Social value orientation and capitalism in societies

Shibly Shahrier
Kochi University of Technology

Koji Kotani
Kochi University of Technology
Research Center for Social Design Engineering, Kochi University of Technology

Makoto Kakinaka
International University of Japan

29th February, 2016

Social value orientation and capitalism in societies

Shibly Shahrier[*]   Koji Kotani[†,‡,§]   Makoto Kakinaka[¶]

February 29, 2016

Abstract

Cooperation and competition are the core issues in economics and biology since they are claimed to affect evolution for human societies and ecological organization. Therefore, there has been a long-standing debate of whether nature or nurture curves people's social preference. We hypothesize that the degree of capitalism in societies influences evolution of people's value orientation, i.e., the degree of competitiveness in societies characterizes people's social preference. To test this hypothesis, we implemented field experiments of social value orientation and questionnaire surveys with 1000 respondents in the three different fields of Bangladesh: (i) rural, (ii) transitional and (iii) capitalistic societies. The analysis reveals that as society becomes capitalistic, people are likely to be less prosocial. A considerable proportion of "unidentified" people, neither proself nor prosocial, are found in transitional societies, implying a potential existence of unstable states in people's social preference during a transformation from the rural to the capitalistic. We have also found that having an additional child makes people individualistic, females' social preferences are more deterministic than males' ones, and people become more competitive with age and education. These results imply that some important problems such as climate change or sustainability, where "cooperation" rather than "competition" is necessary, shall be more endangered as societies become capitalistic.

Key Words: Social value orientation; capitalism; field experiments

---

[*]School of Economics and Management, Kochi University of Technology

[†]Professor, School of Economics and Management, Kochi University of Technology, 2-22 Eikokuji-cho, Kochi-shi, Kochi, 780-0844, Japan (e-mail: kojikotani757@gmail.com).

[‡]Research Center for Future Design, Kochi University of Technology.

[§]Urban Institute, Kyushu University.

[¶]Professor, Graduate School of International Relations, International University of Japan.

Contents

Nomenclature

SD   Standard deviation

SVO   Social value orientation

1 Introduction

Competition and cooperation have been important issues in economics and biology because they are considered determinants for evolution of human societies and ecology (Wilson et al., 2009, Leibbrandt et al., 2013). In evolutionary dynamics, competition is advantageous in the short run, however, for the long-run survival, cooperation can also be an effective strategy (Dawkins, 2006, Wilson et al., 2009). In economics, rational self-interest models under capitalistic competition are claimed to brings efficiency in allocating private goods, but cannot fully solve some public and intertemporal problems such as natural resource allocations, public goods provision, and resource sustainability for future generations (Milinski et al., 2006, Hauser et al., 2014).

Whether nature or nurture curves human behavior is an issue of debates for a long time (North, 1990, Henrich et al., 2005, Dawkins, 2006, Richardson and Boyd, 2008, Wilson et al., 2009, Henrich et al., 2010b, Leibbrandt et al., 2013). For instance, Dawkins (2006) introduces a concept of "meme" as an agent of how culture plays a role in societies like genes, and discusses that cultural evolution can nurture a change (or an evolution) in human behavior and preference. When a change in economies is considered a part of cultural evolution, economic development and growth are hypothesized to affect people's behavior and preference based on this "nurture" theory. Given a rapid growth of capitalism together with growing concerns for environmental problems and future sustainability, this article addresses a change in human behavior and preference central to competition and cooperation in relation to economic development of societies.

Several past studies have documented how culture affects human behavior of competitiveness, fairness, equity and trust. Henrich et al. (2005, 2010a) study 15 small-scale societies and conclude that people in small-scale societies integrated with markets are likely to exhibit higher prosociality and fairness.[1] Leibbrandt et al. (2013) show that fishermen in individualistic lake-based fishery are more competitive than those in collective sea-based fishery suggesting that the ways of interactions with other people in workplace affect human behavior and preference. Van Lange et al. (2011) use

---

[1]Our research differ from Henrich et al. (2005, 2010a), since we study people in three large-scale societies that are integrated with markets and have different degrees of competitiveness and capitalism, holding the same language, religion and so on.

a decomposed game of social value orientation (hereafter, SVO) to analyze the degree of competitiveness between economics and psychology students as well as the corresponding volunteering behavior. They reveal that economics students are more competitive than psychology students, and the "prosocial" individuals volunteer more in practice. Ockenfels and Weimann (1999) and Brosig-Koch et al. (2011) study people's cooperative and solidarity behavior in the Eastern and Western Germany, considering the two different economic and social histories. They find that subjects from the Eastern part act more selfishly than that of the Western part in both public goods and solidarity games.

None of past literature focuses on the degree of capitalism in societies to analyze human behavior and preference of competition and cooperation, although a rapid growth of capitalism has taken place in the world. Most previous research has been conducted in laboratory experiments with student pools and in developed countries. Nevertheless, to generalize and to understand real human behavior, preference and its implications, further studies are necessary in both fields and developing countries as claimed in Henrich et al. (2010b). This study examines how the degree of capitalism in economic environments brings a change or an evolution in human behavior and social preference through conducting field experiments.

