Araştırma Makalesi/*Research Article*
Başvuru/*Submission:* 19.04.2024
Kabul/*Acceptance:* 30.09.2024

ADAM AKADEMİ Sosyal Bilimler Dergisi, 15 (2), 429-444
DOI: 10.31679/adamakademi. 1423300

Factors Affecting Exports in Manufacturing Industry: Toda Yamamoto Causality Analysis For Basic Pharmaceutıcal Products Sector

Zeynep KARACA UZUNKAYA*

Erzurum Teknik Üniversitesi

Abstract

Exports play an important role in promoting economic growth. For many countries, international trade, especially exports, has a crucial role as a driver of the national economy. Exports generate foreign exchange that can then be used to finance imports and the domestic economic development sector. In addition to directly increasing gross domestic product, an emphasis on exports can also lead to positive externalities in the form of knowledge spillovers in non-export sectors, such as more efficient management and production techniques. This can lead to increased innovation and production in export and non-export sectors, raising incomes and supporting growth. In this study, the factors affecting the exports of the basic pharmaceutical products sector, one of the manufacturing industry sectors, are investigated by Toda Yamamoto causality analysis. In the study, capacity utilization rate, industrial production index, number of patents and export series are used for causality and the study period is 2007-2022. The data used in the study are annual data. As a result of the causality analysis, a bidirectional causality relationship was found between capacity utilization rate, industrial production index, number of patents and exports.

Keywords

Exports, industrial production index, capacity utilization rate, number of patents, Toda-Yamamoto causality

* Doç. Dr. Erzurum Teknik Üniversitesi, İktisadi ve İdari Bilimler Fakltesi, İktisat Bölümü, zeynep.karaca@erzurum.edu.tr, ORCID: 0000-0001-8046-7222

İmalat Sanayinde İhracatı Etkileyen Faktörler: Temel Eczacılık Ürünleri Sektörüne Yönelik Toda Yamamoto Nedensellik Analizi

Öz

İhracat ekonomik büyümenin desteklenmesinde önemli bir rol oynamaktadır. Birçok ülke için uluslararası ticaret, özellikle de ihracat, ulusal ekonominin itici gücü olarak çok önemli bir role sahiptir. İhracat, daha sonra ithalatı ve yurt içi ekonomik kalkınma sektörünü finanse etmek için kullanılabilecek döviz yaratır. İhracata yapılan vurgu, doğrudan gayri safi yurtiçi hasılayı artırmanın yanı sıra, ihracat dışı sektörlerde daha verimli yönetim ve üretim teknikleri gibi bilgi yayılımı şeklinde olumlu dışsallıklara da yol açabilir. Bu da ihracat ve ihracat dışı sektörlerde inovasyon ve üretimin artmasına, gelirlerin artmasına ve büyümenin desteklenmesine yol açabilir. Bu çalışmada imalat sanayi sektörlerinden biri olan temel ilaç ürünleri sektörünün ihracatını etkileyen faktörler Toda Yamamoto nedensellik analizi ile araştırılmaktadır. Çalışmada nedensellik için kapasite kullanım oranı, sanayi üretim endeksi, patent sayısı ve ihracat serileri kullanılmış olup, çalışma dönemi 2007-2022'dir. Çalışmada kullanılan veriler yıllık veri şeklindedir. Nedensellik analizi sonucunda kapasite kullanım oranı, sanayi üretim endeksi, patent sayısı ve ihracat arasında çift yönlü bir nedensellik ilişkisi bulunmuştur.

Anahtar Kelimeler

İhracat, sanayi üretim endeksi, kapasite kullanım oranı, patent sayısı, Toda-Yamamoto nedensellik

Introduction

The question of why some countries are rich and others poor has been in the economic literature for decades. Numerous theories have been developed emphasizing the importance of geographical factors, diseases, institutions and culture. Typical determinants identified include higher initial education and life expectancy, lower fertility, lower government consumption, better rule of law protection, lower inflation, improved terms of trade, higher investment rates and financial sector development, as well as some cross-regional factors such as income convergence and spatial spillovers (Grancay et al., 2015: 233). However, Hausmann, Hwang and Rodrik (2007) showed that the structure of exports is also an important determinant of economic growth. The authors developed an indicator that shows the level of productivity associated with patterns of specialization underlying a country's export structure and can also be interpreted as a measure of the quality of the country's export basket. They proved that countries that specialize in a range of goods that are higher on the quality spectrum tend to perform better.

