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Early Life Circumstance and Adult Psychological Well-being

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The disparity in psychological well-being during adulthood can be traced back to early-life circumstances. While existing literature has highlighted the significant influence of contemporaneous factors on psychological well-being, little is known about its long-term determinants. I study the impact of early life circumstances on adult psychological well-being using the property reform in China as a positive and policy-driven change in economic resources in early life. Exploiting the staggered adoption of the reform, I find that exposure to property reform during the in-utero period and early childhood leads to higher adult life satisfaction, higher adult happiness, and better adult mental health. Larger effects are found among males and those whose parents are less educated. Birth weight, parental investment, adult health, and subjective assessments of one's circumstances are likely operative channels of effect. These findings shed light on the long-lasting consequences of early-life circumstances on psychological well-being in adulthood.

Keywords: land reform, early-life circumstances, adult psychological well-being, life satisfaction, mental health
JEL codes: I150, O15

Early Life Circumstance and Adult Psychological Well-being[1]

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Abstract

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I. Introduction.

There is a large gap in psychological well-being between the rich and poor (Diener and Biswas-Diener 2002; Deaton 2008; Stevenson and Wolfers 2013). As stated by Case, Lubotsky, and Paxson (2002), health and economic disparities take root early in life. The "Fetal origins" hypothesis provides some causal evidence that early-life circumstances play a central role in shaping later life ability and health trajectories (Barker, 1990; 1995; Almond and Currie, 2011). In a similar vein, it is plausible that disparities in psychological well-being may originate in early life circumstances. Understanding the extent to which early-life circumstances contribute to long-term psychological well-being is crucial in unraveling the origins of the psychological well-being gap and holds substantial relevance for policymakers striving to address psychological inequality.

Psychological well-being exhibits distinct characteristics in terms of its origin and development when compared to objective well-being. Psychological well-being is an overall subjective assessment of well-being arising from the different aspects of one's life, including genetics, personality, social-economic characteristics, and cultural differences. Unlike objective well-being, psychological well-being is primarily shaped by individual preferences. Objective indicators, such as income, can only explain part of the variations of subjective well-being (Western and Tomaszewski 2016). At the same time, psychological well-being directly affects the individual decision-making process by changing cognition, preferences, and beliefs (Ridley et al. 2020), consequently influencing their objective welfare. While there is a growing body of research exploring the early-life determinants of objective wellness, such as health and economic self-sufficiency (Almond and Currie 2011; Hoynes, Schanzenbach, and Almond 2016), the exploration of long-term factors shaping psychological well-being remains relatively limited.

In this paper, I examine whether the increase in family agriculture yields when a child is in utero

and during childhood affects later life psychological well-being. In particular, I focus on the adoption of China's agricultural land right reform, known as the Household Responsibility System (HRS) program. Prior to 1978, land ownership in China was held collectively by teams, and agricultural outputs were distributed based on the number of labor hours. However, this collectivized system posed challenges in supervising and incentivizing farmers, leading to lower agricultural productivity and stagnant output levels after collectivization (Lin 1990). Beginning in 1978, HRS was introduced, assigning collectively owned farmland to individual households. This reform aimed to address the incentive problem within the collective land ownership system by privatizing the rewards of individual efforts, thereby enhancing labor productivity and agricultural outputs (Lin 1990; 1992). Given that agriculture was the primary income source for rural families in China until the early 2000s[2], I leverage the variation in HRS adoption across villages as an identification strategy to examine the impact of increased early-life economic resources.

In this study, I focus on three key psychological indicators—general life satisfaction, happiness, and an index of mental health—to investigate the impact of China's Household Responsibility System (HRS) on psychological well-being. Comparing the well-being of cohorts born before and after the start of HRS is problematic because those two cohorts might be systematically different. To get a credible causal estimate of the effect of HRS, I use a Difference-in-Difference (DID) strategy by comparing cohorts who had different exposure to HRS during early childhood (from in-utero to age five) due to the differences in the overlap between early childhood and HRS implementation. The assumption of my DID strategy is that exposure to HRS is exogenous to adult psychologic well-being conditional on a set of primary determinants of HRS adoption. Previous

[2] "Agricultural Development and Poverty Alleviation in China," Agricultural Development, Center for International Knowledge on Development, China, last modified July 24, 2020, http://www.cikd.org/english/detail?leafid=217&docid=1567

literature documents that the timing of HRS adoption across villages is not exogenous (Lin 1987; Zhang, 2012). To address this concern, I control the interactions of primary determinants of HRS timing with a set of cohort dummies to capture potential cohort-specific effects.

To validate the choice of my treatment age threshold, I conduct an event study analysis to identify the critical period during early life when exposure to HRS has the most significant impact on psychological well-being. Additionally, to ensure the validity of my findings, I account for the influence of other significant changes that occurred around the 1980s, controlling for their potential confounding effects. Lastly, I explore several potential mechanisms through which HRS may shape psychological well-being. Specifically, I investigate how the impact of HRS exposure change with agricultural terrains and parents' occupation, the impact of HRS adoption on birth weights, and the amount of time spent with parents during early childhood. By examining these factors, I aim to shed light on the early life pathways through which HRS affects subsequent psychological well-being outcomes. Moreover, I explore the mediating roles of adult education, physical health, and adult subjective circumstances. Understanding how these factors mediate the relationship between HRS and psychological well-being is crucial in unraveling the complex interplay between early-life experiences, individual characteristics, and long-term psychological outcomes.

My primary DID results show that early life circumstances have a large and persistent effect on adult psychological well-being. Specifically, individuals who experienced a longer duration of exposure to the Household Responsibility System (HRS) during the critical period from in-utero to early childhood exhibit higher levels of adult life satisfaction, happiness, and better adult mental health. Moreover, the positive effects of HRS adoption are more pronounced for males and children from economic disadvantage families, highlighting the importance of considering gender

and socioeconomic factors in understanding the impact of early life conditions on psychological well-being. To establish the validity of my findings, I conducted placebo tests using a control group consisting of respondents born 15-35 years before the implementation of HRS and respondents born in urban areas unaffected by HRS. The absence of any significant effects in these placebo groups strengthens the credibility of my identification strategy. Furthermore, the results are robust to the inclusion of the village infrastructure construction programs, One-Child policy, send-down movement, and a set of the other province-level policies. The event study analysis reveals that shocks experienced before the age of five play a pivotal role in shaping adult psychological well-being, while shocks occurring after the age of five have limited effects. This finding aligns with the assumption that early childhood experiences have a profound and enduring impact on psychological well-being.

What drives the long-term impact of HRS on adult psychological well-being? Firstly, a large literature documented the conditions during the in-utero period can profoundly influence nutrition and birth weight, which are strong predictors of adult well-beings (Almond, Hoynes, and Schanzenbach 2011). In light of this, I investigate how exposure to HRS during the in-utero period affects birth weight and find that babies born after the introduction of HRS tend to have higher birth weights. Additionally, I examine how parents alter their post-natal investments in their children in response to HRS. I find evidence that after the implementation of HRS, parents spend more time with their children before they reach the age of three, suggesting a change in parental behavior and increased investment in early childhood development. Lastly, I investigate how exposure to HRS during early life impacts adult education, health and other subjective factors. The results indicate that cohorts exposed to HRS during the early life period exhibit better adult health and higher comprehension ability. They also display greater confidence in their future prospects

and place a higher value on the well-being of the next generation. However, the evidence regarding the effects of HRS on education and cognitive ability is limited, suggesting that these particular factors may not be strongly influenced by early-life exposure to HRS.

My paper contributes to the expanding body of literature on the determinants of psychological well-being, with a particular focus on the early life factors. While recent studies have primarily examined the contemporaneous determinants of psychological well-being, such as macroeconomic circumstances (Tella, MacCulloch, and Oswald 2003), income (Clark, Frijters, and Shields 2008; Kahneman and Deaton 2010; Haushofer and Shapiro 2016; Lindqvist, Östling, and Cesarini 2020), residential environment (Cattaneo et al. 2009), competition (Brandts, Riedl, and van Winden 2009), my paper extends the scope by exploring the impact of early life circumstances. Existing studies that investigate the influence of early life circumstances have mostly focused on shocks during the in-utero period, overlooking the potential impact of post-natal shocks (Adhvaryu, Fenske, and Nyshadham 2018; Adhvaryu et al. 2015). Additionally, these studies have often examined a single measure of psychological well-being, typically mental health. In contrast, my paper offers a more comprehensive exploration by considering both pre- and post-natal shocks in the early life period and examining a broader range of psychological well-being indicators, including life satisfaction, happiness, and mental health.

My paper also contributes to the expanding literature on the "fetal origins" hypothesis, which posits that early-life shocks and circumstances, particularly during the in-utero period, have long-lasting effects on various outcomes in later life (Almond and Currie 2011). This hypothesis has been extensively documented in relation to physical health (Barker 1995; Hoynes, Schanzenbach, and Almond 2016), IQ, test scores, education attainment (Black, Devereux, and Salvanes 2007; Royer 2009; Zhang 2012; Bharadwaj, Løken, and Neilson 2013; Xu 2021), labor market outcomes

(Almond 2006; Gould, Lavy, and Paserman 2011; Brown, Kowalski, and Lurie 2020), and mental health (Adhvaryu, Fenske, and Nyshadham 2018; Adhvaryu et al. 2013; Al-Haddad et al. 2019). While the existing literature has mainly focused on objective outcomes, less attention has been given to the impact of early life shocks on psychological well-being. This is a significant gap, as objective measures may not fully capture an individual's subjective experience of well-being. In my paper, I extend the "fetal origins" hypothesis to encompass a broader measure of psychological well-being and estimate its causal impact. By examining the casual link between early life shocks, and psychological well-being outcomes, my research enhances our understanding of the broader implications of the "fetal origins" hypothesis and sheds light on the factors that shape individuals' subjective assessment of well-being.

Lastly, the HRS policy is regarded as one of the most prominent reforms in transforming a planned-oriented economy into a market-oriented economy (Dwight H Perkins 1994; 1988; Garnaut, Song, and Fang 2018). However, existing examinations of the HRS have primarily focused on the short-term effect in the agriculture sector (Lin 1987; 1988; 1992), while its long-term implications have received limited attention. Only recently have a few studies started exploring the long-term impact of the HRS on economic well-being, such as education and physical health (Zhang 2012; Xu 2021.). Nevertheless, the long-term psychosocial well-being effects of the HRS remain largely unexplored. In this article, I pioneer the investigation of the long-term effect of the HRS on individuals' psychosocial well-being. By filling this research gap, my study contributes to the understanding of the social returns associated with land rights reform programs in developing countries. Moreover, by emphasizing the psychosocial well-being dimension, my estimates provide valuable insights for policymakers and researchers seeking to conduct subjective well-being valuation of the HRS. This valuation relies on subjective well-being

data to elicit individuals' willingness-to-pay for both market and non-market goods, thus enhancing the cost-benefit analysis of the reform (Dolan and Fujiwara 2021).

My article is structured as follows: Section 2 introduces the background of the agriculture system under collectivization and household responsibility system reform in 1978. Section 3 describes the individual data on psychological well-being and HRS treatment. Section 4 discusses my empirical strategy and section 5 summarizes the results from my main analyses. Section 6 explores the mechanism of HRS exposure on adult psychological well-being. Section 7 concludes.

