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Performance of food processing industry sector in Uttar Pradesh

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Abstract
India's agricultural production foundation is quite robust, and it has regularly produced more. India is first in the world for milk, ghee, ginger, banana, guava, papaya, and mango output, and second for rice, wheat, and a variety of other vegetables and fruits. At the same time, food processing in the country is extremely low, and agricultural produce waste is extremely high. Despite India's large-scale food production, food inflation, food security, and farmers not receiving remunerative rates for their output, among other challenges, are the country's significant concerns. These concerns worry policymakers in the country because they impact residents' basic necessities. The value of wastage of raw food materials in the country, on the other hand, is extremely significant.

Keywords: Infancy, livestock compositions, fundamental reason, structural changes

Introduction
Uttar Pradesh food processing sector is still in its infancy. In comparison to other states, Uttar Pradesh has enormous development potential. The processing level in the country is quite low, and the waste of raw food resources is very high, as shown in table, and both of these facts are also true in Uttar Pradesh. Furthermore, Uttar Pradesh is the top state in terms of agriculture and allied sector production in the country, as well as the greatest contributor to agriculture and allied sector GDP. In 2018-19, Uttar Pradesh's agriculture and allied sector contributed 12.8% to the state's GDP (agriculture and allied sector), while Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, and Tamil Nadu contributed 9%, 8.2%, 7.6%, 6.8%, and 5.3%, respectively.

Uttar Pradesh is at the forefront in the production of the total food grains (20%), sugar cane (36%), and potato (34%), livestock excluding cow (11%) and milk (17%), wheat (33%), lentil (45%), vegetables (30%) in the country. This study focuses on the untapped potential and highlighted the scope for the agro based agro-processing and agri-business in Uttar Pradesh. Efficient arrangement with favorable policy support and incentives, by taking into account the strengths, weaknesses, opportunities and threats of decisive components like human and land resources, crops, livestock and agro-processing activities would lead to plan the state of Uttar Pradesh as one of the major players in the field of agro-processing as well as agri-business sector of India. The diversified commodity mix in crop sector, livestock compositions, large geographical coverage, variety of soils and diverse agro climatic conditions, abundant availability of labour force, varied availability of agricultural raw materials in state offers excellent prospects for the development of high value agro-based industries and promotion of agri-business. Still state needs to address the issue of strengthen the agribusiness sector with proper implementation of business policies and to create strong mechanism for forward and backward linkages in it. Uttar Pradesh, the land where holy Ganga flows is the second-largest economy in India after Maharashtra, with an NSDP of ₹14.46 lakh crore (US$230 billion) and hence contributes 8.406% of GDP India.The GSDP of the state's registered food processing sector was 7957.45 crore in 2018-19, up 157.76% from the GSDP of the state's registered food processing industry of 3087.14 crore in 2004-05. Furthermore, in 2014-15, GSDP FPI contributed 15.00% to GSDP manufacturing, 3.07% to GSDP agricultural and allied sectors, 0.81% to Uttar Pradesh's total GSDP, and 8.68% to the country's GDP FPI.

Growth Rate/Path of GS dP of Food Processing Industry (Gsdp-Fpi)

The development paths of Uttar Pradesh's GSDP of food processing industry (GSDP FPI) and India's GDP of food processing industry are both very irregular, but the state's GSDP FPI growth route is more irregular than India's GDP FPI growth path. The fundamental reason for this is because, with the exception of Uttar Pradesh, the food processing industry has grown in most states. As shown in Table, Uttar Pradesh ranks third in terms of GSDP-FPI, fifth in terms of total registered food processing units, and seventh in terms of total workers employed in this industry. According to India's Ministry of Food Processing Industry, 41 mega food parks are operational, completed, or under construction across the country, yet there isn't a single huge food park in Uttar Pradesh. The growth rate/path of the GSDP FPI in Uttar Pradesh, as well as in the context of India, is depicted between 2008-09 and 2018-19, the average growth rate of Uttar Pradesh's GSDP FPI was 14.31%, which was lower than the country's average growth rate of GDP FPI (15.96%). In 2014-15, the state's GSDP FPI grew at a pace of 77.8%, whereas in 2011-12, it grew at a rate of -43%. The main reason is likely the state's underdeveloped infrastructure for preservation and processing industries, as well as a lack of facilities for a proper supply channel to the market.

