Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Openness, rural-urban inequality, and happiness in China

Yong Ma\textsuperscript{a,∗}, Diandian Chen\textsuperscript{b}

\textsuperscript{a} China Financial Policy Research Center, School of Finance, Renmin University of China, No. 59 Zhong Guan Cun Street, Haidian District, Beijing, 100872, China
\textsuperscript{b} School of Finance, Renmin University of China, No. 59 Zhong Guan Cun Street, Haidian District, Beijing, 100872, China

ARTICLE INFO

JEL classifications:
D63
I31
O15

Keywords:
Financial openness
Happiness
Rural-urban inequality
Trade openness

ABSTRACT

Although the relationship between income inequality and subjective well-being has been extensively discussed in the literature, relatively little is known about the effects of openness on subjective well-being and how rural-urban inequality may influence these effects. This article attempts to address this issue by using the dataset of the China General Social Survey (CGSS). We find that the effect of trade openness on happiness takes an inverted U shape, whereas that of financial openness is U-shaped. We also find that rural-urban inequality has a dampening effect on happiness, and this effect is strengthened by trade openness but weakened by financial openness. These findings extend previous studies on the determinants of happiness by highlighting the different effects associated with trade openness and financial openness and how these effects may interact with rural-urban inequality.

1. Introduction

Since the end of World War II, globalization has arguably been one of the most prominent trends across the world. With this as a backdrop, Asian countries have adopted policies aimed at economic and financial opening to promote economic growth and public welfare. Theoretically, the welfare effect of trade opening is that increased imports help to alleviate income inequality. Researchers find that tradable commodities account for a high proportion of expenditure by low-income households. The implementation of trade opening has lowered the prices of these commodities, thereby reducing the expenditure and increasing the welfare of low-income families (Carroll and Hur, 2020). Also, trade opening increased employment opportunities in the export sector, raising labor force participation rates (Madanizadeh and Pilvar, 2019).

As for the welfare effects associated with financial opening, some studies argue that backward areas can narrow the urban-rural income gap through foreign direct investment (FDI) to develop tourism and other industries for poverty alleviation (Kim and Kang, 2020). It also generates welfare gains in the sense that advanced technologies from foreign investment have spillover effects, fostering economic development in developing countries (Ma et al., 2019). Moreover, opening domestic trade and financial markets can expand choice in commodities and lifestyles as cross-border flows of goods, services, and finance become increasingly convenient. All these improvements in economic freedom and efficiency contribute to improving individual welfare (Rahman and Veenhoven, 2018).

From an empirical perspective, some evidence shows that openness has a positive effect on subjective well-being. For example, Khun et al. (2015) find that people in countries with fewer trade restrictions report a higher degree of life satisfaction. Tsai (2009) provides evidence that subjective well-being improves during the transition from a closed economy to an open one. However, other
studies suggest that openness may not necessarily increase happiness. For example, although studies overwhelmingly argue that openness promotes economic growth (e.g., Chang et al., 2009; Darku and Yeboah, 2018), it remains largely unsettled whether economic growth enhances people's subjective well-being. According to the classic Easterlin paradox (1974), although economic growth and increased income can boost up happiness to some extent, the effects typically are diluted across countries and periods. As documented by Bartolini and Sarracino (2015), in the ten years around 2000, despite substantial growth in the economy, China reported a decline in subjective well-being. This situation is contrary to the intuition that increased absolute income brings happiness. In this regard, the so-called China puzzle demonstrates the Easterlin paradox. To account for this puzzle, Knight et al. (2009) focus on the role of income inequality, instead of absolute income, and propose that relative deprivation caused by an income gap, rather than poverty, captures variations in happiness within a country.

In fact, the effects of openness on poverty and inequality are highly controversial. Policies that bring openness and lower consumer and investment costs produce a redistributive effect on income (Turnovsky and Rojas-Vallejos, 2018), which aggravates job polarization (Lee, 2020). In particular, financial openness usually leads to reductions in the cost of financing activities, from which those with a higher level of income actually gain more benefits (Erauskin and Turnovsky, 2019). This is because financing activities, such as foreign direct investment (FDI) and borrowing are more relevant to the lives of rich people. Nonetheless, meta-analysis indicates that the previous literature generally shows a small negative correlation between financial openness and income inequality (Ni and Liu, 2019).

In recent years, the explosive growth of data has enriched studies on Chinese happiness. For example, Wen et al. (2019) note that among rural migrant workers in urban areas, children are being raised by their parents in their rural home areas. They investigated whether the happiness of these elderly people is being reduced under these conditions and provided inconclusive evidences. Morgan and Wang (2019) use a modified Oaxaca decomposition method and find that improving labor market conditions are the main contributor to rising life satisfaction among urban Chinese over the period of 2002–2012. Han and Gao (2019) show that participation in welfare programs, such as subsistence allowance in rural areas, can raise life satisfaction among recipients. Other determinants of subjective well-being in China include the quality of government, belief in distributive justice, and social values (Huang, 2019; Lim et al., 2020; Liu et al., 2020).

It is noteworthy that, despite the vast literature on happiness, very little is known about how openness affects happiness, because traditionally the opening policy is not regarded as a direct cause of happiness. However, as China becomes more deeply integrated into the global economy, the Chinese people have become wealthier, and materialism has become more popular (Bartolini and Sarracino, 2015). With this as a backdrop, the economic results of the opening policy play an important role in determining happiness. Moreover, the process of economic development creates income distinctions between different social groups, which suggests that the “inequality channel” is very likely to exist. Taken together, as openness can affect happiness through both the wealth channel and the inequality channel, how these two channels might interact with others becomes an interesting question that needs to be studied.