II. Background

A. Introduction of Household Responsibility System Reform

Since 1949, China has implemented a planned economy, with one of its key strategies being the collectivization of agriculture. Under this system, prices were centrally controlled, and trade was prohibited. Notably, private property rights to assets and land were abolished. Agricultural production was organized into production teams consisting of 20-30 households, where outputs were distributed based on the number of working hours rather than the true marginal output. Workers received fixed work points per day, primarily determined by their working hours, and their compensation was based on the total work points earned after the harvest (Lin 1987). Consequently, individuals who put in the same number of hours received equal pay regardless of their level of effort. This inconsistency between marginal benefits and costs created a lack of incentive for people under the collective system to exert greater effort. As a result, agricultural productivity declined and remained stagnant throughout the collectivization period (Lin 1990).

After the passing of Mao Zedong, the first communist political leader of China, in 1976, the Chinese government embarked on a path of market-oriented economic reforms. One of the most

notable reforms in agricultural sector was the implementation of the Household Responsibility System (HRS). This reform allocated farmland to individual households based on the number of household members, with guaranteed land rights for a period of 15 years (Lin 1992). The initiation of the Household Responsibility System (HRS) took place through informal means, as it was not initially legally approved by the central government (Lin 1987). In 1978, Anhui province suffered a severe drought. With the threat of starvation, a small number of production teams in Anhui province first secretly contracted the land and agricultural equipment to individual households (Lin 1987). They assigned output quotas to individual households and allowed them to gain all of their outputs after fulfilling grain obligations to governments. At that time, allocating collective prosperity to individual households was regarded as a violation of the socialism principles by some opponents. In the November of 1978, China Communist Party (CCP) issued a document "Regulations on the Management of Rural People's Commune" which stipulated that contracting collective owned land and properties to individual households was not permitted (Zhang 2012). However, a year later, it became evident that households operating under this new system achieved significantly higher grain yields compared to other farmers in the same region (Lin 1992). The success of these initial experiments helped alleviate political pressure and led to more production teams in other regions adopting the new farming system. By 1979, the central government acknowledged this alternative farming and allocation regime, but with the stipulation that it be limited to households residing in peripheral, remote, mountainous, and impoverished areas. Finally, in January 1982, the "Household Responsibility System" (HRS) was officially recognized as a socialist economic arrangement by the central government and granted legal status.

Although the ownership of land still belonged to the collective, the HRS brought about significant changes in the production and allocation systems. Farmers, in exchange for the right to

use the allocated land, were required to deliver a certain portion of their agricultural output to the government as rental fees. However, they were allowed to keep the remaining portion after meeting the compulsory delivery to the state (Perkins 1988) . This new arrangement provided farmers with a strong incentive to work harder, as they could directly benefit from the marginal revenue generated by their efforts in agricultural production. Furthermore, the HRS reform shifted the decision-making authority from the collective farm to the household level. Individual households gained the autonomy to make their own decisions regarding agricultural inputs and had greater flexibility in maximizing their grain outputs. This decentralization of decision-making power at the household level contributed to increased productivity and efficiency in agricultural production under the HRS system.

Empirical studies estimate that the introduction of HRS in China contributed to the majority of output growth during the period of 1978-1984 (McMillan, Whalley, and Zhu 1989; Lin 1992). Figure 1 illustrates the trajectory of Total Factor Productivity (TFP) in China's agriculture sector over time. Following the completion of agricultural collectivization in 1958, TFP in the agriculture sector experienced a decline of approximately 20 percent, with agricultural productivity remaining stagnant throughout the collectivization period. However, with the implementation of HRS, TFP in the agriculture sector exhibited a steady increase. By 1983, around 95 percent of production teams had adopted the HRS, and TFP had rebounded to its pre-collective level, indicating the positive impact of the reform.

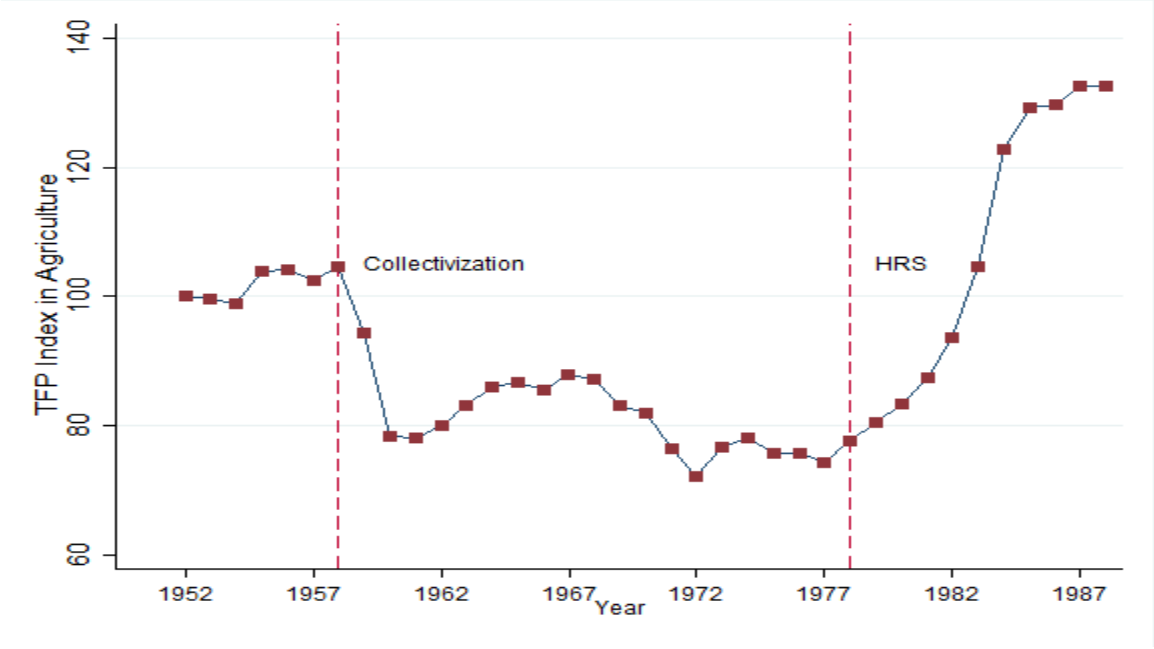

Figure 1: Total Factor Productivity (TFP) index of Chinese Agriculture, 1952–1988

Notes: This figure plots the TFP index in Chinese agriculture by year. (Index 1952=100). Data source: data are drawn from Wen (1993).

B. Variation in the reform timing

In contrast to many top-down policy implementations, the decision to adopt the HRS is made at the production team level through a voting process involving team members.[3] Previous studies have primarily relied on provincial-level data to determine the timing of HRS adoption, leading to measurement noise and inaccuracies in capturing HRS variation (Lin 1992; Xu 2021). Almond, Li, and Zhang (2019) improved the measurement of HRS adoption by collecting data from gazettes and examining the introduction pattern at the county level. My paper supplements Almond, Li, and Zhang (2019) by leveraging information on HRS timing from the China Family Panel Study (CFPS) village survey. The CFPS provides detailed data on the exact year of HRS adoption in

[3] Usually, a village consists of several production teams in China; a county consists of many villages.

surveyed villages and communities. Since HRS was exclusively introduced in rural areas, my sample focuses on rural villages that have experienced HRS in their history. Consistent with Almond, Li, and Zhang (2019), I also estimate the time of HRS adoption at the county level using the CFPS sample.[4] Figure A1 in the appendix illustrates the share of villages and counties adopting HRS in my sample, as well as the evolution of county-level HRS adoption based on the findings of Almond et al. (2019).[5] Generally, the timing of HRS adoption in my sample aligns with the adoption pattern observed in counties from gazetteers, albeit with some lag of a few years. To ensure consistency between the timing of HRS adoption in my sample and the county-level adoption data from gazetteers, I exclude villages where HRS was adopted after 1988.

The decision to adopt the Household Responsibility System (HRS) is not randomly assigned and is instead made by production members. The previous literature provides three main ideas about what drives HRS adoption (Lin, 1987; Yang, 1996; Chung, 2000). First, regions that experienced more severe adverse weather conditions prior to the reform were more likely to adopt the new system earlier, given the extreme hardships faced during that period (Yifu et al. 1987, Zhang, 2012). Anhui province, where the HRS was initiated, had suffered from a severe drought before its implementation, leading to lower productivity compared to previous years. The reform that consolidated all land and assets in 1978 posed political risks to the initiators. However, the imminent threat of widespread starvation compelled local village leaders to take risks and initiate land reform, and individuals were more willing to vote for HRS. Second, politically, the new system was initially seen as a violation of "socialist principles" by certain proponents. Villages

[4] Almond et al. (2019) defined the county HRS adoption time as the year when a few villages of this county adopted HRS, and it usually took 2-3 years to spread the HRS to the whole county.

[5] Almond et al. (2019) collected the timing of land reform at the county level from 1242 published gazetteers, accounting for approximately 1/3 of total counties in China. Their data from gazetteers are similar to yearbook data.

located farther from the central or provincial government faced less political scrutiny, making them more inclined to adopt the new farming system earlier. These regions encountered comparatively less political pressure in the adoption process. Third, poorer regions suffered more from starvation under the collective production system. Observing the significant increase in agricultural outputs in production teams that contracted land and output quotas to households, people in these regions had a stronger incentive to adopt HRS. Furthermore, recognizing the effectiveness of HRS in such production teams, the Central Committee, in September 1980, legally permitted poor, remote areas, and production units heavily reliant on state subsidies to adopt HRS.[6]

III. Data

A. The China Family Panel Studies (CFPS)

My primary dataset is China Family Panel Study (CFPS), a nationally representative household survey conducted by the Institute of Social Science Survey (ISSS) at Peking University. The CFPS data consists of interviews conducted in 2010 and subsequent follow-ups in 2012, 2014, 2016, and 2018. The survey employed a multistage probability sampling procedure and covered approximately 15,000 households and all individuals residing in these households across 645 communities in 25 provinces of Mainland China. This coverage accounted for approximately 83 percent of the Chinese population in 2010.[7] The CFPS dataset offers comprehensive information on various demographic characteristics of the respondents, including age, gender, educational

[6] I utilize data from the China Family Panel Survey (CFPS) village survey and rainfall data sourced from the NOAA-ESRL Physical Sciences Laboratory, Boulder Colorado to examine the relationship between HRS adoption timing at the village level and the three potential determinants. This study contributes the first empirical evidence on this relationship. The findings reveal a consistent pattern, and the detailed results are presented in Table A1 in the appendix.

[7] Provincial population data are from the National Bureau of Statistics in China. http://www.stats.gov.cn/english/Statisticaldata/CensusData/rkpc2010/indexch.htm

attainment, family background, employment status, and health conditions. Given the panel structure of the data, most respondents were tracked across multiple waves. Since one person interviewed in several waves has the same HRS treatment variation, this study primarily focuses on the CFPS-2010 wave.

The CFPS includes a community/village survey conducted in 2010 and 2014, which provides valuable information about the history and characteristics of the surveyed villages. The community/village survey collects detailed data from village leaders, including the specific year of HRS adoption, as well as information on infrastructure construction programs and the socio-economic and geographical conditions of the villages. The reliability of the reported HRS adoption timing in the CFPS community survey is high. HRS represents a significant and socially desirable event that has had a profound impact over the past three decades. The village leaders and residents have firsthand knowledge and have witnessed the transformative changes in land rights and production practices associated with HRS, which enhances the accuracy of reporting the year of HRS adoption, even when reported many years later (Beckett et al. 2001).

