

# Cognitive Skills, Non-Cognitive Skills, and the Employment and Wages of Young Adults in Rural China

*Preliminary: please do not cite*

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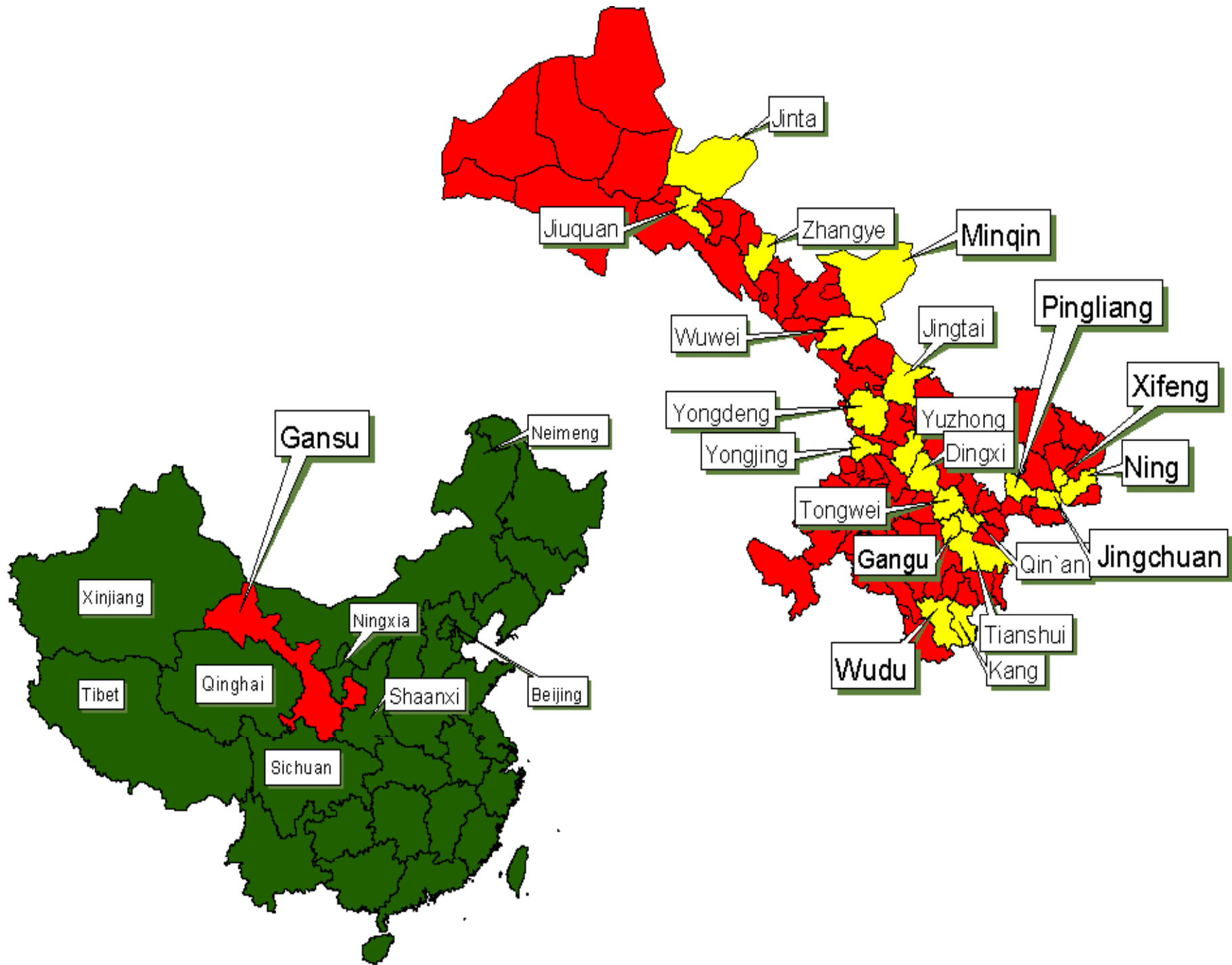
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# Motivation

