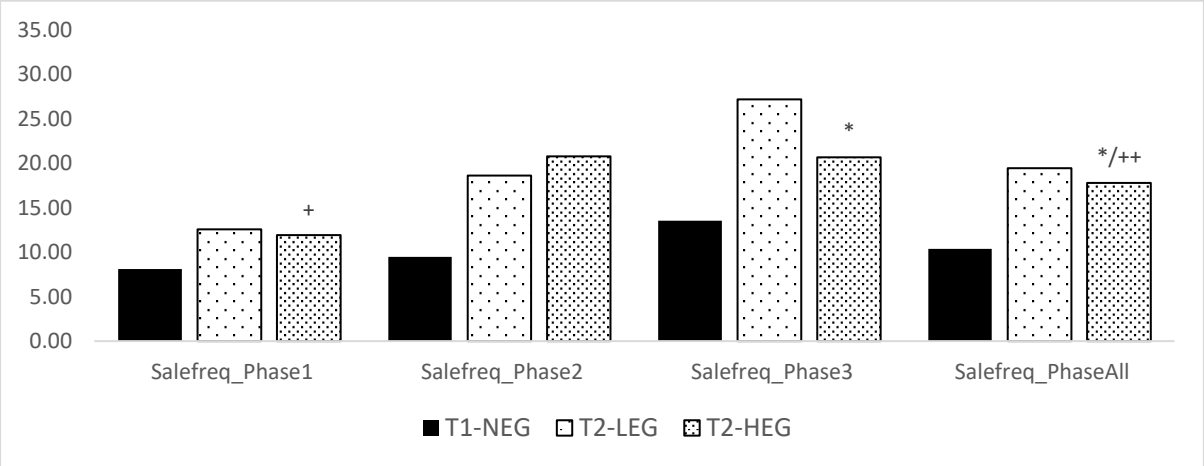
I move forward by studying treatments that are comparable one by one. First, I compare T1 (Equal) and T2 (Unequal, Symmetric, Salient). I test whether subjects' buying and selling frequencies of the equal endowment treatment (T1-Equal) are the same as the symmetric unequal treatment (T2 - Unequal, Symmetric, Salient) (see Figure 5). Although the low-endowed group in T2 (Unequal, Symmetric, Salient) has less cash, they consistently buy more in all three phases compared to the normal-endowed group in T1 (Equal) (Mann Whitney U test, $p>10\%$) and the higher-endowed group in the T2 (Unequal, Symmetric, Salient) (Mann Whitney U test, $p<10\%$).

The average selling frequency shows a more convincing pattern, that the low-endowed group in T2 (Unequal, Symmetric, Salient) sell more frequently and significantly different compared to the high-endowed group in T2 (Unequal, Symmetric, Salient) (Mann Whitney U test, $p<5\%$) and normal-endowed group in T1 (Equal) (Mann Whitney U test, $p<10\%$).

The low-endowed group in T2 (Unequal, Symmetric, Salient) is more active in trading. They want to acquire more shares and sell more shares compared to the two other groups. Given the small endowment that the low-endowed group in T2 (Unequal, Symmetric, Salient) has, this is curious.



(a) Buying frequencies



(b) Selling frequencies

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment. (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

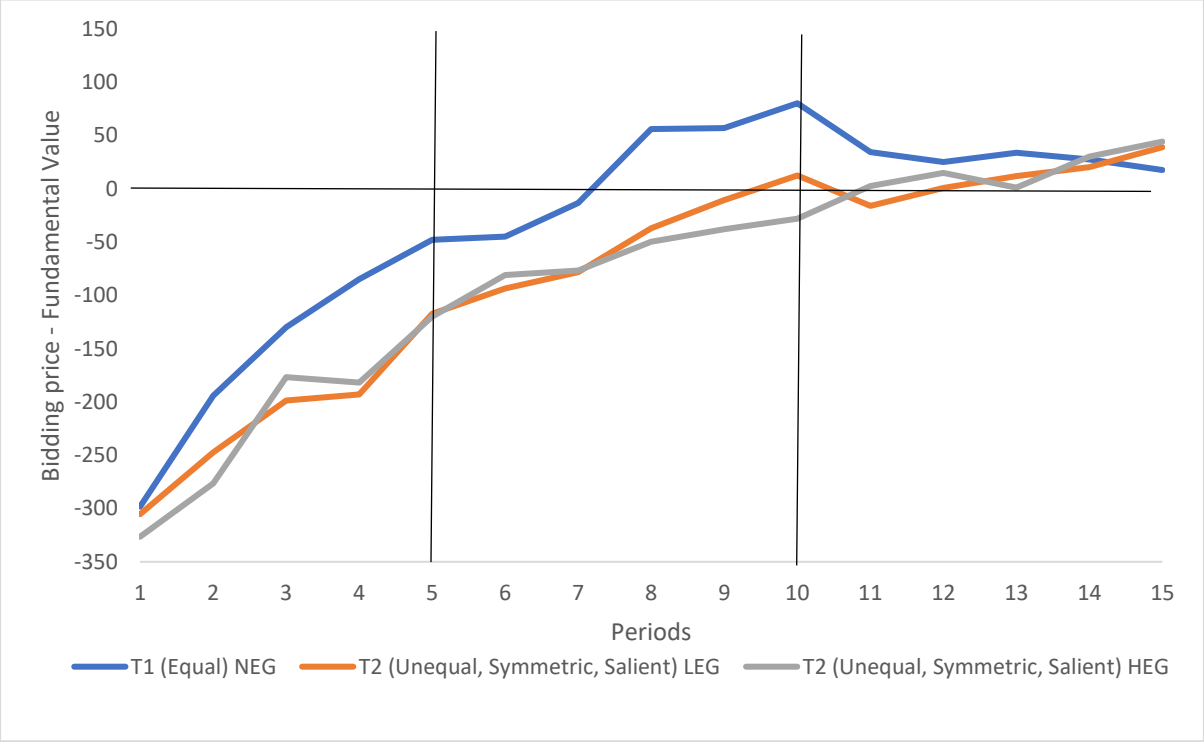
Figure 6 Average Trading Frequency T1 (Equal) and T2 (Unequal, Symmetric, Salient)

Now I move to investigate subjects' willingness to take risks in trading. As explained above, this is done by comparing the bidding price offered by different endowment groups (see Figure 7). The aim is to capture the risky trading behaviour that is conducted by the subject. I assume that any buying decision that exceeds the fundamental value constitutes risky trading behaviour. The higher the positive gap, the riskier the trading behaviour is.

The bidding price data shows an increasing pattern from far below the fundamental value in phase 1 and gradually increasing until it reaches above the fundamental value in phase 3. I found that both the low-endowed and high-

endowed groups in T2 (Unequal, Symmetric, Salient) take less risks in buying shares compared to the normal-endowed group in T1 (Equal). The difference is significant in phase 1 (Mann-Whitney Test p-value<5%) and phase 2 (Mann-Whitney Test p-value<1%). Note that in T2 (Unequal, Symmetric, Salient), the inequality is informative to all subjects. This contradicts to my hypothesis that the low-endowed group is willing to take more risks by bidding higher share prices compared to the normal-endowed group.

An additional note here is that the difference is also evident in the high-endowed group (see Table 5). Although subjects in this group have more wealth hence have more power to ask a higher price, their asking price is still below the normal-endowed group. This finding is also in contrast to previous literature in decision making that high endowed subjects suffer from optimistic bias or better-than-the-average effect (Helweg-Larsen and Shepperd, 2001; Loughnan *et al.*, 2011).



Note: (1) 0 line showing the fundamental value, (2) phase 1: periods 1 to 5, phase 2: periods 5 to 10, phase 3: periods 11 to 15.

Figure 7 Asking Price T1 (Equal) and T2 (Unequal, Symmetric, Salient)

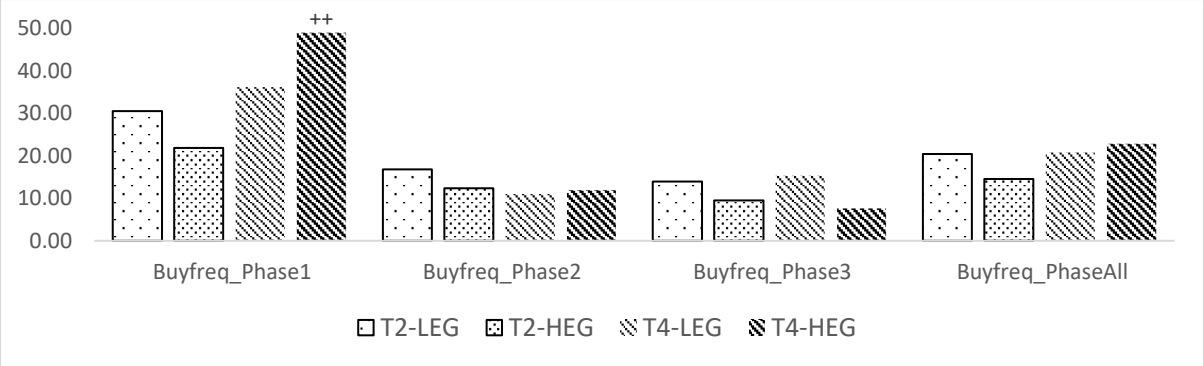
	T1 (Equal) NEG	T2 (Unequal, Symmetric, Salient) LEG	T2 (Unequal, Symmetric, Salient) HEG	Sig Diff	Sig Diff	Sig Diff
	(1)	(2)	(3)	(1):(2)	(1):(3)	(2):(3)
Phase 1	- 151.0	- 212.3	- 216.3	**	**	-
Phase 2	27.0	- 41.4	- 54.7	***	***	-
Phase 3	27.6	11.1	18.6	-	-	-

Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

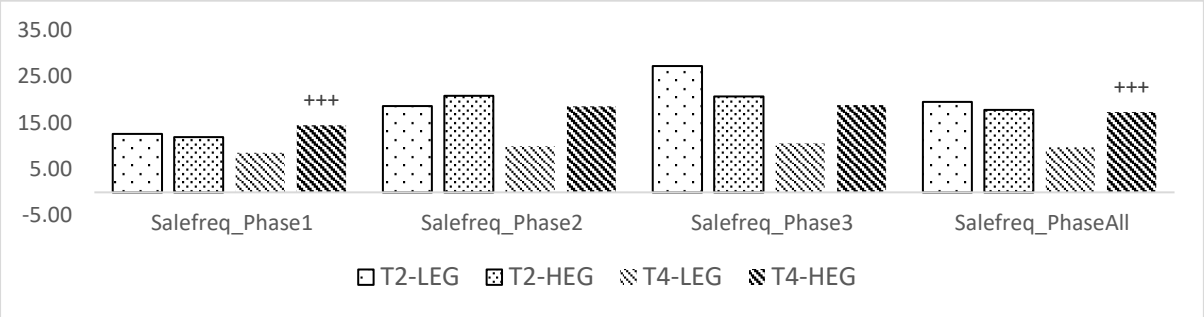
Table 5 Difference Bidding Price T1 (equal) and T2 (Unequal, Symmetric, Salient)

I continue to explore how different types of endowment distribution affect trading behaviour. I compare both the frequency of trading and the subject's willingness to take risks in trading between T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient).