Another issue that is not adequately addressed in the previous literature is the distinction between different dimensions of openness and its implications for the openness-happiness nexus. Recent studies suggest that economic (trade) openness and financial openness may have different effects on the economy and society. For example, economic (trade) openness can stimulate the massive production of domestic products and thereby promote economic growth (Ma et al., 2014), especially in developing countries (Šemancíková, 2016; Tahir and Azid, 2015). But this conclusion does not necessarily hold for the effects of financial openness. Indeed, financial openness is found to be associated with higher financial risks (Ashraf, 2018), which are harmful for financial development and might have a negative impact on economic growth (Bremus and Buch, 2016; Guillen, 2016). In this regard, another focus of this paper is to investigate the potentially different effects associated with different dimensions of openness. In particular, we distinguish in this paper between two important aspects of openness (i.e., economic openness and financial openness) and discuss the potential differences in their relationships with happiness.

In sum, despite the extensive literature on the various determinants of people’s subjective well-being, little is known about how financial and trade openness affect people’s subjective well-being. In this paper, we attempt to address this inadequacy, although tentatively, using data from a national survey in China. We find interesting and enlightening results, which are not well understood in the previous literature and are discussed in detail in the main text. Also, to the best of our knowledge, this is the first paper to study how financial and trade openness affect people’s subjective well-being in China. Therefore, our analysis complements the emerging literature on the various determinants of subjective well-being in China.

The rest of the paper is organized as follows. Section 2 presents the data and methodology. Section 3 reports the baseline empirical results and discusses their implications. Section 4 extends the analysis by examining cohort differences. Section 5 concludes the paper.

2. Data and empirical strategy

2.1. Data and variables

The raw data in this paper are collected from multiple data sources. The dataset of the China General Social Survey (CGSS) is used as the source of information on individuals. Starting in 2003, the CGSS is conducted annually (or biannually) by Renmin University of China and the Hong Kong University of Science and Technology and has been widely used in many fields of social studies. To maintain consistency, we use the last four waves of the CGSS data (because the sampling approach in the previous waves of the survey is different). We then obtain a sample of 51,574 respondents aged over 17 years, in 31 provinces (Hong Kong, Macao, and Taiwan are not included due to data unavailability). The proportion of urban and rural samples is approximately 6:4. After dropping 6843 observations with missing values, the final sample for empirical analysis consists of 44,731 observations. Table 1 presents the year-wise
sample distribution. To ensure the absence of bias from omitted samples, Table 2 shows the distribution of happiness. Trivial statistical differences exist between the full sample and the final sample, indicating little danger of sample bias.

The data for provincial variables—including the gross domestic product (GDP), per capita disposable income, exports, imports, and FDI, which are used to construct proxy variables for trade openness, financial openness, and rural-urban inequality—are obtained from the National Bureau Statistics of China and provincial statistical yearbooks. Data for the various regional control variables—such as the consumer price index, industrial production, and government expenditure—are also extracted from the same source.

2.1.1. Measure of happiness

In line with previous studies, in this paper “happiness” is measured by interviewees’ answers to the following multiple-choice question: “Generally speaking, how do you feel about your life?” Except for cases of inapplicability, inability to answer, and refusal to answer, the choices use a Likert-scale type: “very unhappy,” “relatively unhappy,” “neither unhappy nor happy,” “relatively happy,” and “very happy.” In our analysis, we code the responses from 1 to 5, where 1 means “very unhappy” and 5 means “very happy.” As suggested by Ferrer-i-Carbonell and Ramos (2014), this measure of subjective well-being is the most commonly used and has sufficient reliability. The happiness score of interviewees in the final sample averages 3.821. Fig. 1 displays the year-wise sample distribution of happiness in the final sample, which shows a consistent pattern with the previous literature (e.g., Jiang et al., 2012; Knight and Gunatilaka, 2010) and further confirms the validity of the data.

### Table 1
Year-wise sample distribution.

| Year  | 2010  | 2011  | 2012  | 2013  | 2015  | Total |
|-------|-------|-------|-------|-------|-------|-------|
| Number of respondents | 10,216 | 4871  | 10,250 | 9734  | 9660  | 44,731 |
| Average happiness     | 3.77   | 3.91  | 3.83  | 3.77  | 3.88  | 3.82  |

### Table 2
Distribution of happiness in the full sample and the final sample.

| Happiness                  | Full sample |                | Final sample |                |
|-----------------------------|-------------|----------------|--------------|----------------|
|                             | Frequency   | Percent (%)    | Frequency    | Percent (%)    |
| Very unhappy                | 857         | 1.66           | 728          | 1.63           |
| Relatively unhappy          | 3677        | 7.13           | 3108         | 6.95           |
| Neither unhappy nor happy   | 8222        | 16.14          | 7039         | 15.74          |
| Relatively happy            | 30,158      | 58.48          | 26,429       | 59.08          |
| Very happy                  | 8424        | 16.33          | 7427         | 16.60          |
| Missing                     | 136         | 0.26           | –            | –              |
| Total                       | 51,574      | 100            | 44,731       | 100            |

Fig. 1. Distribution of Happiness in China, 2010–2015.
whether openness has strengthening or weakening effects on inequality. Square terms are included to investigate the potential nonlinear relationships, and the interaction terms are included to examine measures of openness: trade openness (TO) and financial openness (FO). Consistent with the prior literature (e.g., Zhang et al., 2015),

2.1.2. Measures of openness and rural-urban inequality

The core explanatory variables used in this paper include openness and inequality as well as their square and interaction terms. The square terms are included to investigate the potential nonlinear relationships, and the interaction terms are included to examine whether openness has strengthening or weakening effects on inequality.

As explained earlier, to detect the potentially different effects associated with different dimensions of openness, we use two measures of openness: trade openness (TO) and financial openness (FO). Consistent with the prior literature (e.g., Zhang et al., 2015), we measure TO by calculating the total trade volume of imports and exports as a share of GDP in the region.\(^1\) To measure FO more accurately, several measures are considered here. Lane and Milesi-Ferretti (2007) recommend using the de facto measure, which defines FO as a ratio of total capital flow to GDP. Alternatively, Chinn and Ito (2006) propose the de jure measure, which quantifies FO as a dummy indicating the limitations on cross-border financial activities. Although the de jure measure has a solid theoretical basis, the de facto measure has better econometric properties. To avoid endogeneity and because of data unavailability, we use the de facto measure, that is, in this paper FO is measured by the ratio of FDI to GDP in each region.

