

**Religiosity as a Driving Force of Altruistic Economic Preferences****Vojtech Konarik\***

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**ABSTRACT**

*This paper analyzes the influence of selected socioeconomic factors on prosocial economic preferences with special attention to religiosity and religion. We examine whether particular socio-economic characteristics (gender, age, income, regular income, education, religion, and religiosity) have a significant effect on prosocial economic preferences, represented by the willingness to donate to a beggar, the amount of the donation, willingness to donate more to a child beggar, the amount of the donation to a child beggar, and participation in charity events. We run a questionnaire survey, and we test individual effects on a sample of 181 observations using graphical analysis and non-parametric tests. We find that both religiosity and religion significantly influence prosocial economic preferences, but the effects of religiosity are broader. The other significant drivers of prosocial economic preferences include socioeconomic characteristics of participants regular income, and to a lesser extent age and gender.*

**Keywords: Religion, Altruism, Beggar, Prosocial behavior, Socioeconomic factors****1. Introduction**

The economic mainstream as a science of human selfish behavior focuses on the imperialistic model of *Homo Oeconomicus*. While theoretical economics assumes that people are primarily selfish, research on social behavior reveals that people exhibit prosocial traits. The social environment affects behaviors such as the tendency towards solidarity, redistribution, cooperation, and compliance with ethical norms and standards. People tend to pay attention to equality, justice, sociality, solidarity, and mutuality. This behavior can differ depending on social characteristics. Religiosity and religion provide an essential framework within human relations and interaction related to solidarity, cooperation, and prosocial volunteering as well as to social mentality. These findings lead us to focus on socioeconomic characteristics that can have a significant role in creating prosocial economic preferences, as well as understanding them. As Ammerman (2014) suggests, religion can shape a person's identity, actions, and social norms. The same applies to lack of religion. A large body of the literature suggests that religion has a large effect on the behavior of the followers and leads to behavior that is generous and selfless, see, for instance, Bennett and Einolf (2017) and Galen et al. (2015).

Bennett and Einolf (2017) cover individuals from 126 countries and suggest that religion helps promote prosocial norms and values that motivate people to help strangers. This study makes a large contribution to the literature, but the dependent variable remains quite general. Similarly, for instance, Etter (2019) focuses instead on indirect broader questions to measure altruism, and Ahmed and Salas (2013) focus on how the environment (lecture hall vs. church) impacts prosocial behavior. Therefore, our research can contribute to the existing literature by providing more detail. To our knowledge, we are among the first to analyze the effect of a broader set of socioeconomic variables on various altruistic intentions. Specifically, we study not only the willingness to donate to a poor stranger in the street, called a "beggar" in this paper, but also (i) the possibility of a higher empathy effect if the beggar is a child, (ii) the amount of money people are willing to donate to a beggar and child beggar, and (iii) participation in charity events. We study how prosocial behavior can influence how people perceive economic and social realities, and what factors lead them to make decisions inconsistent with *Homo Oeconomicus*'s utility function.

We find that socioeconomic factors significantly influence prosocial economic preferences. We empirically confirm that five of seven socioeconomic variables gender,

age, regular income, religiosity, and religion impact our prosocial variables. We suggest that religiosity may be more important than a specific religion and that the regularity of income may play a more significant role in forming prosocial preferences than its magnitude. Our findings may inspire non-profit organizations active in charity and providing help for the socially disadvantaged, as well as policymakers focusing on prosocial policy.

The remainder of the paper is organized as follows: Section 2 presents a literature review focused on altruism, its manifestations, and the role of religion and religiosity in a social context. Section 3 describes empirical methodology including data collection and statistical tests. Section 4 briefly describes the data employed. Section 5 discusses the results of graphical analysis and hypothesis testing. Section 6 concludes.

## 2. Altruism and religion

### 2.1 Altruism

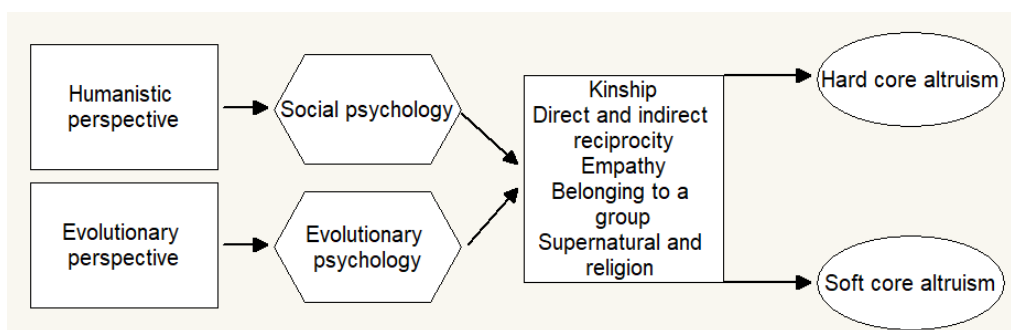
There are many definitions of altruism. Altruism is a mode of behavior motivated primarily by the benefit of others, with the absence of selfish intention in material or mental form (Etter, 2019; Kassin 2007; Pellegrini, 2019). Based on this, the transfer of interest from oneself to others is present, while the specification of the result is missing or is insufficient (Pellegrini, 2019). Another definition views altruism as costly actions that result primarily in benefits for others (Clavien and Chapuisat, 2012; Katz and Malul, 2014). Critics opine that even if such motivations underlie altruistic behavior, this is not sufficient (Field, 2004). As a reaction to the mentioned contrast between the intention and results, the concept of effective altruism appears. This concept abstracts from factors that cannot be objectively assessed and considers altruism with as rational an approach as possible based on its real impacts (Erlandsson et al., 2020; Gabriel, 2016).

Many distinctions occur within the discussion of real motivations of altruistic behavior that may be summarized as the ratio of expected net benefits of altruistic interaction and which factor is dominant: whether a self-concern factor (some kind of positive impact for the giver) or concern for others factor (positive impact for others only). This discussion is compatible with the results of the original proponent of the concept of altruism, Auguste Comte, whose view of altruism

focuses on the motivation and intention of people to live for others (Nantz, 2015; Steiner, 2019). Therefore, altruism takes two forms hard-core altruism and soft-core altruism (Dibou, 2012; Kassin, 2007; Sesardic, 1995). Under hard-core altruism, the intention is based on the willingness to give without any expectation of return (Spread, 2013). Other authors mention the possibility of an element of self-destruction or self-sacrifice for the benefit of others (Dibou, 2012). Soft-core altruism (reciprocal altruism) represents a person's intention to help others who may return the aid in the future (Bruni, 2008; Kassin, 2007; Spread, 2012). The principle of reciprocity defines the amount of help provided by the first subject for the proportion of the help returned by the second subject (Smith, 2013). Conforming to reciprocity norms leads to benefits within social interactions, such as liking, trust, and the quality of relationships overall (Mirghassemi, Ocejia, Socks, 2016). Altruism is close to reciprocity within economic and social interactions as a natural element persisting within market institutions that may center on self-interest, but bring benefits to all (Bowles and Gintis, 2013; Bruni, 2008). Field (2004) provides a different approach according to which altruism is the assumption that relations of reciprocity can occur. On the other hand, Gardner and West (2010) consider reciprocity as non-altruistic because of the presence of self-interest.

Having covered a theoretical division of altruism depending on its forms, we elaborate on the factors that determine these forms. The concepts of altruism differ according to perspectives that can be used to examine prosocial economic behavior a humanistic approach represented by social psychology and an evolutionary approach represented by evolutionary psychology. Both perspectives clarify factors of altruistic motivation and based on the level of particular factors, allow us to distinguish between hard-core altruism and soft-core altruism. All factors of altruistic motivation are bounded, and it remains unclear which is more significant. Figure 1 reviews areas of research describing prosocial economic preferences. The humanistic perspective and the evolutionary perspective apply a socio-psychological and an evolutionary-psychological approach to explaining phenomena such as kinship, reciprocity, empathy, group participation, and especially supernatural and religious beliefs (religiosity).

**Figure 1: Areas of research on prosocial economic preferences**



Source: Own processing

## 2.2 Manifestations of altruism

The evolutionary approach describes altruism as an adaptational ability of organisms within an environment (Alger et al., 2020; Gardner and West, 2010). In evolutionary terms, altruism is a behavior reducing the fitness of one actor while increasing the fitness of other actors (Field, 2004). At the micro level, genes and organisms are led by the maximization of their reproductive success or fitness (Gardner and West, 2010). Given this, certain common elements between the evolutionary approach and the theory of rational choice in economics can be observed (Alger et al., 2020; Field, 2004). Elements of evolutionary methodology based on the concepts of fitness further entered social sciences, for example, economics (Bruni, 2008).