I found no evidence that the low-endowed group in T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient) have a significant frequency in buying and selling. Nevertheless, I found that the high-endowed group in T4 (Unequal, Skewed-high, Salient) buy more frequently in phase 1 (Mann Whitney U test, $p<5\%$) and sell more frequently in phase 1 and in all periods (Mann Whitney U test, $p<1\%$) compared to the high-endowed group in T2 T4 (Unequal, Skewed-high, Salient) (see Figure 8).



(a) Buy Frequencies



(b) Sale Frequencies

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment. (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

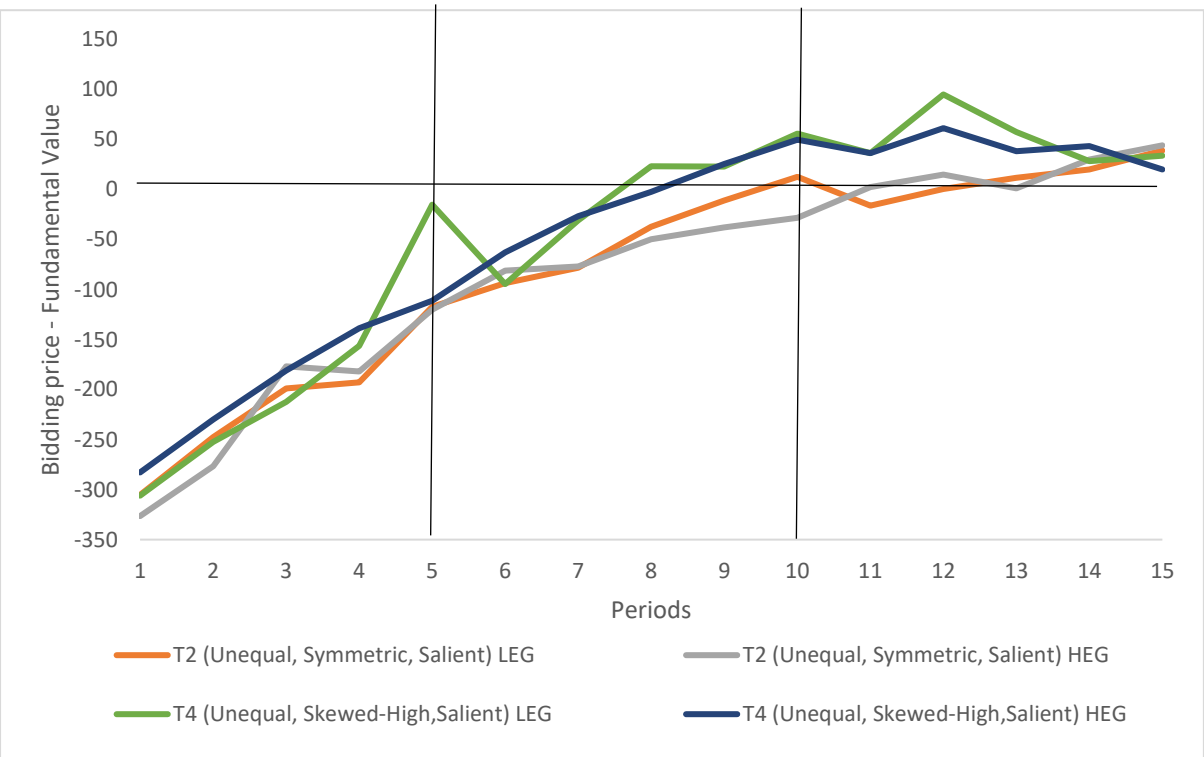
Figure 8 Average Trading Frequency T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient)

The trading frequency data above does not show any significant difference between the corresponding groups in T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient). Comparing the bidding price yields an interesting result.

The bidding price in phase 1 is below the fundamental value and overlapping one to another (Mann Whitney U test, p>10%). Entering the second phase, divergence starts to emerge. Both low- and high-endowed groups in T4 (Unequal, Skewed-high, Salient) start to offer higher bidding prices compared to the corresponding group in T2 (Unequal, Symmetric, Salient) (Mann Whitney U test, p<1%). The difference becomes less clear entering the final phase of the experiment (Mann Whitney U test, p<10%) (see Figure 9 dan Table 6).

This finding is in line with my prediction that since the low-endowed group in T4 (Unequal, Skewed-high, Salient) faces social comparison, they are more motivated to improve their wealth, even if they have to take more risks by bidding a higher price than the fundamental value. Remember that the low-endowed group in T4 (Unequal, Skewed-high, Salient) is the minority. Although they have less wealth, their bidding price resembles that of the high-endowed group.

Again, curiously, it appears that the high-endowed group in T4 (Unequal, Skewed-high, Salient) also behaves the same. In T4 (Unequal, Skewed-high, Salient), the high-endowed group have higher wealth and they are the majority in the game. It seems that the two advantages they have do not persuade them to put the same aggressive bidding price as the low-endowed group put.



Note: (1) 0 line showing the fundamental value, (2) phase 1: periods 1 to 5, phase 2: periods 5 to 10, phase 3: periods 11 to 15.

Figure 9 Asking Price T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-High, Salient)

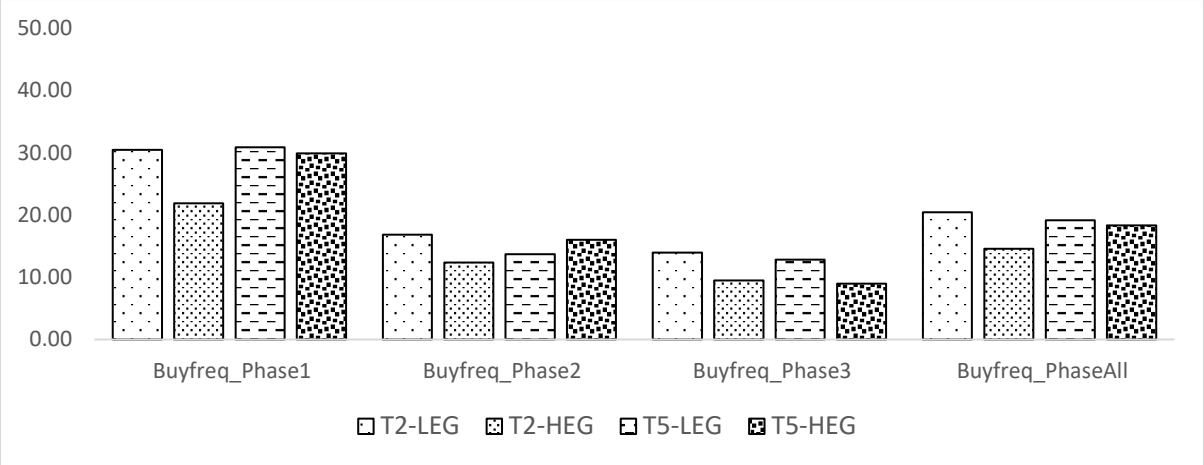
	T2 (Unequal, Symmetric, Salient) LEG	T2 (Unequal, Symmetric, Salient) HEG	T4 (Unequal, Skewed-High, Salient) LEG	T4 (Unequal, Skewed-High, Salient) HEG	Sig Diff	Sig Diff	Sig Diff
	(1)	(2)	(3)	(4)	(1):(3)	(2):(4)	(3):(4)
Phase 1	- 212.3	- 216.3	-188.4	- 188.7	-	-	-
Phase 2	- 41.4	- 54.7	- 4.5	- 3.2	***	***	-
Phase 3	11.1	18.6	50.3	40.0	*	*	-

Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

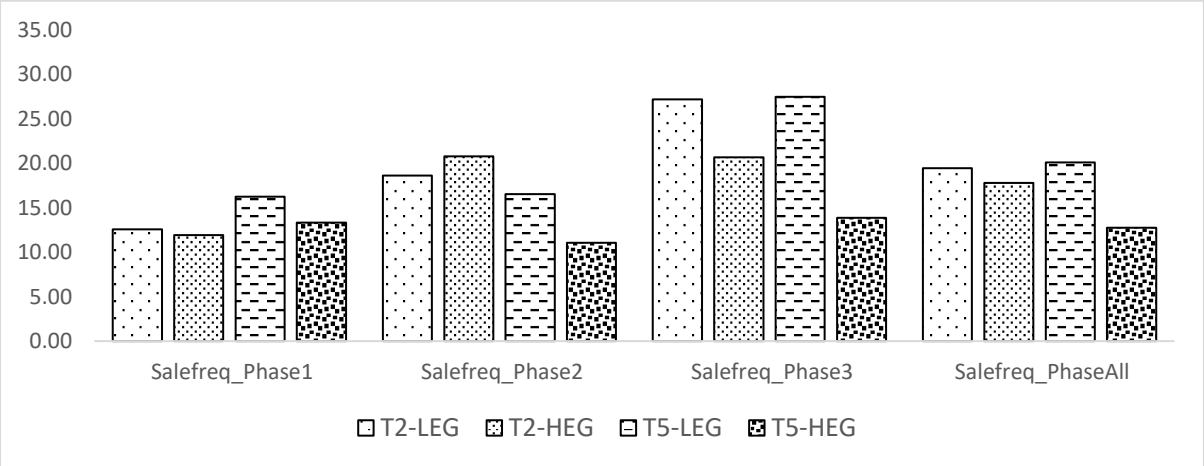
Table 6 Difference Bidding Price T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-High, Salient)

After comparing T2 (Unequal, Symmetric, Salient) to T4 (Unequal, Skewed-high, Salient), now I compare T2 (Unequal, Symmetric, Salient) to T5 (Unequal, Skewed-low, Salient). I want to know whether the same low- (high-) endowed group behave the same in trading if they face a market where the majority are high-endowed subjects.