Aside from the methodology and data issues, there is a political issue on the measure: whether provincial governments in China are authorized to make regional trade and financial policies. Generally, foreign trade and investment policies are formulated by the central government in China. Nonetheless, local governments still have certain administrative powers in deciding trade and financial opening policies. For example, local governments may, because of the actual conditions in the region, draft local laws and regulations and direct their implementation. In deciding about openness, local governments are responsible for the management of licenses and quotas for import and export commodities, as well as approvals (with limited authorities) and filings for the establishment of foreign-invested enterprises. Furthermore, supporting measures for funds and services—such as loans to foreign-invested enterprises, environmental standards in production, and the convenience of export rebates—are all under local jurisdiction. Hence, local governments can influence the degree of openness by changing regional policies as well as related administrative procedures. For example, in response to the economic impact of COVID-19, the Shanghai Municipal Commission of Commerce issued eleven policies to support foreign trade, including the exemption of tariffs for epidemic prevention and control materials, and the reduction of guarantee fees for financing.

Following the literature on income inequality (e.g., Lu and Chen, 2006; Morgan and Wang, 2019), we adopt the income ratio of urban residents to that of rural residents as the measure of rural-urban inequality. The ratio is calculated as the per capita disposable income of urban residents divided by the per capita disposable income of rural residents. Based on where the respondents live, we group individuals within the same province to generate the inequality indicators. Because of data unavailability, we employ indicators estimated at the provincial level, rather than at a lower level. Alternative measures are discussed in the robustness analysis. As mentioned earlier, we also include interaction terms between measures of inequality and openness to investigate whether a channel exists in which openness can have an additional impact on the effect of inequality on happiness.

\(^1\) Dollar-denominated foreign trade volumes and foreign direct investment amounts are converted into renminbi at the prevailing exchange rate that year.

| Variable | Description |
|----------|-------------|
| Happiness | Self-reported happiness level. Very happy = 5; relatively happy = 4; neither unhappy nor happy = 3; relatively unhappy = 2; very unhappy = 1 |
| Trade openness | Total volume of foreign trade in the province/provincial GDP |
| Financial openness | Foreign direct investment (FDI) in the province/provincial GDP (in %) |
| Inequality | Per capita disposable income of urban residents/per capita disposable income of rural residents in the province where the respondent is interviewed |
| Age | Age of the respondent (in years) |
| Income | Natural logarithm of the respondent’s household income in the previous year of being investigated |
| Gender | Gender of the respondent. If male, then Gender = 1; if female, then Gender = 0 |
| Ethnicity | Ethnicity of the respondent. If Han, then Ethnicity = 1; if minority, then Ethnicity = 0 |
| Education | Education background of the respondent. Bachelor’s degree and above = 5; post-secondary education = 4; senior middle school or secondary vocational school education = 3; junior high school education = 2; primary education = 1; no formal education = 0 |
| Political status | Political status of the respondent. If member of the Chinese Communist Party (CCP), then Political status = 1; otherwise, Political status = 0 (including member of Communist Youth League, member of democratic parties, and none) |
| Religion | Religious affiliation of the respondent. If follower of a religion, then Religion = 1; if no religious affiliation, then Religion = 0 |
| Divorced | Marital status of the respondent. If divorced or separated, then Divorced = 1; otherwise, Divorced = 0 |
| Married | Marital status of the respondent. If married, then Married = 1; otherwise Married = 0 |
| Health | Physical condition of the respondent. In good health = 5; relatively healthy = 4; so-so = 3; relatively unhealthy = 2; in poor health = 1 |
| Status change | Socioeconomic status change compared with previous period. Higher = 2; unchanged = 1; lower = 0 |
| GDP per capita | Natural logarithm of real GDP per capita in the province where the respondent is interviewed (in RMB) |
| GDP proportion | Provincial GDP as a proportion of total national GDP |
| CPI | The rate of change in consumer price index in the province where the respondent is interviewed (in %) |
| Industrial production | Natural logarithm of industrial added value in the province where the respondent is interviewed (in RMB 100 million) |
| Government expenditure | Provincial government expenditure as a share of provincial GDP |
2.1.3. Other control variables

In addition to the main variables of interest mentioned above, in line with the previous literature (e.g., Han and Gao, 2019; Huang, 2019; Morgan and Wang, 2019; Tran et al., 2018; Wen et al., 2019; Yang et al., 2019; Zhang and Churchill, 2020), we also include a set of individual characteristics that may affect happiness. Specifically, in our regressions we control for age, income level, gender, ethnicity, education, political status, religious belief, marital status, health, and social status. In addition, the measurement of openness might be biased by other provincial variables. For instance, a higher ratio of trade to GDP might result because some Chinese provinces are industrial hubs. If so, the cross-province comparison would be misleading. It is also possible that the average income in the area helps mitigate the negative relationship between inequality and subjective welfare (Tran et al., 2018). To address these concerns, we also control for various province-level variables, including GDP per capita, provincial GDP as a percentage of total national GDP, industrial production, the consumer price index (CPI), and government expenditure. Year dummies are included in regressions to capture the time effects. Detailed definitions of the variables are presented in Table 3. Table 4 reports descriptive statistics of the data.

