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Spatial fertility variation at county-level in China in 2000

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Introduction:

- China has been facing fertility decline for decades and fertility variation can be observed
- Some previous studies of fertility variation used statistical methods analysed the fertility variation at provincial level
- This research focuses on the spatial variation in fertility and its determinants at county-level in China in 2000
- Three competing hypotheses:
 - Compositional hypothesis
 - Contextual hypothesis
 - Selective migration hypothesis

Variables:

- Contextual variables: population density, GDP per capita, sex ratio under 5;
- Compositional variables: the proportion of population employed in the agricultural sector, females' average schooling years, proportion of married people, proportion of ethnic minority.
- Outcome variable: Total fertility rate (TFR)

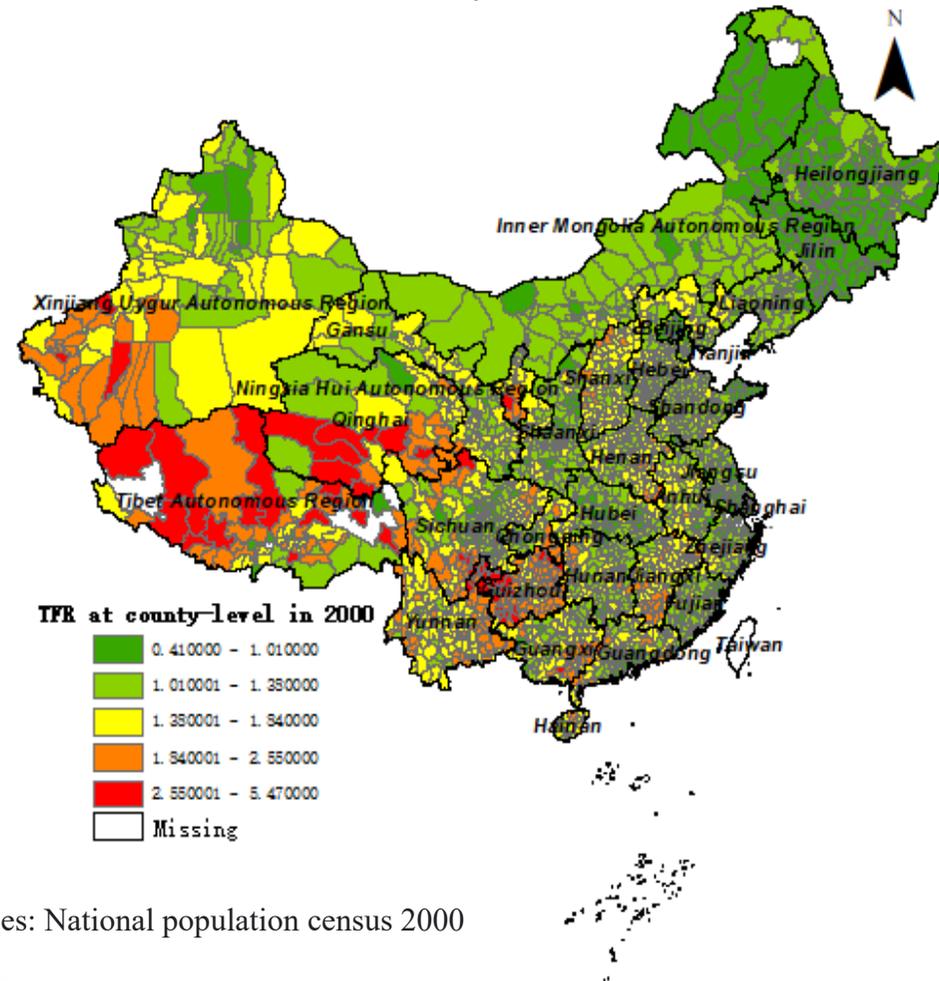
Data:

- 2000 Population census by county
- Statistical yearbooks and local yearbooks from 2001
- 2869 counties, 31 provinces in total
- 15 counties are excluded because of missing data of explanatory variables. 381 counties' data for GDP per capita or population density are replaced by municipality-level data.

Methods:

- OLS: OLS models are helpful to illustrate the relationship between the explanatory variables and TFR.
- Spatial lag model: Spatial lag model reflects the endogenous interaction effect that neighbouring counties' TFR influence the certain country's TFR (Elhorst,2014).
- Spatial error model: Spatial error models focus on the error terms' interaction effects (Elhorst, 2014).

Distribution of TFR at county-level in China in 2000



Results of the models

	OLS model	Spatial model lag	Spatial model error
Constant	0.00	-0.02 **	-0.01
Log (Population density)	0.08 ***	0.06 ***	0.11 ***
Log (GDP per capita)	-0.13 ***	-0.06 ***	-0.09 ***
The proportion of population employed in the agricultural sector	0.16 ***	0.10 ***	0.13 ***
Average schooling years (female)	-0.45 ***	-0.25 ***	-0.45 ***
Proportion of married individuals	0.03 ***	0.05 ***	0.09 ***
Proportion of ethnic minorities	0.22 ***	0.08 ***	0.18 ***
sex ratio under 5	0.07 ***	0.02 **	0.00
Adjusted R square	0.55		
Spatial lagged TFR		0.62 ***	
Lambda			0.73***
Log-likelihood	-2905.38	-2265.72	-2187.25
AIC (Akaike information criterion)	5826.75	4549.45	4390.49
Moran's I for residuals	0.51***	0.02**	-0.06***

***: The indicator is significant at the 0.01 level.

** : The indicator is significant at the 0.05 level.

* : The indicator is significant at the 0.10 level.

(Data are standardized; all the values are kept to two decimal places; spatial weighted matrix is first order Queen's contiguity.)

Conclusion:

- The significant result of TFR's Moran's I is 0.698 (p-value is 0.001), which means that there is a positive spatial autocorrelation of TFR in China at the county level, i.e. counties' TFR tend to be similar to their neighbours'.
- For contextual factors, GDP per capita has a negative relationship with fertility.
- The positive relationship between population density and fertility is conflicting with the results of other economic factors, and it may be due to the interaction between the explanatory variables.
- For compositional factors, females' average schooling years has negative relationship with TFR.
- More married population, more labour works for agriculture, and more ethnic minorities in counties are associated with higher TFR.
- The results of the proportion of population working for agriculture and ethnic minorities may be influenced by family planning policy.
- Sex ratio under 5 is a variable that indicates the son preference in counties. The relationship is significant positive in OLS and spatial lag models, but insignificant in spatial error model.

Limitations:

- This research ignores the effect of selective migration.
- No policy variable directly being analysed in this research. The effect of some variables (e.g. proportion of ethnic minorities, proportion of population working in agricultural sector) may be influenced by family planning policies as well, but policies' effect cannot be distinguished because there is no such variable in models.
- These counties with missing and replacing data may influence the final results.

Further study:

- We are planning to use spatial panel models to investigate the spatial variation of TFR at county-level in China, and the changes of the determinants over time and across space.

Acknowledgement :

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