

# **Effect of Parents' Subjective Well-being on Having a Second Child in China**

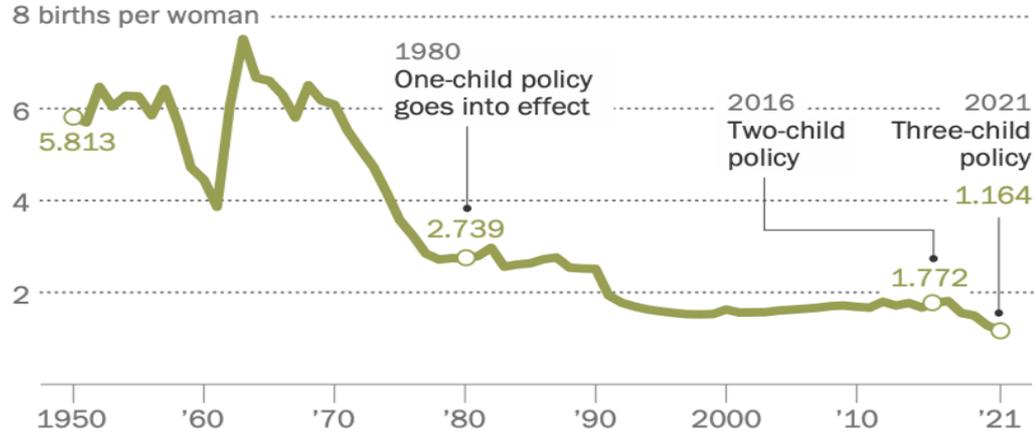
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# Declining Fertility in China

*Total fertility rate in China*



Note: The total fertility rate is the expected number of children a woman who lives to the end of her childbearing years and has children will have during her lifetime based on the given age-specific rates.

Source: UN Population Division's World Population Prospects: The 2022 Revision.

# Statement of Problem

Voluntary childbearing remains substantially understudied (Myrskylä & Margolis, 2014)

Research question:

“Happy life leads to additional child sooner?”

# Literature review

## 1. Children are burdens, subjective well-being down

- 1.1. Perceptions changed: equitably raise up (Kane & Li, 2023; Peng, 2020)
- 1.2. High housing and educational cost (Chen et al., 2019; Zhang et al., 2023; Zhou & Guo, 2020)
- 1.3. Imbalance childbirth and family responsibility of mothers (Bao, Chen & Zheng, 2017; Wang & Shi, 2021)
- 1.4. Weaker traditional belief “more children, more happiness” (Pollmann-Schult, 2014; Kohler & Mencarini, 2016).

## 2. Children brings joy, subjective well-being up

- 2.1 Preparation for being parenthood (Aassve, Goisis & Sironi, 2012; Mencarini, Vignoli, Zeydanli & Kim, 2018; Zhu et al., 2024; Yang & Guo, 2023).
- 2.2 Pre-birth SWB is high (Balbo & Arpino, 2016; Myrskylä & Margolis, 2014; Zhu et al., 2024; Yang & Guo, 2023)