Exports play an important role in driving economic growth. For many countries, international trade, especially exports, has a crucial role as a driving force for the national economy. Exports generate foreign exchange, which can then be used to finance imports and the domestic economic development sector (Sumiyati, 2020: 254). A casual examination of the relationship between exports and gross domestic product would lead to the conclusion that the correlation between the two is positive. Since exports are a component of GDP, an increase in exports will ceteris paribus increase GDP. But in addition, there are potential positive externalities generated by exports. In addition to directly increasing GDP, an emphasis on exports can also lead to positive externalities in non-export sectors in the form of knowledge spillovers, such as more efficient management and production techniques. This in turn can lead to increased innovation and production in export and non-export sectors,

raising incomes and supporting growth. Exports can also provide foreign exchange needed for imports, with further beneficial effects on economic growth (Sheridan, 2014: 2). Crespo-Cuaresma and Wörz (2005) argue that as a result of competition in international markets, important positive externalities accrue to the exporting country, such as increasing returns to scale, learning spillovers, increased innovation and other productivity gains, all of which can increase the rate of economic growth. Exporting firms are more productive than non-exporting firms. Moreover, productivity triggers exports; firms start exporting after reaching a certain productivity threshold (self-selection in export markets). The main argument explaining why exporters should be more productive is the existence of sunk costs in the export activity (market research, product adaptation, etc.). Firms enter foreign markets if the expected gross operating profit from exporting is greater than the sunk entry costs (Altuzarra et al., 2016: 162).

The manufacturing sector employs more and more mathematicians, engineers, IT specialists and business professionals. Services used or produced by manufacturing firms include research and development services, but more generally information or intangible capital services, as well as services such as telecommunications and transportation (Lodefalk, 2014: 60). The manufacturing sector is also a significant contributor to the value added of national output. The growth of the manufacturing sector within the industry is essential for building national technological capacity, industrial capability, technology advancement, productivity and capital accumulation (Sumiyati, 2020: 255).

Economic activities in Turkey are divided into 16 sections. Among these, the manufacturing industry consists of 24 departments. Among these sections, the manufacturing of basic pharmaceutical products and pharmaceutical materials constitutes the research area of this study. When the total import and export values on the basis of product groups in Turkey's foreign trade are analyzed, food products have a foreign trade volume of approximately 23 billion dollars; agricultural, forestry and fishery products have a foreign trade volume of approximately 21 billion dollars and basic pharmaceutical products have a foreign trade volume of approximately 10 billion dollars and are among the important product groups imported and exported (TurkStat). The factors affecting the exports of basic pharmaceutical products and pharmaceutical materials manufacturing sector were investigated by Toda Yamamoto causality analysis. The main objective of this study is to identify the causal relationships that promote the export performance of the basic pharmaceutical products and pharmaceutical materials manufacturing sector. This is because this sector ranks third after food products and agriculture, forestry and fishery products in terms of foreign trade volume (TurkStat). Improving the sector's export performance will lead to economic growth, foreign exchange inflows, technological development and economies of scale. The study

consists of four parts. The first section provides an overview of the manufacturing of basic pharmaceutical products and pharmaceutical materials sector in Turkey. In the second part, a detailed literature summary will be given. Then, the methodology and data to be used in the study will be explained and the findings will be explained. Finally, recommendations will be given in the conclusion section.

