INCOME - HAPPINESS RELATIONSHIP:

"THE MORE THE BETTER?"
EVOLUTIONARY PSYCHOLOGY APPROACH

by

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Abstract

The paper's aim is to analyze the influence of absolute and relative income growth on happiness level of an individual. The paper uses the admixture of current Psychology science's theoretical approaches and Economic science's quantitative approach. Specifically, the paper used Lyubomirsky's et al. (2005) Set Point theory and evolutionary psychology's theoretical approach to conduct fundamental analysis of happiness and its influencing factors. Data are based on the individual data of "World Values Survey" waves three, four, five and six. The empirical methods used are OLS, Logit and OLS IV regressions.

The analysis demonstrates two findings. First, that predictions based on evolutionary psychology's theoretical approach are fully confirmed by the models' findings. Secondly, the paper demonstrates the positive correlation of relative and absolute income with happiness level. Relative income in terms of social status is economically more significant than absolute income in terms of the influence of GDP per capita and previous year's GDP per capita growth rate. However, when considering the net effects of absolute income growth and discords that are connected with it, the positive influence of increased absolute income is not necessarily the case. Evolutionary psychology's theoretical approach and the paper's empirical findings based on it were demonstrated as the tool to better estimate the net influence of increased absolute income on happiness level of an individual.

1 Introduction

Numerous theoretical approaches have been proposed by philosophy, psychology, neuroscience, politics, economics, sociology, and other sciences on understanding both the concept of happiness and the ways of increasing it (Cigman R., 2014). The main reasonable assumption of these approaches is that the pursuit of happiness is considered to be the inherent characteristic of the human species and the increase of own happiness is considered to be the good for a human. Such wide interest from different angles on one concept together with the above-mentioned rational assumption demonstrates the importance of the subject.

Happiness maximization is one of the key objectives of the economic science if not the most important objective. As, Krugman and Wells (2013) put it in their textbook "Economics": "You might imagine that the efficient use of resources has something to do with money, maybe that it is measured in dollars-and-cents terms. But in economics, as in life, money is only a means to other ends. The measure that economists really care about is not money but people's happiness or welfare". Despite being one of the key objectives, mainstream economics has not given the nature of happiness and its influencing factors thorough attention based on empirical evidence. Most interaction of the mainstream economic science with the concept of happiness and related ones, namely satisfaction, utility, welfare has been through the means of different assumptions and mathematical models on the nature of the concepts. The break from such tradition has been observed only recently with the development of happiness economics that began to comprehensively study happiness using the developments and knowledge of other disciplines, such as psychology and sociology and using empirical evidence to study the nature of happiness.

The paper's aim is to analyze the influence of absolute and relative income growth on happiness level of an individual. Since the analysis and the prediction of relationship heavily depend on evolutionary psychology's theoretical prediction, the paper has two main hypotheses to examine. First hypothesis is whether evolutionary psychology predictions on contributing factors to happiness fit data. Second hypothesis is whether absolute and relative income growth contribute to happiness growth

This paper proceeds with the quantitative approach and uses two theoretical approaches of psychology science on happiness to study the nature of happiness and the influence of different

factors on happiness, in particular the influence of relative and absolute income on happiness. First approach is the happiness set point theory and the second approach is the theoretical approach of evolutionary psychology on happiness. The paper uses both theories to propose the potential contributing factors to the individual happiness level, to predict their direction of influence and to verify the predictions based on the quantitative analysis of the individual data.

Paper uses the methods of econometric analysis. Two main econometric models are used, which are based on both psychology theories. Data are based on the individual data of "World Values Survey", waves three, four, five and six. Data consist of the cross-sectional survey data of the large number of individuals from 83 countries and years 1995-2014. The methods used are OLS, Logit and OLS IV regressions.

The paper first outlines the literature on the subject. Secondly, the paper develops theoretical approach based on two theoretical models of psychology science. Thirdly, the paper proposes hypotheses and describes data and used variables for the models. Finally, the paper develops econometric model and provides results, discussions of the results and the general conclusion to the paper.

The analysis demonstrated two findings. First, that predictions based on evolutionary psychology's theoretical approach are fully confirmed by the models' findings. Secondly, that relative income contribution to happiness level expressed through social status proxy variable is positive and both statistically and economically significant. Absolute income's contribution to happiness level expressed through two proxy variables: GDP (PPP) per capita as long-term influence and previous year's GDP (PPP) per capita growth rate as short-term influence are also both positive and both are statistically significant, but less economically significant compared to relative income.

The paper provides additional insight into the topic. First, data used for the analysis contains the newly-developed Wave 6 of World Values Survey, which has not been used for the analysis of the topic. Secondly, the analysis uses the current psychology science theories of different contributing factors on happiness. Specifically, it employs the theoretical model of happiness by Lyubomirsky et. al. (2005) to construct two econometric models in the paper. Such method allows the analysis to be more precise and less biased in the estimation of the influence of

income on happiness due to better model building. Finally, it must be noted that the theoretical approach of evolutionary psychology used in the paper has not been widely used in the studies of happiness and such wide use of evolutionary psychology approach for theoretical predictions on the empirical analysis of happiness is the first of its kind.

2 Literature review

Research in happiness economics mainly suggests the correctness of "Easterlin paradox": economic growth contributes nothing to happiness at least for countries that are relatively wealthy (Bartram 2011, Easterlin 1974). Studies using data from the past five decades for developed countries indicate that despite significant increase in real income per head, the average happiness level did not increase at all (Darma 2013). Blanchflower and Oswald (2000) found that from the period of early 1970s to the late 1990s, despite the rise of national income, the reported level of happiness was dropping in the US and was approximately flat in Britain. Frey and Stutzer (2002) claim that despite spectacular sixfold income growth in Japan from 1958 to 1991 the average life satisfaction level has remained constant and has not increased at all. Myers (2000) claims that despite doubling the real income from 1957 to 2000, the happiness of individuals in the US has not increased. Tella et. al. (2010) analyzed individual panel data on people living in Germany. The authors found that individuals adapt to income change over time, returning 65% of impact of income change on happiness over four years. Easterlin and Angelescu (2009) found no significant relationship between long-term GDP growth per capita and happiness. On the other hand, Stevenson and Wolfers (2008) claim that there is a clear positive relationship between GDP per capita, economic growth and average level of subjective well-being with no satiation threshold beyond which wealthier countries have no further increase in happiness level.

Newman (2016) finds a threshold of around $75,000 of annual income above which additional income does not bring more happiness. Kahneman and Deaton (2010) found that higher earners have higher life satisfaction, but day-to-day emotional well-being rose only until the annual income threshold of $75000. Veenhoven (1991) found the curvilinear pattern of the relationship between income and happiness, so that the marginal utility of income diminishes as income grows.

Several explanations were provided in the literature on the weak effect of income on happiness. First explanation is that it is relative income that matters for happiness, not absolute income (Easterlin 2003a, Frank 1999). Easterlin (1974) found that relative income has much higher positive relationship with happiness than the relationship between income and happiness in the national comparisons of income over time. Easterlin and Angelescu (2009) argue that absolute income matters to an individual only up to a point where basic needs are met, after which relative income matters. The effect is called social comparison effect in psychology or interdependent preferences in economic theory (Easterlin 2003b). Another explanation uses hedonic adaptation effect, or habit formation effect, the term used in economic literature, according to which individual would quickly adapt to new higher income (Easterlin 1995, 2003a). Angeles (2010) analyzed the panel of British households and found that people adapt to change in income. Third explanation is that as their income rises people do not spend time properly to maximize their happiness; spending it on work, compulsory non-work activities (childcare, shopping), and active leisure (exercising), rather than on passive leisure (like watching TV) (Kahneman et al., 2006).

3 Theoretical approach

3.1 Defining happiness

According to Darma (2013) there is no definite way of defining happiness in the literature. Nevertheless, happiness is usually defined as proposed by Diener and his colleagues with the label of subjective well-being that consists of the combination of life satisfaction (cognitive judgment aspect) and the balance of the frequency of positive and negative affect (emotional judgment aspect) (Lyubomirsky et al. 2006).

According to Lyubomirsky et al. (2005), the measure of happiness is widely accepted to be the self-report of a person. Thus, widely used measure of happiness in the literature is the self-report survey results. Particularly, the behavioral school of economics treats happiness as subjective and measurable through surveys (Darma 2013). This paper uses the reasonable assumption that the ultimate judge of the happiness is the person himself and herself and uses

happiness self-reports as the objective measure of happiness.

Self-report happiness levels demonstrate high consistency, reliability and validity. Stutzer and Frey (2000) argue that subjective happiness have a "high consistency, reliability and validity". Myers and Diener (1995) claim that self-reported well-being converges with other measures. Those who claim to be happy also seem happy to their friends and family members (Myers and Diener, 1995). Ratings from clinical interviews converge well with self-report happiness scores (Myers and Diener, 1995). Despite somewhat being dependent on mood, such reports are relatively stable with good long-term reliability (Diener, 1994). Moreover, many studies demonstrate that daily mood is not consistently correlated with happiness (Lyubomirsky et al. 2006), which further proves happiness levels' consistency.

