

Premarital Investments in Physical versus Human Capital with Imperfect Commitment

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Studies on premarital investments

- Classical work examines premarital investments in a transferable utility context, which implicitly assumes full commitment at the time of marriage
- Recent work begins to depart from such a context and make a more reasonable assumption of imperfect commitment
- An extreme case of imperfect commitment is non-transferable utility

Imperfect commitment assumption is particularly compelling in societies like China

- Before marriage, prospective brides are in an enviable position due to high sex ratios (more men than women)
- After marriage, divorce is prohibitively costly, the traditional power of husbands reasserts itself
- Imperfect commitment comes from the divergence in the relative bargaining powers of men and women at the ex ante stage, before marriage, and ex post, after marriage

How imperfect commitment affects premarital investments in children undertaken by parents?

- Distinguish between bequeathed physical capital (such as housing) and human capital
- A man's attractiveness depends not only on total investments, but also on the composition
 - If a man invests in human capital, his future labor earnings increase, sharing is determined by ex post bargaining
 - If a man invests in housing, which is non-excludable, spouses jointly consume it without bargaining
 - So housing signals a credible commitment and is more favorable in a competitive marriage market.
- This creates an incentive for parents with sons to shift their investments towards housing and away from human capital

How imperfect commitment affects premarital investments in children undertaken by parents?

Empirical analyses in the setting of China

Results in a nutshell

- When the sex ratio is high, parents of boys are more likely to increase labor supply
- The share invested in housing increasing relative to the share in children' education for parents with sons
- Sex imbalance is associated with worse cognitive skills, non-cognitive skills, and health of boys

Sex ratio in China rises drastically in recent decades among second- and higher-order births

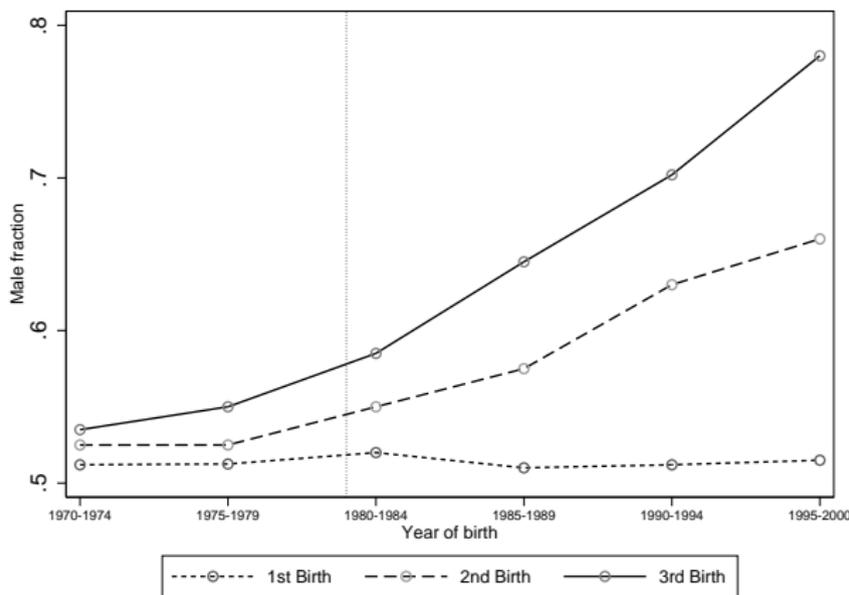


Figure: Male fraction of births by birth order in China

Source: Ebenstein (2010)