Comparing buying and selling frequency, I found no difference between both low- and high-endowed groups in T2 (Unequal, Symmetric, Salient) and the corresponding groups in the T5 (Unequal, Skewed-low, Salient) (see Figure 8). For example, although the low-endowed group in T5 (Unequal, Skewed-low, Salient) buy more frequently in phases 1, and 3 and in all periods of trading compared to the high-endowed group in T5 (Unequal, Skewed-low, Salient), the difference is not statistically significant.



(a) Buy Frequencies



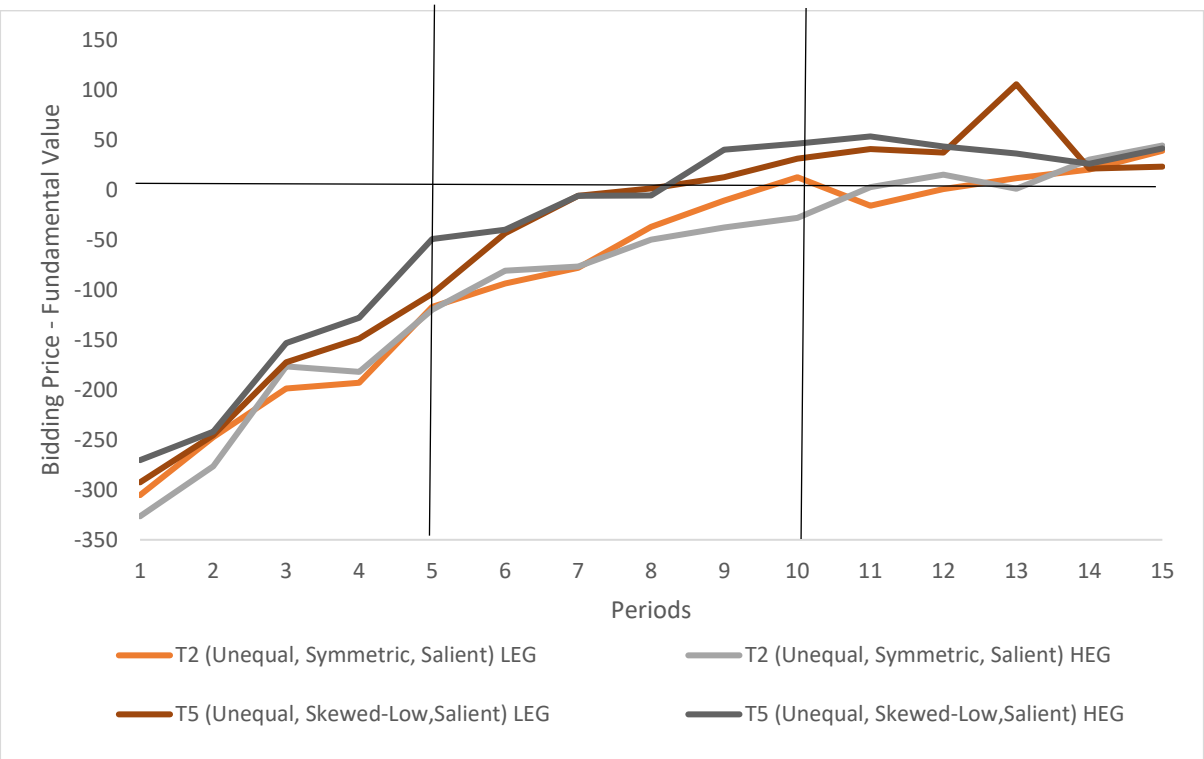
(b) Selling Frequencies

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment. (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

Figure 10 Average Trading Frequency T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-low, Salient)

Social comparison might not be the trigger for differences in trading frequency for T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-low, Salient). However, the difference in the willingness to accept risk is evidence. This is shown by a higher bidding price by both low- and high-endowed groups in T5 (Unequal, Skewed-low, Salient), particularly in phase 2 (Mann Whitney U test, $p<1\%$) (see Figure 11 and Table 7 below). Although the low-endowed group are the majority in the game, they still respond to the social comparison effect hence motivating them to put a higher bidding price compared to low-endowed subjects in the symmetrical inequality setting (T2).

As before, however, it is not only the low-endowed group who are more aggressive in bidding a higher price. The high-endowed group behave in the same way.



Note: (1) 0 line showing the fundamental value, (2) phase 1: periods 1 to 5, phase 2: periods 5 to 10, phase 3: periods 11 to 15.

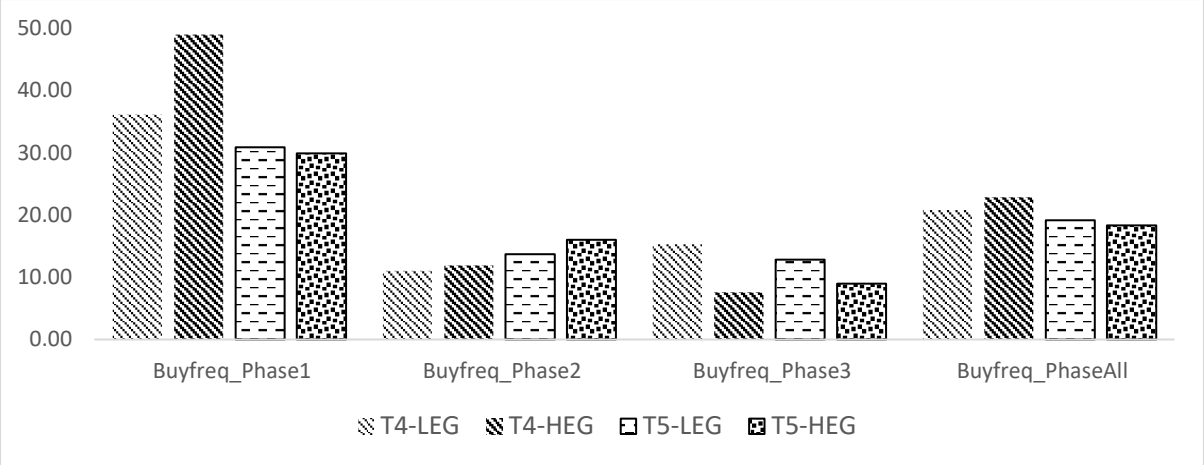
Figure 11 Asking Price T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-low, Salient)

	T2 (Unequal, Symmetric, Salient) LEG	T2 (Unequal, Symmetric, Salient) HEG	T5 (Unequal, Skewed-low, Salient) LEG	T5 (Unequal, Skewed-low, Salient) HEG	Sig Diff	Sig Diff	Sig Diff
	(1)	(2)	(3)	(4)	(1):(3)	(2):(4)	(3):(4)
Phase 1	- 212.3	- 216.3	-192.6	-168.5	-	-	-
Phase 2	- 41.4	- 54.7	-0.9	6.9	***	***	-
Phase 3	11.1	18.6	45.6	40.1	***	-	-

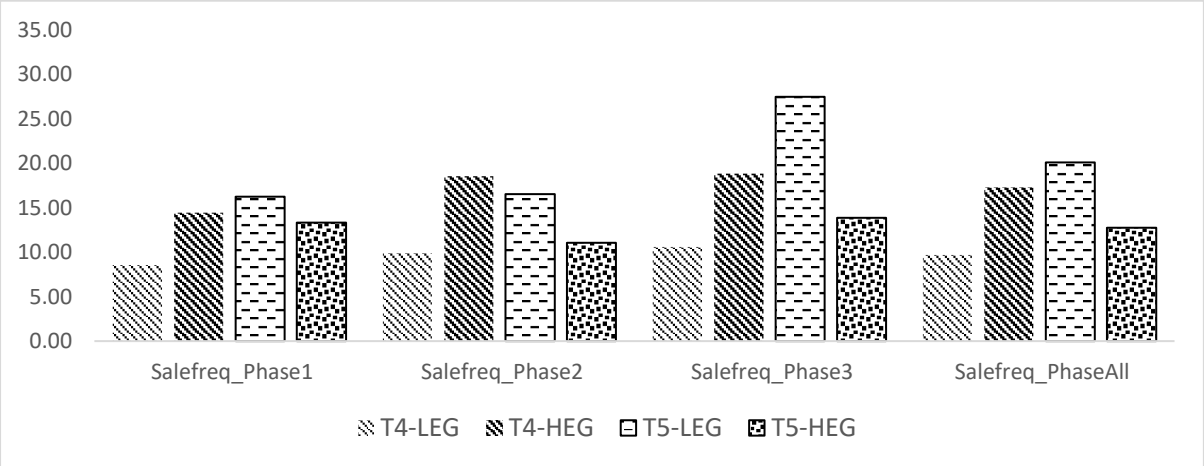
Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 7 Difference Bidding Price T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-low, Salient)

Comparing T4 (Unequal, Skewed-low, Salient) to T5 (Unequal, Skewed-low, Salient) could also yield interesting information, as both have different skewness of endowment distribution. However, the difference in skewness endowment does not produce the difference in buying and selling frequency (see Figure 12)