It should be acknowledged that different other concepts similar to happiness are used in the happiness literature but the happiness concept itself is preferred in the paper. For instance, one of the most used happiness concepts other than happiness itself is life-satisfaction. Life satisfaction could be considered as a cognitive global evaluation of one's satisfaction with his or her own life (Heller, et al. 2004). The problem with this concept is that people do not constantly cognitively evaluate their life, but rather feel their happiness level at any time. Cognitive evaluation of life satisfaction leads to focusing illusion in which people exaggerate the importance of different factors to their day-to-day happiness level (Kahneman et al., 2006). For instance, people get reminded of their relative social standing, recent significant life changes like lottery win, getting married or being disabled and begin to focus on them, rather than reporting actual day-to-day happiness level (Kahneman et al., 2006). For example, Dunn, Gilbert & Wilson (2011) found that when asked of their life satisfaction people with more money reported a good deal more satisfaction, whereas when asked of their happiness level, the difference is much smaller. Therefore, in order to measure actual day-to-day happiness level, happiness level itself is used in the paper.

3.2 Happiness theories

Psychology science developed the following theories of happiness: Liking, Wanting, Needing theory; the Top-Down and Bottom-Up Factors; The Orientations to Happiness Model; Multiple

Discrepancy Theory; Mental Health Continuum Model; Set Point Theory; and Evolutionary Psychology Approach. Theories that propose factors that influence happiness are Top-Down and Bottom-Up Factors; Set Point theory developed by Lyubomirsky et. al (2005); and Evolutionary Psychology approach. Set Point theory developed for explaining happiness by Lyubomirsky et al. (2005) is useful in that it encompasses Top-Down and Bottom-Up theories. Therefore, the paper uses two theories: set point theory by Lyubomirsky et. al. (2005) and evolutionary psychology approach.

Top-Down and Bottom-Up theories of happiness propose opposite factors that influence happiness level. Bottom-Up theories of happiness propose that happiness is the accumulation of happiness experiences from different external events, situational and demographic factors. Early happiness thinking was dominated by Bottom-Up theories. However, high number of studies demonstrated that external events explain very low percentage of happiness variation. Thus, for instance Andrews and Withey (1976) found that demographic factors (sex, education, marital status, race, age, income) account for only about 8% variation of subjective well-being. Argyle (1999) claims that all demographic variables combined are responsible for only fifteen percent of the happiness variation between individuals. Lykken and Tellegen (1996) used twin studies to find that socioeconomic status, family income, marital status, educational attainment, religiosity accounted for no more than 3% of the variance in happiness. Campbell et al. (1976) found that several demographic factors accounted for less than 20% variance in happiness.

Top-Down theories of happiness propose that people's happiness is determined by genetic characteristics. High number of studies demonstrated that genes account for significant share of happiness. For example, Lykken and Tellegen (1996) using several thousand twins found that 44% to 52% variance in happiness could be explained by genes. Genes determine the predisposition of a person to a certain happiness level, which is called the "set point of an individual", the concept first developed by the team of psychologists from Northwestern University and the University of Massachusetts (Brickman et al. 1978) and currently widely accepted in the Psychology science. The set point is the mean value of happiness in a person's set range of happiness that is determined by the genes. The set point is genetically determined and is assumed to be stable over time, fixed, and immune to influence. Supporting this theory, many studies after the pioneering research by Brickman et al. (1978) demonstrated long-term stability in happiness,

which supports the set point concept.

3.3 Set point theory by Lyubomirsky et al. (2005)

Set Point theory developed for explaining happiness by Lyubomirsky et al. (2005) is useful in that it encompasses Top-Down and Bottom-Up theories. Thus, Lyubmorisky et al. (2005) claims that factors that influence happiness are: genetics, that account for approximately 50% of long-term happiness variation, individual intentional activities that account for 40% of long-term happiness variation, and circumstantial factors with demographics that account for about 10% of long-term happiness variation. Set Point is determined by genetics that currently cannot be changed; second factor is to a degree affected by personality traits that are difficult to influence. Third factor are circumstantial and demographic factors (income, wealth, education level, marriage status, number of children, etc.).

First factor influencing happiness is genetics, the notable share of which is genetically indistinct from personality traits. Studies suggest that personality traits are also highly heritable. For example, Big Five personality traits are highly heritable with genes explaining 40-60% of the variance (Power and Pluess 2015). One study using twin pairs study found that happiness is linked to personality by common genes and that heritable happiness differences are entirely accounted by the genes of the Big Five personality domains (Weiss et al. 2008). It was found that typically, personality traits account for 40-50% of the happiness variance (Lyubomirsky et al. 2006). No good explanations for trait-happiness correlation are given yet, as causation might go from any side (Myers and Diener 1995). Moreover, it might also be the case that genetically driven correlation might not have any causation at all apart from common genes.

Many studies found replicating relationships of happiness and different traits. Meta-analysis found that main personality factors that were found to significantly correlate with happiness were neuroticism and extraversion (Steel et al. 2008). Neuroticism was found to negatively correlate with happiness and extraversion was found to positively correlate with happiness. Also, agreeableness, openness to experience and conscientiousness were found to positively correlate with subjective well-being. Moreover, qualities such as self-esteem, internal locus of control and optimism were also found to positively correlate with happiness (Myers and Diener 1995).

Tender-mindedness was as well found to be positively correlated with happiness (Doyle and Youn 2000).

Lyubmorisky et al. (2005) claim that it is possible to alter happiness level in a way that it will be in the upper or lower range of an individual's set range. It could be done by the above-mentioned two factors: individual's intentional activity and circumstantial factors. Individual's intentional activities are actions and practices that a person chooses to engage that requires some degree of individual effort to enact. This effort is the essential difference between circumstantial factors and intentional activities: whereas circumstances happen to people and are by this exogenous by nature, people act using their intentional activities on their circumstances. Examples of intentional activities are: behavioral (exercising, gratitude, altruism, trust, active leisure); cognitive (positive thinking about a situation, appreciation, optimism); volitional (striving for personal goals). Conkle (2008) suggests other examples of intentional activities like opportunity thinking, remembering past positive experiences rather than negative ones.

Third factor that influence happiness according to Lyubomirsky et al. (2005) are circumstantial factors and demographics. As mentioned previously in Bottom-up theories, many demographic and circumstantial factors were found to have small relationship with happiness. Small correlation was found between income, health, age, race, gender, occupation, religion, education, children (Lyubomirsky et al. 2006). For instance, it was found that females have slightly higher levels of happiness than males (Lyubomirsky et. al., 2006). Positive correlation between self-rating of health and happiness was found (Okun et al., 1984). Education and marital status correlation with happiness was not consistent (Lyubomirsky et al., 2006).

Low influence of circumstantial and demographic factors accounting for 10% happiness variation could be explained by the theory of "hedonic adaptation", according to which, any gains in happiness by external events are only temporary, so that short-term changes in happiness rapidly diminish as an individual adjusts to the change (Diener et al., 1999). The proposed explanation is that people become habituated to external events, circumstances and as time passes their happiness slowly returns to their genetic set point level.

3.4 Evolutionary psychology on happiness

Evolutionary psychology approach allows proposing and predicting the direction of influence of different evolutionarily developed and thus gene-imprinted factors that influence happiness. This approach is useful since it is fundamental, heuristic and it generates hypotheses that cannot be generated by any other theoretical approaches. Moreover, apart from other theoretical approaches it uses strongly developed evolutionary biology principles as the foundation for theoretical explanation of the influence of different factors on happiness.

Evolutionary psychology approach to the study of happiness is very scarce. This is because evolutionary psychology is only recently developing theoretical approach to the study of human psychology. Therefore, there are only a handful of studies on the happiness topic from evolutionary psychology approach (Hill et al. 2013). Most notable of studies are that of Buss (2000), Grinde (2006, 2010) and the economic model of happiness using evolutionary approach by Rayo and Becker (2007).

Human species has genetically evolved long before the beginning of human civilization. The last common ancestor of human and chimpanzees lived very approximately 7 million years ago. Humans are similar to chimpanzees at around 98.8% on the nucleotide level (Tishkoff and Kidd 2004). Findings of the first Homo Sapiens fossils account to around 315,000 years ago (Callaway 2017). The earliest survived "out-of-Africa" dispersal wave of modern humans that diverted human genetic evolution took place only around 70,000 years ago. Thus, human as a species is genetically more homogenous than most other species (Grinde 2006). So that human individuals differ in only about 0.1% in their DNA (Jorde and Wooding 2004).

High genetic similarity and only very recent significant change of living environment lead to the proposal of rational hypothesis that most of humans' physiology and psychology is common and adapted to Pleistocene environment. First, not considering very small admixture of homo sapiens with archaic humans, for the most part of the human history until around 70000 years ago humans lived in the African environment. Secondly, humans lived for the most part of human history in the Pleistocene environment in the hunter-gatherer societies until the Neolithic revolution (invention of agriculture) around 12500 years ago. For the purposes of wording simplicity, due to small genetic changes after around 70000 years ago, from this point on the wording that

humans were fit to Pleistocene environment is used, which is also labeled as ancestral environment; despite the fact that late out-of-Africa Pleistocene environment was slightly different. It should be mentioned that evolutionary psychology literature also uses the wordings "Savannah environment" and "Paleolithic environment". Thus, evolutionary forces forced humans to adapt to Pleistocene environment and the way of living at time, both physiologically and psychologically. Moreover, rationally thinking, agricultural way of life and modern way of life in the industrialized society due to its recentness from evolutionary perspective, have not affected in any significant way genetic predisposition of humans to Pleistocene environment. It should be noted, though, that scientific community has scant indirect evidence on the way of life and the nature of environment of that time (Grinde 2002).

Happiness as any other emotion was developed as the system that produces behaviors which increase evolutionary fitness by natural selection (Kovac, 2012). From that point on all evolutionary selection mechanisms apart from artificial ones: natural, sexual, fecundity are referred as natural for simplicity purposes. It should be noted that there was no grand plan of natural selection to produce certain motivational system nor the direction of motivational system production was towards optimal, moral or rational behavior. But rather certain traits or in the case of behaviors – complex strategy sets were successful in its reproduction through natural selection.