High sex ratios lead to marriage market competition

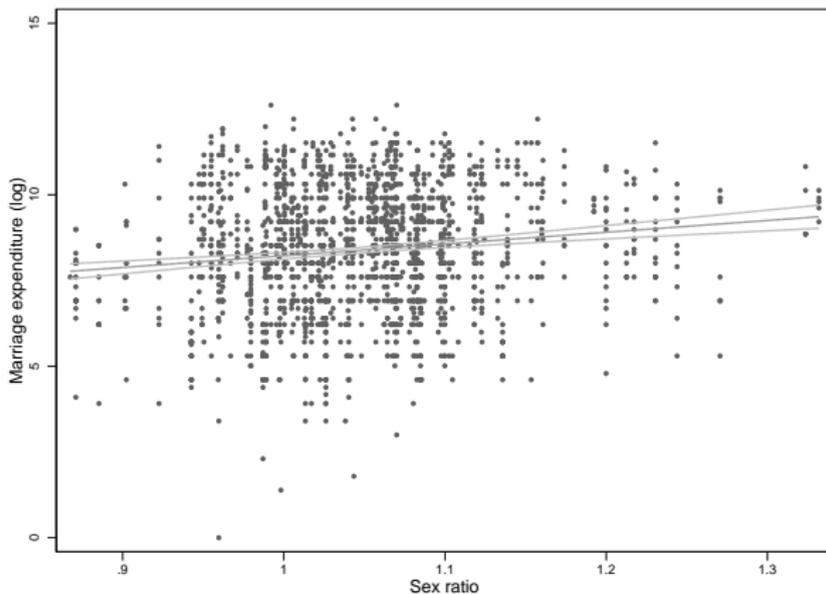


Figure: Higher sex ratio, larger marriage expenditure

High sex ratios lead to marriage market competition

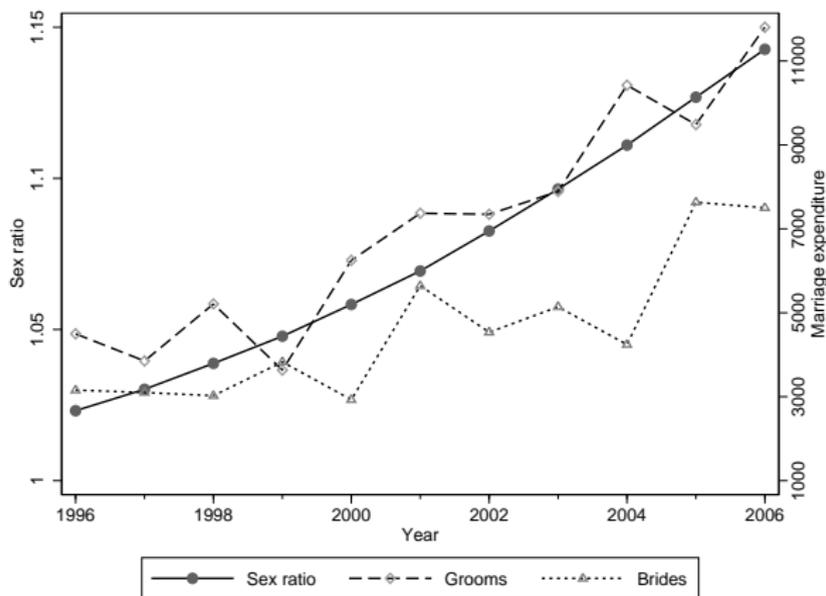


Figure: Grooms' families are spending more on marriage over time

Housing as a premarital investment

- In China, housing traditionally considered as investments in preparation for marriage
- Family housing wealth enhances a man's marriage market prospects
- Housing capital bought by parents when the future groom is young, can be regarded as one for his marriage
 1. Bequeathable nature of housing
 2. A dominant role in household wealth composition
 3. A marriage-age man often has not yet accumulated enough wealth to afford a house
 4. Intergenerational family coresidence is common

Housing as a premarital investment

- Both housing and education grant marriage premium
- Premium of housing turns out to be higher

Dependent variable	Marital status of men (married=1)				
	(1)	(2)	(3)	(4)	(5)
High-quality housing (costs \geq 50k=1)	0.019*** (0.004)				0.013*** (0.004)
High-quality housing (private bathroom=1)		0.045*** (0.004)			0.044*** (0.004)
High education (high school and above=1)			0.002 (0.004)		
High education (college and above=1)				0.010** (0.005)	0.005 (0.005)
Age	0.461*** (0.004)	0.460*** (0.004)	0.461*** (0.004)	0.460*** (0.004)	0.460*** (0.004)
Age square	-0.008*** (0.000)	-0.008*** (0.000)	-0.008*** (0.000)	-0.008*** (0.000)	-0.008*** (0.000)
Hukou (urban=1)	0.018*** (0.003)	0.015*** (0.003)	0.024*** (0.004)	0.020*** (0.004)	0.008** (0.004)
Observations	94,457	94,457	94,457	94,457	94,457
R-squared	0.216	0.217	0.216	0.216	0.217
Dependent variable mean	0.440	0.440	0.440	0.440	0.440
Model	OLS	OLS	OLS	OLS	OLS

Imperfect commitment within marriage

- Asymmetry between ex ante and ex post bargaining power
- Partly reflected by frictions in the marriage market—the difficulty in divorce