Table 1 summarizes the factors of altruism from the perspective of evolutionary psychology. The relation rate represents the Hamilton theory that organisms are naturally willing to help primarily those individuals that are genetically related (Kassin, 2007). It is caused by the fact that genes can

spread not only by direct transmission but also by indirect influence through the support of genes similar to one's present in other individuals (Gardner and West, 2010). This can be demonstrated in family members but also distant relatives. Apart from factors discussed previously, the fact that people are willing to contribute, donate, and cooperate can stem from reciprocity as well. This could happen in several situations: (i) under reciprocal altruism that stems from the expectation of repeated interaction between particular subjects (Kassin, 2007), (ii) number of givers (Hsu and Chiang, 2019), (iii) direct reciprocity, (iv) people may help others to boost their social capital in the form of a good reputation for helping (Bennett and Einolf, 2017; Evans and Ferguson, 2013), so that, if the reputational reward increases, the probability of helping others increases as well, (v) network reciprocity, focused on interactions and connections between individuals, where the number of possible interactions is essential, together with the creation of mutual altruistic codes within the group (Bowles and Gintis, 2013; Li and Liu, 2018).

**Table 1: The factors of altruism from the perspective of evolutionary psychology**

Factor	Formula	Description
Relation rate	$rb - c > 0 \sim r > c/b$	$r$ – genetic relatedness coefficient $b$ – benefit to recipient $c$ – cost to giver
Direct reciprocity	$w > c/b$	$w$ – probability of re-encounter $c$ – cost of altruistic act $b$ – benefit of altruistic act
Indirect reciprocity	$q > c/b$	$q$ – others' knowledge of subject's reputation $c$ – cost of altruistic act $b$ – benefit of altruistic act
Network reciprocity	$c/b > k$	$k$ – average number of neighbors $c$ – cost of altruistic act $b$ – benefit of altruistic act

Source: Own processing, based on Bowles and Gintis (2013), and Nowak and Sigmund (2006).

A strictly biological (genetic) explanation of altruistic motivation seems insufficient. Humans live in a world of social norms, values, and cultures, expecting that society will contribute to satisfying their biological needs. The social perspective examines topics such as social perception, attribution, effects of empathy and sympathy, the impact of the group on the individual, situational contexts and attractiveness, role of norms, rules, and institutions in human behavior and their impact on prosocial behavior (Bohns and Flynn, 2021; Bowles and Gintis, 2013; Dibou, 2012; Field, 2004; Kassin, 2007).

## 2.3 The role of religion and religiosity in social perspective

Religiosity and altruism are correlated according to various authors (Ali and Shah, 2012; Barrera-Hernández et al., 2018; Etter, 2019). Following previous information on the relationship between society and biological needs, there is a

significant impact of religion on evolutionarily unexpected behavior (Bennett and Einolf, 2017; Saroglou et al., 2005). Nevertheless, there is a lack of consensus on the origin of religious beliefs from an evolutionary perspective and their impacts on prosocial behavior (Norenzayan and Shariff, 2008).

Therefore, a multidisciplinary approach needs to be employed to capture prosocial behavior in economics. Investigations of religion and prosocial behavior in the field of behavioral economics include approaches and concepts such as game theory and microeconomic experimental games (Ahmed and Salas, 2013; Higuchi and Miyatake, 2017), behavioral economic priming, and the peer effect (Batara et al., 2016; Guan, Ma et al., 2018; Sasaki et al., 2011), and the macroeconomic perspective (Grim, Grim, 2016; Henrich et al., 2010; Savage, 2019). All of these perceive religion within a social framework discussing economic impacts and approaches.





Prosocial behavior results from the historical development of institutions and norms (including religion) and represents a necessary part of markets and communities (Henrich et al. 2010). Religiosity can influence the environment, cooperation, and consumer beliefs and decisions (Barrera-Hernández et al. 2018; Davari et al., 2017). Religiosity contributes not only to institutional framework development; it also affects production. Grim and Grim (2016) show the impact on societies on the example of economic production in the US, and present three estimates of its scale: The conservative estimate is based on revenues of faith-based organizations, which amount to USD 378 billion. The authors' mid-range estimate gives an impact of religion of USD 1.2 trillion, which is the value of the goods and services provided by religious organizations, as well as several businesses with religious roots. In the high-end estimate, they find an impact of religion based on household income by religious affiliation for USD 4.7 trillion. Bennet and Einolf (2017) document how religiosity (regardless of religion) correlates with helping strangers on an individual and social level. They find that this help is not limited to one's community (religion and social group) and that religion and religiosity promote altruist norms and standards in the entire society.

On a macro level, Savage (2019) discusses how religiosity provides a substitute for state welfare and how it influences the economic calculus of individuals. He finds that in Central and Eastern Europe, religious people are willing to redistribute more, which reflects in their voting patterns. Believers in Eastern Europe tend to support parties with mostly left-wing economic programs characterized by a higher degree of redistribution, while believers in Western countries are more in favor of individualism and support more liberal political programs. We discuss the association with pro-redistribution attitudes within microeconomic and behavioral approaches in more detail.

From a microeconomic perspective, game theory can be employed to study the relationship between priming and prosocial preferences. Ahmed and Salas (2013) find that in experiments participants tend to be more willing to cooperate in groups with a religious context than in groups without one. Other studies based on religion priming find that spiritual primes increase prosocial behavior (Batara et al., 2016; Higuchi and Miyatake, 2017). Based on these results, some authors discuss various manifestations. According to Guan et al. (2018), participants primed with religious words (Buddhist specifically) recognized prosocial words faster than participants primed with neutral words. Therefore, they conclude that religious (Buddhist) concepts in the way of explicit and implicit primes increase mental accessibility to prosocial concepts. These findings are similar to observations that religion increases the flexibility of donors' reaction to incentives and may motivate other donors to contribute (Leonard et al., 2010).

Under the neuroeconomic approach, Sasaki et al. (2011) highlight that situational priming of religion can lead to different prosocial behavior depending on genes. They focus on the dopamine D4 receptor, which is connected to prosocial behavior. They find that individuals with DRD4 susceptibility react more to religious primes compared to non-religious primes. On the contrary, among individuals without DRD4 susceptibility no priming effect is found. This may explain why some people react in a more prosocial way than others and how their reactions differ in various environmental interactions.

The peer effect represents another behavioral perspective that drives prosocial preferences within religiosity and religion (Bennett, Einolf, 2017; Saroglou et al., 2005) as the effect of social groups sharing the same or similar characteristics of individual behavior (Bursztyjn et al., 2014). Therefore, religion priming and the peer effect may significantly impact human behavior, including prosocial behavior. Whether the motivation is selfish or not remains an open question.

### 3. Methodology

To find out whether or not selected socio-economic factors influence prosocial behavior, we run a questionnaire survey. Specifically, we focus on social factors sex, age, income, regularity of income, education, religion, and religiosity. The survey ran from June 7, 2020, through September 17, 2020. The questionnaire was distributed via email, social networks, and private conversations, including a call for forwarding, i.e., using the snowball effect. We received 181 completed questionnaires. First, the questionnaire was sent to university students of the economic faculty<sup>1</sup> with 100 fulfilled questionnaires obtained. Second, the questionnaire was distributed to private companies and public institutions with 81 fulfilled questionnaires obtained. Therefore, our sample covers not only university students of different ages but also other populations.

We summarize data and analyze them in STATA through graphic analysis and statistical tests. We prefer to use non-parametric tests because of the nature of our data, considerable heterogeneity, and occurrence of outliers. Regarding evaluation, we focus on social characteristics and their impacts on prosocial economic preferences. These preferences (dependent variables) cover willingness to donate to a beggar (yes / no); the amount of the donation to a beggar (in CZK); willingness to donate more to a child beggar (yes / no); the amount of the donation to a child beggar (in CZK); and history of participation in charitable events (yes / never). The questions on the donation amount were open, i.e., respondents could enter any amount.

Identifying questions were used to split the respondents into groups by gender (male / female), age category (0–19; 20–29; 30–49; 50–65; and 66+ years), monthly income in CZK (0–10,000; 10,001–20,000; 20,001–30,000; 30,001–40,000;



and over 40,000), regularity of income (yes/no), highest achieved education (primary, secondary, or tertiary), religion (Christianity, Islam, Buddhism, Hinduism, and other), and finally “religiosity”, which offered four categories with the following description:

**Regular believer** – the believer regularly attends worship and various religious events, prays, and professes faith in and love of God. Religion significantly affects the way of life and behavior (moral and values identity based on the religion’s teachings).

**Casual believer** – the believer casually (irregularly) attends worship and various religious events, and the intensity of prayer and faith profession is not as high. Religion does affect the way of life and behavior, but decision-making is less bounded by religious teachings. Moral and values identity are only partially based on religion.

**Unbeliever** – does not attend worship, does not pray, is not religious. Does not believe in the existence of God.

**Hard to say** – does not attend worship, does not pray, is not religious. The existence of God is impossible to verify/falsify. Believes in “something”, but is not sure what it is.