The mechanism of happiness could be considered as the following: the set point of generally being happy, brain reward in the form of positive affect and brain punishment in the form of negative affect. First, in the absence of negative circumstances, people are generally happy, people rate themselves as being happier than expected average (Grinde 2010). This conforms to the evolutionary logic, since generally happier people tend to be more reproductively successful: positive state of mind leads to higher success in finding food and partners (Grinde 2010). However, people do not live in the state of perpetual happiness, nor the set point is "very happy". This also conforms to the evolutionary logic, since "very happy" people would have no motivation in the form of brain reward for evolutionarily fit behavior and perpetual happiness state would be dangerous for humans due to low alertness for potential threats and enemies.

Secondly, positive affect serves as the way of brain reward for the behavior that was evolutionarily fit for the environment, not modern, but Pleistocene, as was argued previously (Hill

et al. 2013). Thus, any behavior today that would have been fit in the Pleistocene environment would provide happiness boost. Examples of such behaviors are finding food, finding nutritious food such as sugar and fat, finding mate and sexual intercourse. It should be noted that both positive and negative affections have specific locations in the brain called 'centres of brain reward' and 'centres of punishment' respectively (Kovac 2012).

Thirdly, negative affect serves as the way of brain punishment for the behavior that was evolutionarily unfit for the Pleistocene environment. Examples of such behaviors are horror from spiders, distress from not finding food, jealousy from mate flirting with another that would obviously serve the purposes of reproductive success. This negative affect would motivate a person to escape it, by finding a way from the negative situation.

Brain reward and punishment for human behavior should have been much more powerful than that of other mammals in order to serve its purposes. Compared to mammals, humans have free will that allows them to direct their behavior in any rational or irrational way. Thus, in order for the reward and punishment system to work properly, evolution should have generated strong reward and punishment system; otherwise, free will could have easily resulted in maladaptive behavior (Grinde 2002). Moreover, punishment system should have been developed as more urgent and powerful than the reward one. As Kahneman and Tversky (1991) found, humans feel a loss more than they enjoy a gain of the same amount, which is called by economists as loss aversion. This also satisfies evolutionary perspective, since in the Pleistocene environment, negative situations would be much more urgent than prospective positive situations. As Kahneman and Tversky (1991) noted "pain is more urgent than pleasure".

Deviation from the assumed way of life both in physical and social sense that human's genes are adapted to, leads to mismatches that might cause somatic, mental health problems and might diminish happiness. Human brain has been developed to be adapted to the Pleistocene environment, which is why it perceives and responds to current environment as if it is the ancestral environment, and might have difficulties in comprehending and dealing with situations from an non-ancestral environment (Kanazawa and Li 2015). Studies on animals clearly demonstrated that living under unnatural conditions, whether regarding behavioral or physical aspects, leads to stress, harmful effects on health, including mental, and in this ways negatively influence qual-

ity of life (Moberg 1985; Lord 2002, cited in Grinde 2002). Using this logic, zookeepers try to keep animals in the environment as close as possible to their natural one (Grinde, 2010).

While some mismatches might be beneficial, such as sleeping on a mattress, others might be detrimental and might contribute to stress, lower health, somatic and mental health problems, and reduced quality of life. The term 'discord' is used to refer to such negative mismatches. While some discords might create classical stress response, compromising immune system, leading to emotional problems, such as nervousness, aggression, depression, social maladjustment, leading by this to the reduction in happiness; other discords might be subtle, not as clearly manifested, but also leading to the subtle reduction in happiness and health (Grinde 2002). Moreover, subtle discords might not necessarily be obvious and it might be the case that even slight non-obvious deviation from the ancestral condition leads to the long-term detrimental effect on health and happiness. Studies on animals clearly demonstrated that living under unnatural conditions, whether regarding behavioral or physical aspects, leads to stress, harmful effects on health, including mental, and in this ways negatively influence quality of life (Moberg 1985; Lord 2002, cited in Grinde 2002). Using this logic, zookeepers try to keep animals in the environment as close as possible to their natural one (Grinde, 2010).

Many different examples of the influence of factors that could only be reasonably explained by evolutionary psychology exist. For example, it was found that living in the monoethnic group makes people happier (Kanazawa and Li 2015). The evolutionary explanation is that our ancestors lived their whole lives in ethnically homogenous groups, and multi-ethnic society is a modern phenomenon. The fundamental evidence of this is the fact that humans have psychological mechanisms to classify others by age and sex, but do not have such a mechanism to classify by ethnicity (Kurzban et al. 2001). Moreover, living in a new tribe, being the member of another tribe would have been dangerous (Kanazawa and Li 2015). That is why human brain might consider this as a threat and respond accordingly. As an evidence of this, it was found that train passengers experience increased stress and negative mood if surrounded by passengers of different ethnicities (Burrow and Hill 2013).

4 Data

Data on individual responses for the first regression model come from the "World Values Survey" waves three, four, five and six. The cleared form of data contains 181786 individual survey responses from 83 countries that were collected periodically once or mostly several times for a country in the period of 1995-2014, excluding 2008. The country-level data were obtained either from computing averages on individual responses or from the World Bank database.

Second regression model is based on the "World Values Survey Wave 6" data. The cleared form of data contains 25530 individual survey responses from 20 countries that were collected in one year from the period 2012-2014 for an individual country.

Happiness is the ordinal dependent variable. It is measured as the response of an individual to four possible variants in the survey according to the Likert-scale. The question of the survey is "Taking all things together, would you say you are: very happy, rather happy, not very happy, and not at all happy."

Both Set Point theory of Lyubomirsky et al. (2005) and Evolutionary Psychology's theoretical approach limited in a way by data restrictions were used to determine independent variables that might also correlate with happiness. The independent variables relate to one of the five groups: the variables of special interest – log of GDP per capita, social class, previous year's GDP per capita growth rate; circumstantial factors; variables representing intentional activities; individual traits; individual demographic variables.

It must be pointed that in the following reasoning on each variable that uses mismatch hypothesis as an argument for theorizing through Evolutionary psychology lens, the predicted sign is the case when the mismatch is a discord; which should most probably be the case since the discussed mismatches are very significant in nature, seriously affecting the life of an individual. Otherwise, in the low probability case of the following mismatches not being discords, the prediction of no correlation is the case. Going ahead, all discussed mismatches have the predicted correlation of discords, which is why this massive reasoning is not used further, although, is assumed.

The following variables were used in the regression:

GDP per capita (log form) is the proxy measure of absolute income level of an individual for each country for that year. Data are obtained from the World Bank Database and measures the GDP per capita (PPP) for each country. The variable in the model is used in natural logarithm form. Although, available data do not provide absolute income measures, GDP per capita (PPP) could be used as the proxy for it, since it positively correlates with absolute income in dollar terms and one can expect that income of a person controlled for his social status in one country with higher GDP per capita (PPP) is higher than income of a person in another country with lower GDP per capita (PPP). According to evolutionary psychology explanation people were designed to be motivated to find food and shelter, and from that perspective, rewarded by brain with positive affection for finding it and for finding increasing amount of it. Thus, absolute income should have positive correlation with happiness. However, it could be expected, that given the satisfaction of basic needs, increasing amount of income will give less and less positive affection. Therefore, log form of income in the regression model of the paper is used.

Previous year's GDP per capita growth rate.Previous year's GDP (PPP) per capita growth rate was also used as the proxy measure of the influence of absolute income on happiness. Unlike GDP per capita value itself, which captures mainly long-term happiness influence of absolute income, the measure mainly takes into account short-term increase in happiness from absolute income level increase. The value is expected to be positive with similar reasoning as GDP per capita itself. Moreover, additional optimism might positively influence happiness.

Social class is the measure of the influence of relative income on happiness of an individual. Data come from the survey, which asks to indicate the social class from the given five options: "Lower class", "Working class", "Lower middle class", "Upper middle class", "Upper class". According to evolutionary psychology's theoretical approach, people were designed to be motivated to increase in social rank since it would give them reproduction advantage: more provision of food, higher chance of meeting a mate, and higher number of mates. Therefore, since relative income could be to a certain degree considered as the measure of social rank, it is expected to positively correlate with happiness.

The following **four circumstantial factors** were used:

Perceived gender inequality (and perceived gender inequality on females) is the proxy mea-

sure of gender inequality in a society. The measure is obtained by taking the mean of the survey responses of individuals for each country for a given year. The measure is proxy, since it is obtained as the response to indirect question. The survey question states: "If Jobs are scarce, men should have more right to a job than women" and has three answers "Agree", "Disagree", "Neither". To differentiate between the effects of gender inequality on sexes, two variables for gender inequality were used. If intuitive reasoning suggests that higher gender inequality in the country is expected to negatively influence happiness level and females would be unhappier; evolutionary psychology approach prediction is not as clear. There is no clear and fundamental evidence on whether the society of the past was more patriarchal or egalitarian. Therefore, no prediction of the correlation could be made. If the early societies were egalitarian, the sign for both would be negative, since the higher is the inequality in a country, the higher the level of potential discord; moreover, since the discord concerns more the life of a woman, the negative effect on happiness for woman would be higher. If the early societies were patriarchal in nature, the sign for both would be positive with the same reasoning. If the early societies were egalitarian, but to a certain degree patriarchal, the expected sign for gender inequality would be negative, but the expected negative effect of gender inequality on females would be less, and the sign for female's variable thus positive.

