RESEARCH

Economic growth and subjective well-being: analyzing the formative mechanism of Easterlin Paradox

Lulu Li and Lei Shi[*]

* Correspondence:
shilei2014@ruc.edu.cn
Department of Sociology, Renmin
University of China, Beijing, China

Abstract

In this paper, we investigate the formative mechanism of the Easterlin paradox in China using 2010 Chinese General Social Survey (CGSS) data. By establishing a multi-factor, multi-level dynamic framework, we unveil the formative mechanism of the Easterlin paradox. The impact of multiple factors on subjective well-being and the influence of micro-level individual factors conditional on macro-economic development were analyzed. We find that with economic growth, on the one hand, material needs upgraded to enjoyment needs, and the return to well-being from material conditions decreased. On the other hand, the intensity of social inequality triggered relative deprivation, offsetting the return from economic growth. Therefore, subjective well-being stagnated, instead of increasing with economic growth.

Keywords: Easterlin paradox, Subjective well-being, Economic growth, Social inequality

Introduction: the Easterlin paradox

Since the 1950s, the study of subjective well-being (SWB) has become a theoretical focus of academic research across the world. A large body of research has emerged in various disciplines including psychology, economics, sociology, and political science (Wilson, 1967; Brickman and Campbell, 1971; Diener et al. 1995; Easterlin, 1974, 1995, 2001, 2012; Bjørnskov et al. 2008; Di Tella and MacCulloch, 2005, 2008; Madden, 2011; Sacks et al. 2012; Stevenson and Wolfers, 2013). Employing distinct disciplinary perspectives and theoretical frameworks, scholars recognized the heterogeneity of individuals and extensively studied the factors affecting SWB. On the one hand, these works have made significant progress towards revealing the secrets of happiness, enriching and diversifying the study of SWB. On the other hand, some debates regarding this issue remain open, and among these the most typical is the happiness paradox, or the Easterlin paradox (Easterlin, 1974), formulated by American economist Richard Easterlin.

In a cross-country comparative study using data from the USA and 11 other countries, Easterlin found that, first, within countries, richer individuals reported higher SWB compared to poorer ones. Second, across countries, there was no significant difference between the average SWB of rich and poor countries. Third, longitudinally, the development of the national economy did not increase individual SWB (Easterlin, 1974). The Easterlin paradox incorporates micro- and macro-propositions. The

micro-proposition focuses on the effect of individual income on SWB and concludes that individual income increases SWB significantly. The macro-proposition concerning the effect of national economic growth on SWB suggests that national economic growth does not necessarily increase SWB (Easterlin, 1974).

The Easterlin paradox has stirred academic interest to study SWB in Western Europe, Japan, and many other countries. It is surprising that although these countries differ in historical tradition, culture, political system, natural environment, and economic development, they have all experienced the SWB phenomenon described by the Easterlin paradox (Easterlin, 1995; Clark et al. 2008; Xing, 2011; Walsh, 2012).

However, some empirical studies have raised questions about the Easterlin hypothesis, mainly regarding cross-country comparative evidence and longitudinal effects. In terms of the former, Veenhoven and his colleagues found that in rich countries, SWB is much higher than that in poor countries, and the correlation between per capita GNP and SWB is as high as 0.84 (Veenhoven, 1991). Studies by Diener and colleagues also suggested a significant association between national wealth and SWB (Diener et al. 1995; Cummins, 1998; Myers, 2000; Deaton, 2008; Stevenson and Wolfers, 2008; Sacks et al. 2012). In terms of longitudinal effect, Veenhoven studied many developing countries including India, South Korea, the Philippines, Egypt, Nigeria, South Africa, Mexico, and Brazil, and found that the SWB in these countries had increased significantly over the past 50 years (Veenhoven and Hagerty, 2006). A study using the 2003–2010 Chinese General Social Survey (CGSS) showed that in the past 10 years, despite heightened inflation (as indicated by the CPI), the association between individual absolute income and SWB has always been positive (Liu et al. 2012), casting doubt on the Easterlin paradox.

In response to these doubts, Easterlin revised his theory. Drawing on studies of transitional countries including Eastern Europe, South Korea, and Chile, he suggested a U-shaped pattern of the association between economic development and SWB. Though in the short term, the average SWB trend is positively correlated with economic development, in the long term, economic development has limited effect on SWB (Easterlin et al. 2010). The revised Easterlin paradox is more convincing for its emphasis on the time threshold.

Similarly, Easterlin's study about China suggested that the SWB of Chinese residents had started increasing slowly after a decrease throughout the 1990s and hitting the bottom in 2000–2005. Therefore, the revised Easterlin paradox, which applies widely to Western developed countries, also fits the Chinese reality, although it has taken longer to manifest itself. Many empirical studies have supported this conclusion (Kahneman and Krueger, 2006; Inglehart et al. 2008; Brockmann et al. 2009; Knight and Gunatilaka, 2011; Li and Rain, 2014; Wu, 2016).

Debates about the Easterlin paradox have focused on two perspectives. First, does the Easterlin paradox exist? If so, to what extent, and where? As summarized above, this debated has been settled. The Easterlin paradox has been broadly observed for a relatively long time period. Second, what causes the Easterlin paradox and how should we understand it? This is the focus of this paper. We analyze the formative mechanism of the Easterlin paradox using Chinese data, attempting to unify different facets of the Easterlin paradox in order to advance research about SWB.