- Formal schooling has a strong effect on labor market participation and on wages.
- Much, and probably most, of this **impact operates through skills that children acquire from their schooling.**
- Until recently, the skills that economists have focused on ***cognitive*** skills.
- More recently, Heckman and coauthors have focused on ***noncognitive*** skills, which can be defined as patterns of thoughts, feelings and behavior that affect one's social interactions with others.
- To date, all research on noncognitive skills and labor markets has focused on the U.S. and other developed countries.
- To our knowledge, this is the **first study** to examine the **impact of non-cognitive skills on labor market outcomes in a developing country.**

# Literature on Labor Market Impacts of Noncognitive Skills

- Recent review of 13 studies (Lindqvist and Vestman, 2011) finds that impacts of a one standard deviation change in measured noncognitive increases wages by 4-8%
- Heckman, Stixrud, and Urzua estimate an 11.2% return to latent noncognitive ability using a structural model
- Lindqvist and Vestman (2011) find that noncognitive skills have larger impact than cognitive skills on unemployment, and for wages at the low end of the distribution
- All previous work studies developed countries (nearly all the US), with external control (Rotter) and self-esteem (Rosenberg) the most commonly used noncognitive skill measures



# Study Site: Rural Gansu Province

- Located in northwest China.
- One of China's poorest provinces.
- Gansu had a population of 25.6 million in 2000, 76 percent of whom resided in rural areas.
- Relative to China as a whole, Gansu has low per capita income, high rates of illiteracy, and low per-child educational expenditures.
- Rural residents are primarily work in subsistence farming, animal husbandry, and migrant wage labor.



# Gansu Survey of Children and Families (GSCF)

- **Panel data** that follow a random sample of **2,000 children** in rural areas of Gansu Province who were **9-12 years old in the year 2000**.
- **Three waves** of surveys were completed in **2000, 2004, and 2007-2009**.
- Of these 2000 children, only nine never enrolled in school, and only 19 had left school before 2000.
- In each wave, GSCF collected extensive data, with **separate questionnaires for children, their parents, teachers, school principals, and village leaders**.
- **Low sample attrition:** All but one of original 2,000 children have complete information in the first wave, including measurements of both cognitive and non-cognitive skills. Of these 1,999, 1,869 (93.5%) were re-interviewed in wave 2 (2004), when they were 13-17 years old, and data were collected for 1,858 (92.9%) in wave 3 (2009) when they were 17-21 years old.

# Skill Measurements in GSCF

<i>Year</i>	<i>Cognitive Skills</i>	<i>Non-Cognitive Skills</i>
2000	<ol style="list-style-type: none"> <li>1. Chinese Test (half of sample)</li> <li>2. Math Test (other half)</li> <li>3. General Cognitive Skills Test</li> </ol>	<ol style="list-style-type: none"> <li>1. Internalizing Behavior</li> <li>2. Externalizing Behavior</li> </ol>
2004	<ol style="list-style-type: none"> <li>1. Chinese Test</li> <li>2. Math Test</li> <li>3. Literacy/Life Skills Test</li> </ol>	<ol style="list-style-type: none"> <li>1. Internalizing Behavior</li> <li>2. Externalizing Behavior</li> <li>3. Resilience (with subscales in optimism, self-efficacy, adult relationship, peer relationship, interpersonal sensitivity and emotional control)</li> </ol>
2009	<ol style="list-style-type: none"> <li>1. Literacy/Life Skills Test (similar to one used in 2004)</li> </ol>	<ol style="list-style-type: none"> <li>1. Rosenberg Self-Esteem Scale</li> <li>2. Depression Scale (from Center for Epidemiological Studies)</li> </ol>