Urbanization is the measure of the degree of urbanization of a country in a given year. Data are obtained from the World Bank Database. From evolutionary perspective, the measure is expected to negatively influence the level of happiness due to higher intensity of work in the cities, lower level of family and communal ties, higher divergence from the ancestral environment. One should understand, however, that urbanization level – retreat from ancestral environment mismatch relationship is very complicated, with the general positive relationship between them but being different for different societies, countries, cultures. Nevertheless, since the variable is one of the best available measures of the huge mismatch that happened from traditional life to urban life transition, where traditional life is obviously far more closer to ancestral environment, it is expected that the coefficient for the variable would be negative and highly economically significant (controlled for its benefits on happiness, one of the huge of which is increased GDP).

Friendliness (country level) is the measure of how much individuals are friendly on the country level. The measure is proxy and obtained by taking the mean of the survey question

"For each of the following, indicate how important it is in your life. Would you say Friends are: very important, rather important, not very important, not at all important." More friendliness in a country leads to lower probability of conflicts and by this to lower probability of stress, negative affection, higher probability of more happiness. From evolutionary perspective friendliness in a country should positively correlate with happiness since the ancestral environment required huge intergroup cooperation not only for the purpose of social cohesion but in order just to survive. Without developed friendliness earlier humans would have had low survival probability. Thus, it is rational to hypothesize that higher friendliness in a country leads to the higher number of friends, which would be rewarded by brain mechanisms with positive affection increasing by this the level of happiness.

Religious diversity is the measure of the diversity of religious denomination memberships in a country in a given year. The measure is obtained through obtaining fractionalization of the respondent's reported religion. The formula for fractionalization is given below, where s_{ijk} is the share of the religion i in a country j at year k. N is the number of religions in a country j at year k. The measure of fractionalization was used for calculating ethnic, linguistic and religious diversity fractionalizations by Alesina et al. (2003). No specific intuitive reasoning answer might be provided for happiness-religious diversity relationship. Though, it should be noted that some studies, for instance that of Okulicz-Kozaryn and Adam (2011) have demonstrated negative correlation between them. From evolutionary perspective, religious diversity would potentially decrease the probability of social cohesion, would decrease identification of oneself with one's own society, and by this decrease the probability of obtaining social capital and by this leading to higher probability of negative affection and lower probability of happiness.

$FRACT_{jk} = 1 - \sum_{i=1}^{N} s_{ijk}^2$

The following **nine intentional activity variables** were used:

Leisure is the measure of the amount of time spent on leisure activities. The measure is the proxy measure obtained from the question on how much an individual values leisure time. The question of the survey is "Important in life: Leisure time" and has four Likert-scale responses. Like most other animals, humans had the scare supply of food most of the time before modernity and thus needed efficient use of scarce energy. Therefore, humans are evolutionary adapted to

rest and do passive leisure activities when basic necessities are met. Thus, the expected sign from evolutionary psychology perspective is positive.

Religiosity is measured as the response of an individual to four possible variants in the survey according to the Likert-scale. The question of the survey asks religion's importance in the life of a respondent: "Importance in life: Religion". Religious people were found to be less vulnerable to depression, were found to report higher levels of happiness and satisfaction with life (Myers and Diener 1995). The expected sign of the influence from evolutionary perspective is positive. Debates are going on the specific evolutionary explanation of the importance of religiosity, with one of the explanation being that a religion served as the way of increasing pro-social behavior and increasing the feeling of membership in a social group.

Exercising is the measure of individual sport enthusiasm. The survey question asks "For each organization, could you tell me whether you are an active member, an inactive member or not a member of that type of organization? Sport or recreational organization." Higher sport enthusiasm is expected to positively affect happiness level according to various previous studies and proposed explanation that exercising reduces stress. No specific evolutionary psychology hypothesis can be proposed for exercising-happiness relationship. Although, it is expected that for an individual who does mostly intellectual job and lack physical activity, exercising might serve as the way of compensating mechanism for mismatch between medium to intense physical activity in the past and low physical activity in the current office environment.

Perseverance is the measure of the individual level of perseverance. The variable is proxy as it is obtained as the response to indirect question. The survey question asks "Here is the list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Determination and perseverance." and have either mentioned or non-mentioned response. Evolutionary perspective has no clear hypothetical prediction on this trait since on the one hand perseverance might lead to increased achievement, increased food and shelter capture and production, by which increased social rank and increased chances of mating success. On the other hand perseverance might not necessarily lead to success, which would necessarily lead to stress out of frustration that would increase various health problems and by this lower chances of mating success. Moreover, perseverance might lead to energetically

inefficient behavior, dangerous behavior that would also lead to lower chances of reproduction success. Thus, first, evolution does not necessarily would lead to the success of perseverance virtue, and by this to its brain reward. Secondly, perseverance at current times also would not necessarily lead to success and by this would not necessarily be rewarded, if not punished for stress and inefficient energy use.

Family value is the measure of family tie strength of an individual. The variable is a proxy as it is obtained as the response to indirect question. The survey question asks "For each of the following, indicate how important it is in your life. Would you say Family is: very important, rather important, not very important, not at all important". Higher family value is rationally expected to positively affect individual happiness level due to social and psychological support. From evolutionary perspective high family ties and support hugely increases reproduction success, and thus it is expected to be observant in the ancestral environment. Thus, high family ties are expected to be rewarded with positive affect. Moreover, high family ties are also expected to be rewarded for increased social ties. Thus, it expected that family value will positively correlate with happiness. Moreover, since the influence from evolutionary perspective is significant, it is expected to be economically more significant compared to most other variables.

Locus of control is the measure of an individual's locus of control. The survey question asks: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means "no choice at all" and 10 means "a great deal of choice" to indicate how much freedom of choice and control you feel you have over the way your life turns out:" Higher locus of control is expected to positively influence individual level of happiness through giving more motivation towards achieving personal goals. From the evolutionary perspective, controlled for perseverance, people with higher locus of control would be evolutionarily more fit, since they would have more motivation for seeking food, shelter, sex; getting by this positive affection in the form of reward for achieving reproduction goals.

Private collective self-esteem (nationalism) is the measure of the positive evaluation of one's own group, in this case his or her own nationality. The measure is obtained through survey question "how proud are you of your nationality" and has four Likert-scale answers. No intuitive

rational prediction on the relationship of this variable and happiness could be made, although, previous studies have explored positive relationship. Evolutionary psychology approach on the other hand suggests that being proud of own group's membership demonstrates better adaption to his or her own society and thus higher social success, which would be rewarded with positive affection and leads to higher happiness.

Traditionalism (Traditionalism by females) is the measure of an individual's attitude toward traditional gender roles in a society. The question asks "Do you strongly agree, agree, disagree, or strongly disagree? Being a housewife is just as fulfilling as working for pay." Intuition and previous studies do not present evidence on this with some studies demonstrating positive, some negative correlation. Evolutionary psychology approach, though, would give more definite answer to the question. From the perspective of evolutionary psychology, it could be safely assumed that women were doing job close to home most of the time in the ancestral environment. This is because: birth and death rate were high at that time; life expectancy was low; pregnancy made women less able to do physical job which was the only type of job at that time; humans as a species have one of the most underdeveloped children at birth, which required at minimum several years of care. Therefore, female housekeeping at this time would be closer to the ancestral environment. Thus, safely assuming that the measure could be considered as the proxy for a respondent's actual role, it could be hypothesized that both man and woman would be happier with traditional gender role beliefs. Moreover, it is rational to claim that mismatch would be higher for a woman, since the mismatch concerns a woman's life more than a man's life. Thus, it could be expected from evolutionary psychology perspective that the correlation would be positive and higher for woman.

Communal is the measure of an individual's ties with his or her own local community. The measure is proxy and obtained through the answer on the survey question "I see myself as member of my local community" with four Likert-scale answers. From the evolutionary perspective, it is the measure of social success and should therefore be positively correlated with happiness.

The following **three individual trait variables** were used:

Friendliness is the measure of how much an individual is friendly. The measure is proxy and obtained through the same survey question as that of the variable on country level. From

evolutionary perspective the same logic of social cohesion and higher number of friends as that of country level friendliness apply that would lead to higher happiness.

Neuroticism is the measure of one of the Big-5 personality traits, neuroticism. The value is proxy and obtained through the answer on the survey question "I see myself as someone who: gets nervous easily" with five Likert-scale answers. Rational intuition and the number of different studies suggest that the variable should negatively correlate with happiness. From the standpoint of Evolutionary Psychology, such trait might have its own fitness advantages like increased alertness for danger. However, since such increased alertness is exhaustive for an organism, the trait might have genetically evolved together with increased negative affection and decreased happiness.

Extraverted is the measure of one of the Big-5 personality traits, extraversion. The value is proxy and obtained through the answer on the survey question "I see myself as someone who is outgoing, sociable" with five Likert-scale answers. Intuition and studies suggest that the variable should positively correlate with happiness. From the standpoint of Evolutionary Psychology, such trait might have its own fitness advantages like increased social network, social support and potentially increased social rank. Since these factors should be rewarded for increased fitness and satisfying needs of a human, who is social animal, the trait should positively correlate with happiness.

The following **five individual demographic variables** were used:

Together is the measure of close personal relationship with the significant other. Data are from the survey, which asks to indicate the marital status from the following: married, living together as married, divorced, separated, widowed, single. Together is the dummy variable which is equal to 1 if an individual is married and living together as married, and zero otherwise. Evolutionary psychology perspective suggests positive correlation with being together with the significant other and happiness. Profound phylogenetic analysis using data from hunter-gatherer societies around the world suggest that marriages were arranged and most of them were monogamous and it could be historically traced at least back to first modern human migrations out of Africa (Walker et al. 2011). Moreover, it is rational to claim that marriage significantly

increases reproduction chances of both partners, thus leading to brain reward with positive affection and by this to higher happiness level. Therefore, it is also expected to have high economic significance on happiness level.

