Education Expansion and Human Capital Investment of Rural Women in China

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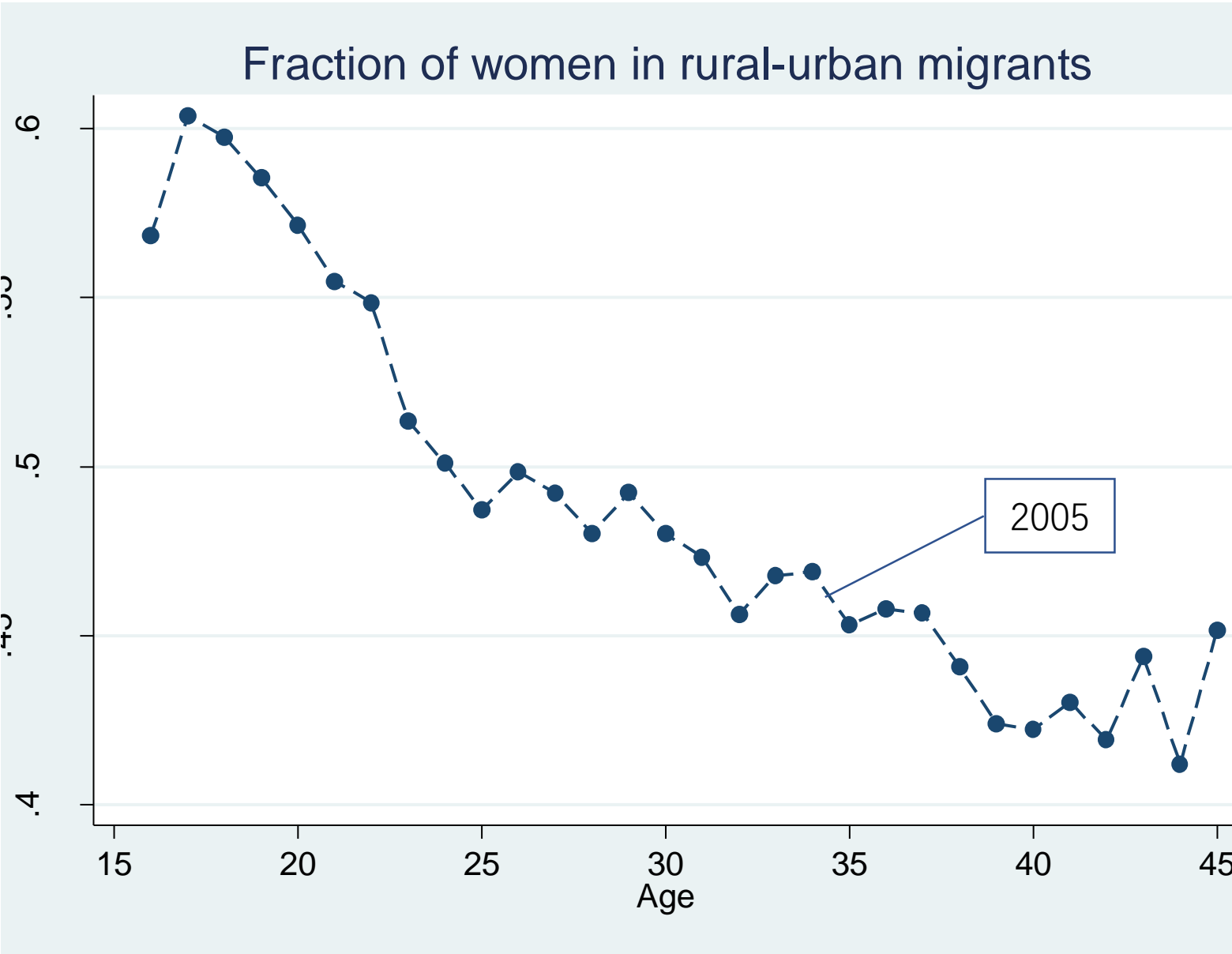**Yan SUN**

Beijing Normal University

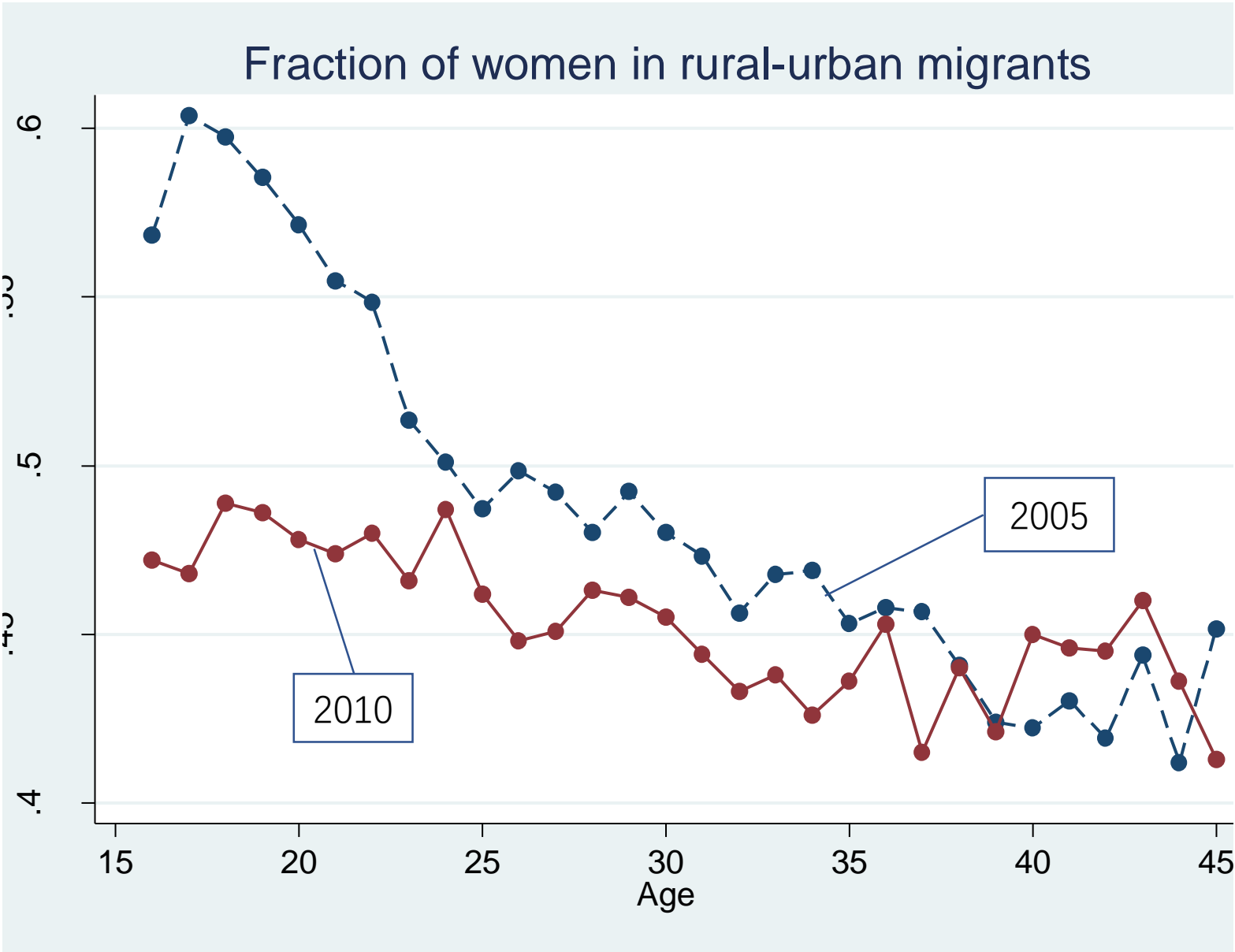- **Surplus** of women in young migrants and **deficit** of women in old migrants

- The surplus of women in young migrants disappears.

Fraction of women in rural-urban migrants

2005

2010

Age

Motivation

- Education and migration are two major ways of human capital investment.

- Education and migration opportunities and an individual's decision in these two aspects are crucial for the inclusiveness of economic growth.

- China's high economic growth accompanied rising income inequality (rural-urban income gap and educated-less educated income gap)

Motivation: why women?

- Women were disprivileged in these two aspects.

- Son preference, social norms, attitudes, labor division, etc. (Sen, 1989; Sen, 1992; Qian, 2008; Edlund, 1999; Wei and Zhang, 2011; Qian 2008; Chen et al., 2013; Almond et al., 2013. Jayachandran and Kuziemko, 2011; Hafeez and Quintana-Domeque, 2018)

Hukou system and the rural-urban divide

- Two categories: _agricultural_ vs _non-agricultural_

- Hukou status is _location Specific_

- Determination: by _birth (matrilineal rule before 1998)._

- Urban local hukou: _better paid and decent job, education, health care_

- Moving from one place to another needed permission from both origin and destination authorities.

Relaxation of the Hukou system and migrant workers

- With economic transition and a series of reforms, rural residents are allowed to move to cities

- **Migration**: move from rural to urban areas without changing one's official household registration (**Hukou**).

- [137 million migrant workers in urban China in 2017](#).

- For most of the rural people, conversion of hukou status is difficult.

- Formal ways of changing Hukou status: **college education**, military service, cadre promotion, losing land, purchasing housing, …

Research question

- <u>How have economic environments/policies shaped the migration pattern and education decisions of women relative to men?</u>

- Before and after the higher education expansion

A simple model

- We take into consideration the following aspects:

1. The temporariness of migration (women more so) for low educated workers.
2. Endogenous determination of migration age.
3. Separate-residing arrangements (left-behind wives and children).