# Internalizing and Externalizing Behavior Indices

- Internalizing behavior index: captures the extent to which the child suffers from anxiety, depression and withdrawal.
- Externalizing behavior index: reflects interpersonal interactions, extent of destructive behavior, impulsivity, aggression and over-activity
- Questions based on scales developed by psychologists (Achenbach and Edelbrock, 1978), adapted to fit Chinese context
- Indices are mean scores normalized as standard deviations from sample means

<b>Internalizing Behavior Index Questions</b>	<b>Externalizing Behavior Index Questions</b>
I don't want others to meddle in my own business	I break things on purpose.
I can't concentrate on what I am doing	I lose my temper.
I have many strange / weird ideas (often daydream)	Even if I know I am wrong, I am reluctant to listen to others.
I easily get flushed. (I am easily frustrated or anxious)	I steal things from others or my home.
I can't do things well when my parents are not present (I usually need help from adults to do something well)	I like to show off my strengths in front of others.
I am very indifferent to others	I always want to be the center of attention.
I am very shy	I quarrel with others.
I always want to be the center of attention	I do not observe school discipline.
I am often teased by classmates	I like to brag.
I do not feel guilty, even if I have done something wrong	It bothers me if others do things better than I do.
My temper changes quickly and easily	I act impulsively.
I feel inferior to others	I often am suspicious of others.
I often am suspicious of others	I often say obscenities.
I prefer to be alone	I often make fun of others.
I often feel nervous	I sometimes tell lies.
I am often bored	I am easily angered.
I stay quiet when I am with my classmates or friends	I often disregard other people's ideas.
There is always something to worry about	I sometimes menace and even hurt others.

# Cross-sectional Skill Correlations (2004)

	Chinese	Math	Literacy	Internalizing	Externalizing
Math	0.482 <sup>***</sup>	1			
Literacy	0.301 <sup>***</sup>	0.310 <sup>***</sup>	1		
Internalizing	-0.0363	-0.0468	0.00265	1	
Externalizing	-0.0792 <sup>**</sup>	-0.0733 <sup>*</sup>	-0.0952 <sup>***</sup>	0.677 <sup>***</sup>	1
Resilience	0.150 <sup>***</sup>	0.110 <sup>***</sup>	0.176 <sup>***</sup>	-0.349 <sup>***</sup>	-0.542 <sup>***</sup>

# Selected Intertemporal Skill Correlations

Correlation between...	..and..	Correlation coefficient
Internalizing 2000	Internalizing 2004	0.0530
Externalizing 2000	Externalizing 2004	0.111 <sup>***</sup>
Internalizing 2000	Resilience 2004	-0.130 <sup>***</sup>
Externalizing 2000	Resilience 2004	-0.152 <sup>***</sup>
Resilience 2004	Rosenberg 2009	0.115 <sup>***</sup>
Internalizing 2004	Depression 2009	0.0628 <sup>*</sup>
Math 2000	Math 2004	0.0945 <sup>**</sup>
Chinese 2000	Chinese 2004	0.119 <sup>***</sup>

# Employment and Wages

- Of the 1,858 children (young adults) for whom we have data in early 2009, 846 (45.5%) were still in school, 845 (45.5%) were working, and 167 (9.0%) were neither working nor in school.
- Of these 1,858, 423 could not directly answer the questionnaire since they had migrated and did not return home for the spring festival (240) or other reasons. Employment data were collected from parents, but only the 1,435 children at home took tests of cognitive and non-cognitive skills in 2009.
- Of the 845 who were working in 2009, 771 (91.2%) were working for wages, and the rest (74) were self-employed. Note that 517 (61.2%) were working in another province, and 167 (19.8%) were working in Gansu province but in a different county than the one they grew up in.
- The log hourly wage variable is computed based on the answers to three questions: monthly income from current job (including bonuses and subsidies), days worked per month, and hours worked per day.

# Estimation Strategy

- The objective of this paper: examine whether ***noncognitive*** skills explain differences in **employment status** (working or still a student) and **wages** even after **controlling for age, experience, schooling and *cognitive* skills**.
- Of particular interest is to examine the ***relative magnitudes*** of the impacts of the cognitive and noncognitive skills on these labor market outcomes.
- The basic approach is to estimate **standard models of these outcomes**, and examine **whether *noncognitive* skills offer additional explanatory power** for those labor market outcomes.