(a) Buy Frequencies

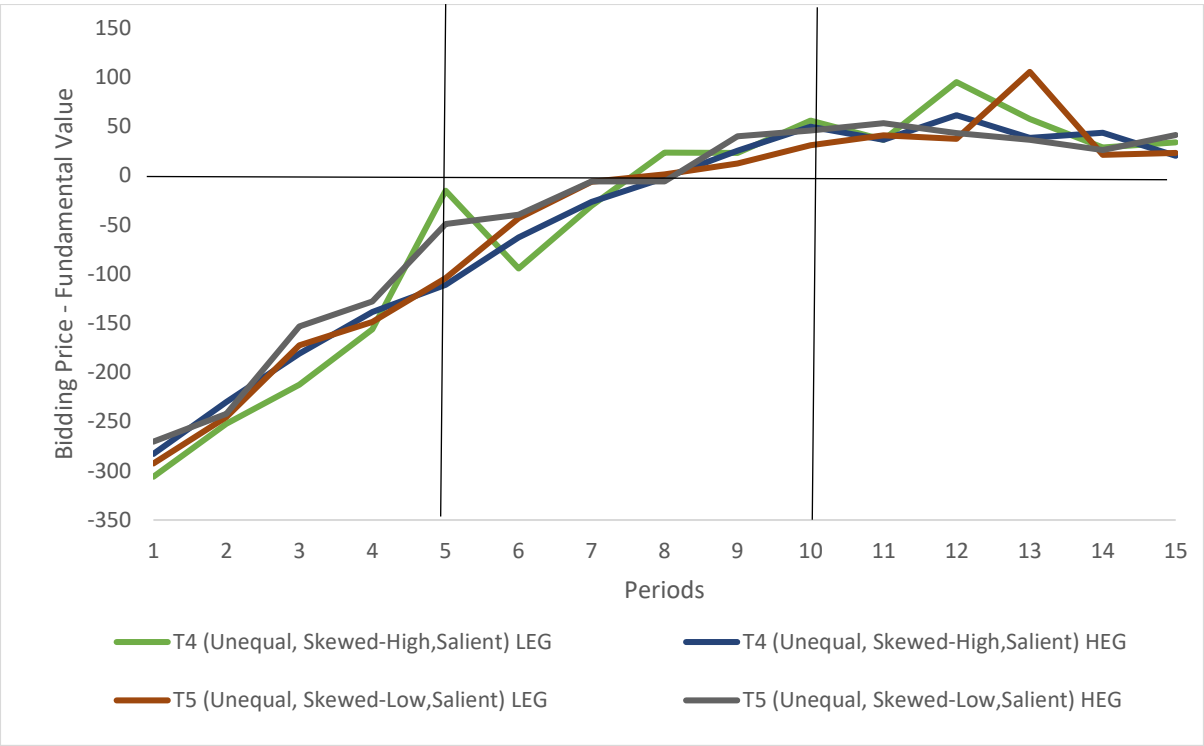


(b) Selling Frequencies

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment. (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

Figure 12 Average Trading Frequency T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

Moving on to compare the willingness to accept risk, in general the line between each endowment group shows little difference (see Figure 13). Although there is some divergence in the bidding price in some periods such as the low-endowed group in T4 (Unequal, Skewed-high, Salient) willing to buy at a higher price compared to others in periods 5 and 12, and the low-endowed group in T5 (Unequal, Skewed-low, Salient) in period 13, the Mann Whitney U Test shows no differences (see Table 8). This indicates that the trading behaviour of low-endowed and high-endowed groups are the same irrespective of whether they are the majority or minority in the group.



Note: (1) 0 line showing the fundamental value, (2) phase 1: periods 1 to 5, phase 2: periods 5 to 10, phase 3: periods 11 to 15.

Figure 13 Asking Price T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

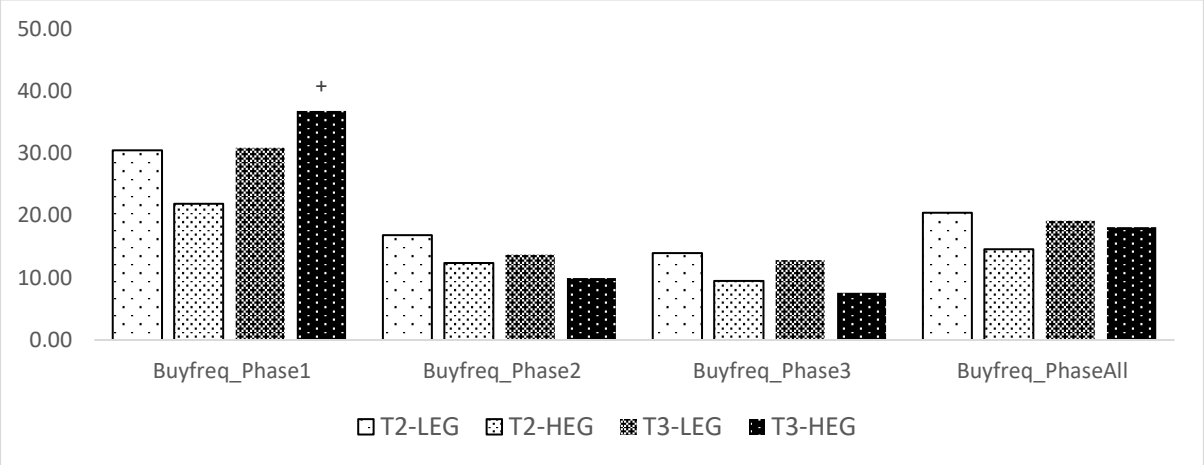
	T4 (Unequal, Skewed-high, Salient) LEG	T4 (Unequal, Skewed-high, Salient) HEG	T5 (Unequal, Skewed-low, Salient) LEG	T5 (Unequal, Skewed-low, Salient) HEG	Sig Diff	Sig Diff
	(1)	(2)	(3)	(4)	(1):(3)	(2):(4)
Phase 1	-188.4	-188.7	-192.6	-168.5	-	-
Phase 2	-4.5	-3.2	-0.9	6.9	-	-
Phase 3	50.3	40	45.6	40.1	-	-

Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

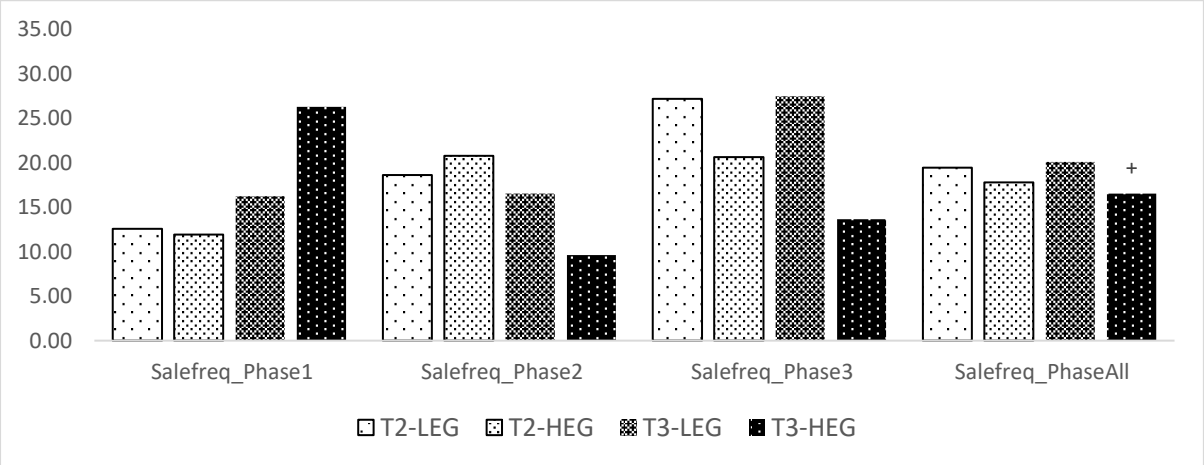
Table 8 Difference Bidding Price T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

I also want to investigate the impact of the salience of inequality on trading behaviour. I do this by comparing T2 (Equal) and T3 (Unequal, Symmetric, Non-Salient). Saliency is important in analysing the impact of inequality on decision making. (Anderson et al., 2008; Loughnan et al., 2011; Kerbo, 2011; and Wilkinson and Pickett, 2010). Making inequality salient to the subject means that every subject knows each subject's wealth, which should intensify the social comparison effect on subjects. Using the trading frequency data, however, I found no evidence to support this argument (see Figure 8).

.



(a) Buy Frequencies



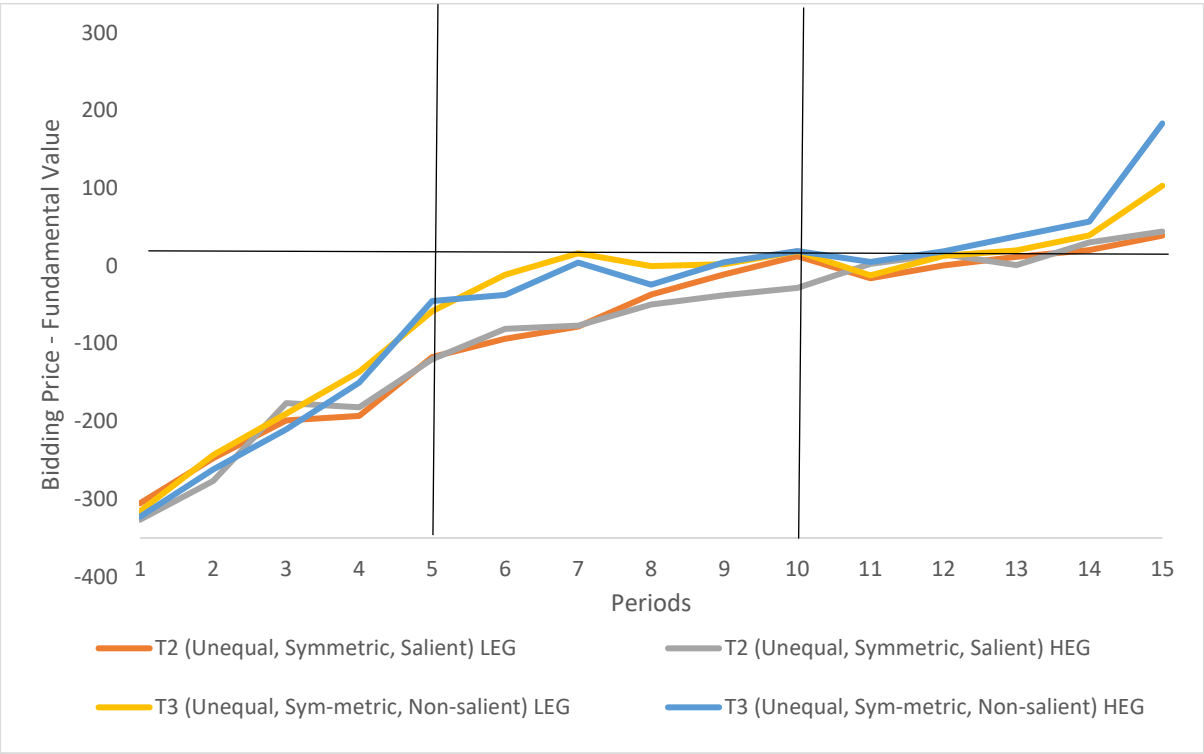
(b) Sale Frequencies

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment. (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

Figure 14 Average Trading Frequency T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

The differences are evident when trading behaviour is investigated using the bidding price. The gap in the bidding price between T2 (Equal) and T3 (Unequal, Symmetric, Non-Salient) starts to emerge in the last period of phase 1 although it does not increase to a significant difference (see Figure 13). In phase 2 I found, counter-intuitively, that both low and high groups in the treatment where the inequality is unknown (T3) is higher compared to the corresponding groups in the treatment where the inequality is salient (see Table 8).