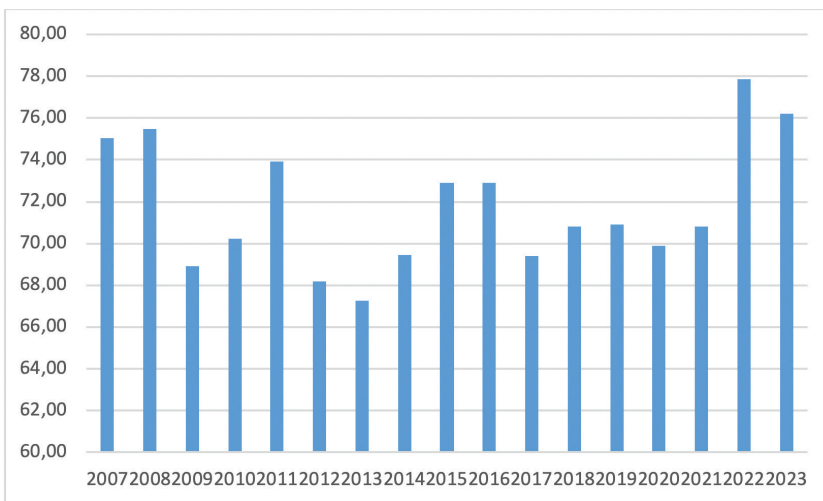
General Outlook Of Basıc Pharmaceutıcal Products And Pharmaceutıcal Ingredıents Manufacturıng Sector In Turkey

In this part of the study, some basic indicators published by the Turkish Statistical Institute (TURKSAT), the Central Bank of the Republic of Turkey (CBRT) and the Turkish Patent and Trademark Office will be examined to analyze the general outlook of the basic pharmaceutical products and pharmaceutical materials manufacturing sector.

When the indicators by economic activities published by the Turkish Statistical Institute are analyzed, the number of enterprises in the manufacturing of basic pharmaceutical products and pharmaceutical materials sector as of 2022 is 717, the turnover is 101,748,702,688, the number of paid employees is 47,041 and the production value is 98,863,958,098.

When the capacity utilization rate figures published by the Central Bank of the Republic of Turkey are analyzed, it is seen that the year with the highest capacity utilization rate in the manufacture of basic pharmaceutical products and pharmaceutical materials was 2022. An increase in the capacity utilization rate indicates an increase in production, while a decrease indicates a decrease in production.

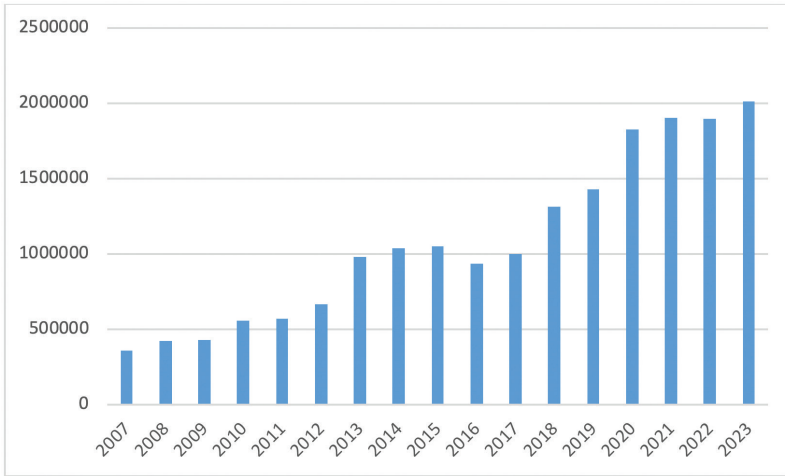
Graphic 1. Capacity utilization rate



Source: *CBRT, Access: 02.04.2024*

An analysis of the export figures for the manufacture of basic pharmaceutical products and pharmaceutical materials published by the Turkish Statistical Institute shows that the sector's exports are in a continuous upward trend.

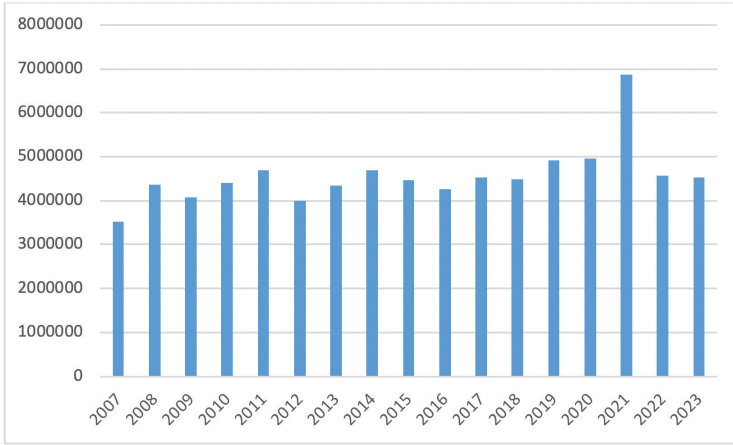
Graphic 2. Export



Source: *TURKSTAT, Access: 02.04.2024*

An analysis of the import figures for the manufacture of basic pharmaceutical products and pharmaceutical materials published by the Turkish Statistical Institute shows that the imports of the sector reached the highest value in 2021 and displayed a similar outlook in other years.