The model

- A simple three-period model: In period 1 and/or 2, one chooses the amount of time searching or education for an urban job and then goes to the city for employment.

- In period 3, individuals get married and women go back to rural areas

- job search can be understood in a more general way as any activity that enhances an individual's earning capacity in urban areas, such as education and training.

- No direct costs of searching and migration occur.

The model

- Rural wage is w_r; urban wage w_u depends on searching time x which increases the base urban wage w_u^B ($w_r < w_u^B$) by $s(x)$ (i.e. $w_u = (1 + s(x))w_u^B$), with $s'(x) \geq 0$ and $s''(x) \leq 0$.

- A risk neutral women: $\max\limits_{x_f} \left(1 + s(x_f)\right) w_u^B \left(2 - x_f\right) + w_r$

- Her optimal searching time satisfies: $\dfrac{s'\left(x_f^*\right)}{1+s\left(x_f^*\right)} = \dfrac{1}{2-x_f^*}$

- Similarly, a man's objective function is: $\left(1 + s(x_m)\right)w_u^B(3 - x_m)$

- His optimal searching time satisfies: $\dfrac{s'(x_m^*)}{1+s(x_m^*)} = \dfrac{1}{3-x_m^*}$

Model predictions

- Men's searching time is longer than that of women: $x_m^* > x_f^*$;

- Women's migration duration is shorter than men;

- Women dominate in the young group, but men dominate in the older migrant group;

- The relationship between gender gap in migration probability and age is of inverted U shape.

- The surplus disappears when women can stay in the urban areas longer.

Data

- One-fifth random draw from the 2005 1% population survey

  ① Migrants: who have left hukou place for more than 6 months.
  ② Migrants who migrate only within the city of Hukou and who remain in rural areas are deleted.

- China Household Income Project (CHIP): 2002; 2007; 2013

Empirical evidence for the model assumptions

Young women are more likely to return
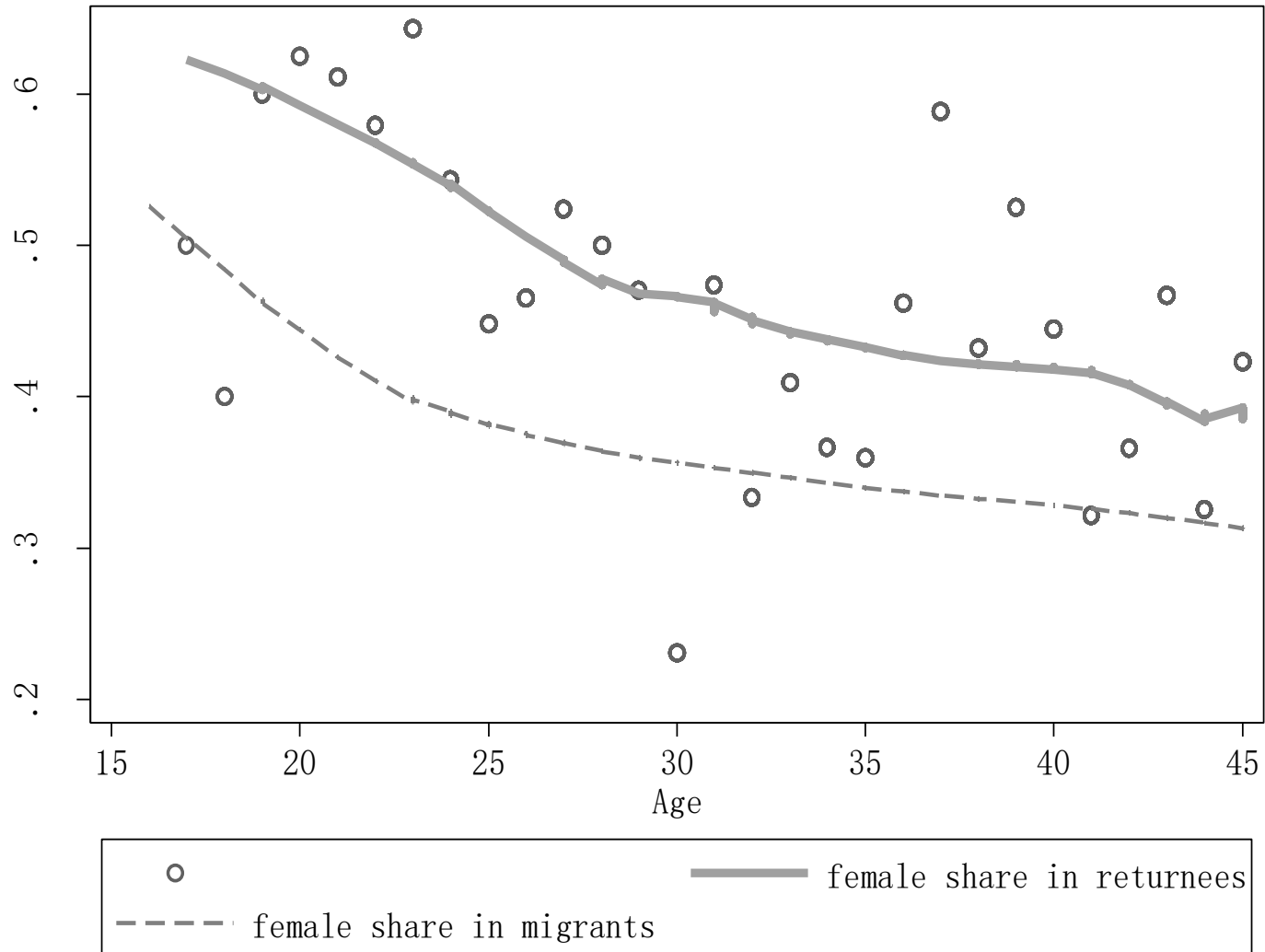
Women are more likely to leave the labor force

Table 3 Gender and labor market participation

	(1)	(2)	(3)	(4)	(5)	(6)
	work dummy		weekly working hours		Ln (hourly wage)	
	single	married	single	married	single	married
female	-0.024***	-0.272***	-0.319	-0.783***	-0.037***	-0.304***
	(0.004)	(0.007)	(0.194)	(0.146)	(0.008)	(0.008)
Obs.	32,613	58,677	30,534	47,932	30,398	47,036
Adj. R2	0.041	0.172	0.051	0.035	0.218	0.206

Note: (1) education levels, age, hukou city, and a constant term are controlled for in all regressions. (2) standard errors are heteroskedasticity robust and clustered at the city level. (3) *, **, and *** represent significance level at 10%, 5%, and 1%, respectively.

Data source: 2005 population survey.

Gender wage differentials
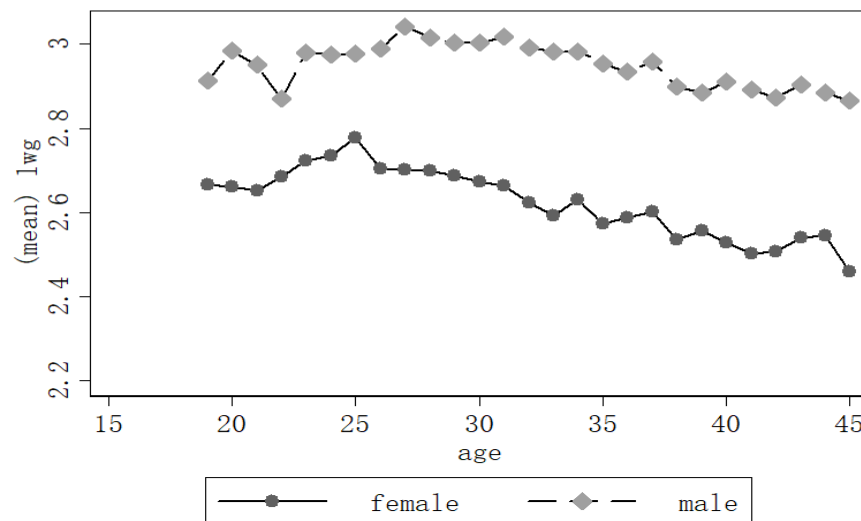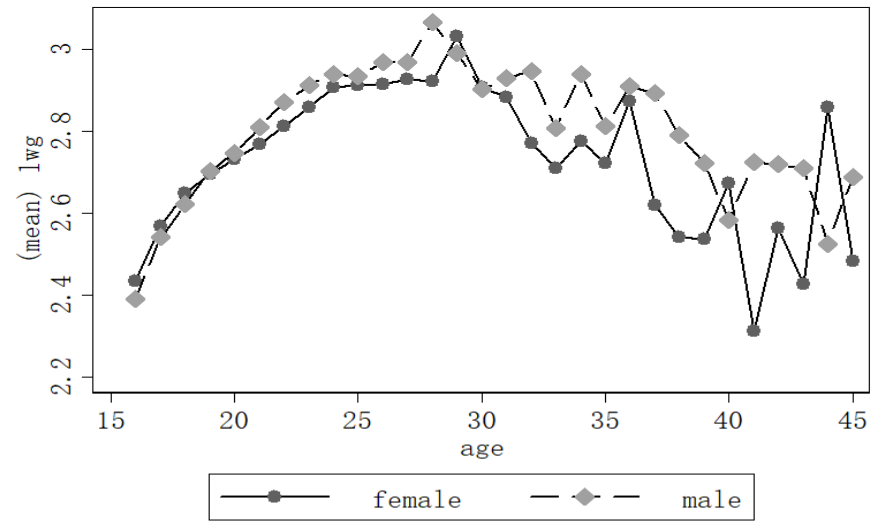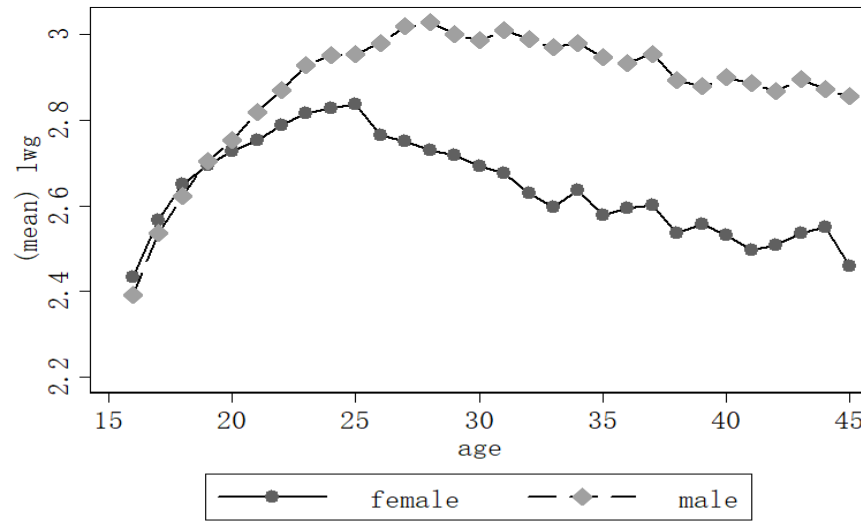
Evidence for the predictions