Bangladesh has been chosen as a country of analysis because the capital city, Dhaka, is the most highly-densed and capitalistic society, and there also exists a huge gap between Dhaka and the rural areas with the respect to the degree of capitalism (Dewan and Corner, 2014). We have implemented field surveys and experiments in the three fields: (1) rural, (2) transitional and (3) capitalistic societies each of which possesses the same ethnicity, religion and culture, but differs from each other with respect to the degree of capitalism. In each field, we have collected socio-economic information and identify subjects' social value orientation of (i) competitive, (ii) individualistic and (iii) prosocial and (iv) unidentified types, following Van Lange et al. (1997, 2007). With this data, we characterize social value orientation in relation to the degree of capitalism as well as other socio-economic factors through statistical analyses.

2 Study region

The field surveys and experiments have been implemented in three regions of Bangladesh: 1. Dhaka, the capital city of Bangladesh (capitalistic), 2. Bogra, a northern subdistrict (transitional) and 3. Dacope, a southern subdistrict (rural). Dhaka is the most highly densed and capitalistic city, Bogra has been experiencing a transformation from the rural to the capitalistic societies due to the fast economic growth in the last ten years. Dacope is a rural area with the least level of capitalism, i.e., agrarian societies based on fishing and agriculture. Bangladesh is ethnically and culturally a homogeneous country, and these three societies are integrated with markets and possess the same culture, language, religious variation and social norms. However, they differ from each other regarding the inhabitation in the degree of capitalism, and the locations are shown in figure 1.

[Figure 1 about here.]

Dhaka city is located in between $90°18'$ and $90°57'$ east longitude, and $23°55'$ and $24°81'$ north latitude (See figure 1). The total land area, population, and population density are $1371\,\mathrm{km}^2$, 14.51 million and $10\,484$ people km^{-2}, respectively (Dewan and Corner, 2014). The population density in this region is almost nine times higher than that of the country average and it is the most densely-populated city in the world (Dewan and Corner, 2014). Dhaka is the center of industrialization, business, and service in Bangladesh. Business, service and some labor intensive occupations are the major occupations in Dhaka. No farming activities are available in current Dhaka metropolitan.

Bogra is located in between $89°16'$ and $89°29'$, and $24°41'$ and $24°50'$ east longitudes, and north latitudes (figure 1). The total land area is $215.64\,\mathrm{km}^2$, and the population density of Shahjanpur subdistrict where Bogra is located is 1307 people km^{-2}. It is slightly higher than the country average of 1218 people km^{-2} (Bangladesh Bureau of Statistics, 2013). Bogra is known to be a gateway for the southern part of Bangladesh and one of the modern as well as industrialized cities in Bangladesh. All the villages in Bogra have electricity supply and good communication with the nearest district cities. The modernization has occurred due to the efforts made by several

5

government agencies, and NGOs for green revolution and improving agriculture in that region. Green revolution, infrastructural development by the last two decades, and the suitable location for industrialization lead to a rapid economic growth. Thus, Bogra has been experiencing a transition from the rural to the capitalistic with fast speed.

Dacope is located in between $22°24'$ and $22°40'$ north latitudes, and $89°24'$ and $89°35'$ east longitudes. The total land area of Dacope subdistrict is $991.58\,\mathrm{km}^2$, and the population densities is approximately $980\,\mathrm{people\,km}^{-2}$ (Bangladesh Bureau of Statistics, 2013). The population density in Dacope is lower than the country average of $1218\,\mathrm{people\,km}^{-2}$. The infrastructure in this region is one of the least developed ones in Bangladesh. River network is the main channel of transportation. The earthen embankment is built to protect this region from storm surges and it partially provides road transportation to a limited extent. Except some hatcheries and agriculture, there are few industries in this region.

Due to the close vicinity with the world's largest mangrove forest called the Sundarban as well as the absence of industries and service sectors, livelihood in Dacope is dependent on nature. Many households in Dacope rely upon the availability of natural resources for their livelihood such as in some primitive agrarian societies. Unlike the other two study regions, farming, wood (honey) collection and fishing are main occupations, being contingent on the resources and rivers in the Sundarban. Although some people in Dacope are in the service sectors and in small-scale industries such as shrimp cultivation firms, harvesting natural resources, farming and small businesses are the major economic activities. Thus, natural uncertainty and availability of natural resources directly affect people's incomes in Dacope.

3 Methodology

3.1 Social value orientation experiment

To measure people's social preference of competition and cooperation in three different regions, we have employed a decomposed SVO game developed by Van Lange et al. (1997, 2007).

The concept of social value orientation comes from a game-theoretical approach of interdependence which represents the effective matrix of outcomes for self and for another person (Van Lange et al., 2007). In this game, numbers are given to represent the outcomes for oneself and the other with a pair of two persons where the other is unknown to the subject. Following Van Lange et al. (2007), the game is called a triple dominance decomposed game, because each subject is asked to make a choice among the three options for one question. For example,

Option 1: You get 500 and the other gets 100.

Option 2: You get 500 and the other gets 500.