Age cohort	Secondary school		High school		College and above	
	Male	Female	Male	Female	Male	Female
<i>A: Share of population divorced</i>						
22–31	0.011	0.009	0.007	0.009	0.003	0.004
32–41	0.024	0.018	0.027	0.038	0.018	0.034
42–51	0.024	0.019	0.029	0.047	0.022	0.052
52–61	0.018	0.019	0.019	0.033	0.017	0.042
<i>B: Share of population ever married</i>						
22–31	0.636	0.780	0.505	0.628	0.363	0.453
32–41	0.944	0.984	0.943	0.968	0.945	0.955
42–51	0.979	0.996	0.985	0.992	0.989	0.987
52–61	0.985	0.997	0.992	0.995	0.995	0.990
<i>C: Divorce rate</i>						
22–31	0.018	0.011	0.013	0.014	0.008	0.010
32–41	0.026	0.018	0.029	0.039	0.019	0.036
42–51	0.024	0.019	0.030	0.047	0.022	0.053
52–61	0.018	0.019	0.020	0.033	0.017	0.042

Data source: China Family Panel Studies (CFPS)

2010 baseline survey

- Nationally representative of Chinese *individuals, households, and communities*
- **25** provinces, **95%** of total population

Sample

- Cross section
- First-born children 0–15 years old
- Parents <50 years old

Main outcome variables

	Mean	Std. Dev.	Min	Max	Observations
<i>A: Parental labor supply</i>					
Paternal migration	0.098	0.297	0	1	4,314
Maternal migration	0.025	0.158	0	1	4,314
At least one parent migration	0.111	0.314	0	1	4,314
Paternal working hours, thousand	2.466	0.947	0.400	5.400	1,534
Maternal working hours, thousand	2.416	0.902	0.240	5.400	978
<i>B: Housing investment</i>					
Housing construction area, thousand sq.m	0.126	0.086	0.008	1	4,169
Housing ownership	0.831	0.375	0	1	4,314
Housing mortgage, thousand	5.392	32.04	0	750	4,314
<i>C: Child educational investment</i>					
Education expenditure, thousand	1.507	2.629	0	40	3,978
Having an education funding	0.297	0.457	0	1	3,978

Migration is a crucial form of labor supply in China

Dependent variable	Gross family income, thousand			
	(1)	(2)	(3)	(4)
Paternal migration	6.935*** (2.447)			
Maternal migration		8.891*** (3.093)		
At least one parent migration			7.065*** (2.248)	
Both parents migration				11.672*** (3.702)
Observations	4,314	4,314	4,314	4,314
R-squared	0.191	0.190	0.191	0.189
Dependent variable mean	32.1	32.1	32.1	32.1
Percentage increase (migration=1)	21.6	27.7	22.0	36.4
Model	OLS	OLS	OLS	OLS
Other controls?	YES	YES	YES	YES
County fixed effects?	YES	YES	YES	YES

Regression model

$$y_{ic} = \beta_0 + \beta_1 FirstSon_{ic} + \beta_3 FirstSon_{ic} * SexRatio_c + X_{ic}\Gamma + \lambda_c + \epsilon_{ic}$$

- County-specific sex ratio for premarital-age cohort 10–24

Identifying assumptions

- Randomness of first-child gender
- Sex ratio?

Randomness of first-child gender

A balance test

	Mean (Std. Dev.)			Difference	SE
	All	First-son families	First-daughter families		
	(1)	(2)	(3)	(4)	(5)
First son	0.507 (0.500)	–	–	–	–
Sex ratio (M/F)	1.077 (0.101)	1.076 (0.100)	1.077 (0.101)	-0.001	0.003
Ethnicity (minority=1)	0.124 (0.330)	0.121 (0.326)	0.128 (0.334)	-0.007	0.010
Region of residence (urban=1)	0.438 (0.496)	0.452 (0.498)	0.424 (0.494)	0.028	0.015
First-child age	8.746 (4.543)	8.623 (4.531)	8.874 (4.552)	-0.251	0.138
Father's age	36.14 (6.149)	36.03 (6.137)	36.27 (6.162)	-0.240	0.187
Father's schooling years	7.818 (4.308)	7.890 (4.266)	7.745 (4.350)	0.145	0.131
Father's political status (party=1)	0.091 (0.287)	0.090 (0.286)	0.092 (0.289)	-0.002	0.009
Mother's age	34.30 (6.251)	34.21 (6.264)	34.40 (6.239)	-0.190	0.190
Mother's schooling years	6.549 (4.693)	6.591 (4.652)	6.506 (4.735)	0.085	0.143
Mother's political status (party=1)	0.026 (0.160)	0.030 (0.171)	0.023 (0.149)	0.007	0.005
Observations	4,314	2,186	2,128		

