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Dataset of Economic Resilience and Industrial Evolution Path of Cities in the Yangtze River Delta (2002–2016)

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Abstract: According to the data about GDP and export products and using 26 cities in the Yangtze River Delta region as the research area, the author constructed a dataset of economic resilience and industrial evolution path of cities in the Yangtze River Delta region (2002–2016) to reveal related temporal and spatial evolution characteristics. This dataset includes economic resilience, the number of new industries of 2-digit HS codes and dependence degree of urban industrial evolution path in the Yangtze River Delta from 2002 to 2016. The dataset is archived in the .xlsx format with a size of 117 KB.

Keywords: economic resilience; industrial evolution; path dependence; Yangtze River Delta

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Dataset Availability Statement:

The dataset supporting this paper was published and is accessible through the *Digital Journal of Global Change Data Repository* at: https://doi.org/10.3974/geodb.2023.10.06.V1 or https://cstr.escience.org.cn/CSTR:20146.11.2023.10.06.V1.

1 Introduction

With the development of globalization, the Black Swan and Gray Rhino events have attracted more and more attention from scholars and policy makers. Especially since the global financial crisis from 2007 to 2008, continuously improved awareness of economic risk prevention has made economic resilience one of the hot spots in the research field of economic development[1]. In the framework of evolutionary economic geography, economic resilience is an important concept that facilitates our deep insights into the resistance, recovery, relocation and renewal capabilities of economic systems in the face of risks[2].

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Existing studies mostly focus on the measurement, temporal and spatial distribution and influencing factors of economic resilience. Industrial structure is considered to be one of the most important influencing factors[3]. Industrial evolution is closely related to local resource endowment and development history, and the change in industrial structure can be analyzed from the characteristics of industrial evolution path. Industrial evolution path dependence refers to a strong correlation between old and new industries in a region. The original technology, equipment and labor force provide facilitate the generation and development of the new industry, but local development is also potentially restricted by rigid institution and other issues caused by too intimate relations[4]. Therefore, exploring industrial evolution path dependence and its impact on economic resilience is of great value for supporting existing local industries, guiding the development of new industries, improving urban economic resilience, and promoting high-quality economic development.

There are few quantitative studies due to the lack of methods to calculate the industrial evolution path dependence. The Yangtze River Delta, one of the most developed regions in China, is typical and representative in the research on economic resilience and industrial evolution path.

Therefore, the author establishes the dataset of economic resilience and industrial evolution path of cities in the Yangtze River Delta (2002–2016) using national economic accounting data and export product data, which provides data support for investigating urban industrial evolution path and its impact on economic resilience of cities in the Yangtze River Delta.

2 Metadata of the Dataset

Table 1 summarizes the metadata of the Dataset of economic resilience and industrial evolution path of cities in the Yangtze River Delta (2002−2016)[5], with dataset full and short names, authors, year, data format, data size, data files, data publisher, and data sharing policy included.

3 Methods

3.1 Data Sources

According to the Yangtze River Delta urban agglomeration development plan approved by National Development and Reform Commission of China in 2016, the Yangtze River Delta urban agglomeration includes a total of 26 cities, including a municipality directly under the central government and some cities in three provinces, with a total area of about 210,000 km^2. We constructed the dataset based on export product data of countries around the world and cities in the Yangtze River Delta, as well as GDP data of China and cities in the Yangtze River Delta from 2002 to 2016. The export product data of countries around the world was derived from the UN Comtrade Database[7], the export product data of cities in the Yangtze River Delta from the China Customs Enterprise Database[8], Gross domestic product (GDP) data of China and cities in the Yangtze River Delta from the National Data of National Bureau of Statistics[9] and the China Urban Statistical Yearbook[10].

3.2 Research Method

3.2.1 Economic Resilience

According to the method proposed by Martin[11], the economic resilience of cities was calculated based on the GDP data of China and cities in the Yangtze River Delta considering

Table 1 Metadata summary of the Dataset of economic resilience and industrial evolution path of Cities in the Yangtze River Delta (2002–2016)

