

Analysis of spatial inequality using DMSP-OLS nighttime-light satellite imageries: A case study of Thailand

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Analysis of spatial inequality using DMSP-OLS nighttime-light satellite imageries: A case study of Thailand

Krittaya Sangkasem¹ | Nattapong Puttanapong² 

¹Bank of Thailand, Southern Region Office, Thailand

²Faculty of Economics, Thammasat University, Thailand

Correspondence

Nattapong Puttanapong, Faculty of Economics, Thammasat University, 2 Prachan Road, Phranakorn, Bangkok 10200, Thailand.
Email: nattapong@econ.tu.ac.th

Abstract

Unbalanced regional development has been a persistent concern in Thailand, and satellite imageries can provide alternative data for examining the dynamics of regional development. This study validated the consistency between Defense Meteorological Satellite Program–Operational Linescan System (DMSP-OLS) nighttime light (NTL) imageries and data from the official nationwide socio-economic survey. It found that the two sources exhibited a statistically significant correlation in 1994–2013. On the basis of this

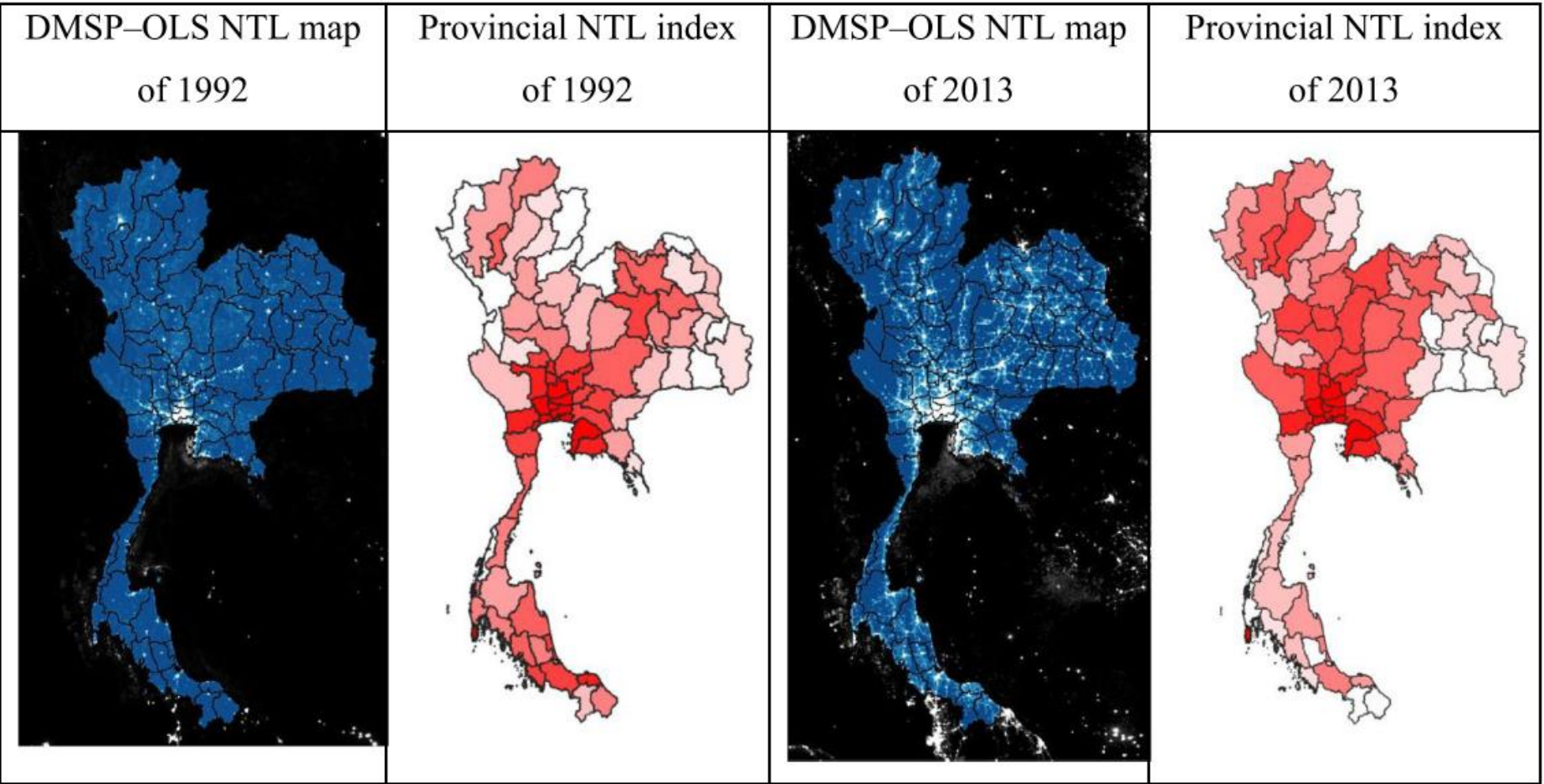


FIGURE 1 Annual DMSP-OLS NTL imageries and provincial NTL indices

