Agriculture Development Lowers the Risk of Cognitive Disability:

Evidence from China's Rural Household Responsibility System Reform

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Abstract

Agriculture and health are generally regarded as two separate fields. Although food provides basic nutrients for the human body, the linkage between agriculture and health has not been widely recognized. The linkage may be particularly strong in developing countries because most people reside in rural areas and rely on agriculture as their major livelihood. In this paper, we use China as an example to illustrate such a linkage. In the early 1980s, China adopted the rural household responsibility system (HRS) to grant farmers land user rights and allow them to make their own production decisions. The reform greatly boosted agricultural production and farmers' income. Using a two-wave national representative disability survey in 1987 and 2006, we show that the cohort born during or after the HRS reform was less likely to develop cognitive disability than other cohorts.

JEL code: I15

Key word: agricultural reform; cognitive disability

1. Introduction

Health as a key component of human capital contributes to economic growth (Romer, 1986, 1990; Lucas, 1988; Azariadis and Drazen, 1990). Moreover, having a healthy life itself is a desire of human beings (Bleakley, 2010). Therefore improving health has both instrumental and intrinsic values. There are many ways to improve health. Ensuring adequate maternal nutrition is one of them. Nutritional status at the fetal stage has been regarded as a crucial factor in shaping life-long health outcome. This is the so called "fetal origins hypothesis" proposed by Barker (1990, 1992).

There has been a burgeoning body of literature testing the "fetal origins hypothesis." Since is infeasible to directly test this hypothesis using the random control trials, popularly used in the medicine literature, on human beings, researchers instead have used exogenous shocks, such as infectious disease, famine, war, and extreme weather, to identify the long-term health impact of fetal exposures to adverse environment. For instance, Almond (2008) and Lin and Liu (2012) found that in utero exposures to the 1918 influenza pandemic in the U.S. and Taiwan casted a lasting damage on health in later life. Using the Great Chinese Famine as a natural experiment, studies showed that women conceived during the Great Chinese Famine in 1959-1961 were more likely to be overweight and disabled in later life (Luo, Mu and Zhang, 2006; Mu and Zhang, 2011). Meng and Qian (2009) exemplified that the Great Famine has thwarted the anthropometric and labor market performance of the cohort exposed in early life. Using the regional variations in Phylloxera plagued French vineyards in the late nineteenth centuries, Banerjee et al. (2010) documented that those born in the infected regions were significantly shorter in height. Using the Islamic holy month of Ramadan as a natural experiment, Almond and Mazumder (2011) discovered that prenatal exposure to Ramadan increases the likelihood of lower birth weight and mental disability, suggesting that even mild in utero exposures can have persistent effects.

These findings based on negative shocks provide strong evidence in support of the "fetal origins hypothesis." The next question is how to translate the findings into policy actions. What is the best way to improve in utero nutritional status? In developed countries when food is abundant for most people, a targeting approach may be more appropriate. For example, prenatal participations in the U.S. WIC (supplemental nutrition for women, infants, and children) program have been found to enhance their children's scores in cognitive tests (Rush et al., 1988).

However, in developing countries, because of the enormous size of the poor, governments often cannot afford to target so many people using their own budgets. Considering that most people in developing countries reside in rural areas and rely on agriculture as their major livelihood, agricultural development may be a more effective way of improving mothers' and children's nutritional status in a large scale. In this paper, we use China as an example to illustrate this point.

In the early 1980s, China adopted the rural household responsibility system (HRS) to grant farmers the land user rights and allow them to make their own production decisions. The reform greatly boosted agricultural production and farmers' income. Using a two-wave national representative disability survey in 1987 and 2006 in China, we show that the cohort born during or after the HRS reform had much lower incidence of cognitive disability than the pre-reform cohorts. The HRS reform reduced the number of cognitive disabled people by more than six millions.

The proceeding sections are organized as follows: Section Two reviews the literature and background of HRS; Section Three describes the data and identification strategy; Section Four presents the empirical results; and Section Five concludes.