There is a large body of research about the formative mechanism of the Easterlin paradox. We do not describe it in detail here. However, while multiple attempts have been made to explain the Easterlin paradox, reaching consensus has been challenging

because most existing theoretical explanations are monofactor, static, and divided between micro- and macro-levels. Proposing a dynamic multi-dimensional research framework, this paper analyzes SWB at multiple levels in a multifactor, longitudinal, and comprehensive manner. We seek to speed up research about the formative mechanism of the Easterlin paradox through this new framework.

Literature review

Under the impact of utilitarianism, classical economics, and welfare economics, economists have long regarded well-being as the ultimate accumulation of wealth. Individual well-being results naturally, it has been thought, from material richness. However, scholars have casted doubt on this prediction. Following the emergence of evidence that supports the Easterlin paradox, scholars from many fields started reflecting on the relation between economic development and subjective well-being and try to shed light on the formative mechanism of well-being paradox. The existing theoretical attempts to explain the Easterlin paradox have proceeded along two paths, as summarized in Fig. 1.

Internal psychological mechanism

The first path attributes the Easterlin paradox to individual internal psychological mechanism, arguing that economic development does not lead to an improvement in subjective well-being because of some innate psychological factors. This perspective can be further divided into direct and indirect mechanisms.

Indirect psychological mechanism

The indirect psychological mechanism perspective argues that economic development induces changes in intermediate factors, and these intermediate factors further trigger some psychological mechanisms that lessen the improvement of subjective well-being.

The relative income hypothesis formulated by Duesenberry and adapted by Easterlin as a potential formative mechanism for the well-being paradox is representative of the indirect psychological mechanism. The relative income hypothesis points out that an individual's sense of well-being is not determined by income level, but instead on the level of relative income, since it is common for people to compare themselves to others. On the one hand, SWB increases as income level increases. On the other hand, universal increase of income means a lack of relative increase at the individual level. As a result, individuals do not perceive their income as increasing. This serves to explain why a rapidly developing national economy does not result in an improvement to SWB (Easterlin, 1974; Asadullah et al. 2016).

Fig. 1 Two paths to explain the Easterlin paradox
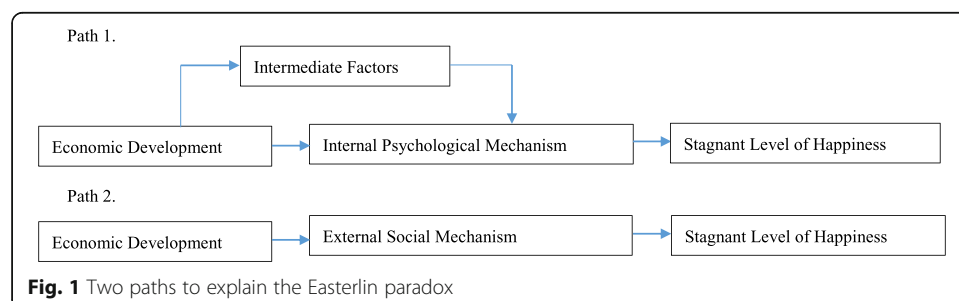
Veenhoven and others cast doubt on the Easterlin paradox, as well as the relative income hypothesis. Veenhoven advances three critiques,[1] suggesting that an individual's SWB is based on the satisfaction of human needs, a natural and absolute emotion not affected by the relative standard (Veenhoven, 1991). Many scholars supported this critique (Diener et al. 1993; Bjørnskov et al. 2008; De Tella et al. 2003; Di Tella and MacCulloch, 2008; Madden, 2011; Sacks et al. 2012; Stevenson and Wolfers, 2013).

There is also a debate about the relative income hypothesis in China-based studies on SWB. Some scholars suggested a significant positive impact of relative income on individual SWB, while the effect of absolute income on SWB could be strengthened or weakened with based on increases of the reference group's income, thus supporting the relative income hypothesis (Knight, 2014; Guan, 2010; Zhang and Cai, 2011; Asadullah et al. 2016; Li, 2016).

However, other empirical research has raised questions about the relative income hypothesis. Luo's study found that absolute income has a significant positive effect on SWB even after controlling for relative income (Luo, 2009). Liu and others also suggested a stable positive impact from individual's absolute income on SWB (Liu et al. 2012; Bian, Xiao, 2014; Bian et al. 2015).

Besides critiques from Veenhoven and other scholars, the relative income hypothesis suffers from its own logical deficiency. If the relative income hypothesis holds true, there exists an irreconcilable contradiction between a nation's economic development and its citizens' SWB. Diachronically, it then seems impossible to increase SWB. This contradicts the revised Easterlin paradox. The fundamental cause of this problem is the relative income theory's failure to consider the conditional effect of macro-level economic development on the micro-level mechanisms that influence citizens' SWB. Consequently, relative income hypothesis fails to establish a complete logical structure that incorporates both macro- and micro-results, and falls to the extreme that the SWB can never increase.

Moreover, there are methodological flaws in some studies that examine the impact of relative income on SWB. For example, relative income is not appropriately measured. Relative income should be measured by the objective difference or ratio between individual income and the income of the reference group, instead of subjective evaluation.[2]

Direct psychological mechanisms

The direct psychological mechanisms, represented by adaptation theory and saturation theory, emphasize the direct impact of individual psychological factors on the Easterlin paradox. Adaptation theory posits that one's mental state adjusts itself when external stimulation changes, so as to adapt to the new environment, thus maintain the subjective emotion at a relatively stable level.