Outcome variables

The first outcome variable of interest in this study is “Overall Life Satisfaction”. Respondents are asked to rate their satisfaction with their own life on a scale ranging from 1 ("Extremely dissatisfied") to 5 ("Extremely satisfied"). The second outcome variable is Happiness, which is derived from the respondents' answer to the question "How happy do you think you are?" The respondents rate their happiness on a scale ranging from 1 ("Extremely unhappy") to 5 ("Extremely happy"). The third outcome variable, Mental Health, is measured using a six-question short-form scale (K6) embedded within the 10-question Kessler Psychological Distress Scale (K10). Kessler et al. (2002) introduces those questions as a measure of anxiety-depression mental distress and

find that both the K6 and K10 have good precision for diagnosed mental health. Each question asks respondents how often they have experienced specific negative emotions, such as anxiety or hopelessness, during the last month. The response options range from 1 ("Nearly every day") to 5 ("Never"). To compute the overall mental health status, the mental health variable is defined as the sum of the respondents' answers to the six K6 questions, with higher values indicating better mental health.[8] To facilitate meaningful comparisons across the psychological well-being indicators, I standardized the three outcome variables (Overall Life Satisfaction, Happiness, and Mental Health) by subtracting the mean and dividing the standard deviation of each corresponding psychological variable, ensuring a common scale for analysis and interpretation.

Treatment status

The treatment variable in this study is defined as the share of years an individual was exposed to HRS in early life, spanning from the in-utero period through early childhood. A growing literature documents that circumstances in utero and early childhood, usually defined as the first five years of life, have a large impact on later life outcomes (Currie and Almond 2011; Almond and Currie 2011; Attanasio 2015; Boudreaux, Golberstein, and McAlpine 2016). Hoynes, Schanzenbach, and Almond (2016) test when the early life exposure to shock matters with an event study and find that exposure to Food Stamp program under age 5 has a large impact on adult physical health while exposure after age 5 has minimal effect. Drawing from their findings, I assume that exposure to HRS after age 5 have a trivial impact on adult psychological wellbeing. To assess the relevance of the age 5 threshold for psychological well-being, I conduct a heterogenous effect analysis for different age cohorts when HRS was implemented. This analysis reveals that the age of five is

[8] CFPS provides details about how to construct general mental health. http://www.isss.pku.edu.cn/cfps/docs/20180928161838082277.pdf?CSRFT=67OY-9O6S-U83T-DSM5-Q7V6-0LEA-GTFZ-MF1C

indeed a significant threshold for psychological well-being.

Sample

Given that the implementation of HRS was limited to rural areas, my analysis focuses specifically on individuals with rural registration, as they would have been directly affected by the reform. To ensure comparability, I narrow my attention to individuals born within a specific time frame relative to the introduction of HRS. Specifically, I include individuals born from 15 years before the initiation of HRS to 5 years after its implementation as my treatment group. To examine the long-term effects of HRS, it is crucial to have accurate information regarding the individuals' locations when the reform took place. However, it is important to note that population migration occurred in China, particularly after the relaxation of residential restrictions in the late 1990s. Consequently, the present residential locations of individuals may not necessarily align with their birth locations. In CFPS-2010, approximately 40% of respondents were born in rural areas but currently reside in urban areas. Considering that HRS may have influenced individuals' migration behavior, excluding rural-to-urban migrants from the analysis would result in a non-representative sample. Therefore, in my main analysis, I retain rural-to-urban migrants and assign their treatment status based on their county of birth.

Table 1 presents the summary statistics for the variables of interest and principal control variables. The psychological indicators in this study are measured such that a higher value corresponds to better psychological well-being. The observed psychological indicators exhibit significant variation, with life satisfaction ranging by 3.8 standard deviations and mental health ranging by 6.5 standard deviations. Based on the defined treatment of HRS exposure from in-utero to age 5, the average share of individuals exposed to HRS in the sample is 24.8%. The mean year of HRS adoption in the sample is 1981, with substantial variation spanning from 1978 to 1988.

The average birth year of the respondents is 1974. Approximately half of the respondents are male, while 11% belong to minority groups. Furthermore, 33% of the respondents currently reside in urban areas. In terms of education, the average schooling duration for the respondents in the sample is 7.132 years, which corresponds to approximately completing primary school education. The average schooling duration for the respondents' spouses is 6.391 years. On average, the fathers in the sample have attained 5.249 years of education, while the mothers have completed 4.052 years of education.

Table 1 Summary Statistics

Variable	Mean	Standard deviation	Min.	Max.	N
Psychological wellbeing					
Life satisfaction	1.19e-08	1	-2.315	1.548	7396
Happiness	-1.21e-08	1	-2.69	1.193	7378
Mental health	-5.25e-09	1	-5.729	0.812	7355
HRS exposure					
HRS	0.248	0.278	0	1	7420
The year of HRS introduction	1981	1.748	1978	1988	7406
Control					
Year of birth	1974	5.943	1963	1992	7406
Male	0.499	0.5	0	1	7406
Minority	0.105	0.307	0	1	7406
Urban residents	0.332	0.471	0	1	7406
Schooling	7.132	4.168	0	19	7406
Spouse schooling	6.391	4.333	0	19	6785
Father education	5.249	3.306	0	19	7406
Mother education	4.052	0.700	0	19	7406

Note: All three psychological indicators are standardized before sample selection. HRS is the share of years from in-utero period to age 5 when HRS was adopted at the adult's county of birth. Data source: CFPS-2010

IV. Empirical Strategy

I employ a cohort difference-in-difference model that leverages two distinct sources of variation. Firstly, the adoption of HRS occurred at different times across counties in China. Secondly, within the same county, individuals from different cohorts experienced varying degrees of exposure to

HRS during their early childhood, depending on the timing of their birth relative to the implementation of the land reform. Following Hoynes, Schanzenbach, and Almond (2016), I compare the psychological well-being of those with longer early childhood exposure to HRS to those with shorter childhood exposure to HRS. As a baseline specification, I estimate the following two-way fixed-effect (TWFE) model:

$$y_{ict} = \alpha + \beta \boldsymbol{HRS}_{ct} + \boldsymbol{X}_{ict}\gamma + \eta_c + \lambda_t + \boldsymbol{Z}_c \times t + trend_{ct} + \varepsilon_{ict} \quad (1)$$

where *i* indexes the individual, *c* the county of birth, *t* the year of birth. The variable of interest, $\boldsymbol{HRS}_{ct}$, measures the HRS exposure from in-utero period to early childhood. In my case, $\boldsymbol{HRS}_{ct}$ is the share of years from in-utero period to age 5 when HRS was adopted at the adult's county of birth.

Because HRS was quickly diffused within a county, there is limited variation in the timing of village-level HRS adoption within a county (Almond, Li, and Zhang 2018). In addition, I assign rural-to-urban migrants the HRS treatment time according to the timing of HRS in their county of birth. For consistency of HRS treatment, therefore, I control the county fixed effect, η_c , instead of village fixed effect to capture any time-invariant effect of county heterogeneity. There are 156 counties in CFPS, providing sufficient variation in the timing of HRS adoption. To account for systematic time-invariant differences across cohorts, I incorporate cohort fixed, λ_t. Additionally, I also control for individual-level covariates $\boldsymbol{X}_{ict}$, including gender, ethnic groups, a quadratic in age, number of siblings, mother's age at birth, and father's education attainments. To address concerns regarding the parallel trends assumption, Angrist and Pischke (2014) suggest controlling for county-specific linear trends. Consequently, I include county-specific linear trends in the year of birth, $trend_{ct}$, to alleviate potential violations of the parallel trend's assumption. All models

are estimated using the sample weights provided by the China Family Panel Study, and standard errors are clustered at the county of birth level to account for potential correlation within counties.

The validity of my design depends on the exogeneity of the timing of the HRS implementation across counties. However, as demonstrated in section 2.2, certain factors such as drought in April, economic level, and distance to the provincial government are predictors of the timing of HRS adoption by villages. Failing to account for these factors would introduce a downward bias in my estimates. The results indicate that villages experiencing drought in April were more likely to adopt HRS earlier, while childhood exposure to drought and limited access to government subsidies due to greater distance from the provincial government had a detrimental effect on adult outcomes. Similarly, neglecting to control for economic level prior to HRS implementation would also lead to biased estimates. Counties with higher pre-1978 economic wealth tended to adopt HRS later, and greater economic resources during childhood associated with higher economic development levels had a positive impact on adult outcomes. I add the rainfall at county level in the regression to control the time-varying effect of rainfall on adult psychosocial well-being. Although county fixed effect in my research design can absorb the time-invariant effect of the economic level prior to HRS and the distance to the provincial government, the effect of these two determinates of HRS timing on adult psychological well-being may vary by cohorts. Following Gentzkow and Shapiro (2008) and Hoynes, Schanzenbach, and Almond (2016) strategy, I control for trends in the primary determinants of HRS adoption by including interactions between primary determinants of the HRS county of birth and a set of dummies in year of birth ($\boldsymbol{Z}_c \times b$). This approach helps reduce the likelihood that my results will be confounded by unobserved differences in cohort or time trends across counties with varying economic levels or distances to the provincial government.

My estimates should be interpreted as the lower bound of the childhood HRS exposure on long-term psychological wellbeing for two reasons. Firstly, I assume that exposure to HRS after age five has no impact on adult psychological well-being. However, it is possible that individuals who were older than five at the time of HRS introduction could still benefit from HRS in various ways. For one thing, HRS increased the grain output per capita per year by 3.8 percent (Almond, Li, and Zhang 2018), which might directly affect the adult psychological well-being of those older than five at HRS introduction. For another, individuals who were older at HRS introduction may benefit indirectly from the positive effects experienced by their younger peers. Secondly, the measurement error in HRS treatment might could attenuate the observed positive effects, thus leading to an underestimation of the true impact of childhood HRS exposure on long-term psychological well-being.

In addition, one may worry about that the TWFE model could only provide consistent estimates under the relatively strong assumption about homogeneity in treatment effects across treatment groups and across period (de Chaisemartin and D'Haultfœuille 2020; Borusyak, Jaravel, and Spiess 2021; Callaway and Sant'Anna 2021; Goodman-Bacon 2021; Sun and Abraham 2021). To allay concerns about the reliability of the TWFE estimator, I replicated the main results using the robust estimator introduced by Borusyak,, Jaravel, and Spiess (2021) and Callaway and Sant'Anna (2021). Those estimators exclude all 2 × 2 difference-in-difference comparisons between newly and already treated units. Even in the presence of heterogeneous treatment effects across periods and/or across treated units, these estimators could provide consistent estimates.

V. Main results

A. Psychological wellbeing

Table 2 shows the results of equation (1) for adult psychological well-being, as measured by general life satisfaction, happiness, and mental health. The findings demonstrate a positive impact of early childhood exposure to HRS on adult psychological well-being. Specifically, Columns (1), (4), and (7) display the standard Difference-in-Differences (DID) estimates, which account for individual and family characteristics, fixed effects for county of birth, and cohort effects. The outcomes from these three columns suggest that exposure to HRS during the in-utero period and early childhood significantly enhances general life satisfaction, happiness, mental health, with statistically significant effects observed across all dimensions except happiness.