Separated is the measure of separation from the close personal relationship with the significant other. Data are from the survey, which asks to indicate the marital status from the following: married, living together as married, divorced, separated, widowed, single. Separated is the dummy variable which is equal to 1 if an individual is divorced, separated and widowed, and zero otherwise. Thus, the paper uses being single as the control. The variable is expected to negatively influence happiness level both on intuitive and evolutionary perspective. It is rational to hypothesize that separation decreases reproduction chances of both partners, thus leading to brain punishment in form of negative affection.

Number of children is the measure of the number of children of an individual. The measure is from the survey that asks to provide the number of children. The measure is expected to positively influence the level of happiness due to higher number of close social ties. Moreover, higher number of children increases further reproduction chances, which is why it could be claimed that higher number of children would be rewarded with positive affect leading to higher happiness level. Thus, from evolutionary perspective, the expected sign is positive. It must be mentioned that the gender of child might influence the happiness level, since the large share of traditional societies have higher share of son preference. However, data do not allow the separation of effect for each gender of a child.

Health is the measure of subjective current individual health. The survey question asks "All in all, how would you describe your state of health these days? Would you say it is:" and has four levels of answer: "Very good, good, fair, poor". The variable is expected to positively affect the individual level of happiness. From Evolutionary psychology perspective, undoubtedly, it is expected that lower subjective health leads to severe brain punishment in order to take human's attention on the problem and motivate person to cure it. Thus, health from evolutionary psychology perspective should also positively correlate with happiness and should be highly economically significant.

Female is the dummy variable that represents whether the respondent is a female or not. No

specific evolutionary psychology expectation can be made.

Age and age_squared are the variables that represents the age of an individual. The model has two variables for age: age and age squared since it is expected that individual happiness decreases at a decreasing rate with age and increases when an individual is old. No specific evolutionary psychology expectation can be made.

5 Empirical strategy

First, key variables were checked for their key statistics (Table 1). The distribution of variables does not demonstrate any distortions, the mean, standard deviation, min and max of the variables are in the expected range. The average GDP per capita (PPP) is slightly higher than the World's average of 14454 dollars in 2014 (constant international (2011) dollars), the distribution of countries is normal, representing all types of countries. Representation is similar to the actual representation of countries, with similar share of poor-income, middle-income and higher income countries. The number of observed countries is 83 that were observed periodically once or mostly several times for a country in the period of 1995-2014, except 2008.

Table 1: Summary Statistics

Variable	Mean	Standard deviation	Min	Max
Happiness	2.098	0.737	0	3
GDP per capita (PPP), constant (2011) international $	16,261	14,698	857	76,029
Social class	1.688	0.985	0	4

Secondly, statistical comparison of variables was conducted. GDP per capita of countries was plotted to the average happiness level in the countries (Figure 1). Moreover, average GDP per capita to each happiness level was plotted against the happiness level (Figure 2). While first graph demonstrates weak positive correlation between them, the second graph shows a little bit more clearly the positive relationship between them. Though, the average GDP per

capita from “happy” to “very happy” slightly decreases. Finally, the social class was plotted against happiness level (Figure 3). The graph demonstrates that with the increasing social class, happiness level increases.

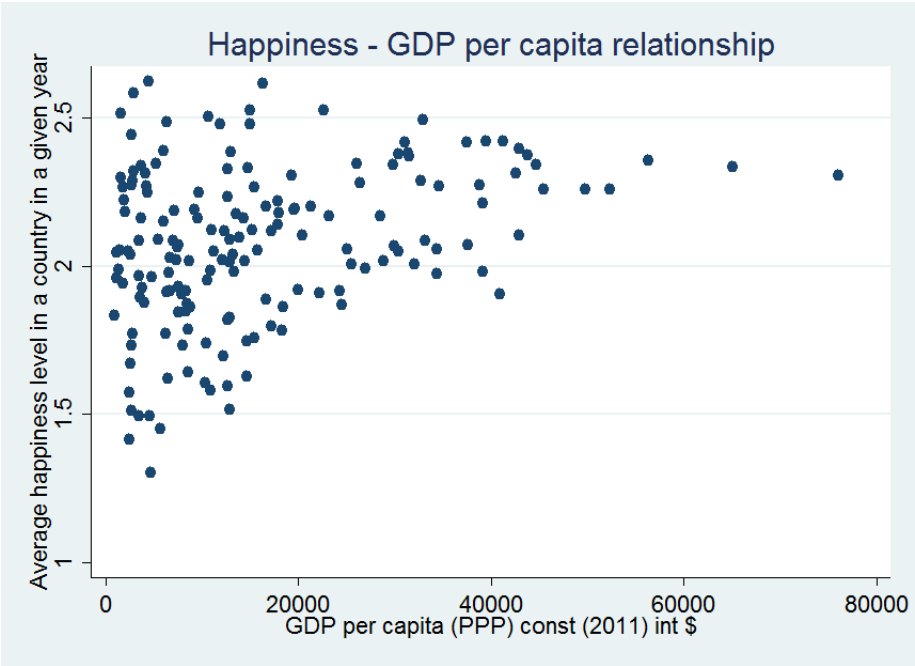

Figure 1: Happiness - GDP per capita relationship

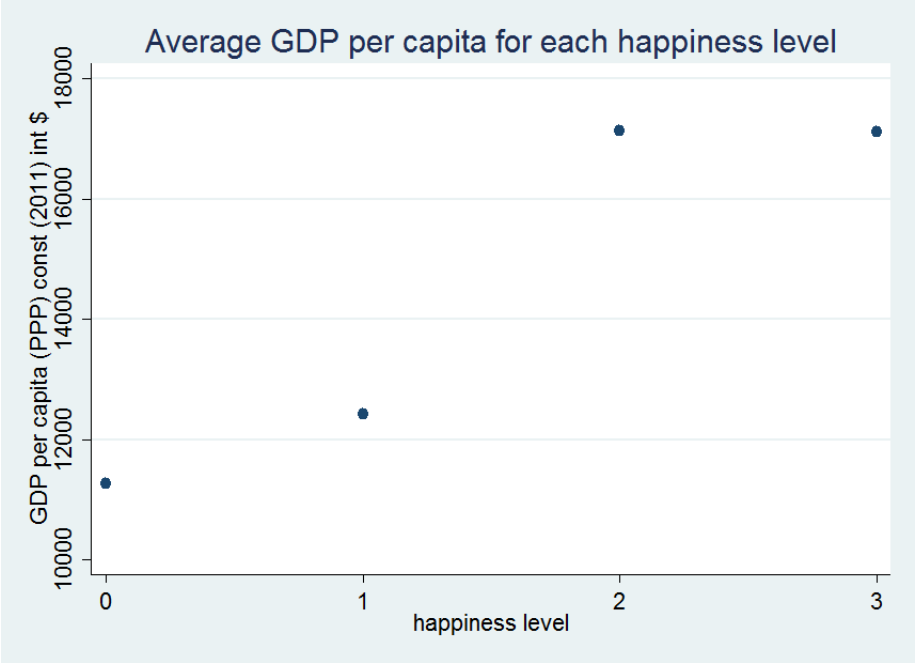

Figure 2: Average GDP per capita for each happiness level

Figure 3: Happiness - Social Class relationship

Two similar regression models were used due to data restrictions that do not allow their aggregation. First regression model is the following:

$$happiness_{ijk} = \beta_1 LGDP\_per\_capita_{ijk} + \beta_2 social\_class_{ijk} + \beta_3 dgdp\_2_{ijk} + \beta_4 W_{ijk} + \beta_5 X_{ijk} + \beta_6 Y_{ijk} + \beta_7 Z_{ijk} + \beta_8 Year_{ijk} + \beta_9 Country_{ijk} + u_{ijk}$$

The analysis is cross-sectional and uses ordered logit model and OLS for comparison. The $LGDP\_per\_capita$ variable is the GDP per capita (PPP) of a country j of an individual i in a given year k in a log form; the $social\_class$ variable is the variable that is the proxy for relative income and represents social class of an individual; $dgdp_2$ variable is the previous year's GDP (PPP) per capita growth rate; W is the vector of five circumstantial factors; X is the vector of eight variables that represents intentional activities of an individual; Y is the vector of one individual trait, Z is the vector of seven demographic variables, Year is the dummy variables for each year, Country is the dummy variable for each country.

Second regression model is based on "World Values Survey Wave 6" data. Data contain individual responses from 20 countries that were collected in one year from the period 2012-2014 for an individual country. The model is the following:

$$happiness_{ijk} = \beta_1 social\_class_{ijk} + \beta_2 X_{ijk} + \beta_3 Y_{ijk} + \beta_4 Z_{ijk} + \beta_5 Country_{ijk} + u_{ijk}$$

The analysis is cross-sectional and uses ordered logit model and OLS for comparison. The $social\_class$ variable is the variable that is the proxy for relative income and represents social class of an individual i in a given year k in a country j;X is the vector of ten variables that represents intentional activities of an individual; Y is the vector three individual traits, Z is the vector of seven demographic variables, $Country$ is the dummy variable for each country.

The study uses 2SLS IV regression to check the consistency of findings for both models, using two instrumental variables for two endogenous ones. First, it should be mentioned that the study has the limitation in the form of several other potential endogenous variables for which data cannot provide satisfactory instruments. Secondly, according to the study by Ferrer-i-Carbonell and Frijeters (2004) on happiness research methodology, assuming cardinality for happiness scores and running OLS makes little difference to assuming ordinality with bias being negligibly small. Therefore, using 2SLS IV to verify the consistency of findings is rationally appropriate.