According to the logic of adaptation theory, psychologists proposed two specific theories for SWB research—hedonic treadmill theory and set-point theory. Hedonic treadmill theory (aspiration theory) suggests that as income increases, the individual's material desire also increases. As a result, the individual gradually becomes accustomed to their higher income, and the degree of SWB due to increases in income will decrease (Brickman and Campell, 1971; Knight, 2012; Tsutsui and Ohtake, 2012).

Set-point theory posits that factors including genes, personality, and disposition determine the individual's fixed baseline of happiness. When the external environment

and life events change, the individual's SWB will fluctuate around this baseline. However, when the emotion system adjusts itself to the new circumstances, SWB will return to the baseline. Therefore, the so-called happiness or lack of happiness is only a temporary emotional response (Lykken and Tellegen, 1996; Cummins, 2011).

Adaptation theory provides a possible explanation for the Easterlin paradox according to the individual's direct psychological mechanism, but it suffers from several shortcomings. First, it suffers from the fallacy of individualism and deems that individual SWB can only be improved by micro-level adaptation. Second, adaptation theory lacks empirical support due to the difficulty of tracking and measuring the individual's mental state in the long-term, and the inability to tease out the impact of other environmental factors on individual mental changes. Third, though adaptation theory provides a new analytical perspective from beyond the economic framework, it still suffers from shortcomings of monofactor analysis.

In addition to adaptation theory, another popular direct mechanism is happiness satiation point theory. This theory posits that income impacts on SWB are subject to the rule of decreasing marginal utility. When the marginal utility of income becomes zero, the individual reaches the happiness satiation point and then income has no effect on individual SWB (Diener et al. 1993; Diener and Biswas-Diener, 2002; Clark et al. 2008; Proto and Rustichini, 2013; Liang and Shen, 2016). Similar to happiness satiation theory, income threshold theory also suggests the existence of an income threshold beyond which any increase in income will not affect the individual's SWB (Layard, 2003, 2005; Diener and Seligman, 2004; Di Tella and MacCulloch, 2008).

Based on the basic economic assumption of decreasing marginal utility, happiness satiation point theory and income threshold theory attempt to explain the longitudinal effects of the Easterlin paradox at the micro level. However, this explanation has several flaws. First, it is a stretch to use this micro individual-level theory to explain the macro-level phenomenon observed in the Easterlin paradox. Second, if we extend the logic of happiness satiation theory to the macro level, the association between economic development and SWB should be an inverted U-shape or inverted L-shape, contrary to the U-shape or wave-like shape suggested by Easterlin and others (Easterlin et al. 2010, 2012; Ma and Zhang, 2014). Third, just like relative income theory and adaptation theory, happiness satiation theory is also single-factored.

In general, the mechanisms in path 1 both incline to a pessimistic, predeterministic theoretical orientation (Qiu and Li, 2012), suggesting that the innate psychological mechanism fixes the SWB at a certain level and any socio-political effort is in trivial.

External social mechanism

Unlike path 1, path 2 considers the direct effect of economic development, rather than individual psychological factors, on SWB. This perspective suggests that macro-level economic development itself can increase SWB. That is, the higher the level of economic development, the higher the SWB. However, in the process of economic development, social changes induced by economic development constrains increase in individual SWB. For example, omitted variables theory posits that though income growth can lead to an increase in SWB, other factors accompanying increased income, including longer work hours and poorer health outcomes, would lower the utility of income growth.

Diener and Seligman's study found that with the accumulation of national wealth, changes in the level of well-being are increasingly dependent on non-economic factors, including social capital at the societal level, degree of democracy of the government, rights of the citizen, satisfaction with work (Diener and Seligman, 2004). Di Tella and MacCulloch (2008) incorporated non-economic factors including leisure and crime rates into the model when they studied SWB in 12 OECD countries. Their results show that the "disconnection between income growth and increased happiness" paradox intensifies when non-economic factors are incorporated. Other scholars have also described the impact of other factors on SWB, including social capital, environmental pollution, working hours, marriage, employment status, social security, and urbanization (Helliwell and Putnam, 2004; Di Tella et al. 2003; Bjornskov et al. 2005; Dockery, 2005; Graham, 2006; Hudson, 2006; Chan and Yao, 2008; Smyth et al. 2008; Welsch, 2006; Luttmer, 2005; Pouwels et al. 2008).

Omitted variable theory broadens the horizon of SWB studies and introduces new perspectives to explain the Easterlin paradox. However, this theory is also imperfect. First, while omitted variable theory attempts to explain the Easterlin paradox using non-economic factors that may affect SWB, it is detached from the theoretical framework of the Easterlin paradox, leading to fragmented studies. Second, compared with the internal psychological mechanism, it is harder for omitted variable theory to find a universal formula given the uniqueness and complexities of different countries and regions. Third, though omitted variable theory shows a tendency of conducting multi-factor analysis, most studies employ a static analytical framework because of difficulties to figure out the relationship between various factors and economic development as well as income growth. Therefore, omitted variable theory fails to provide a reliable explanation for the trends of SWB observed in the Easterlin paradox.

