ISSN: 1304-4796
Manisa Celal Bayar Üniversitesi Sosyal Bilimler Dergisi
Manisa Celal Bayar University Journal of Social Sciences
2023; 21 (4); 321-336

G7 Ülkelerinde Sağlık Sektörü Yoğunlaşmasının İşsizlik Üzerine Etkisi[a]

Elif Tuğçe Bozduman[b, c], Melih Özçalık[d] Birol Erkan[e]

Özet

Çalışmada G7 ülkelerinin sağlık sektörü yoğunlaşmaları Ticaret Yoğunlaşma Endeksi (CR), Herfindahl-Hirschman Endeksi (HHI) ve Entropi endeksi ile ölçülmüştür. Ardından G7 ülkelerinde yoğunlaşmanın işsizliğe etkisini incelemek açısından Dinamik Panel Veri yöntemi olan Arellano-Bond Genelleştirilmiş Momentler Metodu (GMM) kullanılmıştır. Ampirik sonuçlar, G7 ülkelerinde sağlık sektörü yoğunlaşmasının işsizliği açıklamakta anlamlı ve negatif olduğunu göstermektedir. Yoğunlaşmadaki her bir birimlik artış, G7 ülkelerinde işsizliği 0.017 birim azaltmaktadır.

Anahtar Kelimeler

Yoğunlaşma
Sağlık Sektörü
İşsizlik
GMM Tahmincisi

Makale Hakkında

Geliş Tarihi: 09.07.2023
Yayın Tarihi: 28.12.2023
Doi: 10.18026/cbayarsos.1324761

The Impact of Health Sector Concentration on Unemployment in the G7 Countries

Abstract

In the study, the health sector concentrations of the G7 countries were measured with the Trade Concentration Index (CR), Herfindahl-Hirschman Index (HHI) and Entropy Index. Then, the Arellano-Bond Generalized Moments Method (GMM), which is the Dynamic Panel Data method, was used to examine the effect of concentration on unemployment in G7 countries. Empirical results show that health sector concentration in the G7 countries is significant and negative in explaining unemployment. Each one-unit increase in concentration reduces unemployment in the G7 countries by 0.017 units.

Keywords

Concentration
Health Sector
Unemployment
GMM Estimator

About Article

Received: 09.07.2023
Published: 28.12.2023
Doi: 10.18026/cbayarsos.1324761

[a] Çalışma, Elif Tuğçe Bozduman'ın 18.05.2023 tarihinde savunulan ve Prof. Dr. Melih Özçalık'ın tez danışmanlığında, Prof. Dr. Birol Erkan'ın ikinci tez danışmanlığında yönetilen "Sağlık Sektöründeki Yoğunlaşmaların Ekonomik Etkileri: E7 ve G7 Ülkeleri Üzerine Bir İnceleme" başlıklı doktora tezinden üretilmiştir.

[b] İletişim Yazarı: tugce.bozduman@cbu.edu.tr
[c] Arş. Gör. Dr., Manisa Celal Bayar Üniversitesi, Manisa/ Türkiye, ORCID ID: 0000-0002-6145-8571
[d] Prof. Dr., Manisa Celal Bayar Üniversitesi, Manisa/ Türkiye, ORCID ID: 0000-0002-3559-4975
[e] Prof. Dr. İskenderun Teknik Üniversitesi, Hatay/ Türkiye, ORCID ID: 0000-0001-8363-5543

Introduction

After the spread of the Covid 19 crisis all over the world and its transformation into a pandemic, the health sector has gained more importance than ever, and accordingly, all the arguments in the health sector with the export of medical products have started to come to the fore. If there is a problem in the foreign trade of the health sector of the countries, it will be almost impossible for people in those countries to receive health services. In this context, the concentrations in the health sector of the countries gain importance. Thus, the concentration in the health sector affects not only the country in question, but also other people who can benefit from that service. Because, the health sector is very important in the qualification of the labor factor. Therefore, in the study, the effect of export concentrations related to the health sector of developed countries (G7) on unemployment was examined.

In the study, Concentration Ratio (CR) index, Herfindahl- Hirschman index (HHI) and Entropy Index were used to measure the export concentrations of the G7 countries in the health sector. The export concentrations of the health sector are based on Standard International Trade Classification (SITC) 2-digit medical and pharmaceutical products. After the export concentration values were calculated, the Dynamic Panel data method was applied to analyze the effect of this value on unemployment. In this context, Arellano-Bond was analyzed using the Two-Step Generalized Moments Estimator (GMM). The study covers the period of 2000-2020.