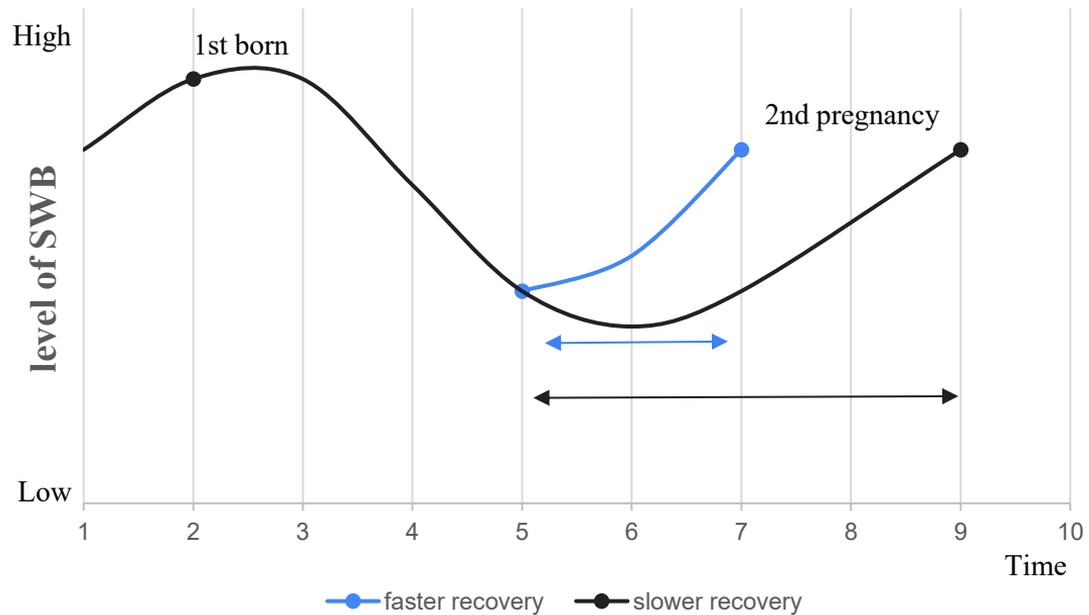
# Research Gap

1. Use SWB at time of pregnancy to predict birth of second child
2. Most of studies only consider cross sectional data
3. Treat birth as an isolated event, ignoring child rearing experience
4. Child parity as a key mediator factor in bidirectional causality, usually ignored

SWB falls after realizing the difficulties of raising first child

SWB continually rises to certain level, leading to the occurrence of 2nd birth (Parr, 2010; Kohler & Mencarini, 2016; Xu & Liu, 2021)

# Conceptual framework



# Data source

China Family Panel Studies (CFPS) 2010 - 2018

Independent variable: **Life satisfaction**

“How satisfied are you with your life?” Scale: 1 - 5, lowest to highest

Dependent variable: **duration**

The accumulated months since first birth to second birth with 2<sup>nd</sup> birth  
or survey date without 2<sup>nd</sup> birth

Use the life satisfaction before 2nd pregnancy

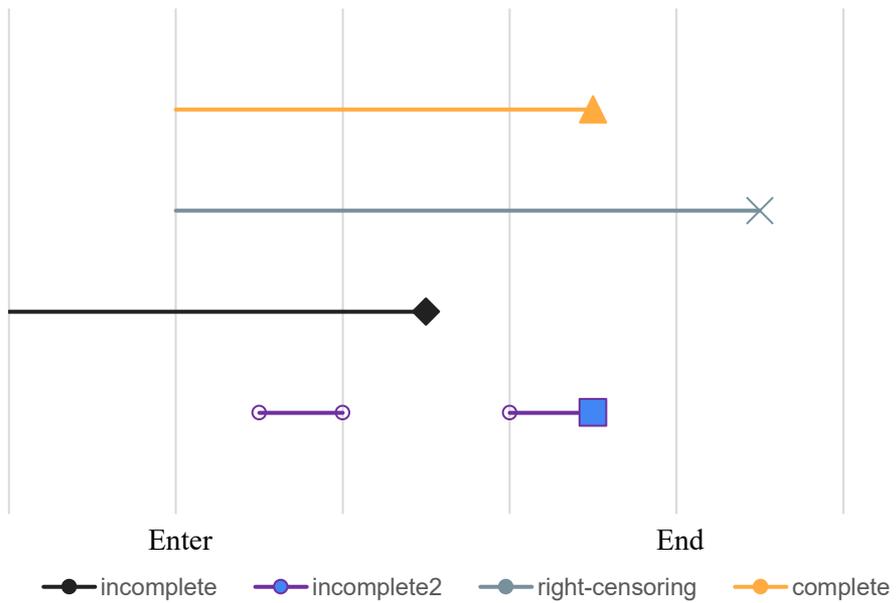
If date of survey + 9 months < 2<sup>nd</sup> child birthday, the corresponding survey is considered as event occurrence = 1, 0 otherwise