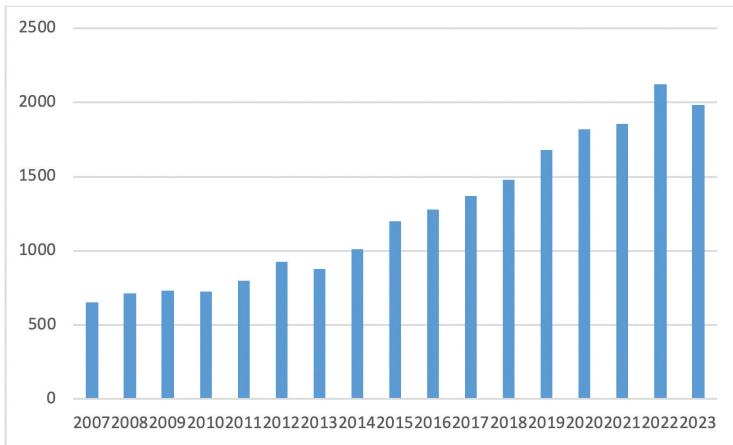
Graphic 3. Import



Source: *TURKSTAT, Access: 02.04.2024*

When the industrial production index figures for the manufacture of basic pharmaceutical products and pharmaceutical materials published by the Turkish Statistical Institute are analyzed, it is seen that the industrial production index of the sector reached the highest value in 2022 and has been in a continuous upward trend.

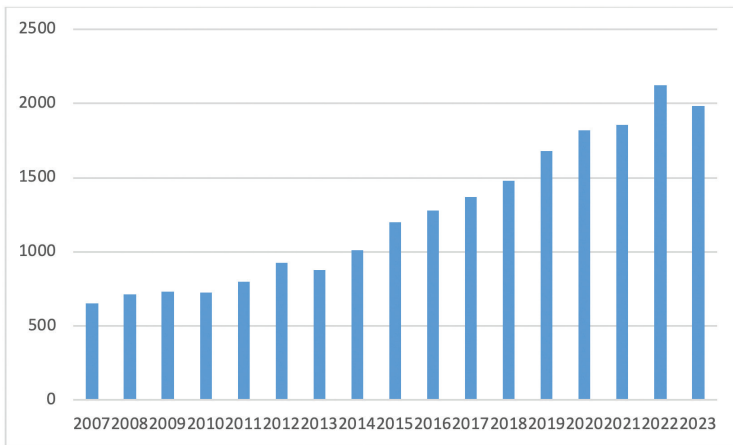
Graphic 4. Industrial production index



Source: *TURKSTAT, Access: 02.04.2024*

An analysis of the number of patents in the manufacture of basic pharmaceutical products and pharmaceutical materials published by the Turkish Patent and Trademark Office shows that the number of patents in the sector reached the highest value in 2018 and started to decrease after this year.

Graphic 5. Number of patents



Source: *Turkish Patent and Trademark Office, Access: 02.04.2024*

Literature Summary

In this section of the study, a summary of the literature will be given and the contribution of this study to the field will be discussed.

Boccardo (2004) investigated the relationship between firms' capacity utilization rates and their exports and found that capacity utilization is higher for exporting firms and that increasing the level of exports also affects capacity, but at a decreasing rate. Tian (2016), in his study to investigate the effect of export participation on the capacity utilization rate of Chinese firms, showed that the capacity utilization rate of exporting firms is higher than that of non-exporting firms. Ogungbenle (2022) found that capacity utilization rate has a significant effect on output in the manufacturing industry in Nigeria. Pavitt (1982) showed that there is a strong relationship between exports and innovative activities in the chemical and engineering sectors. Ivus (2010) finds that improvements in patent rights increase exports. Panda et al. (2020), using panel data analysis on 67 countries between 1996 and 2014, found that patent rights further stimulate a country's exports.