2. Literature Review and Background of HRS

A. Literature Review

The "fetal origins hypothesis" stipulates that nutrition deprivation in utero can lead to irreversible adaptive physiologic responses to the hunger environment that harm adult outcome when food becomes more abundantly available (Barker, 1990, 1992). There is a vast body of literature empirically testing the "fetal origins hypothesis" using exogenous shocks, which are beyond the control of affected individuals. For example, Using the Dutch famine of 1944-1945 owing to the German blockade as a natural experiment, Rosebloom et al (2001) and Ravelli et al (2001) found that the Dutch famine of 1944-1945 exerted negative effect on adult survival and glucose tolerance. A few studies (Chen and Zhou, 2007; Meng and Qian, 2010; Mu and Zhang, 2011) showed that the Great Chinese Famine in 1959-1961 also casted a heavy toll on adult health.

Using famine as a natural experiment has a drawback. Excess mortality is a salient feature of famine. The presence of mortality selection poses a challenge to accurately measure the damaging effect. For instance, Stein et al. (1972) observed that in utero exposures to the Dutch Famine had little to do with the adult mental performance. Huang (2010) and Mu and Zhang (2011) found that the presence of the selection problem makes it harder to detect the negative health impact because the adverse environment eliminates the fragile and therefore the survivors tend to be stronger than average. Only if the negative effect is large enough to overwhelm the positive selection bias, can it eventually be detected.

Some recent studies use more mild fetal insults to test the “fetal origins hypothesis,” including infectious disease (Costa and Lahey, 2005; Barreca, 2010), pollution (Currie, 2011 and Sanders , 2011), weather shocks (Deschenes, Greenstone and Guryan, 2009; Maccini and Yang, 2009), and economic shocks (Baten, Crayen and Voth, 2007).

While most of the studies examine the impact of restricted nutrition in utero on long-term physical health, a few studies delve into the impact on mental health and cognitive ability. Currie and Hyson (1999) found that lower birth-weights, a good indicator of prenatal nutrition, are associated with higher probability of failing the high school exit exams. Bono and Ermisch (2009) demonstrated that a boy’s cognitive development at age 3 is highly correlated with his birth weight. Ampaabeng and Tan (2012) detected that the intelligence test scores of the 1983 Ghanaian Famine were compromised.

In most circumstances, the poor do not face so severely comprised nutrition situations during fetal development as used in the above studies. Do nutritional interventions at early life stage to circumstance with marginal nutrition deficiency improve late life outcome? Some randomized control trials of nutritional supplementation programs in developing countries reveal that the nutrition intake enhances cognitive development (Grantham-McGregor, 1991; Pollitt et al., 1993; and Maluccio et al., 2006). However, it is not clear whether the nutritional program can be sustained for a long time without the help of external donors. Developing countries are constrained by their own financial resources. A targeting program covering too many poor people creates a huge fiscal burden. Considering that many of the poor in developing countries are smallholder farmers, does agricultural development offer a way to combat nutritional problems at the fetal stage? In this paper, we aim to answer this question using China's HRS as an example.

B. Rural reform

Prior to the economic reform the in late 1970s, collective farming was the major mode of agricultural production in rural China. Farmers worked in production teams and earned fixed work points according to which the commune allocated food. Because the payoffs were not tied to efforts, farmers did not have incentives to work hard. Despite massive mobilization of labors, for three decades during the planning economic era, agricultural output could barely keep pace with population growth.

In 1978, Xiaogang Village in Anhui Province adopted a household responsibility system (HRS). The village allocated each household a piece of land for cultivation and farmers were obliged to pay a certain amount of grain to the government at a fixed price to meet procurement requirement. Once the grain quotas were met, the household was allowed to keep all the remaining harvest. With more aligned incentive, farmers in Xiaogang put more effort into farming and applied more fertilizer. Accordingly, their agricultural output increased dramatically after the reform was put into place.

When the word about HRS in Xiaogang Village was spread out, a group of researchers at the Research Center for Rural Development (RCRD) at the State Council paid a visit to the village, learned about its experience, and proposed to scale this up nationwide (Du, 2010). However, the idea received strong resistance within the central and provincial leadership. At the time, public ownership had been in place for over two decades, and many policy makers were used to the order of collective farming system and were concerned about the potential chaos stemming from this reform. More importantly, the HRS seemed to forsake the socialism principles embedded in the minds of most officials and some regarded HRS as a "tail of capitalism."