Sex imbalance and parental labor supply

Dependent variable	Migration			Working hours, log	
	Father	Mother	At least one parent	Father	Mother
	(1)	(2)	(3)	(4)	(5)
First son * Sex ratio (β_3)	0.235** (0.094)	0.098* (0.059)	0.264*** (0.093)	0.569*** (0.169)	0.473 (0.408)
Observations	4,314	4,314	4,314	1,534	978
R-squared	0.109	0.064	0.113	0.164	0.256
Dependent variable mean	0.098	0.025	0.111	7.726	7.701
Percentage difference sex ratio+0.1	24.1	38.6	23.8	5.7	4.7
Model	OLS	OLS	OLS	OLS	OLS
Other controls?	YES	YES	YES	YES	YES
County fixed effects?	YES	YES	YES	YES	YES

Sex imbalance and premarital investments

<i>B: Premarital investments</i>					
Dependent variable	Housing investment			Child educational investment	
	Construction area, log sq.m (1)	Ownership (2)	Mortgage, thousand (3)	Education expenditure, thousand (4)	Having an education funding (5)
First son * Sex ratio (β_3)	0.413** (0.205)	0.233** (0.117)	15.403** (7.141)	-1.663** (0.800)	-0.337** (0.161)
Observations	4,169	4,314	4,314	3,978	3,978
R-squared	0.278	0.177	0.145	0.323	0.135
Dependent variable mean	4.650	0.831	5.392	1.507	0.297
Percentage difference sex ratio+0.1	4.1	2.8	28.6	-11.0	-11.3
Model	OLS	OLS	OLS	OLS	OLS
Other controls?	YES	YES	YES	YES	YES
County fixed effects?	YES	YES	YES	YES	YES

Robustness: Potential issues related to son-prefering fertility stopping rules

Dependent variable		Paternal migration	House construction area, log sq.m	Education expenditure, thousand
		(1)	(2)	(3)
		Interaction-term coefficient (β_3)		
Benchmark		0.235**	0.413**	-1.663**
<i>A: Family-size effect</i>				
Adding number of children		0.240**	0.409**	-1.689**
		[0.218]	[0.478]	[0.285]
Adding number of children		0.245**	0.410*	-1.689**
& Interaction with first son		[0.215]	[0.745]	[0.467]
<i>B: Families with one child</i>				
One-child families		0.234**	0.336	-1.776**
No age limit				
Child ≥ 4		0.223**	0.217	-2.411**
<i>C: Alternative measures of marriage market conditions</i>				
Having any son		0.223***	0.310	-1.168*
OLS				
OLS, adding number of children		0.221***	0.313	-1.151
OLS, adding number of children & interaction		0.220***	0.313	-1.154
IV		0.355**	0.528**	-2.505**
IV, adding number of children		0.360**	0.522**	-2.644**
IV, adding number of children & interaction		0.356**	0.505**	-2.608**
Share of sons		0.300***	0.398*	-1.095
OLS				
OLS, adding number of children		0.302***	0.394*	-1.112
OLS, adding number of children & interaction		0.301***	0.394*	-1.114
IV		0.305**	0.495**	-2.173**
IV, adding number of children		0.312**	0.493**	-2.231**
IV, adding number of children & interaction		0.308**	0.474**	-2.243**

Robustness: Potential issues related to son-preferring fertility stopping rules

First-stage results: Child-gender measures are instrumented

Second-stage dependent variable	Paternal migration (1)	House construction area, log sq.m (2)	Education expenditure, thousand (3)
<i>A: Endogenous variable is having any son</i>			
First son	1.206*** (0.233)	1.213*** (0.229)	1.224*** (0.252)
R-squared	0.630	0.638	0.611
<i>B: Endogenous variable is share of sons</i>			
First son	1.113*** (0.165)	1.099*** (0.156)	1.123*** (0.177)
R-squared	0.821	0.825	0.809
Observations	4,314	4,169	3,978