Kurt and Terzi (2007) investigated the causality relationship between manufacturing exports, imports, productivity and economic growth. Bozkurt (2008) investigated the relationship between patent registrations and sectoral export performance in the Turkish manufacturing industry and found that there is a positive and significant relationship between these variables. Uzay et al. (2012) investigated the relationship between exports of manufacturing industry sectors and R&D expenditures. Önder and Hatırlı (2014) investigated the causality relationship between manufacturing industry exports and economic growth. Kılıç and Yıldırım (2015) investigated the effect of exchange rate volatility on manufacturing exports. Akarsu (2020) used the ratio of exports to domestic product as the dependent variable and patent applications as the independent variable and found that there is a causality relationship from exports to patents. Özbay (2021) investigated the relationship between industrial production index and foreign trade and found that there is a bidirectional causality relationship between industrial production index and imports and a unidirectional causality relationship between industrial production index and foreign trade. Doğaner (2022) found that the increases and decreases in the industrial production index, export quantity index and import quantity index affect each other in Turkey. Aktepe and Yumuş (2023) investigated the causality relationship between manufacturing industry capacity utilization rate and exports by Granger causality analysis. Avcı and Işık (2023) investigated the impact of advanced technology exports on economic growth and found that there is a unidirectional causality relationship from exports of aerospace vehicles to exports of basic pharmaceuticals and pharmaceutical materials.

As seen in the literature review above, there is no study directly on the manufacturing of basic pharmaceutical products and pharmaceutical materials. This sector is also mentioned in the studies on manufacturing industry sectors. Since this study will focus on the exports of basic pharmaceutical products and pharmaceutical materials manufacturing sector, it is aimed to contribute to the literature.

Data and Methods

In this study, in order to analyze the relationship between exports, capacity utilization rate, industrial production index and number of patents in the manufacturing sector of basic pharmaceutical products and pharmaceutical materials in Turkey, the annual data set between 2007 and 2022 is used. Table 1 shows where the data are obtained from.

Table 1. Data used in the study

Data Name	Source
Exports of basic pharmaceutical products and pharmaceutical materials	Turkish Statistical Institute
Industrial production index for the manufacture of basic pharmaceutical products and pharmaceutical materials	Turkish Statistical Institute
Capacity utilization rate in the manufacture of basic pharmaceutical products and pharmaceutical materials	Central Bank of the Republic of Turkey
Number of patents in the manufacture of basic pharmaceutical products and pharmaceutical materials sector	Turkish Patent and Trademark Office

In this study, Toda-Yamamoto causality analysis is preferred to investigate the causality relationship between exports, industrial production index, capacity utilization rate and number of patents. This analysis is preferred because the series are stationary at different levels. While the Granger causality test, which is widely used in the literature, emphasizes that the variables are stationary and cointegrated at the same level, Toda-Yamamoto causality analysis can be performed when the variables are stationary at different levels, cointegrated or not (Baskak, 2023: 266).

Unlike the standard causality tests, the causality test developed by Toda and Yamamoto (1995) does not require equal stationarity between the series and does not take into account the cointegration relationship between time series. The level values of the variables are used to determine the causality relationship, so there is no loss of information about the series. For this causality test, an extended VAR model with (k+dmax) lags is constructed. Here, k represents the lag length of the classical VAR model, while dmax represents the maximum degree of integration of the variables (Okur and Çiçek, 2023: 372). After determining the number of lags (k) and the maximum stationarity level

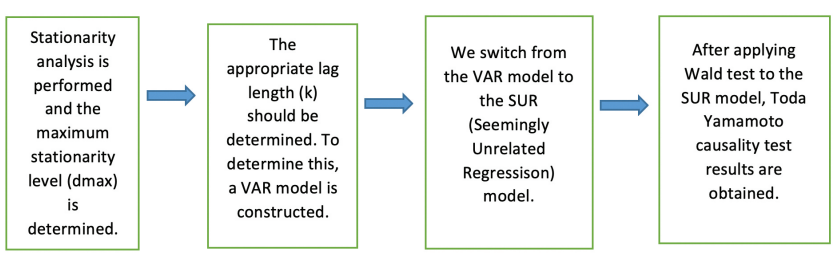
(dmax) in the established VAR model, a new VAR model is established with k+ dmax. This model is defined as in equation 1 and equation 2.