Model predictions

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Rural women migrate earlier

Table 4 Gender, schooling status and migration propensity

Dependent variable =	(2) migrant
A: sample aged 16-25	
female	0.036***
	(0.003)
dropout	
femaleXdropout	
Obs.	183,517
Adj. R2	0.159

Rural women migrate earlier not because they are more likely to dropout of school

Table 4 Gender, schooling status and migration propensity

	(1)	(2)	(3)	(4)
Dependent variable =	dropout (not in school=1)	migrant		
A: sample aged 16-25				
female	0.013***	0.036***	0.034***	0.003**
	(0.004)	(0.003)	(0.003)	(0.002)
dropout			0.149***	0.083***
			(0.009)	(0.008)
femaleXdropout				0.044***
				(0.004)
Obs.	183,517	183,517	183,517	183,517
Adj. R2	0.315	0.159	0.185	0.185

……, but because their search/waiting time is shorter

Table 5 Migration age and gender

	(1)	(2)	(3)	(4)	(5)
	Age: 16-25	Age: 16-45			
	All education	All education.	Primary	Middle	High School
Census05					
female	-0.406***	-1.628***	-1.615***	-1.673***	-1.874***
	(0.036)	(0.044)	(0.102)	(0.053)	(0.093)
Obs.	32,623	80,842	11,610	49,702	13,372
Adj. R2	0.144	0.483	0.320	0.485	0.438

……, but because their search/waiting time is shorter

Table 6 The gender difference in work experience before migration

	Have cadre/military/non-farm job experience before migration (yes=1/no=0)	
	(1) age: 16-25	(2) age: 16-45
female	-0.029*	-0.046***
	(0.015)	(0.010)
Obs.	2,636	6,651
Adj. R2	0.016	0.025

Note: (1) we also control for age, education levels, and hukou province. (2) Robust standard errors are clustered at the province level. (3) *, **, and *** represent significance level at 10%, 5%, and 1%, respectively.

Data source: Migrant module of CHIP 2007

Model predictions

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- The relationship between gender gap in migration probability and age is of inverted U shape.
- The surplus disappears when women can stay in the urban areas longer.

Table 8 Gender difference in migration duration

|	(1)	(2)	(3)	(4)
	years left Hukou registration		left Hukou place	
	(top coded at 6)		for over 5 years	
female	-0.211***	-0.008	-0.046***	-0.009***
	(0.020)	(0.017)	(0.004)	(0.003)
Obs.	91,290	91,290	91,290	91,290
Adj. R2	0.040	0.154	0.034	0.123
control for age	no	yes	no	yes

Note: (1) Education level, hukou city, and a constant term are controlled for in all regressions. (2) Standard errors are heteroskedasticity robust and clustered at the hukou city level. (3) *, **, and *** represent significance level at 10%, 5%, and 1%, respectively.

Data Source: 2005 Census.

Model predictions

- Men's searching time is longer than that of women: $x_m^* > x_f^*$;

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- **Surplus** of women in young migrants and **deficit** of women in old migrants
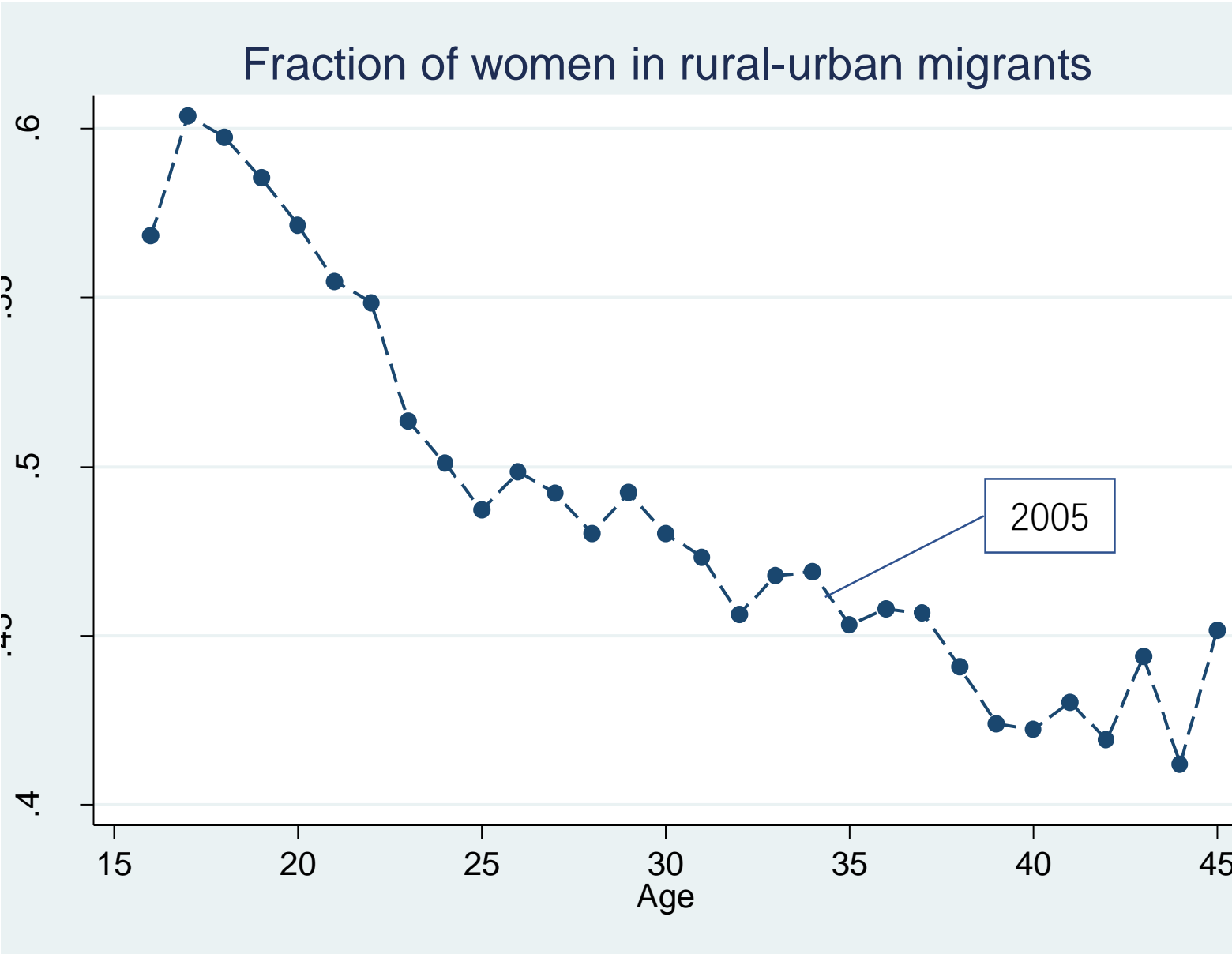
Fraction of women in rural-urban migrants

Model predictions and empirical evidence

- Men's searching time is longer than that of women: $x_m^* > x_f^*$;