In sum, the existing explanations for the formative mechanism of the Easterlin paradox suffer from the following shortcomings:

First, existing approaches offer only a static and single-factor explanation. Prior theories have failed to completely uncover the formative mechanism of the Easterlin paradox because they more or less neglect the historical and societal context in which the paradox rises. While the relative income hypothesis attributes the Easterlin paradox to income, the adaptation theory associates it with psychological factors, masking the fact that SWB is induced by mechanisms at multiple levels. Consequently, much variation remains unexplained. Although omitted variable theory provides an opportunity for a multi-factorial analysis of SWB, it has yet to spell out the dynamic process by which various factors change with macro-level economic development, as well as their corresponding relationship with individual income increase. Therefore, it hardly provides a reasonable explanation for the dynamic trend of SWB observed in Easterlin paradox.

Second, micro and macro mechanisms have been separated. As mentioned above, the Easterlin paradox includes a macro-level proposition that focuses on the impact of national economic development on SWB, and a micro-level proposition that looks at the association between individual income increase and SWB. These two lines of inquiry may reach contradictory conclusions, but it is hard to deny the correlation between national economic development and individual income, which is a precondition for the existence of the Easterlin paradox. Therefore, if we want to explain why the formation of the Easterlin paradox, we cannot ignore the conditional effect of macro-economic

development on the micro-level mechanisms that impact SWB. The existing explanations for the Easterlin paradox either discuss the macro-level results by examining the micro-mechanism, like relative income, adaption theory, and saturation theory in pathway 1, or analyze only the macro-level variables and ignore the micro-level results, like the discussion about unemployment rate and inflation in the omitted variable theory. These two perspectives both separate micro- and macro-level mechanisms, instead of establishing a logical structure that incorporates both.

To address the shortcomings of existing research, this paper employs a multi-factorial, multi-level dynamic framework. We try to establish a logical chain to provide a relatively comprehensive explanation for the Easterlin paradox by studying multi-dimensional factors as well as micro- and macro-mechanisms, while simultaneously conditioning the micro-level mechanism on the macro environment in a comprehensive multi-dimensional analytical framework.

Analytical framework and working hypotheses

Three basic societal variables

After World War II, the improvement of material wealth as a result of economic growth and wealth accumulation in western capitalist countries disguised serious social problems. In 1958, Galbraith's reflection on the affluent society demonstrated the academic critique of materialism and the blind pursuit of GDP, while also advocating for happiness and quality of life. Against this background, the study of SWB proliferated throughout the 1960s (Galbraith, 1965: 68).

Similarly, since the end of the 1970s, China's modernization accelerated. After becoming the second largest economic entity in the world, China started striding towards becoming a high-income country. As material wealth improved, the immediate need of most Chinese families went beyond basic survival and transitioned to higher-level needs (Zhang, 2016). However, income inequality intensified; an unpleasant side effect from 40 years of high growth. The most updated statistics from the National Statistical Bureau show that the China's Gini coefficient was as high as 0.465 in 2017, indicating that the social inequality is pretty high in China.[3]

In sum, both the historical origin of the Easterlin paradox and the Chinese temporary context reveal two concomitant effects of rapid economic growth. First, at the micro level, affluent material life drove individuals from basic material needs to developmental needs. Second, because of the unequal distribution of new wealth, societal income gap keeps widening, resulting in serious social inequality. We summarize the economic growth and its two concomitant effects into three basic societal variables: macro-economic development, the transition of individual needs, and the intensification of social inequality. We argue that these three fundamental variables and the interaction among them form the basis of the Easterlin paradox in China and other regions. They fundamentally determine the pattern and internal logic of changes in SWB.[4]

Multiple factors affecting SWB

The above three basic social factors form the three dimensions by which we analyze SWB. The first dimension is the macro-economic factor, i.e., the economic development level of the nation. Economic development not only leads to growth in personal income, but also

contributes to improving the provision of public resources—such as education, healthcare, and social security—and the construction of infrastructure including housing, transportation, and energy. These form the essential material foundation for a nation's survival and development. Economic development also allows for occupational diversification, boosts employment rate, satisfies safety needs, improves individuals' sense of pride and confidence, and thus increases SWB. This in turn leads to the first hypothesis.

Hypothesis 1: Macro-economic development has a significant positive impact on individuals' SWB. The higher the level of economic development, the higher the SWB.

The second dimension is micro-level individual factors. SWB, which results from individual needs, is fundamentally emotional and cognitive. SWB reflects individuals' cognitive evaluation or emotional response to the satisfaction of their needs.

Human needs are diverse but not disordered. Systematic psychological research has found human needs to be hierarchical. (Lewin, 1936; McClelland and Clark, 1949; Alfderfer, 1972). Humanistic psychologist Maslow went a step further to classify needs into five hierarchies including physiological needs, safety, love/belonging, esteem, and self-actualization, building up a systematic and comprehensive theory of the hierarchical needs (Maslow and Green, 1943).

From a developmental perspective, scholars classified human needs into survival needs, development needs, and transcendence needs (Marx, 1961; Mo, 2013; Zhang, 2016). Survival needs refer primarily to needs related to the satisfaction of basic material conditions; personal development needs refer to the needs for spiritual development and enjoyment after basic material needs have been satisfied; and transcendence needs are derived needs, meaning, similar to self-actualization in Maslow's hierarchy, the pursuit of ideal human preferences such as truth, beauty, and kindness.