$$Y_t = \mu + \sum_{i=1}^{k} a_{1i} + X_{t-i} + \sum_{i=1}^{k} \beta_{1i} Y_{t-i} + \sum_{j=m+1}^{dmax} \gamma_{1i} X_{t-i} + \sum_{j=m+1}^{dmax} \delta_{1i} Y_{t-i} + \varepsilon_{1t} \quad (1)$$

$$X_t = \gamma + \sum_{i=1}^{k} a_{2i} + X_{t-i} + \sum_{i=1}^{k} \beta_{2i} Y_{t-i} + \sum_{j=m+1}^{dmax} \gamma_{2i} X_{t-i} + \sum_{j=m+1}^{dmax} \delta_{2i} Y_{t-i} + \varepsilon_{2t} \quad (2)$$

In the equations, k is the lag length, dmax is the maximum stationarity level, ε1t and ε2t are the error terms assumed to have zero mean and constant covariance. For causality analysis, the stationarity analysis of the series should be performed first. Toda-Yamamoto causality analysis differs from the others in that it does not require the same level of stationarity among the series. However, the stationarity levels of the series are still included in the study. The stationarity level of the series is determined by using the Extended Dickey-Fuller (ADF) unit root test. After determining the maximum level of stationarity, the appropriate lag length is determined. In order to determine the appropriate lag length, the VAR model is switched to the SUR (Seemingly Unrelated Regressison) model. After applying Wald test to the SUR model, Toda Yamamoto causality test results are obtained (Baskak, 2023, p. 267). Figure 1 shows the flow diagram of the Toda-Yamamoto causality analysis.

Figure 1. Toda-Yamamoto Causality Analysis Flow Diagram



Findings

In order to determine the causality relationship between exports, capacity utilization rate, industrial production index and number of patents in the manufacturing of basic pharmaceutical products and pharmaceutical materials sector, firstly, stationarity test is applied to the series. Stationarity test helps to determine the type of stationarity and unit root of the series. In the study, the Extended Dickey-Fuller (ADF) unit root test was utilized. As a result of the test, all series except the capacity utilization rate are stationary at first order. Table 2 presents the ADF unit root test results of the series.

Table 2. ADF unit root test results of the series

		t statistic	Prob.
Level	Export	0.143000	0.9580
	Industrial Production Index	3.493888	1.0000
	Capacity Utilization Rate	-3.796337	0.0145
	Number of Patents	-1.851403	0.3438
First Difference	Export	-3.414786	0.0274
	Industrial Production Index	-4.411602	0.0043
	Capacity Utilization Rate	-5.275760	0.0011
	Number of Patents	-3.915319	0.0109

Looking at the level values in Table 2, it is seen that only the capacity utilization rate series is stationary at level and the other series become stationary when first differences are taken. In other words, dmax=1. After the unit root test, the lag length needs to be determined in order to construct a VAR model. While estimating the VAR model, the dependent variable is determined as exports. Table 3 shows the results of the appropriate lag lengths in the VAR model and it is determined that the lag length in the model is 2.

Table 3. Determination of appropriate lag length with VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-453.6981	NA	3.75e+21	61.02641	61.21522	61.02440
1	-408.7047	59.99111*	8.72e+19	57.16063	58.10470	57.15057
2	-377.3665	25.07059	2.14e19+*	55.11553*	56.81485*	55.09743*

(*) indicates the lag length.

Table 3 shows that the appropriate lag length is 2 (k=2) for all information criteria. Therefore, causality analysis was conducted with a lag length of k+dmax=2+1=3. The VAR model established with the new lag length was switched to the SUR (Seemingly Unrelated Regresison) model. As a result of the Wald test applied in this model, the results of the Toda-Yamamoto causality test were obtained. These results are presented in Table 4.