Facing the impossibility of accomplishing the reform in one fell swoop, Mr. Du Runsheng, the head of RCRD, came up with an ingenious idea and reported it to Mr. Deng Xiaoping, the supreme leader at the time. He proposed to conduct a trial of HRS in a few impoverished mountainous regions based on the facts that these regions were already facing a shortfall of food grains and posed a heavy burden on the state and that if the trials failed, the impact would be confined to the limited regions. The idea was quickly adopted and a pilot was conducted.

The pilot proved to be a big success. Facing the new evidence in favor of HRS, many officials changed their mind and started to support HRS. In a few years, HRS was fully rolled out nationwide. In 1981, 45% of households adopted HRS and the rate jumped to 80% next year. Although the reform process varied across provinces and even across counties within the same province, by 1984 most Chinese villages have adopted HRS. Thanks to the successful scale up of HRS, both agricultural output and farmers' income witnessed an unprecedented growth. As shown in Figure 1, the rural poverty rate dropped sharply from 76% in 1980 to 24% in 1986 (Ravallion and Chen, 2007). In other words, more than 400 million people moved out of poverty in a short, six-year spell. The success of the rural reform laid a foundation for subsequent rapid economic growth (Lin, 1992).

In the subsequent analysis of evaluating the impact of HRS, we use two ways to measure HRS. The first approach is to use the window of time for the HRS reform (1979-1984). The second measure is based on the household adoption rate of HRS at the provincial level. This provincial-level HRS data come from Lin (1992). All households were engaged in collective farming prior to 1979; after 1984, over 99 percent of teams adopted HRS.

3. Data Description and Identification Strategy

A. Data Description

The individual-level disability data used in this paper come from China National Survey on Disabled People. The surveys were conducted jointly by the National Bureau of Statistics, Ministry of Civil Affairs and China Federation of Disabled

People in 1987 and 2006. The household surveyed in 1987 were not traced in the second wave. So the dataset is not a panel.

The population surveyed was from 29 provinces, autonomous regions and municipalities, with age ranging from 0 to 112. The second wave covered 31 provinces, autonomous regions and municipalities. Eliminating abnormal values resulting from input errors, the dataset has 1,531,329 individuals and 2,369,496 individuals respectively in the first and second wave.

The survey used such methods of probabilistic proportional sampling as multiple tiers, multiple phases and group sampling, with the whole nation considered as a general unit and provinces, autonomous regions and municipalities taken as secondary general units. The sample size of the different provinces, autonomous regions and municipalities was fixed and distributed by the leading team of the China National Survey on Disabled People. Hence the sample is quite random and representative.

The survey includes basic information on individuals, their economic and social status, and disability status. Basic information refers to individual’s age, gender, family address; economic and social status is reflected by school attainment, personal income and marital status. Disability information is more detailed, consisting of disability status, the timing of the first occurrence, pathogenic cause and degree, and his/her most urgent requirement. Because the occurrence time of the disability is difficult to identify, there were many missing values for this question in the first-wave survey. So in the second wave, this variable was replaced by diagnostic time.

All disabilities fall into five categories, visual, hearing and speech, cognitive, mental and physical disability. The key variable of interest is the cognitive disability. There are roughly 17 pathogenic causes, including heredity, brain disease, fetal and neonatal asphyxia, premature birth, low body weight and late birth, and so on. Many of them are related to fetus environment, but approximately 30% disabled person cannot tell the real reason in the second wave. This percentage reached even 43% in the first wave.

As described in Table 1, four out of five disabilities, except for the cognitive disability, increased from 1987 to 2006. The hearing and speech disability and visual disability rose mildly, while mental and physical disabilities more than doubled in the second wave. In contrast, the cognitive disability declined from 1.26% to 0.74%.

Table 2 and 3 show the frequency and accumulative frequency of the five type of disability by the time of first occurrence in the first wave and the time of first diagnose in the second wave. Obviously, the cognitive disability is more congenital than other four types of disability. Therefore, it is more likely related to fetal nutrition deprivation.

More than 92% of cognitive disability were reported to first occur by 20 years old (last row in Table 2), while 85% of cognitive-disabled people were first diagnosed by age 20 (last row in Table 3). By comparison, other four types of disability are not developed into a major problem until into adult life.