2.2. Estimation methodology

Following recent studies on happiness (e.g., Tran et al., 2018; Wen et al., 2019), we specify the following regression model to estimate the effects of TO, FO, and rural-urban income inequality on happiness:

\[
\text{Happiness}_{ij} = \alpha + \beta_1 \text{TO}_j + \beta_2 \text{TO}^2_j + \beta_3 \text{FO}_i + \beta_4 \text{FO}^2_i + \beta_5 \text{Ineq}_i + \beta_6 \text{Ineq}_i \times \text{TO}_j + \beta_7 \text{Ineq}_i \times \text{FO}_i + \beta_8 X_{ij} + \epsilon_{ij}
\]

(1)
where $i$ and $j$ are individuals and provinces, respectively. $\text{Ineq}_{ij}$ is self-reported happiness; and $TO_{ij}$ and $FO_{ij}$ are trade openness and financial openness, respectively. $\text{Ineq}_{ij}$ is the rural-urban income gap. $X_{ij}$ is the vector of control variables and year dummies. $\varepsilon_{ij}$ is the error term.

Concerning the estimation method, conventional econometrics treats the dependent variable Happiness as an ordinal variable and thus uses ordered-response models. However, Ferrer-i-Carbonell and Frijters (2004) argue that it does not matter for the result whether happiness is treated as cardinal or ordinal. In line with the standard practice in the literature (e.g., Jiang et al., 2012; Yang et al., 2019), we use the ordered probit (Oprobit) model in the main analysis. Additionally, the results of ordered logit (Ologit) model and ordinary least squares (OLS) are reported in the robustness checks.

### 3. Empirical results

#### 3.1. Baseline results

Table 5 reports the estimation results of Eq. (1), showing that for all model specifications and estimation methods, the coefficient on the level term of Happiness is significantly positive, whereas on the square term it is significantly negative; this result suggests that the relationship between TO and happiness takes an inverted U shape. For example, in the results estimated by the Oprobit model, the threshold value of TO occurs at approximately 2 in the regression without control variables and at 1.67 in the regression with full control variables, ceteris paribus. This means that living in a region with increasing TO can improve the happiness of those living there until TO reaches a specific threshold value, which is between 1.67 and 2 in our sample. After that, life satisfaction decreases as the degree of TO further increases. However, in the sample no region has a TO higher than 1.46. Thus, people in almost all regions in China can still obtain more happiness by promoting the TO in the regions where they live.

In contrast to the inverted-U-shaped relationship between TO and happiness, the impact of FO on happiness forms a U shape, as suggested by the negatively significant coefficient on the level term of FO and the positively significant coefficient on its square term. In other words, the effect of FO on happiness is negative before it reaches a critical threshold value and afterward becomes positive. In our sample, the associated threshold value of FO is at approximately 10.68% in the regression without controls and 11.2% in the regression with full controls. Afterward, people’s happiness improves as the degree of FO increases. However, none of the sample regions have reached a degree of FO higher than 7.96%, indicating that China is still in a stage in which FO has a dampening effect on people’s happiness.

As for the effect of rural-urban inequality on happiness, consistent with the previous literature (e.g., Huang et al., 2016; Jiang et al., 2012), the coefficient on inequality is negative and statistically significant, suggesting that people’s happiness decreases as income disparity increases. Meanwhile, the coefficient on the interaction term between inequality and TO ($\beta_6$) is estimated to be significantly negative, implying an exacerbating effect of TO on the negative effect of inequality on happiness. In particular, in a region with higher TO, relative deprivation from rural-urban inequality tends to be more substantial, resulting in less happiness for people in these regions.
regions. In other words, although TO can raise happiness, its positive effect is discounted by decreasing the slope of inequality and happiness. This is also consistent with the results by Yang and Greaney (2016), who find that TO alleviated inequality in the US and Japan but worsened inequality in China. By comparison, the coefficient on the interaction term between the rural-urban gap and FO ($\beta_7$) is estimated to be significantly positive, suggesting that it can moderate the negative impact of inequality on happiness. The implication is that in a region with higher FO, the feeling of relative deprivation is weaker, and people tend to be happier because of less aversion to income inequality.

Overall, the results obtained with different estimation methods are highly consistent, which confirms the validity of our main findings. Trivial differences are found in the magnitude of the estimates: of the three models, Ologit generates the highest values,
followed by Oprobit, and OLS the lowest. As for model specification, the estimations without control variables are slightly overestimated, implying the necessity of including the control variables.

Almost all of the control variables have effects that are estimated to be statistically significant. This means that our selection of controls is generally valid. For better interpretation, Table 6 quantifies the baseline results by reporting the average marginal effect of the explanatory variables.

Because the dependent variable takes all levels of happiness into account, the estimations of the average marginal effect yield five sets of results. As the predicted outcome shifts from unhappiness to happiness, the effects of the variables of being male, not being a member of an ethnic minority, and being divorced shift from positive to negative. In contrast, the marginal effects of the variables of higher income, higher education, being a member of the Chinese Communist Party (CCP), having religious belief, being married, having good health, and higher social status shifts in the opposite direction.

As for the specific effects associated with the controls, our results are generally consistent with the prior studies (e.g., Han and Gao, 2019; Huang, 2019; Morgan and Wang, 2019; Tran et al., 2018; Yang et al., 2019; Zhang and Churchill, 2020). For example, the result supports a U-shaped age-happiness curve, with the lowest point at about forty years old, for middle-aged people suffering from economic pressure and career ceilings. A 1 % increase in average income can increase the marginal probability of happiness by 0.033. The results suggest that females are more likely to be happy than males (with a higher marginal probability of 0.024). Not surprisingly, ethnic minorities enjoy more happiness because of preferential policies. Enhancement in happiness can also be achieved by receiving a higher level of education, being a CCP member, or a nonbeliever. Marital, health, and social status are the top three critical determinants of happiness among all the individual control variables, which can raise the marginal probability of happiness by 0.050, 0.047, and 0.034, respectively. Concerning the provincial variables, the positive coefficients of GDP per capita, industrial production, and government expenditure indicate that improvement in the economic conditions of the province in which respondents live can improve individual well-being. Nonetheless, the share of GDP has a negative impact on happiness when absolute GDP is controlled for, indicating that those who live in highly developed provinces might suffer from high pressure in life as the same time that they enjoy better economic conditions. Finally, the marginal likelihood of the CPI is −1.438, suggesting that inflation has a strongly negative influence on happiness, as shown by Tsai (2009).