# Econometric Identification Issues

- Apparent impact of both cognitive and non-cognitive skills on labor market outcomes could reflect **causal pathways in the opposite direction**. We address this problem by using skills measured in 2000 or 2004.
- **Omitted variable bias**. Example, child “innate ability” could affect scores on test of cognitive skills but could also have direct effects on the decision to remain in school. We use a variety of variables, plus community fixed effects.
- **Measurement error bias** in measures of cognitive and non-cognitive skills. We address this by using instrumental variables (second measurements).
- **Selection bias** (applies only to estimates of the impact of cognitive and non-cognitive skills on wages). We use Heckman’s 2-step method.

# Identifying variables in the selection equation

1. Whether students failed the high school entrance exam (discontinuity)
  - Conditional on finishing middle school, the percentage of those who fail the high school entrance exam who go onto high school is 48%, compared to  $816/972=84\%$  of those who do not fail. 20% of kids report not completing middle school.
  - We control for academic scores, but failing exam could provide independent information on skills; this should lead us to underestimate the impact of skills on wages
2. Harvest shocks from 2000 to 2006 (# bad harvests)
  - With credit constraints, could influence ability to pay for children's schooling
  - Control for current wealth recognizing that past shocks could affect current wealth



# Results I: Decision to Remain in School, Work, or Do Neither

- Multinomial Logit estimates of either remaining in school (base category), working, or doing neither. **Both cognitive and non-cognitive skills have significant explanatory power.**
- Binary Logit of remaining in school (base category) or something else (combines working and doing neither). Similar results.
- Linear probability model. Similar to binary logit, w/ same results.
- Linear probability model; IV estimation and using 2004 scores.
- Linear probability model, 2000 scores + 2004 resilience measure.

# Multinomial logit results: school/work/neither in 2009

Base group=Students	Outcome: Working		Do nothing		Working		Do nothing	
Chinese test score in 2000			-0.246**	-0.297**	-0.238**	-0.296**		
			(0.103)	(0.121)	(0.105)	(0.119)		
Math test score in 2000			-0.265***	-0.245	-0.257***	-0.243		
			(0.0867)	(0.172)	(0.0858)	(0.169)		
General cogn. skills score 2000			-0.208**	-0.252**	-0.165	-0.218**		
			(0.104)	(0.101)	(0.103)	(0.107)		
Internalizing scale in 2000					-0.116	-0.285**		
					(0.0969)	(0.133)		
Externalizing scale in 2000					0.272**	0.362**		
					(0.108)	(0.153)		
Age of sample children	0.474***	0.270***	0.539***	0.344***	0.557***	0.359***		
	(0.0397)	(0.0635)	(0.0482)	(0.0524)	(0.0472)	(0.0600)		
Gender dummy (=1 if female)	0.114	0.0388	0.106	0.0337	0.126	0.0515		
	(0.168)	(0.271)	(0.166)	(0.278)	(0.165)	(0.279)		
Father's years of schooling	-0.0933***	-0.0867***	-0.0867***	-0.0786***	-0.0869***	-0.0789***		
	(0.0185)	(0.0285)	(0.0195)	(0.0289)	(0.0193)	(0.0286)		
Mother's years of schooling	-0.0603***	-0.0487	-0.0446**	-0.0311	-0.0468**	-0.0341		
	(0.0186)	(0.0299)	(0.0197)	(0.0335)	(0.0193)	(0.0338)		
Log 2000 per capita wealth	-0.303***	-0.0640	-0.252***	-0.00416	-0.246***	-0.00544		
	(0.0742)	(0.143)	(0.0787)	(0.144)	(0.0822)	(0.147)		
Observations	1857		1857		1857			