Literature Review

When the literature is examined, there are many studies examining the effect of different types of concentration on different variables. Bhuyan and Oh (2021) investigate the effects of textile and apparel exports on income inequality in Bangladesh. The high concentration of the textile and garment sector, which accounts for more than 90% of Bangladesh's total exports, has been examined on income inequality. According to the results of the study where the ARDL limit test was used, there is a long-term relationship between the variables. Shadab (2021) examines the short and long-term relationship between export diversification, physical and human capital, imports, and economic growth in the United Arab Emirates (UAE). The findings from this study, which uses the Vector Error Correction Model (VECM) and the Toda-Yamamoto Causality approach, confirm the existence of a significant long-term relationship between export diversification, imports and economic growth in the UAE. Shahzad et al. (2021) investigate the effects of export diversification on renewable energy consumption in the E7 and G7 countries. In the study, panel cointegration analysis, in which renewable energy consumption is given as a function of export diversification, economic growth, industrialization, trade openness and natural resources, is based on FGLS and FMOLS techniques. Empirical findings suggest that product diversification policies have positive effects on the demand for renewable energy for developed and developing economies. Lee and Zhang (2022) use export concentration indices to investigate the link between export structure and economic growth/volatility in low-income countries. The results show that export diversification differs according to the economic size and income level of the countries.

In the literature, there are empirical analyzes using concentration analysis and subsequent econometric methods in many sectors. However, when the literature is examined, there is no study that calculates the level of geographical concentration in the health sector and examines

the effect of this situation on unemployment. Therefore, it is thought that the study will contribute to the literature both in terms of concentration level and empirical analysis.

Methodology

The HHI is a standard index used to analyze the degree of concentration of a particular industry in a particular geographic market. HHI is calculated by squaring the export shares of a particular sector in all countries. HHI is formulated as follows (Meilak, 2008):

$$\text{HHI}= (Pi)^2$$

Pi represents the export share of each of the n groups of the selected dimension (geography or product) in the total. The square values of each Pi are added up and the concentration ratio of that country's exports is calculated. The index value ranges from 0 to 1. If the index value is below 0.01, the export concentration is negligible (diversification is high) and this situation increases the foreign trade competitiveness of the country. An index value below 0.15 indicates low concentration. If the index is between 0.15 and 0.25, there is medium concentration, and if it is above 0.25, there is high concentration (Vaid, 2018).

The CR index is one of the most used methods in concentration analysis. It can be used for foreign trade of a company, product, sector or country. The CR index is formulated as follows (Topçu & Sarıgül, 2019):

$$\text{CR} = \sum_{i=1}^{k} Pi \; x \; 100$$

The CR index takes values between 0 and 100. If the index is below 30, there is low concentration, between 30 and 50 medium concentration, between 50 and 70 high concentration, and above 70 very high concentration (Ünlü & Yıldız, 2019).

Another concentration criterion is the Entropy index. Although the share of exported product in this index is weighted, it can also be applied for geographical concentration. Here the weighting factor is the logarithm of the inverse of the numerator. The index is formulated as follows (Erkan, 2019):

$$\text{E}= \sum_{i=1}^{n} Pi \text{ x } ln \text{ (1 / P}_i \text{)}$$

In the formula, Pi represents the trade share of country i in the export partner country. If a country trades at the same rate with all its trading partners, the diffusion will be at its highest. The entropy index takes values between 0 and ln (1/Pi). As the index approaches 0, the concentration increases (Yılmaz & Akkaya, 2020).

Arellano-Bond Generalized Moments of Method

A dynamic panel data model was used to determine the economic effects of concentration in the health sector in G7 countries. Because most economic relations are in a dynamic process and are affected by the situation in the past year. Therefore, a lagged value of the dependent variable needs to be included in the model. The Generalized Method of Moments (GMM) estimation method is preferred in estimating the relationships between variables in the panel data set where time is more than the number of units (N < T). Therefore, in panel data sets where the unit is greater than time (N > T), choosing the system GMM estimation method gives

more accurate results in revealing the linear relationship between the variables (Ağazade et al., 2017).

GMM analysis is based on the analysis first developed by Hansen (1982) in the econometrics literature. Anderson and Hsiao (1982) adapted GMM to panel data. Later, this method was developed by Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), and it was mentioned in the literature as GMM and System GMM, which are mentioned with the names of the authors in the panel data literature. The dynamic panel data model is formulated as follows (Baltagi, 2005):

$$Y_{it} = \delta Y_{it-1} + X_{it}\beta + u_{it}$$

In this formula, Yit is the dependent variable, $Yit-1$ is the lagged value of the dependent variable, δ is the coefficient of the lagged dependent variable, Xit is the $1 \times K$ independent variable vector, β $K \times 1$ is the independent variable coefficient vector (Dündar, 2020), and uit is the error term. . In dynamic panel data models, the lagged values of the dependent variable become valid tools in differential equations corresponding to the next periods (Arellano & Bond, 1991).