Sample: Households with 1<sup>st</sup> child, wife age < 50 years old

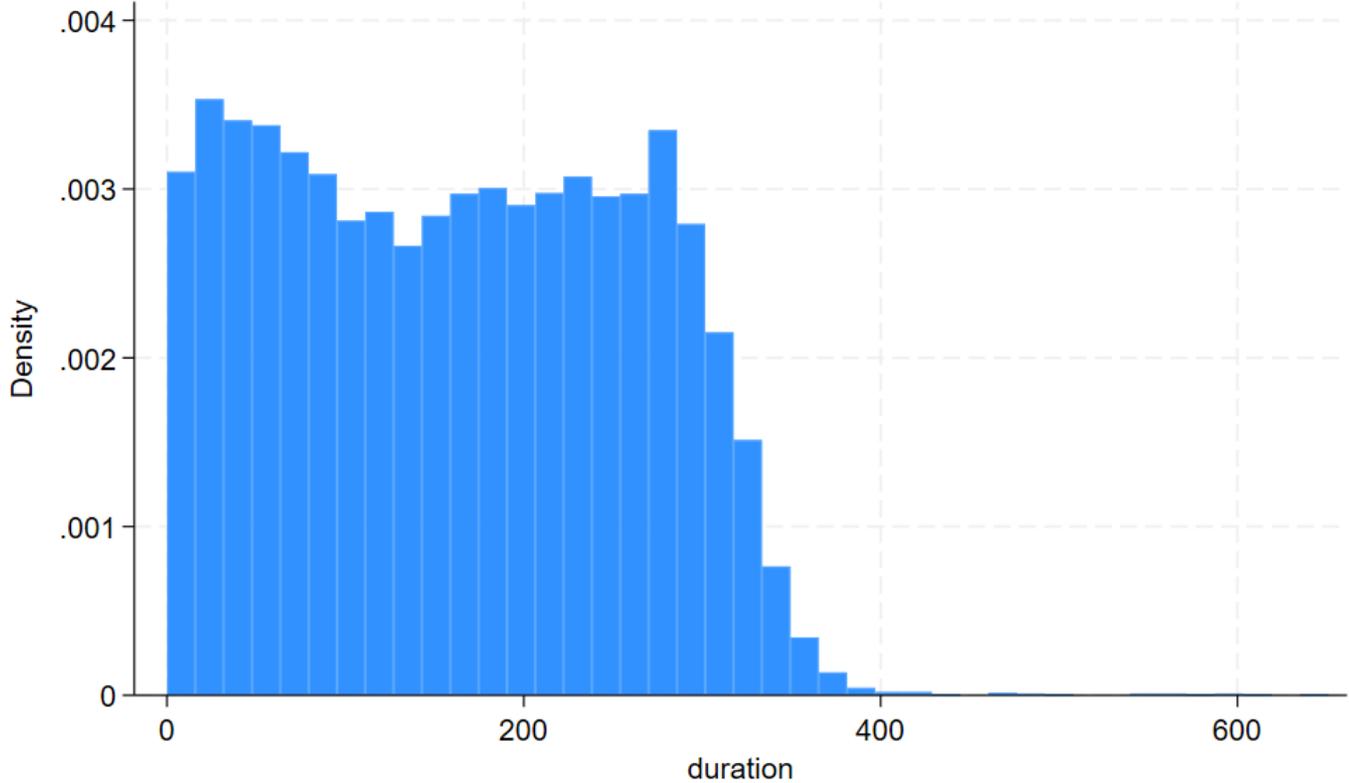
Year	% of first parity	% of second parity	% of third parity and above
2010	55.8	35	9.1
2011	55.8	34.8	9.4
2012	54.4	36.5	9.1
2013	52	38.2	9.8
2014	48.3	41.9	9.8
2015	43.1   52.6	46.1   40.5	10.8   6.9
2016	37   48	53.9   45.4	9   6.7
2017	42.8	49.3	7.9
2018	42.2	48.2	9.5

*Note: The data in the year 2010-2015 is from He et al., (2018). The numbers at right side and subsequent are from Zhang et al., (2021).*

# Data scenarios



# Distribution of duration



# Estimation Model

**Accelerated Failure-Time model**(Luppi, 2016) **with shared frailty: dealing with right censoring**

**Lognormal distribution: capture right-skewed density**

Failure event: binary, 1 = before 2<sup>nd</sup> pregnancy; Exclude information after the event

**AFT vs Cox proportional hazard model:**

1. Better for time-dependent variables (George, Seals & Aban, 2014)
2. Small sample size (Luppi, 2016)
3. Relaxation of Cox proportional hazard rate, but AFT requires time distribution (George, Seals & Aban, 2014)

# Model Specification

Personality traits may lead to endogeneity issues (Luppi, 2016; Margolis & Myrskylä, 2015)

Use life satisfaction at household level to avoid the issue

$$\ln(\text{duration}_{i,t}) = \beta_1 * (\text{LS}_{i,t}) + \beta_2 * (\text{Controls}_{i,t}) + \alpha_i + \varepsilon_{i,t}$$

$\alpha_i$ : frailty term capturing unobservable heterogeneities, random effect

**LS is (life satisfaction\_husband + life satisfaction\_wife)**

Controls are fixed effect

1. Demography (age of wife, urban/rural, gender of 1st child, working status of wife, management occupation of husband)
2. Economic situation (yearly net household income in LN form, housing value in LN form, yearly educational expense in LN form)

