(PP3302) Expressway Connectivity and Economic Growth: A Case Study of Vietnam

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Introduction

■ A few studies on the relationship between transportation and economic growth. have been conducted in developing countries, primarily owing to the unavailability of data.

■ Therefore, we present a method for estimating the impact of expressway connectivity on economic growth with minimal data, based on a case study of Vietnam.

Objectives

This study aims to test three following hypotheses:

1) Better expressway connection may increase FDI capital and projects

2) Better expressway connection may lead to higher in-migration and population growth

3) Better expressway connection may increase the number of road passengers

Data & Method

■ Data: Annual road connectivity data and outcome data (e.g., population and FDI capital) for 63 provinces from 2009 to 2018

■ Method:

1) Three types of centrality indices are used to measure the expressway connectivity.

2) A conventional two-way fixed effects model is used to estimate the influence of expressway connectivity on outcome variables

$$C_{D,road}(i) = \sum_{j=1}^{N} a_{ij}$$

$C_{D,road}(i)$: The **degree centrality** of vertex i

$a_{ij} = 1$ if province i was connected to province j through expressways

$$C_{H,road}(i) = \sum_{j}^{N} \frac{1}{r(i,j)}$$

$C_{H,road}(i)$: The **harmonic centrality** of vertex i

$r(i,j)$ is no. of edges included in the shortest path from province i to j. If no path exists, $r(i,j) = \infty$.

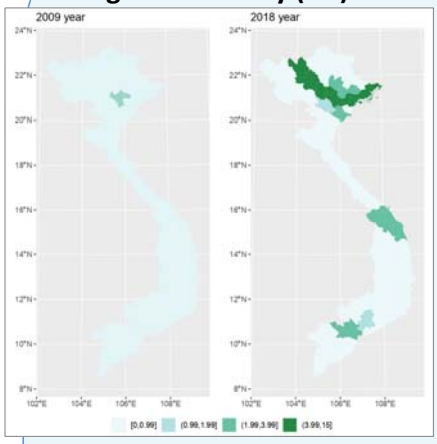
$$C'_{H,road}(i) = \sum_{j}^{N} \frac{1}{r'(i,j)}$$

$C'_{H,road}(i)$: The **distance-weighted (DW) harmonic centrality** of vertex i

$r'(i,j)$ is the shortest distance from province i to j in the expressway network

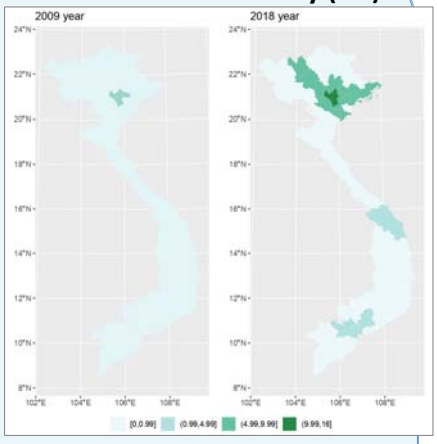
Estimation Results

Degree centrality (DC)



Outcome variables	Parameter of DC	R2 Adjusted	RMSE
Population	0.003	0.998	0.02
In-migration rate	0.036 (+)	0.793	0.39
Out-migration rate	-0.019	0.669	0.33
FDI capital	0.043	0.925	0.64
FDI projects	0.044 (*)	0.943	0.42
No. of road passengers	0.018 (**)	0.996	0.08

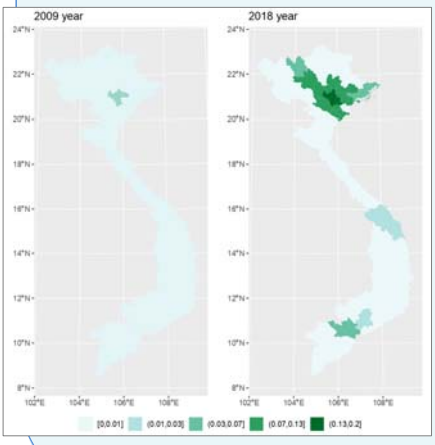
Hamornic centrality (HC)



Outcome variables	Parameter of HC	R2 Adjusted	RMSE
Population	0.0008	0.998	0.02
In-migration rate	0.029 (*)	0.795	0.39
Out-migration rate	-0.015	0.67	0.33
FDI capital	0.064 (*)	0.927	0.63
FDI projects	0.038 (*)	0.943	0.42
No. of road passengers	0.011 (**)	0.996	0.08

+: p<0.1; * p<0.05, ** p<0.01, *** p<0.001

DW hamornic centrality



Outcome variables	Parameter of DWHC	R2 Adjusted	RMSE
Population	0.038	0.998	0.02
In-migration rate	2.766 (**)	0.795	0.39
Out-migration rate	-1.967	0.673	0.33
FDI capital	5.719 (*)	0.927	0.63
FDI projects	3.945 (**)	0.944	0.41
No. of road passengers	1.104 (***)	0.996	0.08

Robustness checks: By controlling for *average wages & population* as a proxy variable of job opportunities, DWHC are still statistically associated with the following outcome variables:

(1) Out-migration rates; 2) FDI capital/project, 3) No. of road pax

Conclusion

■ The DW harmonic centrality *positively impacted* the in-migration rate, FDI capital, FDI projects, and the number of road passengers.

→ the construction of expressways promotes short- and long-term human (and logistic) flows and attracts FDI.

→ Usefulness of DWHC developed in this study