Option 3: You get 560 and the other gets 300.

Option 1 represents competitive orientation that maximizes the gap between oneself and the other ($500 - 100 = 400$) compared to any other option. Thus, subjects who choose option 1 can be considered competitive to maximize the relative outcome. Option 2 is a prosocial orientation that maximizes the joint outcome ($500 + 500 = 1000$). Finally, option 3 represents an individualistic orientation in that subjects who choose option 3 maximizes the own outcome of 560 and appears to be indifferent to the outcome of the other. The triple-dominant method of decomposed SVO games developed by Van Lange et al. (1997, 2007) consists of such nine questions each of which consists of three options as introduced above.[2] Subjects are asked to choose one option among three options for each question and in total answer nine questions. The answers are first utilized to identify whether each subject's orientation is competitive, individualistic or prosocial. More specifically, when at least 6 out of 9 choices of the person are consistent with one of the orientations (competitive, individualistic and prosocial), he/she is categorized as the orientation. Otherwise, the subject is categorized as "unidentified."

We have implemented our experiments with monetary payments, because we needed to attract people to come to the experimental sites and seriously participate in them, considering transportation and opportunity costs of time. To invite people in an equally random manner, the information

---

[2]A major reason for using the triple-dominant method is due to its simplicity. Many subjects in the Bangladeshi fields are not educated and we needed a simple game for everyone to understand.

about our experiments was distributed to all kinds of people through our human network of local NGOs, government offices, universities and so on. For each session, we have collected $20 \sim 40$ subjects at a time in an experimental site, gave experimental instructions to subjects, and experimenter (the first author) orally made presentations to confirm subjects' understanding. After eliciting subjects' answers for SVO, we conducted questionnaire surveys collecting each subject's socio-demographic information, randomly matched one questionnaire with another to make pairs and calculated the total payoff for each subject.[3] One session took $40 \sim 50$ minutes, and the average payment was BDT 300 ($\approx$ USD 3.30) with a showup fee of BDT 150 ($\approx$ USD 2.00).

3.2   Random sampling in the fields

We have implemented different approaches of random sampling for the three study regions, because they possess different socio-demographic and geographical characteristics. In each study region, we have administrated the field survey and experiments with 334 subjects.[4] The experiments have been conducted between December, 2014 and March, 2015. All subjects are household heads or female subjects with income and financial contribution to the household. In the first study region, Dhaka, we did randomization based on occupations to avoid concentration on some specific group of people. First, we approximately computed a proportion of each occupational category in the total population by referring to several governmental reports such as Bangladesh Bureau of Statistics (2011, 2013). After that, we randomly selected a number of organizations or companies for each category. We contacted with the organizations and based on their compliance, we randomly selected individuals from these organizations. However, for low-income occupations and the occupations that require frequent movement within the city, such as rickshaw and van pullers, we randomly selected some slums where they live and invited a required number of personnels from those slums. Our experiments were at the classrooms in the Institute of Information Technology in Dhaka University.

---

[3]For the details of the game instructions and payoff calculations, see appendix 1.

[4]The first author mainly administered the surveys and experiments.

In the second study region, Bogra, we conducted a household-level randomization. First, we designated the number of samples for the selected unions based on the total number of households in each union. We conducted our experiments with 145, 99, and 90 subjects, respectively from Aria Bazar, Amrool and Chupinagar unions grounded on the number of households in each unions. The household numbers had been collected from respective local union offices. We had randomly selected the household numbers and invited the household heads by sending them invitation letters. Finally, we realize that our monetary incentives and invitation letters enabled to collect an enough number of subjects, and we conducted the experiments in several schools within the study region.

The third study region consists of two unions in Dacope subdistrict of Khulna district, namely Kamarkhola, and Sutarkhali. The total number of households in Kamarkhola and Sutharkhali is 3,559 and 7,536, respectively (Bangladesh Bureau of Statistics, 2011, 2013). We have randomly picked 108 (32% of the total subjects) and 226 (68% of the total subjects) subjects respectively from Kamarkhola and Sutarkhali based on the proportion of the number of households in these two unions. Because the list of residents in the local government office is not available, and people frequently move their shelters for daily activities such as harvesting in the study region, we were unable to implement a usual randomization procedure for this region.

To implement random sampling, we follow the procedures used in Himelein et al. (2013, 2014), called geographic cluster sampling. Prior to the experiments, first, we observe human movements and the density of households within the study region using GIS technology. Moreover, we visited the study region twice before implementing the experiments. With the help of GIS technology and information obtained through field visits, we divided each of the unions into five subregions and segregate each of the subregions into several seemingly equal stratums with approximately the same number of households. Finally, we randomly picked an identical number of subjects from each stratum and invited them to participate in our experiments.