Figure 2 displays the incidence of cognitive disability by age in the 1987 and 2006 surveys. It spiked in the first five year in both waves. However, the two lines diverged greatly between age 7 and 16. The cohort 0-6 years old was exposed to HRS in both waves. However, the cohort aged 7-16 in the 1987 was largely conceived prior to the HRS reform and therefore was not exposed to HRS in the fetal development stage, while the same age cohort in 2006 were all born after the HRS reform was fully implemented nationwide. The disability rate of the cohort 7-16 in the 1987 wave figured much higher than their counterpart in 2006, reflecting more adequate access to nutrition during the critical fetal period thanks to HRS likely reduces cognitive disability.

Figure 3 further depicts the cognitive disability rate by age from 0 to 20 years old. Both males and females exhibit the same pattern as for the combined sample shown in in Figure 2. In utero exposures to HRS reduced the likelihood of disability rate for both boys and girls.

Since it was the rural residents not the urban residents who directly benefited the HRS reform, we would expect to see a large gap in cognitive disability for the cohort 7-16 between the rural and urban residents. In Figure 4, we plot the difference between rural and urban disability rate by age for males and females up to age 20. The difference shows up significantly for the cohort 7-16 in the 1987 wave when the rural cohort was born before HRS and suffered relatively more restricted fetal nutritional environment than their urban counterpart.

B. Identification Strategy

a) <u>Country-level identification</u>

In this paper we use the HRS reform as a quasi-experiment. Our main variable of interest is cognitive disability. We confine our analysis to people under 20 years old because most of cognitive disabilities occur prior to 20.

Let W and T be the wave and birth cohort indicators, respectively. In both waves, cohort 0-6 is the control group as they were born after the HRS started. We classify cohort 7-16 as the treatment group. In the first wave, they were exposed to less desirable nutrition in utero. In the second wave, both cohorts experienced the fruit of rural reform when conceived. We define $\mathrm{T}=0$ if a person belongs to the younger age cohort, while $\mathrm{T}=1$ if he belongs to the older one. $\mathrm{W}=0$ and $\mathrm{W}=1$ represent the first and second wave respectively. A person's disability status can be expressed as a linear probability function as follows:

$$C_i = \alpha_0 + \alpha_1 W_i + \alpha_2 T_i + \alpha_3 (W_i * T_i) + \beta' X_i + \varepsilon_i \qquad (1)$$

where the vector X_i represents other control variables, including gender, age effect (age, age squared, and age cubic), being born with disability, and a set of province fixed effects. The coefficient of our interest is α_3, which captures the causal effect of rural reform on cognitive disability.

b) Province-level regression

Next, we further consider the regional and temporal variations in adopting the HRS in our analysis. We add the HRS variable cited from Lin (1992) into our estimation equation. The new estimation equation can be specified as:

$$C_{ij} = \alpha_0 + \alpha_1 W_i + \alpha_2 T_i + \alpha_3 (W_i * T_i) + \beta' X_i + \gamma HRS_j + \varepsilon_i \qquad (2)$$

Where i still denotes an individual, while j stands for a province.

Most rural people still lived in the place of their birthplaces in the 1980s. Therefore, the HRS variable at the provincial level largely corresponds to the actual places of being conceived and born. However, by 2006 cross-regional migration became more popular. Therefore, the HRS variable may become less precise.

4. Empirical Results

A. Basic results

Table 4 presents the main estimates for equations (1) and (2). The odd-number columns list the results corresponding to equation (1); the even number ones show the estimates of equation (2) which includes HRS. Panel A is for the whole sample. In order to explore the gender difference, we run two sets of regressions on the male and female samples, respectively, in columns (1)-(4). The coefficient for W*T (α_3 in equation 1) is negative and significant in three out four regressions. The coefficient is larger for the male sample than for the female sample, suggesting that boys born in the reform period had a lower likelihood of being cognitive disabled than girls. The HRS variable, whenever included, is negative and significant, indicating that the degree of adopting HRS reform matters to the cognitive health status of those conceived at the time. The results confirm our hypotheses that fetal exposures to HRS reduced the likelihood of cognitive disability.

The above analyses based on the whole sample mask the importance difference between the rural and urban sample. HRS as a rural reform policy mainly benefited the rural residents. To sharpen our analysis, in Panel B, we repeat the same regressions on the restricted rural sample. Now the coefficient for the DID term (W*D) is significantly negative in all the four regressions and the HRS variable remains significant and negative.