Next, we discuss the motivation for including the selected socioeconomic variables. We expect that gender may influence prosocial preferences for the receiver of the donation (beggar, child), as well as amounts of donation. Based on previous studies (Boorman et al., 2019; Collignon et al., 2010), we assume a higher emotional reaction of women compared to men, especially when a child is involved. Therefore, women should be more willing to help and donate a higher amount at least in this case. In general, we assumed a higher willingness to donate, a higher amount of donation, and especially more experience with charity events with rising age. The reasons may include more life experiences, longer access to income, and longer time spent in the social environment. Nevertheless, there might be strong prosocial tendencies among young people that may decrease linear effects. We expect that people with higher education would be willing to donate to beggars and child beggars more frequently and that they would take part in charity events with a higher probability. Education as a multicomplex outcome may affect emotional intelligence within a sense of situational context and support prosocial behavior.

Furthermore, we assume that people with higher incomes are willing to donate more than people with lower incomes. Simply, if a richer person donates the same percentage of income, the donation in the absolute term will be higher compared to a poorer one. While our income variable captures rather a quantity, the regularity of income represents a qualitative income indicator. We expected that people with regular income experience less uncertainty and will donate to a beggar, a child beggar, and participate in charity events more often. The reason for such behavior may stem from the easier estimation of life-situation and economic planning.

Considering religiosity, we assume higher prosocial preferences among people with a higher degree of religiosity because religious people are stimulated by various sources of faith and beliefs. The reciprocity on a spiritual level (help during life to be rewarded in the afterlife) may be strengthening the effect even further. Prosocial preferences could differ according to the religion professed. We expected that people professing specific religions show prosocial preferences more than people not practicing religion. Moreover, religious people can be stimulated by the environment of religious communities through the peer effect. This effect may be partly present also in the case of religiosity.

As for the statistical tests, we employ the two-sample Wilcoxon (Mann-Whitney) test, the Kruskal-Wallis test, the Pearson test, and Fisher’s exact test. We briefly describe them focusing on the tested hypothesis in appendix 8. We follow by performing association, Spearman correlation and Point-biserial correlation (ibid), and post-hoc analysis using Dunn’s Comparison. For more details, see the cited literature.

## 4. Data

### *Aggregate characteristics*

Appendix 1 presents the aggregate characteristics of our sample. The sample contains responses of 181 participants of which the majority (61%) are female. Regarding the age structure, most of the respondents belong to the 20–29 age group (61.88%), followed by 30–49 (6.63%) and 50–64 (6.63%); the rest fall into other groups. Most of the respondents (64.64%) completed tertiary education, followed by those with completed secondary education (34.25%), and only two (1.11%) with only primary education. Most of the participants (74.68%) had a regular income. Furthermore, 27.27% of participants earn CZK 0–5,000 per month, 16.48% earn CZK 5,000–10,000 per month, 14.77% earn CZK 20,000–30,000, 19.32% earn CZK 30,000–40,000, and 33.16 % earn over CZK 40,000. Out of all participants, 45.30% do not worship any specific religion (“unbelievers”), 31.49% are indecisive, 18.23% see themselves as occasional believers, and 4.97% of participants identified themselves as regular believers. The majority of respondents identify themselves as Christians (53.79%), 3.79 % profess the Buddhist faith, and 0.76% declare Hinduism. A large proportion of respondents selected the “Hard to say” option (41.67%), i.e., they believe in “something else”; see the Methodology section for a more precise definition.

## 5. Discussion of results

In this section, we discuss the graphical analysis of the relationship between the main variables (preferences) and socioeconomic categories. For graphical analysis, we replace outlier values with the highest permissible value based on their frequency within the measured data. This modification significantly improves the readability of graphs.<sup>2</sup> However, during the statistical testing phase, we use the original values.

<sup>2</sup> Graphs without this modification are available upon request.



### 5.1 Graphical analysis

Appendix 2 presents the results for the willingness to donate to a beggar. Regarding gender, there is a slightly higher willingness to donate among men. We do not find any significant differences across the age categories mentioned above. Among those aged 50+, the projected differences are not fully representative, due to the lower number of observations in these categories. In the case of education, we identify only small differences between secondary (high school) and tertiary (university) education. The results for primary education may be biased due to the low number of observations in this category. Quite surprisingly, the regularity of income does not seem to have a significant impact on the willingness to donate to a beggar. Nevertheless, it seems that this willingness differs in some of the income categories. We find the highest willingness for the CZK 5,000-10,000 per month income category, which, given current socioeconomic conditions and minimum wage laws in the Czech Republic, is likely to consist of respondents with part-time or occasional jobs. On the other hand, the lowest willingness appears among those who earn CZK 20,000–30,000 per month, which is less than the average wage and around the median wage. Regarding religion and religiosity, respondents considering themselves unbelievers show lower willingness to donate to a beggar compared to other categories, especially practicing and casual believers. Regarding specific faiths, the willingness to donate to a beggar seems to be highest for Christians and lowest for the other categories.

Appendix 3 provides the results on the amount of donation to a beggar for socioeconomic categories. We present these results in the form of boxplots. Gender does not seem to have much effect. The effect of age is limited to the data-poor categories 0–19 and 50+. In the case of education, we find some differences, especially a greater occurrence of unusually high values in the tertiary education category, as well as a high median for this group. As for the regularity of income, we can see similar values for both categories. Within income categories, we identify higher values more often in the 30–40 and 40–50 groups but are accompanied by higher volatility. Nevertheless, we cannot identify clear patterns. Regarding religiosity, we observe higher medians in all believer groups compared to unbelievers. Christians have a higher tendency for extremely high values compared to others.

Next, we analyze how socioeconomic factors influence willingness to donate more to a small child. The results presented in appendix 4 show that differences appear in the case of gender. Women were willing to donate a higher amount more often than men, which we speculate may be driven by an empathy effect and the maternity instinct. Regarding age, there are no visible deviations across the categories, except the 0-19 category, which, however, suffers from a low number of observations. Education does not have much effect, except if we compare the underrepresented primary education group with the others. Not surprisingly,

respondents with regular income are willing to donate more if the beggar is a child. Mid-income groups are more often willing to donate more than the high-income and lowest-income groups. Furthermore, the willingness differs if we compare the group of unbelievers and uncertain respondents with casual believers. Quite surprisingly, we find only negative answers to this question among believers. A possible explanation for this effect may be that believers make no distinction about whom they help. Differences may be found for religion, with willingness being highest for Christians.

Appendix 5 shows the results for the amount of donation to a child beggar. The results are in line with the results for willingness to donate to a child beggar in most cases, except for small deviations in the effect of income and religiosity. We find that the gender split produces interesting results. Women, even if they are more willing to donate a higher amount of money to a child in a yes / no question, differ only very little in the median amount of donations offered from those offered by men. There is an observable difference in income regularity, as the median donation value is almost double for respondents whose income is regular.

Appendix 6 provides the results for experience with participation in charity events, which seems to be slightly higher among men than women. Regarding age, we identify an increase in participation between the 0–19 and 20–29 groups, which persists in higher age categories but does not grow further. The effect of education is limited to the tiny primary education group. We observe a difference between respondents by income regularity. Respondents with regular income participate in charity events more often than those without, and with higher income, the rate of positive responses increases. The effect stagnates soon, however, and the differences are more pronounced in the lower income categories. Significant differences arise by religiosity, were practicing and casual believers tend to have a higher participation rate than unbelievers and the undecided. The effect of particular religions remains unclear due to the high volatility of some categories, especially Buddhism.

Last but not least, we find interesting patterns in the amounts that participants are willing to donate, which hold both donations to a generic beggar and a child (see Appendix 7). The participants of our online survey tended to donate amounts that correspond to the nominal values of the various coins and banknotes in circulation in the Czech Republic. Most of the amounts are equal to some nominal value of Czech cash (of which CZK 1; 2; 5; 10; 20; 50; 100; 200; 500; 1,000; 2,000; and 5,000 coins and notes exist). This may have practical consequences: For instance, if a non-profit organization convinces a donor to give more than CZK 50, there is a high probability that the donor will give CZK 100 (the next higher cash denomination) and not some amount in between.