To address potential endogeneity concerns associated with HRS adoption, I incorporate cohort-specific interactions of primary determinants of HRS adoption. The estimated effects of HRS on adult general life satisfaction, happiness, and mental health, presented in Columns (2), (5), and (8), indicate slightly larger magnitudes compared to the estimates in Columns (1), (4), and (7). Additionally, I introduce county-specific linear trends in year of birth as controls to mitigate the possibility of results being driven by divergent cohort trends in psychological well-being across counties. As discussed in Section 4.2, the most rigorous model specifications, encompassing county-specific cohort-varying controls and county of birth time trends, are reported in Columns (3), (6), and (8) and deemed as the preferred specifications. The findings in Column (3) demonstrate that transitioning from zero to full exposure to HRS, from in utero to age five, leads to a notable improvement of 0.419 standard deviations in adult life satisfaction, statistically significant at the 1 percent level (This corresponds to 12% increase in the mean of life satisfaction as indicated in appendix A3). However, the effects on adult happiness, as observed in Column (6), are relatively small and statistically insignificant for exposure to HRS during childhood. Finally, the results in the last column of Table 3 suggest that an increase in the share of HRS exposure from

zero to one corresponds to an enhancement of 0.322 standard deviations in adult mental health, significant at the 5 percent level (This corresponds to 4.70% increase in the mean of mental health as indicated in appendix A3). Notably, the incorporation of county of birth trends and a comprehensive set of potential confounding factors leads to slightly larger effect estimates on average.

Table 2 The impact of HRS exposure during childhood on adult psychological well-being

	Life satisfaction			Happiness			Mental health		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HRS share IU–5	0.368**	0.372**	0.419***	0.022	0.031	0.020	0.266*	0.275*	0.322**
	(0.145)	(0.147)	(0.155)	(0.151)	(0.151)	(0.162)	(0.150)	(0.148)	(0.154)
Observations	6,505	6,505	6,505	6,490	6,490	6,490	6,470	6,470	6,470
R^2	0.097	0.113	0.140	0.123	0.139	0.163	0.123	0.144	0.177
$\boldsymbol{Z}_c$ * Cohort FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
County-specific trend	No	No	Yes	No	No	Yes	No	No	Yes

Note: All the dependent variables are standardized with zero mean and standard deviation of one. Gender, ethnicity, mother's age at birth, father's education, county fixed effect, cohort birth year and month fixed effect are controlled in all regressions. $\boldsymbol{Z}_c$ include whether a county experienced a drought in April at the year of HRS introduction, the logarithm of distance to the provincial government, and economic development prior to 1978. County-specific trend includes county-specific linear trend in year of birth. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Due to the possible bias of TWFE, I use the methodology developed by Borusyak, Jaravel, and Spiess (2021) and Callaway and Sant'Anna (2021) to estimate those effects. The point estimates generated by robust estimator using those new methods are shown in Table 3. These estimators yield positive regression results similar to those of our baseline model for life satisfaction and mental health, while the results for happiness become significant, demonstrating the HRS reform increased the overall psychological well-beings.

Table 3 The robust point estimates of treatment effects of HRS exposure

Estimator	Life satisfaction	Happiness	Mental health
TWFE	0.368**	0.022	0.266*
	(0.145)	(0.151)	(0.150)
Borusyak, Jaravel, and Spiess (2021)	0.371***	0.354**	0.191*
	(0.135)	(0.107)	(0.115)
Callaway and Sant'Anna (2021)	0.312**	0.313**	0.103
	(0.152)	(0.152)	(0.100)

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All estimators account for individual and family characteristics, fixed effects for county of birth, and cohort effects. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

B. Heterogeneous Effects

Does the Timing of Treatment Matter?

The previous fetal origins literature mostly relies on natural experiments induced by disasters, like famines, disease outbreaks, which occur and subsequently dissipate. In such cases, individuals born after the cessation of the shock are not subject to its influence. The identification of treated and untreated individuals is straightforward as it can be explicitly defined based on the timing of the shock and the year of birth. In contrast, the adoption of HRS represents a persistent intervention that remains in effect over time. Consequently, individuals of any age, including adults, can be influenced by HRS. In this context, comparing different cohorts within the same county poses challenges since the entire population within that county has been exposed to the intervention.

Some literature suggests that circumstances during the preschool period exert a more substantial influence on later life outcomes than conditions in subsequent stages of life (Campbell et al. 2002; Doyle et al. 2009; Hoynes, Schanzenbach, and Almond 2016). However, there is no consensus in the biological and economic literature regarding the specific timing of early-life exposures that matter. Notably, Hoynes, Schanzenbach, and Almond (2016) made pioneering contributions by examining the critical periods of exposure to the Food Stamp program for physical health and

economic self-sufficiency. Through a comparison of effects across different cohorts exposed to the program at varying ages, they find that exposure after age five has minimal impact on later life outcomes. Similarly,. Y. J. Chen, Li, and Xiao (2020) uncover the same threshold in their examination of the timing of exposure to tap water and its effects on later life outcomes.

Building upon their methodology, this study examines the impact of HRS on psychosocial indicators across different age cohorts during the introduction of HRS. Specifically, I explore the potential heterogeneity in the effects of HRS based on the age at which individuals were exposed to the program. For instance, individuals born in 1973 in a county where HRS was implemented in 1978 would have been 5 years old at the time of HRS introduction, resulting in an event period of 5 years. To capture these variations, I estimate a modified version of equation (1) by replacing the variable $\boldsymbol{HRS}_{ct}$ with a set of dummies based on two-year intervals of age at HRS introduction with age 10 and 11 as the omitted group.

In Figure 2, Panel A and C present the estimated coefficients of HRS on adult life satisfaction and mental health for each cohort relative to the reference group of 10- and 11-year-olds at the time of HRS adoption. For cohorts older than 5 years at HRS adoption, the estimated differences in adult life satisfaction and mental health compared to the age 10 and 11 groups are statistically indistinguishable from zero. This suggests that exposure to HRS after the age of five has minimal impact on adult life satisfaction and mental health outcomes. In contrast, cohorts younger than 6 years old or not yet born at HRS adoption experience a significant increase in life satisfaction and mental health. Furthermore, the magnitude of the coefficient becomes larger as the age at HRS

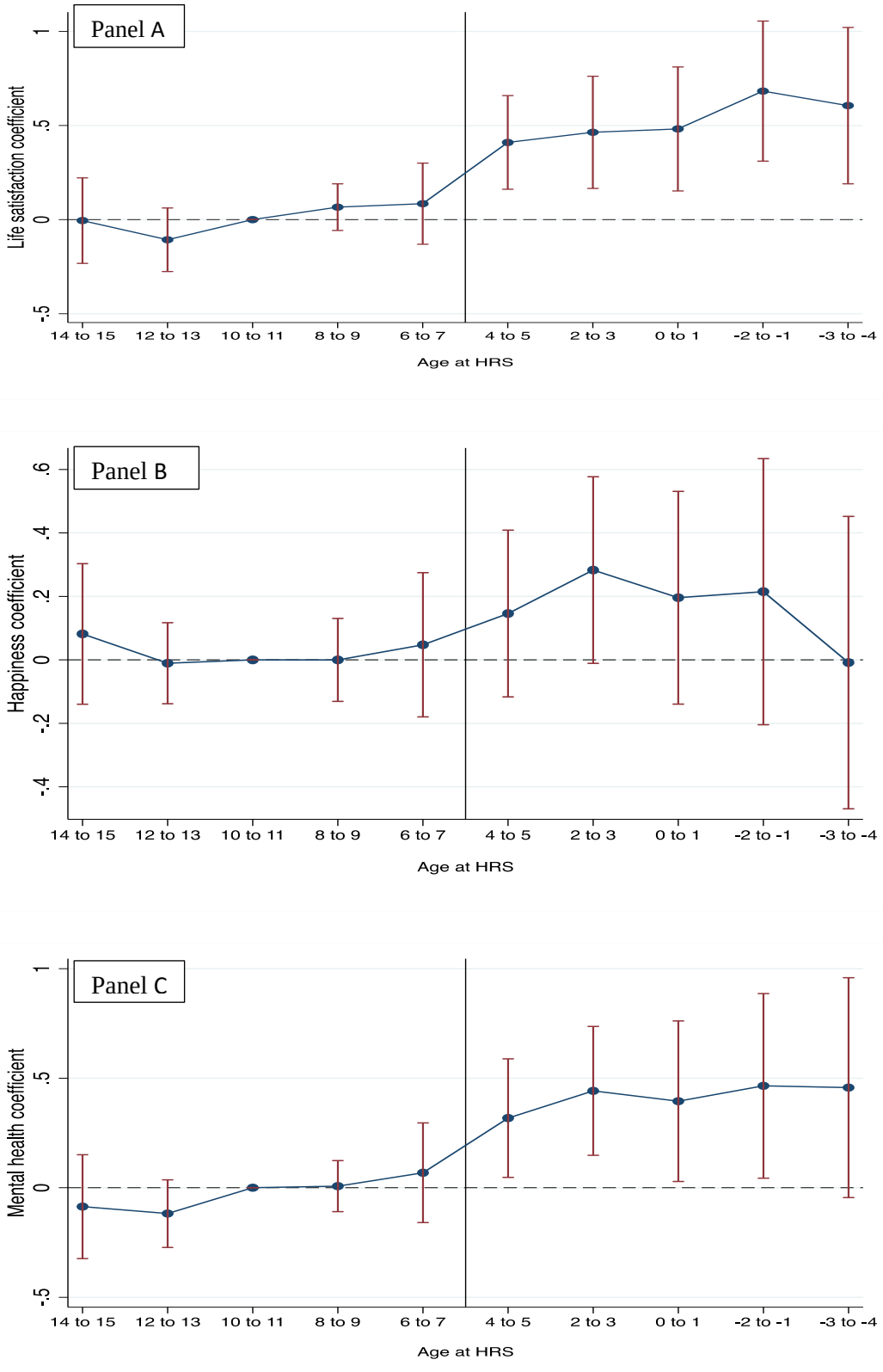

Figure 2 Heterogenous age estimates of the effects of HRS on adult psychological well-being

adoption decreases, consistent with the notion that younger cohorts have longer exposure to HRS during childhood.

Turning to Panel B of Figure 2, it examines the effect of HRS during early life on adult happiness for each age group at the time of HRS introduction. While the coefficients for each cohort are statistically insignificant from zero, there is a notable jump observed for the age four and five groups at the time of HRS introduction. Heterogenous effects by age using new methods introduced by Borusyak,, Jaravel, and Spiess (2021) and Callaway and Sant'Anna (2021) are shown in appendix D: FA2. These results exhibit the same age threshold. It is worth noting that all the coefficients in Figure 2 represent relative effects compared to the age 10- and 11-year-old groups at HRS adoption. Direct testing of the impact of HRS on the age 10- and 11-year-old group is not feasible. Therefore, the figure serves as suggestive evidence supporting the threshold assumption made in the earlier section that exposure to HRS during the first five years of life is crucial for adult psychological well-being, while exposure to HRS after the age of five has minimal effect on later-life psychological well-being.