# Results on education/employment status

- Both cognitive and noncognitive skills in 2000 are important explanators of education and employment status (externalizing behavior is most influential skill variable)
- Internalizing and externalizing behavior have different impacts:
  - Internalizing index reduces likelihood of working, and reduces likelihood of doing nothing even more
  - Externalizing index increases likelihood of working, and increases likelihood of doing nothing even more
- 2004 noncognitive skills do not significantly influence 2009 education/employment status
- Other regression analysis (not reported) finds no impact of noncognitive skills on migration propensity or skill component of work



# Linear Probability: Left school in 2009, using 2000 Skills

Chinese test score in 2000	-0.0581*** (0.0196)	-0.0563** (0.0197)	-0.0446** (0.0196)	-0.0424** (0.0190)
Math test score in 2000	-0.0579*** (0.0188)	-0.0564*** (0.0185)	-0.0630*** (0.0191)	-0.0610*** (0.0185)
Gen. cogn. skills score in 2000	-0.0427** (0.0203)	-0.0335 (0.0199)	-0.0740*** (0.0196)	-0.0637*** (0.0201)
Internalizing scale in 2000		-0.0310 (0.0197)		-0.0280 (0.0170)
Externalizing scale in 2000		0.0610** (0.0216)		0.0653*** (0.0203)
<b>Fixed effects at village level</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>
Observations	1857	1857	1857	1857

Note: control variables same as in previous table, not reported.

# Linear Probability: Left school in 2009, IV's & 2004 Skills

	IV Regressions					
Chinese test score in 2000	-0.0563** (0.0197)	-0.0424** (0.0190)	-0.0481 (0.0932)	-0.0511 (0.0929)		
Math test score in 2000	-0.0564*** (0.0185)	-0.0610*** (0.0185)	-0.0937 (0.138)	-0.0977 (0.136)		
Gen. cogn. skills score in 2000	-0.0335 (0.0199)	-0.0637*** (0.0201)	-0.224* (0.121)	-0.222* (0.120)		
Internalizing scale in 2000	-0.0310 (0.0197)	-0.0280 (0.0170)	0.0180 (0.175)			
Externalizing scale in 2000	0.0610** (0.0216)	0.0653*** (0.0203)	0.233 (0.174)	0.247*** (0.0928)		
Chinese test score in 2004					-0.0228 (0.0174)	-0.0192 (0.0163)
Math test score in 2004					-0.0358** (0.0149)	-0.0343** (0.0146)
Literacy test score in 2004					-0.0726*** (0.0196)	-0.0833*** (0.0193)
Internalizing scale in 2004					-0.0108 (0.0184)	-0.0150 (0.0168)
Externalizing scale in 2004					0.00974 (0.0201)	0.0153 (0.0191)
<b>Fixed effects at village level</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>YES</b>
Observations	1857	1857	1782	1782	1557	1557

