

REGIONAL BRAIN DRAIN IN VIETNAM: AN ANALYSIS OF THE IMPACT OF INCOME AND REGIONAL ECONOMIC CONDITIONS ON THE MIGRATION BEHAVIOR OF HIGHLY EDUCATED PERSONNEL

Le Thi Thuy Hang^{1*}, Nguyen Tuan Duy¹, Ta Minh Cong¹, Nguyen Thuy Duong¹, Tran Phu Dong¹, Pham Ngoc Phuong Nghi¹, Nguyen Phuoc Quy Son¹

¹ University of Finance - Marketing, Vietnam

*Corresponding author: Email: ltt.hang@ufm.edu.vn

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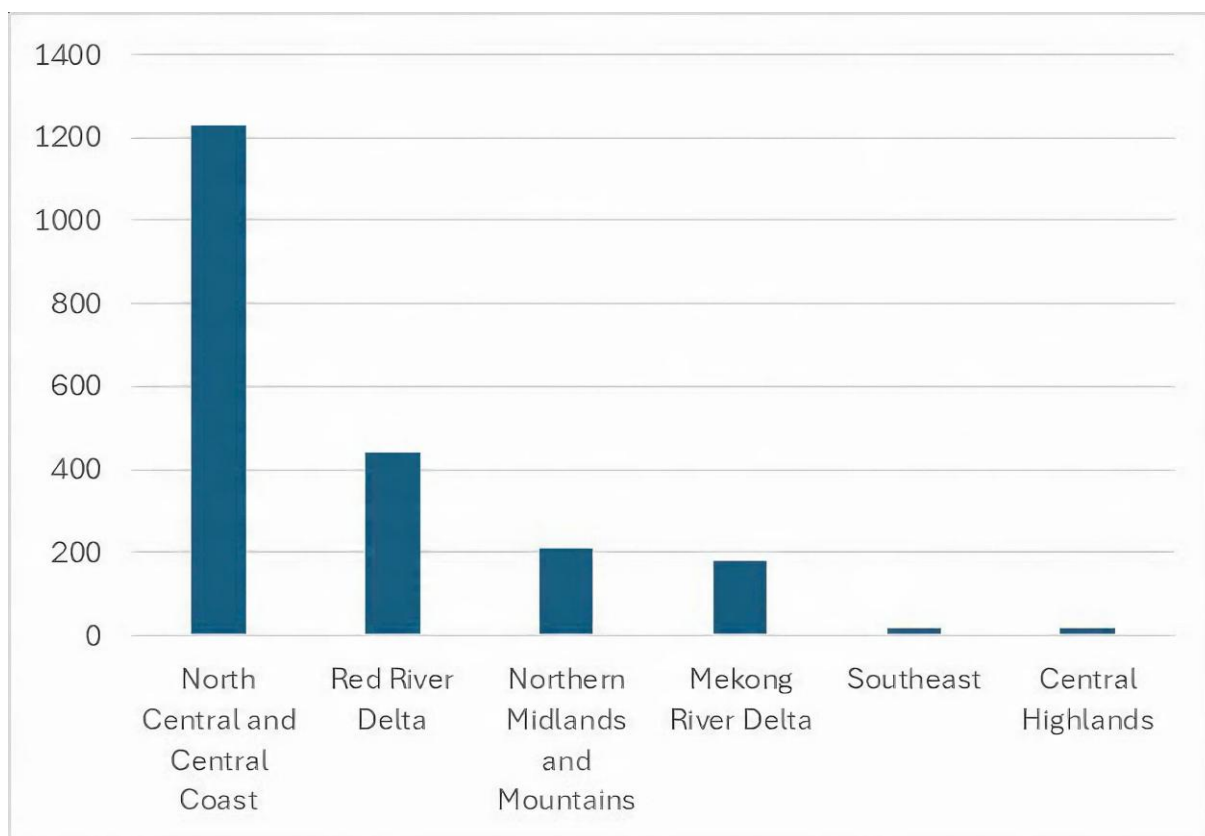
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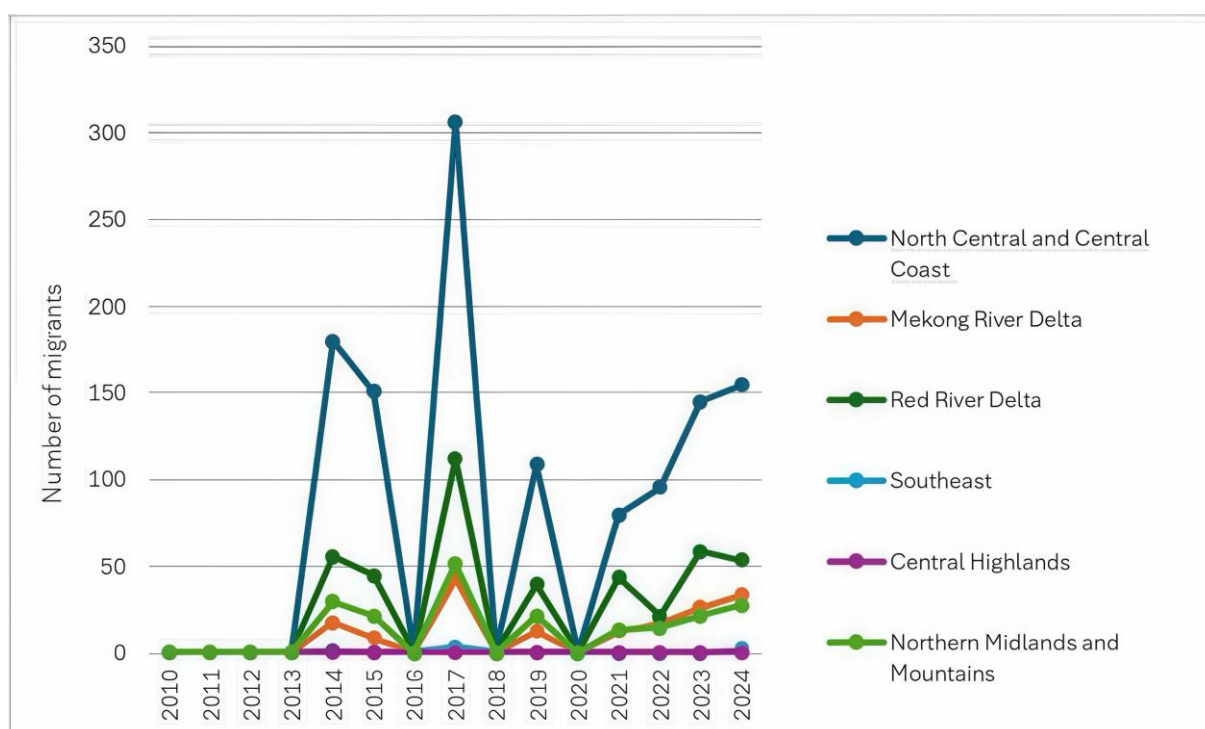
Appendix 1. Expected signs of variables in the research model