## 5.2 Hypothesis testing

Graphical analysis provides some interesting results; however, to judge their statistical relevance, we proceed with formal hypothesis testing. We test whether our prosocial variables willingness to donate to a beggar; the amount donated; willingness to donate more to a child beggar; the amount donated to the child beggar; and whether the respondent has ever taken part in a charity event are significantly influenced by socioeconomic variables gender, age, income, regular income, education, religiosity, and religion. We summarize the results in appendix 9, where prosocial variables are listed in the columns and socioeconomic variables are on the rows. If we accept  $H_0$ , the socioeconomic variable does not statistically significantly affect the prosocial variable. If we reject  $H_0$ , we find the effect of the socio-economic characteristic on prosocial behavior. Each cell includes information on the test used, the probability of acceptance, and the final decision regarding the null hypothesis.<sup>3</sup>

According to our hypothesis testing, gender significantly affects only the willingness to donate more to a child beggar. Similarly, age affects only one of the five prosocial variables, specifically, experience with participation in charity events. On the other hand, income regularity significantly affects a broader range of prosocial variables including willingness to donate more to a child beggar, the amount of the donation to the child beggar, and experience with participation in charity events. Nevertheless, we do not confirm any statistically significant effect on monthly income. It seems that the stability of income is more important than its

magnitude. Education does not seem to have any significant effect on prosocial variables. As confirmed by the formal tests, religiosity plays a key role in forming prosocial preferences. Religiosity impacts 4 of 5 prosocial variables willingness to donate to a beggar, the amount of the donation, willingness to donate more to a child beggar, and experience with participation in charity events. The effect of religion only materializes in two cases the amount donated to a (generic) beggar and the willingness to donate more to a child beggar. Overall, we have found at least one statistically significant effect of a socioeconomic variable for each of the prosocial variables. Most frequently, we identified the effects of willingness to donate more to a child beggar (4) and experience with participation in charity events (3).

## 5.3 Co-movement analysis

Following the results of statistical tests, we perform correlation and association analysis depending on individual data characteristics. We apply spearman correlation ( $p$ ) as a non-parametric variant for Pearson correlation within the amount of donation and socio-economical characteristics within the ordinal scale. We calculate Point-biserial correlation ( $bi$ ) to analyze the relationship between a quantitative variable and a bimodal variable. However, the religion consists of a small number of observations for different churches. Therefore, we create just two categories Christians and others (including Buddhism and Hinduism, five religions in total). We use association ( $a$ ) to analyze the relationship between willingness to donate to beggars and child beggars, and participation in charity events. For further description of the methodology, see appendix 8-b.

**Table 1: Correlation and association analysis**

Variable	Willingness to donate to beggar	Amount of donation to beggar	Willingness to donate more to child beggar	Amount of donation to child beggar	Ever participated in a charity event
Association ( $a$ ) Spearman correlation ( $p$ ) Point-biserial correlation ( $pi$ )	<b>Religiosity</b> $a$ (0.279) **	<b>Religiosity <math>p</math></b> (0.229) **	<b>Gender</b> $a$ (0.166) *	<b>Regular income</b> $pi$ (0.185) *	<b>Age</b> $a$ (0.188) ***
		<b>Religion</b> $pi$ (0.111) **	<b>Regular income</b> $a$ (0.256) ***		<b>Regular income</b> $a$ (0.140) **
			<b>Religiosity</b> $a$ (0.349) ***		<b>Religiosity</b> $a$ (0.192) *
			<b>Religion</b> $a$ (0.298) **		

Notes:  $a$  stands for the association coefficient,  $p$  stands for the Spearman correlation and  $pi$  stands for the Point-biserial correlation. The numbers in parentheses represent the coefficient size, \*, \*\*, \*\*\* (statistical significance 10 %, 5 % and 1 %).

<sup>3</sup>For more details on the selection test and hypothesis testing, consult the Methodology section.

Table 2 shows the results of co-movement analysis among variables of interest, i.e. coefficients of Spearman correlation ( $\rho$ ), Point-Biserial correlation ( $bi$ ), and association ( $\rho$ ). We observe the correlation between the amount of donation to a beggar and religiosity (0.229) as well as a weak correlation with religion (0.111), both statistically significant at a 5% level. Similarly, we find a weak correlation between the amount of donation to a child beggar and regular income (0.185)<sup>4</sup>. Discussing association, we find on standard significance level weak dependency between willingness to donate to beggars and religiosity (0.279). We identify slightly stronger associations between willingness to donate to a child beggar and regular income (0.256), religion (0.298), and especially religiosity (0.349). A weak association is observed between willingness to donate to child beggars and gender (0.166). A weak association also appears between experienced participation in charity events and age (0.188), regular income (0.140), and religiosity (0.192), all statistically significant at the standard level.

Results of correlation and association analysis suggest a significant relationship between examined variables symbolizing prosocial preferences and chosen socioeconomic characteristics. In general, the most important drivers seem to be religiosity and religion and regular income, and also, in individual cases, gender and age. Religiosity and religion positively correlate or associate with the willingness to donate to a beggar on the street, amount of donation to the beggar, willingness to donate more to a child beggar, and observed participation experience with charity events. Both the level of religiosity and prosocial preferences are bounded, and as the level of religiosity increases, so do prosocial preferences. According to Dunn's pairwise Comparison (see appendix 10), most of the effects come from the contrast of any form of religiosity (hard to judge, occasionally believers, and regularly believers) with unbelievers. Discussing religion, the highest effect appears within Christians and other religions. Gender positively correlates only with a willingness to donate more to a child beggar. This stems from the finding that women are more willing to donate higher amounts to a child than men. Likewise, people with a regular income may be willing to contribute more to a child, donate with a higher amount of money, and, more probably, participate in a charity event. Finally, with higher age, the experienced participation in

charitable events is increasing. This reflects the fact that longer life offers more opportunities to take part in charity events.

## 6. Conclusion

We find that socioeconomic factors gender, age, income regularity, religiosity, and religion significantly influence prosocial economic preferences. We identify the most prominent effects in the case of religiosity, while religion plays a less important role. These findings are in line with the theoretical and empirical literature on altruism as a function of religiosity (Saroglou et al., 2005) and literature studying mechanisms and processes through which religiosity forms prosocial preferences and behavior (Ahmed, Salas, 2013; Barrera-Hernández et al. 2018; Batara et al., 2016; Davari et al., 2017; Guan et al., 2018; Higuchi and Miyatake 2017; Leonard et al., 2010; Sasaki et al., 2011). It supports the findings of Bennett and Einolf (2017) that religiosity regardless of the particular religion leads to higher prosocial behavior.

Regarding income, it seems that the regularity of income significantly influences a wider range of prosocial preferences, while the impact of income magnitude is inconclusive within our sample. Whether or not one has ever participated in a charity event may be related to age, but without clear patterns. We find that women react more to the behavioral impulse of a small child and are willing to donate more to a child beggar, which may be driven by their higher empathy in general and the maternal instinct. Other incentives may include a small child in the family and a younger sibling. Higher empathy present between a woman and child may come from the connection between a mother and fetus (Boorman et al., 2018).

Our research provided much-needed details that were missing in the studies focused on the prosocial effect of socioeconomic drivers. Nevertheless, to generalize our results, further research on more data is necessary. Apart from questionnaires, one can consider other techniques, such as field experiments and focus groups, while employing methods connected to priming and content analysis. The factors and mechanisms behind the effects need to be researched in more detail using a multidisciplinary approach.

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<sup>4</sup> In fact, negative signs occurred in our result due to the definition of yes (2) and no (1). According to our data, it is obvious that people with regular income are willing to contribute more. Therefore, we present the positive value not to confuse the readers. The result is very close to the calculation using Spearman correlation (0.188).