# Linear Probability: Left School in 2009, + 2004 Resilience Variable

	Only kids in school in 2004					
Chinese test score in 2000	-0.0584*** (0.0200)	-0.0458** (0.0189)	-0.0540** (0.0212)	-0.0402* (0.0210)	-0.0551** (0.0201)	-0.0423** (0.0192)
Math test score in 2000	-0.0556*** (0.0181)	-0.0603*** (0.0183)	-0.0551*** (0.0187)	-0.0591*** (0.0185)	-0.0549*** (0.0179)	-0.0593*** (0.0182)
Gen. cogn. skills score in 2000	-0.0305 (0.0213)	-0.0622*** (0.0213)	-0.0268 (0.0241)	-0.0561** (0.0236)	-0.0295 (0.0209)	-0.0620*** (0.0216)
Internalizing scale in 2000	-0.0325 (0.0191)	-0.0319* (0.0169)	-0.0338 (0.0238)	-0.0354 (0.0208)	-0.0340* (0.0193)	-0.0327* (0.0167)
Externalizing scale in 2000	0.0564** (0.0219)	0.0644*** (0.0204)	0.0585** (0.0242)	0.0698*** (0.0220)	0.0583** (0.0210)	0.0659*** (0.0196)
Resilience scale in 2004	-0.0323*** (0.0106)	-0.0325*** (0.0112)	-0.0298** (0.0109)	-0.0324*** (0.0113)		
Optimism scale in 2004					-0.0432*** (0.0123)	-0.0390*** (0.0114)
Self-Efficacy scale in 2004					-0.0266* (0.0132)	-0.0337** (0.0138)
Relationship w/ Adults scale, 2004					0.0169 (0.0145)	0.0142 (0.0127)
Peer Relationship scale, 2004					-0.0109 (0.0134)	-0.00653 (0.0142)
Interpersonal Sensit. scale, 2004					0.0157 (0.0146)	0.0158 (0.0143)
Emotional Control scale, 2004					0.00911 (0.0141)	0.00989 (0.0147)
<b>Fixed effects at village level</b>	<b>NO</b>	<b>YES</b>	<b>NO</b>	<b>YES</b>	<b>NO</b>	<b>YES</b>
Observations	1768	1768	1585	1585	1768	1768

# Results II: Wage Regressions

- Correct for selection bias (Heckman), report probits for employment
- Use skills measured before entering the labor market (in 2000 or 2004)
  - With and without controlling for years of schooling
- Use contemporaneous skills measured in 2009
  - Address endogeneity bias using lagged skills as instruments



Selection and wage regressions, 2000 skill variables and 2004 skill variables

	2000 skill variables		2004 skill variables	
	employed	lnwage	employed	lnwage
Failed the entrance exam to high school	0.354** (0.178)		0.456** (0.212)	
Years of bad harvest during 2000-2006	-0.0269 (0.0535)		0.0402 (0.0603)	
Chinese achievement test score	-0.0863 (0.105)	-0.000650 (0.0417)	0.0999 (0.0960)	0.0314 (0.0272)
Math achievement test score	0.0752 (0.169)	0.00456 (0.0297)	-0.117 (0.101)	-0.0669* (0.0334)
Dummy =1 if took Math achievement test in 2000	-0.0734 (0.121)	0.0195 (0.0605)		
General cognitive ability	0.144 (0.0940)	0.0358 (0.0282)		
Life skill test score			0.137 (0.0886)	0.00427 (0.0410)
Internalizing scale	0.0817 (0.116)	0.0198 (0.0338)	0.0152 (0.135)	0.0382 (0.0321)
Externalizing scale	-0.160 (0.120)	-0.00394 (0.0336)	0.0116 (0.167)	-0.00424 (0.0340)
Resilience scale in 2004			0.109 (0.129)	-0.0128 (0.0363)
Years of schooling	-0.000591 (0.0411)	0.0457** (0.0158)	0.0369 (0.0577)	0.0629*** (0.0180)
imr		0.379 (0.638)		0.475 (0.614)
Constant	0.231 (0.996)	1.021*** (0.295)	-0.920 (1.140)	0.844** (0.358)
Observations	814	737	654	599

# Results on Wage Regressions with predetermined skills

- Failing entrance exam strongly associated with observing wages (bad harvests matter when years of schooling not controlled for)
- Controlling for years of schooling, no 2000 and 2004 cognitive and noncognitive skills do not affect wages
- Results similar when NOT controlling for years of schooling, except 2000 general ability test and 2004 internalizing scale increase wages
  - Lack of significance may be associated with limited sample of wage earners, since skills are found to affect years of schooling (below)