The study uses social class and private collective self-esteem as endogenous variables and education level with willingness to fight for a country as corresponding instrumental variables. It seems reasonable that education and willingness to fight for a country do not correlate with happiness apart from their influence through both endogenous variables. Education has significant correlation with social class and willingness to fight for a country has significant correlation with private collective self-esteem (nationalism).

Ordered logit regression was used as the main regression form to be analyzed, since the dependent variable represents ordinal variable. Since the choice between two possible methods ordered probit and ordered logit regressions is the matter of individual choice due to the fact that both types of regression are very similar, with the small difference of similar underlying distributions, ordered logit regression was used. Robust standard errors were derived for the regression. Apart from standard coefficients of the regression, the coefficients representing the change in standard deviations of latent dependent variable per unit of independent variable or per standard deviation of independent variable were derived. The McKelvey & Zavoina's R-squared, the most similar to OLS R-squared estimator of R-squared was also derived.

6 Results

Both OLS and IV regressions demonstrate almost no difference with the main ordered logit regression (Tables 2 & 3). First, such results conform to the study results by Ferrer-i-Carbonell and Frijeters (2004) on happiness research methodology, which found negligible difference between OLS and ordered logit regression in the analysis of happiness. Secondly, accounting for two endogenous variables social class and private collective self-esteem (nationalism), there is also negligible difference between simple OLS and IV OLS regression, and thus negligible difference between ordered logit and IV OLS regression analysis. Therefore, the interpretation of the results in the study is mostly based on the interpretation of ordered logit analysis due to convenience issues.

Coefficients that are represented in both models demonstrate only slight difference. First, this demonstrates the consistency of results despite significant difference in data used. Secondly, remaining differences in two variables is explainable, and is explained further in the text, which also demonstrates the consistency of results.

The economic significance of the coefficients were approximately found using the coefficients that represent the change in the latent dependent variable measured in standard deviations with the one standard deviation increase of an independent variable or in more appropriate cases with the one-point change of the coefficient of an independent variable. Almost all variables demonstrated statistical significance at 1% significance level. Rare exceptions in the form of no statistical significance are explained further in the text.

First, every single hypothetical prediction of the evolutionary psychology approach was confirmed. The explanation of prediction for each variable is written in the "data" section. Here, the paper concentrates on those predictions that are not intuitive, and cannot be easily explained by one theoretical approach, other than evolutionary psychology approach. The most important prediction that urbanization level controlling for its positive influence in terms of gdp increase would negatively correlate with happiness is observed here. Moreover, as it was predicted, since urbanization level could be to a certain degree considered as the proxy for retreat from ancestral environment, the variable is highly economically significant, in fact the most economically

Table 2: Model 1 Regression Results

Variable	Evolutionary Psychology Prediction	OLS		Logit					IV	
		Coef	SE	Coef	SE	bStdY	bStdXY	SDofX	Coef	SE
social_class	+	**0.069**	0.002	**0.212**	0.005	0.096	0.095	0.989	**0.073**	0.006
friendliness	+	**0.038**	0.002	**0.123**	0.008	0.056	0.041	0.736	**0.036**	0.003
friendliness country level	+	**0.132**	0.030	**0.446**	0.096	0.203	0.048	0.237	**0.169**	0.035
gender inequality	x	**-0.251**	0.019	**-0.794**	0.061	-0.361	-0.145	0.402	**-0.255**	0.021
gender inequality female	x	**0.045**	0.007	**0.118**	0.023	0.054	0.029	0.542	**0.040**	0.008
children	+	**0.005**	0.001	**0.017**	0.004	0.008	0.014	1.826	**0.005**	0.001
leisure	+	**0.039**	0.002	**0.125**	0.007	0.057	0.047	0.828	**0.034**	0.002
perseverance	x	**-0.019**	0.003	**-0.065**	0.010	-0.030	-0.015	0.486	**-0.019**	0.003
locus of control	+	**0.034**	0.001	**0.108**	0.002	0.049	0.118	2.404	**0.036**	0.001
together	+	**0.121**	0.005	**0.388**	0.015	0.177	0.085	0.480	**0.122**	0.005
separated	-	**-0.088**	0.007	**-0.253**	0.021	-0.115	-0.036	0.316	**-0.087**	0.007
health	+	**0.249**	0.002	**0.809**	0.007	0.368	0.321	0.871	**0.246**	0.003
female	x	**-0.024**	0.009	-0.060**	0.029	-0.028	-0.014	0.500	-0.019**	0.010
age	x	**-0.012**	0.001	**-0.040**	0.002	-0.018	-0.295	16.109	**-0.012**	0.001
age_sq	x	**1.4e-4**	6.0e-6	**4.5e-4**	1.9e-5	2.0e-04	0.301	1485	**1.3e-4**	6.6e-6
religiosity	+	**0.038**	0.002	**0.130**	0.006	0.059	0.061	1.028	**0.037**	0.002
family_value	+	**0.104**	0.005	**0.304**	0.015	0.138	0.048	0.346	**0.100**	0.006
priv_col self_est	+	**0.094**	0.002	**0.298**	0.008	0.136	0.097	0.714	**0.108**	0.016
religious diversity	-	-0.067**	0.028	**-0.270**	0.090	-0.123	-0.029	0.240	-0.002	0.038
traditionalism	+	**0.014**	0.003	**0.051**	0.008	0.023	0.021	0.910	**0.014**	0.003
traditionalism female	+	**0.016**	0.003	**0.052**	0.011	0.024	0.026	1.106	**0.015**	0.004
urbanization	-	**-0.014**	0.001	**-0.042**	0.004	-0.019	-0.396	20.722	**-0.014**	0.001
lgdp	+	**0.110**	0.015	**0.305**	0.048	0.139	0.139	1.003	**0.118**	0.017
dgdp_2	+	**0.009**	0.001	**0.026**	0.002	0.012	0.046	3.871	**0.010**	0.001
_const		**-0.768**	0.133						**-0.956**	0.145
/cut1				4.400	0.415					
/cut2				6.858	0.416					
/cut3				9.915	0.416					
N		181,786		181,786					154,015	
R_sq		0.274		0.319					0.274	

For Ologit - McKelvey & Zavoina's R_sq was used

The regression also contains country and year dummy variables

Bold – significant at 1% level, ** - significant at 5% level, *- significant at 10% level

Dependent variable – happiness level

Evolutionary Psychology prediction:

+ is a positive correlation prediction

- is a negative correlation prediction

x no prediction was given

Table 3: Model 2 Regression Results (Wave 6)

Variable	Evolutionary Psychology Prediction	OLS		Logit					IV	
		Coef	SE	Coef	SE	bStdY	bStdXY	SDofX	Coef	SE
social_class	+	**0.072**	0.004	**0.217**	0.014	0.101	0.104	1.027	0.045**	0.019
friendliness	+	**0.029**	0.006	**0.099**	0.020	0.046	0.034	0.741	**0.030**	0.007
children	+	0.004	0.003	0.017*	0.009	0.008	0.015	1.883	0.002	0.003
leisure	+	**0.033**	0.006	**0.112**	0.017	0.052	0.044	0.849	**0.034**	0.006
perseverance	x	**-0.042**	0.008	**-0.139**	0.027	-0.065	-0.031	0.479	**-0.036**	0.009
Locus of control	+	**0.041**	0.002	**0.125**	0.007	0.058	0.127	2.192	**0.041**	0.003
together	+	**0.106**	0.012	**0.330**	0.039	0.154	0.074	0.483	**0.110**	0.013
separated	-	**-0.066**	0.019	**-0.186**	0.059	-0.086	-0.025	0.285	**-0.071**	0.020
health	+	**0.279**	0.006	**0.898**	0.020	0.417	0.348	0.834	**0.282**	0.008
female	x	**0.048**	0.017	0.136**	0.055	0.063	0.032	0.500	**0.052**	0.018
age	x	**-0.012**	0.002	**-0.040**	0.005	-0.019	-0.292	15.683	**-0.012**	0.002
age_sq	x	**1.5e-4**	1.6e-5	**4.8e-4**	5.2e-5	2.0e-04	0.319	1435	**1.5e-4**	1.8e-5
religiosity	+	**0.037**	0.006	**0.133**	0.018	0.062	0.063	1.012	**0.036**	0.007
family_value	+	**0.084**	0.013	**0.233**	0.037	0.108	0.042	0.385	**0.081**	0.014
priv_col self_est	+	**0.097**	0.007	**0.299**	0.022	0.139	0.096	0.690	0.134**	0.058
traditionalism	+	0.011	0.007	0.031	0.021	0.014	0.014	0.948	0.001	0.007
traditionalism female	+	0.014	0.009	0.044	0.028	0.021	0.022	1.071	0.013	0.009
neuroticism	-	**-0.016**	0.003	**-0.051**	0.011	-0.024	-0.031	1.292	**-0.016**	0.004
extraverted	+	**0.015**	0.004	**0.049**	0.012	0.023	0.028	1.233	**0.015**	0.004
communal	+	0.012**	0.006	**0.05**	0.019	0.023	0.017	0.722	0.008	0.001
exercising	x	**0.032**	0.006	**0.106**	0.021	0.049	0.034	0.683	**0.033**	0.007
_const		0.120*	0.064						- 0.145	0.115
/cut1				2.940	0.201					
/cut2				5.087	0.200					
/cut3				8.143	0.206					
N		25,530		25,530					23,703	
R_sq		0.247		0.209					0.245	

For Ologit - McKelvey & Zavoina's R_sq was used

The regression also contains country dummy variables

Bold – significant at 1% level, ** - significant at 5% level, *- significant at 10% level

Dependent variable – happiness level

Evolutionary Psychology prediction:

+ is a positive correlation prediction

- is a negative correlation prediction

x no prediction was given

significant variable in terms of standard deviation change of latent variable by one standard deviation change of the explanatory variable. The variable was even more economically significant than subjective health.