Number of Registered food processing industry units in Uttar Pradesh

For the purpose of setting up of food processing units in the country, Ministry of Food Processing Industries had been implementing a Scheme namely Scheme for Technology Upgradation/ Establishment/ Modernization of Food Processing Industries up to 31.03.2012. Under this scheme, financial assistance in the form of grant-in-aid was being provided for Setting up / Technology Up-gradation / Modernization of food processing units in the country. The quantum of financial assistance admissible for eligible entrepreneurs under the above scheme was at the rate of 25% of the cost of Plant & Machinery and Technical Civil Works subject to a maximum of Rs. 50 lakhs in case of General areas and for difficult areas, the same was at rate of 33.33% of the cost of Plant & Machinery and Technical Civil Works subject to a maximum of Rs. 75 lakhs. The aforesaid scheme was subsequently subsumed in the Centrally Sponsored (CSS)-National Mission on Food Processing (NMFP) with effect from 01.04.2012 till 31.03.2015. Thereafter, the said scheme got delinked from Government of India's assistance and it was left to the State Governments to decide on its continuance from their increased resource as per recommendation of 14th Finance Commission. As a part of the Committed / Spill over liabilities of 11th Plan period during the 12th Plan period also, Ministry of Food Processing Industries has been releasing grant-in-aid to eligible entrepreneurs under the Scheme for Technology Upgradation/ Establishment/ Modernization of Food Processing Industries. As per an assessment of the extent of food processing in various food sub-sectors done in 2014 by the Institute of Economic Growth on behalf of Ministry of Agriculture, the average extent of processing of agro-products in 2010-11 was 6.76%. It implies that huge scope available for setting up food processing industries by the interested and eligible entrepreneurs of food processing sector in the country. The Schemes implemented by the Ministry Food Processing Industries have also contributed to the setting up of food processing units in the country. The Mission for Integrated Development of Horticulture (MIDH) is being implemented in the States and Union Territories. Under this, the fruits and vegetables are being promoted as an area expansion and under protected cultivation also as a cluster approach to fulfil the requirement of raw material for processing units and also to fulfil the market demand. The cultivation of fruits and vegetables are promoted on the basis of agro-climatic conditions and market demand also.

Objectives

1. The performance of Food processing industry of Uttar Pradesh has been improved in recent years.
2. The overall cost benefit analyses has been favourable for Food processing industry in Uttar Pradesh.

Research Methodology

This paper focuses on the current study's data and methodology. The study's title is "Food Processing Industry and Job Creation in Uttar Pradesh." The technique is developed based on the study's title, aims, and hypothesis, as well as the availability of data. From 2008-09 to 2018-19, the study employed two types of data: time series data and panel data from the Annual Survey of Industries (ASI) issued by the Central Statistical Organisation (CSO), Ministry of Statistics and Programme Implements (MOSPI), India. The ASI offers two different data formats: time series unit level data and punitive data, both of which are unit level. ASI provides block-wise data at the unit level. The factory codes are highly useful for constructing the ownership of factory by organisation. Each block contains numerous units with factory codes. The ASI framework is divided into two parts: a census sector and a sample sector. All factories employing 50 or more workers and using electricity, as well as factories employing 100 or more workers and not using electricity, are included in the census sector. The current study employed panel data to look at the long-term link between employment and output in Uttar Pradesh's food processing industry. The panel Johansen-Fisher Co-integration test is used for this purpose. The variables must be stationary in order to use the cointegration test as a pre-request condition. To put it another way, variables must be in the same sequence, i.e. (0). Many panel unit root tests have recently been established by different researchers such as Maddala and Wu (1999) [15], Hadri (2000) [16], Levin *et al*. (2002) [17], Im, Pesaran, and Shin (2003) [1]. To check for the presence of the unit root in panel series data, we employed the LLC and PP- Fisher Chi2 panel unit root tests. Apart from that, the government is also promoting fruits and vegetables cultivation in the States through Rashtriya Krish I Vikas Yojana (RKVY) on the basis of projects submitted to States and Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare.

