

Background

- Deinstitutionalization, one of major reforms undergone over the last 50 years, has become a new policy strategy in psychiatric care in many high-income countries.
- In 1939, British scientist Lionel Penrose suggested an inverse correlation between the number of psychiatric beds and the number of inmates in prison using data from 18 European countries, which later became subsequently called “Penrose hypothesis”
- The purpose of this study was to examine whether the Penrose hypothesis was applicable in Korea. In particular, this study aimed to assess a possible correlation between psychiatric hospital beds and prison population in Korea.

Methods

- This study employs annual times series data from 1990 to 2016 using Vector Auto-Regressive (VAR) modelling to examine the association between annual series of psychiatric beds, homeless population, and prison population, considering interaction with macro-economic factors.
- The number of prison population (1992-2016) were obtained from the website of the Supreme Prosecutor’s Office. The numbers of psychiatric hospital beds (1990-2016) were extracted from the National Mental Health Statistics. Following the extant literature, unemployment and income distribution indicators were controlled in the analytic model.

Results

Figure1. Annual time series variables for analysis from 1990 to 2016

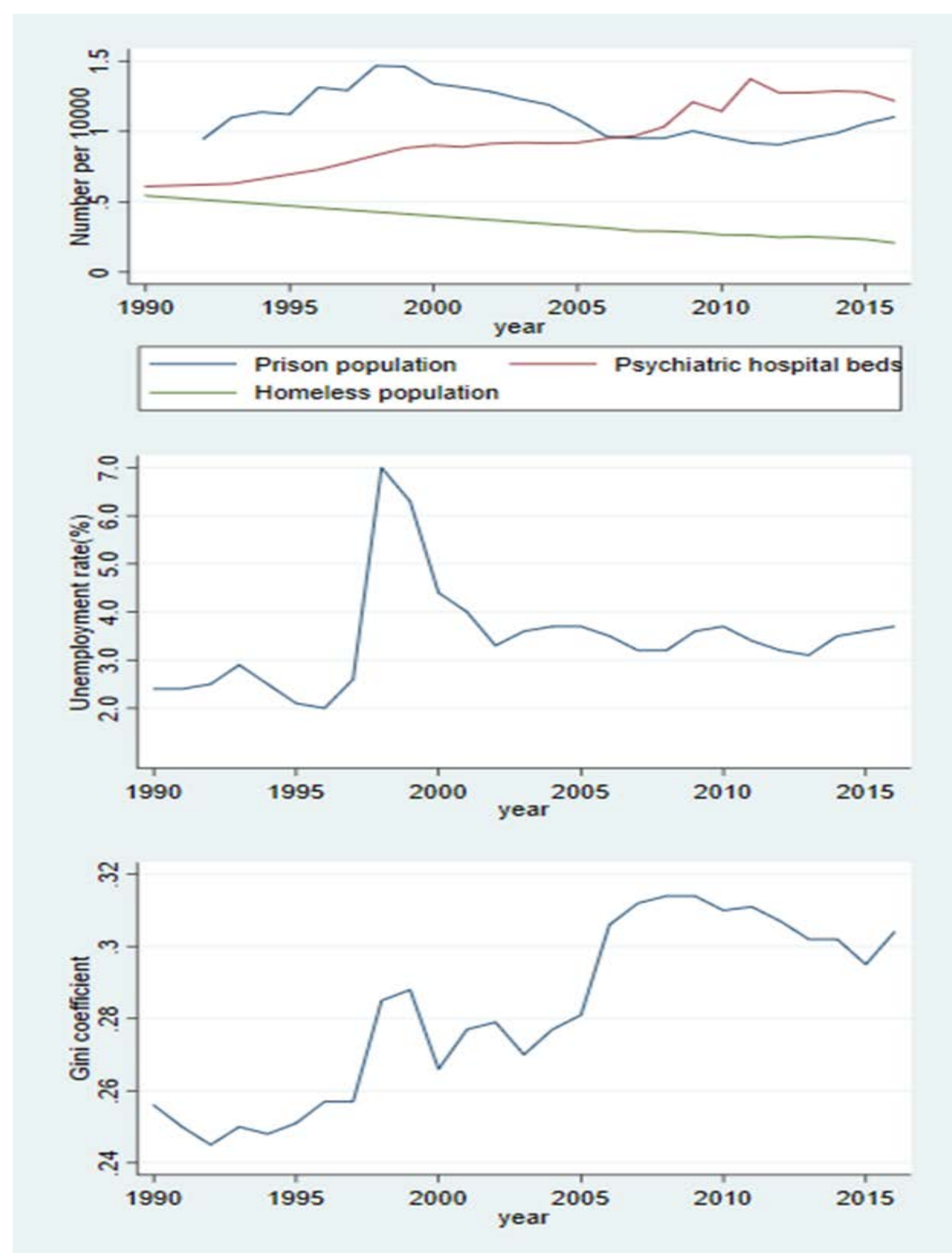


Table1. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots

Variables	ADF statistic	CV (LL)	PP statistic	CV (BW)
Psychiatric hospital beds	-2.646	-3.596 (2)	-0.893	-2.997 (2)
Prison population	-2.408	-3.600 (1)	-1.561	-3.000 (2)
Homeless population	-1.420	-3.596 (1)	-1.398	-3.596 (2)
Unemployment rate	-2.545	-3.596 (2)	-2.676	-2.997 (2)
Gini coefficient	-2.226	-3.596 (1)	-1.046	-2.997 (2)
Δ Psychiatric hospital beds	-7.121	-3.600 (1)	-6.870	-3.600 (2)
Δ Prison population	-3.952	-3.600 (0)	-3.979	-3.600 (2)
Δ Homeless population	-5.270	-3.600 (0)	-5.258	-3.600 (2)
Δ Unemployment rate	-4.376	-3.600 (0)	-4.336	-3.600 (2)
Δ Gini coefficient	-4.986	-4.380 (0)	-5.013	-3.600 (2)