Since a lagged value of the dependent variable is added to the model as an independent variable in dynamic panel data models, dynamic panel data models eliminate the residual and stationarity problem in static panel data models. Therefore, dynamic panel data models can be applied without applying panel unit root tests.

In the GMM method developed by Arellano and Bond (1991), the structure of error terms is taken into account. This method can also be applied if the error terms are autocorrelated. The dynamic effect models, whose first differences are taken in GMM, are transformed using the first difference model and the instrumental variables matrix, and then estimated with the least squares (Least squares) estimator. For this reason, GMM is also called "two-stage instrumental variables estimator" (Tatoğlu, 2018). The first difference model with means variable, which has independent variables other than lagged values, can be shown as follows:

$$Z\acute{\Delta}\, Y = \delta\, Z\, \acute{\Delta}\ X + \acute{Z}\, \Delta\, u$$

The GMM estimators are obtained as follows when the means-variable first differences model is estimated with GMM. Here, Ωˆ denotes the variance-covariance matrix of the error terms. This matrix is found with the help of error terms obtained from the difference equation. If the error terms are not autocorrelated, they give better results (Akay, 2018).

$$\hat{\delta}_{GMM} = (\Delta \acute{X} Z\, (\acute{Z}\hat{\Omega} Z)^{-1}\, Z\acute{\Delta} X)^{-1}\, \Delta\, \acute{X}\, Z\, (\acute{Z}\hat{\Omega} Z)^{-1}\, Z\, \acute{\Delta}\, Y$$

In order for the prediction methods to be reliable in dynamic panel data models, some assumptions need to be realized. For this reason, information about what these tests are and their functions will be given.

Autocorrelation Test

Arellano and Bond (1991) suggested an autocorrelation test for the GMM estimator to be effective. Because for this estimator to be effective, there must be no second-order autocorrelation ([E [Δ uit Δuit-2] = 0). Therefore, it is very important to perform the autocorrelation test. The autocorrelation test statistics of Arellano and Bond are shown in the figure below (Tatoğlu, 2018).

$$m_2 = \hat{u}_{-2}\,\hat{u} \;/\; \hat{u}^{1/2} \sim N(0,1)$$

The null hypothesis of the test is expressed as there is no autocorrelation. The alternative hypothesis is that there is an autocorrelation. Autocorrelation testing must be performed for any GMM regression.

Sargan Test

Another very important assumption for GMM to be valid is that the tools are exogenous. When the number of instrument variables increases too much, overdefinition constraints need to be tested. The P value must be 1000 or above 1000. Those below 1000 or p probability value below 0.25 do not give reliable results (Roodman, 2009). Sargan test statistics are formulated as follows (Yıldırım & Kostakoğlu, 2015):

$$s = \Delta\,\hat{u}Z\,(\textstyle\sum_{i=1}^{N} Z'_i\,\Delta\,\hat{u}_i\,\Delta\,\hat{u}_i'\,Z_i)^{-1}\,Z'\,\Delta\,\hat{u} \sim x^2_{p-K-1}$$

The null hypothesis of Sargan's test is that over-identification restrictions are valid, and the alternative hypothesis is that over-identification restrictions are not valid. The rejection of the null hypothesis in the model shows that the over-identification restrictions are not valid, that is, the variables are internal (Tatoğlu, 2018). If the null hypothesis cannot be rejected, over-identification restrictions apply, that is, the variables are exogenous.

Empirical Results

In the analyses for the G7 countries, the export values (Pi) of these countries were considered as exports of SITC medical and pharmaceutical products and geographical concentration analysis was performed accordingly.

Table 1. HHI Index Scores of G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	0,0945907	0,0990597	0,083439759	0,1181109	0,0845272	0,5594171	0,2390551
2001	0,1172692	0,1276878	0,094130016	0,1135644	0,0900405	0,6947805	0,2604631
2002	0,0983254	0,1067485	0,098995084	0,1372298	0,0915041	0,6579854	0,2790646
2003	0,0929403	0,1273495	0,084820285	0,1439913	0,0758579	0,6468608	0,2988787
2004	0,0969433	0,1708677	0,085415676	0,1248808	0,0896234	0,549001	0,2644767
2005	0,0988901	0,1677673	0,089642162	0,1121914	0,0807926	0,5020096	0,2053669
2006	0,1093296	0,1622592	0,075464498	0,1160792	0,0956693	0,5660419	0,1943015
2007	0,0986143	0,1542894	0,074154057	0,1340703	0,0948723	0,5972748	0,1573182