# Statistical summary

- Using pre-pregnancy surveys to identify the nearest future actual 2<sup>nd</sup> births

Survey	Actual No. of 2 <sup>nd</sup> birth in following year	No. of measures before 2 <sup>nd</sup> pregnancy
survey  <sub>2010</sub>	99	193
survey  <sub>2012</sub>	97	198
survey  <sub>2014</sub>	93	185
survey  <sub>2016</sub>	108	103

# Statistical summary

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
duration	13,032	162.5	98.47	0	651
life_hus	9,801	3.442	1.048	1	5
life_wife	9,394	3.529	1.039	1	5
future_hus	9,795	3.882	1.029	1	5
future_wife	9,380	3.880	1.010	1	5
ffuture	8,733	7.780	1.617	2	10
housing	10,139	163,547	449,738	0	1.000e+07
hhnetinc	9,729	56,530	77,696	1	4.073e+06
eee	9,996	5,908	12,319	0	421,000
urban	13,032	0.487	0.500	0	1
fir_sex	12,824	0.603	0.489	0	1
swb_hh	8,750	6.997	1.672	2	10
policy	13,032	0.322	0.467	0	1
work	13,032	0.531	0.499	0	1
management	13,032	0.101	0.302	0	1
res1	8,349	3.00e-10	1.407	-6.518	5.877
Number of groups	3,619	3,619	3,619	3,619	3,619

# Preliminary result

Note: The coefficients are in log-odds. Standard errors in parentheses  
 \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

1. Life satisfaction likely reduces the duration form 1<sup>st</sup> to 2<sup>nd</sup> birth.
2. Theta justify the shared frailty model (Cameron & Trivedi, 2005, Chapter 18).

VARIABLES	(1)	(2)	(3)	(4)
	ln(duration)	ln(duration)	ln(duration)	ln(duration)
life hus	-0.030 (0.154)			
life hus^2	-0.005 (0.022)			
life wife		-0.154 (0.183)		
life wife^2		0.012 (0.026)		
swb hh			-0.242* (0.145)	-0.342** (0.174)
swb hh^2			0.013 (0.010)	0.019 (0.012)
policy				-0.292** (0.142)
urban				0.600*** (0.167)
fir sex				0.377*** (0.126)
work				0.130 (0.098)
management				0.160 (0.149)
lnhousing				0.023* (0.013)
lnnetincome				-0.058* (0.035)
lnece				0.070*** (0.012)
lnsigma	-0.352*** (0.063)	-0.330*** (0.068)	-0.281*** (0.072)	0.006 (0.176)
lntheta	2.878*** (0.083)	2.840*** (0.091)	2.826*** (0.099)	2.107*** (0.369)
Constant	5.016*** (0.271)	5.299*** (0.327)	6.054*** (0.523)	6.472*** (0.778)
Observations	9,781	9,377	8,734	8,352
Number of groups	3,980	3,764	3,699	3,621

# Further control endogeneity

- We use Two-stage residual inclusion (Terza, Basu & Rathouz, 2008)
- Stage one: Panel data fixed effect
  - $flife_{i,t} = \beta_0 + \beta_1 * ffuture_{i,t} + \beta_2 * Controls_{i,t}$
  - IV = The objective confidence level about future of wife (husband)
  - $ffuture = wife + husband$
  - The personal confidence level may be less likely to directly affect the timing of pregnancy, more likely cause an effect via SWB
- Stage two: include the (swb\_hh – predicted swb\_hh) as controls in AFT model

# Stage 1 result: Panel Fixed-effect with clustered robustness

swb_hh	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ffuture	.504	.016	31.19	0	.472	.535	***
policy	-.189	.042	-4.53	0	-.271	-.107	***
urban	-.068	.135	-0.51	.613	-.332	.196	
fir_sex	-	-	-	-	-	-	
work	-.07	.054	-1.31	.191	-.176	.035	
management	.127	.063	2.03	.043	.004	.25	**
lnhousing	-.051	.004	-12.80	0	-.059	-.044	***
lnnetincome	.04	.022	1.79	.074	-.004	.084	*
lnceec	.001	.007	0.13	.894	-.012	.014	
Constant	3.136	.279	11.23	0	2.588	3.683	***
Mean dependent var		6.996	SD dependent var		1.678		
R-squared		0.279	Number of obs		8349		
F-test		176.426	Prob > F		0.000		
Akaike crit. (AIC)		21665.302	Bayesian crit. (BIC)		21721.541		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## Stage 2 result: Logmoral AFT with SWB quadratic term