Table 1: Number of registered food processing units (number & in operation) in Uttar Pradesh

Years	Registered Food Processing Factories		Factories in Operation (no.)
	Units	Percentage of total Registered Manufacturing Units	
2004-05	1717	17.91	NA
2005-06	1763	16.67	NA
2006-07	1624	15.71	NA
2007-08	1700	15.89	NA
2008-09	1708	14.91	1621
2009-10	2091	14.98	1501
2010-11	2095	15.18	1693
2011-12	2075	14.89	1708
2012-13	2127	14.63	1755
2013-14	2090	14.36	1785
2014-15	2118	14.16	1744
2015-16	2127	13.38	1751
2016-17	2091	13.61	1742
2017-18	2117	13.29	1782

***Source*:** Annual surveys of Industries, India (2004-05 to 2018-19)

During 2018-19, there were 2054 registered food processing facilities, up from 1505 in 2008-09. Between 2008-09 and 2018-19, the total number of registered food processing units accounted for about 14% of the state's total industrial units. In 2018-19, 1744 of the total 2054 food processing facilities were operational. The table shows the number of registered food processing units and the number of units in operation in Uttar Pradesh.

Table 2:% Age share of Uttar Pradesh food processing industry in all industry

Years	Consumed Material	Total Output	Gross value added	Net added value	Registered Industry
2004-05	26.91	23.37	18.45	18.99	17.43
2005-06	24.00	21.50	16.39	16.17	16.84
2006-07	22.08	19.86	14.90	14.16	16.23
2007-08	20.70	19.25	13.78	12.63	15.59
2008-09	19.66	18.52	12.9	11.44	14.90
2009-10	22.37	20.45	13.22	11.79	14.98
2010-11	24.20	21.75	13.47	12.05	15.18
2011-12	25.53	22.67	13.66	12.26	14.89
2012-13	26.54	23.36	13.81	12.42	14.63
2013-14	27.96	23.99	13.72	12.56	14.36
2014-15	29.21	24.50	13.66	12.66	14.16
2015-16	30.32	24.94	13.61	12.73	13.84
2016-17	31.30	25.31	13.57	12.77	13.61
2017-18	29.12	24.92	19.79	19.94	13.29

***Source*:** Annual surveys of Industries, Uttar Pradesh (2004-05 to 2017-18)

It has become one of the most rapidly growing sectors in the state. According to the UP State Industrial Development Authority, in 2020-21, the largest investment was received in the food processing sector, amounting to more than ₹940 crore and making for 32% of total investments received in the year. From the above table percentage share of Uttar Pradesh Food Processing Industry in All Industry has been measured from 2004-05 to 2017-2018. Where consumed material, total output Gross Value Added. Net added value of registered industry has been analyzed. In each variable the value of items has been fluctuated in the assumed years.

It was also seen during 2004-05 consumed material was 26.91%, 23.37 was total output, gross value added was 18.45% Net added value was 18.99% while registered industrial growth was 17.43%. During 2005-06 consumed material was 24.00%, 21.50 was total output, gross value added was 16.39% Net added value was 16.17% while registered industrial growth was 16.84%. It was examined during 2006-07 consumed material was 22.08%, 19.86 was total output, gross value added was 14.90% Net added value was 14.16% while registered industrial growth was 16.23%. During 2010-11 consumed material was 24.20%, 21.75 was total output, gross value added was 13.47% Net added value was 12.05% while registered industrial growth was 15.18%. In the study 2011-12 consumed material was 25.53%, 22.67 was total output, gross value added was 13.66% Net added value was 12.26% while registered industrial growth was 14.89%.

Again it was found during 2014-15 consumed material was 29.21%, 24.50 was total output, gross value added was 13.66% Net added value was 12.66% while registered industrial growth was 14.16%. During 2015-16 consumed material was 30.32%, 24.94 was total output, gross value added was 13.61% Net added value was 12.73% while registered industrial growth was 13.84%. Again it was being observed during 2016-17 consumed material was 31.30%, 25.31 was total output, gross value added was 13.57% Net added value was 12.77% while registered industrial growth was 13.61%. In the last year 2017-18 consumed material was 29.12%, 24.92 was total output, gross value added was 19.79% Net added value was 19.94% while registered industrial growth was 13.29%.