2008	0,0978044	0,1477655	0,067325426	0,1306398	0,0827628	0,5433656	0,1392492
2009	0,0957967	0,1410766	0,0661239	0,1358768	0,076216	0,5430791	0,1655011
2010	0,0860729	0,1172812	0,072830083	0,1543022	0,0741967	0,4727878	0,147232
2011	0,0798738	0,1023113	0,056313314	0,135064	0,0754468	0,5179065	0,1142874
2012	0,0717134	0,1124224	0,070980459	0,1312813	0,0667996	0,5529421	0,0963673
2013	0,0633548	0,1095335	0,077279945	0,1313339	0,0787287	0,4513805	0,0989808
2014	0,0687351	0,1298961	0,073006822	0,1510806	0,096522	0,375492	0,1034675
2015	0,0744662	0,1592375	0,066346252	0,3328703	0,1079558	0,4945398	0,1498987
2016	0,0706123	0,1404928	0,065787657	0,2231912	0,0961418	0,4654962	0,166126
2017	0,0653341	0,1285798	0,06504549	0,182864	0,0949797	0,4134927	0,1499593
2018	0,0666996	0,110596	0,081337289	0,1592763	0,0892889	0,4296108	0,154903
2019	0,0655614	0,107704	0,088051543	0,1841212	0,1096099	0,4460985	0,1961489
2020	0,0622102	0,1173706	0,086985119	0,1526481	0,0955756	0,3930359	0,1736295

Source: Calculated by us using data from the COMTRADE database.

When the scores obtained as a result of the HHI analysis of the G7 countries between 2000-2020 are examined, it is seen that Canada and the UK have a higher level of concentration in the health sector than other countries. Canada's level of concentration over the years shows a decreasing trend. The UK's concentrations in the sector's exports, especially in 2015-2016, reached the highest level and then started to decrease. It can be stated that the HHI analysis scores of the G7 countries other than Canada and the UK are closer to each other. The countries with the lowest geographical concentration in the G7 are France and the United States. These scores show that these two countries have diversified their exports in the health sector at a relatively higher level.

The reason for conducting CR (1), CR (2), CR (4), CR (8), CR (12) analyses separately is to analyse the extent to which the concentration ratios of the countries in question vary according to the number of countries. CR analyses; shows the country to which the country exports the most in the health sector and therefore depends on it. For example, if the CR (1) result is 80%; It shows that 80 % of a country's health product exports are made to a single country. It is not correct to say that concentration is high just by looking at an analysis. Therefore, it is important to perform other CR analyzes for the accuracy of the analysis.

Table 2. CR (1) Analysis Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	16,39	14,44	10,56	19,22	17,13	72,32	46,81
2001	16,95	18,39	11,63	17,68	21,77	83,13	49,35
2002	14,21	15,27	12,76	20,66	21,11	80,79	51,29
2003	13,76	17,06	11,76	21,69	14,68	80,13	53,29
2004	15,14	27,73	11,22	19,13	21,38	73,55	49,72
2005	15,15	29,61	13,10	17,38	16,78	70,07	42,78
2006	15,78	28,18	12,17	17,95	17,91	74,78	41,19
2007	13,05	27,24	11,37	20,71	20,13	76,90	35,86

2008	14,97	25,10	10,74	20,20	15,34	73,22	32,71
2009	15,92	23,60	11,49	20,99	15,37	73,15	36,83
2010	13,99	19,49	15,80	23,16	16,21	68,16	33,65
2011	11,74	15,45	11,22	20,25	17,00	71,53	26,69
2012	9,54	13,88	15,51	18,84	13,45	73,96	21,05
2013	11,04	13,81	17,38	20,67	16,75	66,37	20,25
2014	13,34	16,60	13,67	21,48	22,98	59,53	20,42
2015	14,69	18,98	10,70	33,41	26,70	69,68	32,28
2016	11,97	17,84	10,15	27,31	23,22	67,47	34,97
2017	8,96	17,37	10,42	24,27	18,71	63,43	31,95
2018	9,89	16,20	13,43	23,29	18,47	64,33	31,69
2019	9,71	16,85	13,97	25,61	25,58	65,74	37,32
2020	9,91	18,28	12,88	22,04	18,77	60,85	32,26

Source: Calculated by us using data from the COMTRADE database.

According to the CR (1) analysis scores of the G7 countries, the country with the highest single-country concentration in health sector exports is Canada. Canada, whose single-country concentration value was over 80% in the early 2000s, has reduced its geographical concentration a little more over the years. After Canada, the countries with the highest concentration levels are Japan and the UK. Japan's concentration level, especially in the early 2000s, is around 50% and is quite high. However, over the years, Japan's export concentrations in the sector have decreased.