9

3.3 Empirical method

We apply a multinomial logit model to characterize the determinants of SVOs. Based on SVO specifications, a subject's SVO falls into one of the four orientations: (i) the competitive, (ii) individualistic, (iii) prosocial and (iv) unidentified. The multinomial logit model is used to analyze the probability for subjects to be in one orientation, and is specified as:

$$\text{Prob}_n(i) = \text{Prob}(S_{in} \geq S_{In}), \quad \forall I \neq i \tag{1}$$

where $\text{Prob}_n(i)$ is the probability that subject n falls into an orientation i among four orientations of $I = \{\text{competitive, individualistic, prosocial, unidentified}\}$. S_{in} is a function of independent variables that characterize the likelihood of subject n being an orientation i and is specified as a linear form:

$$S_{in} = \boldsymbol{\beta}_i \mathbf{X}_n + \epsilon_{in}. \tag{2}$$

Here, $\mathbf{X}_n$ is a vector of independent variables, $\boldsymbol{\beta}_i$ is a vector of estimable coefficients and ϵ_n is a disturbance term that takes account of unobserved factors.

Combining equations (1) and (2), the following equation can be derived:

$$\begin{aligned} \text{Prob}_n(i) &= \text{Prob}(\boldsymbol{\beta}_i \mathbf{X}_n + \epsilon_{in} \geq \boldsymbol{\beta}_I \mathbf{X}_n + \epsilon_{In}), \quad \forall I \neq i \\ &= \text{Prob}(\boldsymbol{\beta}_i \mathbf{X}_n - \boldsymbol{\beta}_I \mathbf{X}_n \geq \epsilon_{In} - \epsilon_{in}). \end{aligned} \tag{3}$$

Equation (3) enables us to estimate coefficients of independent variables by multinomial logit models under the assumption that ϵ_{in}s are generalized extreme-value distributed. With this approach, equation (3) reduces to the following closed form:

$$\text{Prob}_n(i) = \frac{\exp \boldsymbol{\beta}_i \mathbf{X}_n}{\sum_I \exp \boldsymbol{\beta}_I \mathbf{X}_n}. \tag{4}$$

The vector of coefficients $\boldsymbol{\beta}_i$ in equation (4) can be estimated by standard maximum likelihood methods. The set of independent variables $\mathbf{X}_n$ includes household income, age, education, the

number of children less than 12 years of age in the household, gender, family structure, and regional dummy. Table 1 presents the definitions of the variables that are considered possible determinants for people's value orientations. Age is coded as an ordered categorical variable from 0 to 5 following prosocial-growth or proself-growth hypothesis (Van Lange et al., 1997). The number of children less than 12 years of age and faimly structure are considered because they claimed to affect people's value orientation. Finally, regional dummy variables are considered to capture the effect of capitalism. The multinomial logit regression estimates a change in probability for people to be in a certain value orientation when one independent variable alters.

[Table 1 about here.]

4 Result

4.1 Summary statistics

Tables 2 and 3 summarize the statistics of independent variables and SVOs. First, household income is the highest in Dhaka and the lowest in Dacope. This reflects the fact that Dhaka is highly industrialized and capitalistic, while most people in Dacope engage in agriculture and are dependent on natural resources in their daily life. As mentioned earlier, Bogra can be considered in-between and thus the income data is quite consistent with our intuition. The gap between the rich and the poor seems to be the highest in Dhaka because the standard deviation (hereafter, SD) in household income is the largest among the three regions.

The population in Dhaka is relatively younger than that of Bogra, and Dacope. Nevertheless, the overall average age of 32.6 years suggests that most people in these three regions are in working age. With respect to education, people in Dhaka are highly educated with 16 years of schooling, while most people in Bogra and Dacope have only 5 years of education. The highest number of children less than 12 years of age per household has been found in Dacope on an average. The number of joint family is significantly higher in Dacope than that of Dhaka and Bogra. All of these

11

summary statistics are quite consistent with what we expected from these three regions and follow the order in their degree of capitalism.

[Table 2 about here.]

Table 3 draws the summary statistics of subjects' SVOs across three regions. The number of competitive people is the highest in Dhaka (108), the next in Bogra (79) and the lowest in Dacope (59). Individualists are the uppermost in Dacope (109) followed by Dhaka (103), and Bogra (75). The number of the prosocials is the highest in Dacope (115) and the smallest in Dhaka (59). The 106, 64, and 51 subjects of "unidentified" value orientation have been found in Bogra, Dhaka and Dacope, respectively. Overall, the results in table 3 demonstrate a clear tendency that competitive and prosocial people are dominant in Dhaka and Dacope, respectively, whereas a proportion of unidentified people is outstanding in Bogra. This tendency seems to suggest that in a transitional stage of Bogra from the rural and the urban, people's value orientations are in unstable states, while people in Dhaka and Dacope reflect their daily-life practices and interactions with other people in societies with respect to competitiveness.

[Table 3 about here.]

4.2 Social value orientation in relation to the degree of capitalism

First, on the basis of table 3, we ran pair-wise chi-squared tests of categorical variables for the three regions to see whether any pair of two regions is independent of the distribution of SVOs. More specifically, the null hypothesis is that the distributions of SVOs are the same between any two regions. We have confirmed that all the pairs of Dhaka vs. Dacope, Dhaka vs. Bogra and Dacope vs. Bogra reject the null hypothesis with 1% significance of $\chi^2(3) > 20$, suggesting that the distribution of SVOs is dependent upon the regions. It is hypothesized that the societies where people reside might have strong influence on SVOs, controlling for other factors. Table 4 presents

12

the estimation results for marginal effects in multinomial logit regression.[5] The results estimate

marginal probabilities for subjects to be in the competitive, individualistic and unidentified relative

to being in a base group of the prosocial when an independent variable changes.