3.2. Marginal analysis

To intuitively illustrate the interplay of openness and inequality on well-being, we adopt a graphical approach following Ashraf et al. (2020) for further marginal analysis. To this end, we convert the continuous variables into discrete ones. Specifically, to distinguish between regions with high and low FO, we introduce a dummy variable TOdum, which takes the value of one if TO is greater than the sample mean and zero otherwise. Similarly, the dummy FOdum distinguishes regions with high and low FO, and Ineqdum distinguishes regions with high and low rural-urban inequality. Then Eq. (1) becomes:

\[
\text{Happiness}_{ij} = \alpha + \beta_1 \text{TOdum}_j + \beta_2 \text{FOdum}_j + \beta_3 \text{Ineqdum}_j + \beta_4 \text{Ineqdum}_j \times \text{TOdum}_j + \beta_5 \text{Ineqdum}_j \times \text{FOdum}_j + \beta_6 X_{ij} + \epsilon_{ij}
\] (2)

The marginal effects of TO and FO are respectively given by:

\[\text{Marginal Effect of \text{TO}} = \beta_1 \]

\[\text{Marginal Effect of \text{FO}} = \beta_2 \]

Because of the existence of the square and interaction terms, the marginal effects of the main variables are barely distinguishable from their own change. Hence, we discuss the marginal effect of openness and inequality in the next section and simply focus on the control variables here.
Fig. 3. Marginal effects of financial openness.

Fig. 4. Interaction of inequality and trade openness.

Fig. 5. Interaction of inequality and financial openness.
It is clear that inequality affects the impact of TO and FO by $\beta_6$ and $\beta_7$, respectively. Meanwhile, the marginal effect of inequality is also affected by TO and FO:

\[
\frac{\partial \text{Happiness}}{\partial \text{TO dum}_j} = \beta_1 + \beta_6 \text{Ineq dum}_j, \quad \frac{\partial \text{Happiness}}{\partial \text{FO dum}_j} = \beta_2 + \beta_7 \text{Ineq dum}_j
\]

Based on the estimation results of Eq. (2), Figs. 2 and 3 display the marginal effects of different levels of openness on the well-being of people living in areas with low (i.e., $\text{Ineq dum} = 0$) and high (i.e., $\text{Ineq dum} = 1$) inequality, respectively. Based on a horizontal comparison in Fig. 2, the marginal probability of happiness is higher in regions with higher degrees of TO than in those with lower degrees of TO. This suggests that TO has a positive impact on happiness, as estimated earlier. In a vertical comparison, the marginal effect of TO is more pronounced in regions with higher inequality than in regions with lower inequality, indicating that inequality strengthens the positive impact of TO. In addition, this strengthening effect becomes stronger as the degree of TO increases, as shown by the enlarging gap between the two curves.

As for financial openness (see Fig. 3), people in regions with a higher degree of FO tend to have a lower marginal probability of happiness, which again confirms the previous baseline results. In a within-group comparison, highly unequal regions show greater marginal effects of FO than regions with lower inequality, implying a moderation effect of inequality that weakens the negative impact of FO. Additionally, this moderating effect is attenuated with a rise in FO, as shown by the decreasing gap between the curves.

Figs. 4 and 5 depict the marginal effects of inequality at different levels of happiness. It appears that inequality dampens happiness, as shown by the downward slope of the line illustrating the impact of inequality on happiness in the third subgraph. Alternatively, in the first subgraph, the line representing the impact on unhappiness has an upward slope. Taken together, these two figures reveal that the marginal probability of unhappiness for residents in areas with higher inequality is greater than those with low inequality, which is consistent with our previous results.

Note also that each subgraph has two lines. The gray line is the marginal effect of inequality on the well-being of people living in areas with less openness, whereas the black line is for that in areas with more openness. Looking closely at Fig. 4, in areas with high TO, the marginal effect of inequality on unhappiness is higher than that in areas with low TO. Hence, Fig. 4 reflects that TO strengthens the negative effect of inequality on happiness. This moderating effect diminishes as inequality increases, as implied by the narrowing gap between the two lines in the first subgraph. However, Fig. 5 shows that in regions with high FO, the marginal effect of inequality on unhappiness is less than that in regions with low FO, suggesting that it weakens the negative effect of inequality on happiness. This adjustment effect, as shown in the first subgraph, also shrinks when inequality increases.

In sum, rural-urban inequality has a moderating effect on the impact of openness on happiness: it strengthens the positive impact of TO and weakens the negative impact of FO. In turn, the negative impact that inequality has on happiness is exacerbated by TO and impaired by FO.

### 3.3. Robustness check

Because individuals are more aware of and affected by what happens in their surrounding areas, an alternative and perhaps better measure of inequality might be estimated in smaller areas, such as counties (xian) or districts (qu). Previous literature (e.g., Tran et al., 2018) uses a small estimation method to estimate inequality indicators at the community level. However, because of its privacy policy,
the CGSS does not release information on the location of the sample below the provincial level. Thus, we could not match the CGSS data with other databases below the provincial level. A workaround is to use CGSS data directly for calculations. In doing so, because the survey did not cover every county (some counties have only urban samples, with few rural samples, or the opposite), to avoid sample bias, we excluded counties with a proportion of rural samples below 10% or above 90%. The remaining sample size is 9626, covering 167 county-years.

The results are reported in Table 7. We first replace the inequality indicator with the county-level urban-rural income ratio, which is the ratio of the average income of urban residents to the average income of rural residents in the county for each year. The second alternative is the between-group component of the Gini coefficient, which is obtained by decomposing the county’s Gini coefficient based on the sample type for each year.