Table 3. CR (2) Analysis Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	27,33	27,26	20,75	30,89	32,37	76,07	53,07
2001	30,84	29,19	21,72	31,03	32,39	85,09	55,17
2002	26,10	26,09	22,73	34,00	32,41	82,71	56,20
2003	24,14	32,28	21,15	33,53	25,91	81,80	57,85
2004	26,76	40,62	21,79	31,58	33,95	79,26	54,32
2005	26,47	40,14	22,85	29,38	28,35	77,70	48,03
2006	28,68	39,31	20,34	30,46	35,60	80,43	47,34
2007	24,87	37,46	20,78	31,29	34,77	82,16	42,98
2008	27,06	36,77	19,97	30,11	30,39	78,21	39,98
2009	27,91	35,54	21,51	31,55	27,57	77,76	44,47
2010	24,12	33,32	24,94	32,95	27,18	73,58	42,56
2011	21,91	28,96	19,90	34,94	28,53	74,44	36,87

2012	18,83	26,02	25,42	35,30	24,45	76,38	33,95
2013	19,46	25,39	28,27	30,77	29,01	72,87	34,90
2014	21,84	27,19	24,57	33,60	34,90	69,54	38,51
2015	22,40	31,09	20,86	45,04	37,11	74,94	47,78
2016	20,43	29,35	19,99	41,33	34,60	72,82	50,33
2017	17,09	29,11	19,51	39,62	36,65	69,60	48,03
2018	19,70	27,86	21,98	36,16	36,00	74,06	49,35
2019	18,98	27,22	24,12	36,45	41,28	74,37	57,29
2020	19,46	28,09	24,28	33,89	36,00	71,70	51,25

Source: Calculated by us using data from the COMTRADE database.

The CR (2) analysis scores of the G7 countries are in line with the CR (1) scores. Just as Canada's single-country concentration is high, so is its two-country concentration. With these levels of concentration, Canada has the highest concentration level in the G7. The level of concentration of the other G7 countries is generally close to each other.

Table 4. CR (4) Analysis Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	44,08	40,97	38,24	44,67	50,56	81,08	64,11
2001	47,57	45,49	40,92	46,41	50,07	88,42	64,10
2002	45,90	40,80	41,47	48,71	50,33	85,31	65,21
2003	43,79	47,65	38,73	49,38	46,37	84,62	66,53
2004	45,82	54,36	38,50	47,60	50,13	82,79	63,32
2005	46,47	52,34	38,94	46,00	47,89	82,24	57,94
2006	47,81	52,28	34,72	47,45	54,01	84,88	58,77
2007	45,37	52,07	36,41	48,54	52,87	86,37	55,55
2008	45,30	51,44	35,23	47,51	49,60	84,59	54,19
2009	46,06	51,08	35,36	48,44	47,31	84,90	58,77
2010	42,21	48,61	37,71	49,31	46,26	78,78	56,76
2011	37,16	45,94	33,00	47,57	46,54	79,13	54,66
2012	36,26	43,09	38,02	48,36	42,65	80,19	53,48
2013	34,19	41,01	39,81	46,80	46,90	78,87	54,81
2014	37,95	43,97	38,46	50,95	52,04	82,15	55,68
2015	37,74	48,03	36,18	56,57	53,17	81,80	62,42
2016	36,22	47,31	35,57	54,80	52,38	81,98	64,22

2017	32,82	46,54	35,45	51,50	53,83	77,99	62,21
2018	35,52	43,09	38,70	47,62	51,04	82,81	63,57
2019	35,56	41,22	42,70	49,81	53,77	82,18	69,86
2020	34,30	42,94	43,51	49,11	55,89	83,33	71,40

Source: Calculated by us using data from the COMTRADE database.

According to the CR (4) analysis scores of the G7 countries, the concentration of countries other than Canada in the health sector is gradually converging. In this regard, Canada has diverged negatively from the G7 countries. As the number of countries increases, the concentration levels converge. However, while the concentration level of other countries is around 40% to 50%, this rate is over 80% in Canada.