TABLE 2 Correlation coefficients between IPI and ALI

Year	Correlation coefficients between IPI and ALI
1994	0.7933***
1996	0.7615***
1998	0.7779***
1999	0.7101***
2000	0.7745***
2001	0.8069***
2002	0.8054***
2004	0.7512***
2006	0.8409***
2007	0.8538***
2009	0.8395***
2011	0.7774***
2013	0.7974***

Note: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

TABLE 3 Regression coefficients between IPI and ALI. Dependent variable: IPI

	1994	1996	1998	1999	2000	2001	2002
ALI	1.81*** (0.1614)	1.73*** (0.1710)	1.84*** (0.0212)	1.60*** (0.1847)	1.84*** (0.1745)	1.78*** (0.1514)	2.01*** (0.1723)
Constant	-3.81e-09 (0.1614)	3.86e-09 (0.1710)	6.51e-09 (0.1994)	-5.53e-10 (0.1847)	-1.00e-08 (0.1745)	-7.91e-09 (0.1514)	8.18e-09 (0.1723)
F-statistic	125.61***	102.13***	113.81***	75.28***	110.97***	138.13***	136.63***
R-squared	0.6293	0.5799	0.6060	0.5043	0.5999	0.6512	0.6487
Adj R-squared	0.6243	0.5742	0.6007	0.4976	0.5945	0.6464	0.6439
Root MSE	1.4079	1.4912	1.5061	1.6109	1.522	1.3206	1.5026
Observations	76	76	76	76	76	76	76

Note: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

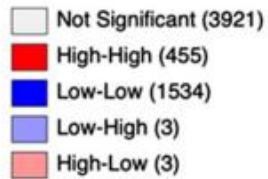
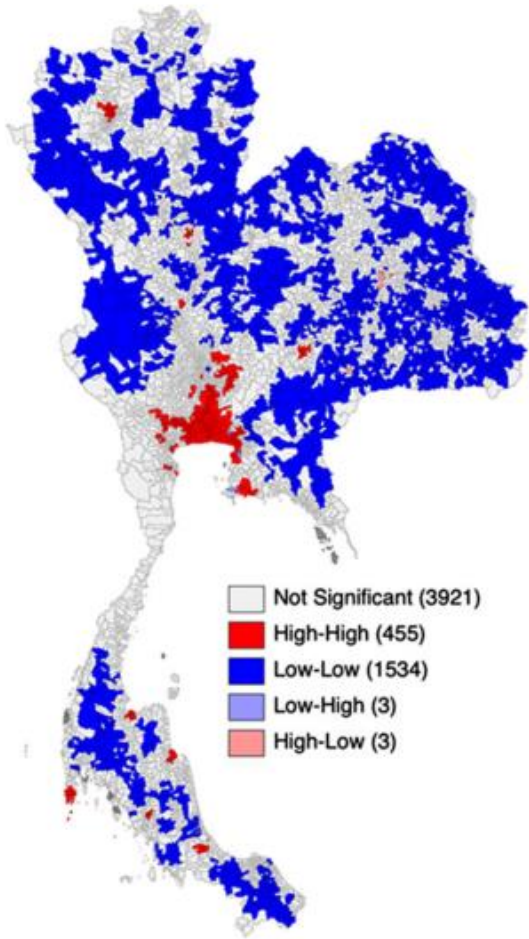
TABLE 3 Continued