The variety of needs results in the multivariate and comprehensive feature of factors affecting SWB. The hierarchical nature of needs means factors affecting SWB are weighed differently at different levels. According to the Stolper-Samuelson theorem,[5] factors that satisfy individuals' current needs are more important to result in happiness. When individual needs are mainly material, factors related to material wealth are relatively important factors affecting SWB, while when individuals' immediate needs become developmental, the relative importance of material factors in improving their happiness decreases. Consequently, quality of life, which is related to enjoyment and personal development, becomes more important in improving one's happiness. Thus, we have our second hypothesis.

Hypothesis 2: Material condition has a significantly positive effect on SWB. The better the material condition, the higher the SWB. Quality of life has a significantly positive effect on SWB. The better the quality of life, the higher the SWB.

The third dimension is social structural factor, i.e., social inequality. Since the 1990s, studies of SWB gradually transitioned from micro-level individual behavior to macro-level social circumstance. Mainstream studies scrutinized the relationship between income and SWB from a collective perspective. Unlike studies of individualism, supporters of collectivism shifted attention from micro-level income changes to the degree of concentration of material wealth among members of society, asking how the structure of inequality affected SWB (Huang, 2016).

Two competing views exist about how the structure of social inequality affects SWB. On the one hand, a large income gap will decrease SWB. Sociologist Runciman posits

that relative deprivation is sensed when individuals are disadvantaged compared to the reference group. When income becomes the subject of comparison, the increase in the income gap will no doubt lead to relative deprivation, negatively affecting SWB (Runciman, 1972).

On the other hand, another view suggests that an increase in income inequality will improve SWB instead of decreasing it. Economist Hirschman proposed the tunnel effect theory to explain the positive effect of income inequality on SWB (Hirschman and Rothschild, 1973).[6] This theory suggests that individuals will have an optimistic expectation of income level when income increases for people surrounding the individual, thus improving SWB. Evidence from transitioning countries, including Russia and those in Eastern Europe support this theory (Caporale et al. 2009).

Therefore, we have these competing hypotheses:

Hypothesis 3.1: Income gap has a significant negative effect on SWB. The bigger the income gap, the lower the SWB (relative deprivation hypothesis).

Hypothesis 3.2: Income gap has a significant positive effect on SWB. The bigger the income gap, the higher the SWB (positive tunnel theory hypothesis).

The conditional effect of macro- and micro-factors and dynamic analysis

The three basic social aspects on which Easterlin hypothesis is based suggest that factors in these three dimensions are not isolated. In terms of the relationship between factors at the macro-economic level and at the micro-individual level, economic development increases the material conditions, causing individual needs to transition from survival needs to developmental and enjoyment needs. Based on the theory of hierarchical needs, when lower level needs are satisfied, an individual's immediate needs will move up to a higher level. As a result, the reward of satisfying higher level needs on one's happiness increases while that of satisfaction of lower level needs on happiness decreases.

Needs are an important foundation and source of SWB. If an individual's needs increase, the micro-dynamics that influence their well-being will also change. Improvement of material condition will lead to higher SWB when material needs are dominant. When material needs are satisfied and individual needs shift upward to development and enjoyment, the utility of the increase in material conditions will attenuate, while the factors related to development and enjoyment like entertainment will significantly increase SWB. Corresponding to the Stolper-Samuelson theorem discussed above, we describe the effect of micro-individual factors on SWB conditional on macro-economic development as the following: with the development of the macro-economy, the relative importance of material wealth decreases, and that of developmental factors increases. The mechanism by which an individual's return to well-being shifts from socio-economic status to quality of life. Therefore, we have the fourth hypothesis.

Hypothesis 4: With the development of the economy, the positive effect of quality of life on SWB increases while the positive effect of material condition attenuates.

Macro-economic factors and social structural factors are also closely related. Economic development means not only an increase of the total economy, but also modernization. Modernization theory posits that industrialization will lead to a series of social changes including upgrades to occupational and industrial structures, shifts in division of labor, and universal education. These changes improve social mobility and opportunity to move upwards. The opening of social opportunity structure equalizes

the attainment of resources and promotes optimistic expectations of the future, attenuating the negative effect of relative deprivation and leading to the tunnel effect. Therefore, the ongoing development of the macro economy will improve the openness of the opportunity structure and increase the return to well-being from social inequality.

However, social closure theory, in contrast to modernization theory, posits that the advantaged class will utilize their advantage over resources and opportunities to maintain class privilege (Weber, 2005). Based on social closure theory, the social structure will become rigid through various channels of social reproduction. Raftery and Hout (1993) studied the distribution of educational opportunities in the process of educational expansion and found that advantaged groups utilize their economic, social, and cultural advantages to monopolize new opportunities generated through educational expansion, leading to permanent education. Their theory is termed maximally maintained inequality (MMI). Based on these theories, we infer that, although the development of the macro economy creates new mobility opportunities, the opportunity structure will become increasingly rigid because of social closure and exclusion. Consequently, the tunnel effect is stemmed and the relative deprivation between social classes will intensify, decreasing the return to well-being from social inequality. Therefore, we can have the following competing hypotheses:

Hypothesis 5.1: The development of the macro economy will increase the return to well-being from social inequality (modernization theory hypothesis).

Hypothesis 5.2: The development of the macro economy will decrease the return to well-being from social inequality (social closure hypothesis).