Does Gender and Parental Education Matter?

By gender. I first explore the long-term effect of HRS exposure during childhood by gender. The results are shown in panel A of Table 4. The first three columns in Panel A display the impact of HRS on adult general life satisfaction for males. The findings reveal a substantial and statistically significant effect of HRS on male general life satisfaction. However, I did not observe a significant effect on adult happiness and mental health for males. In contrast, the last three columns in Panel A indicate that the effects of HRS on psychological well-being for females are smaller in magnitude and statistically insignificant. Panel A of table A3 in Appendix. E. show that

boys benefit more from HRS in terms of psychological mean. These results are in line with the biological evidence that males are more subject to harm in utero and early childhood than females (Currie and Almond 2011; Grönqvist, Nilsson, and Robling 2020) and also culture of son-preference in China.

By parental education. Next, I estimate the long-term effect of HRS exposure during childhood by parental education. It is important to note that in 1981, the World Health Organization estimated that 85% of China's population lived in extreme poverty, with a daily income of $1.25 per person.[9] These extreme poor households faced severe resource limitations, with all family members struggling to meet basic survival needs, which could have adverse effects on child development. Considering the potential role of HRS in alleviating family budget constraints during childhood and its impact on long-term psychological well-being, I hypothesize that children from initially poorer families before land reform may benefit more from the introduction of HRS. Unfortunately, the CFPS-2010 dataset lacks information on family socioeconomic status prior to the reform. Therefore, I employ parental education as a proxy in my analysis. In Panel B of Table 4, I present the results categorized by the mother's education. Remarkably, the first three columns in Panel B indicate that individuals whose mothers are illiterate derive greater benefits from HRS exposure. In contrast, among those whose mothers have higher levels of education, the estimated long-term effects are smaller in magnitude and statistically insignificant, as observed in the last three columns of Panel B[10]. Panel B of table A3 in Appendix. E. show that children from disadvantaged backgrounds benefit more from HRS in terms of psychological mean. These findings align with

[9] https://www.worldbank.org/en/news/feature/2010/03/19/results-profile-china-poverty-reduction
[10] Similarly, Table A* in the appendix show that people whose fathers are illiterate benefit more from HRS

previous research indicating that children from disadvantaged backgrounds tend to benefit more from early-life interventions (Kirdar, Dayioğlu, and Koç 2016; Y. Chen et al. 2020).

Table 4 The heterogeneous impact of HRS adoption on adult psychological wellbeing

	(1) Life satisfaction	(2) Happiness	(3) Mental health	(4) Life satisfaction	(5) Happiness	(6) Mental health
Panel A	***Men***			***Women***		
HRS share IU–5	0.788***	0.047	0.298	0.033	0.028	0.257
	(0.209)	(0.212)	(0.185)	(0.257)	(0.216)	(0.257)
Observations	3,261	3,253	3,243	3,244	3,237	3,227
SD of outcome Var	0.197	0.232	0.239	0.222	0.244	0.242
Panel B	***Mother illiterate***			***Mother with some education***		
HRS share IU–5	0.648***	0.052	0.529**	0.034	0.036	-0.020
	(0.223)	(0.226)	(0.203)	(0.350)	(0.319)	(0.201)
Observations	4,374	4,367	4,346	2,131	2,123	2,124
R-squared	0.166	0.199	0.222	0.284	0.302	0.332

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. All the regressions include county fixed effect, cohort effect, $\boldsymbol{Z}_c$ interact with cohort dummies and county-specific trends. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

C. Placebo test

Time-shifted placebo test

Individuals who were older than 15 at the time of HRS implementation in their county of birth had no exposure to HRS during the critical period from in-utero to early childhood. Based on the assumption that only exposure to HRS during childhood (younger than age 5) affects adult psychological well-being, it is expected that there would be no effect when assigning HRS exposure to individuals older than 15 at HRS introduction. To test this hypothesis, I shift the birth year of individuals aged 15 to 35 at HRS introduction backward by 20, aligning them with the age of respondents in my main analysis. Subsequently, I conduct a placebo test by assigning HRS

treatment status to these individuals based on their shifted birth year and the timing of HRS introduction in their county of birth. The results of the placebo test, presented in the first three columns of Table 5, reveal small and statistically insignificant estimates that are indistinguishable from zero. This finding suggests that the main results are unlikely driven by cohort trends, or any spurious effects associated with HRS exposure in individuals older than 15 at the time of HRS introduction.

Birth Registration placebo test

HRS was a reform specifically targeted at enhancing productivity in the rural agricultural sector, thus exclusively impacting individuals with rural registration. Individuals born with urban registration, residing in the same county as those with rural registration, were not affected by the HRS reform. To investigate this further, I assign the timing of HRS adoption at the county level to individuals born with urban registration within the same county. Using the same methodology for constructing HRS exposure, I run the regression analysis for the urban counterparts. It is anticipated that HRS adoption would have no effect on individuals born in urban areas. Although the estimates in columns (4) to (6) of Table 5 are statistically insignificant, it is worth noting that the standard deviations for all three psychological indicators are relatively large. One potential explanation for this is the limited sample size of individuals born with urban registration. However, despite the lack of statistical significance, the negative coefficients observed in columns (4) and (6) suggest that the positive effects observed for those born with rural registration in my main analysis are less likely driven by a positive cohort trend affecting individuals with urban registration.

Table 5 Placebo test

	(1) Life satisfaction	(2) Happiness	(3) Mental health	(4) Life satisfaction	(5) Happiness	(6) Mental health
	Time-shifted placebo test			***The birth registration placebo test***		
HRS share IU–5	-0.187	-0.093	-0.032	-0.129	0.309	-1.285
	(0.215)	(0.172)	(0.208)	(0.681)	(0.784)	(0.780)
Observations	6,130	6,125	6,084	686	680	685
R-squared	0.165	0.151	0.175	0.573	0.565	0.556

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

D. Robustness Checks

Confounding factors

Village Infrastructure Constructions. In China, the government initiated several village infrastructure constructions, particularly following the implementation of the Reform and Opening Policy in 1978. These infrastructure developments encompassed various aspects, such as electricity, cable radio, telephone services, cell phone signal coverage, public roads, railways, pipeline gas, and tap water. Previous literature has demonstrated that early childhood exposure to infrastructure constructions, such as access to television, tap water, latrines, and school construction, has a lasting effect on later life outcomes (Duflo 2001; Gentzkow and Shapiro 2008; Spears and Lamba 2016; Zhang and Xu 2016; Chen, Li, and Xiao 2020). Considering that these infrastructure constructions coincided with the introduction of the HRS policy and may have differential impacts on the psychological well-being of cohorts older than 5 years and cohorts younger or equal to 5 years at HRS adoption, I include controls for exposure to these infrastructure construction programs from the in-utero period to early childhood to mitigate any potential confounding effects on adult psychological well-being. The results presented in panel A of Table 6 indicate that the estimates remain similar regardless of whether early-life exposure to various

village infrastructure constructions is included or not. This suggests that the findings of my study are not driven by the influence of various village infrastructure constructions on adult psychological well-being.

Table 6 Confounding factors

	(1) Life satisfaction	(2) Happiness	(3) Mental health	(4) Life satisfaction	(5) Happiness	(6) Mental health
Panel A: Infrastructure Constructions						
HRS share IU–5	0.421***	0.029	0.347**	0.392**	0.026	0.320**
	(0.158)	(0.161)	(0.154)	(0.158)	(0.169)	(0.161)
Early-life exposure to infrastructure constructions	No	No	No	Yes	Yes	Yes
Observations	6,505	6,490	6,470	6,505	6,490	6,470
R-squared	0.126	0.153	0.165	0.143	0.164	0.181
Panel B: Send-Down Movement						
HRS share IU–5	0.502**	0.112	0.571***	0.469**	0.088	0.560***
	(0.197)	(0.199)	(0.164)	(0.192)	(0.196)	(0.157)
SDY x Cohort FE	No	No	No	Yes	Yes	Yes
Observations	5,233	5,223	5,206	5,233	5,223	5,206
R-squared	0.136	0.167	0.185	0.148	0.172	0.189
R-squared	0.231	0.260	0.258	0.232	0.263	0.262
Panel C: OCP						
HRS share IU–5	0.636***	0.174	0.380**	0.643***	0.172	0.363**
	(0.160)	(0.195)	(0.167)	(0.159)	(0.195)	(0.164)
Province-Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of siblings FE	No	No	No	Yes	Yes	Yes
Observations	6,505	6,490	6,470	6,505	6,490	6,470
R-squared	0.231	0.260	0.258	0.232	0.263	0.262

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. SDY is the share of send-down youth in each county from 1968 to 1979. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Send-down Movement. The "send-down movement" was a government initiative in China that compelled approximately 16 million urban youth to relocate and work in rural areas. This movement occurred between 1968 and 1979, resulting in a substantial influx of educated urban

youth into rural regions. During this period, the urban youth were often more educated than their rural counterparts, and many of them served as teachers for rural children. Additionally, the urban youth brought with them new urban technology, knowledge, and values, potentially influencing the rural area. Chen et al. (2020) collect data on the number of send-down youth in each county from local gazetteers and found that the presence of educated urban youth had long-lasting beneficial effects on rural children, including in education, beliefs and values, internal locus of control, and occupation. Given the overlap between the send-down movement and the introduction of the HRS policy,[11] the send-down movement could potentially confound the main results of my study. To address this concern, I control for the interaction between the share of send-down youth in each county and the cohort dummy.[12] The results in the last three columns of panel B in Table 6 demonstrate that the estimated impacts of HRS remain largely unchanged, indicating that my findings are not driven by the influence of the send-down movement.

One-Child Policy (OCP). The One-Child Policy (OCP) was implemented during the same period as the HRS policy, with the objective of population control. Financial penalties and political pressure were introduced to enforce the policy. However, the financial penalties and the resulting smaller family sizes caused by the OCP may also have had long-term effects on children's outcomes. Failing to account for the OCP could introduce bias into my estimates. According to Document 11 issued by the central government in 1982, provincial governments were given the authority to issue specific and locally adjusted regulations for implementing the OCP. Therefore, it is believed that the OCP was implemented at the provincial level (Huang, Lei, and Sun 2019). If this is the case, the impacts of the OCP on adults' psychological well-being can be absorbed by

[11] Send-down movement ranged from 1968 to 1979, while HRS was firstly introduced in 1978.
[12] Share of send-down youth in each county are from Y. Chen et al. (2020).

including province-specific cohort fixed effect, λ_{pt}. The results in panel B of Table 6 demonstrate the robustness of my findings to the inclusion of province-specific cohort fixed effects, indicating that my results are not driven by provincial-level shocks. Additionally, the estimates in panel B of Table 6 remain similar whether or not the number of siblings is included, which represents the primary impact of the OCP on families. In summary, the results in panel B of Table 6 provide evidence that my estimates of the effects of the HRS policy on adult psychological well-being are not influenced by the OCP.