There could be at least two explanations for this finding. It could be that the social comparison that is established in T2 (Equal) through the salient inequality setting does not put much pressure on the subject to be more aggressive in buying shares by bidding a higher price, or, there are motives other than social comparison that motivate the subject in T3 (Unequal, Symmetric, Non-Salient) to be more aggressive and take more risk to gain more wealth[8].



Note: (1) 0 line showing the fundamental value, (2) phase 1: periods 1 to 5, phase 2: periods 5 to 10, phase 3: periods 11 to 15.

Figure 15 Asking Price T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

	T2 (Unequal, Symmetric, Salient) LEG	T2 (Unequal, Symmetric, Salient) HEG	T3 (Unequal, Symmetric, Non-Salient) LEG	T3 (Unequal, Symmetric, Non-Salient) HEG	Sig Diff	Sig Diff	Sig Diff
	(1)	(2)	(3)	(4)	(1):(3)	(2):(4)	(3):(4)
Phase 1	- 212.3	- 216.3	-188.7	-198	-	-	-
Phase 2	- 41.4	- 54.7	5.2	6.6	***	**	-
Phase 3	11.1	18.6	32.6	60.4	-	-	-

Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 9 Difference Bidding Price T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

[8] I have checked that there is no difference in risk preference and cognitive ability of subjects in T2 (Equal) and T3 (Unequal, Symmetric, Non-Salient)

Up to this point, I have presented the trading behaviour between different endowment groups which face different inequality settings. Table 10 below presents a summary to help us understand the results of every comparable group within the same treatment or in different treatments. Capturing trading behaviour through trading frequency and willingness to take a risk, I found evidence that different endowment groups behave differently in the asset market experiment.

Group comparison	Average buying frequency	Average selling frequency	Willingness to take risk (Average gap between bidding price and fundamental value)
LEG and HEG in T2 (Unequal, Symmetric, Salient)	LEG > HEG in phase 1 ($^{+}$)	HEG>LEG in phase 1 ($^{+}$) and in all periods ($^{++}$)	-
LEG and HEG in T3 (Unequal, Symmetric, Non-Salient)	T3-HEG>T3-LEG in phase 1 ($^{+}$)	T3-LEG>T3-HEG in all periods ($^{+}$)	-
LEG and HEG in T4 (Unequal, Skewed-high, Salient)	T4-HEG>T4-LEG in phase 1 ($^{++}$)	T4-HEG>T4-LEG in phase 1 and in all periods ($^{+++}$)	-
LEG and HEG in T5 (Unequal, Skewed-low, Salient)	-	-	
T1 (Equal) vs T2 (Unequal, Symmetric, Salient)	-	HEG>NEG in phase 3 (*)	LEG and HEG < NEG (phase 1 ** and phase 2***)
T2 (Unequal, Symmetric, Salient) vs T4 (Unequal, Skewed-high, Salient)	-	-	T4-LEG>T2-LEG (phase 2 ***, phase 3 *) T4-HEG>T2-HEG (phase 2 ***, phase 3 *)
T2 (Unequal, Symmetric, Salient) vs T5 (Unequal, Skewed-low, Salient)	-	-	T5-LEG>T2-LEG (phase 2 and phase 3 ***) T5-HEG>T2-HEG (phase 2 ***)
T4 (Unequal, Skewed-High, Salient) vs T5 (Unequal, Skewed-low, Salient)	-	-	-
T2 (Unequal, Symmetric, Salient) vs T3 (Unequal, Symmetric, Non-Salient)	-	-	T3-LEG>T2-LEG (phase 2 ***) T3-HEG>T2-HEG (phase 2 **)

Notes: (1) NEG: Normal-endowed group, LEG: Low-endowed group, HEG: High-endowed group. (2) * shows comparison endowment group between treatment and $^{+}$ sign shows comparison endowment group within treatment (3) the Mann Whitney U test: ***/$^{+++}$ significant at 1%, **/$^{++}$ significant at 5%, */$^{+}$ significant at 10%

Table 10 Summary of Differences in Trading Behaviour

Wealth Creation

In this typical asset market experiment, the main goal of every subject is to increase their wealth. In the unequal endowment setting, some subjects have the advantage of a higher endowment compared to others. Using the endowment they have, subjects make trading decisions in the market either to buy or sell or keep shares expecting the cash streams from a dividend that diminishes over the period.

Previously I have analysed how endowment inequality affects the strategy of buying and selling. In this section, I want to investigate further how differences in endowment influence wealth creation.

I compare wealth before and after the experiment (see Figure 10) and I find that the low-endowed group perform better in gaining wealth from trading. The groups who increase wealth are the low-endowed groups in T2 (Unequal, Symmetric, Salient) (85.7%) and T3 (Unequal, Symmetric, Non-Salient) (64.3%), the high-endowed group in T5 (Unequal, Skewed-low, Salient) (25.2%) and the normal-endowed group in T1 (Equal) (0.7%). Other groups experience losses.

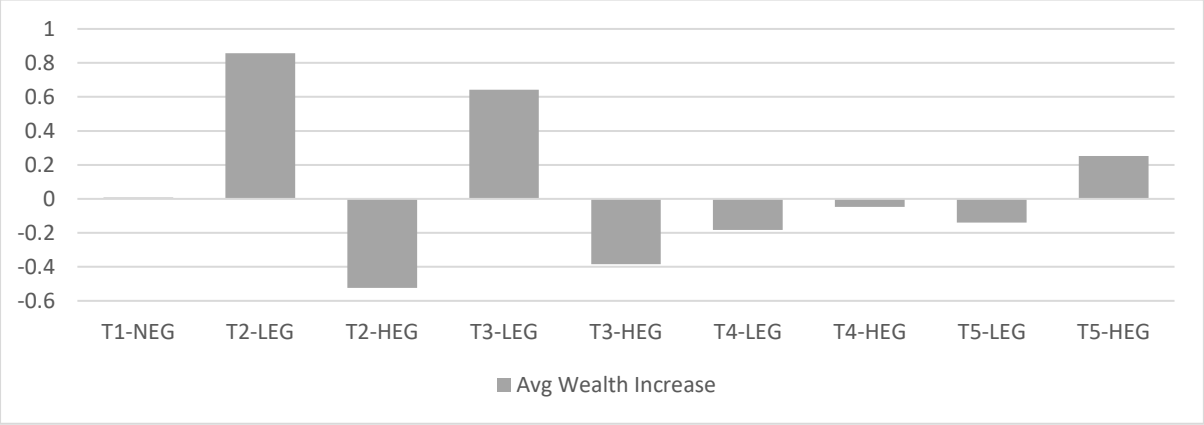


Figure 16 Average Wealth

I continue to test whether some endowment groups significantly increase wealth compared to their control treatment. Comparing T1 (Equal) and T2 (Unequal, Symmetric, Salient) (see Figure 10a), I find that the low-endowed group in T2 (Unequal, Symmetric, Salient) gain significantly higher wealth (Mann Whitney U test, p-value<5%) while the high-endowed group in T2 (Unequal, Symmetric, Salient) experience a significantly lower wealth decrease (Mann Whitney U test, p-value<1%). Previously I noted that the low-endowed group in T2 (Unequal,

Symmetric, Salient) used a different strategy in trading compared to the high-endowed group in the same treatment, in that the low-endowed group buy significantly more shares in phase 1 of the experiment and sell significantly more shares at the end of the experiment (phase 3) (see Figure 5a).

Comparing T2 (Unequal, Symmetric, Salient) to T4 (Unequal, Skewed-high, Salient) (see Figure 10b), I find that two groups in the T4 (Unequal, Skewed-high, Salient), the high-endowment group and the low-endowment group, experience losses. Each of the groups' wealth significantly differs compared to the corresponding group in T2 (Unequal, Symmetric, Salient) (Mann Whitney U test, p-value<5%). This is true knowing that there is no difference in the trading behaviour between groups in T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient) (see Figure 7).

I continue by comparing T2 (Unequal, Symmetric, Salient) to T5 (Unequal, Skewed-low, Salient) (see Figure 10c). I find that the two groups in T5 (Unequal, Skewed-high, Salient), the high-endowment group and the low-endowment group, gain different levels of wealth compared to the corresponding group in T2 (Unequal, Symmetric, Salient) (Mann Whitney U test, p-value<5%). Again this is interesting, as both groups in T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-high, Salient) have the same trading frequency in both buying and selling throughout the period (see Figure 8).

Lastly, I compare T2 (Unequal, Symmetric, Salient) to T3 (Unequal, Symmetric, Non-Salient) (see Figure 10d). Having salience treatment, I find no significant difference in wealth creation for T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient). This result is as expected as there is no difference in the trading behaviour of these groups (see Figure 8).