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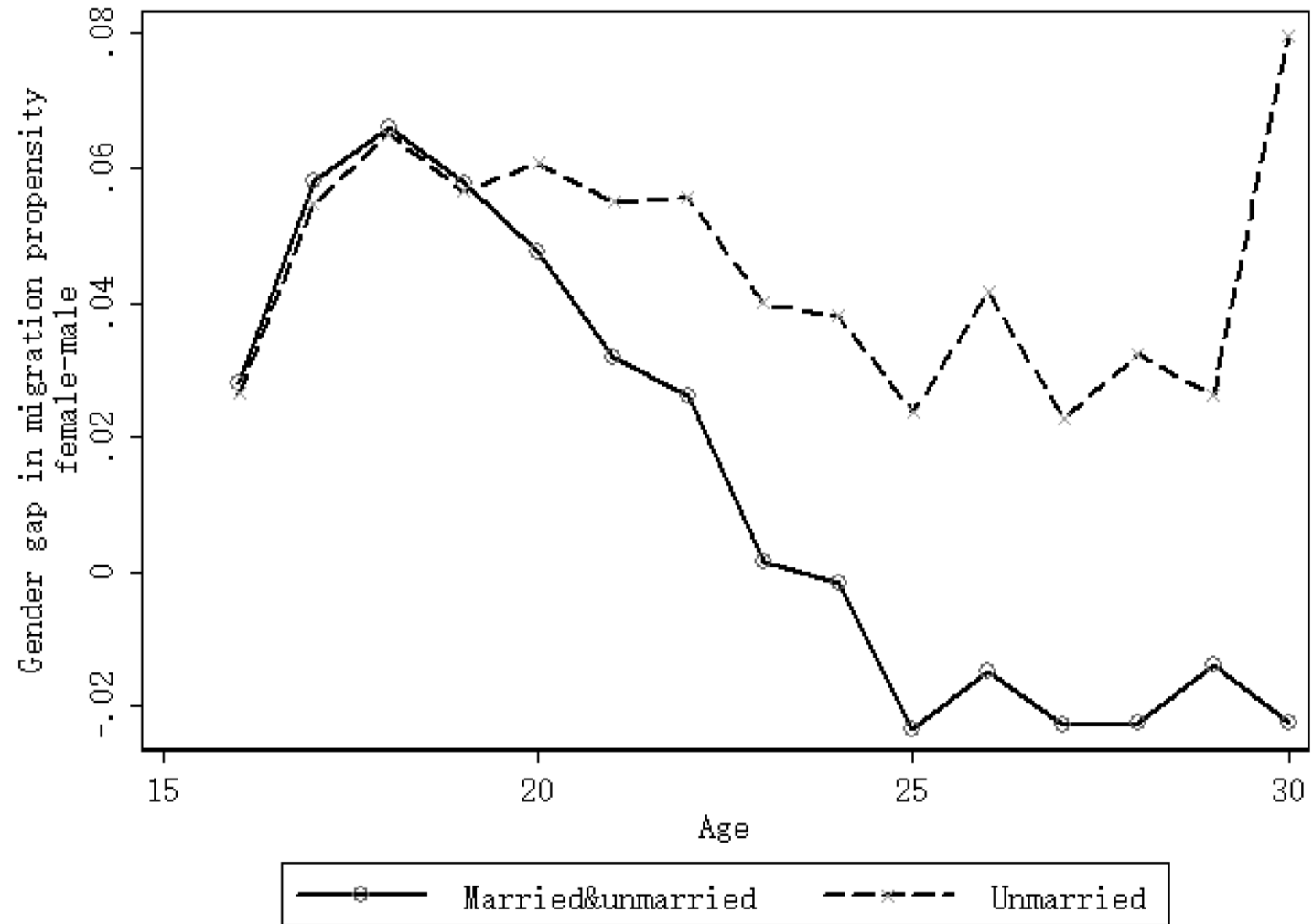- The surplus disappears when women can stay in the urban areas longer.

Figure 6 Gender gap in migration probability by age

Model predictions and empirical evidence

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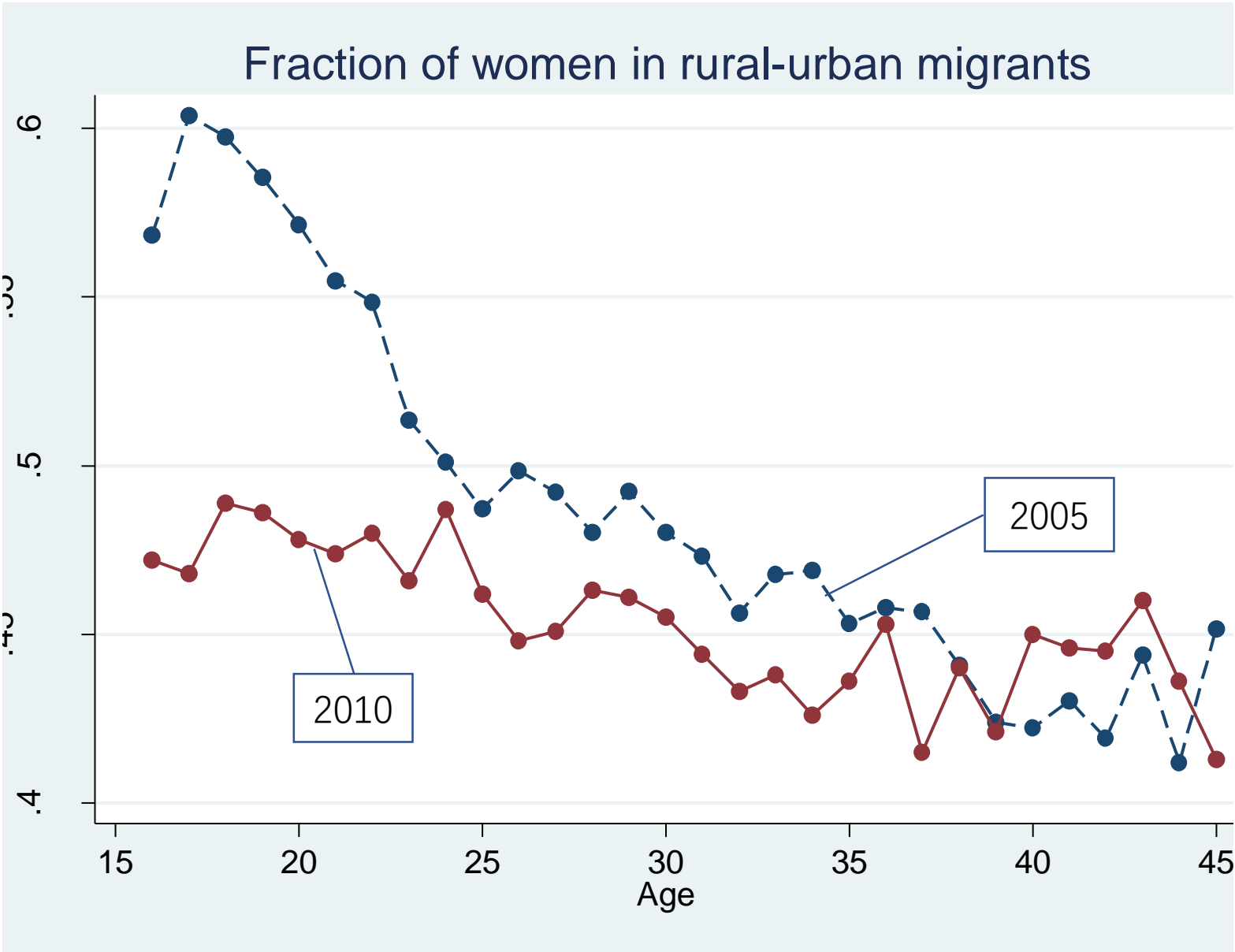
Higher education expansion
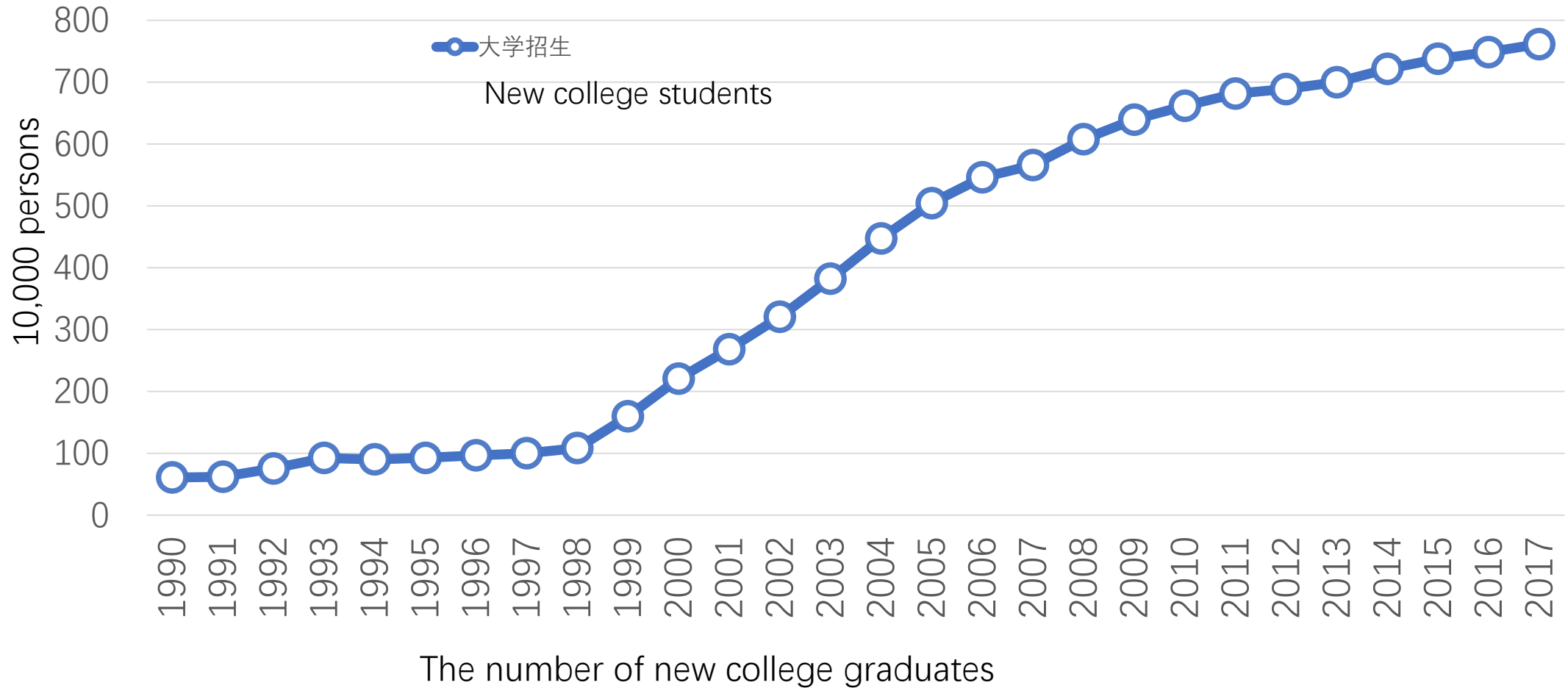
Higher education expansion