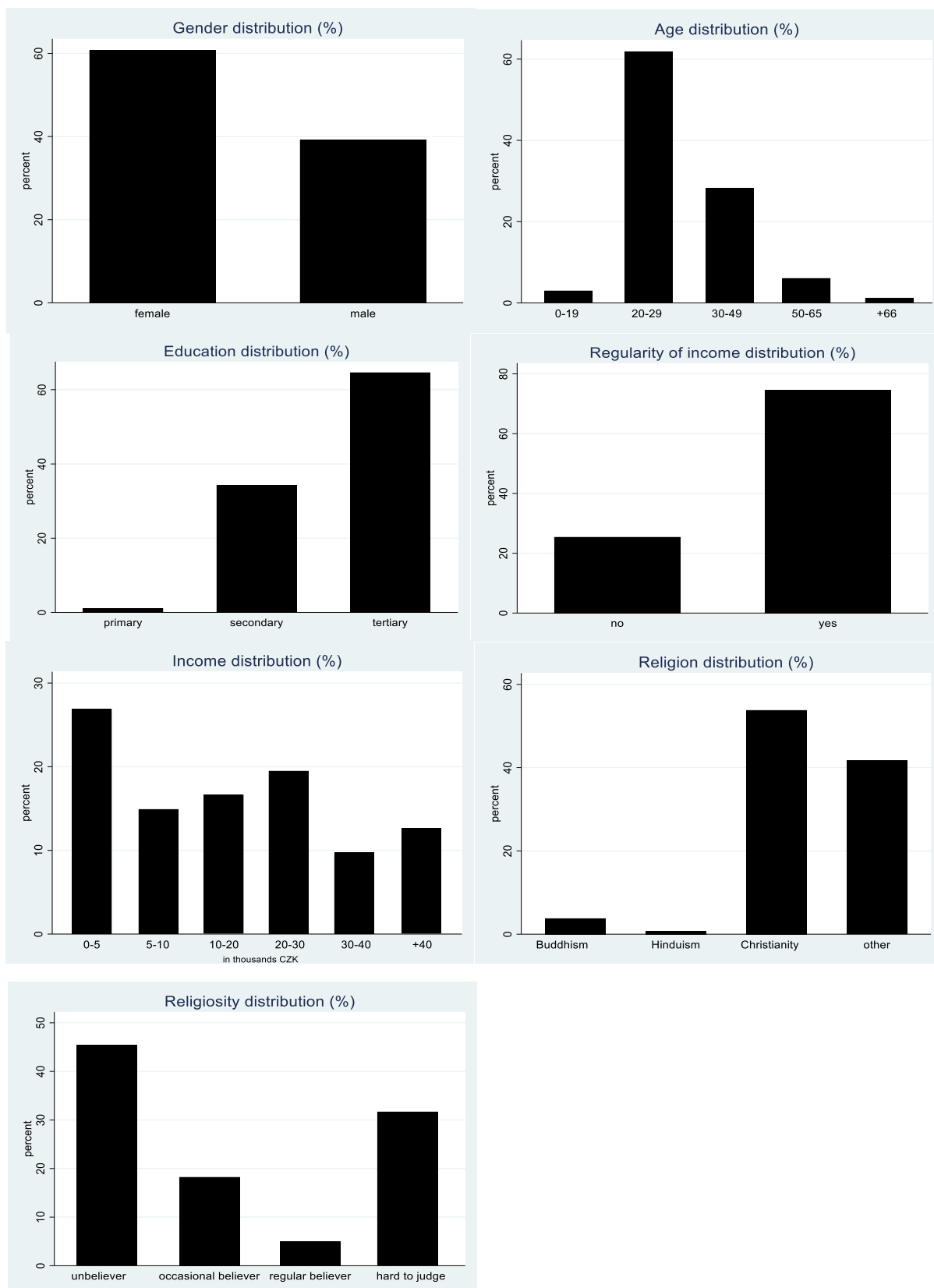
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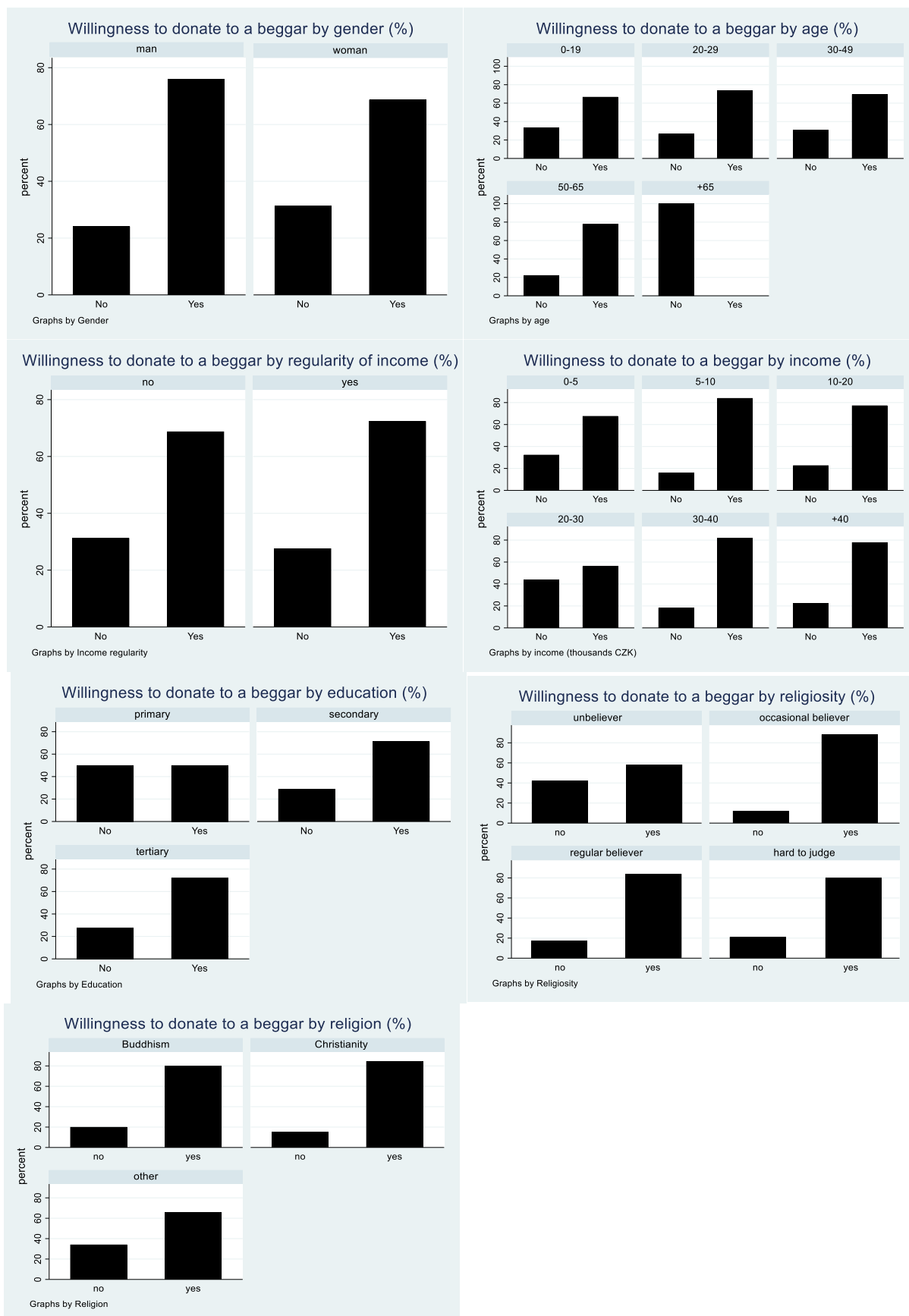
## Appendix