Data and methods

Data

We used data from the 2010 China General Social Survey (CGSS). The CGSS uses multi-level probability sampling, drawing from 100 townships, 480 villages/residential councils from all provinces (or equivalent units), and 25 families from each residential council. A KISH table was then used to draw one individual from each family. The obtained sample size is about 12,000.

Variables

Dependent variable

The dependent variable of this analysis is the level of SWB. Respondents were asked if, in general, they think they have a happy life. The options include "very unhappy," "somewhat unhappy," "between unhappy and happy," "somewhat happy," and "very happy." The question is a Likert scale, with 1 assigned to "very unhappy" and 5 "very happy."

Independent variables

The key independent variables for this analysis fall into four categories: economic development, socio-economic status, quality of life, and social inequality. Economic development is the level of national economic development. Following the convention of previous studies, we operationalized economic development as the gross domestic product per capita (GDP per capita). Due to the lack of longitudinal data, it was difficult to use cross-sectional GDP per capital to model the long-term change of economic

development. We utilized regional variation in economic development across the country to simulate historical changes, using GDP per capita of 100 counties or county-level cities in the 2010 CGSS as the indicator for economic development. The vast territory of China and regional inequality justifies this synthetic approach.

Socioeconomic status is a comprehensive measurement of the individual's social and economic standing, a rather accurate reflection of an individual's relative structural position in the society (Li, 2005). We include two variables to indicate the socioeconomic status: income and educational attainment. The income variable is the log of the absolute value of income throughout a year, and the educational attainment variable is the number of years of education.

Because quality of life in this analysis emphasizes the spiritual enjoyment, we used two variables—frequency of participating in high-quality entertainment activities and expenditure on cultural entertainment—to measure quality of life.

Based on the existing index, high quality of entertainment can be measured as the frequency of attending concerts, exhibits, and performances in the past year. The score ranges from 1 to 5, with 1 assigned for "never," 2 for "a handful of times or less," 3 for "a couple times every month," 4 for "a couple times every week," and 5 for "every day." Respondent's reported expenditure on cultural entertainment in the past year is logged in the analysis.

Social inequality is measured as the Gini coefficient in 2010 in sampled townships and cities, calculated with Stata.

In addition, we include control variables including sex, party affiliation, age, marital status, ethnic group, and *hukou* status in the regression model. Table 1 shows descriptive statistics for the variables.

Models

The sample used in this analysis spans two levels: micro-level individual characteristics and macro-level national economic development. Based on the study framework, regional economic development improves the material condition for people in that region, changes the relative importance of various factors in affecting SWB, and intensifies social inequality. Because micro-level factors are embedded in macro-level factors, we use a hierarchical linear model (HLM) to investigate the influence of social and individual level factors, and the effect of micro mechanism, conditional on economic development, on SWB. We conduct the following calculation for the two levels:

Level 1:

$$Y_{ij} = \beta_{0j} + \sum_{k=1}^{p} \beta_{kj} X_{kij} + r_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} W_j + \mu_{0j}$$
$$\beta_{kj} = \gamma_{k0} + \sum_{k=1}^{p} \gamma_{k1} W_j + \mu_{kj}$$

The hierarchical mixed effect:

Table 1 Descriptive statistics

Variable	Mean	Std. Deviation	Coding
Subjective well-being	3.78	0.88	Min = 1, max = 5
Socioeconomic status			
Educational attainment	8.39	4.84	Min = 1, max = 19
Log of income	8.35	2.97	Min = 0, max = 14.85
High quality of entertainment	3.43	1.73	Min = 2, max = 10
Log of expenditure on cultural entertainment	1.9	1.56	Min = 0, max = 11.51
Gini coefficient	0.43	0.84	Min = 0.25, max = 0.76
County GDP per capita	3.66	2.3	Min = 1, max = 5
Sex	0.49	0.5	Female = 0, male = 1
Age	47.76	15.68	Min = 19, max = 98
Squared age/100	27	15.68	Min = 4, max = 92.16
Marital status	0.86	0.35	Single = 0, married = 1
Religious belief	0.13	0.33	Not religious = 0, religious = 1
Ethnicity	0.91	0.29	Ethnic minority = 1, Han ethnic = 1
Party membership	0.13	0.34	Not party member = 0, party member = 1
Hukou status	0.47	0.5	Rural = 0, urban = 1

$$Y_{ij} = \gamma_{00} + \gamma_{01} W_j + \mu_{0j} + r_{ij} + \sum_{k=1}^{p} \left(\gamma_{k0} + \gamma_{k1} W_j + \mu_{kj} \right) X_{kij}$$

where X_k represents explanatory variables at the micro level, including educational attainment, income, entertainment, and cultural entertainment expenditure. W_j represents macro-level explanatory variables, such as GDP per capita in the county.

Table 2 shows the decomposition of the variance of SWB from the intercept-only hierarchical model.

Within-group variance is 0.858 and between-group variance is 0.208 with a chi-square value of 460.42 ($p < 0.001$). This suggests that there is considerable variation of SWB between counties. According to the composition of variance, the calculation indicates that regional and individual variation accounts for 19.49% and 80.51% of the total variation respectively, meaning the difference in SWB across areas accounts for 19.19% of total variance. We conclude that HLM is appropriate for the analysis.