Table 5. CR (8) Analysis Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	67,93	59,98	60,00	64,89	71,49	86,15	78,39
2001	69,87	64,22	62,10	66,20	71,35	91,09	77,33
2002	70,72	61,98	63,06	68,21	73,73	89,39	79,01
2003	71,09	66,68	61,87	67,54	70,93	89,22	80,67
2004	73,14	71,52	60,11	67,21	70,45	87,39	78,66
2005	71,59	70,11	59,58	65,82	72,64	86,70	76,18
2006	74,53	69,17	55,39	65,01	74,58	88,61	78,44
2007	72,42	69,22	55,17	65,96	74,64	90,15	75,11
2008	71,33	68,08	52,60	67,15	72,47	90,12	74,99
2009	68,37	68,49	52,17	66,00	69,71	90,65	77,61
2010	65,32	66,65	53,11	65,40	68,77	85,54	76,96
2011	61,52	64,19	49,78	63,72	68,12	85,77	74,72
2012	60,50	63,36	53,95	64,88	66,27	85,84	72,73
2013	56,03	61,23	54,06	63,89	70,86	86,06	74,03
2014	58,38	62,04	53,85	67,11	71,47	88,29	72,77
2015	59,31	63,76	51,79	70,58	71,37	88,79	76,92
2016	60,60	62,93	52,07	69,18	70,91	89,13	78,05
2017	60,35	62,05	52,63	67,70	72,05	85,18	77,13
2018	60,52	62,18	56,19	64,65	68,89	88,05	80,17
2019	60,44	59,68	58,03	65,81	70,81	88,17	83,52
2020	58,99	61,24	60,10	69,24	72,18	89,39	84,99

Source: Calculated by us using data from the COMTRADE database.

The CR (8) analysis scores of the G7 countries show that the level of concentration in all G7 countries has risen above 50% and there is a high degree of concentration. As with other CR analyses, CR(8) scores indicate a higher level of concentration of Canada's exports to the sector than other G7 countries.

Table 6. CR (12) Analysis Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	81,18	70,84	68,20	75,10	79,68	88,96	88,15
2001	81,33	75,43	70,52	75,78	79,79	92,80	87,53
2002	82,66	73,19	71,02	77,32	81,94	91,90	88,77
2003	84,64	76,18	70,01	77,62	80,64	91,93	90,18
2004	84,73	79,40	69,50	78,32	80,30	90,24	90,67
2005	84,06	78,74	68,83	78,06	81,99	89,97	89,72
2006	84,99	77,77	64,24	77,59	82,50	91,25	89,22
2007	83,98	77,38	64,08	76,88	82,95	92,64	87,70
2008	83,91	76,70	62,53	76,84	81,37	92,73	86,64
2009	81,64	77,15	61,78	75,38	80,08	92,86	87,79
2010	79,79	76,33	62,08	74,05	78,04	89,69	86,26
2011	76,93	74,49	60,23	73,15	77,58	89,78	86,32
2012	75,38	74,08	63,60	73,57	76,39	89,99	84,94
2013	72,91	72,59	63,47	72,99	79,90	90,23	85,59
2014	73,84	73,16	63,79	75,26	80,59	91,98	85,35
2015	75,90	73,99	61,33	78,12	79,93	92,46	86,98
2016	76,75	73,56	61,35	77,69	79,94	92,30	87,32
2017	76,87	72,49	62,25	76,89	80,08	89,59	86,87
2018	76,69	73,47	65,59	75,92	79,39	91,51	89,22
2019	75,72	71,80	66,10	76,14	80,61	91,72	91,07
2020	74,91	71,63	67,14	78,65	81,07	92,71	91,85

Source: Calculated by us using data from the COMTRADE database.

CR (12) analyses of G7 countries show similar results with CR (8) analyses. Of course, as the number of countries increased, concentrations increased at certain rates. As in all other analyses, France, which has the lowest geographical concentration in health sector exports, is positively differentiated from the other G7 countries.

Table 7. Entropy Index Scores of the G7 Countries

	USA	Germany	France	United Kingdom	Italy	Canada	Japan
2000	3,329	3,359	4,154	3,346	3,040	1,484	2,299
2001	3,446	3,218	4,118	3,290	3,021	1,060	2,261
2002	3,300	3,312	4,112	3,263	2,970	1,178	2,189
2003	3,219	3,166	4,007	3,267	3,059	1,212	2,110
2004	3,177	2,943	4,100	3,215	3,008	1,467	2,196
2005	3,253	2,954	4,135	3,217	3,006	1,587	2,387
2006	3,223	2,995	4,247	3,229	2,906	1,405	2,426
2007	3,231	3,009	4,196	3,257	2,917	1,294	2,568
2008	3,211	3,044	4,201	3,223	3,010	1,428	2,637
2009	3,250	3,065	4,188	3,261	3,071	1,419	2,531
2010	3,358	3,149	4,092	3,321	3,118	1,693	2,616
2011	3,500	3,234	4,149	3,295	3,110	1,588	2,723
2012	3,478	3,279	3,998	3,244	3,180	1,492	2,817
2013	3,447	3,331	3,974	3,345	3,046	1,714	2,792
2014	3,359	3,296	4,125	3,250	2,960	1,802	2,783
2015	3,355	3,220	4,257	3,317	2,941	1,542	2,569
2016	3,366	3,252	4,287	3,244	2,977	1,611	2,518
2017	3,368	3,263	4,226	3,248	2,961	1,811	2,584
2018	3,364	3,279	4,194	3,332	3,038	1,693	2,488
2019	3,358	3,339	4,110	3,353	2,916	1,654	2,301
2020	3,369	3,310	4,012	3,211	2,932	1,720	2,313

Source: Calculated by us using data from the COMTRADE database.