### Appendix 1: Graphic analysis of the sample

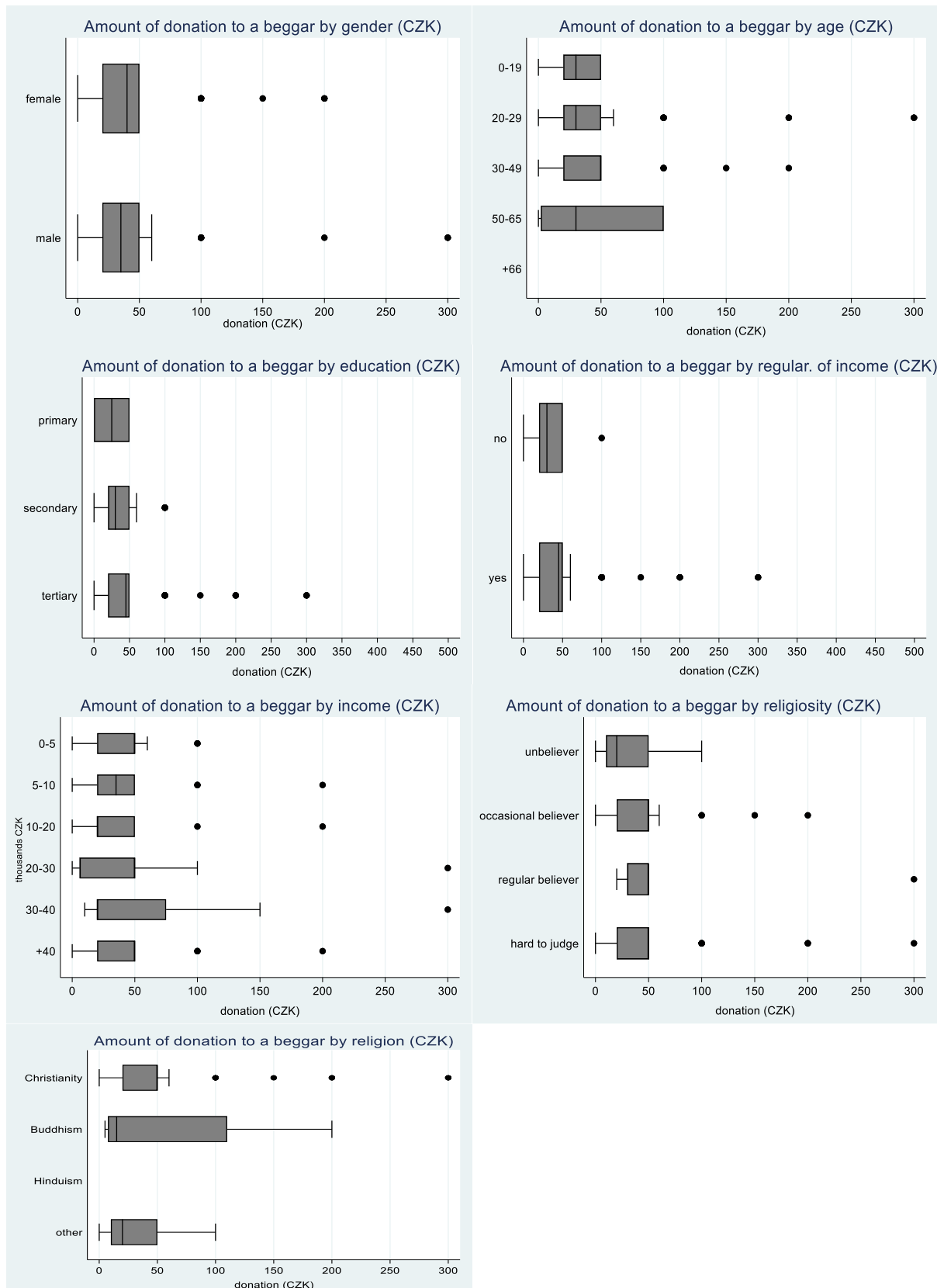




## Appendix 2: Graphic analysis of the willingness to donate to a beggar

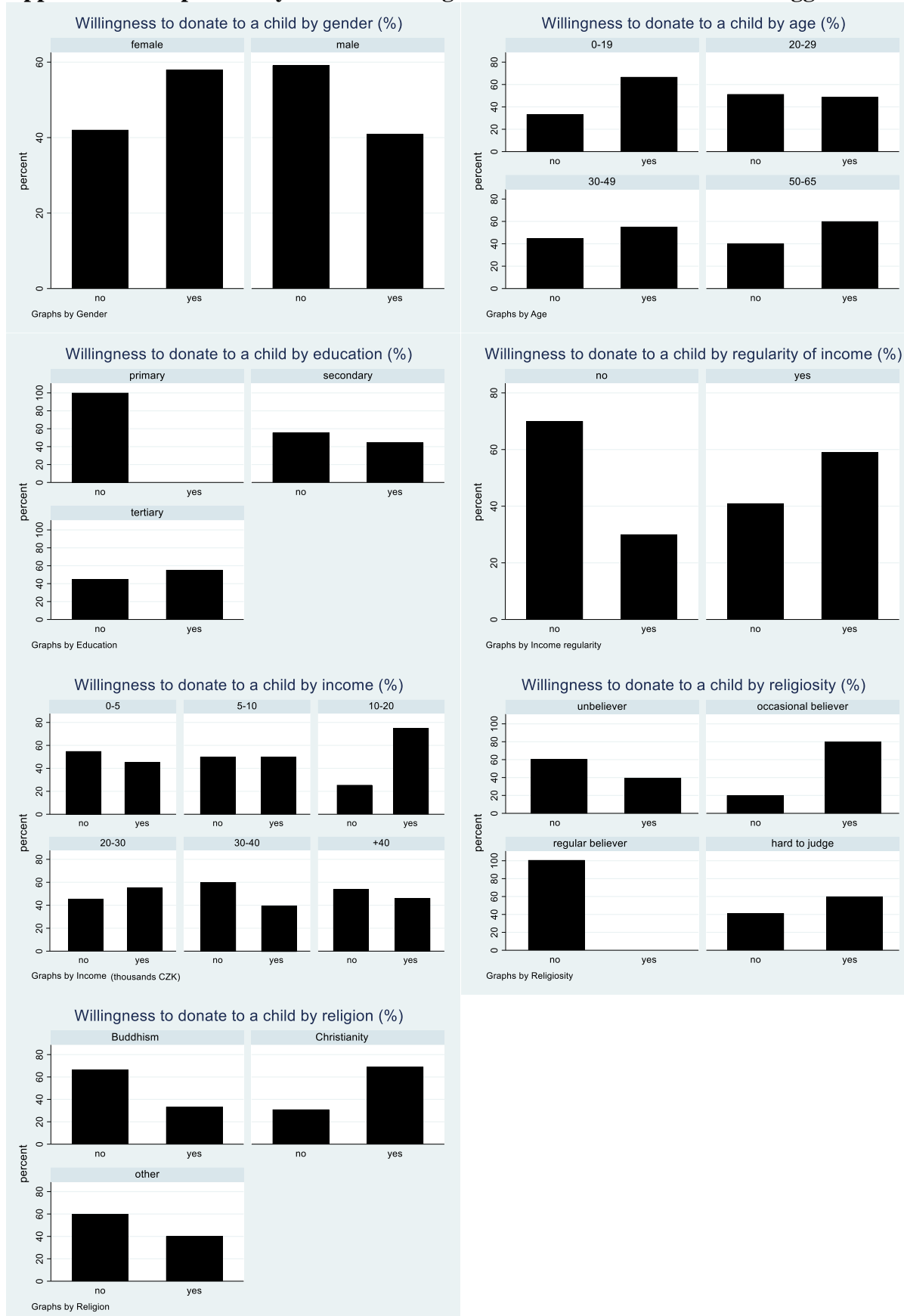


## Appendix 3: Graphic analysis of the amount of donation to a beggar



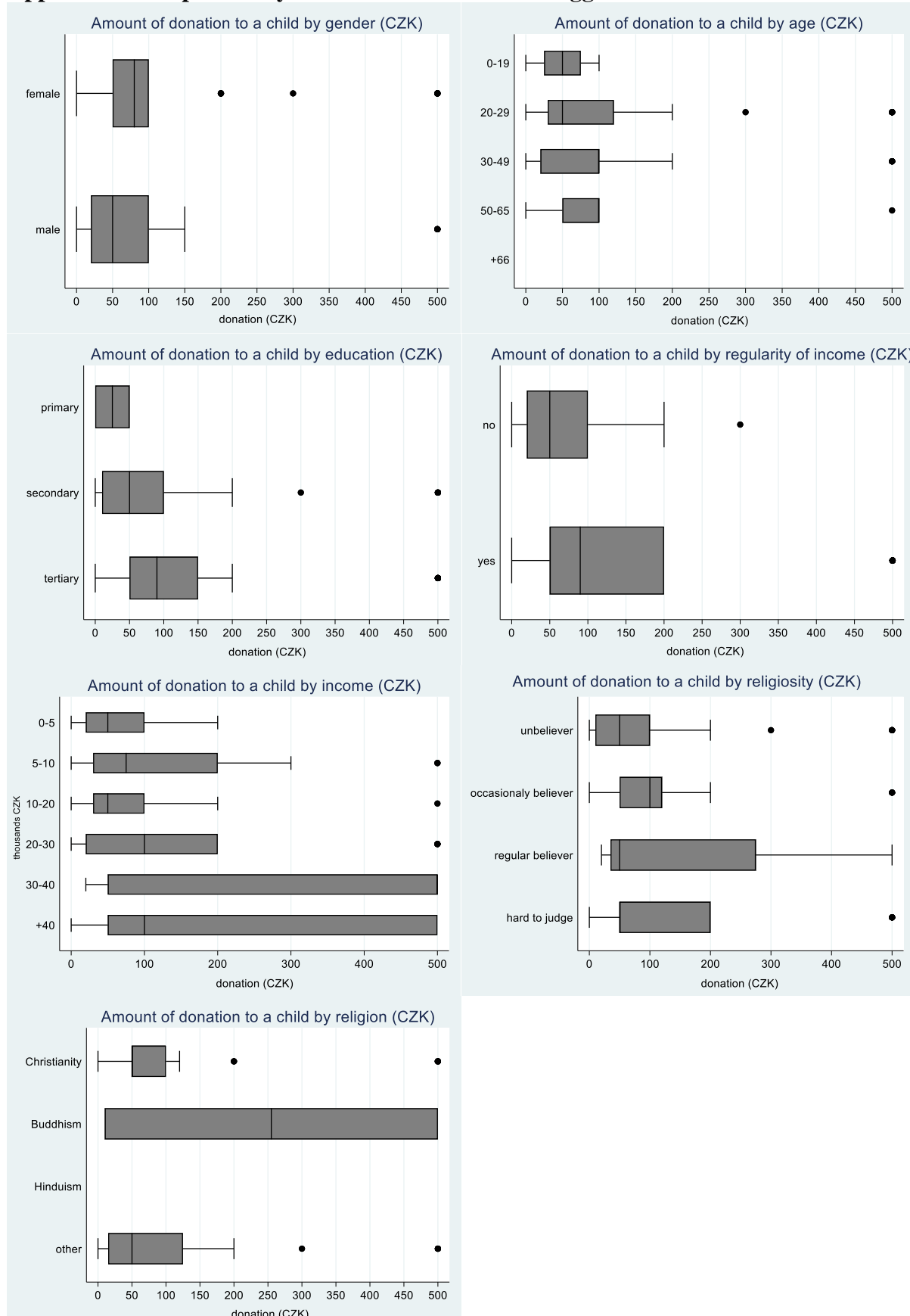
Notes: Empty box plots within categories include decisions to donate 0 CZK (i.e., not donate)