	2004	2006	2007	2009	2011	2013
ALI	1.92*** (0.1963)	2.36*** (0.1762)	2.52*** (0.1786)	2.39*** (0.1798)	2.12*** (0.1994)	2.41*** (0.2105)
Constant	2.17e-09 (0.1963)	-6.01e-09 (0.1762)	6.90e-09 (0.1786)	-8.68e-09 (0.1798)	6.74e-09 (0.1994)	1.26e-08 (0.2105)
F-statistic	95.82***	178.60***	199.09***	176.68***	113.04***	130.98***
R-squared	0.5642	0.7070	0.7290	0.7048	0.6044	0.6359
Adj R-squared	0.5584	0.7031	0.7254	0.7008	0.5990	0.6310
Root MSE	1.7121	1.5365	1.5574	1.568	1.7384	1.8476
Observations	76	76	76	76	76	76

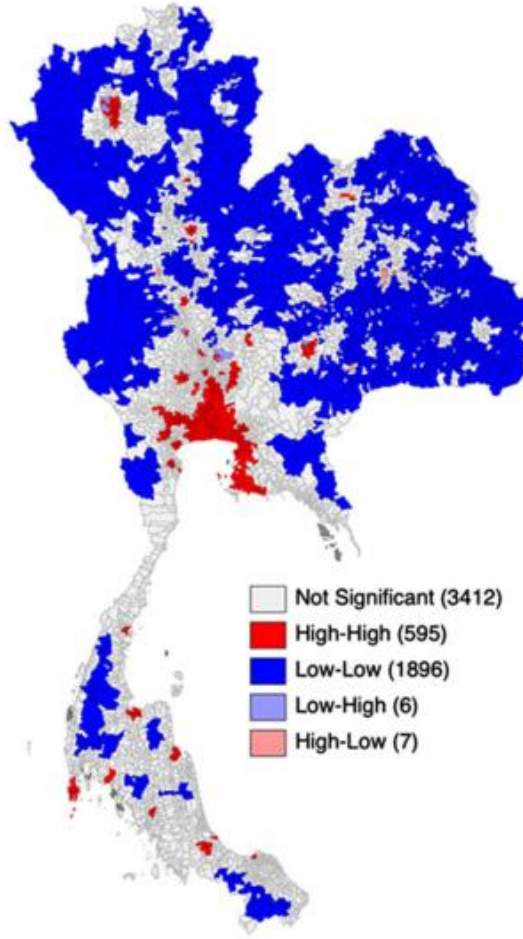
Note: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Source: Authors' calculation.