# Selection and wage regressions using 2009 skill measures

	employed	lnwage	employed	lnwage	employed	lnwage
Failed the entrance exam to high school	0.455*		0.502*		0.455*	
	(0.243)		(0.261)		(0.244)	
Years of bad harvest during 2000-2006	-0.00925		-0.0378		-0.00809	
	(0.0711)		(0.0711)		(0.0725)	
Life skill test score	0.0734	0.00847	0.0852	0.0209	0.0734	0.00941
	(0.148)	(0.0410)	(0.119)	(0.0395)	(0.151)	(0.0403)
Standardized Rosenberg Self-Esteem Scale 2009	0.228***	0.106*			0.248***	0.0905
	(0.0706)	(0.0519)			(0.0518)	(0.0604)
Standardized CES-D Depression Scale 2009			0.0512	-0.0840*	0.0718	-0.0482
			(0.137)	(0.0412)	(0.135)	(0.0473)
Years of schooling	-0.00483	0.0234	0.0452	0.0357	-0.00216	0.0219
	(0.0579)	(0.0211)	(0.0514)	(0.0244)	(0.0593)	(0.0220)
imr		0.754		0.847*		0.764
		(0.593)		(0.449)		(0.527)
Constant	-0.0258	1.381**	-0.707	1.084*	-0.143	1.430**
	(1.225)	(0.508)	(1.053)	(0.542)	(1.290)	(0.525)
Observations	408	366	429	385	408	366
AIC	206.7	666.5	237.3	707.1	208.3	665.4

# Results on wage regressions using 2009 skill measures

- Better contemporaneous noncognitive skills associated with higher wages
- Addressing possibility of reverse causality:
  - Instrumenting 2009 skills with 2000 and 2004 skill measurements finds even larger impacts of noncognitive skills
  - However, first-stage of IV is weak and produces imprecise estimates, again power limited by small selected sample of wage earners
  - Impact of contemporaneous noncog skills on wages is not influenced by controlling for years of schooling
  - Cannot rule out reverse causality interpretation

## Results III: Indirect Effects of Cognitive and Noncognitive Skills on Wages

- Estimate impact of prior skills on current skills and years of schooling
- Censored ordered Probit estimates of years of schooling

# 2009 production of skills

	Life skills	Rosenberg	CESD	Years of schooling
Chinese achievement test score in 2000	0.0417 (0.0389)	-0.00553 (0.0531)	0.0169 (0.0481)	0.203*** (0.0556)
Math achievement test score in 2000	0.0149 (0.0374)	0.0772 (0.0457)	-0.00352 (0.0376)	0.214** (0.0776)
Took Math achievement test in 200	-0.0198 (0.0544)	-0.0411 (0.0561)	-0.000164 (0.0676)	-0.0197 (0.0816)
General cognitive ability 2000	0.142* (0.0697)	0.0968* (0.0493)	-0.0481 (0.0395)	0.352*** (0.106)
Internalizing scale in 2000	-0.0852** (0.0380)	-0.0338 (0.0658)	0.00502 (0.0523)	0.0154 (0.0664)
Externalizing scale in 2000	-0.0112 (0.0337)	0.00805 (0.0444)	0.00977 (0.0617)	-0.0825 (0.0602)
Chinese achievement test score in 2004	0.0356 (0.0251)	0.0255 (0.0313)	0.0458 (0.0455)	-0.00639 (0.0644)
Math achievement test score in 2004	0.0405 (0.0252)	0.0445 (0.0336)	-0.0323 (0.0359)	0.153*** (0.0478)
Life skill test score 2004	0.244*** (0.0462)	0.0252 (0.0427)	0.0299 (0.0364)	0.463*** (0.0730)
Internalizing scale in 2004	0.0563* (0.0279)	-0.0293 (0.0360)	0.0728 (0.0515)	0.0557 (0.0567)
Externalizing scale in 2004	-0.0700** (0.0329)	0.0312 (0.0488)	-0.0134 (0.0516)	-0.00220 (0.0527)
Resilience scale in 2004	0.0723** (0.0340)	0.107** (0.0391)	-0.0480 (0.0421)	0.119** (0.0484)

Additional controls:  
age, gender, height-for-age,  
mother's education,  
father's education,  
log wealth p.c.