## Appendix 4: Graphic analysis of the willingness to donate more to a child beggar



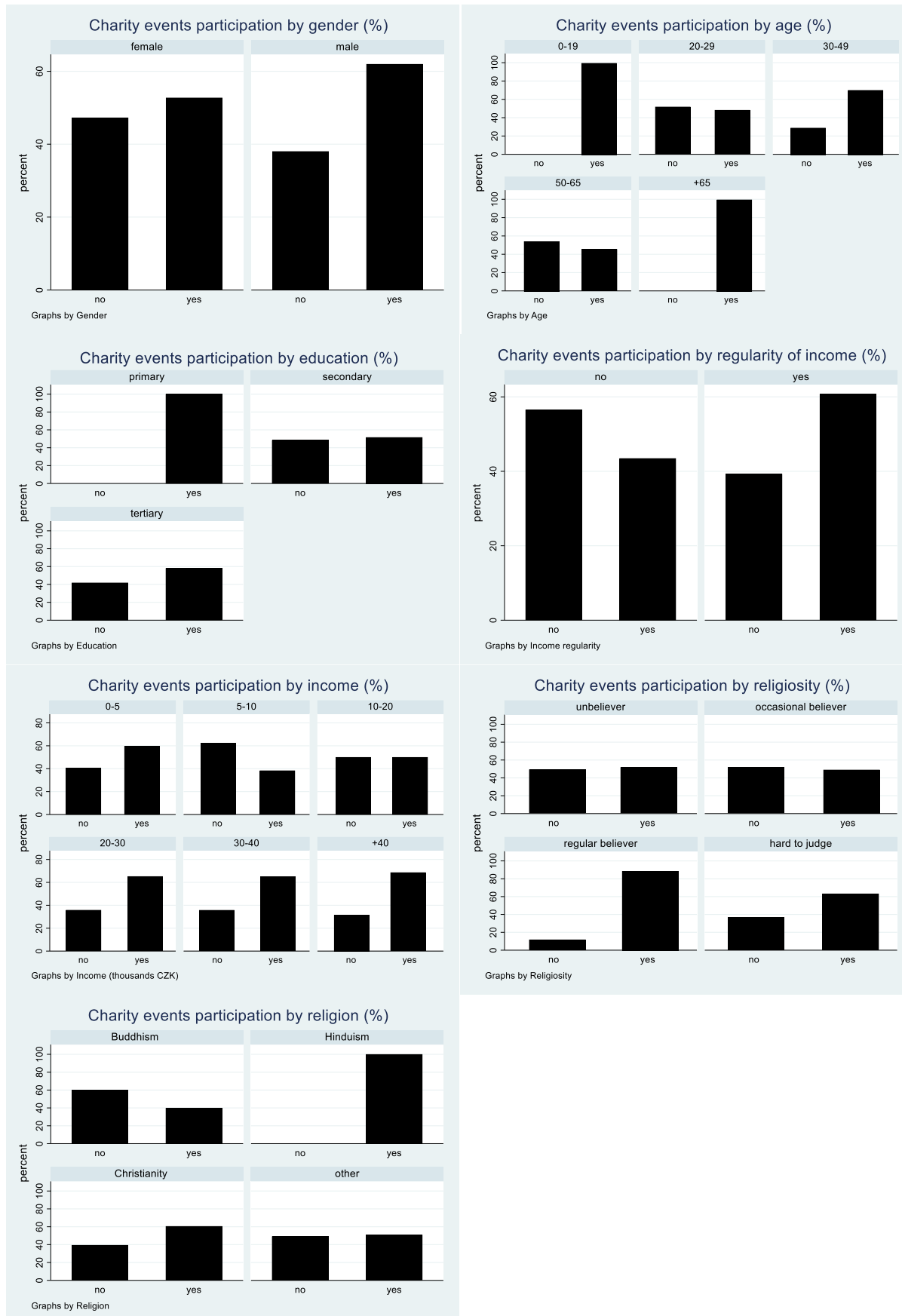


## Appendix 5: Graphic analysis of donation to a child beggar

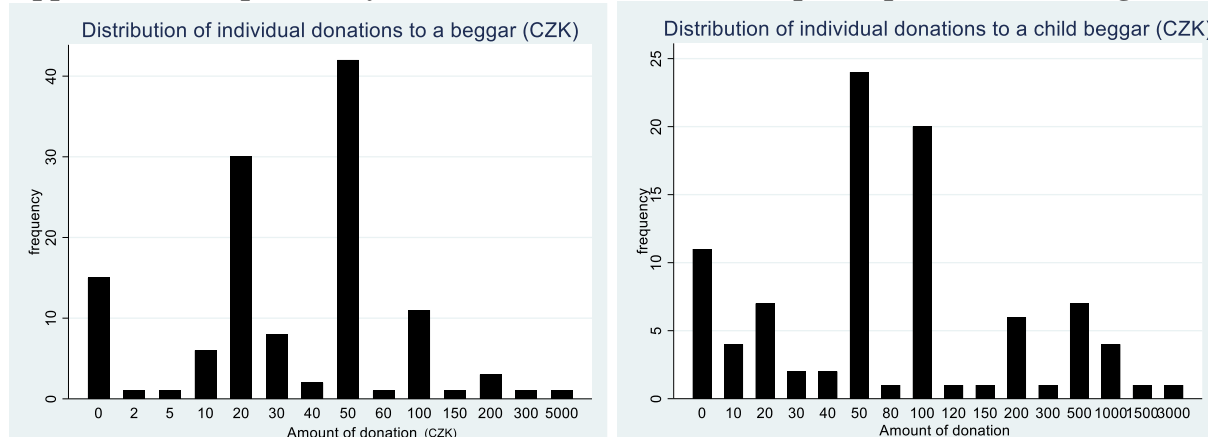


Notes: Empty box plots within categories include decisions to donate 0 CZK (i.e., not donate)

## Appendix 6: Graphic analysis of participation in charity events (at least once in respondent's life thus far) by chosen characteristics



## Appendix 7: Graphic analysis of amounts that individual participants were willing to donate



Notes: Current nominal values of Czech coins and banknotes are (CZK): 1; 2; 5; 10; 20; 50; 100; 200; 500; 1,000; 2,000; 5,000.

## Appendix 8-a: Using statistical methods

### Two-sample Wilcoxon (Mann-Whitney) test

The distribution functions of the selected variables were compared via Wilcoxon test. Assume two independent random variables  $X_1$  and  $X_2$ , with samples of size  $n_1$  from  $X_1$  and  $n_2$  from  $X_2$ . The collected data are sorted in ascending order, regardless of which sample (variable) they come from. Then their order or the average order for the values that match is determined. For the observations in the first sample, the Wilcoxon test statistic is created as a sum of ranks ( $T$ ):

$$T = \sum_{i=1}^{n_1} R_i(Y). \quad (1)$$

(Dickhaus, 2018; Stata, 2021)

Under the null hypothesis of Mann-Whitney's  $U$  statistic, we test whether two samples come from the same population

$$H_0: U = T - \frac{n_1(n_1+1)}{2}; \quad (2)$$

(Stata, 2021)

where  $T$  is the sum of the ranks according to the observations in sample  $n_1$ . If Mann-Whitney's statistic  $U$  exceeds a critical value than  $H_0$  should be rejected. (Kanji, 2010).

### Kruskal-Wallis test

To compare the distribution functions of more than two samples, we use the Kruskal-Wallis test, which is a multi-sample generalization of the two-sample Wilcoxon (Mann-Whitney) test. Let us have samples of sizes  $n_j$ , with  $j = 1, \dots, m$  the number of samples. Similarly, as in the case of the Wilcoxon test, the sum of the ranks of the overall sample size is determined:

$$R_j = \sum_{i=1}^{n_j} R(X_{ji}); \quad (3)$$

(Stata, 2021)

where  $R$  represents the sum of ranks for the sample  $j$ . Let  $n$  denote size of the combined sample and  $n_j$  represent the  $j$ th sample out of  $m$  the number of samples. If the distribution functions come from the same division, then:

$$H_0: H = \frac{12}{n(n+1)} \sum_{j=1}^m \frac{R_j^2}{n_j} - 3(n+1); \quad (4)$$

(Kanji, 2010; Stata, 2021)

where  $H$  is a test statistic with a  $\chi^2$  distribution with  $m - 1$  numbers of freedom. If  $H$  exceeds a critical value, then  $H_0$  is rejected at the given significance level (Kanji, 2006).

### Pearson $\chi^2$ test

Some of our data series are nominal variables that cannot be sorted. In this case, we use Pearson  $\chi^2$  test. Let us have a sample of size  $n_{ij}$ , where the number of observations in the  $i^{\text{th}}$  row is  $i = 1, \dots, I$ , and in the  $j^{\text{th}}$  column  $j = 1, \dots, J$ . Then the expected frequencies for the  $i^{\text{th}}$  row and  $j^{\text{th}}$  column are denoted:

$$m_{ij} = \frac{n_i n_j}{n}. \quad (5)$$



(Kanji, 2010; Stata, 2021)

The test statistic is defined as:

$$H_0: \chi^2 = \sum_i \sum_j \frac{(n_{ij} - m_{ij})^2}{m_{ij}}; \quad (6)$$

(Stata, 2021)

with  $(I - 1)(J - 1)$  degrees of freedom. If the critical value of the test criterion is exceeded,  $H_0$  is rejected at a given level of significance (Kanji, 2010; Stata).