Panel 3 present the estimates on the city sample. For the DID variable, two out four regressions are insignificant. If the city sample was totally isolated from the rural reform, then we could use the city sample as a placebo test. However, HRS might indirectly affect urban residents. The success of HRS boosted agricultural production, lowering lower food prices which in turn could benefit urban consumers. This is probably why two out of four coefficients for the interaction term remain significant and negative. In general, the coefficient for the interaction term of W*T is larger in the rural sample than in the city sample perhaps because HRS applies more to the rural sample.

In the four regressions, we also include a variable indicating whether the disability is born with or not. The coefficient for this variable is positively significant in all the four regressions. Next we particularly look at the subsample to see the incidence of inborn cognitive disability rate is more strongly associated with the rural reform.

Table 5 reports the results for restricted sample of inborn cognitive disability. The coefficient for the interaction term is highly negative. The magnitude is more than 10 times larger than that in Table 4 for the whole sample. The results in Table 4 and 5 reflect that HRS has reduced both prenatal and postnatal cognitive disability, but the impact is much larger for the inborn disability. At the critical period of fetal stage, adequate nutrition is crucial for cognitive development.

B. HRS and other types of disability

As shown in Tables 2 and 3, unlike cognitive disability, the other four types of disability are more likely to acquire after age 20. We suspect their linkage with fetal development is weaker than the cognitive disability. Table 6 reports the regression estimates for the four types of disability with Panel A for the simple DID and Panel B for the augmented DID with HRS. In Panel A, among the four types of disability, the DID coefficient is significantly negative only in the regression on hearing and speech disability. It is even positive for physical disability and insignificant for mental and visual disabilities.

In Panel B, after adding the HRS variable, the coefficient for the interaction term in the regression on visual disability becomes negative and significant. However, the HRS variable is positive and significant across the four regressions. In other words, the depth of HRS reform is positively associated with the incidence of these four types of disability. It appears that the "fetal origins hypotheses" applies more to cognitive disability than other four types of disability.

5. Conclusion

This paper shows that agricultural development can play a role in reducing cognitive disability in developing countries using China's HRS as an example. By providing better alliance with incentives, HRS greatly boosted agricultural yields and farmers' income. Bounty harvest enabled mothers to access more adequate food during their pregnancy. As a result, the children born during or after HRS had lower incidence of cognitive disability. Based on our estimates, HRS explains the entire drop in cognitive disability from 1987 to 2006. Considering China's vast population size, the economic significance is enormous. A 0.5% decline in cognitive disability rate means that 6.5 million (1.3 billion * 0.5%) population have become cognitive-able productive labor force as a result of HRS, directly contributing to China's economic growth rather than relying on family and social care.

The study has a caveat. There were variations in the timing of adoption of HRS within a province. Our use of provincial-level HRS clouds the variance across counties. In the next step, we will collect the timing of HRS at the county level and conduct more precise estimations.

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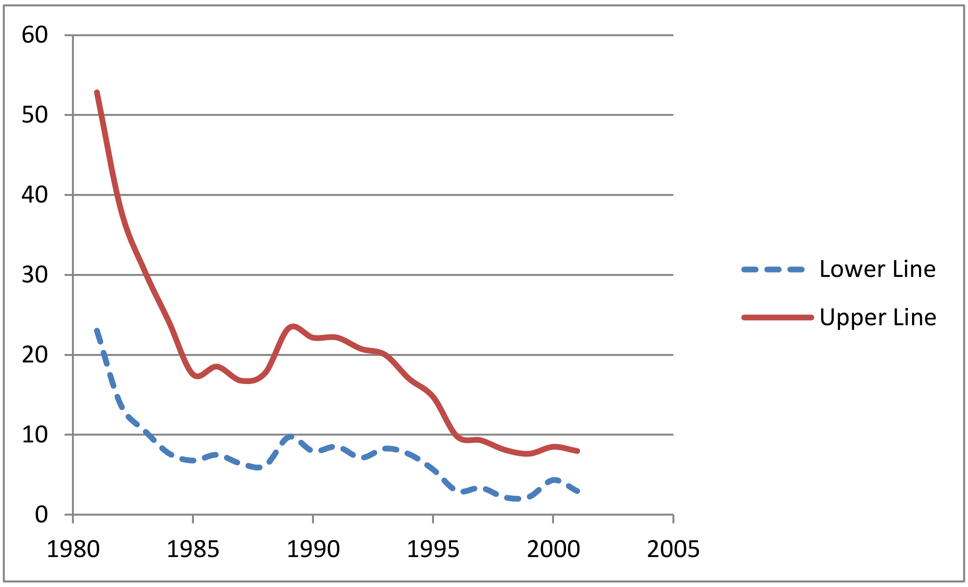