Notes: CV (critical values) are calculated from MacKinnon (1991). LL (lag length) are selected using the Schwarz Bayesian criterion. BW (bandwidth) is selected using the Newey - West Bartlett kernel. Both tests were conducted including an intercept and linear deterministic trend.

Table2. Results from multivariate Johansen-Juselius cointegration test hypothesis

H0: rank(= (r)	H1: Maximum Eigenvalue	Trace	Critical values Maximum Eigenvalue	Trace
0	38.11	72.97	33.46	68.52
1	20.80	34.86	27.07	47.21
2	13.20	14.06	20.97	29.68
3	0.59	0.86	14.07	15.41
4	0.28	0.28	3.76	3.76

Note: Critical values were calculated using Osterwald-Lenum procedure

Table3. Results from granger causality

Dependent variable	F-statistics				
	Δ Psychiatric hospital beds	Δ Prison population	Δ Homeless population	Δ Unemployment rate	Δ Gini coefficient
Δ Psychiatric hospital beds	—	0.469	9.355**	1.811	7.998**
Δ Prison population	9.481**	—	20.927***	0.175	0.068
Δ Homeless population	1.247	4.929*	—	.0866	2.903
Δ Unemployment rate	0.083	1.592	0.146	—	.0838
Δ Gini coefficient	15.864***	0.048	42.954***	0.0248	—

Note: The asterisks ***, ** and * denote statistical significance at the 0.1, 1 and 5 per cent levels, respectively.

- The Johansen-Juselius cointegration test showed that there is a long-run equilibrium relationship between psychiatric hospital beds, prison population, and homeless population in Korea.
- Regarding the direction of causality between the variables through the VECM framework, we found that both psychiatric hospital beds and homeless population Granger cause prison population.
- There was also uni-directional Granger causality running from homeless population to psychiatric hospital beds rate in the short-run.
- The results also showed that there was bi-directional short-term Granger causality between prison population and homeless population

Conclusions

- The results of this study demonstrate how deinstitutionalization policies could affect crime rates, and cause unintended consequences.
- To prevent this, there is a need to expand budgets for community mental health services, including budgets for mental health, as well as to organize and enhance the capacity of community resources to provide a sustainable and interactive systematic service to the mentally ill.