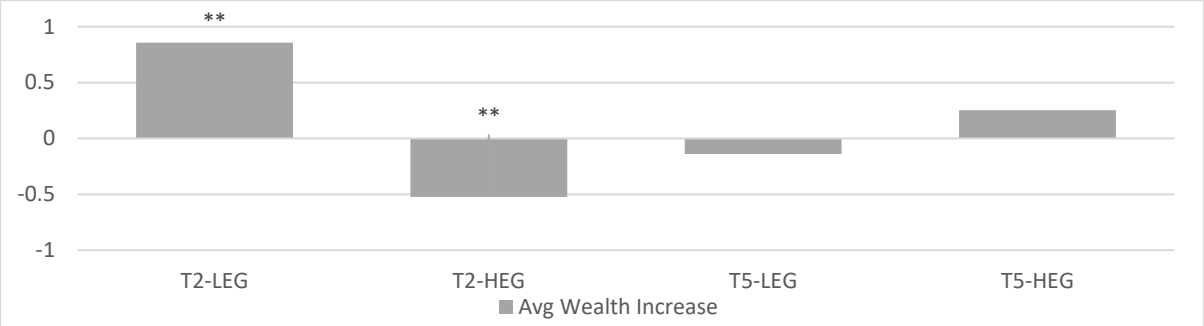
* sign shows comparison of low-endowment group and high-endowment group to normal-endowment group, + sign shows comparison of low-endowment group to high-endowment group

(a) T1 (Equal) and T2 (Unequal, Symmetric, Salient)



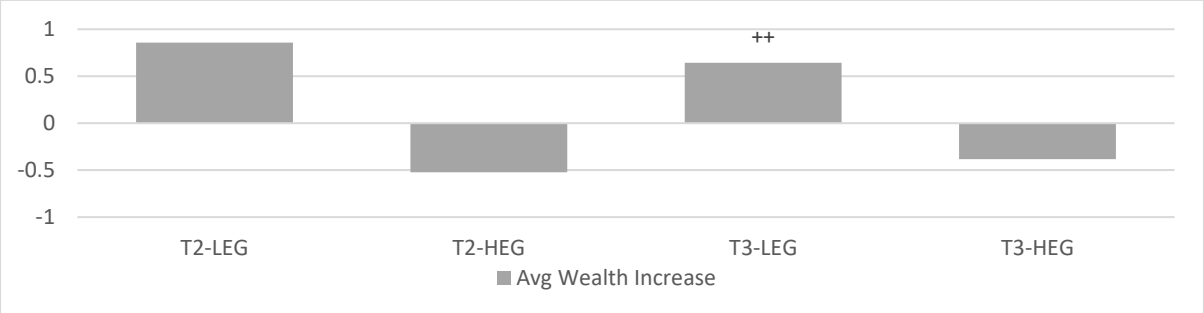
* sign shows comparison of low-endowment groups (LEG) or high-endowment groups (HEG) between treatments, + sign shows comparison LEG to HEG in one treatment

(b) T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient)



* sign shows comparison of LEG to LEG or HEG to HEG between treatment, + sign shows comparison of LEG to HEG in one treatment

(c) T2 (Unequal, Symmetric, Salient) and T5 (Unequal, Skewed-low, Salient)



* sign shows comparison of LEG to LEG or HEG to HEG between treatments, + sign shows comparison of LEG to HEG in one treatment

(d) T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

Note: Mann Whitney U test: ***/+++ significant at 1%, **/++ significant at 5%, */+ significant at 10%

Figure 17 Wealth and Endowment Group

4.5 Conclusion

Extensive literature has used the asset market experiment (SSW) as a tool to investigate the incidence of bubbles and bursts in the lab. Previous literature explored the potential of inequality to influence individual-level behaviour and decision making[9]. This paper presents the first asset market experiment (SSW) adopting an inequality of endowment setting to determine whether inequality of endowment affects trading behaviour and stimulates bubbles and bursts. I predicted that an unequal wealth setting, as simulated by different endowments, would trigger a social comparison effect which would stimulate the low-endowed subjects to trade seeking to avoid the last place (last place aversion effect (Kuziemko et al., 2011)) and create greater intensity of bubbles and bursts in the market.

The experimental result, however, yields no evidence to support this hypothesis. This study contributes to the literature on the asset market experiment in finding that bubbles and bursts disappear in a market where inequality of endowment is symmetric.

I found that a market with an unequal symmetric endowment (T2-Unequal, Symmetric, Salient) creates significantly lower average market prices (AMP) compared to the equal endowment setting (T1-Equal). This difference is mainly triggered by the difference in AMP in phase 2 and this is supported by a significant difference in relative deviation in phase 2.

My further investigation concludes that both T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient) do not produce difference market prices compared to T2 (Unequal, Symmetric, Salient). I found only a weak difference in market price and relative deviation during periods 6 to 15 (phase 2a) (Mann Whitney U test, p-value<10%).

Nor does saliency of endowment among subjects appear to contribute to a significant difference in market price. A higher market price and number of

[9] Kuziemko et al. (2011) and Haisley et al. (2008) in the lottery game; Bagnoli and Mckee (1991), Rapoport and Suleiman (1993) and Anderson et al. (2008) in the public goods game; Greiner et al (2012) and Anderson et al., (2006) in the trust game; Armantier (2006) and Schmidt et al. (2015) in the ultimatum game; Guenther and Alicke (2010) in the trait rating experiment; and Loughnan et al., (2011) in their self-enhancement assessment method.

bubbles in T3 (Unequal, Symmetric, Non-Salient) are observed in certain phases but the difference is only weakly significant (Mann Whitney U test, p-value<10%). This is in contrast to the literature on inequality and decision making which mainly found that saliency of inequality boosted social comparison and hence affected behaviour in various canonical games such as the public goods game, trust game, and lottery game.

I also explore how differently-endowed groups behave differently in trading. I approach this research question using two different types of data; the trading frequency data and the willingness to take risk data.

There are two main observations from the trading frequency data. First, comparing the trading behaviour of the LEG and HEG within the same treatment, the evidence is ununiformed as to whether the LEG or HEG are more active in trading activity. In T2 (Unequal, Symmetric, Salient)-the LEG is more active in buying, but in T3 (Unequal, Symmetric, Non-salient) and T4 (Unequal, Skewed-high, Salient), it is the HEG who is more active. The scattered finding is also evident in selling behaviour. In T3 (Unequal, Symmetric, Salient) the LEG is more active but in T2 (Unequal, Symmetric, Salient) and T4 (Unequal, Skewed-high, Salient), it is the HEG who is more active in selling.

Second, comparing the LEG and HEG between treatments, I find no evidence that the LEG is more active in trading. It seems that the hypothesis that inequality of endowment creates a social comparison of wealth effect which influences subjects' behaviour in the low-income group to trade more to gain profit and increase their wealth is not proven. On the contrary, I find evidence that the HEG in T2 (Unequal, Symmetric, Salient) is more active in trading compared to the NEG (T1-Equal).

The inconclusive finding also found when comparing the subject's willingness to take the risk. The social comparison effect does not occur in T2 (Unequal, Symmetric, Salient), both LEG and HEG in T2 (Unequal, Symmetric, Salient) bid less compare to NEG.

The effect is more convincing in T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient). I find that not only the low-endowed group but also the high-endowed group are consistently more aggressive in buying shares. Despite that LEG in T4 (Unequal, Skewed-high, Salient) are exposed to more social

comparison effect compare to LEG in T5 (Unequal, Skewed-low, Salient), both LEG willing to take more risk compared to LEG in T2 (Unequal, Symmetric, Salient).

I predict that a different motivation could trigger the same trading behaviour by the high-endowed group. It could be that this group has more self-confidence because they have more wealth (optimistic bias) (Helweg-Larsen and Shepperd, 2001; Loughnan et al., 2011).

Interestingly, I find the majority of LEGs perform better in creating wealth than HEGs. Of the three endowment groups who show positive growth in wealth, two of them are LEGs (in T2-Unequal, Symmetric, Salient and T3-Unequal, Symmetric, Non-Salient). There is clear evidence to be highlighted here, that the different trading strategy used by the T2 (Unequal, Symmetric, Salient) LEG compared to the T2 (Unequal, Symmetric, Salient) HEG, gives the LEG a substantial increase in wealth (64.3%) compared to 3.6% for all subjects across all different endowment groups.

My research on how inequality affects trading behaviour using the asset market experiment is still in its infancy. There remain some important discussions in the asset market experiment that have not been covered in this research. For example, previous literature found that cognitive ability, risk preference, gender, personality, and experience of subjects (Powell and Shestakova, 2016) are factors in the formation of bubbles. These crucial factors also shape decision making. Future research might want to analyse the complex interaction of such variables in settings where inequality of endowment exists.

This research is limited by the fact that our saliency treatment is set only at the beginning of the experiment, by giving all subjects access to information about every participant's endowment. Future research testing the effect of the saliency of endowment in an asset market experiment could explore this area in more depth by exposing wealth information continuously, updating it at the very end of each period.

Research on the effect of inequality in the asset market experiment might also want to investigate the effect of earned money. Previous literature found that house money and earned money could influence subjects' trading behaviour (Corgnet et al., 2014). This research design incorporates the social comparison

effect through differences in the endowment that each subject receives at the beginning of the experiment. There is no effort required by the subject to earn the endowment, and hence the feeling of ownership towards the endowment might be limited. As a consequence, this might also inhibit the social comparison effect among subjects, as they perceive the endowment as "house" money.

Supplementary Materials

Appendix A: Instruction and the experiment

Please read this instruction carefully.

This is an experiment in market decision making. You will be paid in cash for your participation at the end of the experiment. Different participants may earn different amounts. What you earn depends on your decisions and the decisions of others. The experiment will take place through computer terminals at which you are seated. If you have any questions during the instruction round, raise your hand and a monitor will come by to answer your question. If any difficulties arise after the experiment has begun, raise your hand, and someone will assist you.

THE TRADING

In this experiment, you will be able to buy and sell a commodity, called Shares, from one another. At the start of the experiment, every participant will be given some Cash and Shares. The shares last for EXACTLY 15 periods of trading. By the end of period 15, share value will be 0. Each period will last for 180 seconds. At the end of each trading period, including period 15, the computer randomly draws a dividend 0, 8, 28, 60 ECU with equal probability. The average dividend in each period is 24. The dividend is added to your cash balance automatically. After the dividend is paid at the end of period 15, there will be no further earnings possible from shares.