Figure 1—National Incidence of Poverty in China 1981-2001

Source: Ravallion and Chen (2007).

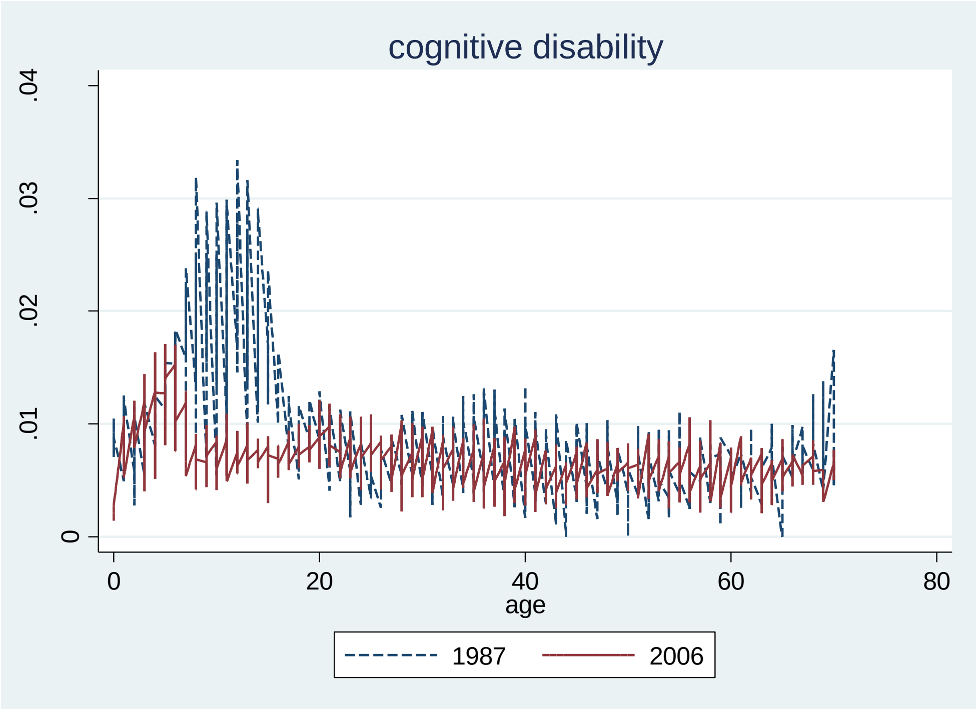

Figure 2: Cognitive Disability Rate in 1987&2006

Source: China national sample survey on disability data, 1987 and 2006.

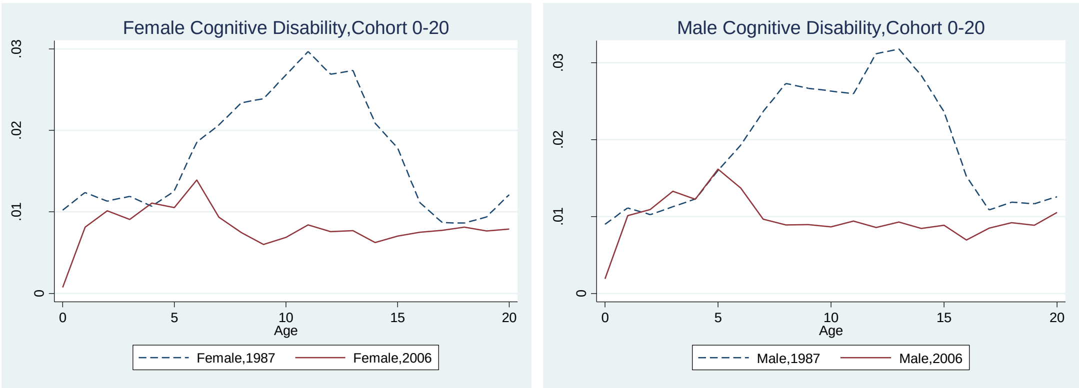

Figure 3: The Cognitive Disability Rate of Males and Females Aged 0-20

Source: China national sample survey on disability data, 1987 and 2006.

