Semiparametric Analysis of Out-farm Migration in China

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Introduction

The literature on the relationship between out-farm migration and income gap provides important insights into the forces driving the development of countries. The prevailing hypothesis suggests a linear relationship between the two variables. This suggests that as the income gap increases, more agricultural workers migrate to non-agricultural sectors in search of better economic opportunities, and vice versa. However, multiple factors can complicate this relationship, making it more nuanced than a simple linear model suggests.

Most research on this topic has focused on occupational migration in developed countries, while developing countries often have a larger agricultural sector and a smaller share of employment in non-agricultural sectors. This situation means there is still a high likelihood of individuals migrating from agriculture to industry in these countries. Therefore, it's important to separately consider the inter-sectoral migration in developing countries due to their distinct pace and dynamics.

Research Questions

- Is the relationship between out-farm migration and the income gap in developing countries nonlinear as opposed to the traditionally assumed linear relationship?
- What are the different patterns and drivers of inter-sectoral migration in various stages of China's development?

Data

- Collected national annual time series data between 1978 and 2020
- Major variables of interests in our research are found in China statistical yearbook compiled by National Bureau of Statistics(NBS), and International Labour Organization(ILO), etc.

Methodology

The off-farm migration is rates defined as percentage change in agricultural employment from one year to the next. Figure 1 shows the off-farm migration rate in China over years.

Variable	Description	China Mean	Std. Dev.
L_{nf}	Number of employees in non-farm sector (10 thousands)	35,205.47	14,497.86
L_f	Number of employees in farm sector (10 thousands)	30,583.67	5,909.237
y_{nf}	Value added by non-farm sector (100 million yuan)	220,103.5	284,417.5
y_f	Value added by farm sector (100 million yuan)	23,667.87	23,751.21
APL_{nf}	Labor productivity in non-farm sector (y_{nf}/L_{nf})	4.45	4.99
APL_f	Labor productivity in farm sector (y_f/L_f)	.97	1.22
ur	Unemployment rate in non-farm sector	3.5	.97
age	Percent of labor force $\geq$		
$educ$	Avg. years total schooling	7.39	1.08
M_{all}	Out farm migration rate	1.04%	3.93%
r	$\log(APL_{nf}/APL_f)$	1.57	.16
u	$\log(ur)$	1.21	.3
g	$\log(L_{nf}/L_f)$	.061	.603