The results in Table 7 show that the coefficients on TO and FO retain the same sign and significance. This confirms that the inverted-U-shaped relationship between TO and happiness and the U-shaped relationship between FO and happiness still hold for different measures of inequality. Moreover, the threshold for a turning point is 0.21 for TO and 2 for FO is between the minimum and the mean value. However, it turns out that the county-level inequality indicator and happiness are positively correlated. This result is consistent with Kelley and Evans (2017), suggesting that the Kuznets curve may indeed exist: at the early stage of economic development, unequal income growth may enhance happiness. In this case, TO depresses the marginal impact of inequality, as indicated by the significantly negative coefficients on the interaction terms for TO and inequality. Likewise, FO tends to reduce the marginal impact of inequality and thus depresses happiness, although the related coefficients are not statistically significant.

Table 8
The classification of household income over the sample period (in RMB).

| Income classification | Low-income households | Middle-income households | High-income households |
|-----------------------|-----------------------|--------------------------|-----------------------|
| 2010                  | ≤17,130               | 17,130-38,000            | >38,000               |
| 2011                  | ≤20,000               | 20,000-40,000            | >40,000               |
| 2012                  | ≤20,000               | 20,000-50,000            | >50,000               |
| 2013                  | ≤30,000               | 30,000-60,000            | >60,000               |
| 2015                  | ≤30,000               | 30,000-60,000            | >60,000               |
| Total                 | 16,862                | 14,214                   | 13,655                |

Notes: The full sample is divided into three subsamples roughly equal in household numbers each year. Each interval includes the upper boundary and excludes the lower boundary.

Table 9
Robustness to different income groups and residential status.

| Dependent variable: Happiness | Household income class | Residential status |
|-------------------------------|------------------------|--------------------|
|                               | Low-income             | Middle-income      | High-income         |
|                               | (1)                    | (2)                | (3)                |
| Trade openness                | 0.225                  | 0.067              | 0.892***           |
| (0.53)                        | (0.41)                 | (0.34)             | 0.853**            |
| Trade openness squared        | −0.996                 | −0.167             | −0.194*            |
| (0.14)                        | (0.12)                 | (0.11)             | −0.220**           |
| Financial openness            | −0.280***              | −0.227***          | −0.428***          |
| (0.08)                        | (0.07)                 | (0.07)             | −0.296***          |
| Financial openness squared    | 0.016***               | 0.011***           | 0.014***           |
| (0.00)                        | (0.00)                 | (0.00)             | 0.019***           |
| Inequality                   | −0.104**               | −0.107**           | −0.044             |
| (0.04)                        | (0.04)                 | (0.05)             | −0.092**           |
| Inequality × Trade openness   | −0.100                 | −0.020             | −0.373***          |
| (0.19)                        | (0.14)                 | (0.11)             | −0.307**           |
| Inequality × Financial openness| 0.046*                | 0.034              | 0.113***           |
| (0.02)                        | (0.02)                 | (0.02)             | 0.080***           |
| Controls                      | Yes                    | Yes                | Yes                |
| Year                          | Yes                    | Yes                | Yes                |
| LR statistic                 | 1912.68***             | 1210.66***         | 1037.57***         |
| Pseudo R-squared             | 0.05                   | 0.04               | 0.04               |
| Number of observations        | 16,862                 | 14,214             | 13,655             |
| Notes: Robust standard errors are in parentheses; *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively. All regressions include full controls but are not reported in the table to save space (results are available from the author upon request).
Table 10
Robustness to different genders, different ethnicities, and different religious beliefs.

| Dependent variable: Happiness | Gender | Ethnicity | Religious belief |
|-------------------------------|--------|----------|-----------------|
|                               | Male   | Female   | Han            | Minority       | Believer      | Nonbeliever   |
| Trade openness                | 0.844*** | 0.378    | 0.405*         | 1.761          | 0.571         | 0.423*        |
|                               | (0.31) | (0.30)   | (0.22)         | (1.37)         | (0.54)        | (0.24)        |
| Trade openness squared        | −0.215** | −0.143  | −0.197***      | −0.617*        | −0.141        | −0.183***     |
|                               | (0.09) | (0.09)   | (0.07)         | (0.36)         | (0.15)        | (0.07)        |
| Financial openness            | −0.335*** | −0.322*** | −0.287***    | −0.878***      | −0.437***     | −0.280***     |
|                               | (0.06) | (0.06)   | (0.04)         | (0.17)         | (0.13)        | (0.04)        |
| Financial openness squared    | 0.015*** | 0.015*** | 0.014***      | 0.018**        | 0.022***      | 0.013***      |
|                               | (0.00) | (0.00)   | (0.00)        | (0.01)         | (0.01)        | (0.00)        |
| Inequality                   | −0.088** | −0.112*** | −0.130***    | −0.164*        | −0.097        | −0.097***     |
|                               | (0.04) | (0.04)   | (0.03)        | (0.09)         | (0.07)        | (0.03)        |
| Inequality × Trade openness   | −0.309*** | −0.143  | −0.150**      | −0.369         | −0.217        | −0.155*       |
|                               | (0.11) | (0.10)   | (0.08)        | (0.49)         | (0.18)        | (0.08)        |
| Inequality × Financial openness | 0.069*** | 0.066*** | 0.052***      | 0.268***       | 0.082***      | 0.054***      |
|                               | (0.02) | (0.02)   | (0.01)        | (0.05)         | (2.07)        | (4.13)        |
| Controls                      | Yes    | Yes      | Yes           | Yes            | Yes           | Yes           |
| Year                          | Yes    | Yes      | Yes           | Yes            | Yes           | Yes           |
| LR statistic                  | 2703.98*** | 2423.41*** | 4769.28***   | 524.90***      | 694.45***     | 4477.78***    |
| Pseudo R-squared              | 0.06   | 0.05     | 0.06          | 0.07           | 0.06          | 0.06          |
| Number of observations        | 22,131 | 22,600   | 41,096        | 3635           | 39,408        | 39,408        |
| Mean income                   | 53583.08 | 49459.28 | 52375.59     | 41595.50       | 50666.48      | 51612.09      |

Notes: Robust standard errors are in parentheses; *, **, and *** indicate statistical significance at the 10 %, 5 %, and 1 % level respectively. All regressions include full controls but are not reported in the table to save space (results are available from the author upon request).