Figure 4: Difference in Cognitive Disability Rate between Rural Areas and Cities for Males and Females by Age

Source: China national sample survey on disability data, 1987 and 2006.

Table 1: Disability rate

Disability	1987		2006	
	No. of Disabled	Disability Rate	No. of Disabled	Disability Rate
Mental	3,635	0.24%	13,976	0.59%
Hearing and Speech	23,245	1.52%	36,889	1.56%
Cognitive	19,334	1.26%	17,583	0.74%
Visual	9,295	0.61%	15,524	0.66%
Physical	12,162	0.80%	41,879	1.77%

Source: China national sample survey on disability data, 1987 and 2006.

Note: The whole data includes 1,531,329 individuals in the 1987 survey and 2,369,496 individuals in the 2006 survey.

Table 2 Disability Rate (%) among Age Cohorts in 1987

Age	**Mental**	**Hearing & Speech**	**Cognitive**	**Visual**	**Physical**
0	0.24	8.23	31.49	5.42	8.93
1	0.17	2.11	5.49	7.59	0.17
2	0.14	2.26	5.23	5.45	0.14
3	0.28	2.61	5.83	4.63	0.28
4	0.14	1.49	3.35	2.37	0.14
5	0.17	1.49	3.39	1.72	0.17
6	0.03	1.36	4.29	1.54	0.03
7	0.35	1.32	7.18	1.54	0.35
8	0.38	1.60	5.49	1.43	0.38
9	0.20	0.66	2.87	0.96	0.20
10	0.59	1.87	3.72	1.44	0.59
11	0.31	0.44	2.26	0.95	0.31
12	0.62	1.13	2.71	1.45	0.62
13	0.72	0.76	2.32	1.28	0.72
14	1.25	0.60	1.58	1.00	1.25
15	1.51	0.97	1.23	1.38	1.51
16	2.73	0.60	0.75	1.32	2.73
17	2.58	0.45	0.41	1.17	2.58
18	3.38	0.55	0.50	1.40	3.38
19	3.45	0.38	0.25	1.02	3.45
20	4.62	1.15	0.78	1.74	4.62
Accumulative frequency	23.86	32.03	91.12	18.98	50.31

Source: China national sample survey on disability data of 1987.

Note: The last row indicates the accumulative frequency of five disabilities under 20 years old.

Table 3 Disability Rate (%) among Age Cohorts in 2006

Age	**Mental**	**Hearing**	**Speech**	**Cognitive**	**Visual**	**Physical**
0	2.66	7.11	18.09	21.04	5.28	9.47
1	1.96	5.01	14.37	13.88	1.91	6.39
2	1.69	3.21	12.56	11.17	1.36	4.14
3	1.88	3.22	18.13	9.48	1.50	3.33
4	1.16	1.74	6.62	5.93	1.31	1.67
5	0.85	1.74	3.44	4.96	1.26	1.48
6	1.09	1.63	2.16	4.49	1.18	1.35
7	0.90	1.40	1.59	3.28	1.23	1.18
8	0.80	1.46	1.54	2.42	1.26	1.09
9	0.63	0.75	0.71	1.11	0.74	0.72
10	0.93	1.40	0.95	1.92	1.28	1.00
11	0.71	0.71	0.47	0.83	0.58	0.69
12	0.87	0.91	0.55	0.70	0.81	0.86
13	0.99	0.70	0.42	0.70	0.58	0.77
14	1.22	0.65	0.32	0.52	0.49	0.72
15	1.44	0.67	0.30	0.49	0.56	0.80
16	2.28	0.52	0.24	0.56	0.51	0.78
17	2.24	0.44	0.19	0.35	0.60	0.89
18	2.32	0.44	0.21	0.46	0.58	1.01
19	2.17	0.54	0.20	0.43	0.48	0.88
20	3.37	0.99	0.28	0.56	0.87	1.09
Accumulative frequency	32.16	35.24	83.34	85.28	24.37	40.31

Source—China national sample survey on disability data of 2006.