- Share of college educated in male and female residents in rural China increased significantly with E.E..
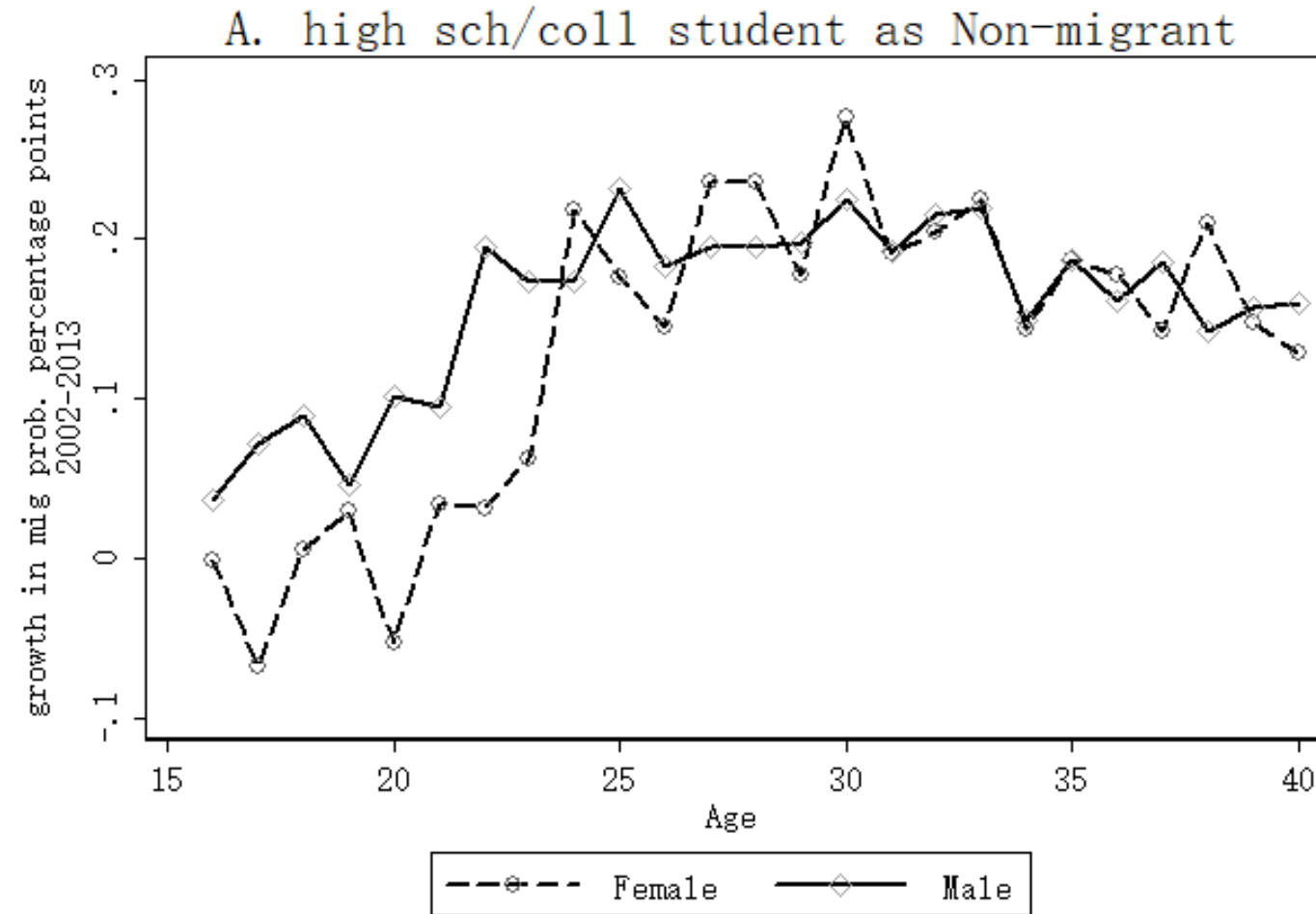
- Female share increased more rapidly than that of male.

A. rural
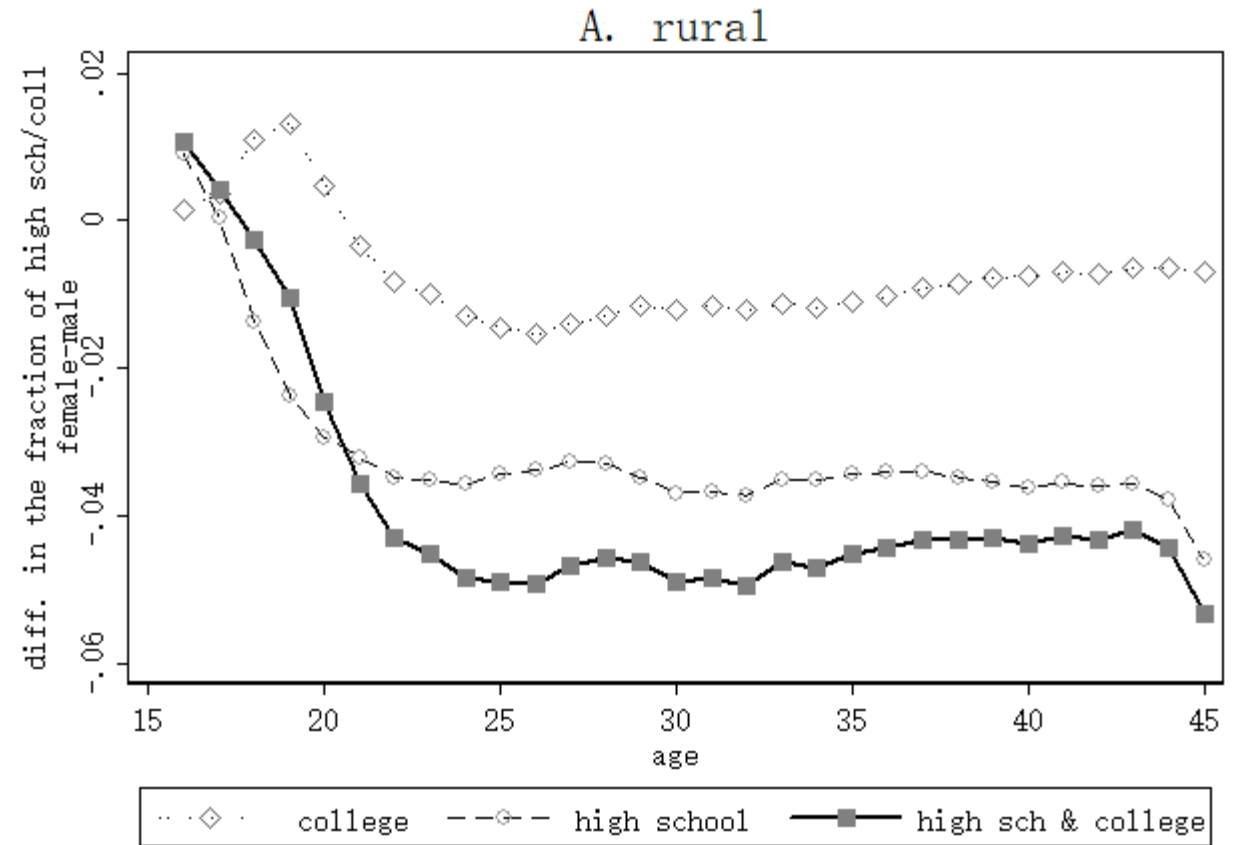
Data source: 2010 census.

- The surplus of women in young migrants disappears.