Table 3: Percentage share of Uttar Pradesh food processing industry in all industry

Years	Fixed Capital	Invested Capital	No. of Employees	Fuel Expenditure	Total Emolument (Salary & wages etc.)
2004 -05	15.17	27.16	24.93	12.94	19.58
2005 -06	15.57	27.98	23.82	12.38	18.37
2006 -07	16.03	28.55	22.81	11.93	17.52
2007 -08	16.52	28.96	21.9	11.55	16.89
2008 -09	16.84	29.23	21.05	11.23	16.41
2009 -10	18.27	28.67	20.41	11.89	16.26
2010 -11	18.41	28.22	19.82	12.4	16.15
2011 -12	19.52	27.89	19.28	12.79	16.07
2012 -13	20.48	27.62	18.79	13.11	16.00
2013 -14	22.76	27.96	18.31	14.21	14.93
2014 -15	23.45	28.25	17.89	15.2	14.22
2015 -16	24.06	28.51	17.51	16.09	13.72
2016 -17	23.29	28.75	17.17	16.9	13.36
2017 -18	23.70	27.83	26.00	16.58	14.67

***Source*:** Annual surveys of Industries, Uttar Pradesh (2004-05 to 2017-18)

Uttar Pradesh is the largest producer of fruits and vegetables in the country, yet less than 10% of the fruits and vegetables produced in the state were being processed previously due to lack of a visionary leadership. Since 2018 till now, altogether 803 applications worth Rs. 4,109.74 crore have been received by the government from entrepreneurs for setting up a wide range of factories including 81 for fruit-vegetable processing, 232 for consumer products, 397 for food milling, 3 for herbal processing, 35 for milk processing, 27 for oilseeds processing, 15 for pulses processing, 8 for meat processing and 10 for referrer vans. In the last four years, these industrialists have submitted proposals worth Rs 9105.58 crore to the state government for setting up 139 food processing units, of which 101 have started operations also. Established at the cost Rs 4,074.02 crore, the 101 companies have provided employment to 20,176 people. Besides, construction of 38 food processing factories is underway at the cost of Rs 5,031.31 crore. The companies are expected to start production by the end of this year. A total of 21,111 people will get employment in these factories.

Table 4: Cagr of Uttar Pradesh food processing industry

During Period	Consumed Material	Total Output	Gross value added	Net added value	Registered Industry	Total Input
2004-05 to 2010-11	16.70	16.61	8.65	6.32	1.43	17.76
2011-12 to 2017-18	9.95	11.06	17.41	20.06	0.16	10.30
2004-05 to 2017-18	16.57	16.71	13.41	14.07	1.83	17.12

During period 2004-05 to 2010-11 CAGR of Uttar Pradesh food processing industry was: in case of Consumed material was 16.70%, 16.61% was total output, gross added value was 8.65%, having with 6.32 net added value. In the same period registered industry was 1.43% while total input was 17.76%.

Again when CAGR was calculated during period 2011-12 to 2017-18 CAGR of Uttar Pradesh food processing industry was: in case of Consumed material was 9.95%, 11.06% was total output, gross added value was 17.41%, having with 20.06 net added value. In the same period registered industry was 0.16% while total input was 10.30%. In the study during period 2004-05 to 2017-18CAGR of Uttar Pradesh food processing industry was: in case of Consumed material was 16.57%, 16.71% was total output, gross added value was 13.41%, having with 14.07net added value. In the same period registered industry was 0.83% while total input was 17.12%.

Table 5: Cagr of Uttar Pradesh food processing industry

During period	Fixed capital	Invested capital	No. of employees	Fuel expenditure	Total Employment (Salary & wages etc.)	Worker
2004 -05 to 20010 -11	12.12	17.49	.70	9.85	12.61	0.17
2011 -12 to 2017 -18	9.78	7.10	4.43	11.96	13.17	4.81
2004 -05 to 2017 -18	11.58	12.23	2.17	12.71	13.12	1.85

During study of Uttar Pradesh food processing industry, fixed capital, Invested capital, No of employees, Fuel expenditure, total emolument having with salary & salary as well as workers CAGR value has been has been calculated. Its results are being explored in the given table. During2004 -05 to 2010 -11 CAGR of Uttar Pradesh Food Processing Industry was in case of Fixed Capital was 12.12%, 17.49% was Invested Capital, No. of Employees was 0.70%, having with 9.85 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 12.61% while Worker was 0.17%. During period 2011 -12 to 2017 -18 CAGR of Uttar Pradesh Food Processing Industry was: in case of Fixed Capital was 9.78%, 7.10% was Invested Capital, No. of Employees was 4.43%, having with 11.96 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 13.17% while Worker was 4.81%.