[Table 4 about here.]

First, we make a quick review of our qualitative results in table 4. The results show that income

and family structure have no explanatory powers for value orientation. Education is statistically

significant for being in the competitive and the unidentified. A number of children less than 12

years of age in a household affects the relative likelihood of being in the individualistic and in the

unidentified. Age is identified to positively affect the probability of being in the competitive relative

to the prosocial. Finally, regional dummies of "Dhaka" and "Bogra" are significant predictors for

people to be in the competitive, the individualistic and the unidentified, respectively, in comparison

to being in the prosocial, taking "Dacope" as a base group.

With respect to income, the result of insignificance is quite consistent with previous research

(Henrich et al., 2005, Wilson et al., 2009, Henrich et al., 2010a, Leibbrandt et al., 2013), reporting

that incomes or wealth are not determinants to characterize people's behavior associated with com-

petitiveness, fairness, equity and trust. Insignificance of family structure in our results might not

align with some of the previous research. For instance, Van Lange et al. (1997) and Van Lange et al.

(2011) argue that higher interdependence at family level leads to prosocial orientation. However,

Leibbrandt et al. (2013) demonstrate that interdependence at social level rather than at family level

becomes strong determinants for people's competitiveness. Therefore, this issue remains unsettled

and need further investigation.

The effect of education tells us that one-year rise in education raises the likelihood of being

in the competitive and the unidentified by 1.1% and 1.0%, respectively relative to the prosocal.

Although the magnitude of the probability might be considered rather small, note that one standard-

deviation increase in education (approximately 6 years, i.e., high school plus university) boosts up

---

[5]We have included occupation dummies in the original regression. However, none of them becomes significant and do not affect the result in qualitative and quantitative manners with the one we present in this manuscript. Therefore, we simply omit the occupation dummies from the regression.

the likelihood of being in the competitive and the unidentified by 6.34% and 5.76%, respectively. Our results suggest that the education system in Bangladesh influences individuals to become competitive as years of schooling increase. Definitely, current Bangladeshi education requires young people to go through cutthroat competitions for the admissions of good high schools and universities. We conjecture that this is one reason for the increased likelihood of being in the competitive and in the unidentified through more education. This result is consistent with Dawkins (2006) demonstrating that the idea of competition propagates from brain to brain as they get more education in competitive environments, and then individuals become more competitive .

Having one more child less than 12 years of age in a household raises the probability of being in the individualistic and the unidentified by 2.7% and 2.5%, respectively, relative to being in the prosocial. This finding is in contrast with the argument in Van Lange et al. (1997) claiming that people become more prosocial due to more interaction and experience with children. However, this difference may derive from some special context in a developing country like Bangladesh, and it is very distinct from that of a developed country. For instance, having and raising a young child in a developing country come with more difficulties and harship than in a developed country, and an adult person needs to work and compete very hard for his/her children, even sacrificing themselves for food and daily survival. In such a situation, the probability of being in the individualistic or in the unidentified is expected to increase with an additional child in a household.

With respect to a gender dummy, the probability of being in the unidentified for male is identified to be statistically significant and is higher than that for females by 7.1% relative to being in the prosocial. Van Lange et al. (1997) find that females are more prosocial than males. However, our finding weakly supports this finding, rather suggests that females' social preferences are more deterministic than males' ones. Regarding a variable of family structure, we initially expected that joint family structure may induce people to be in the prosocial, because it induces more interactions with relatives and family members. However, our results demonstrate that family structures would not affect the probability of being in a specific value orientation.

Regarding age, a 2.2% rise in the probability of being in the competitive relative to being in

14

the prosocial has been found when age increases by one category of 10 years. It is in contrast with the prosocial-growth hypothesis claimed in Van Lange et al. (1997), and our results seem to support the proself-growth hypothesis. The magnitude of the change with respect to age might be considered significant, because it is established that individuals' behavior and preference related to competitiveness and cooperation do not change in a short period (Harbaugh and Krause, 2000, Henrich et al., 2005, Brosig-Koch et al., 2011). In developing countries such as Bangladesh, there have been no social security systems and no public supports for elderly people. Therefore, elderly people are required to compete for a stable future as they get old, influencing their innate psychology to be in the competitive.

Finally, we look at the relationship between the value orientation and regional dummies. Recall that in the rural society (Dacope), the "prosocial" people are the most dominant. On the other hand, in the capitalistic society (Dhaka), the "competitive" people are dominant. In the in-between society (Bogra), the portion of the unidentified people becomes large. As expected, the regional dummies in the regression confirm that a person in Dhaka is more likely to be in the competitive by 9.4% than a person in Dacope relative to being in the prosocial. A person in Bogra is more likely to be in the individualistic by 10.1% than a person in Dacope as compared to being in the prosocial. Likewise, persons in Dhaka and Bogra are more likely to be in the unidentified by 10.2% and 16.30%, respectively, than persons in Dacope relative to being in the prosocial.