The results of the Entropy index analysis of the G7 countries show that France has the highest score and Canada has the lowest score. The fact that Canada's HHI and CR scores are very high and the Entropy index score is low shows that these concentration index analyses give consistent results.

The health sector export concentration analysis of the study was carried out with three different indices: CR, HHI and Entropy indices. However, HHI values were used as the condensation rate since the simultaneous use of all variables in the panel data analysis would not give different results. In the G7 countries, HHI data was included in the model as an independent variable. When the empirical literature is taken into consideration, the use of HHI data in almost all of the econometric studies performed by concentration analysis played a role in preferring HHI results in the study.

The concentration data in the health sector in the G7 countries were calculated by us with the data taken from the COMTRADE database, and the unemployment data as % was taken from the World Bank database. The model created for empirical analysis is as follows:

$$UNPP_{it} = \delta UNPP_{it-1} + HHI_{it}\beta + u_{it}$$

In the model, the UNPPit dependent variable UNPPit−1 is the delayed value of the dependent variable, δ is the coefficient of the delayed dependent variable, HHIit is the independent variable vector of size 1 × K, β is the variable coefficient vector of the size K × 1, and uit is the error term.

Table 8. Arellano-Bond GMM Estimator Results

Dependent variable unpp						
Single-stage GMM estimator						
Variables	Coefficients	Std. Error	z	P > |z|	[95% Confidence Intervals]	
unppL1	0.8584767	0.0366186	23.44	0.000*	0.7867056	0.9302478
hhi	-0.0201682	0.01364	-1.48	0.139	-0.0469021	0.0065658
Wald testi						
Wald chi2 (2) = 551.98				Prob > chi2 = 0.0000*		
Two-stage GMM estimator						
Variables	Coefficients	Std. Error	z	P > |z|	[95% Confidence Intervals]	
unppL1	0.6935437	0.5002741	1.39	0.166	-0.2869756	1.674063
hhi	-0.0178088	0.0056868	-3.13	0.002*	-0.0289548	-0.0066629
Wald testi						
Wald chi2 (2) = 21.96				Prob > chi2 = 0.0000*		

Note: (*) indicates a significance level of 1%.

When the effect of concentration on unemployment is examined with the GMM estimator (Table 8), the delayed dependent variable in the single-stage GMM estimator is significant in explaining the unemployment data (according to the 1% significance level) and the hhi data is meaningless. According to the results of the two-stage GMM estimator, the delayed dependent variable is meaningless in explaining the unemployment data, and the hhi data is meaningful in explaining the unemployment data (according to the 1% significance level). The Wald test, which was conducted to test the significance of the entire model, was significant at the level of 1% in both estimators.

According to the two-step GMM forecaster, a 1-unit increase in concentration in the health sector in the G7 countries reduces unemployment by 0.017 units. In other words, the hhi data is both negative and meaningful in explaining unemployment.

Table 9. Arellano-Bond Autocorrelation and Sargan Test Results

Autocorrelation test		
Order	z	Prob > z
1	-0.27953	0.7798
2	-0.86922	0.3847
Sargan Test		
chi2(111) = 6.428593		
Prob > chi2 = 1.0000		

According to the results of the Arellano-Bond autocorrelation test (Table 9), there is no both first-order and second-order autocorrelation between the variables. The null hypothesis of the autocorrelation test cannot be rejected for either level. Therefore, there is no autocorrelation of both the first and second order.

Whether the restrictions of extreme identification are valid has been tested by the Sargan test. The null hypothesis of the test is that over-identification constraints apply. When the probability values of the Sargan test in Table 9 are examined, it is seen that the null hypothesis cannot be rejected, that is, the limitations of extreme identification apply. This shows that the variables are external.

Conclusion

Today, the level of development of countries is mainly measured by indicators such as national income, national income per capita, foreign trade, health, education, etc. Especially considering the socio-economic conjuncture today, it is obvious that the health sector and the economic indicators related to the sector have a strategic importance. Considering that the private and public health expenditures of the countries have increased with the pandemic process, the importance of the policies related to this has been better understood.