In the study period 2004 -05 to 2017-18 CAGR of Uttar Pradesh Food Processing Industry was: in case of Fixed Capital was 11.58%, 12.23% was Invested Capital, No. of Employees was 2.17%, having with 12.71 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 13.12% while Worker was 1.85%.

Table 6: Cagr of Uttar Pradesh all industry

During Period	Consumed Material	Total Output	Gross value added	Net added value	Registered Industry	Total Input
2004 -05 to 2010 -11	19.12	18.23	14.71	15.05	4.12	19.04
2011 -12 to 2017 -18	6.83	9.16	13.01	13.69	2.04	8.35
2004 -05 to 2017 -18	13.85	14.65	14.01	14.64	3.70	14.79

During study of Uttar Pradesh food processing industry of all industries including consumed material, total output, gross value added, Net added value registered industry as well as total input has been calculated. Its results are being explored in the given table. It was also observed period 2004 -05 to 2009 -10 CAGR of Uttar Pradesh all industry was: in case of Consumed material was 19.12%, 18.23% was total output, gross added value was 14.71%, having with 15.05 net added value. In the same period registered industry was 4.12% while total input was 19.04%. In the same period 2010-11 to 2014-15 CAGR of Uttar Pradesh food processing industry was: in case of Consumed material was 6.83%, 9.16% was total output, gross added value was 13.01%, having with 13.69 net added value. In the same period registered industry was 2.04% while total input was 8.35%.

Table 7: Cagr of Uttar Pradesh all industry

During period	Fixed capital	Invested capital	No. of employees	Fuel expenditure	Total emolument (salary & wages etc.)	Worker
2004 -05 to 2010 -11	8.49	16.10	4.64	10.91	16.23	4.49
2011 -12 to 2017 -18	6.30	6.74	7.91	6.47	16.09	7.07
2004 -05 to 2017 -18	7.56	12.21	5.53	9.59	15.94	4.90

During study of Uttar Pradesh food processing industry of all industries including fixed capital, Invested capital, No of employees, Fuel expenditure, total emolument having with salary & salary as well as workers CAGR value has been calculated. Its results are being explored in the given table.

In the present study during period 2010 -11 to 2014 -15 CAGR of Uttar Pradesh Food Processing Industry was: in case of Fixed Capital was 6.30%, 6.74% was Invested Capital; No. of Employees was 7.91%, having with 6.47 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 16.09% while Worker was 7.07%. This was the period 2014 -15 to 2017-18CAGR of Uttar Pradesh Food Processing Industry was: in case of Fixed Capital was 7.56%, 12.21% was Invested Capital; No. of Employees was 5.53%, having with 9.59 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 15.94% while Worker was 4.90%. During study it was also observed that gross output per person employees (GVO/NE) was 1621.89 during the year 2004-05. It has been rapidly increased and has been beneficiaries for the industry. It was 6710.52 during 2017-18, it has increased by four times of the selected period of the studies. In case of net value added per person employees (NVA/NE) it has been also a positive sign in the same period. But in in case of salaries and wages /no worker (NW) employees that as soon as salaries increases, it kicks of unskilled manpower. Overall from the table it has been observed that food processing industry has been a beneficiary tool of growth in economic development, if cost benefit analysis is wider and favourable.