Analytical strategy and findings

We constructed a dynamic, multi-factorial, and multi-layered framework to examine the mechanism of the formation of the Easterlin paradox in China based on the three basic social factors. To simplify the analysis, we first examined the micro-level

Table 2 Decomposition of variance of SWB

Fixed effect	Coefficient	Standard error			
Subjective well-being	3.785	0.021			
Random effect	Variance	% in variance	Std. error	Chi-square	p value
Level 1 (between individuals)	0.208	19.49%	0.016	460.42	0
Level 2 (between counties)	0.858	80.51%	0.006		

mechanism of individual SWB against the backdrop of the transition of needs. And we analyzed the mechanism of the formation of the Easterlin paradox by investigating the effect of micro-mechanism conditional on macro-economic development. Second, we examine how the intensifying social inequality affects individual SWB. We included social inequality into the greater dynamic background to study whether the mechanism by which social inequality affects SWB changes with the economy. The results are presented in Table 3.

In Table 3, model 1 is the baseline model, including variables about macro-economic development, socioeconomic status, quality of life, and social inequality. The results of our regression show significance in the effects of GDP per capital, at the macro level, lending support to hypothesis 1, which expects economic development to boost SWB. At the micro level, educational attainment, absolute individual income, frequency of participating in high-quality entertainment, and expenditure on cultural entertainment, supporting hypothesis 2, which states that SWB improves with material condition and quality of life. Improvement to material condition and life of quality can significantly improve SWB, supporting hypothesis 2.

Table 3 Three basic social factors and subjective well-being, $N = 9102$

Variable	Model 1	Model 2	Model 3	Model4	Model5
Micro-level variables					
Intercept	4.025***	3.851***	4.003***	3.634***	3.470***
Education	.020***	.028***	.019***	.019***	.028***
Income (log)	.018***	.029***	.018***	.018***	.029***
High quality entertainment	.023+	.023+	.019	.023+	.010
Expenditure on entertainment (log)	.023***	.024***	.031***	.023***	.026***
Social inequality variables					
Gini coefficient	− .100	− .099	−.092	− .041	− .070
Macro-level variables					
GDP per capita	.018+	.058**	.009+	.083**	.134***
Interaction terms					
Education* GDP per capita		− .003*			− .003*
Income* GDP per capita		− .003*			− .003*
High entertainment* GDP per capita			.001		.000
Exp. on cultural entertainment* GDP per capita			.002		.001
Gini coefficient* GDP per capita				− .184**	− .190**
Control variables					
Sex	.094***	.097***	.094***	.094***	.097***
Age	− .039***	− .039***	− .039***	− .039***	− .039***
Age squared/100	.001***	.001***	.001***	.001***	.000***
Marital status	.264***	.262***	.264***	.264***	.262***
Religious belief	.024	.025	.024	.025	.025
Ethnicity	− .068+	− 0.070+	−.067+	− .066+	− .070+
Party membership	.122***	.125***	.121***	.121***	.124***
Hukou status	− .066*	− .072*	− .068*	− .067*	− .073*

Notes: +$p < 0.1$, *$p < −.05$, **$p < 0.01$, ***$p < 0.001$

The Gini coefficient that measures social inequality did not pass the significance test, meaning social inequality does not have a significant effect on SWB. Hypothesis 3.1 and 3.2 were not supported. What noteworthy, however, is the negative value of the Gini coefficient's effect size, indicating lower SWB as social inequality intensifies.

Models 2–4 show the effect of socioeconomic status, quality of life, and social inequality conditional on macro-economic development. Model 5 is the full model. The results suggest that for socioeconomic status, economic growth attenuates the positive effect of educational attainment and absolute income on SWB. Therefore, as with economic growth, the positive effect of educational attainment and income on SWB decreases. In terms of quality of life, the interaction effect between GDP per capita and high-quality entertainment frequency as well as the interaction effect between GDP per capita and expenditure on cultural entertainment had positive effects, but the effects were not significant. This suggests that the impact of high-quality entertainment and expenditure on cultural entertainment on SWB is not affected by economic development, partially supporting hypothesis 4. For social inequality, there was a significantly negative effect of the interaction between GDP per capita and the Gini coefficient. As with economic growth, the negative effect of income gap on individual' SWB increases, supporting hypothesis 5.2. Importantly, the coefficients for GDP per capita and the interaction term between GDP per capita and Gini coefficient were 0.134 and − 0.19 respectively, meaning social inequality offsets the positive effect of economic development.

Moreover, the control variables show that being male, married, a Communist Party member, and city resident are associated with higher SWB. A U-shaped relationship exists between age and SWB, indicating higher SWB for younger and older individuals, while lower SWB for middle-aged individuals.

Conclusion and discussion

In order to investigate the formation mechanism and a logical explanation of the Easterlin paradox, this paper positioned it against a three-fold background, including macro-economic growth, transition of citizens' human needs, and social inequality. Using data from CGSS 2010, we summarize our findings below.

At the micro-level, improvement to material condition can significantly improve SWB, which is consistent with the micro-level proposition of the Easterlin paradox. The positive effect of quality of life on SWB is also supported. At the macro-level, the development of the regional economy can significantly improve SWB, which contrasts the macro-level proposition of the Easterlin paradox. Thus, findings from this analysis suggest that the stagnation of well-being in the macro-proposition of the Easterlin paradox is not a result of economic development per se.