Robustness: Potential endogeneity of local sex ratios

A: Unobservable cross-county heterogeneity

No county fixed effects	0.233**	0.245	-1.857***
	[0.914]	[0.017]	[0.428]

B: Potential sex-ratio confounders

Adding average household financial wealth	0.236**	0.397**	-1.665**
	[0.688]	[0.479]	[0.939]
Adding average household financial wealth & Interaction with first son	0.236**	0.396*	-1.675**
	[0.738]	[0.413]	[0.885]
Adding average household income	0.237**	0.402*	-1.662**
	[0.592]	[0.363]	[0.911]
Adding average household income & Interaction with first son	0.239***	0.405**	-1.632**
	[0.663]	[0.593]	[0.748]
Adding gender earning differential, m-f	0.251***	0.356*	-1.756**
	[0.142]	[0.029]	[0.441]
Adding gender earning differential, m-f & Interaction with first son	0.252***	0.356*	-1.766**
	[0.176]	[0.025]	[0.453]
Adding social insurance	0.236**	0.432**	-1.694**
	[0.911]	[0.418]	[0.560]
Adding social insurance & Interaction with first son	0.242***	0.429**	-1.679**
	[0.494]	[0.550]	[0.858]
Adding grandparental coresidence	0.232**	0.394*	-1.661**
	[0.567]	[0.526]	[0.824]
Adding grandparental coresidence & Interaction with first son	0.237**	0.393*	-1.664**
	[0.857]	[0.532]	[0.966]
Adding all variables above	0.249***	0.347*	-1.794**
	[0.298]	[0.271]	[0.321]
Adding all variables above & Interactions with first son	0.260***	0.339*	-1.802**
	[0.245]	[0.156]	[0.331]
Adding variables selected by high-dimensional method & Interactions with first son	0.251***	0.519**	-1.734**
	[0.786]	[0.359]	[0.844]

Robustness: Potential endogeneity of local sex ratios

Implementation of family planning policy as instruments for sex ratios

C: IV results 0.374* 1.283* -3.291*
(0.224) (0.776) (1.993)

Regressing sex ratios on variables for implementation of family planning policy

Dependent variable	Sex ratio		
	Paternal migration estimation (1)	House construction area estimation (2)	Education expenditure estimation (3)
Policy-violation penalty	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
Quota of births	0.034*** (0.005)	0.031*** (0.006)	0.037*** (0.006)
Policy-violation penalty * Minority	-0.004*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)
Quota of births * Minority	-0.025** (0.011)	-0.019* (0.011)	-0.027** (0.011)
Observations	4,314	4,169	3,978
R-squared	0.663	0.653	0.663
Other controls	YES	YES	YES

Sex imbalance and child human capital development

Dependent variable	Cognitive skills		Non-cognitive skills		Health outcomes	
	Math ranking (1)	Chinese ranking (2)	Openness (3)	Cooperation (4)	Weight, z-score (5)	Height, z-score (6)
First son * Sex ratio (β_3)	-0.734*** (0.237)	-0.567** (0.246)	-0.498** (0.250)	-0.572*** (0.200)	-0.907** (0.412)	-0.179 (0.605)
Observations	1,154	1,154	2,125	2,125	4,137	3,870
R-squared	0.618	0.641	0.405	0.457	0.265	0.261
Dependent variable mean	0.692	0.702	0.859	0.729	-0.505	-0.639
Percentage difference sex ratio+0.1	-10.6	-8.1	-5.8	-7.9	-18.0	-2.8
Model	OLS	OLS	OLS	OLS	OLS	OLS
Other controls?	YES	YES	YES	YES	YES	YES
County fixed effects?	YES	YES	YES	YES	YES	YES