Religiosity, religious diversity in a country, individual ties to his or her own local community and private collective self-esteem also have the predicted signs. Thus, as predicted, the study suggests positive correlation between religiosity and happiness level, negative correlation between religious diversity in a country and happiness level, positive correlation between individual ties to his or her own local community and happiness level, and positive correlation between nationalism and happiness level. Among these variables the most economically significant variable is nationalism.

Traditionalism in the form of the approach towards traditional gender roles in the society is also very successfully predicted by the evolutionary psychology approach. Thus, as expected by the approach, traditionalism is positively related with happiness level. Moreover, as predicted, those females who believe that being housewife is just as fulfilling as working for pay are predicted to be happier than males who believe the same. In the second model traditionalism for both genders is not significant. However, when considering the second model without the division of effects into genders and when considering the second model without the gender control, traditionalism is statistically significant and has the predicted sign of the effect (Table 4). Thus, considering the first model, which is more informative due to much more data being analyzed, traditionalism could be considered as successfully predicted by evolutionary psychology approach.

From the perspective of evolutionary approach, the sign of gender inequality in a country for both males and females demonstrates interesting findings. First, the influence of gender inequality on both sexes is negative, which according to the evolutionary psychology might suggest about the egalitarian nature of the ancestral societies. However, the influence of gender inequality on happiness, which in this study is the proxy for inequality for females, is less negative for females themselves than for males. The only reasonable explanation from the perspective of evolutionary psychology is that the ancestral societies were not fully egalitarian, but

Table 4: Regression results of the different variants of the 2-nd model

	OLS		Logit					IV	
Model 2	Coef	SE	Coef	SE	bStdY	bStdXY	SDofX	Coef	SE
Original model 2									
Female	**0.048**	0.017	0.136**	0.055	0.063	0.032	0.500	**0.052**	0.018
Traditionalism	0.011	0.007	0.031	0.021	0.014	0.014	0.948	0.01	0.007
Traditionalism female	0.014	0.009	0.044	0.028	0.021	0.022	1.071	0.013	0.009
Model 2 without the division of traditionalism effects into two genders									
Female	**0.072**	0.008	**0.212**	0.026	0.098	0.049	0.500	**0.075**	0.086
traditionalism	**0.018**	0.006	**0.054**	0.015	0.025	0.024	0.948	**0.017**	0.005
Model 2 without female dummy variable									
Traditionalism	-0.001	0.005	-0.002	0.016	-0.001	-0.001	0.948	-0.002	0.005
Traditionalism female	**0.035**	0.004	**0.104**	0.013	0.048	0.052	1.071	**0.036**	0.004
Bold – significant at 1% level, * - significant at 5% level									

were slightly more patriarchal than fully egalitarian society in the fully egalitarian and fully patriarchal society continuum. Nevertheless, it must be mentioned, that the scale of it should have been small, since the influence of gender inequality on happiness level for both sexes is still negative and economically significant.

The economic significance of variables was also successfully predicted by evolutionary psychology approach. Thus, apart from urbanization, subjective health, family value and "together", when considering the influence of one-point increase in independent variable on the standard deviation change of latent variable, which is more appropriate for these variables, are both highly economically significant, as predicted by evolutionary psychology's theoretical approach. Apart from that variables, economic significance was demonstrated by gender inequality level in a country, locus of control, age, nationalism, social status, being "separated".

The only variable that requires further attention is the number of children, which was found to positively correlate at 1% significance level in the first model, but is only correlated at a 10% significance level in the second model. This might be due to the fact that the influence of variable is so small, that it cannot be statistically observed at smaller sample sizes. From the first model itself, the variable is not economically significant. Moreover, in additional, not included into the results models, no gender difference of the variable's influence is found. The potential explanation from evolutionary perspective is that humans by nature were driven to have sex that led to children rather than vice versa. Moreover, the potential discord's negative effect on happiness from not having children or having small number of children might be hugely mitigated by the "opportunity cost" of children's negative influence on happiness through huge complexities of their upbringing. Such hypothesis could be in a way supported by the fact that conducting regression on the group of people with age equal to or above 60, who have less probability of having to worry about their children and experience negative upbringing effect; have statistically positive influence at 5% level (1% in the first model) of the number of children on happiness level. Moreover, the economic significance is three times higher for that group of people.

Secondly, the variables that were not given theoretical prediction by evolutionary psychology approach were also statistically significant. Thus, controlling for traditionalist view on gender roles and gender inequality in society, females are expected to be less happy than males. However, not controlling for these effects (not included into the results section), or considering the positive effect of traditionalism, females are expected to be happier than males. Considering the fact that the respondents are of age 18 and higher, age is negatively correlated with happiness at a decreasing rate as individual ages. Perseverance was found to negatively correlate with happiness which demonstrates that its negative effects are more expected than positive ones. Exercising is expected to positively correlate with happiness level.

Thirdly, the influence of different types of income on happiness level is also as predicted by the evolutionary psychology approach. All of the variables: social class, log of GDP (PPP) per capita and previous year's GDP (PPP) per capita growth rate demonstrate statistical significance at 1% level in all models, with the exception of social class demonstrating 5% significance level in the IV regression of the second model. The expected increase of absolute income by 5% in

one year is expected to increase the latent variable with long-term influence by 0.006 standard deviations and with short-term influence by 0.05 standard deviations. The influence of relative income is relatively more economically significant, expectedly increasing happiness rate by 0.096 standard deviations with the increase of social class by one in the scale of 5 social classes.

It should be also mentioned that apart from these two main models the first model with GDP and GDP in the squared form instead of the log form was regressed. The model results are almost identical to the first model results. Coefficients on GDP and GDP squared are as expected: statistically and economically significant, with GDP positively influencing happiness level at a diminishing rate with the threshold of around 37000$.

One should be very careful in interpreting the sign and influence of the log of GDP (PPP) per capita and previous year's growth rate variable on happiness level. Both of them could be considered only to a certain degree as proxy for absolute income and absolute income growth rate. Discussion of this problem is done in the "data" section. Moreover, the pure effect does not take into account the fact that increased absolute income comes with the increasing urbanization rate. Data on hand demonstrate that urbanization explains 35% of GDP variation or 54% of log of GDP variation. Such high correlation is rationally expected. Therefore, in order to consider full net influence of the certain level of absolute income one must take into account both urbanization and gdp levels. Considering these restrictions, though, the predictions are as expected: short-term influence of absolute income increase on happiness exists and is positive; long-term influence of absolute income increase holding urbanization level constant also exists and is positive, although economically weakly significant.

Interpretation of the expected net influence of absolute income, considering connection with urbanization level, is much more complicated. "Table 5" demonstrates examples from data that demonstrate expected ranking in happiness level among three countries and actual mean of happiness level for them. The expected ranking conforms to the actual predictions. Thus, the least urbanized country Tanzania with very low GDP per capita level and medium GDP per capita growth rate is the happiest. Kazakhstan, with its medium GDP per capita medium urbanization and high GDP per capita growth rate is less happy than Tanzania but more happy than Germany. Germany, despite its highest GDP per capita rate, due to high urbanization rate

and low GDP per capita growth rate is the least happy among three countries.

Table 5: Examples of the net influence of factors on happiness level

Country	Year	Urbanization level, %	GDP (PPP) per capita in 2011 constant int. $	Previous year's gdp per capita growth rate,%	Expected happiness level at the actual value of given three variables and mean value of others	Actual mean level of respondents' happiness level
Tanzania	2001	22.67	1529	2.22	2.43	2.51
Kazakhstan	2011	53.58	21278	5.80	2.31	2.20
Germany	2013	74.89	42914	0.30	2.05	2.10

The sign of the influence of social class on happiness level is as expected, positive – the higher is the social class level, the higher is the expected happiness level. Moreover, the economic significance of the social class is also high. In order to better observe the influence of social class on happiness, the plot of predicted probabilities of each happiness level on the different values of social class at mean values of other independent variables was created from the first model (Figure 4). The plot suggests that with the increase of social class level, the probability of individual being "not at all happy", "not very happy" and "rather happy" decreases; whereas the probability of individual being "very happy" increases.

7 Discussion

Economic science has long been serving humanity for the general purpose of increasing humanity's well-being. However, as with many good aims, certain biases and exaggerations occurred due to the necessity to measure, quantify and predict complex nature in simple terms. Assumed human nature led to the construction of models, policies that overemphasize certain human characteristics and preferences; the value of economic growth both from individual and country perspective.