VI. Mechanism

A. Agricultural Incomes

In this subsection, I present empirical evidence demonstrating that early-life exposure to the HRS policy influences adult psychological well-being through an increase in agricultural income during childhood. A key aspect of the HRS policy was the provision of private agricultural land to rural individuals, enabling them to make independent production decisions and retain the outputs from their own land. This effectively resolved the disincentive problem associated with collective farming and led to a boost in agricultural output. Drawing on the county-level data collected from gazetteers, Almond, Li, and Zhang (2018) find that the implementation of the HRS policy resulted in an annual increase of 3.8 percent in grain output per capita. If the mechanism through which early-life exposure to HRS operates is increased agricultural income during childhood, we would expect to observe a stronger effect among children from farming households and those residing in flatland areas, which are typically more suitable for agricultural production. Panel A of Table 7 presents the effects of HRS for children from farming and non-farming households, while Panel B shows the effects for children born in flatland areas compared to those in non-flatland areas. The

results in Table 7 indicate that the effects of HRS are most pronounced and statistically significant for children from farming households and those born in flatland areas. The estimates using raw psychological indicators in table A4 Appendix. F. exhibit similar results in terms of psychological mean. In sum, those estimates in table 7 provide support for the hypothesis that the mechanism operates through increased agriculture income.

Table 7 Heterogeneous impact on psychologic well-being

	(1) Life satisfaction	(2) Happiness	(3) Mental health	(1) Life satisfaction	(2) Happiness	(3) Mental health
Panel A:	Father is a farmer			Father is not a farmer		
HRS share IU–5	0.558***	0.145	0.416**	0.388	-0.003	0.288
	(0.198)	(0.221)	(0.190)	(0.338)	(0.317)	(0.235)
Observations	4,892	4,882	4,865	1,613	1,608	1,605
R-squared	0.152	0.197	0.202	0.361	0.374	0.400
Panel B:	Flatlands			Non-flatlands		
HRS share IU–5	0.820**	0.654**	0.270	0.364	-0.111	0.321
	(0.319)	(0.326)	(0.260)	(0.233)	(0.221)	(0.214)
Observations	1,790	1,785	1,771	4,715	4,705	4,699
R-squared	0.277	0.331	0.322	0.179	0.191	0.221

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

B. Birth weight and post-natal wellbeing

The fetal origin hypothesis posits that conditions during the in utero period can impact the availability of nutrition, thereby directly influencing birth weight (Almond, Hoynes, and Schanzenbach 2011). In China, prior to the adoption of the Household Responsibility System (HRS), agricultural productivity was low, and a significant portion of the rural population lived in poverty. As of 1978, the World Health Organization estimated that 97.5% of China's population

experienced extreme poverty, suffering from malnutrition issues[13]. Introduction of the HRS led to improved agricultural productivity during the early reform period (1978–1984) (McMillan, Whalley, and Zhu 1989). Consequently, women who became pregnant after the implementation of the HRS were likely to have access to better nutrition during pregnancy, leading to improved birth health outcomes. Birth weight is considered an important indicator of infant health status and serves as a strong predictor of adult health (Black, Devereux, and Salvanes 2007; Li et al. 2015; Camerota and Bollen 2016). In this study, birth weight is used as a proxy for infant health to examine the impact of HRS introduction on birth health. Unlike childhood exposure to the HRS, pregnancy exposure to the HRS is constructed based on the overlap between maternal pregnancy and the HRS adoption. Specifically, pregnancy exposure to the HRS is assigned a value of one for individuals born after the HRS introduction, and zero otherwise. The results presented in the first column of Table 8 reveal a positive and significant impact of being pregnant after the HRS adoption on baby birth weight, which aligns with the nutrition mechanism.

Table 8 The impact of HRS exposure on early life circumstances

	(1) Birth weight (500 g)	(2) Always living with father before 3	(3) Always living with mother before 3
Pregnancy exposure to HRS	0.552***		
	(0.207)		
Early three-year exposure to HRS		0.036*	0.010
		(0.021)	(0.016)
Means of Outcomes	5.30	0.901	0.944
Observations	1,781	6,249	6,328
R-squared	0.430	0.262	0.382

Note: “Pregnancy exposure to HRS” equals one for those who was born after HRS was implemented, zero otherwise. “Early three-year exposure to HRS” equals one for those who was three years or younger when HRS was implemented, zero otherwise. “Always living with father before 3” equals to one when a respondent always lived with his or her father before age 3, zero otherwise. “Always living with mother

[13] https://thedocs.worldbank.org/en/doc/bdadc16a4f5c1c88a839c0f905cde802-0070012022/original/Poverty-Synthesis-Report-final.pdf

before 3" equals to one when a respondent always lived with his or her mother before age 3, zero otherwise. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Furthermore, aside from the availability of nutrition during the prenatal period, post-natal nurturing also holds significant importance in shaping future outcomes (Heckman, Pinto, and Savelyev 2013; F. Campbell et al. 2014; Bailey, Sun, and Timpe 2021). While the primary objective of HRS is to address incentive issues in the agricultural sector, it can also encourage farmers to remain on their land and reduce temporary absences from home. The enhanced agriculture productivity resulting from HRS implementation leads to increased profitability in farming. In China, land leasing is restricted to local residents with official registrations, which means that engaging in farming allows parents to stay at home and be present with their children. It is plausible that the introduction of HRS has led to greater parental time spent with their children. The CFPS dataset includes information on whether respondents always lived with their parents before the age of three. To investigate whether HRS has improved early-life investment, I construct an indicator for early three-year exposure to HRS, which equals one for those aged three or younger at the time of HRS implementation, and zero otherwise. The last two columns of Table 8 present the estimates of early three-year exposure to HRS on father's and mother's presence. It is evident that early three-year exposure to HRS has a positive impact on parental presence, although the estimate for mother's presence is not statistically significant at the 10 percent level. In summary, the results in Table 8 indicate that the introduction of HRS improves not only prenatal nutrition and health at birth but also early childhood parental investment.

C. Mediation Analysis: Education, Health, and Subject Factors

Lastly, this study investigates a range of adult outcomes that are measured concurrently with psychological wellbeing. The analysis includes several potential mediating factors available in the CFPS-2010 dataset, namely years of schooling, college attainment, self-rated health, Body Mass Index (BMI), and subjective factors such as confidence for the future, importance placed on money and the next generation, and comprehension ability as assessed by interviewers. These candidate measures encompass key channels through which the effects may operate, including education, health status, and individual attitudes towards main aspects of life. To examine the extent to which the estimated impact of childhood exposure on adult psychological wellbeing varies based on the values of the candidate mediating factors, in addition to the direct impacts of shocks on these factors, a mediation analysis approach developed by Heckman, Pinto, and Savelyev (2013) is employed. To simplify the analysis of each mediating factor's contribution, the HRS exposure is transformed into a binary variable that captures whether an individual was exposed to HRS from the prenatal period to age 5. Firstly, the study examines the impact of early childhood exposure to HRS on the identified mediating factors. The findings presented in panel A of table 9 indicate that early childhood exposure to HRS has a positive and significant impact on self-rated health, while the effects on education and BMI are small and statistically insignificant. Moving to panel B of table 9, the results demonstrate that early childhood exposure to HRS significantly enhances individuals' confidence for the future, their valuation regarding the next generation, and their overall comprehension ability.

Table 9 The impact of HRS exposure on later life circumstances

Panel A	(1)	(2)	(3)	(4)
	Schooling	College	Rated health	BMI
HRS during IU–5	0.202	-0.002	0.202**	-0.238
	(0.301)	(0.027)	(0.101)	(0.295)
Observations	6,514	6,514	6,506	6,379
R-squared	0.402	0.227	0.219	0.203

Panel B	(5)	(6)	(7)	(8)
	Confidence for future	Importance toward money	Importance toward next generation	Ability of comprehension
HRS during IU–5	0.184*	-0.150	0.090*	0.173**
	(0.108)	(0.095)	(0.055)	(0.085)
Observations	6,490	6,510	6,510	6,506
R-squared	0.168	0.166	0.156	0.382

Note: HRS during IU–5 equal one if the respondents are 5-year-old or younger when HRS was adopted at the county of birth. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Next, I proceed to assess the extent to which the impact of exposure to HRS on psychological wellbeing operates through the identified mediating factors. Drawing on the methodology outlined by Heckman, Pinto, and Savelyev (2013), I first estimate the direct impact of early childhood exposure to HRS on adult psychological wellbeing. The results of this analysis are presented in the first three columns of table 10. Subsequently, I proceed to estimate the net impact of early childhood exposure to HRS by controlling for the influence of the mediating factors in the regression. By accounting for the mediating effects, we can isolate and quantify the specific direct impact of HRS exposure on psychological wellbeing. The outcomes reported in the last three columns of the table demonstrate that the estimated effect of early childhood exposure to HRS on adult psychological wellbeing diminishes after incorporating these mediation factors into the analysis. This suggests that a portion of the influence of early childhood HRS exposure operates through the identified adult factors, emphasizing their role as potential mediators in the pathway linking HRS exposure to psychological wellbeing outcomes in adulthood.

By integrating the findings from table 9, I can quantitatively assess the relative contributions of individual mediating factors to the overall effects of HRS exposure on adult psychological wellbeing. The contribution of each mediating factor is determined by multiplying the estimates of early childhood exposure on the specific mediating factor by the estimates of the mediating

factor on adult psychological wellbeing. To ascertain the proportionate contribution, the resulting product is divided by the reduced form estimates reported in the first three columns of table 10. Figure 3 visually represents the percentage contributions of each mediating factor to the total treatment effects on adult life satisfaction. The outcomes reveal that health-related factors, such as self-rated health, appear to exert a more substantial influence on the total treatment effect compared to education. Furthermore, subjective factors, including confidence for the future and

Table 10 The impact of later life circumstances on adult psychological well-being

	(1)	(2)	(3)	(4)	(5)	(6)
	Life satisfaction	Happiness	Mental health	Life satisfaction	Happiness	Mental health
HRS during IU–5	0.325***	0.168**	0.272***	0.269***	0.078	0.226***
	(0.073)	(0.079)	(0.061)	(0.076)	(0.076)	(0.057)
sch				0.005	0.011*	0.013**
				(0.006)	(0.006)	(0.006)
college				0.007	0.022	-0.129*
				(0.083)	(0.070)	(0.071)
Rated health				0.086***	0.063***	0.169***
				(0.014)	(0.013)	(0.012)
BMI				-0.000	0.002	0.005
				(0.004)	(0.004)	(0.003)
Confidence for future				0.238***	0.344***	0.118***
				(0.024)	(0.018)	(0.014)
Importance toward money				-0.065***	-0.027**	-0.048***
				(0.015)	(0.012)	(0.017)
Importance toward next generation				0.062**	0.101***	0.002
				(0.025)	(0.029)	(0.023)
Ability of comprehension				-0.030	0.033**	-0.074***
				(0.019)	(0.015)	(0.018)
Observations	6,505	6,490	6,470	6,501	6,484	6,467
R-squared	0.142	0.164	0.179	0.234	0.322	0.273

Note: HRS during IU–5 equal one if the respondents are 5-year-old or younger when HRS was adopted at the county of birth. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

importance placed on the next generation, contribute the most to the treatment effect on adult psychological wellbeing. These contributions of subjective factors are also estimated with greater

precision, as indicated by the reported one-sided p-values in parentheses under the estimated contributions in table 9.