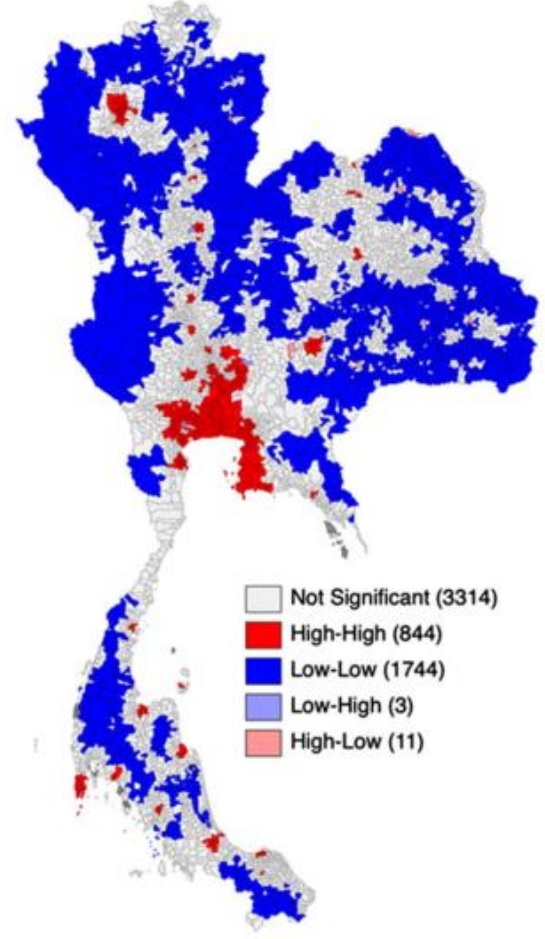
1992



2002



2013



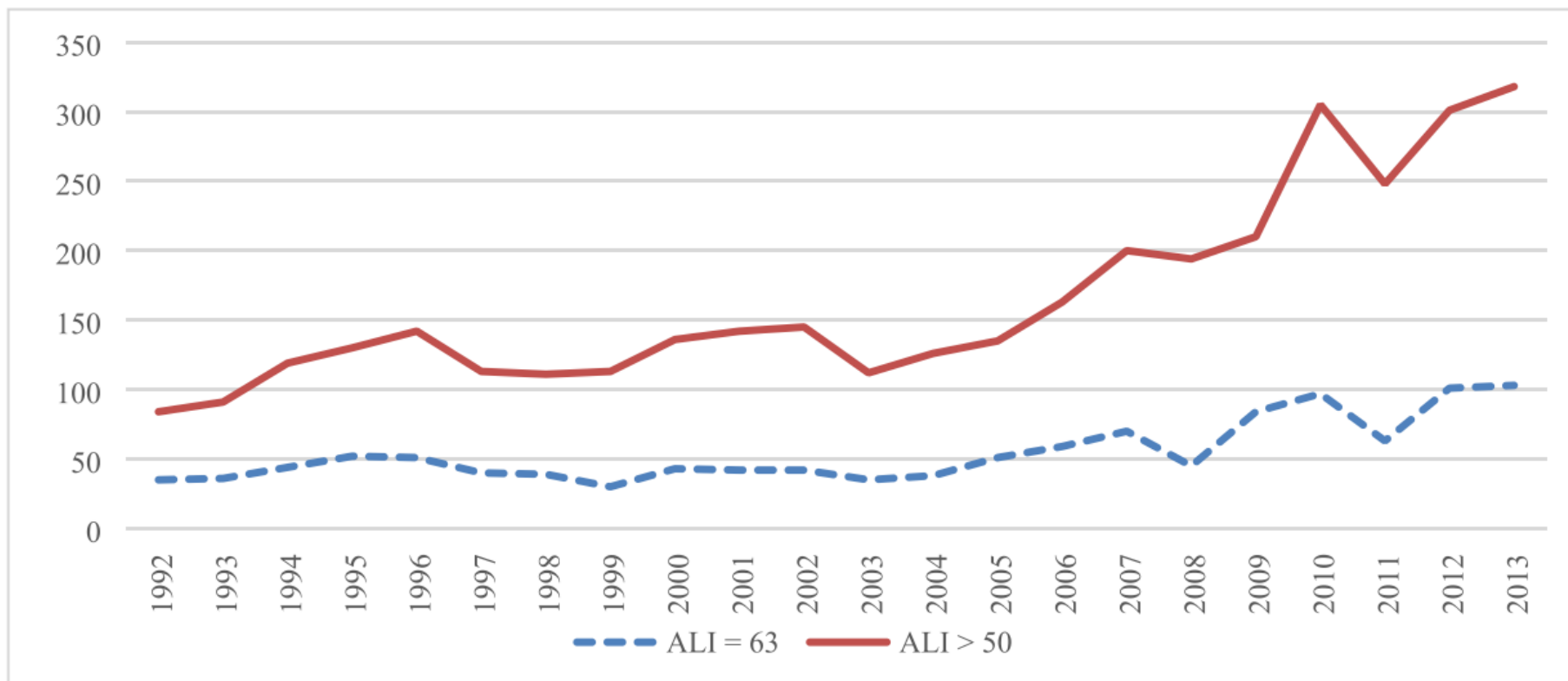


FIGURE 3 Number of districts with a relatively high NTL index (ALI > 50 and ALI = 63)