Conclusions

During study it was also observed in case of gross output per person employees was 1730.11 during the year 2004-05. It has been rapidly increased and has been beneficiary for the industry. It was 4122.61 during 2017-18, it has increased by four times of the selected period of the study. Again has been also a positive sign for net value added per person employees (NVA/NE) in the same period. In case of salaries and wages /no worker (NW) employees, as soon as salary increases, it kicks of unskilled manpower, during 2004-05 NW was 84.65 which increased by 308.24 in the year 2016-17 but it again fall by 230.82 in 2017-18. Again it was also observed during 2004-05 GVA/FC value was 0.37. Again it began to fall from 2005-06 it was 0.39. It has been increased by 2016-17 having with 0.83. But it was slightly high in 2017-18 which was 0.66. It fluctuates due to inflation, role of banking industry as well as political environment. If it increases in leaps and bounce, not be beneficiary sign for the industry. During 2014 -15 to 2017 -18CAGR of Uttar Pradesh food processing industry was: in case of Consumed material was 13.85%, 14.65% was total output, gross added value was 14.01%, having with 14.64 net added value. In the same period registered industry was 3.70% while total input was 14.79%. It was also examined during 2004 -05 to 2009 -10 CAGR of Uttar Pradesh All Industry was in case of Fixed Capital was 8.49%, 16.10% was Invested Capital, No. of Employees was 4.64%, having with 10.91 net Fuel Expenditure. In the same period Total Emolument (Salary & wages etc.) was 16.23% while Worker was 4.49%.

References

1. Anita Kumari, Productivity Growth in Indian Engineering Industries during Pre Reform and Post Reform Period: An Analysis at Company Level. Conference Papers No. 2020;1748:2004-05.
2. Babool A, Reed MR. Food safety standards and export competitiveness in the Food and Processed Food Industries in Asia-Pacific countries; c2020.
3. Babu GS, Sekhar MR. Impact of Foreign Direct Investment (FDI) In Indian Food Processing Sector. Journal of Business and Management (IOSR- JBM) e-ISSN: 2278-487X, p-ISSN: 2319-7668. 2020;17(1.Ver. I):06-12.
4. Bain JS, Industrialisation difference in Industrial Countries: Eight Nations in S, (New Delhi: Yale University Press; c1950.
5. Baliyan SK, Kumar S, Baliyan K. Efficiency and Productivity Growth of Food Processing Industry in India: A Malmquist Index Approach". Journal of Economic & Social Development; c2019.p. 1-11.
6. Bauer PW. Recent Developments in the Econometric Estimation of Frontiers, Journal of Econometrics. 2019;46:39-56.
7. Chambers R. The Origins and Practice of Participatory Rural Appraisal‖, World Development. 2017;22(7):953-

969.
8. Charles Mather. The growth Challenges of Small and Medium Enterprises (SME's) in South Africa's Food Processing Complex, Development Southern Africa. 2017;22(5):607-620.
9. Coelli T. A guide to DEAP version 2.1: A data envelopment analysis (Computer) program (CEPA Working Paper 96/08). University of New England, Australia: Centre for Efficiency and Productivity Analysis, Department of Econometrics; c2016.
10. D Lavanya Kumari K. Santha Kumari. Food Processing Industry in India and Foreign Direct Investment International Journal of Scientific Research; c2015.p. 4.
11. Dev SM, Rao NC. Food processing in Andhra Pradesh: Opportunities and challenges. Centre for Economic and Social Studies; c2015.
12. Fernandez CG, Koop M, Steel A. Bayesian Analysis of Multiple-Output Production Frontiers, Journal of Econometrics, 2014.p. 47-79.
13. Gervais Jean, Phillippe, Bonroy, Oliver, Coutre, Steve, Economies of Scale in the Canadian Food Processing Industry, MPRA Working; c2013.p. 64.
14. Gourieroux CA, Monfort, Simulation Based Econometrics, Oxford University Press, New York; c2013.
15. Maddala GS, Wu S. A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and statistics. 1999 Nov;61(S1):631-52.
16. Hadri K. Testing for stationarity in heterogeneous panel data. The Econometrics Journal. 2000 Dec;3(2):148-61.
17. Levin A, Lin CF, Chu CS. Unit root tests in panel data: asymptotic and finite-sample properties. Journal of econometrics. 2002 May 1;108(1):1-24.
18. Im KS, Pesaran MH, Shin Y. Testing for unit roots in heterogeneous panels. Journal of econometrics. 2003 Jul 1;115(1):53-74.