The combined contribution of all eight mediating factors considered in this study amounts to less than 50 percent of the total treatment effects on psychological wellbeing. This implies that majority of the treatment effects on psychological outcomes are attributable either to the direct effect of the shock under investigation or to channels of mediation that are not captured by the measured mediating factors within the CFPS-2010 data. These results highlight the existence of additional pathways through which the treatment effects on psychological wellbeing manifest, suggesting the presence of unobserved factors or mechanisms that warrant further exploration in future research.

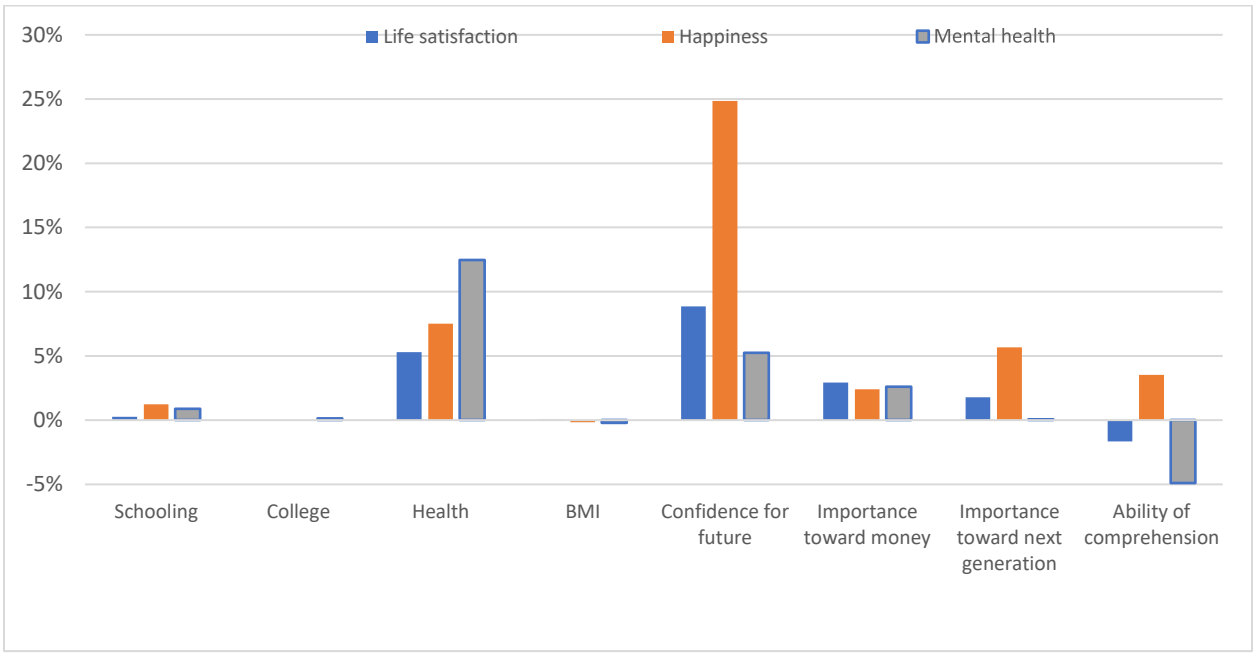

Figure 3 Mediation analysis: contributions of mediating factors to total treatment effects as calculated from regression results reported in table 9 and 10.

VII. Conclusion

In this paper, I provide evidence that an increase in family economic resources during early life has a positive effect on adult psychological well-being. In particular, I use the rollout of China's agricultural land rights reform known as the Household Responsibility System (HRS) program as the exogenous increase in family economic resources. By utilizing a nationally representative survey dataset, the findings reveal that individuals who were fully exposed to the HRS program from the prenatal period to age five exhibit a significant increase in adult life satisfaction by 0.419 standard deviation and adult mental health by 0.323 standard deviation. For happiness, the corresponding point estimates are 0.02 standard deviation, but the estimate is statistically distinguishable from zero. These results are robust to the inclusion of the village infrastructure construction programs, One-Child policy, send-down movement, and a set of the other province-level policies. Overall, this study contributes to our understanding of the link between early-life economic resources and long-term psychological well-being, highlighting the role of the early life circumstances in shaping these outcomes.

In light of these findings, the estimates presented in this study provide further insights. Specifically, early-life exposure to the Household Responsibility System (HRS), which is associated with a substantial increase of 32 percent in agricultural outputs, is found to yield a considerable enhancement in adult general life satisfaction by 0.419 standard deviation and mental health by 0.323 standard deviation. Considering the high costs associated with interventions aimed at increasing life satisfaction and treating mental disorders, policy interventions targeting the augmentation of family resources during early childhood may offer a cost-effective approach to promoting and enhancing psychological well-being. These findings highlight the potential value

and significance of early-life interventions in shaping long-term psychological outcomes and informing policy decisions.

This study is subject to several limitations that warrant consideration. Firstly, psychological well-being is a multifaceted construct encompassing various dimensions. While this analysis examines three indicators of psychological well-being, it is possible that other aspects exist which are not captured by these measures. Future research could explore the impact of early-life economic resources on additional indicators of psychological well-being, such as financial and marital satisfaction. Secondly, this study identifies adult birth weight, duration of parental cohabitation, adult health, and subjective circumstances as potential mediating channels through which the effects of early-life exposure to the Household Responsibility System (HRS) manifest. However, due to the cross-sectional nature of the one-year database, it is challenging to disentangle the causal pathways. Specifically, it is difficult to determine whether exposure to HRS during early childhood influences adult psychological well-being through its effects on adult health or if early-life exposure to HRS affects adult health via its influence on adult psychological well-being. Future research using longitudinal panel data that track individuals from early childhood to adulthood would be well-suited to elucidate the dynamics of how early-life circumstances impact later-life psychological well-being. By addressing these limitations, future investigations can provide a more comprehensive understanding of the relationship between early-life economic resources, various dimensions of psychological well-being, and the underlying mechanisms through which they operate.

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During the preparation of this work, Kerui Geng used ChatGPT in order to check the grammar. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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Appendix

Appendix. A. The rollout of HRS introduction at different geographical level

Figure A1 shows the share of villages and counties adopting HRS in my sample, as well as the evolution of county-level HRS adoption based on the findings of Almond et al. (2019).

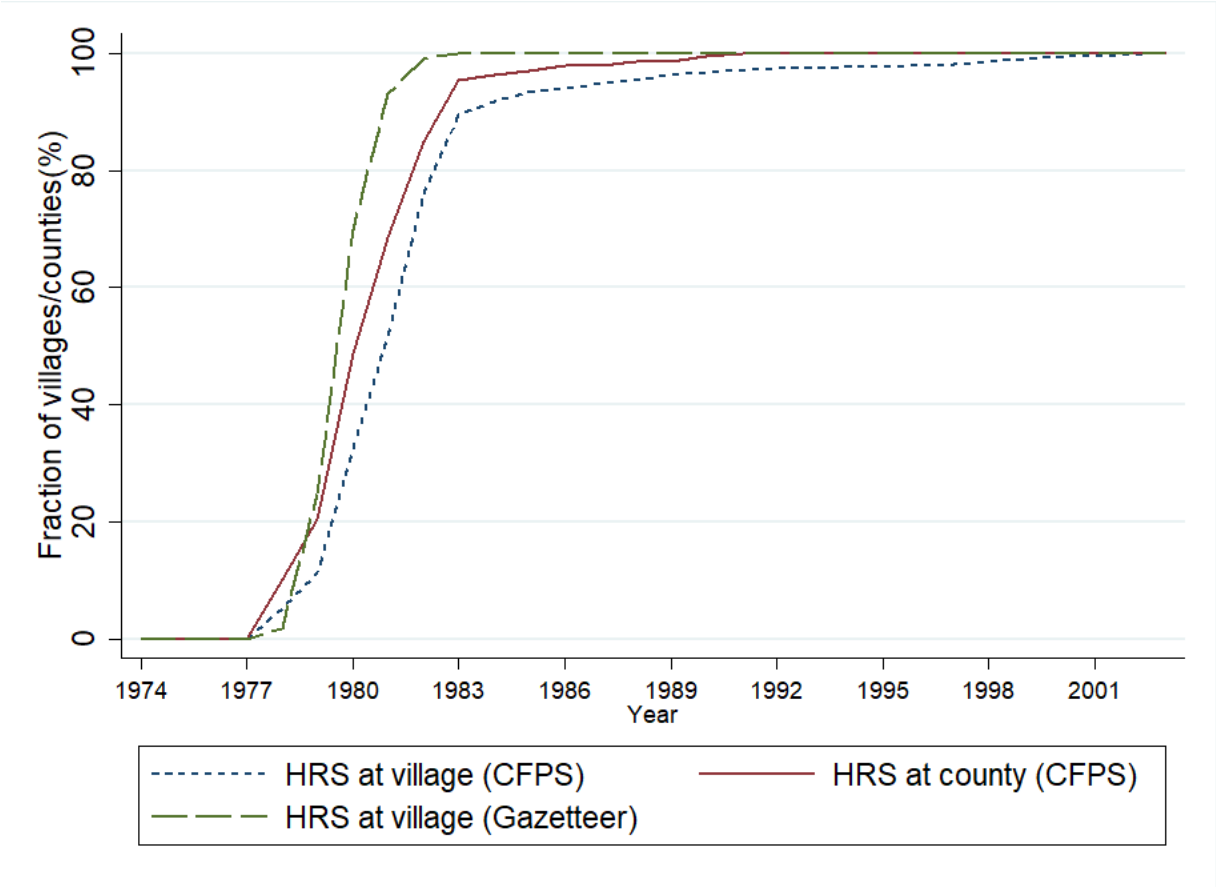


Figure A1: HRS Reform rollout.

Notes: Data for HRS at the village level are from CFPS 2010. Data for HRS at the county level are from Almond, Li, and Zhang (2018).

Appendix. B. The determinate of HRS introduction:

I use the CFPS village survey data and rainfall data from the NOAA-ESRL Physical Sciences Laboratory, Boulder Colorado to provide the first evidence on the relationship of HRS adoption time at the village level and the three potential determinants. CFPS village survey contains detailed information about villages' concurrent conditions and historical events. For political pressure, I use the distance of the village to its provincial capital to measure the freedom in local HRS adoption. Unfortunately, I have no information about the economic development for the villages prior to HRS adoption. Having access to electricity was an important indicator of village development during that period. Therefore, I use whether the village had access to electricity prior to 1978 as a proxy for the village economic development before HRS adoption. The rainfall at the beginning of the growing season, which usually starts in April, play a central role in determine the growth of the main grain output, rice, in China-- rice (Almond, Li, and Zhang 2018). I define a village experienced a drought if the county rainfall in April at the year of HRS introduction was below bottom 20th percentile in the rainfall distribution during 1950-1984.

Table A1 shows the results for the determinant of the timing of HRS adoption based on 247 villages in the CFPS sample. Consistent with previous literature, villages that experienced a spring drought, far from the provincial government, and poor prior to 1978 are more likely to adopt HRS earlier. The first three columns of table 1 indicate that there is a systematic pattern of how HRS is introduced. However, once province-fixed effects are controlled, only whether a county experienced a drought in April of the year when HRS was adopted remains significant. The R-square becomes larger after controlling for province fixed effect, indicating that provincial differences account for much of HRS adopting variations. After controlling for these three important determinants, however, differences between early and late adopters appear much more idiosyncratic. The estimated effects

will be driven solely by variation in the HRS introduction orthogonal to these three factors after controlling three primary determinants of HRS timing.