Items	Description
Dataset full name	Dataset of economic resilience and industrial evolution path of cities in the Yangtze River Delta (2002–2016)
Dataset short name	Res_EvolPath_YangtzeRiverDelta
Author	Qu, Y. HOH-8736-2023, Zhanjiang University of Science and Technology, Institute of Marine Sustainable Development, Liaoning Normal University, quyi1412@163.com
Geographical region	Yangtze River Delta in China
Year	2002–2016
Data format	.xlsx
Data size	117 KB
Data files	(1) Economic resilience of cities in the Yangtze River Delta from 2002 to 2016 (2) The number of new industries of 2-digit HS codes of cities in the Yangtze River Delta from 2002 to 2016 (3) Industrial evolution path dependence of cities in the Yangtze River Delta from 2002 to 2016
Foundations	National Natural Science Foundation of China (41976207); Ministry of Education of P. R. China (22JJD790029); Educational Department of Liaoning Province (LJKQZ2021090); Zhanjiang University of Science and Technology (PPJHYLZY-202205)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	(1) ***Data*** are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use ***Data*** subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute ***Data*** subject to written permission from the GCdataPR Editorial Office and the issuance of a ***Data*** redistribution license; and (4) If ***Data*** are used to compile new datasets, the 'ten per cent principal' should be followed such that ***Data*** records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset [6]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

short-term shock and "slow burn". The equation is expressed as:

$$Res_{c,t} = \frac{\triangle E_{c,t} - g_N^{t+T}(E_c^t)}{|\, g_N^{t+T}(E_c^t)\,|} \tag{1}$$

where, $Res_{c,t}$ and $\Delta E_{c,t}$ are the economic resilience and the change in GDP of city c from t-year to (t+T)-year respectively. E_c^t is GDP of city c in t-year. g_N^{t+T} is GDP's gradient of whole country from t-year to (t+T)-year. According to the theory of industry life cycle, an industry needs to experience a period of development from being initially established to being relatively competitive. Referring to the research of relevant scholars[12–14], we define T=4 in the dataset construction.

3.2.2 Industrial Evolution Path

We employed the export product data of countries around the world and the export product data of cities in the Yangtze River Delta for calculation. Figure 1 shows the developing process of industrial evolution path data. The steps are presented as follows:

(1) We identified the new and old industries according to the revealed comparative advantage index (RCA) of the export products of cities in the Yangtze River Delta.

(2) We calculated the RCA of all countries around the world and constructed the matrix of industry correlation between any industry i and j.

(3) We calculated the maximum proximity of new industry and old industry in each city.

(4) Monte Carlo method was used to calculate the distribution of the counterfactual

maximum proximity in each city.

(5) We determined whether the new industry is path-dependent one by one, and then calculated the path dependence of each city.

The specific calculation formulas above can be found in the reference[1].

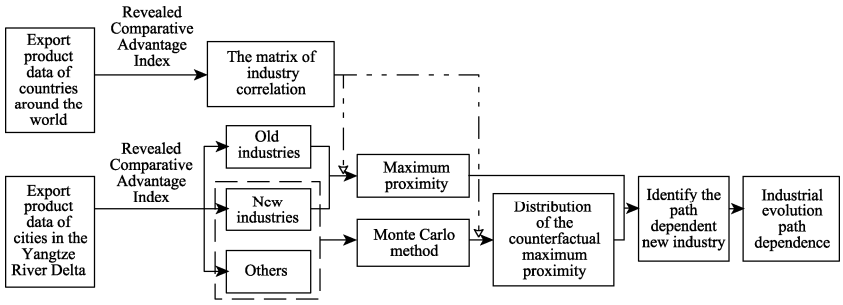

Figure 1 Technology roadmap of dataset development

4 Data Results and Validation

4.1 Data Composition

The dataset consists of three sections, namely economic resilience, the number of new industries of 2-digit HS codes and industrial evolution path dependence of cities in the Yangtze River Delta from 2002 to 2016.

4.2 Data Products

(1) Figure 2 shows the economic resilience of cities in Yangtze River Delta from 2002 to 2016, with an overall trend of "decline firstly, then rise, and finally decline again". Shanghai's economic resilience was less than 0 except for the periods of 2002–2006 and 2012–2016. The economic resilience of cities in Jiangsu province (Nanjing, Wuxi, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Taizhou (Jiangsu), Yancheng) was mostly larger than 0, with relatively consistent variation trend. The economic resilience of cities in Zhejiang province (Hangzhou, Ningbo, Jiaxing, Huzhou, Shaoxing, Zhoushan, Taizhou (Zhejiang) and Jinhua) was less than 0 in the research period, showing a relatively obvious "depression". There was little difference among cities except Zhoushan. The economic resilience of cities in Anhui province (Hefei, Chuzhou, Ma'anshan, Wuhu, Xuancheng, Tongling, Chizhou and Anqing) was generally higher than that of other provinces. However, the change amplitude between different cities in the same statistical year and between different statistical years of the same city was larger than that of other provinces.