duration	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
swb_hh	.483	.214	-3.41	.001	-1.147	-.309	***
swb_hh^2	1.028	.014	2.03	.043	.001	.055	**
res1	1.363	.076	4.07	0	.161	.458	***
policy	.610	.17	-2.91	.004	-.829	-.161	***
urban	2.201	.13	6.07	0	.534	1.044	***
fir_sex	1.749	.122	4.60	0	.32	.797	***
work	1.025	.102	0.25	.806	-.174	.224	
management	1.346	.157	1.89	.059	-.012	.605	*
lnhousing	1.019	.012	1.55	.12	-.005	.043	
lnnetincome	.956	.041	-1.08	.28	-.126	.036	
lnee	1.067	.013	4.89	0	.039	.092	***
Constant	8510.024	1.007	8.99	0	7.077	11.022	***
lnsigma	.267	.109	2.45	.014	.054	.481	**
lntheta	1.339	.383	3.50	0	.589	2.089	***
Mean dependent var		163.824	SD dependent var		96.422		
Number of obs		8335	Chi-square		151.871		
Prob > chi2		0.000	Akaike crit. (AIC)		3208.244		

Note: The coefficients are in the exponential form. \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## Stage 2 result: Logmoral AFT without SWB quadratic term

duration	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
swb_hh	.720	.07	-4.69	0	-.465	-.191	***
res1	1.340	.075	3.89	0	.145	.441	***
policy	0.615	.167	-2.91	.004	-.815	-.158	***
urban	2.143	.135	5.64	0	.497	1.027	***
fir_sex	1.716	.122	4.41	0	.3	.78	***
work	1.026	.102	0.25	.8	-.174	.225	
management	1.309	.155	1.74	.082	-.035	.572	*
lnhousing	1.016	.012	1.34	.18	-.007	.04	
lnnetincome	0.952	.041	-1.20	.23	-.128	.031	
lncee	1.069	.013	5.06	0	.041	.093	***
Constant	2219.417	.72	10.70	0	6.294	9.116	***
lnsigma	.234	.116	2.02	.043	.007	.461	**
lntheta	1.468	.372	3.95	0	.739	2.198	***
Mean dependent var		163.824	SD dependent var		96.422		
Number of obs		8335	Chi-square		147.542		
Prob > chi2		0.000	Akaike crit. (AIC)		3210.573		

Note: The coefficients are in the exponential form. \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$  \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

# Robustness check: Loglogistic distribution—monotonic hazard

duration	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
swb_hh	.895	.042	-2.63	.009	-.193	-.028	***
res1	2.535	.046	2.01	.044	.002	.184	**
policy	.840	.09	-1.94	.053	-.35	.002	*
urban	1.297	.077	3.37	.001	.109	.412	***
fir_sex	1.190	.068	2.56	.011	.041	.307	**
work	1.191	.066	2.65	.008	.046	.305	***
management	1.096	.109	0.84	.4	-.123	.307	
lnhousing	0.999	.007	-0.13	.9	-.015	.013	
lnnetincome	0.950	.024	-2.10	.036	-.098	-.003	**
lncee	1.075	.008	8.48	0	.055	.089	***
Constant	198.343	.402	13.17	0	4.503	6.078	***
lngamma	-1.291	.084	-15.36	0	-1.456	-1.126	***
lntheta	3.018	.101	29.90	0	2.82	3.216	***
Mean dependent var		163.824	SD dependent var		96.422		
Number of obs		8335	Chi-square		143.480		
Prob > chi2		0.000	Akaike crit. (AIC)		3210.250		

Note: The coefficients are in exponential form. \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## Potential issue

- Conditional data, all households have 1<sup>st</sup> child already
- Apparently, there is a non-random sample or sample selection bias issue
- The results are **not generalizable to the broader population.**
- We are trying **regime-switching model**

# Preliminary conclusion

1. Higher household-level life satisfaction promotes earlier occurrence of second-child birth
2. Expenditure on first child would postporn the second pregnancy/child
3. If first child was a boy, it also postporns the second pregnancy/child as they generally get more wound due to active behavior
4. Two-Child policy works to some extend

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Thank you

Q&A