Table 1: Summary Statistics and Description of variables

Finally, we adopt a semiparametric Robinson's (1988) double residual estimator which allows us to leverage the advantages of nonparametric models while incorporating the structure of standard parametric models.
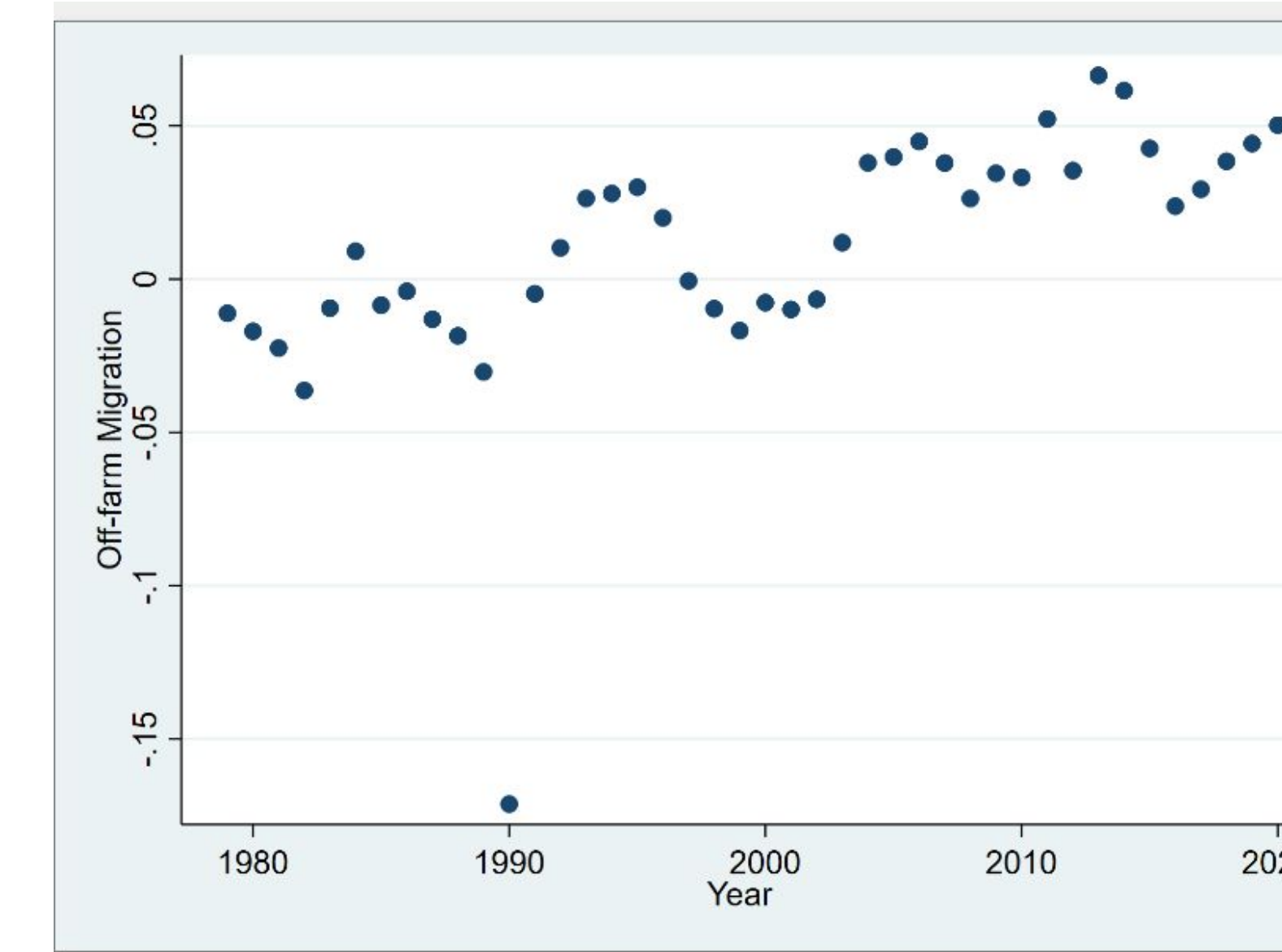