# Censored ordered probit results

Dep. Var.	(1)	(2)	(3)
1 = Primary school	All kids	All kids	Students
2 = Start middle school	2000 skills	2004 skills	2004 skills
3 = Finish middle school			
4 = Started High School			
Chinese score in 2000	0.206*** (0.0366)		
Math score in 2000	0.155*** (0.0541)		
Literacy test score in 2000	0.175* (0.0947)		
Internalizing scale in 2000	0.120** (0.0513)		
Externalizing scale in 2000	-0.166*** (0.0544)		
Chinese score in 2004		0.00396 (0.0382)	-0.0300 (0.0397)
Math score in 2004		0.0992** (0.0415)	0.109** (0.0486)
Literacy test score in 2004		0.310*** (0.0476)	0.311*** (0.0528)
Internalizing scale in 2004		0.0618 (0.0508)	0.0504 (0.0558)
Externalizing scale in 2004		-0.0893 (0.0590)	-0.0656 (0.0660)
Resilience scale in 2004		0.0634* (0.0355)	0.0669* (0.0358)

Impact on  
years of  
schooling of  
increasing  
skills by one  
standard  
deviation

	(1) All kids 2000 skills	(2) All kids 2004 skills	(3) Students 2004 skills
Base	9.774	9.772	9.861
Chinese achievement test, 2000	10.01 (0.237)		
Math achievement test, 2000	9.955 (0.181)		
Literacy test score in 2000	9.977 (0.203)		
Internalizing scale in 2000	9.915 (0.142)		
Externalizing scale in 2000	9.563 (-0.211)		
Chinese achievement test, 2004		9.777 (0.005)	9.826 (-0.035)
Math achievement test, 2004		9.888 (0.115)	9.981 (0.121)
Literacy test score in 2004		10.111 (0.338)	10.183 (0.322)
Resilience scale in 2004		9.847 (0.075)	9.936 (0.075)



# 2004 skill production

	Chinese	Math	Life skills	Internalizing	Externalizing	Resilience
Chinese achievement test score in 2000	0.0599 (0.0455)	0.0242 (0.0585)	0.105*** (0.0358)	-0.0627 (0.0447)	-0.0518 (0.0343)	0.0431 (0.0489)
Math achievement test score in 2000	0.0921* (0.0471)	0.106* (0.0608)	0.133*** (0.0398)	-0.0226 (0.0432)	-0.0671* (0.0365)	0.0863 (0.0509)
Dummy =1 if took Math achievement test in 2000	0.0256 (0.0314)	0.0910 (0.0553)	-0.0308 (0.0441)	-0.0644 (0.0402)	-0.0462 (0.0410)	-0.0118 (0.0456)
General cognitive ability 2000	0.0696 (0.0447)	0.0359 (0.0599)	0.180*** (0.0495)	0.0238 (0.0283)	0.00797 (0.0338)	0.0247 (0.0439)
Internalizing scale in 2000	-0.0588* (0.0304)	0.0211 (0.0446)	0.0454 (0.0335)	0.0164 (0.0476)	-0.0345 (0.0432)	0.0549 (0.0513)
Externalizing scale in 2000	0.0253 (0.0315)	-0.0680 (0.0469)	-0.180*** (0.0340)	0.0117 (0.0575)	0.131*** (0.0430)	-0.147** (0.0572)

Additional controls: age, gender, height-for-age, mother's education, father's education, log wealth p.c.

Results suggest that the impact of noncognitive skills on cognitive skills may be greater than the impact of cognitive skills on noncognitive skills.

# Conclusions

- Strong evidence that noncognitive (and cognitive) skills influence years of schooling which has a large impact on labor outcomes in China
- No strong evidence of impacts of noncognitive (or cognitive) skills on early labor market outcomes
  - Negative relationship between contemporaneous noncog skills and wages cannot be interpreted as causal
  - Many have not yet entered the labor market, and effects could become larger with more years in the labor market

Project information: <http://china.pop.upenn.edu/Gansu/intro.htm>

Paper repository: <http://repository.upenn.edu/gansu>