(2) Table 2 summarizes the number of new industries in the Yangtze River Delta in the research period. The number of new industries in Shanghai, Nanjing, Wuxi, Changzhou, Suzhou and Taizhou (Jiangsu) declined steadily, and that in cities in Zhejiang province fluctuated and declined except Zhoushan. Cities in Anhui province respectively experienced a significant increase and decrease in the number of new industries in the periods of 2007–2011 and 2012–2016 except Hefei and Tongling.

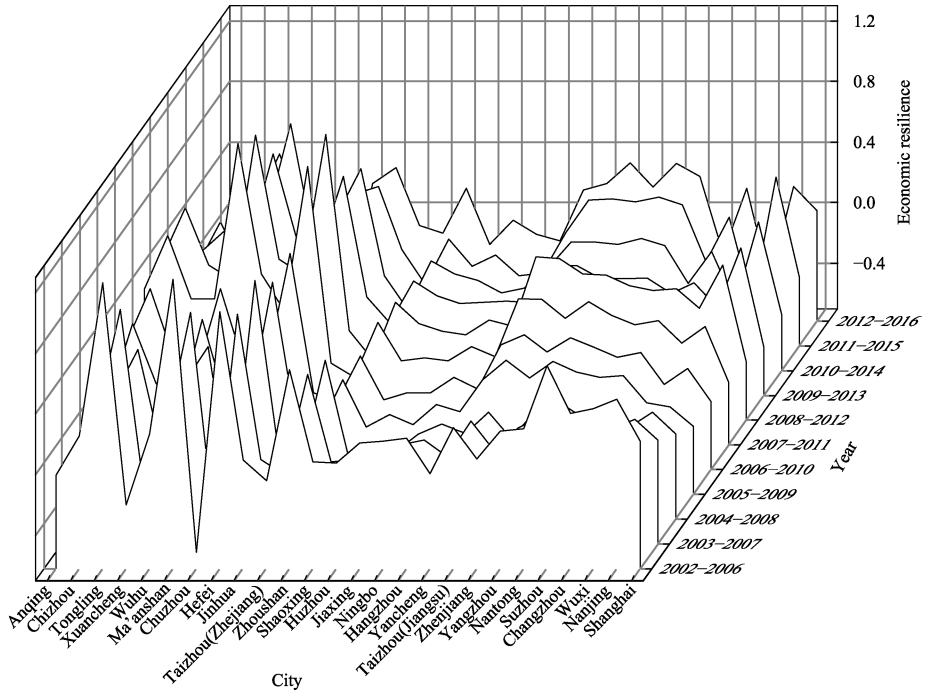

Figure 2 Economic resilience of cities in the Yangtze River Delta (2002–2016)

Table 1 The list of new industries of cities in the Yangtze River Delta (2002–2016)

City	2002–2006	2003–2007	2004–2008	2005–2009	2006–2010	2007–2011	2008–2012	2009–2013	2010–2014	2011–2015	2012–2016
Shanghai	52	50	43	34	31	23	18	25	18	15	14
Nanjing	50	53	58	44	39	38	46	58	36	39	23
Wuxi	62	62	57	40	48	36	38	33	25	19	18
Changzhou	78	70	62	40	41	29	26	33	27	30	22
Suzhou	30	35	40	27	30	35	25	26	21	14	13
Nantong	65	57	47	38	39	37	46	69	69	105	75
Yangzhou	56	74	67	52	36	41	67	50	32	29	27
Zhenjiang	54	67	56	49	39	56	101	64	37	30	22
Taizhou (Jiangsu)	59	63	47	40	45	33	39	46	36	50	43
Yancheng	66	68	68	70	58	44	59	66	48	99	68
Hangzhou	55	52	48	45	39	33	22	26	28	29	39
Ningbo	46	55	53	35	32	23	24	19	29	20	13
Jiaxing	75	69	69	56	36	38	43	37	36	27	20
Huzhou	58	50	61	36	38	37	27	26	24	27	29
Shaoxing	67	55	58	32	27	25	25	25	17	18	31
Zhoushan	21	16	13	8	9	5	3	4	5	44	134
Taizhou (Zhejiang)	33	39	40	41	24	20	18	16	10	8	13
Jinhua	76	59	46	35	28	27	45	50	54	60	20
Hefei	71	64	68	81	58	51	81	65	27	29	22
Chuzhou	52	50	46	33	33	40	121	165	152	130	61
Ma'anshan	23	21	29	63	62	81	111	176	93	114	82
Wuhu	47	42	43	47	37	50	75	109	135	153	52
Xuancheng	73	40	55	48	50	80	128	156	149	128	54
Tongling	13	30	34	25	34	17	53	19	9	21	99
Chizhou	21	34	36	38	39	35	92	99	43	28	26
Anqing	53	49	61	49	59	38	100	152	169	203	95

(3) Figure 3 shows the path dependence of cities in Yangtze River Delta from 2002 to 2016. The path dependence value of almost all cities was higher than 0.5, indicating that the industrial evolution of these cities was mainly characterized by path dependence. At the same time, the average path dependence of each research period fluctuated and declined, and the advantages from developing new industries by relying on local old ones gradually weakened.