Fraction of women in rural-urban migrants

2005

2010

The disappearance of surplus women

A. high sch/coll student as Non-migrant

The disappearance of surplus women

B. high sch/coll student as migrant
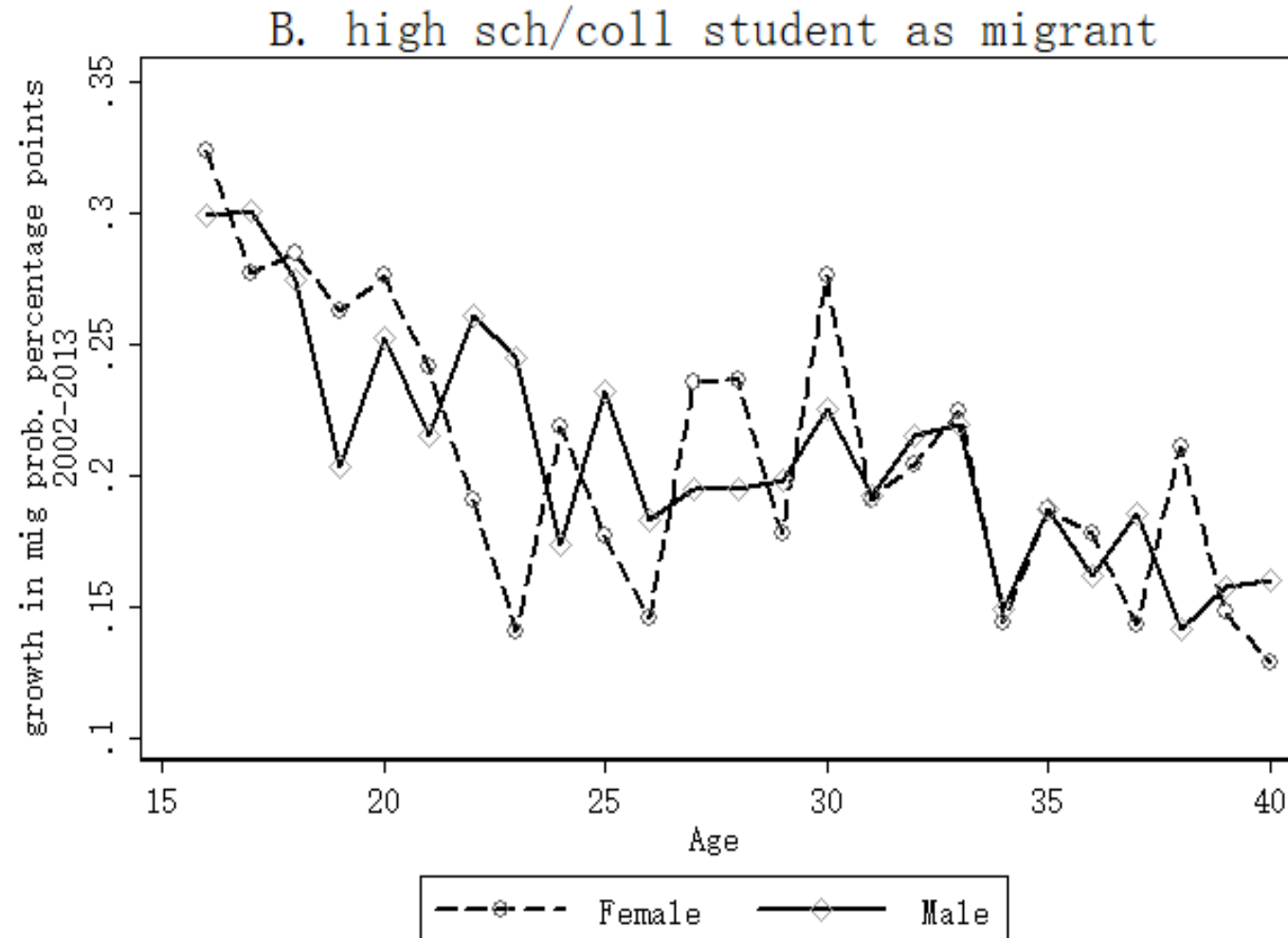
The disappearance of surplus women

Table 15 Education expansion and women migration

	(1)	(2)	(3)	(4)
	In high school and college		In high school and college	
	as NON-migrants		as MIGRANTS	
	Female	Male	Female	Male
*Age16_23*Year2013*	-0.189***	-0.080***	0.003	0.042*
	(0.024)	(0.022)	(0.025)	(0.024)
Age16_23	0.207***	0.090***	0.167***	0.081***
	(0.024)	(0.021)	(0.025)	(0.022)
Year2013	0.197***	0.151***	0.111***	0.077*
	(0.032)	(0.034)	(0.035)	(0.040)
Obs	14,431	15,644	14,431	15,644
Adj. R2	0.177	0.208	0.270	0.203

Notes: We control for age, age squared, education dummies and region dummies. Standard errors are clustered at city level.

Data: 2002 and 2013 CHIP.

Explanations

- Our explanation lies in one basic prediction of migration/human capital investment theory: Individuals' migration decision is influenced by the expected duration of migration.

- People of young age are more likely to migrate (standard theory).

- Our explanation:

- (**the surplus**): Relative to men, women return earlier (due to Hukou restriction and labor division within households) → leave earlier.

- (**the disappearance of the surplus**): When education expansion provides more chances of permanent migration, women go to college rather than migrate at an early age.

- Alternative explanations: migrate for marriage (Edlund, 2005); Demand for young women (Hellester et al., 2017); ……

Girls perform better in school

Table 10 Gender difference in cognitive ability, test scores, and ranking

	(1)	(2)	(3)	(4)	(5)
	Dependent variable=				
	Cognitive ability	Chinese	Math	English	Ranking
female	-0.019	5.811***	0.799***	5.923***	0.266***
	(0.018)	(0.246)	(0.291)	(0.280)	(0.030)
Adj. R2	0.175	0.105	0.010	0.104	0.049

Notes: (1) Observations are restricted to those with rural hukou, and the sample size is 8717. (2) Ethnicity, father's education, mother's education, father's occupation, mother's occupation, family income, grade (7th or 9th), and school fixed effects are controlled for in all regressions. (3) Test scores of Chinese, math, and English are standardized. Ranking refers to rankings within class ranging from 1 (the lowest) to 5 (the highest). (4) Robust standard errors clustered at the school level are in parenthesis.

Data source: CEPS.

# Girls have greater educational expectations

Table 11 Gender difference in educational expectation, LPM

	(1)	(2)	(3)	(4)
	Parents' expectation (college=1/below=0)		Students' expectation (college=1/below=0)	
female	0.065***	0.006	0.116***	0.037***
	(0.011)	(0.011)	(0.012)	(0.012)
Ranking & test scores	no	yes	no	yes
Adj. R2	0.050	0.163	0.069	0.219

Notes: (1) Observations are restricted to those with rural hukou, and the sample size is 8717. (2) Ethnicity, father's education, mother's education, father's occupation, mother's occupation, family income, grade (7th or 9th), and school fixed effects are controlled for in all regressions. (3) Test scores of Chinese, math, and English are standardized. Ranking refers to rankings within class ranging from 1 (the lowest) to 5 (the highest). Dummies for ranking are used when they are controlled for. (4) Robust standard errors clustered at the school level are in parenthesis.
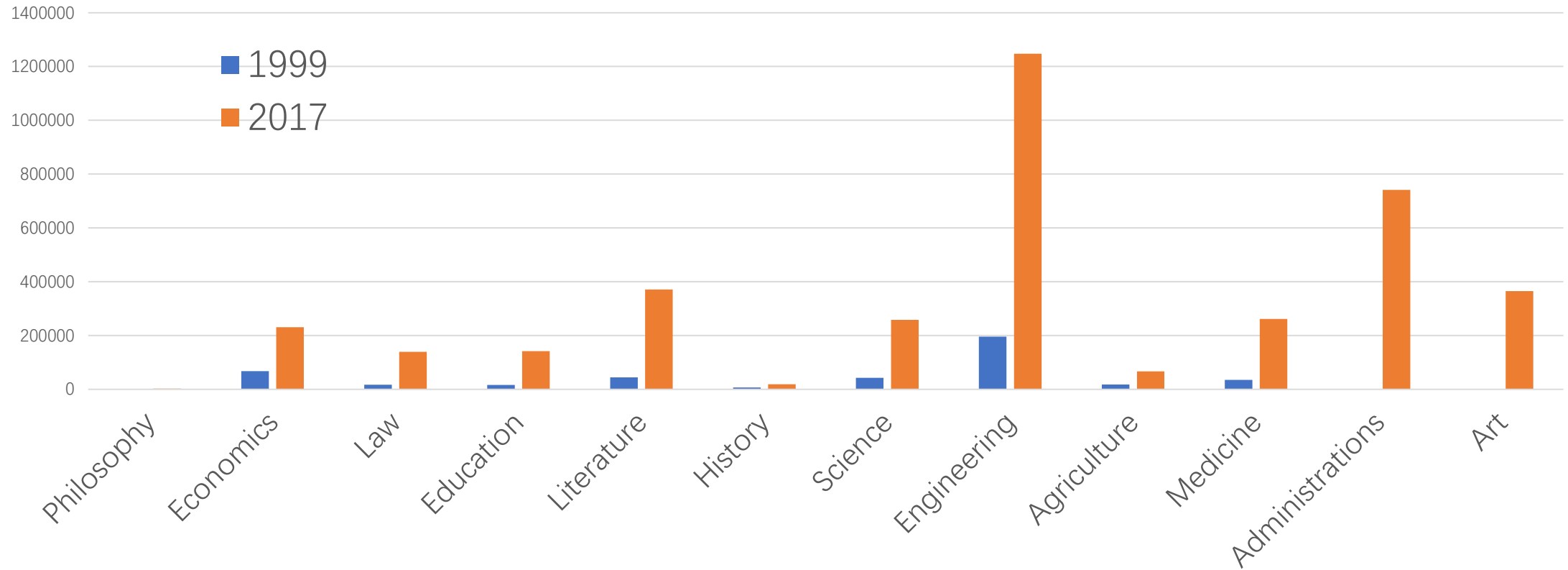
Data source: CEPS.