The results tell us that the economic environments where a person lives is the strongest predictor for his/her value orientation. It implies that economic environments, i.e., the degree of competition in the societies, affect people's behavior and preference central to competition and cooperation, even when we control other factors. As societies become more capitalistic, people become more individualistic, competitive or unidentified. Surprisingly, the proportion of the "unidentified" people in Dacope (the least competitive and capitalistic society) is the lowest among the three regions, while it is the highest in a transitional society of Bogra. This result implies a potential existence of unstable states in people's social preference.

Previous researches of SVOs such as Van Lange et al. (1997, 2011) do not pay attention to the

existence of such "unidentified" subjects in transitional societies. As mentioned earlier, Bogra has been chosen as our study site, because the society is under rapid transformation and approaching to a capitalistic society like Dhaka from a rural setting. On the basis of our hands-on observations and experiences in the field, people in this society appear to have recently encountered an increased level of competition in many economic activities, while some considerable portion of agrarian and traditional activities remains as they had been. Therefore, such a mixture of competitive and traditional economic environments make individuals' SVOs be in unstable states from one orientation to another. Therefore, many of their value orientations could be in the unidentified.

It is worthwhile to note some of our observations about the real-life economic practices in Dacope that make people more prosocial. In Dacope, some economic activities require cooperation rather than competition for mutual long-term survival under natural uncertainty and hardship. For instance, people go to the adjacent forest, the Sundarban, for wood or honey collection, and need to work together for their safety from the attacks of wild animals such as tigers. Moreover, it is quite common to share the profit equally, no matter how much wood or honey they collect individually. The same type of sharing practices can be seen among the fisherman who harvest together in adjacent rivers. The existence of such cooperative practices enhances the degree of prosociality at social level. As a consequence, people in this region are more prosocial than that of Dhaka and Bogra, and it is consistent with the finding in Leibbrandt et al. (2013).

Finally, we check whether individuals have enough interactions with others in everyday life and whether such experiences of social interactions reflect individuals' social preferences identified in our experiments (Erikson, 1980, North, 1990, Van Lange et al., 1997). More specifically, we hypothesize that people's interactions with neighbors in each society have some association with value orientations, because interaction with neighbors seem to change together with transformation of societies.[6] We have collected individual information about the frequency of interactions with

---

[6]Interactions with friends have been difficult to be quantified on the same basis between the rural and the urban, because the way of how they interact is heterogeneous under different environments such as availability of internet and so on. Moreover, interactions with friends are somewhat dependent upon each individual' personality that reflect the fact that friends are chosen endogenously, but neighbors are exogenously given in Bangladeshi societies. Therefore, we determine to use "interaction with neighbors" as a main instrument.

neighbors.[7]

Table 5 presents the summary statistics for the frequency of interacting with neighbors per month in each region. Interestingly, the distribution in the frequency of interactions with neighbors and the value orientation exhibit the same qualitative tendency with respect to regional dummies. People in Dacope interact with their neighbors most frequently among our three study regions in the average and median. On the other hand, people in Dhaka have the lowest frequency in the average and median. People in Bogra fall in-between. The standard deviations also reveal the same tendency except that Bogra's standard deviation is bit higher than Dacope's one. Overall, it appears that the economic development in a capitalistic way changes social preference and interactions with neighbors. That is, as societies become more competitive and capitalistic, people are less likely to interact with their neighbors. This result is also quite consistent with that of our multinomial regression for people to be proself (the individualistic and the competitive) as economies become competitive.

Our results demonstrate that as society becomes more competitive and capitalistic, people tend to become more competitive or unidentified. That is, when an economy grows from the rural to the capitalistic, people's value orientations evolve to be less prosocial. Past literature has already manifested the reliability of culture-gene coevolution (North, 1990, Henrich et al., 2005, Dawkins, 2006, Richardson and Boyd, 2008, Henrich et al., 2010a, Leibbrandt et al., 2013). Our results can be considered one evidence of coevolution between modern economic development and human preference. That is, economic development changes the degree of competitiveness and capitalism in societies, leading to a change in people's social preference. To the best of our knowledge, this paper is the first to focus on the degree of capitalism in the field experiments and to demonstrate that people's social preferences are more likely to be in the individualistic, unidentified and competitive when societies transform from the rural to the transitional and to the capitalistic. In this sense, our

---

[7]To avoid reverse causality between value orientation and social interaction, we have not included the frequency of interactions with neighbors as an independent variable in the regression.

research is unique as an evidence for coevolution between economic development under capitalism and human nature.

5 Conclusion

Past literature shows how culture brings evolution in human behavior and preference. Given the fast spread of capitalism worldwide, it is highly likely that capitalism as an agent of culture brings evolution in human behavior and preference as well. Hence, in this article, we analyze individuals' social preferences in relation to the degree of capitalism. Most of the previous literature that addresses the issue of coevolution between human and culture have been conducted in laboratories or developed countries. The field experiments in Bangladesh enable us to study humans' social preference in relation to the degree of capitalism, since Bangladesh has a wide gap between the rural and the capitalistic.