4. Further discussion: cohort differences

In the previous two sections, we analyzed the effects of TO, FO, and rural-urban income inequality on happiness in China and tested the robustness of the results. Because of the variety of social groups and the enlarging gap between urban and rural income in recent years, both of which might lead to notable differences among different cohorts, in this section we explore the following question: Are there any differences in the effects of openness and rural-urban income inequality on happiness among different cohorts in China? To answer this question, we divide the full sample into corresponding subsamples and redo the regressions in a similar fashion as before.

First, we examine whether our main results are robust to different income groups and residential status. As in conventional in the literature, we divide the sample into three categories based on the household income of the respondents. As shown in Table 8, the number of households in each group is roughly equal. Then we repeated the regression analysis for each subsample, with the results presented in Table 9, which shows that the main results generally hold for all income groups, despite some differences in statistical significance. Notably, high-income households are the only group that is sensitive to the inverted-U-shaped relationship between TO and happiness, yet insensitive to the negative impact of inequality. This is understandable because high-income households may benefit from TO (Turnovsky and Rojas-Vallejos, 2018), and rural-urban inequality further enhances the benefits from TO, as we analyzed above. Meanwhile, TO strengthens the negative impact of inequality on happiness. Consequently, the subjective well-being of middle- and low-income households is little enhanced by TO but significantly impaired by inequality, implying that the gains of the rich from TO and inequality are at the cost of the low- and middle-income groups.

Columns (4) and (5) report the results for urban and rural groups respectively, and they show that, again, our main results remain robust for both groups. The exceptions are that the coefficients on the level term and the interaction term of TO for rural residents are different from the baseline results, although statistically insignificant. One possible explanation is that cities are more attractive to foreign trade than rural areas. Although urban areas enjoy the convenience and prosperity brought by TO, rural areas may suffer from labor outflows, aging population, abandoned farmlands, and other social costs. In addition, taking into account that the income of rural residents (with an average of RMB 39,266 in the sample) is much lower than that of urban residents (with an average income of RMB 69,003), this result is also consistent with those presented in Columns (1) and (2): TO and inequality tend to harm the subjective well-being of the group with lower income. Overall, the results in Table 9 further confirm the robustness of our main results.

Second, because of the diversity of individual characteristics, it is also worthwhile to assess whether there are differences in the effects of openness and rural-urban inequality on happiness across different groups of people with a different gender, ethnicity, and religious belief. The results in Table 10 show that the coefficients for FO remain largely stable across all groups, but the coefficients for TO have differences in statistical significance. This indicates that the two kinds of openness might influence subjective well-being through different mechanisms, which further confirm our previous hypothesis that the model of openness that divides it into two dimensions is necessary to reveal the potential differences.

Interestingly, even after controlling for income, the regression results for the wealthier group in each division remain supportive of the baseline results, but with minor differences in the less-wealthy groups: the coefficients on TO are less significant. In other words,
TO mainly benefits rich people and thus enhances their happiness. In addition to income differences, another underlying reason is that males make up the primary labor force in China, therefore females, especially housewives, are less likely to be affected by TO.

5. Concluding remarks

Despite the vast literature on the various determinants of happiness, very little is known about how openness affects people’s happiness in the current literature. In this paper, we attempt to fill this gap, albeit partially, through an empirical analysis of the CGSS data from China. Several results seem particularly interesting. First, we find that both TO and FO have a statistically significant impact on happiness, but their effects seem to go in opposite directions. Specifically, the effect of TO on happiness is inverted U-shaped, whereas that of FO turns out to be U-shaped. Second, we find that rural-urban income inequality has a significantly negative effect on happiness, which is highly consistent with previous studies. Third, we find that the negative effect of rural-urban income inequality on happiness is strengthened by an increase in TO but weakened by an increase in FO. These results are confirmed to be robust to different estimation strategies and a variety of sensitivity checks.

This paper contributes to the existing literature in three ways. First, our results not only identify openness as an essential determinant of happiness but also highlight the different effects associated with different dimensions of openness (i.e., FO and TO). Second, our paper extends the literature on the inequality-happiness nexus by showing that the effect of rural-urban inequality on happiness also depends on TO and FO, and the favorable adjustment effects of openness seem to be spread unevenly across cohorts. Third, the main findings in this paper also complement the studies on the determinants of subjective well-being in an emerging market economy such as China, where economic and financial opening policies may face some conflicts between opening up the market and maintaining individual happiness.