The return to education is higher for female
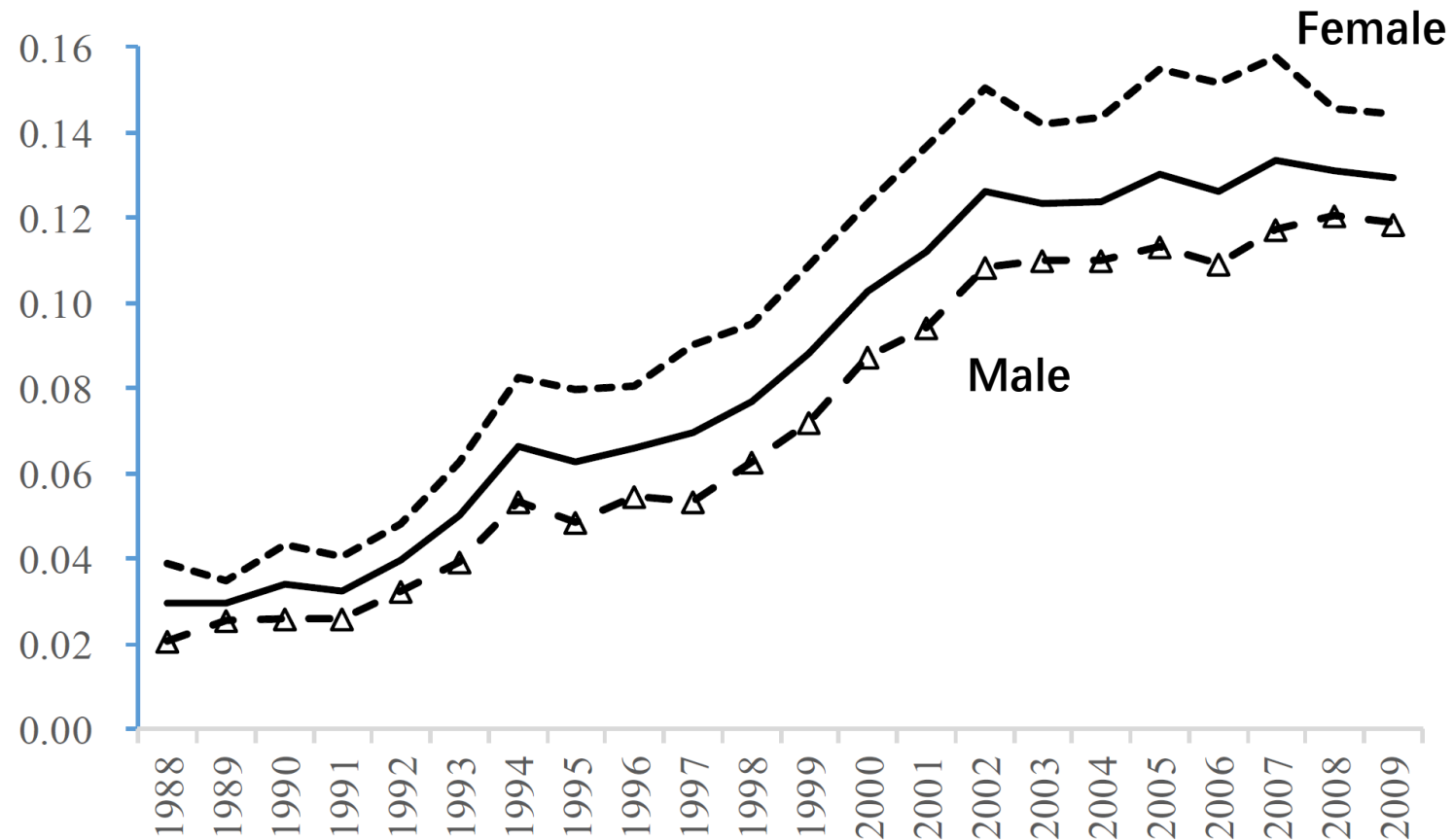
The return to years of schooling in urban China is higher for female than for male workers.
Luo (2019)

Changes in the major structure is less male biased

Number of university graduates by major, 1998 and 2016.
EDUCATIONAL STATISTICS YEARBOOK OF CHINA (1999, 2017)

Alternative explanations

- Migrate for marriage
- Not consistent with the changes: marriage motive should be declining, which is less likely to be true. Empirical evidence actually shows that the marriage possibilities increased.

- Urban areas' demand may be gender and age specific.
- Not consistent with the data.

Alternative Explanation I: migrate for marriage.

- Sex and the City (Edlund, 2005): "*the presence of males with high incomes may attract not only skilled females but also unskilled females. Thus, a surplus of women in urban areas may result from a combination of better labor and marriage markets*"

Migrate for marriage.

Those who had changed
Hukou because of **marriage**
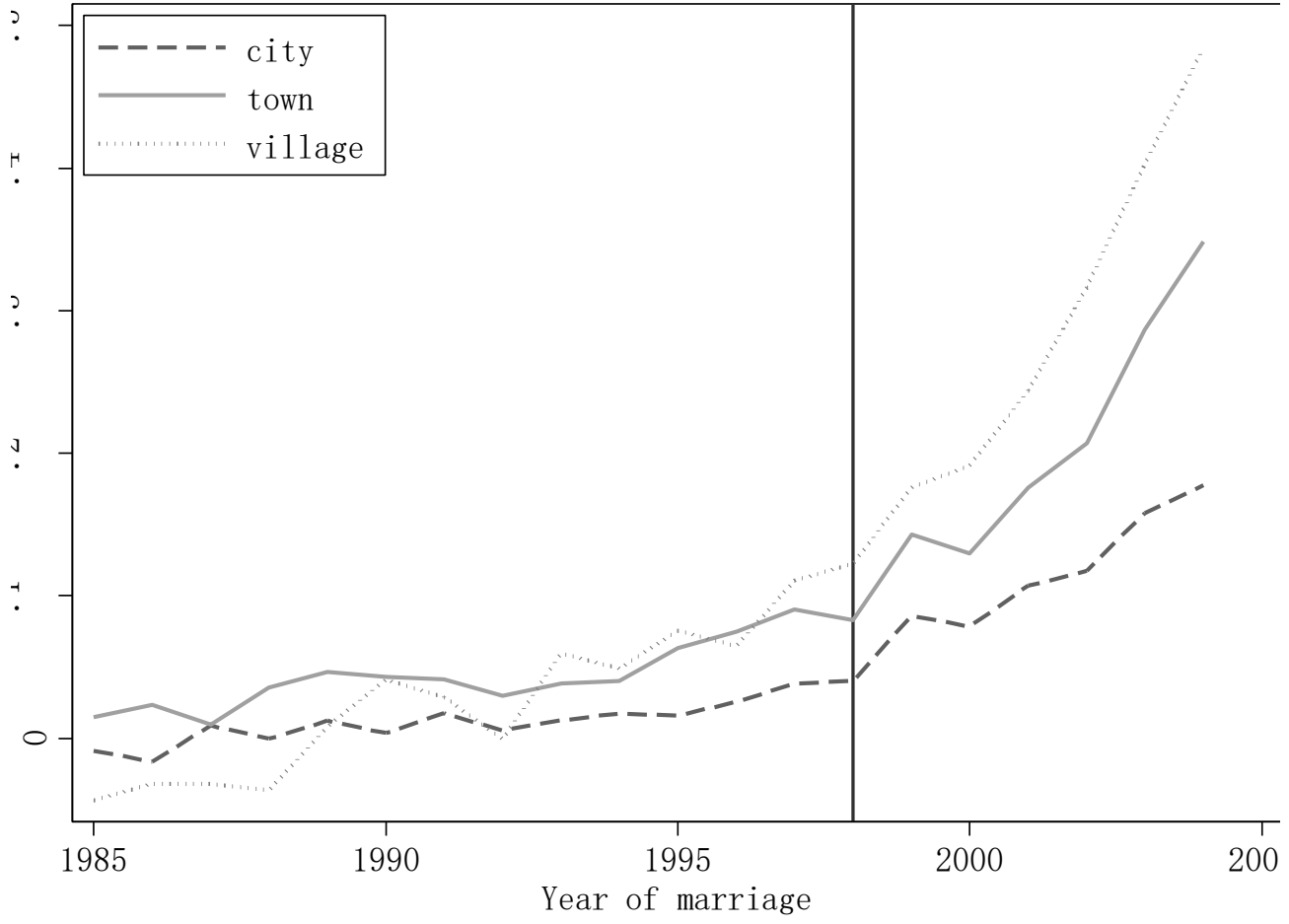as share of female
permanent migrants

Source: CHIP 2013
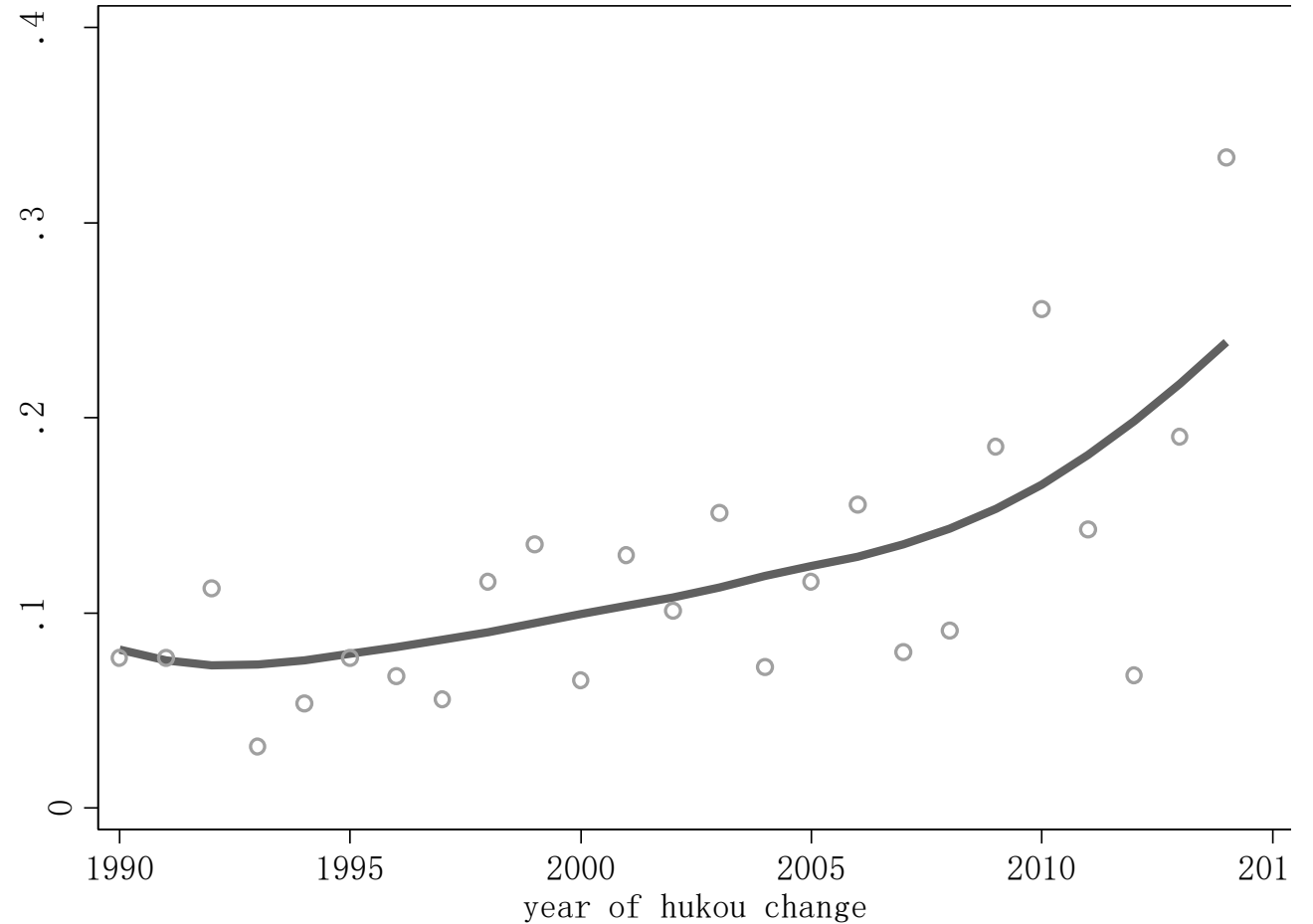
Migrate for marriage.