Figure 1: Off-farm Migration Rates by Year

We first applied the empirical OLS migration model. The coefficient estimated by the OLS method does not indicate a strong correlation between off-farm migration and income gap. There exists a relationship between migration rate and the income ratio between the sectors, which suggests a possibility of a nonlinear U-shaped or S-shaped relationship, rather than a linear (Figure 2)
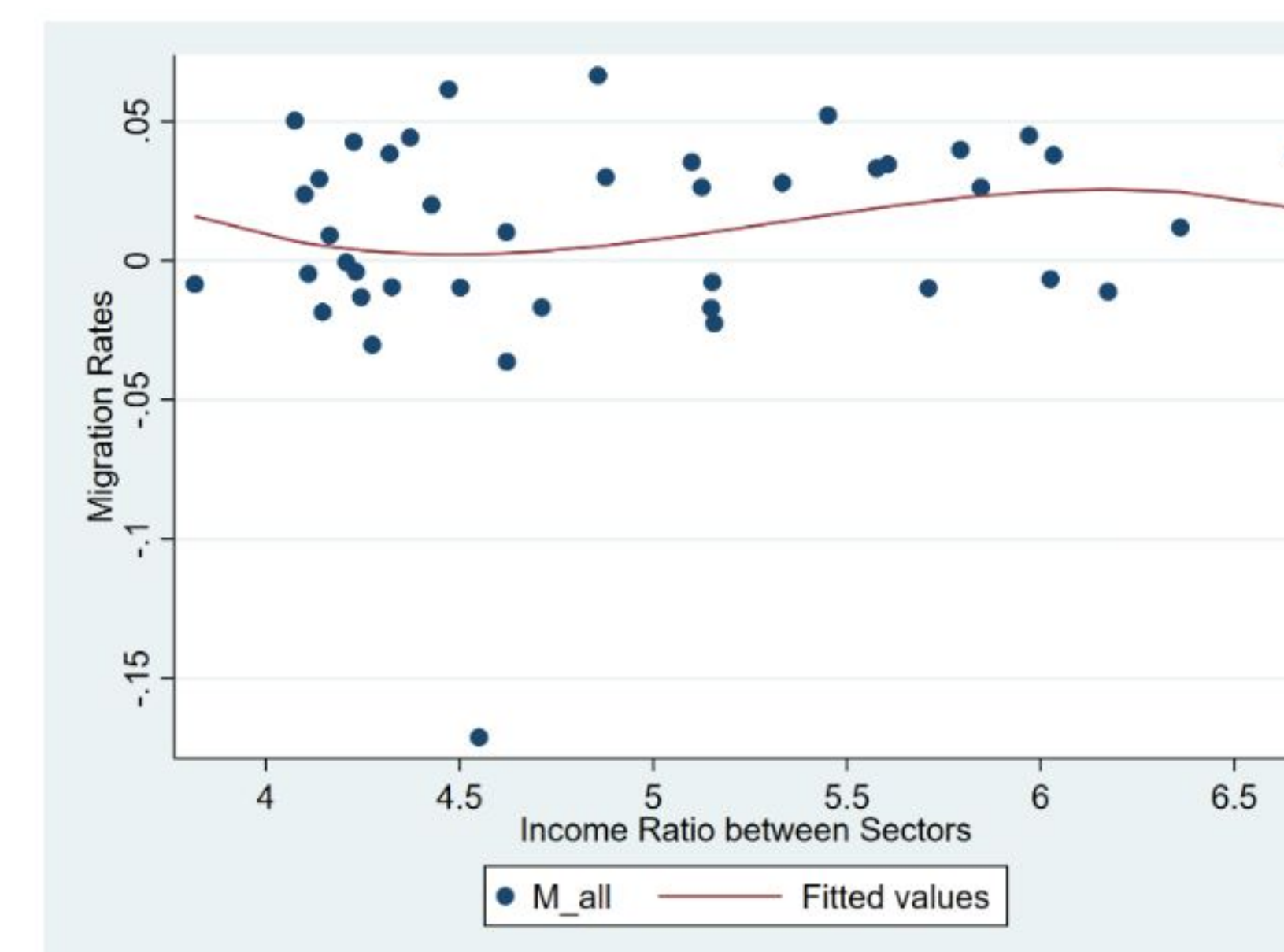