Suppose for example that there are 7 periods remaining. Since the dividend on a Share has a 25% chance of being 0, a 25% chance of being 8, a 25% chance of being 28 and a 25% chance of being 60 in any period, the dividend is on average 24 per period for each Share. If you hold a Share for 7 periods, the total dividend for the Share over the 7 periods is on average 7*24 = 168. Therefore, the total value of holding a Share over the 7 periods is on average 168.

During every period, traders can buy or sell shares from one another by making offers to buy or to sell. When a share is bought, your share increases by one and your cash decreases by the share price purchased. When a share is sold, your share decreases by one and your cash increases by the share sold.

The number of share at the end of the period will become the initial share for the next period.

The amount of cash at the end of the period will become the initial cash for the next period after added by dividend payment.

Total wealth in a period t is equal to Cash + Number of Shares * 24 (16 – t)

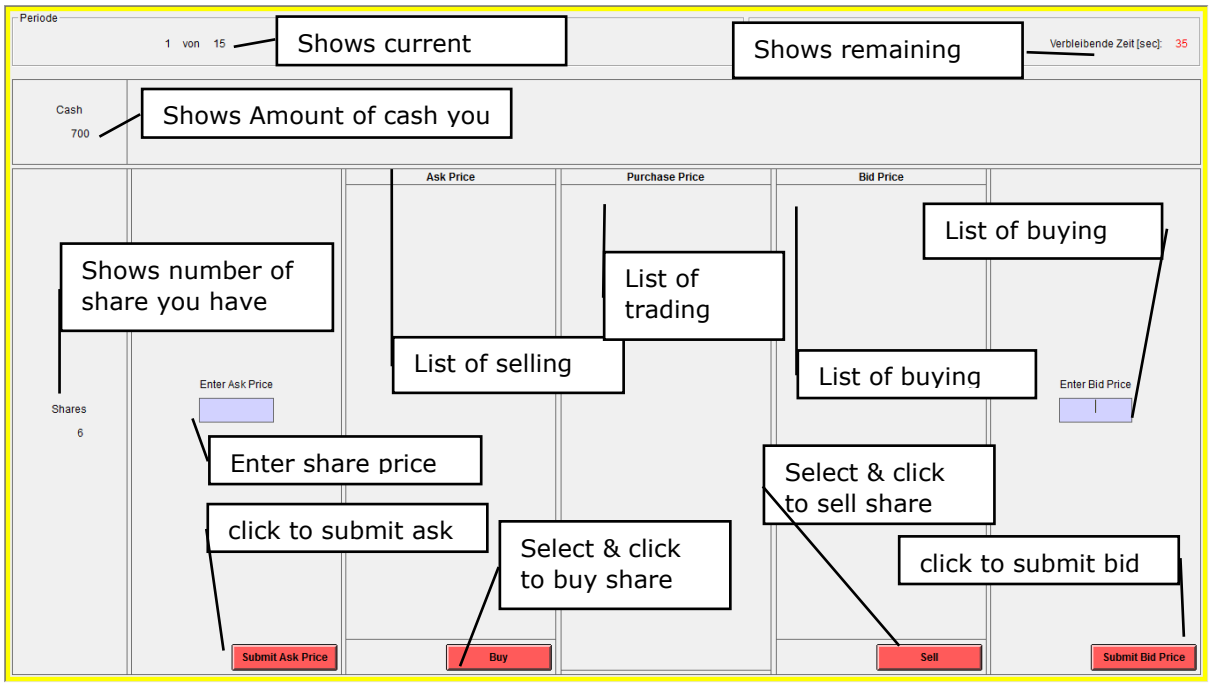
Profit is equal to wealth in period t - wealth in period t-1.

[For equal treatment only]

All participants receive the same amount of endowment*. Each of them receives in total 1.305 ECU consisted of 3 shares (1 share equivalent to 360 ECU) and 225 ECU.*

The trading screen looks like this:

Double Auction Trading Screen



[For unequal treatment only]

THE ENDOWMENT:

Before the trading is started, participants will be distributed randomly into two groups. When you enter the lab, you pick randomly a sheet of paper contained computer number in a closed box and that number determined which group you are in.

Higher Endowment Group:

*The first 4 participants in this group (**computer number 1 to 4**) are assigned to **HIGHER ENDOWMENT GROUP** who receive in total 1.840 ECU (4 shares (each share equivalent to 360 ECU) and 400 ECU in cash).*

Low Endowment Group:

*The other 4 participants (**computer number 5 to 8**) are assigned to **LOWER ENDOWMENT GROUP** who receive in total 870 ECU endowment (2 shares (each shares equivalent to 360 ECU) and 150 ECU in cash.*

THE PAYOFF

You will receive payoff which is equal to wealth at the end of period 15 with exchange rate 1 ECU= 0.005 GBP

Start of Block: H&L

In this part, you will have to answer 10 questions. For each question, you have two choose lottery option A or B.

For example in the first question you will have to choose between Option A (get £2.00 with probability 1/10, and £1.60 with probability 9/10) or Option B (get £3.85 with probability 1/10 and get £0.10 with probability 9/10)

Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used. Obviously, each decision has an equal chance of being used in the end.

Now please choose Option A or Option B.

	Option A	Option B	
Option A (1)	○	○	1/10 of £2.00, 9/10 of £1.60
Option A (10)	○	○	2/10 of £2.00, 8/10 of £1.60
Option A (23)	○	○	3/10 of £2.00, 7/10 of £1.60
Option A (24)	○	○	4/10 of £2.00, 6/10 of £1.60
Option A (25)	○	○	5/10 of £2.00, 5/10 of £1.60
Option A (26)	○	○	6/10 of £2.00, 4/10 of £1.60
Option A (27)	○	○	7/10 of £2.00, 3/10 of £1.60
Option A (28)	○	○	8/10 of £2.00, 2/10 of £1.60
Option A (29)	○	○	9/10 of £2.00, 1/10 of £1.60
Option A (30)	○	○	10/10 of £2.00, 0/10 of £1.60

End of Block: H&L

Start of Block: CRT

Please answer these questions:

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? (in cent

_____

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? (in minutes)

_____

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? (in days)

_____

If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how long would it take them to drink one barrel of water together? (in day

_____

Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are in the class

_____

A man buys a pig for $60, sells it for $70, buys it back for $80, and sells it finally for $90. How much has he made? (in dollars)

_____

Simon decided to invest $8,000 in the stock market one day early in 2008. Six months after he invested, on July 17, the stocks he had purchased were down 50%. Fortunately for Simon, from July 17 to October 17, the stocks he had purchased went up 75%. At this point, Simon h

- ○ Broken even in the stock market (1)
- ○ Ahead of where he began (2)
- ○ Lost money (3)

Please click continue if you have finished

End of Block: CRT

Start of Block: Socio-Demography

Please answer these questions:



What is your year of birth?

_____



What is your gender?

- ○ Male (1)
- ○ Female (2)

What is your marital status?

- Single, never married (1)
- Married (2)
- Cohabiting (not married) (3)
- Widowed (4)
- Divorced (5)
- Separated (6)

How many children do you have?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- More than 3 (5)

What is your belief (religion)?

- Islam (1)
- Christianism (2)
- Catholicism (3)
- Buddhism (4)
- Hinduism (5)
- Confucianism (6)
- Atheist (7)
- Other (please specify) (8) _____

How often do you practice your faith?

- Never (1)
- Once a year (2)
- Twice a year (3)
- Several times a year (4)
- About once a month (5)
- Every week (6)
- Several times a week (7)
- Everyday (15)

Please specify your ethnicity.

- White (1)
- Hispanic or Latino (2)
- Black or African American (3)
- Native American or American Indian (4)
- Asian / Pacific Islander (5)
- Other (6)

Highest level of education completed?

- Less than a High School degree (1)
- High School diploma (2)
- Vocational training (3)
- Attended college (4)
- Bachelor's degree (5)
- Graduate degree (6)
- Unknown (7)

What is your area of study?

- Agriculture/Environmental studies (1)
- Architecture (2)
- Business (3)
- Communications/journalism (4)
- Education (5)
- Engineering/computer science (6)
- General studies (7)
- Health sciences (8)
- Humanities (9)
- Law (10)
- Military/naval science (11)
- Performing and Fine Arts (12)
- Science/Math (13)
- Social sciences/psychology (14)
- Other (15)

When it comes to politics do you usually think of yourself as:

- ○ extremely liberal (1)
- ○ liberal (2)
- ○ slightly liberal (3)
- ○ moderate or middle of the road (4)
- ○ slightly conservative (5)
- ○ conservative (6)
- ○ extremely conservative (7)
- ○ I haven't thought much about this (8)

Please indicate your last year annual income (before taxes):

- Less than £10,000 (1)
- £10,000 to £11,999 (2)
- £12,000 to £13,999 (3)
- £14,000 to £15,999 (4)
- £16,000 to £17,999 (5)
- £18,000 to £19,999 (6)
- £20,000 to £21,999 (7)
- £22,000 to £23,999 (8)
- £24,000 to £25,999 (9)
- £26,000 to £ 27,999 (10)
- £28,000 to £ 29,999 (11)
- £30,000 or more (12)

Please click continue to end the survey

End of Block: Socio Demography

Appendix B: Bubbles and bursts in T1 (Equal) and T2 (Unequal, Symmetric, Salient)

Bubbles and bursts measurements	T1 (Equal)	T2 (Unequal, Symmetric, Salient)	Sig Diff
MP all periods	177.7	122.7	**
RD all periods	- 0.01	- 0.03	*
A all periods	1.54	1.67	-
BD all periods	7.33	5.17	-
NBB all periods	1.40	2.00	-
NBS all periods	2.33	1.83	-
MP Phase 1	169.5	115.3	-
MP Phase 2	247.6	168.3	*
MP Phase 3	115.9	84.5	-
MP Phase 2a	181.8	126.4	*
RD Phase 1	- 0.05	- 0.07	-
RD Phase 2	0.01	- 0.02	**
RD Phase 3	0.01	0.00	-
RD Phase 2a	0.01	- 0.01	**
A Phase 1	0.70	0.56	-
A Phase 2	0.72	0.72	-
A Phase 3	1.18	1.39	-
A Phase 2a	1.49	1.67	-
BD Phase 1	1.33	2.00	-
BD Phase 2	4.00	3.00	-
BD Phase 3	3.33	3.40	-
BD Phase 2a	6.67	4.83	-
NBB Phase 1	1.00	1.00	-
NBB Phase 2	1.80	1.50	-
NBB Phase 3	1.00	1.33	-
NBB Phase 2a	1.83	1.67	-
NBS Phase 1		1.00	-
NBS Phase 2	1.00	1.33	-
NBS Phase 3	1.00	1.00	-
NBS Phase 2a	1.40	1.75	-