We conclude that as society becomes capitalistic, people become less prosocial. A transformation in societies from the rural to the capitalistic brings an unstable state in people's social value orientations, and their initial social preference might gradually change into another orientation. Moreover, the findings show that having one more child makes people individualistic, females' social preference is less likely to be in the unidentified, and people become more competitive as education and age increase. This implies that as society becomes more capitalistic and aging, solving natural resource and environmental problems such as global climate change shall be more challenging due to the lack of cooperation among individuals. In this scenario, new mechanisms or institutions will be needed for the solutions of such problems.

Finally, we note some limitations of our study. We have tried to collect more rich data with respect to interactions among people that should have characterized SVO data in the more detail. Unfortunately, however, economic environment seems to affect the way how people interact each other, and some of our initial attempts have been impossible such as quantifying their interactions with various people such as friends and the quality of human relationship. Future research should

be able to account for not only the quantity but also the quality of various human interactions to address social preference. These caveats notwithstanding, it is our belief that the study has become a first step to address how economic environment, more precisely, the level of capitalism in the societies brings a change (or an evolution) in people's social preference. The more the society experiences competitions under capitalism, the more the strategy of being proself seems to propagate. Our results could be considered an evidence of coevolution between human preference and societies' change. More generally, this study provides an illustration of culture-gene coevolution in relation to capitalism as the new replicator of the meme suggested by Dawkins (2006).

6 Bibliography

Bangladesh Bureau of Statistics (2011). District statistics. Technical report, Bangladesh Bureau of Statistics.

Bangladesh Bureau of Statistics (2013). District statistics. Technical report, Bangladesh Bureau of Statistics.

Brosig-Koch, J., Helbach, C., Ockenfels, A., and Weimann, J. (2011). Still different after all these years: Solidarity behavior in East and West Germany. *Journal of public economics*, 95:1373–1376.

Dawkins, R. (2006). *The selfish gene*. Oxford university press.

Dewan, A. and Corner, R. (2014). *Dhaka megacity: Geospatial perspectives on urbanisation, environment and health*. Springer.

Erikson, E. H. (1980). *Identity and life cycle*. Norton.

Harbaugh, W. T. and Krause, K. (2000). Children's altruism in public good and dictator experiments. *Economic inquiry*, 38:95–109.

Hauser, O. P., Rand, D. G., Peysakhovich, A., and Nowak, M. A. (2014). Cooperating with the future. *Nature*, 511:220–223.

Henrich, J., Boyd, R., Bowles, S., Camerer, C. F., Fehr, E., Gintis, H., McElreath, R., Alvard, M., Barr, A., Ensminger, J., Heinrich, N. S., Hill, K., Gil-White, F., Gurven, M., Marlowe, F. W., Patton, J. Q., and Tracer, D. (2005). "Economic man" in cross-cultural perspective: Behavioral experiments in 15 small-scale soceities. *Behavioral and brain sciences*, 28:795–855.

Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., Bolyanatz, A., Cardenas, J. C., Gurven, M., Gwako, E., Henrich, N., Lesorogol, C., Marlowe, F., Tracer, D., and Ziker, J. (2010a). Markets, religion, community size, and the evolution of fairness and punishment. *Science*, 327(5972):1480–1484.

Henrich, J., Heine, S. J., and Norenzayan, A. (2010b). The weirdest people in the world? *Behavioral and brain sciences*, 33:61–135.

Himelein, K., Eckman, S., and Murray, S. (2013). The use of random geographic cluster sampling to survey pastoralists. World Bank policy research working paper 6589.

Himelein, K., Eckman, S., and Murray, S. (2014). Sampling nomads: A new technique for remote, hard-to-reach and mobile population. *Journal of official statistics*, 30:191–213.

Leibbrandt, A., Gneezy, U., and List, J. A. (2013). Rise and fall of competitiveness in individualistic and collectivistic societies. *Proceedings of the National Academy of Sciences of the United States of America*, 110:9305–9308.

Milinski, M., Semmann, D., Krambeck, H., and Marotzke, J. (2006). Stabilizing the earth's climate is not a losing game: Supporting evidence from public goods experiments. *Proceedings of the National Academy of Sciences of the United States of America*, 103:3994–3998.

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge university press.

Ockenfels, A. and Weimann, J. (1999). Types and patterns: An experimental East-West-German comparison of cooperation and solidarity. *Journal of public economics*, 71:275–287.

Richardson, P. J. and Boyd, R. (2008). *Not by genes alone: How culture transformed human evolution*. University of Chicago press.

Van Lange, P. A., Bekkers, R., Shuyt, T. N., and Vugt, M. V. (2007). From games to giving: Social value orientation predicts donation to noble causes. *Basic and applied social psychology*, 29:375–384.

Van Lange, P. A., De Bruin, E. M. N., Otten, W., and Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of personality and social psychology*, 73(4):733–746.