The analysis-based results of the geographical concentration of the G7 countries in the health sector show the following. The results of HHI analysis show that the highest level of geographic concentration is in Canada and the United Kingdom, and the lowest level of geographic concentration is in France and the United States. When the CR index results are examined on a country-by-country basis, the country with the highest concentration of one country and two countries is Canada. However, as the number of countries where geographical concentration analysis is carried out increases, it has been determined that the level of concentration in the G7 countries converges to each other. It is noteworthy that although the level of concentration has increased in other countries, Canada's apparent concentration is high. Within the G7 countries, it was found that the level of concentration of Japan and Italy increased as the number of countries increased. The concentration charts in eight and twelve countries showed similar results, with Japan almost identical to Canada. Japan, Canada and Italy have the highest concentration levels, while France, the United States and Germany have lower concentration levels. The entropy index results show that France is the country with the highest geographical spread, positively differentiating it from other countries. In particular, the fact that Canada and Japan have significantly declined in their index results is consistent with the results of other indices.

When the effect of concentration on unemployment in G7 countries is examined, the effect of the hhi variable on the unpp variable in the G7 countries is significant and negative. In the analysis, the one-stage GMM estimator is meaningless, while the two-stage GMM estimator is meaningful. According to the two-stage GMM forecaster, a 1-unit increase in concentration in the health sector in the G7 countries reduces unemployment by 0.017 units.

In this context, the policies to be pursued by the G7 countries to increase exports in the health sector are very important. The policies to be implemented by this group of countries, especially in the category of developed countries, will also be a pioneer for underdeveloped and developing countries. Thus, both the importance of the health sector will increase all over the world and the employment rates in this field will increase even more. In order to achieve this, government-supported employment policies should be made.

References

Ababa, A. (2012). *Determinants of Export Commodity Concentration and Trade Dynamics in Ethiopia.* Ethiopia: Ethiopian Economics Association Ethiopian Economics Policy Research Institute.

Akay, E. Ç. (2018). Dinamik Panel Veri Yöntemleri. S. Güriş içinde, *Uygulamalı Panel Veri Ekonometrisi* (s. 105-130). İstanbul: DER Yayınları.

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Oxford University Press, 58*(2), 277-297.

Baltagi, B. H. (2005). *Econometric Analysis of Panel Data.* New York, USA: John Wiley & Sons, Ltd.

COMTRADE. (2022). 04 2019, 07 tarihinde World Integrated Trade Solution: https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx adresinden alındı

Dündar, S. (2020). *Küreselleşme Ve Kalkınma İlişkisi'nin Dinamik Panel Veri Analizi: Türkiye Ve Gelişmekte Olan Ülkeler Örneği.* Aydın: Aydın Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü Yayımlanmamış Yüksek Lisans Tezi.

Erkan, B. (2014). Product and Market Diversification in Turkey's Foreign Trade. *International Journal of Advances in Management and Economics, 3*(1), 1-15.

Erkan, B. (2019). Türkiye Süper Ligi'nin Rekabet Analizi. *30 Ağustos Bilimsel Araştırmalar Sempozyumu* (s. 34-38). İzmir: İKSAD.

Ünlü, F., & Yıldız, R. (2019). Türkiye'de Dış Ticaretin Teknolojik Yapısının Fasıl Bazlı Yoğunlaşma Analizleri ile Belirlenmesi. *Karadeniz Teknik Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Dergisi, 9*(17), 7-25.

Karahan, H. (2017). Export Diversification in Emerging Economies. *Global Financial Crisis and Its Ramifications on Capital Markets: Opportunities and Threats in Volatile Economic Conditions* (s. 287-296). içinde Springer .

Kozáková, M., & Barteková, M. K. (2020). Analysis of market concentration in creative industry. *SHS Web of Conferences, 83*, 1-8.

Meilak, C. (2008). Measuring Export Concentration: The Implications for Small States. *Bank of Valetta Review, 37*, 35-48.

Roodman, D. (2009). How to do xtabond2: An Introduction to Difference and System GMM in Stata. *The Stata Journal, 9*(1), 86-136.

Tatoğlu, F. Y. (2018). *İleri Panel Veri Analizi.* İstanbul: BETA Yayınları.

Topçu, B. A., & Sarıgül, S. S. (2019). Türkiye Demir Çelik Sektörü İhracatının Yoğunlaşma Analizi. *Social Mentality and Researcher Thinkers Journal, 5*(17), 517-524.

Vaid, P. (2018). Concentration of Chinese Export in India. *International Journal of Basic and Applied Research, 8*(7), 823-830.

Yıldırım, K., & Kostakoğlu, S. F. (2015). Ülkelerin Ekonomik Performansı Üzerinde Regülasyonun Etkileri: Bir Dinamik Panel Veri Analizi. *Anadolu Üniversitesi Sosyal Bilimler Dergisi, 15*(2), 45-56.

Yılmaz, F., & Akkaya, G. C. (2020). Türkiye'nin Avrupa Birliği ile Dış Ticaretinde Yoğunlaşma Analizi. *Çukurova Üniversitesi İİBF Dergisi, 24*(2), 251-267.