Notes:
(a) MP: Market price, RD:=Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of bubbles, NBS: Number of Bursts. (b) Phase 1: period 1 to 5, phase 2: period 6 to 10, phase 3: period 11 to 15, phase 2a: period 6 to 15. (c) Mann Whitney U test compare to the baseline treatment (T1-Equal): *** significant at 1%, ** significant at 5%, * significant at 10%

Table 11 Average bubbles and bursts measurements T1 (Equal) and T2 (Unequal, Symmetric, Salient)

Appendix C: Bubbles and bursts in T2 (Unequal, Symmetric, Salient), T4 (Unequal, Skewed-high, Salient), and T5 (Unequal, Skewed-low, Salient)

Bubbles and bursts measurements	T2 (Unequal, Symmetric, Salient)	T4 (Unequal, Skewed-high, Salient))	T5 (Unequal, Skewed-low, Salient))	Sig Diff T2:T4	Sig Diff T2:T5	Sig Diff T4:T5
MP all periods	122.7	142.0	146.5	-	-	-
RD all periods	- 0.03	- 0.02	- 0.02	*	-	-
A all periods	1.67	1.46	1.50	-	-	-
BD all periods	5.17	6.50	7.00	-	-	-
NBB all periods	2.00	1.20	1.33	-	-	-
NBS all periods	1.83	2.00	3.00	-	-	-
MP Phase 1	115.3	118.5	121.1	-	-	-
MP Phase 2	168.3	189.2	200.2	-	-	-
MP Phase 3	84.5	118.2	118.3	-	-	-
MP Phase 2a	126.4	153.7	159.2	*	*	-
RD Phase 1	- 0.07	- 0.07	- 0.07	-	-	-
RD Phase 2	- 0.02	- 0.00	0.00	-	*	-
RD Phase 3	0.00	0.02	0.02	-	-	-
RD Phase 2a	- 0.01	0.01	0.01	*	**	-
A Phase 1	0.56	0.40	0.48	-	-	-
A Phase 2	0.72	0.43	0.53	-	-	-
A Phase 3	1.39	1.05	1.16	-	-	-
A Phase 2a	1.67	1.29	1.39	-	-	-
BD Phase 1	2.00			-	-	-
BD Phase 2	3.00	2.50	3.17	-	-	-
BD Phase 3	3.40	4.00	3.83	-	-	-
BD Phase 2a	4.83	6.50	7.00	-	-	-
NBB Phase 1	1.00			-	-	-
NBB Phase 2	1.50	1.50	1.83	-	-	-
NBB Phase 3	1.33	1.50	1.75	-	-	-
NBB Phase 2a	1.67	2.00	3.00	-	*	-
NBS Phase 1	1.00			-	-	-
NBS Phase 2	1.33	1.00	1.00	-	-	-
NBS Phase 3	1.00	1.25	1.00	-	-	-
NBS Phase 2a	1.75	1.20	1.33	-	-	-

Notes:
(a) MP: Market price, RD:Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of bubbles, NBS: Number of Bursts. (b) Phase 1: period 1 to 5, phase 2: period 6 to 10, phase 3: period 11 to 15, phase 2a: period 6 to 15. (c) Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 12 Average bubbles and bursts measurements T2 (Unequal, Symmetric, Salient), T4 (Unequal, Skewed-high, Salient) and T5 (Unequal, Skewed-low, Salient)

Appendix D: Bubbles and bursts in T2 (Unequal, Symmetric, Salient) and T3 (Unequal, Symmetric, Non-Salient)

Bubbles and bursts measurements	T2 (Unequal, Symmetric, Salient)	T3 (Unequal, Symmetric, Non-Salient)	Sig Diff
MP all periods	122.7	138.3	-
RD all periods	- 0.03	- 0.02	-
A all periods	1.67	1.91	-
BD all periods	5.17	6.17	-
NBB all periods	2.00	1.40	-
NBS all periods	1.83	2.67	-
MP Phase 1	115.3	119.9	-
MP Phase 2	168.3	194.4	-
MP Phase 3	84.5	100.5	-
MP Phase 2a	126.4	147.5	*
RD Phase 1	- 0.07	- 0.07	-
RD Phase 2	- 0.02	- 0.01	-
RD Phase 3	0.00	0.01	-
RD Phase 2a	- 0.01	0.00	-
A Phase 1	0.56	0.55	-
A Phase 2	0.72	0.48	-
A Phase 3	1.39	1.60	-
A Phase 2a	1.67	1.79	-
BD Phase 1	2.00	1.00	-
BD Phase 2	3.00	2.50	-
BD Phase 3	3.40	4.00	-
BD Phase 2a	4.83	5.83	-
NBB Phase 1	1.00	1.00	-
NBB Phase 2	1.50	1.50	-
NBB Phase 3	1.33	2.00	*
NBB Phase 2a	1.67	2.33	-
NBS Phase 1	1.00		-
NBS Phase 2	1.33	1.00	-
NBS Phase 3	1.00	1.50	-
NBS Phase 2a	1.75	1.40	-

Notes:
(a) MP: Market price, RD: Relative deviation, A: Amplitude, BD: Bubble duration, NBB: Number of bubbles, NBS: Number of Bursts. (b) Phase 1: period 1 to 5, phase 2: period 6 to 10, phase 3: period 11 to 15, phase 2a: period 6 to 15. (c) Mann Whitney U test: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 13 Average bubbles and bursts measurements T1 (Equal) and T2 (Unequal, Symmetric, Salient)

Appendix E: Mean Differences Buy & Sale Frequency

E1. Buying Frequency

p-value Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Treatment	Endowment Group	T1	T2		T3		T4		T5	
		NEG	LEG	HEG	LEG	HEG	LEG	HEG	LEG	HEG
Phase 1										
T1	NEG									
T2	LEG	0.1786								
	HEG	0.354	**0.0925**							
T3	LEG	0.1002	0.6574							
	HEG	**0.0799**		**0.0549**	0.7648					
T4	LEG	0.4879	0.7752		0.6383					
	HEG	**0.0122**		**0.0171**		0.4065	0.3171			
T5	LEG	0.0684	0.8326		0.8033		0.712			
	HEG	0.2477		0.1845		0.8535		0.3978	0.9905	
Phase 2										
T1	NEG									
T2	LEG	0.7197								
	HEG	0.9571	0.8122							
T3	LEG	0.7422	0.7804							
	HEG	0.8296		0.9588	0.9013					
T4	LEG	0.3547	0.6621		0.3214					
	HEG	0.4581		0.5814		0.8148	0.1458			
T5	LEG	0.4444	0.5303		0.8858		0.1976			
	HEG	0.6637		0.7239		0.814		0.625	0.5428	
Phase 3										
T1	NEG									
T2	LEG	0.7875								
	HEG	0.5982	0.7641							
T3	LEG	0.9666	0.9423							
	HEG	0.742		0.4626	0.8849					
T4	LEG	0.7882	0.7748		0.9062					
	HEG	0.4384		0.8975		0.3837	0.4032			
T5	LEG	0.3991	0.7104		0.5347		0.4028			
	HEG	0.4368		0.3812		0.8006		0.2768	0.1891	
All period										
T1	NEG									
T2	LEG	0.8157								
	HEG	0.6671	0.536							
T3	LEG	0.6541	0.9753							
	HEG	0.3863		0.2928	0.9178					
T4	LEG	0.6439	0.6383		0.5795					
	HEG	0.3069		0.1943		0.988	0.3919			

T5	LEG	0.9675	0.7059		0.613		0.8582			
	HEG	0.6978		0.4302		0.8142		0.7298	0.6768	

Table 14 Buying Frequency

E2. Selling Frequency

p-value Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Phase 1	Endowment Group	T1	T2		T3		T4		T5	
		NEG	LEG	HEG	LEG	HEG	LEG	HEG	LEG	HEG
T1	NEG									
T2	LEG	0.1962								
	HEG	0.4617	0.0984							
T3	LEG	**0.0227**	0.3318							
	HEG	0.724		0.4693	0.1479					
T4	LEG	**0.0487**	0.3297		0.9064					
	HEG	**0.0011**		**0.0063**		**0.0385**	0.5918			
T5	LEG	**0.0018**	0.0893		0.7056		0.8208			
	HEG	0.1156		0.118		0.3463		0.4458	0.6167	
Phase 2										
T1	NEG									
T2	LEG	0.2975								
	HEG	0.1556	**0.084**							
T3	LEG	0.8809	0.5906							
	HEG	0.1722		0.1099	0.6478					
T4	LEG	0.2579	0.84		0.5666					
	HEG	0.7928		0.2256		0.5204	0.5118			
T5	LEG	0.2668	0.8918		0.5004		0.8393			
	HEG	0.4305		0.105		0.8397		0.6762	0.9714	
Phase 3										
T1	NEG									
T2	LEG	0.9857								
	HEG	**0.0587**	0.1963							
T3	LEG	0.9571	0.8525							
	HEG	0.582		0.1858	0.7647					
T4	LEG	0.8531	0.9331		0.9732					
	HEG	0.4579		0.109		0.7054	0.625			
T5	LEG	0.503	0.8442		0.6503		0.6592			
	HEG	0.6702		0.1628		0.9732		0.8022	0.9525	
All Period										
T1	NEG									
T2	LEG	0.6369								
	HEG	**0.0648**	**0.0391**							
T3	LEG	0.5703	0.8446							
	HEG	0.2563		**0.0888**	0.8852					

T4	LEG	0.1018	0.3559		0.3647					
	HEG	**0.0325**		**0.0083**		0.546	0.962			
T5	LEG	0.0944	0.5817		0.5065		0.6943			
	HEG	0.3092		0.0898		0.9598		0.6004	0.8864	

Table 15 Selling Frequency

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