No.	Variable Name	Symbol	Expected impact nature and importance (SHAP)	Hypothesis
1	Income per capita	INC	Positive impact but non-linear (threshold effect).	H1
2	Average urban population	URB	Primary driver, with the highest importance and strongest impact.	H2
3	Educational institutions per 1000 people	EDU	Acts as the core, with importance equivalent to Urbanization.	H3
4	Average housing floor area	ARE	Complex impact, dependent on synchronization with urban infrastructure.	H4
5	Percentage using hygienic water	WAT	Foundational condition group, with weaker (marginal) importance.	H5
6	Percentage of households using electricity	ELE	Foundational condition group, with weaker (marginal) importance.	H5
7	Doctors per 1000 people	HEA	Foundational condition group, with weaker (marginal) importance.	H5

Appendix 2. Spatial polarization in attracting highly educated labor across economic regions (2010 - 2024)



Appendix 3. Volatility trend of the brain drain flow in key economic regions (2010 - 2024)



Appendix 4. Descriptive statistics of variables in the model

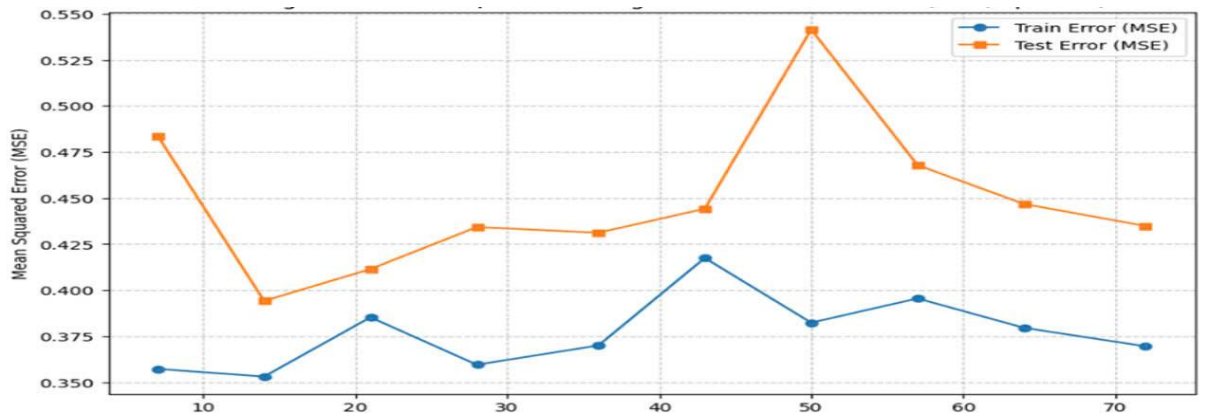
Variable	Obs	Mean	SD (Overall)	SD (Between)	SD Within)	Min	Max
SCH	90	23.233	48.809	30.571	39.935	0.000	306.000
INC	90	8.000	0.487	0.319	0.388	6.808	8.864
WAT	90	0.933	0.073	0.061	0.046	0.670	0.999
ARE	90	22.758	3.841	1.908	3.418	15.100	33.400
ELE	90	0.985	0.022	0.016	0.016	0.904	1.010
EDU	90	6.129	0.285	0.303	0.059	5.634	6.643
HEA	90	6.582	0.237	0.111	0.214	6.213	7.256
URB	90	8.400	0.665	0.713	0.120	7.305	9.462

Appendix 5. Pearson correlation matrix among variables

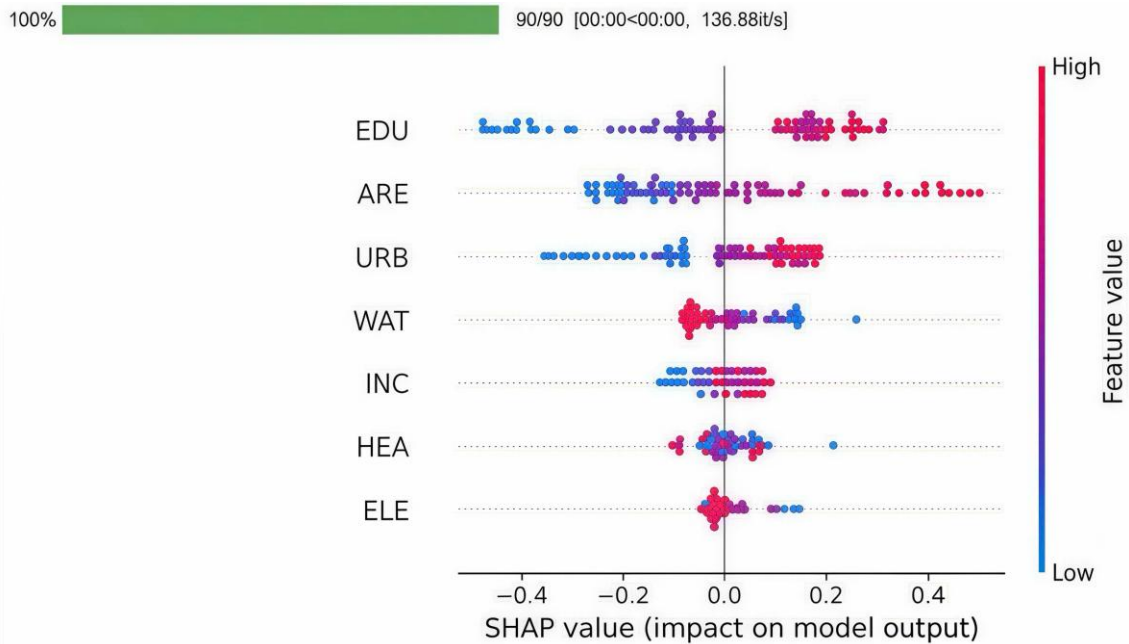
Variable	SCH	INC	WAT	ARE	ELE	EDU	HEA	URB
SCH	1.0000							
INC	0.1281	1.0000						
WAT	0.1186	0.7498*	1.0000					
ARE	0.284*	0.8210*	0.5977*	1.0000				
ELE	0.1159	0.7139*	0.8504*	0.6031*	1.0000			
EDU	0.1061	-0.6315*	-0.6956*	-0.3194*	-0.6202*	1.0000		
HEA	0.0359	0.4717*	0.1190	0.5154*	0.0934	-0.0081	1.0000	
URB	0.1746	0.6272*	0.6708*	0.4620*	0.5051*	-0.8174*	0.1375	1.0000

Note: * indicates statistical significance at the 5% level ($p - \text{value} < 0.05$)

Appendix 6. Learning Curve for testing Overfitting



Appendix 7. SHAP Summary Plot assessing the importance and marginal impact of independent variables



Appendix 8. Heatmap showing the strategic talent attraction characteristics of 3 local clusters