Note: The last row indicates the accumulative frequency of six disabilities under 20 years old.

Table 4: The Impact of HRS on Cognitive Disability

Dependent variable: cognitive disability				
Panel A: Full Sample				
	(1)	(2)	(1)	(2)
Panel A: Whole Sample				
	male		female	
HRS		-0.0081***		-0.0085***
		(0.00)		(0.00)
W*T	-0.0116***	-0.0055***	-0.0074***	-0.0012
	(0.00)	(0.00)	(0.00)	(0.00)
Inborn	0.6276***	0.6312***	0.6304***	0.6374***
	(0.01)	(0.01)	(0.01)	(0.01)
R^2	0.1752	0.1768	0.1725	0.1753
N	718,869	678,335	655,477	616,813
Panel B: Rural Subsample				
HRS		-0.0087***		-0.0086***
		(0.00)		(0.00)
W*T	-0.0127***	-0.0061***	-0.0085***	-0.0021*
	(0.00)	(0.00)	(0.00)	(0.00)
Inborn	0.6325***	0.6360***	0.6403***	0.6479***
	(0.01)	(0.01)	(0.01)	(0.01)
R^2	0.1739	0.1749	0.1722	0.1751
N	586,884	554,743	53,4971	504,493
Panel C: City Subsample				
HRS		-0.0015		-0.0069***
		(0.00)		(0.00)
W*T	-0.0048***	-0.0034	-0.0025**	0.0025
	(0.00)	(0.00)	(0.00)	(0.00)
Inborn	0.5921***	0.5969***	0.5621***	0.5623***
	(0.02)	(0.02)	(0.02)	(0.02)
R^2	0.1859	0.1923	0.1761	0.1782
N	131,985	123,592	120,506	112,320

Note: W stands for wave (1 for 2006 and 0 for 1985) and T indicates cohort (1 for 7-20 and 0 for 0-6). All regressions include wave dummy, cohort dummy, provincial fixed effects, age, the square of age and the cube of age. *** significant at the 1% level,** significant at the 5% level, and * significant at the 10% level. Cluster standard errors at the provincial level are presented in the parentheses.

Table 5: The Impact of HRS on Inborn Cognitive Disability

	Male	Female
W*T	-0.1609***	-0.1248***
	(0.03)	(0.04)
R^2	0.0373	0.0604
N	4,457	3,389

Note: W stands for the wave (1 for 2006 and 0 for 1985) and T indicates cohort (1 for 7-20 and 0 for 0-6). All regressions include wave dummy, cohort dummy, provincial fixed effects, age, the square of age and the cube of age. *** significant at the 1% level,** significant at the 5% level, and * significant at the 10% level. Cluster standard errors at the provincial level are presented in the parentheses.

Table 6: The Impact of HRS on Other Four Types of Disability

	mental	hearing and speech	visual	physical
Panel A：Simple DID				
W*T	0.0001	-0.0018***	-0.0001	0.0004*
	(0.00)	(0.00)	(0.00)	(0.00)
Inborn	0.0300***	0.3349***	0.0757***	0.2436***
	(0.00)	(0.01)	(0.00)	(0.00)
R^2	0.0061	0.1137	0.0326	0.0805
N	1,374,101	1,374,466	1,374,581	1,374,214
Panel B：DID+HRS				
HRS	0.0003***	0.0026***	0.0006***	0.0008**
	(0.00)	(0.00)	(0.00)	(0.00)
W*T	-0.0002	-0.0038***	-0.0006***	-0.0002
	(0.00)	(0.00)	(0.00)	(0.00)
Inborn	0.0288***	0.3335***	0.0740***	0.2395***
	(0.00)	(0.01)	(0.00)	(0.01)
R^2	0.0058	0.1149	0.0324	0.0798
N	1,294,904	1,295,268	1295,383	1295,016

Note: W stands for the wave (1 for 2006 and 0 for 1985) and T indicates cohort (1 for 7-20 and 0 for 0-6). All regressions include wave dummy, cohort dummy, provincial fixed effects, age, the square of age and the cube of age. *** significant at the 1% level,** significant at the 5% level, and * significant at the 10% level. Cluster standard errors at the provincial level are presented in the parentheses.