Then, what has interrupted the positive effect of economic growth on SWB? The effects of the micro-mechanism conditional on macro-level economic growth provide some evidence. The models show that the return to well-being from material condition decreases with economic development, meaning the satisfaction of material needs would gradually lose its utility. As with quality of life, the positive effects of frequency of participation in high-quality entertainment and expenditure on cultural entertainment on SWB were not affected when economic development level increases. When individual needs transitioned from material to enjoyment and development, on the one

hand, the importance of material factors decreases and their return to well-being decreases. On the other hand, when the relative importance of quality of life increases or remains the same, their return to well-being increases.

With respect to social inequality, the results from China show that though social inequality does not have a significant effect on SWB, relative deprivation does exist. The interaction term between social inequality and economic development has a negative effect, which completely offset the return to well-being from economic development. Therefore, although at the beginning of the market transition, the opening up of the opportunity structure spurred optimism about future income, the tunnel effect was not observed. On the contrary, relative deprivation caused by social inequality seriously lowered SWB.

In addition, during the recent decades since the implementation of the economic reform policies, despite the leaps of economic growth and modernization, development has not resulted in the tunnel effect. Instead, it promoted relative deprivation and intensified the negative effect of social inequality on SWB.

In sum, against the backdrop of increased social inequality and upgrades to perceived needs caused by economic development, on the one hand, the increasing need of high life quality attenuated the importance of material wealth to SWB, decreasing its return to well-being. On the other hand, the relative deprivation due to social inequality lowered SWB. These two effects constrained an improvement to SWB and caused it to lag behind the rapid economic growth, thus resulting in the Easterlin paradox.

The findings here are also helpful for understanding the Easterlin paradox in other countries. Studies show that despite variations in historical and cultural traditions and levels of economic development, the factors affecting SWB across countries are similar (Sarracino, 2010). Therefore, conclusions drawn from the studies of the Easterlin paradox in China have certain generalizable explanatory power.

First, unlike relative income theory, adaptation theory and saturation theory, we considered factors affecting SWB as multi-layered and multi-dimensional, thus forming a foundation through which to understand the Easterlin paradox. The multi-factorial and multi-layered paradigm for studying the Easterlin paradox not only responds to the methodological problems such as ecological correlation, reference class, and third variable, that are confronting the studies of the Easterlin paradox, but also approximates reality more closely.

Second, though multiple factors affect SWB at different levels, each factor is of different importance to SWB. More importantly, needs as the foundation of SWB are multi-layered and dynamic. Consequently, factors affecting SWB change with changing needs. This perspective based on the relative importance of factors is more flexible and generalizable compared to other theories. Generally speaking, in the long-term, individual needs progress along a scale following the theory of hierarchical needs. In this process, the relative importance of material factors to well-being decreases. What is worth noticing is that some short-term shocks cause temporary changes in needs and affect the relative importance of these factors. For example, some negative incidences will result in a temporary lack of some resources that influence individual's SWB, thus increasing its relative importance while decreasing the importance of material condition. During this period, though economic growth continues, individuals' SWB may stagnate or even plummet (Ma and Zhang, 2014).

Besides micro-level factors, social structural factors have a significant impact on SWB. Social inequality includes factual inequality and opportunity inequality. Factual inequality is the gap between the better- and worse-off, while opportunity inequality refers to the inequality that arises during the processes of resource distribution and attainment. Though many studies support the tunnel effect, and suggest that social inequality creates conditions for it, this analysis suggests that equality of opportunity and openness of social structure is a prerequisite to the tunnel effect. If the social structure is rigid and closed, inequality is more likely to lead to relative deprivation. In this sense, the higher the level of economic development, the more individuals in the lower rung feel deprived, lowering their SWB.

This study has certain limitations. For instance, the construction of a synthetic longitudinal measure by tabulating regional variation, although shown effective by some studies (Sacks, Stevenson, and Wolfers, 2012), is challenged by others for the possibility that spatial variation may have a smaller effect on SWB than the temporal variation (Zhou and Xie, 2016). Moreover, due to data limitations, there might be inaccuracies in measurement for some variables, which should be addressed by future research.

Endnotes

[1]First, SWB is a sense of satisfaction of one's need and therefore not related to others. Second, the standard of well-being is determined by human needs and is not subject to change; third, the standard for comparison is an imagined, rather than real representation of needs.

[2]In China, many scholars have operationalized relative income as how individual income compares relative to the people surrounding the specific individual. This measures relative deprivation instead of relative income. Relative income, according to Easterlin, can be determined according to the remaining income after subtracting average income in a society from individual income.

[3]Data are from the National Statistical Bureau website (http://www.stats.gov.cn/tjsj/sjjd/201701/t20170120_1456268.html)

[4]Easterlin and his supporters found that in the 1940s to the 1960s, SWB in the USA did not improve with economic development. But they attributed this to the relative decrease in personal income against the increase of average income in society, without considering that with the coming of the affluent society, the micro-mechanism that makes individuals feel happy was transitioning from material wealth to self-actualization needs. Neither did they consider the negative impact of social inequality on SWB.

[5]Stolper-Samuelson theorem can be summarized as when the increases of the relative price of a product leads to the increase of the actual price of the production elements or service required for that product, and the production element or service required for other products will decrease. The high-demanded elements (capital, skill) have higher return in the international division of labor, while the less-demanded elements (raw materials, labor) have lower return.

[6]Hirschman offered an analogy. In a crowded tunnel, despite the fact that a vehicle is not moving, individuals who see adjacent vehicles moving forward will result in individuals in the vehicle being optimistic about possible clearing of traffic and will expect their vehicles to be moving soon.

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