Figure 2 B-Spline Curve of Income Ratio

Results

The findings of the semiparametric analysis reveal a U-shaped nonlinear relationship between outfarm migration and income gap in China, which deviates from the pattern proposed by precious studies. Iin a U-shaped relationship in Chinese case, migration rates rather decrease with a certain level of income gap. This could be due to various factors, such as improved rural living conditions or economic opportunities, government policies to promote rural development, or increased costs and challenges associated with migration to urban areas.
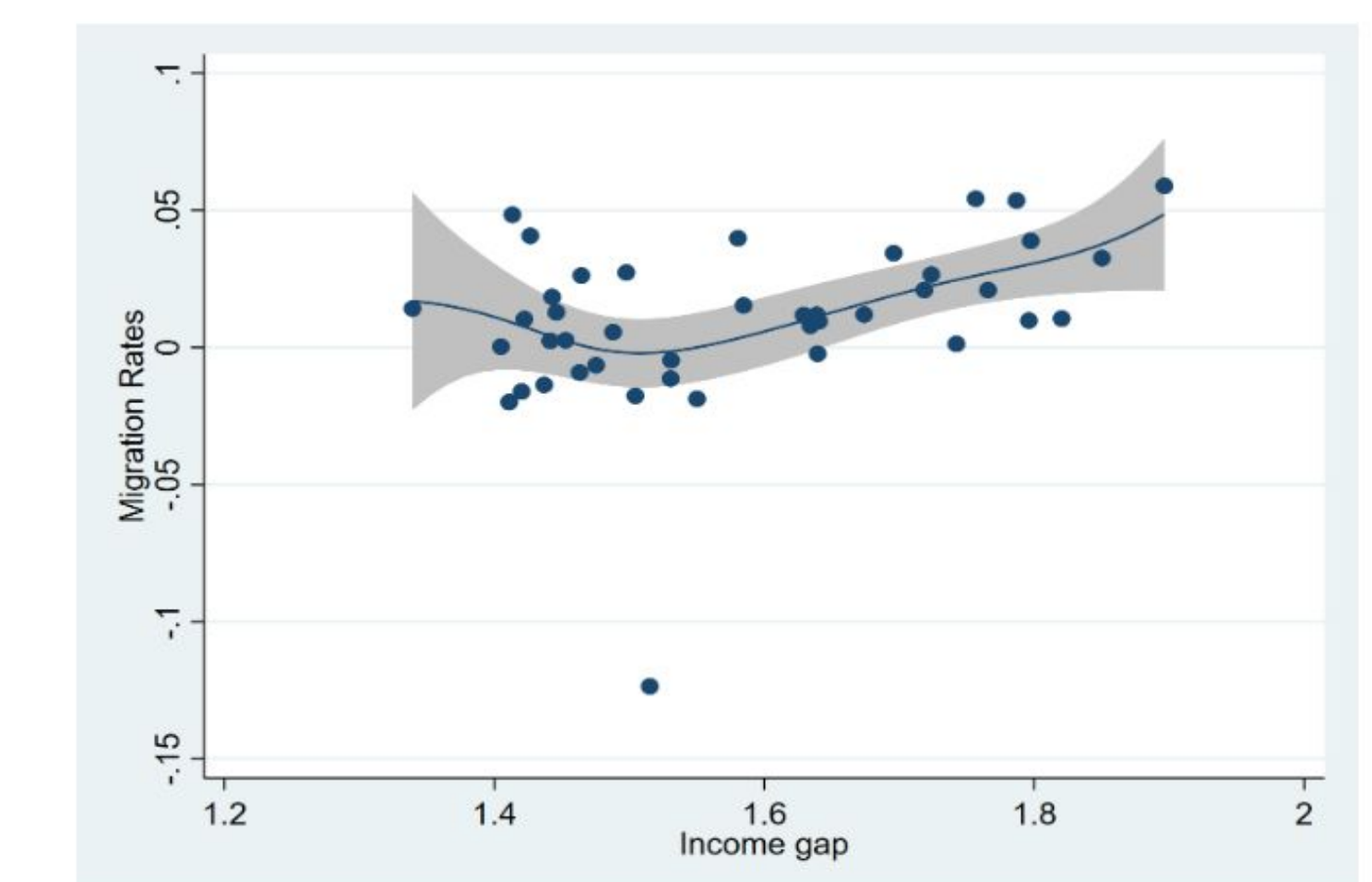

Figure 3: Semiparametric results for nonparametric part

Variable	Partial linear coefficient	t-ratio	Linear coefficient	t-ratio
employment ratio (g)	0.0898**	2.7	0.0906**	2.53
unemployment rate (u)	-0.0223	-0.84	-0.0253	-0.89
education (e)	−0.294**	-2.6	-0.2672**	-2.23
dum90	0.0792***	3.35	0.0658***	2.72
Dependent Variable: Migration rate				
Sample size: 42				

Table 2:Semiparametric results for parametric part

Future Plan

- Incorporating hukou-related data into the analysis to provide a more comprehensive understanding of the dynamics of migration in China
- Qualitative research or data on individual level could be conducted