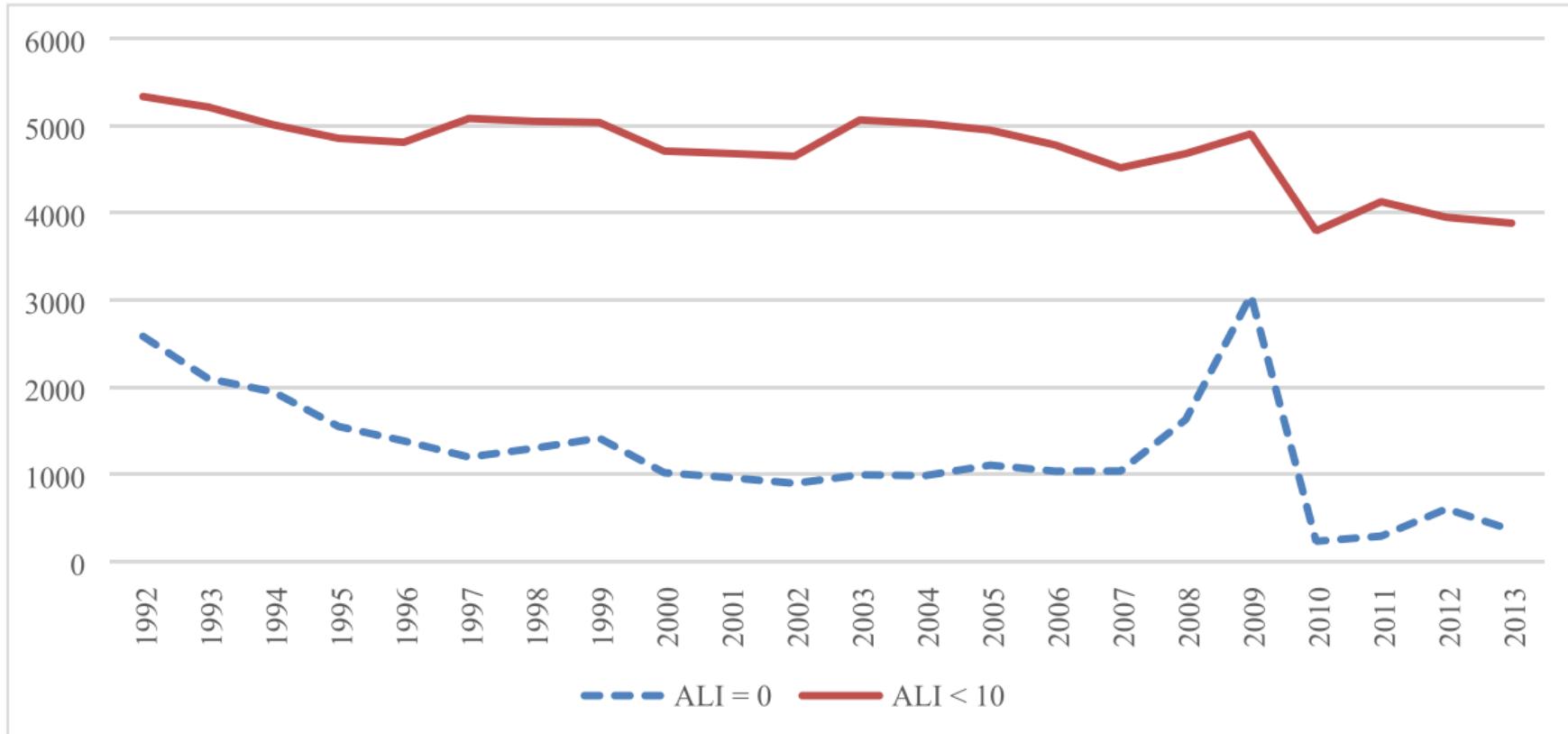


FIGURE 4 Number of districts with a relatively low NTL index (ALI < 10 and ALI = 0)

Source: Authors' calculation

Source: Sangkasem and Puttanapong (2020)