Van Lange, P. A., Schippers, M., and Balliet, D. (2011). Who volunteer in psychology experiments? An empirical review of prosocial motivation in volunteering. *Personality and individual differences*, 51:279–284.

Wilson, D. S., O'Brien, D. T., and Sesma, A. (2009). Human prosociality from an evolutionary perspective: Variation and correlations at a city-wide scale. *Evolution and human behavior*, 30:190–200.

List of Figures

Figure 1: Three regions of Dhaka, Bogra (Shajahanpur) and Dacope

List of Tables

Table 1: Description of variables

Variables	Description
SVO categories	Competitive, individualistic, prosocial and unidentified
Household income	Household income per month in BDT 1000.
Age	Categorical variable of $\{0, 1, 2, 3, 4, 5\}$ where ages between 20 and 29, 30 and 39, 40 and 49, 50 and 59, 60 and 69, 70 and more are coded as $0, 1, 2, 3, 4$ and 5, respectively.
Education	Years of schooling.
Children less than 12 years of age	Number of children less than 12 years of age in the household.
Gender	Dummy variable that takes 1 when the subject is male, otherwise 0.
Family structure	Single-family structures are coded as 1, otherwise (joint family) 0.
Regional dummy	Dacope is a base group. Two dummy variables are defined for Dhaka and Bogra, respectively.

Table 2: Summary statistics of independent variables ($N = 1002$)

	Regions			Overall
	Dhaka	Bogra	Dacope	
Monthly household income in BDT 1000				
Average	110	16	13	47
Median	35	12	10	15
SD[1]	566	21	12	330
Min	3	3	2	2
Max	10000	350	100	10000
Age (ordered categories)[2]				
Average	0.66	1.58	1.53	1.26
Median	0	1	1	1
SD	0.85	1.39	1.26	1.26
Min	0	0	0	0
Max	5	5	5	5
Education (years)				
Average	12.66	6.26	6.56	8.50
Median	16.00	5.00	5.00	10.00
SD	5.30	4.96	4.57	5.76
Min	0.00	0.00	0.00	0.00
Max	20.00	17.00	17.00	20.00
The number of children (< 12 year-old)				
Average	0.84	0.65	1.12	0.86
Median	1.00	1.00	1.00	1.00
SD	1.08	0.78	0.90	0.95
Min	0.00	0.00	0.00	0.00
Max	6.00	6.00	4.00	6.00
Gender (Female $= 0$)				
Average	0.82	0.95	0.93	0.90
Median	1.00	1.00	1.00	1.00
SD	0.39	0.22	0.25	0.30
Min	0	0	0	0
Max	1	1	1	1
Family structure (Joint family $= 0$)				
Average	0.62	0.75	0.46	0.61
Median	1.00	1.00	0.00	1.00
SD	0.49	0.43	0.50	0.49
Min	0	0	0	0
Max	1	1	1	1

[1] SD stands for standard deviation.
[2] The variable of age is defined as an ordered categorical variable (table 1).

Table 3: Social value orientations by study regions ($N = 1002$)

	Competitive	Prosocial	Individualistic	Unidentified
Dhaka	108	59	103	64
	(32.34 %)	(17.66 %)	(30.84 %)	19.16 %
Bogra	79	74	75	106
	(23.65 %)	(22.16 %)	(22.46 %)	(31.74 %)
Dacope	59	115	109	51
	(17.66 %)	(34.43 %)	(32.63 %)	15.27 %
Overall	246	248	287	221
	(24.55 %)	(24.75 %)	(28.64 %)	(22.06 %)

Table 4: Marginal effects in multinomial logit regression where the prosocial is a base group ($N = 1002$).

	Competitive	Individualistic	Unidentified
Monthly household income (in BDT 1000)	0.00	0.00	−0.00
	(0.00)	(0.00)	(0.00)
Education (years of schooling)	0.011***	−0.0010	−0.010***
	(0.0030)	(0.0032)	0.0028
# of children (< 12 years old)	−0.019	0.027*	0.025*
	(0.017)	(0.016)	(0.015)
Male (base group = female)	0.029	0.069	0.071*
	(0.043)	(0.047)	(0.040)
Age (categorical variables)	0.022*	−0.0040	−0.0070
	(0.012)	(0.014)	(0.011)
Single family (base group = joint family)	0.012	−0.038	0.014
	(0.029)	(0.032)	(0.029)
Regional dummy (base group = Dacope)			
Dhaka	0.096**	−0.022	0.10***
	(0.044)	(0.040)	(0.042)
Bogra	0.053	−0.10***	0.16***
	(0.038)	(0.035)	(0.038)

***significant at the 1 percent level, **significant at the 5 percent level and *significant at the 10 percent level.

The Wald χ^2 statistic is 102.67 for the multinomial logit with significance of 1 percent level.

Table 5: Frequency of interactions with neighbors per month ($N = 1002$)

Frequency of interactions per month	Regions			Overall
	Dhaka	Bogra	Dacope	
Average	12.7	28.6	30.3	23.9
Median	4	18	30	15
Standard deviation	15.4	31.9	27.8	27.2
Min	0	0	0	0
Max	120	200	150	200