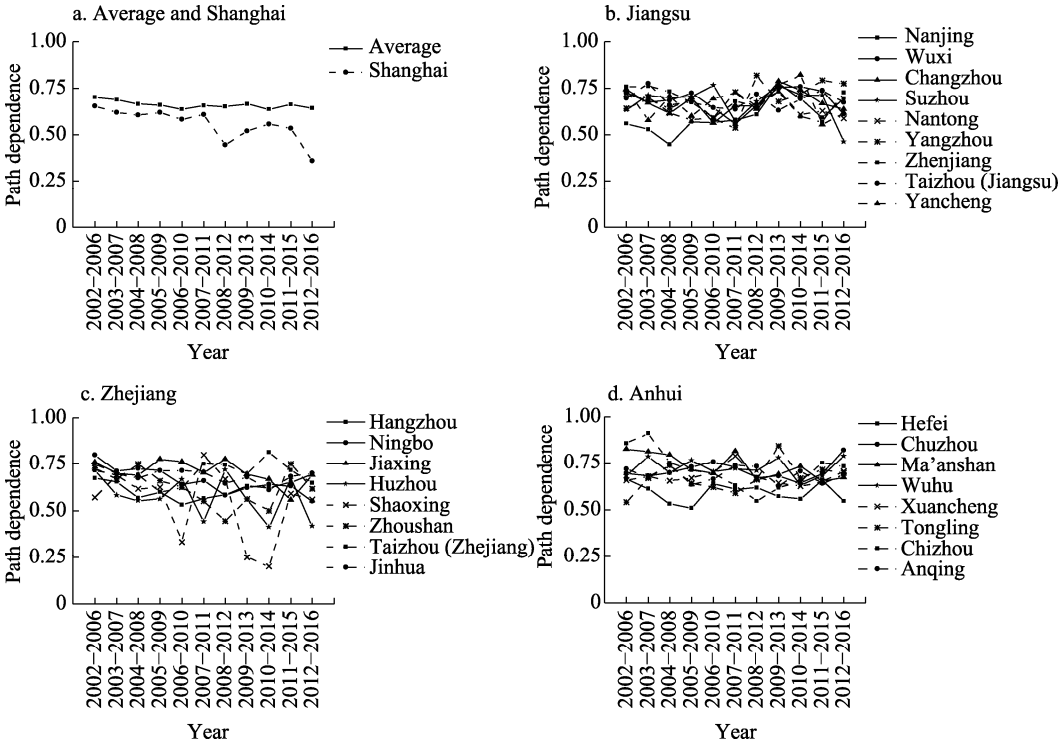

Figure 3 Industrial evolution path dependence of cities in the Yangtze River Delta (2002–2016)

5 Discussion and Conclusion

Urban economic resilience mirrors the comprehensive ability of urban economic system to cope with risks, and the evolution path of urban industry is considered to be one of the factors affecting economic resilience. The constructed dataset provides a data reference for analyzing the spatio-temporal distribution of economic resilience and the characteristics of industrial evolution path of cities in the Yangtze River Delta region, and exploring the impact of industrial evolution path dependence on economic resilience.

Firstly, the economic resilience of cities in the Yangtze River Delta exhibits a variation trend of "decline firstly, then rise, and finally decline again" on the whole. Secondly, the number of new industries in Shanghai, as well as most of the cities in Jiangsu and Zhejiang provinces shows a downward trend, and that in Anhui province fluctuates greatly. Finally, the industrial evolution of cities in the Yangtze River Delta region is path-dependent, whose advantage, however, tends to weaken.

The constructed dataset reflects the city-level economic resilience and industrial evolution in the Yangtze River Delta region, which provides data support for understanding the evolution characteristics of economic resilience in various cities, helps to scientifically predict the development trend of new industries and reasonably guide the optimization of

industrial structure. Based on this dataset, future studies are advised to continue to excavate data such as culture and social relations by using new technologies and new means, so as to conduct a more in-depth and comprehensive exploration of factors affecting economic resilience.

Conflicts of Interest

The authors declare no conflicts of interest.

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