References

Ashraf, B.N., 2018. Do trade and financial openness matter for financial development? Bank-level evidence from emerging market economies. Res. Int. Bus. Financ. 44 (C), 434–458.
Ashraf, B.N., Zheng, C., Jiang, C., Qian, N., 2020. Capital regulation, deposit insurance and bank risk: international evidence from normal and crisis periods. Research in International Business and Finance 52, 1–19.
Bartolini, S., Sarracino, F., 2015. The dark side of Chinese growth: declining social capital and well-being in times of economic boom. World Dev. 74 (6), 333–351.
Bremus, F., Buch, C.M., 2016. Granularity in banking and growth: Does financial openness matter? J. Bank. Financ. 77, 300–316.
Carroll, D.R., Hur, S., 2020. On the heterogeneous welfare gains and losses from trade. J. Monet. Econ. 109, 1–16.
Chang, R., Kaltani, L., Loayza, N.V., 2009. Openness can be good for growth: the role of policy complementarities. J. Dev. Econ. 90 (1), 33–49.
Chinn, M.D., Ito, H., 2006. What matters for financial development? Capital controls, institutions, and interactions. J. Dev. Econ. 81 (1), 163–192.
Darku, A.B., Yeboah, R., 2018. Economic openness and income growth in developing countries: a regional comparative analysis. Appl. Econ. 50 (8), 855–869.
Easterlin, R.A., 1974. Does economic growth improve the human lot? Some empirical evidence. Nations and Households in Economic Growth 89, 89–125.
Erlas, M., Turnovsky, S.J., 2019. International financial integration and income inequality in a stochastically growing economy. J. Int. Econ. 119, 55–74.
Ferrer-i-Carbonell, A., Frijters, P., 2004. How important is methodology for the estimates of the determinants of happiness? Econ. J. 114 (497), 641–659.
Ferrer-i-Carbonell, A., Ramos, X., 2014. Inequality and happiness. J. Econ. Surv. 28 (5), 1016–1027.
Guillem, J., 2016. Does financial openness matter in the relationship between financial development and income distribution in Latin America? Emerg. Mark. Financ. Trade 52 (5), 1145–1155.
Han, H., Gao, Q., 2019. Does welfare participation improve life satisfaction? Evidence from panel data in rural China. J. Happiness Stud. https://doi.org/10.1007/s10902-019-00157-z published online. Available at:
Huang, J., 2019. Income inequality, distributive justice beliefs, and happiness in China: evidence from a nationwide survey. Soc. Indic. Res. 142, 83–105.
Huang, J., Wu, S., Deng, S., 2016. Relative income, relative assets, and happiness in urban China. Soc. Indic. Res. 126 (3), 971–985.
Jiang, S., Lu, M., Sato, H., 2012. Identity, inequality, and happiness: evidence from urban China. World Dev. 40 (6), 1190–1200.
Kelley, J., Evans, M.D.R., 2017. Societal inequality and individual subjective well-being: results from 68 societies and over 200,000 individuals, 1981–2008. Soc. Sci. Res. 62, 1–23.
Khun, C., Lahirii, S., Lim, S., 2015. Do people really support trade restrictions? Cross-country evidence. J. Int. Trade Econ. Dev. 24 (1), 132–146.
Kim, J.H., Kang, K.H., 2020. The interaction effect of tourism and foreign direct investment on urban-rural income disparity in China: a comparison between autonomous regions and other provinces. Curr. Issues Tour. 23 (1), 68–81.
Knight, J., Song, L., Gunatilaka, R., 2009. Subjective well-being and its determinants in rural China. China Econ. Rev. 20 (4), 635–649.
Lan, P.R., Milesi-Ferretti, G.M., 2007. The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004. J. Int. Econ. 73 (2), 223–250.
Lee, E., 2020. Trade, inequality, and the endogenous sorting of heterogeneous workers. J. Int. Econ. 125, 1–22.
Lim, H., Shw, D., Liao, P., et al., 2020. The effects of income on happiness in East and South Asia: Societal values matter? J. Happiness Stud. 21, 391–415.
Liu, H., Gao, H., Huang, Q., 2020. Better government, happier residents? Quality of government and life satisfaction in China. Soc. Indic. Res. 147, 971–990.
Lu, M., Chen, Z., 2006. Urbanization, urban-biased policies, and urban-rural inequality in China, 1987–2001. Chinese Econ. 39 (3), 42–63.
Ma, Y., Li, J., Yu, G., Yuan, D., Mazur, J., 2014. Trade openness, economic growth and the vicissitude of labor-intensive industries: the case of China. Int. J. Manag. Econ. 43 (1), 7–31.
Ma, J., Shi, J., Luo, D., Che, Y., 2019. Effect of trade openness on regional economic growth in China: revisiting the discussion. Appl. Econ. Lett. 26 (16), 1313–1316.
Madanizadeh, S.A., Pilvar, H., 2019. The impact of trade openness on labour force participation rate. Appl. Econ. 51 (24), 2654–2668.
Morgan, R., Wang, D., 2019. Well-being in transition: life satisfaction in urban China from 2002 to 2012. J. Happiness Stud. 20, 2609–2629.
Ni, N., Liu, Y., 2019. Financial liberalization and income inequality: a meta-analysis based on cross-country studies. China Econ. Rev. 56, 1–17.
Rahman, A.A., Veenhoven, R., 2018. Freedom and happiness in nations: a research synthesis. Appl. Res. Qual. Life 13, 435–456.
Semicon, J., 2019. Concentration, the US: a market study. China Econ. 50 (8), 985–899.
Tahir, M., Aziz, T., 2015. The relationship between international trade openness and economic growth in the developing economies. J. Chinese Econ. Foreign Trade Stud. 8 (2), 123–139.

Footnote

3 According to the China Labor Statistical Yearbook, in 2018 employment totaled 111,711,000, of which 37,687,000 are female.
Tran, T.Q., Nguyen, C.V., Vu, H.V., 2018. Does economic inequality affect the quality of life of older people in rural Vietnam? Journal of Happiness Study 19, 781–799.

Tsai, M., 2009. Market openness, transition economies and subjective wellbeing. Journal of Happiness Study 10, 523–539.

Turnovsky, S.J., Rojas-Vallejos, J., 2018. The distributional consequences of trade liberalization: consumption tariff versus investment tariff reduction. J. Dev. Econ. 134, 392–415.

Wen, M., Ren, Q., Korinek, K., Trinh, H.N., 2019. Living in skipped generation households and happiness among middle-aged and older grandparents in China. Soc. Sci. Res. 80, 145-155.

Yang, Y., Greaney, T.M., 2016. Economic growth and income inequality in the Asia-Pacific region: a comparative study of China, Japan, South Korea, and the United States. J. Asian Econ. 48, 6–22.

Yang, J., Liu, K., Zhang, Y., 2019. Happiness inequality in China. J. Happiness Stud. 20, 2747–2771.

Zhang, Q., Churchill, S.A., 2020. Income inequality and subjective wellbeing: panel data evidence from China. China Econ. Rev. 60, 1–10.

Zhang, C., Zhu, Y., Lu, Z., 2015. Trade openness, financial openness, and financial development in China. J. Int. Money Finance 59 (9), 287–309.