Sex imbalance and child human capital development

Parental migration as a channel

	Father			Mother		
	At-home mean (1)	Migration mean (2)	Difference (3)	At-home mean (4)	Migration mean (5)	Difference (6)
<i>A: Child's human capital outcomes</i>						
School math exam ranking	0.683	0.646	0.037*	0.679	0.686	-0.007
School Chinese exam ranking	0.698	0.673	0.025	0.695	0.688	0.007
Openness	0.862	0.881	-0.019	0.863	0.883	-0.020
Cooperation	0.727	0.678	0.049*	0.723	0.650	0.073
Weight, kg	29.03	27.89	1.140*	28.97	26.43	2.540**
Height, m	1.286	1.259	0.027**	1.284	1.255	0.029
<i>B: Child's time allocation on weekend, hours</i>						
Homework and revision	2.006	1.718	0.288***	1.981	1.803	0.178
After-school tuition	0.399	0.129	0.270***	0.371	0.347	0.024
Extracurricular reading	0.720	0.604	0.116**	0.713	0.521	0.192**
Physical exercise	0.336	0.274	0.062*	0.332	0.252	0.080
Observations						2,245
<i>C: Child's psychological well-being</i>						
Happiness	0.465	0.369	0.096***	0.459	0.290	0.169***
Optimism about the future	0.409	0.398	0.011	0.410	0.323	0.087*
Relationship with others	0.341	0.280	0.061**	0.337	0.242	0.095*
Popularity	0.285	0.233	0.052**	0.281	0.226	0.055
Observations						2,259

Interpretations of the results

- **Competitive marriage market**
 - Parents increase labor supply in a competitive manner
 - In order to increase total resources available for premarital investments
- **Imperfect commitment in marriage**
 - A man who brings more housing at the time of marriage is a more desirable marriage partner than one with higher labor earnings but a smaller house
 - This explains why parents direct investments towards more housing than education

Evidence from purposes of migration remittances

Marriage market effects on parental decisions even if children are still young

Dependent variable	Migration purpose	
	For children's marriage (1)	For children's education (2)
First son * Sex ratio (β_3)	0.179** (0.079)	0.096 (0.262)
Observations	1,071	1,071
R-squared	0.213	0.272
Model	OLS	OLS
Other controls?	YES	YES
County fixed effects?	YES	YES

Evidence from heterogenous effects

Effects get larger as children get closer to marriageable age

Dependent variable	Paternal migration	House construction area, log sq.m	Education expenditure, thousand
	(1)	(2)	(3)
Benchmark: First son * Sex ratio (β_3)	0.235**	0.413**	-1.663**
<i>A: Families with a first child above the age of 11</i>			
First son * Sex ratio (β_3)	0.254** (0.119)	0.846** (0.392)	-0.265 (1.073)
Observations	1,811	1,745	1,811
R-squared	0.162	0.265	0.369
Dependent variable mean	0.092	4.656	1.526
<i>B: Families with a first child below the age of 11</i>			
First son * Sex ratio (β_3)	0.284** (0.110)	0.115 (0.221)	-2.651* (1.391)
Observations	2,503	2,424	2,167
R-squared	0.151	0.361	0.357
Dependent variable mean	0.102	4.646	1.492

A model of premarital investments with imperfect commitment

- Investment in a boy (x_B, y_B) .
 1. x_B is investment in a **private good**, such as human capital
 2. y_B is investment in a **public good**, such as a house
- Investment in a girl (x_G, y_G)
- Private goods are bargained over
 - A man has a share λ_B , a woman has a share λ_G
- Public goods are consumed non-exclusively
 - A man's payoff $v_B(y)$ and a woman's payoff $v_G(y)$
 - $y := y_B + y_G$
- There exists a unique, stable **equilibrium**

A model of premarital investments with imperfect commitment

- Enables us to perform a more general welfare analysis on how equilibrium investments differ from utilitarian efficient investments
- Enables us to examine more rich comparative statistics

A model of premarital investments with imperfect commitment

Modelling sex imbalance

- Suppose the ratio of women to men is $r < 1$
- **Proposition:** Men overinvest in the public good, and also overinvest in the private good, while women underinvest in both types of goods, compared to the case where $r = 1$ (sex ratio is balanced)

A model of premarital investments with imperfect commitment

Modelling sex imbalance

- Suppose the ratio of women to men is $r < 1$
- And men have a high bargaining power, i.e. λ_B is large
- **Proposition:** Men overinvest in the public good, relative to women. For private good, men underinvest relative to women
- Consistent with empirical results

Conclusion

- Empirically and theoretically studies how imperfect commitment affects premarital investments
- Empirical part
 - High sex ratios lead to increased parental migration, increased housing investments, and reduced educational investments for families with a first-born son
 - Families with a first-born daughter as a comparison group
- Theoretical part
 - Imperfect commitment combines with sex imbalance to affect the **magnitude** and **composition** of premarital investments
- Implications
 - Highlights the distinction between premarital investments in physical capital and human capital
 - Human capital development of the next generation
 - Marriage matching along multiple dimensions

Thank you!