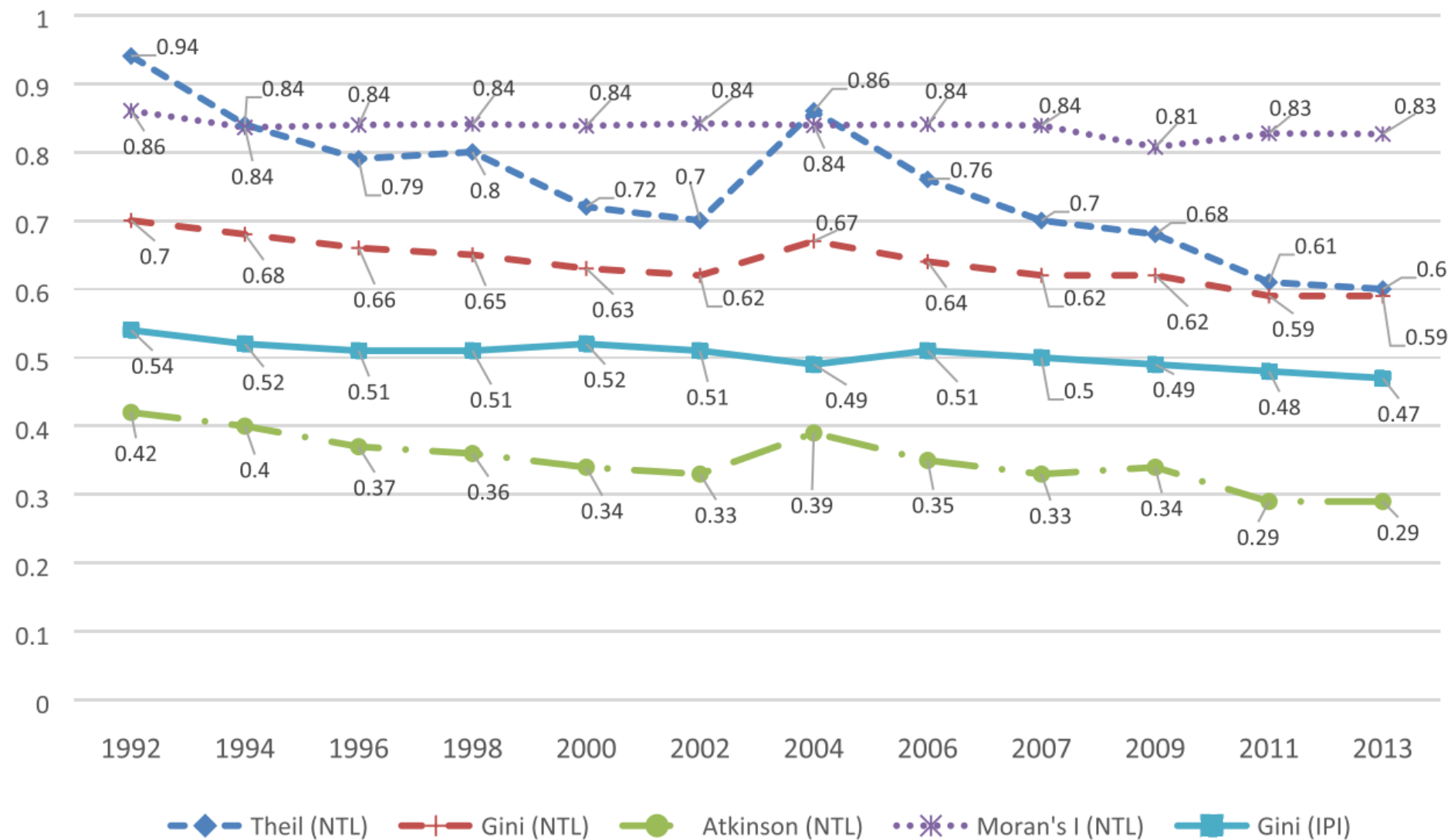


FIGURE 5 Provincial Moran's I, NTL-based, and IPI inequality indices of Thailand in 1992–2013

Source: Moran's I, Gini (NTL), Theil (NTL), and Atkinson (NTL) were calculated using NTL data; and Gini (IPI) is the Gini coefficient of IPI obtained from HSES

Source: Sangkasem and Puttanapong (2020)

Correlation with IPI-based Gini coefficients

Moran's I (NTL)	0.7255***
NTL-based Gini	0.7591***
NTL-based Theil	0.7482***
NTL-based Atkinson	0.7588***

Note: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Source: Sangkasem and Puttanapong (2020)