### Fisher's exact test

If a situation occurs where the assumptions for Pearson  $\chi^2$  test were not met according to the expected frequencies, Fisher's exact (or its generalized form) test is used. This situation occurs when the assumptions that all expected frequencies must be greater than 1 ( $m_{ij} > 1$ ) and at least 80% of expected frequencies must be greater than 5 are not met.

In Fisher's exact test then:

$$H_0: P = \sum_T \Pr(T) \rightarrow \sum p = \frac{(a+b)!(a+c)!(c+d)!(b+d)!}{n!} \sum \frac{1}{n!a!b!c!d!}; \quad (7)$$

(Kanji, 2010; Stata, 2021)

The formula is given by the principle of hypergeometric probability, obtaining the same marginal frequencies in a varied set of tables in the direction of an alternative hypothesis that explains the presence of the factorial (!). Then we can examine if the calculated sum of marginal frequencies is equal to the number of marginal frequencies within the observed (experimental) table.

$$\Pr(T) \leq \Pr(T^*), \quad (8)$$

(Stata, 2021)

where  $T^*$  is the observed (experimental) table.  $H_0$  is rejected when test level is less than the chosen significance level (Kanji, 2010).

A brief overview of the statistical tests used is outlined above. In table A1, we summarize the tests and their hypotheses.

**Table A1: Overview of statistical tests and hypotheses**

Test	Hypothesis
Pearson $\chi^2$	$H_0$ : tested quantities are independent $H_A: \neg H_0$
Fisher exact	$H_0$ : tested quantities are independent $H_A: \neg H_0$
Wilcoxon (Mann-Whitney)	$H_0: F_X = F_Y$ $H_A: \neg H_0$
Kruskal-Wallis	$H_0: F_1 = \dots = F_n$ $H_A: \neg H_0$

Source: own work

In Pearson and Fisher tests,  $H_0$  tests independence among tested quantities, while in the Wilcoxon and Kruskal-Wallis tests,  $H_0$  is distribution function equality. The negation symbol ( $\neg$ ) represents the alternative hypothesis contrary to  $H_0$ .

### Appendix 8-b: Correlation analysis performed

#### Spearman Rank Correlation

As nonparametric correlation was chosen Spearman correlation coefficient. When X and Y ranks are not tied, then formula of coefficients computed is:

$$r_s = 1 - \frac{6 \sum_{i=1}^n d_i^2}{n(n^2 - 1)} \quad (9)$$

(Carlson et al., 2013)

where  $d_i$  stands for ranked pairs,  $n$  number of pairs of observation from a random sample  $(x_1, y_1, \dots, x_n, y_n)$ . If  $H_0$  means no association at given significance level, then hypothesis is rejected in the cases of positive (a), negative (b) and two-sides alternative (c):

- (a)  $r_s > r_{s,\alpha}$ ,
- (b)  $r_s < -r_{s,\alpha}$ ,
- (c)  $r_s < -r_{s,\alpha/2}$ ,  $r_s > r_{s,\alpha/2}$ ;

(10)

(Carlson et al., 2013)

where  $\alpha$  is significance level and  $r_s$  Spearman correlation coefficient.

## Association

Let's sample has  $n$  observations in an  $r \times c$  contingency table denoted by  $O_{ij}$  the number of observations in a cell about the  $i$ th row and the  $j$ th column. If  $H_0$  means no association between tested characteristics, then under  $H_0$  the estimated expected number of observations is

$$E_{ij} = \frac{R_i C_j}{n}; \quad (11)$$

(Carlson et al., 2013)

Where  $R_i C_j$  corresponds to row and column totals. Under a significance level, association is based on the following decision rule for rejecting  $H_0$ :

$$= \sum_{i=1}^R \sum_{j=1}^C \frac{(O_{ij} - E_{ij})^2}{E_{ij}} > \chi^2_{(r-1)(c-1), \alpha}; \quad (12)$$

(Carlson et al., 2013)

Where  $E_{ij}$  is estimation of expected numbers and  $(r-1)(c-1)$  degrees a freedom in a chi-square distribution.

## Point-Biserial correlation

Let's have sample size  $n_1$  with mean value  $\mu_1$  and sample size  $n_2$  with mean value  $\mu_2$ , and standard deviation  $\sigma$  for scores (values) in  $n_1$  and  $n_2$ . We test on significance level association by point-biserial correlation coefficient:

$$r_x = \sqrt{pq} \times \frac{\mu_1 - \mu_2}{\sigma}; \quad (13)$$

(Cox, LeBlanc, 2017)

where  $p$  means proportion of donation in first group (for example, regular income) and  $q$  is proportion of donation in second group (for instance, irregular income).

## Appendix 9: Effect of socioeconomic variables on prosocial variables

**Table A2: Effect of socioeconomic variables on prosocial variables**

Variable	Willingness to donate to beggar	Amount of donation to beggar	Willingness to donate more to child beggar	Amount of donation to child beggar	Ever participated in a charity event
Gender	PE $\chi^2$ (0.358) H <sub>0</sub> Accepted	MW (0.613) H <sub>0</sub> Accepted	PE $\chi^2$ (0.077) * <b>H<sub>0</sub> Rejected</b>	MW (0.326) H <sub>0</sub> Accepted	PE $\chi^2$ (0.221) H <sub>0</sub> Accepted
Age	F (0.273) H <sub>0</sub> Accepted	KW (0.953) H <sub>0</sub> Accepted	F (0.820) H <sub>0</sub> Accepted	KW (0.834) H <sub>0</sub> Accepted	F (0.003) *** <b>H<sub>0</sub> Rejected</b>
Regular income	PE $\chi^2$ (0.690) H <sub>0</sub> Accepted	MW (0.562) H <sub>0</sub> Accepted	PE $\chi^2$ (0.006) *** <b>H<sub>0</sub> Rejected</b>	MW (0.072) * <b>H<sub>0</sub> Rejected</b>	PE $\chi^2$ (0.041) ** <b>H<sub>0</sub> Rejected</b>
Income	F (0.303) H <sub>0</sub> Accepted	KW (0.703) H <sub>0</sub> Accepted	F (0.439) H <sub>0</sub> Accepted	KW (0.394) H <sub>0</sub> Accepted	PE $\chi^2$ (0.192) H <sub>0</sub> Accepted
Education	F (0.768) H <sub>0</sub> Accepted	KW (0.508) H <sub>0</sub> Accepted	F (0.270) H <sub>0</sub> Accepted	KW (0.133) H <sub>0</sub> Accepted	F (0.430) H <sub>0</sub> Accepted
Religiosity	F (0.014) ** <b>H<sub>0</sub> Rejected</b>	KW (0.021) ** <b>H<sub>0</sub> Rejected</b>	F (0.002) *** <b>H<sub>0</sub> Rejected</b>	KW (0.620) H <sub>0</sub> Accepted	PE $\chi^2$ (0.084) * <b>H<sub>0</sub> Rejected</b>
Religion	F (0.103) H <sub>0</sub> Accepted	KW (0.017) ** <b>H<sub>0</sub> Rejected</b>	F (0.022) ** <b>H<sub>0</sub> Rejected</b>	KW (0.546) H <sub>0</sub> Accepted	F (0.489) H <sub>0</sub> Accepted

Notes: KW stands for the Kruskal-Wallis test, MW stands for the Wilcoxon (Mann-Whitney) test, PE $\chi^2$  stands for the Pearson  $\chi^2$  test, F stands for the Fisher exact test, and the numbers in parentheses represent the probability of accepting the null hypothesis, \*, \*\*, \*\*\* (statistical significance 10 %, 5 % and 1 %).

## Appendix 10: Dunn's Comparison of donation to a beggar by religion

Col Mean - Row Mean	Hard to judge	Unbeliever	Believer
Unbeliever	<b>DC</b> 1.760 (0.039) **		
Believer	<b>DC</b> -0.198 (0.179)	<b>DC</b> -1.805 (0.036) **	
Occasional believer	<b>DC</b> -1.133 (0.129)	<b>DC</b> -2.766 (0.003) ***	<b>DC</b> 0.254 (0.390)

Notes: DC stands for Dunn's Comparison, Dunn's Comparison value, and the standard errors in parentheses represent the probability of accepting the null hypothesis \*, \*\*, \*\*\* (statistical significance 10 %, 5 % and 1 %).

Col Mean - Row Mean	Buddhism	Christianity
Christianity	<b>DC</b> -1.269 (0.1022)	
Buddhism	<b>DC</b> -0.169 (0.433)	<b>DC</b> 2.747 (0.003) **

Notes: Notes: DC stands for Dunn's Comparison, Dunn's Comparison value, and the standard errors in parentheses represent the probability of accepting the null hypothesis \*, \*\*, \*\*\* (statistical significance 10 %, 5 % and 1 %).