Those whose reason of migration is **marriage** as share of female migrants.

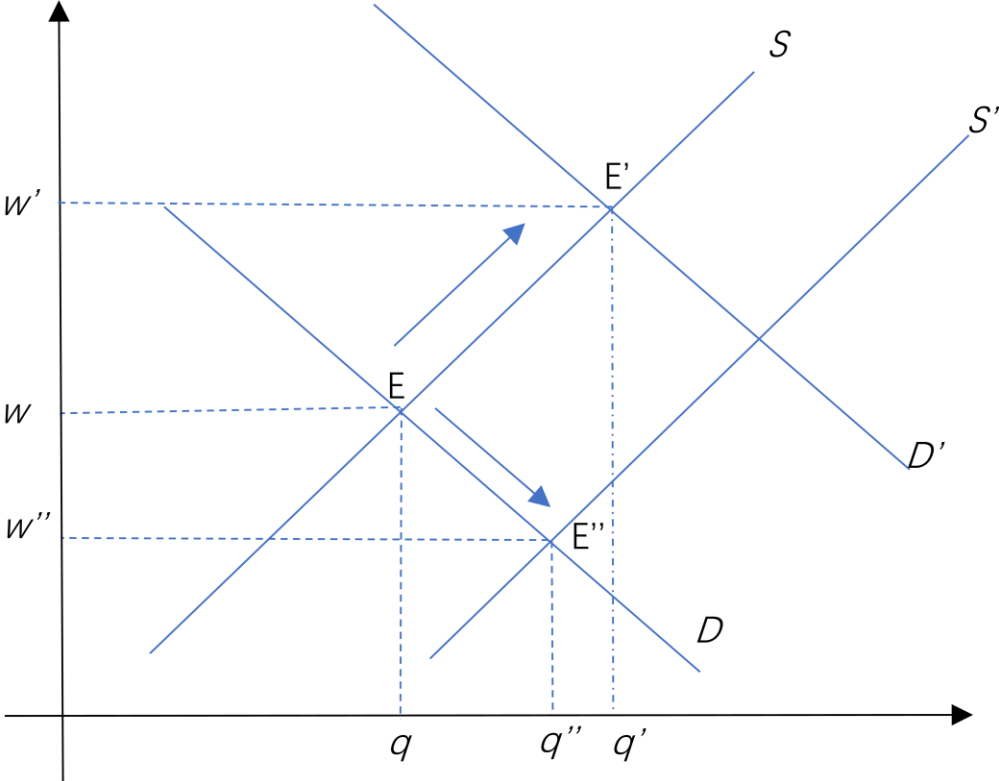Source: Census 2005

Demand for young women?

Table 9 Relative wage and relative share of females

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: wages of women relative to men within					
	city		industry	province and industry		
A: unmarried 16-25 (weighted)						
femalesh	0.253***	0.243*	0.335***	0.231***	0.232***	0.087
	(0.082)	(0.129)	(0.048)	(0.045)	(0.044)	(0.086)
Obs.	197	197	85	485	485	485
Adj_R2	0.024	0.168	0.365	0.050	0.122	0.144
B: married 26-45 (weighted)						
femalesh	-0.162	0.176	0.236***	0.326***	0.312***	0.411***
	(0.321)	(0.299)	(0.065)	(0.039)	(0.038)	(0.095)
Obs.	281	281	90	950	950	950
Adj_R2	-0.001	0.270	0.119	0.068	0.112	0.135
Province	No	Yes	No	No	Yes	Yes
Industry	No	No	No	No	No	Yes

Table 10 Exports and the prevalence of women in migrants

	(1)	(2)	(3)	(4)	(5)
	Female share in migrants				
	aged 16-25, 2005		aged 26-45, 2005		aged 16-25, 2000-2005 fixed effects
Export share	0.197*	0.199	-0.017	0.037	-0.066
	(0.110)	(0.149)	(0.058)	(0.078)	(0.346)

Changes in female shares in migrants
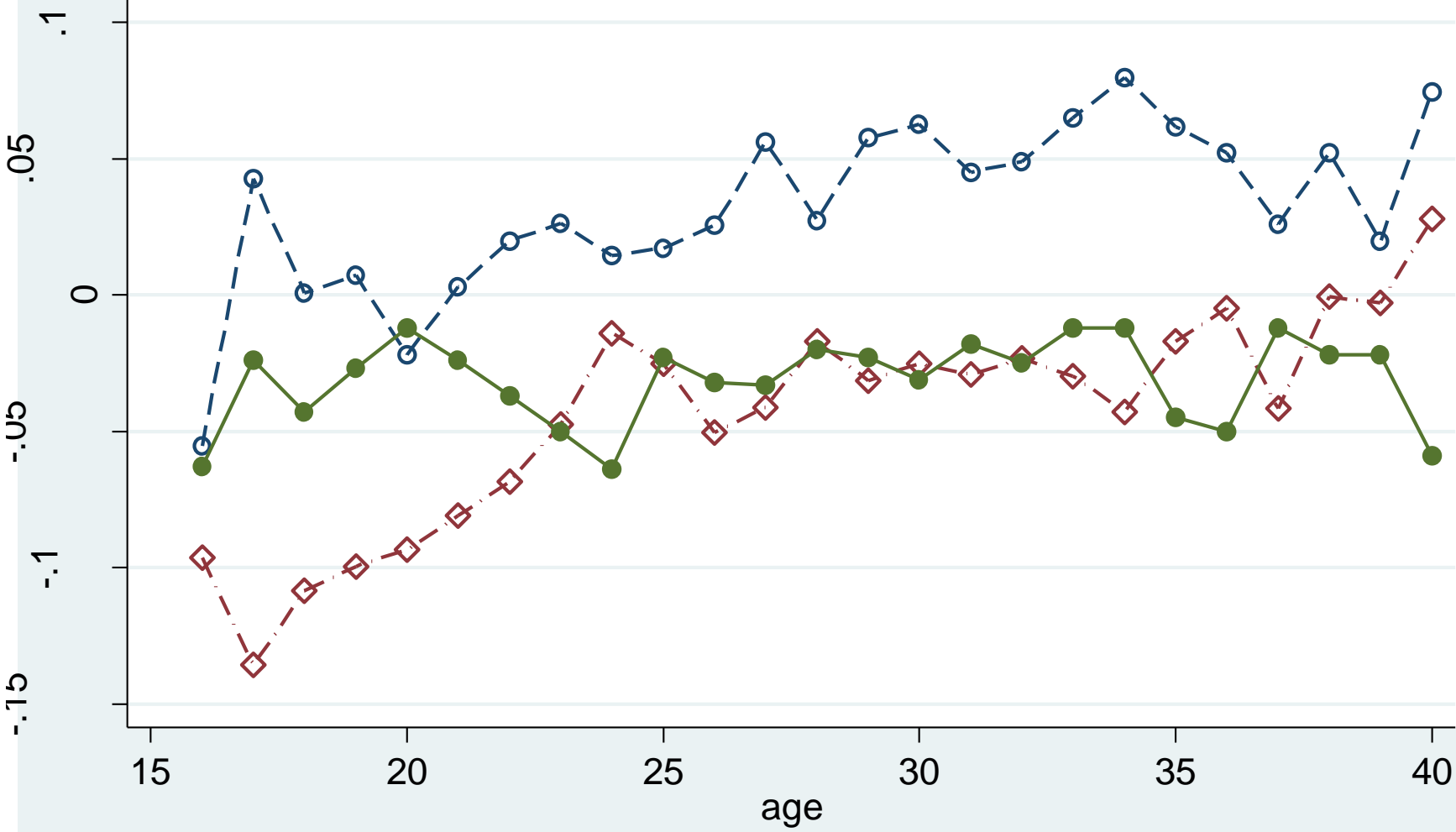
Conclusion

- Social economic situations (economic opportunities) change rapidly in China. Young residents' migration and education decision change accordingly.
- When the chance of permanent migration is small and women expected to return earlier, they migrate to cities early.
- When the chance of permanent migration increases because of higher education expansion, they choose to stay in school and outperform men in college completion.
- Surplus women in young migrants → women in young college graduates.

Thanks!