Table A1 Determinants of HRS reform timing at village level

	Dependent variable: first year of land reform				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Distance to government		-0.173**		-0.117	-0.067
		(0.083)		(0.081)	(0.076)
Electricity before 1978			0.589***	0.507**	0.072
			(0.210)	(0.232)	(0.225)
Drought in April of year t	-0.690			-1.335**	-1.774***
	(0.577)			(0.637)	(0.577)
Province FE	No	No	No	No	Yes
R-squared	0.007	0.015	0.034	0.057	0.309

Note: Data are from CFPS 2010 community survey reported by village leaders. The dependent variable is the first year of land reform ranging from 1978 to 1988. Distance to government is the logarithm of distance from the village to its provincial government in kilometers. Electricity before 1978 is a dummy variable that equals one if the village has access to electricity before 1978, zero otherwise. Drought in April of year t is a dummy variable indicating whether a county experienced a drought in April of the year when HRS was adopted. There are 247 observations for all regressions. Standard errors clustered at county level. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Appendix. C. The magnitude of main estimates with raw psychological indicators:

To check whether my estimates are robust to the standardization of psychological indicators, I replicate the table 2 with row psychological indicators without any transformation. The results of third column in table A2 show that full exposure to HRS from in-utero to age five increases adult life satisfaction by 12.6% in term of mean, while by 0.414 standard deviation in term of variance. Similarly, no significant effects are found for adult happiness. The last column if table A2 indicates that full exposure to HRS from in-utero to age five increases adult mental health by 4.7% in term of mean, while by 0.346 standard deviation in term of variance.

similar estimates to my main results in table 3.

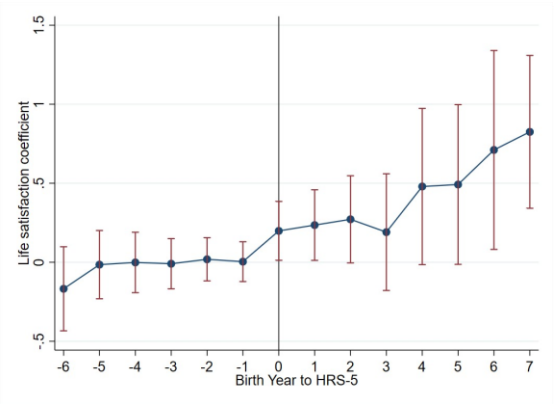
Table A2 The impact of HRS exposure during childhood on adult psychological well-being

	Life satisfaction			Happiness			Mental health		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HRS share IU–5	0.377**	0.381**	0.429***	0.022	0.032	0.021	1.050*	1.086*	1.270**
	(0.148)	(0.151)	(0.158)	(0.155)	(0.155)	(0.167)	(0.591)	(0.582)	(0.606)
Observations	6,505	6,505	6,505	6,490	6,490	6,490	6,470	6,470	6,470
Mean of outcomes	3.397	3.397	3.397	3.771	3.771	3.771	27.021	27.021	27.021
SD of outcomes	1.036	1.036	1.036	1.030	1.030	1.030	3.669	3.669	3.669
$\boldsymbol{Z}_c$ * Cohort FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
County-specific trend	No	No	Yes	No	No	Yes	No	No	Yes

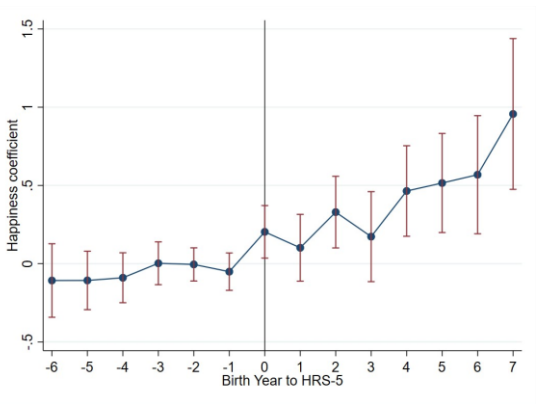
Note: Gender, ethnicity, mother's age at birth, father's education, county fixed effect, cohort birth year and month fixed effect are controlled in all regressions. $\boldsymbol{Z}_c$ include whether a county experienced a drought in April at the year of HRS introduction, the logarithm of distance to the provincial government, and economic development prior to 1978. County-specific trend includes county-specific linear trend in year of birth. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Appendix. D. The event study figures for robust estimators.

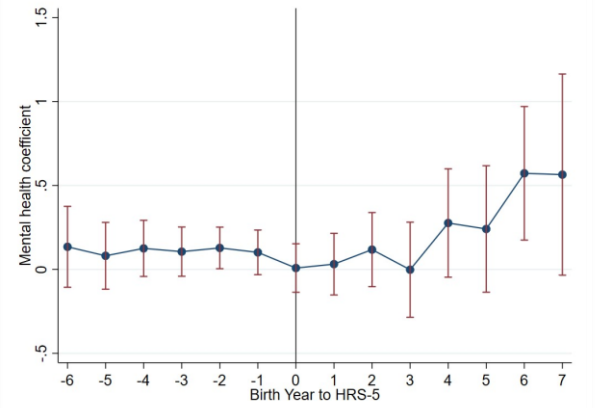
Following figures plot the dynamic response of adult psychological well-being to HRS by Borusyak, Jaravel, and Spiess (2021) and Callaway and Sant'Anna (2021). Prior to HRS, most estimates are not significantly different from zero. The horizontal coordinate indicates the time distance between the date of birth and five years before the HRS reform. As the introduced by Borusyak, Jaravel, and Spiess (2021), "use a reasonable number of pre-trends, do not use all of the available ones", we use six before treated periods from Figure (C.a) to Figure (C.c).



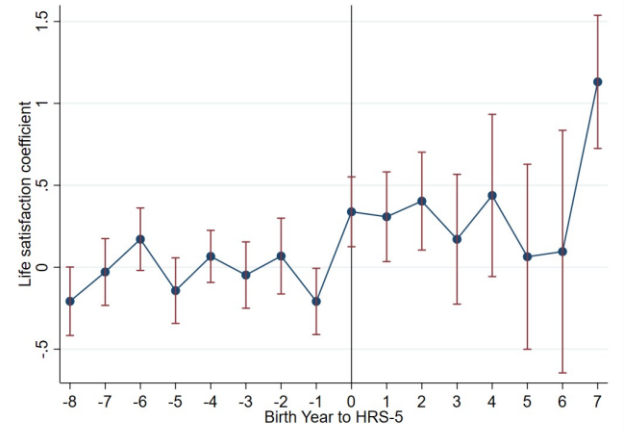
(C.a) Life Satisfaction BJS



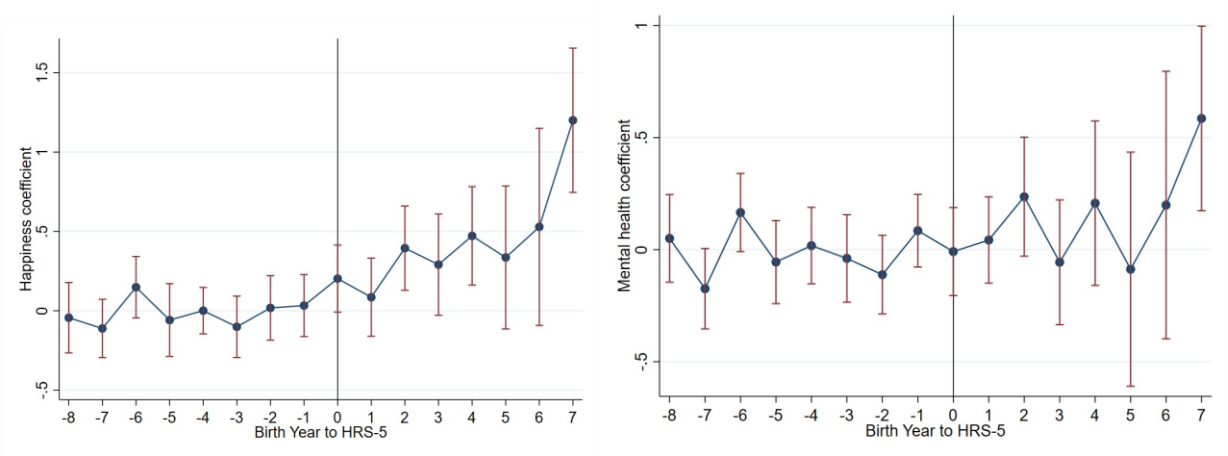
(C.b) Happiness BJS



(C.c) Mental Health BJS



(C.d) Life Satisfaction CS



(C.e) Happiness CS (C.e) Mental Health CS

Figure A2: Heterogenous age estimates of HRS on adult psychological well-being using new methods

Notes: Above figures plot the dynamic response of adult psychological well-being to HRS by BJS and CS. Prior to HRS, none of the estimates are significantly different from zero.

Appendix. E. The magnitude of estimates with raw psychological indicators by gender and family background:

Table A3 The heterogeneous impact of HRS adoption on adult psychological wellbeing

	(1)	(2)	(3)	(4)	(5)	(6)
	Life satisfaction	Happiness	Mental health	Life satisfaction	Happiness	Mental health
Panel A	***Men***			***Women***		
HRS share IU–5	0.806***	0.048	1.175	0.034	0.029	1.014
	(0.214)	(0.218)	(0.729)	(0.263)	(0.222)	(1.014)
Observations	3,261	3,253	3,243	3,244	3,237	3,227
Mean of outcomes	3.334	3.743	27.285	3.460	3.799	26.757
Panel B	***Mother illiterate***			***Mother with some education***		
HRS share IU–5	0.663***	0.053	2.087**	0.035	0.037	-0.081
	(0.228)	(0.232)	(0.801)	(0.359)	(0.327)	(0.791)
Observations	4,374	4,367	4,346	2,131	2,123	2,124
R-squared	3.379	3.707	26.898	3.428	3.885	27.241

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. All the regressions include county fixed effect, cohort effect, $\boldsymbol{Z}_c$ interact with cohort dummies and county-specific trends. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Appendix. F. The magnitude of estimates with raw psychological indicators by father' occupation and terrain:

Table A4 Heterogeneous impact on psychologic well-being

	(1) Life satisfaction	(2) Happiness	(3) Mental health	(1) Life satisfaction	(2) Happiness	(3) Mental health
Panel A:	Father is a farmer			Father is not a farmer		
HRS share IU–5	0.571***	0.148	1.640**	0.397	-0.003	1.136
	(0.203)	(0.226)	(0.749)	(0.346)	(0.325)	(0.925)
Observations	4,892	4,882	4,865	1,613	1,608	1,605
R-squared	3.373	3.726	26.915	3.479	3.924	27.380
Panel B:	Flatlands			Non-flatlands		
HRS share IU–5	0.840**	0.671**	1.065	0.373	-0.114	1.265
	(0.327)	(0.334)	(1.023)	(0.239)	(0.227)	(0.845)
Observations	1,790	1,785	1,771	4,715	4,705	4,699
R-squared	3.390	3.738	26.811	3.4	3.783	27.103

Note: All the dependent variables are standardized with zero mean and standard deviation of one. All the regressions include the same control variables in table 3. Standard errors clustered by county of birth are in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.