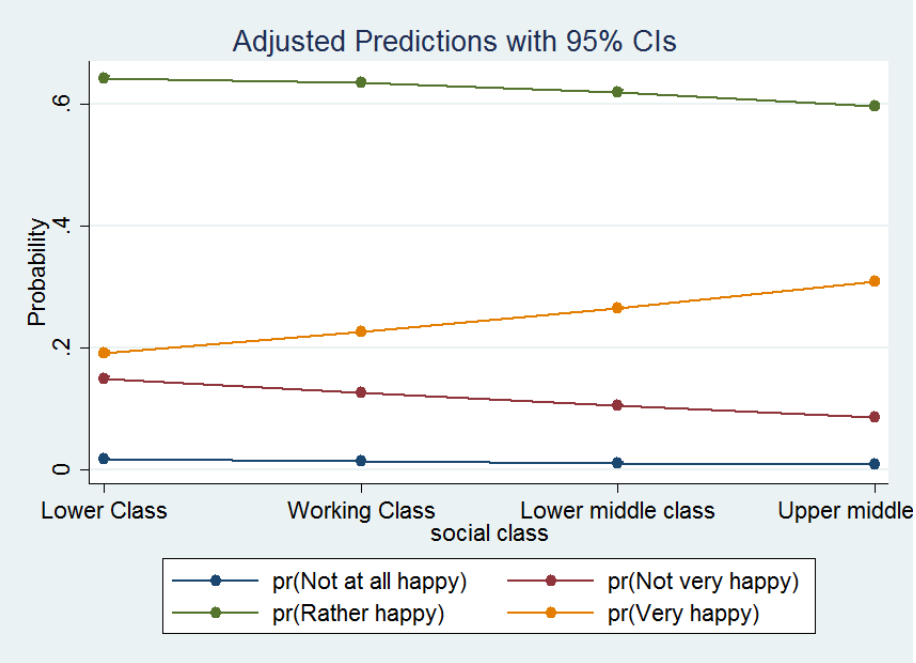

Figure 4: Predicted happiness levels for different social classes

On the traditional nature-nurture debate this paper concentrates primarily on human nature. That is not to say that nurture is not important or that nature has deterministic nature on human and his or her well-being. Nor the paper claims that solely nature should be the consideration for actions, policies, without considering "nurture", moral and humanistic aspects. The reality is certainly far more complicated and the mixture of both nature and nurture influences human behavior and well-being. However, since economic science has mostly concentrated on "nurture", leaving nature side in form of assumptions, with only recent breakthroughs in nature's understanding; it appeared reasonable to fill the gap with concentrating mostly on nature side, its fundamentals and influence on happiness.

Overemphasis of growth in developed countries led both to increased prosperity with the goods that such prosperity brings and to ills. Industrialization period in developed countries and current period of developing countries are known for its ills that detrimentally affect both humans and the environment. Developed countries were first to recognize the adverse effects of uncontrollable growth without looking for its side effects and began to concentrate on "green growth" that is more natural and less harmful for both environment and humans. However, still, the policymakers do not consider enough the negative sides that modernity brings to individuals.

Modernity is linked to many problems when human nature is not considered as a variable in

the equation. For example, humans are designed by evolution to desire fats and carbohydrates, since these substances were nutritional, scarce and full of desired energy. However, modernity with its capacity to produce huge amounts of these substances exploits this human nature and this leads to soaring rates of diabetes, obesity and coronary heart disease in the developed world. In the US, for instance, 37.9% of adults were obese and more than 70% were overweight or obese in 2013-2014 (Flegal et al. 2016). The necessity to look at electronic devices for a long time both from entertainment and work reasons, decreased amount of time spent outdoors, led to the increased rates of myopia and computer vision syndrome. If 60 years ago 10-20% of the Chinese population were short-sighted, now up to 90% of Chinese teenagers are short-sighted; and it is estimated that 2.5 billion will be affected by myopia by the end of this decade (Dolgin E. 2015). Psychological problems are also linked to the rise of unnatural environment. More than 300 million people live with depression, and the depression rate has increased by more than 18% from 2005 to 2015 (WHO 2017). Moreover, the depression rate appears to be higher in economically more developed cultures (Buss 2000). These are just examples of many problems occurring due to non-natural environment that does not take into account human nature: increasing hearing problems, increasing rates of asthma and allergy, etc.

While these examples are the examples of clearly-manifested ills that unnatural environment brings, this paper concentrates on much more subtle problems that take place in human psychology. The paper clearly demonstrated the successful predictive ability of evolutionary psychology on the factors that influence happiness level and their direction of influence. While some of the factors were intuitively understandable, others' influence are so subtle that it would have been difficult to predict their influence and influence direction and fundamental reasons behind that influence without evolutionary psychology's theoretical approach.

One of the predicted factors is the importance of relationships and social networks. It was clearly found that people who value friends higher, people who value family higher, people in the relationship with significant other, people with children are generally happier. The modernity, though, brought with it increased destruction of friendships and marriage institution, lower birth rate, lower and weaker family ties, destruction of extended families. People in developed countries now are more socially isolated than ever before. Recent survey in the UK in 2017 found that one in eight people do not have close friends, 45% admit to feeling lonely at times,

43% of people living with their partners admit to feeling lonely (Relate 2017). Not only this, unlike the ancestral environment, it is difficult to develop close friendship due to the lack of life-threatening situations (Buss 2000). Most people in the Western world live in small family units between one and four individuals (Hill et al. 2014). Divorce rates are soaring and marriage rates are falling down. According to the Office for National Statistics of Great Britain, since 1950 to 2011 marriage rate has decreased by about 3 times, while divorce rate in the same period has increased by 3.6 times. Children increasingly live in single-mother families, in families with no parents at home, in broken families, etc; despite the obvious fact of children need for love, attention, care of parents. According to the US Census Bureau, in the period of 1960-2016 the children percentage who live with two parents has decreased from 88% to 69%, the share children living only with mother has tripled from 8% to 23%. Rather than living in a large community of extended family, friends and allies, people increasingly live lonely life in large cities with millions of strangers.

Labor working conditions that associate with economic growth are also not satisfactory from human nature perspective. Not only people work long working hours that their Paleolithic ancestors were not used to, but also people work in the high division of labor conditions where fruits of their labor is not seen; whereas in the past people had clear connection to the fruit of their labor. Moreover, worker competition that became global in nature makes people dissatisfied with his or her own abilities, since only handful of people are able to call themselves best at their work, unlike the ancestral environment, where being best at something in a small tribe was much easier and better influenced happiness level (Buss 2000). Large number of people also feels less influential in their working environment, feeling themselves as a small replaceable part in a large structure, which decreases their self-worth perception. Work-related stress and feeling that one's work is meaningless is linked to increased depression and anxiety, which negatively affect happiness level (Maslach et al. 2001).

Increased income's positive influence on happiness is questionable. From the point of individual perspective, income positively influences happiness, expectedly slightly from absolute income increase and much higher from the increase of social status. Both of these have clear explanation from the perspective of evolutionary psychology. However, other factors should be taken into account. First, not everyone can get extra happiness from increased social status:

one's increase in social status is the other's decrease. Thus, no policymaking can use its positive relationship. Secondly, expectedly, the rise of income both relative and absolute requires extra effort and extra alienation from natural environment, both of which are expected to detrimentally affect happiness level. For instance, from Evolutionary Psychology perspective, it remains a big question whether considering all net happiness effects it is actually worth for a woman to leave children of very young age for baby-sitter and work long hours instead of taking care of children, detrimentally affecting mother-child bond. Thirdly, one must also take into account not only positive and detrimental effects from extra income, but also opportunity cost of time that could be used in a much more productive way for an individual's happiness. Thus, increasing time for leisure activities, increasing time spent on friends, children, family and significant others might be more productive from happiness perspective.

The purpose of the paper is not to exaggerate the importance and predictive power of genes and our nature on human behavior and human happiness nor is the paper against economic growth and development. There is no illusion on the presence of detrimental factors that affected human lives in the Paleolithic era, nor does the paper deny many benefits of modernity that economic, technologic and scientific growth has brought. Rather than that, paper suggests "natural development", similar to "green development" for countries, with work-life balance, family and social engagement, with more natural lifestyle.

8 Conclusion

This paper used the admixture of current Psychology science's theoretical approaches and Economic science's quantitative approach on the analysis of the influence of different factors on the happiness level of an individual. Specifically, the paper used Lyubomirsky's et al. (2005) Set Point theory and evolutionary psychology's theoretical approach in order to conduct fundamental analysis of happiness and its influencing factors. Evolutionary psychology's theoretical approach demonstrates huge success in its predictive ability on the sign of correlation and its economic significance for factors that influence happiness. Not only this, theoretical explanation on the nature of influence can be referred as highly reasonable.

The paper demonstrates the positive correlation of relative and absolute income with happiness level. Relative income in terms of social status is economically more significant than absolute income in terms of the influence of GDP (PPP) per capita (long-term influence) and previous year's GDP (PPP) per capita growth rate (short-term influence). However, despite its positive influence on happiness level, when considering the net effects of absolute income growth and discords that are connected with it, the positive influence of increased absolute income is not as obvious and necessarily the case. Evolutionary psychology's theoretical approach might be used as a tool to better estimate the influence of increased absolute income on happiness level of an individual.

The paper acknowledges the power of the evolutionary psychology's theoretical approach that could be used to further improve economic science. Not only it might potentially be useful in happiness economics and behavioral economics, but also it might potentially be useful in the construction of better-adjusted to reality microeconomic models of consumer behavior, game-theoretic models, etc.

The paper suggests implementing policies that takes into account human nature and uses it for the purposes of further increasing humanity's prosperity and well-being. The paper proposes "natural development" of an individual, so that an individual should not only concentrate on income growth, but also on work-life balance, family and social engagement and generally more natural lifestyle that is beneficial from the terms of individual utility maximization standpoint.

As a recommendation for further research this paper suggests analyzing longitudinal data on happiness using the similar methodology used in this paper. Apart from this, the paper also suggests including climate deviation factors from the Pleistocene environment as additional variables to analyze the climate factor influence. The paper also suggests preparing and analyzing data with ready instrumental variables to better estimate the coefficients.

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