Table 4. Toda-Yamamoto causality analysis results

Direction of Causality	Statistic Value	Probability Value	Comment
Capacity Utilization Rate → Export	7574.319	0.0000	There is bidirectional causality between the capacity utilization rate and exports in the manufacturing of basic pharmaceutical products and pharmaceutical materials sector.
Export → Capacity Utilization Rate	643.2044	0.0000	
Number of Patents → Export	10888.18	0.0000	There is bidirectional causality between the number of patents and exports in the manufacturing of basic pharmaceutical products and pharmaceutical materials sector.
Export → Number of Patents	13.06666	0.0045	
Industrial Production Index → Export	14302.10	0.0000	There is bidirectional causality between the industrial production index and exports of basic pharmaceutical products and pharmaceutical materials.
Export → Industrial Production Index	30.86411	0.0000	

As seen in Table 4, there is a bidirectional causality relationship between exports of basic pharmaceutical products and pharmaceutical materials manufacturing sector and capacity utilization rate, industrial production index and number of patents variables. These variables affect and are affected by each other.

Conclusion

In recent years, a large number of papers covering a wide range of countries have focused their attention on analyzing the characteristics of exporting firms using micro data. This is not surprising because capitalizing on new markets and increasing the contribution of exports to growth depends to a large extent on these firms. Export growth is becoming critical for an increasing number of countries. Increasing openness and export promotion can encourage firms to export and thus use resources more efficiently, but policymakers can go beyond reducing barriers to trade and try to create other incentives to increase capacity utilization.

In this study, the exports of the manufacturing sector of basic pharmaceutical products and pharmaceutical materials are discussed. The reason for choosing this sector is that basic pharmaceutical products have a foreign trade volume of approximately 10 billion dollars and are among the important product groups that are imported and exported (TURKSTAT). The data used in the study are exports, number of patents, capacity utilization rate and industrial production index and the series cover the years 2007-2022. The data was obtained from the Turkish Statistical Institute, the Central Bank of the Republic of Turkey and the Turkish Patent and Trademark Office. Literature was used to select the data. Toda-Yamamoto causality analysis was used to investigate the causality relationship. For Toda-Yamamoto causality analysis, first the stationarity (dmax) of the series was investigated.

Then, the VAR model was estimated for the appropriate lag length (k). A transition was made from the VAR model, which was established with the new lag length determined by k + dmax, to the SUR (Seemingly Unrelated Regression) model. As a result of the Wald test applied in this model, the results of the Toda-Yamamoto causality test were obtained. According to the causality analysis results, there is a bidirectional causality relationship between exports, industrial production index, capacity utilization rate and number of patents. In other words, these variables are variables that affect and are affected by each other.

The development of a country depends not only on the amount of exports but also on the quality of these exports. High-quality tradable products are less affected by price competition from low-wage producers; It increases export revenues and productivity and ultimately contributes to a country's economic growth. Patent protection can affect product quality through many channels. For example, this can occur through the impact of patent protection on innovation. Given that improving product quality is knowledge intensive and may require a firm to source knowledge and technology beyond its own borders, patent protection may also affect product quality through its impact on interfirm technology and knowledge exchange. Taking advantage of the variation in patent protection across countries and the variation in R&D intensity across industries, it can be argued that there is an increase in the production and export of higher quality products in countries with more effective patent protection. This points to the importance of patent protection for products with greater scope for quality adjustment and return on investment.

Patents in the manufacturing sector of basic pharmaceutical products and pharmaceutical materials;

- It will protect the advantage of the prospective exporter against the companies established in the target country.
- The prospective exporter will be able to sell his embodied idea in the target country without fear of an infringement lawsuit.

Industrial production leads to increased welfare, productivity and efficiency in economies, which in turn causes the growth and development of the national economy. Evaluating industrial production and foreign trade variables together is one of the important issues that should be taken into consideration in the country's industrial and economic policies. A bidirectional causality relationship was found between the industrial production index and exports in the manufacturing sector of basic pharmaceutical products and pharmaceutical materials.

Capacity utilization rate is a concept that gives an idea about the order levels of businesses in the manufacturing industry, new employment opportunities and the vitality of the economy. A bidirectional causality relationship was found between the exports of the manufacturing sector of basic pharmaceutical products and pharmaceutical materials and the capacity utilization rate.

There are studies in the literature that affect the exports of the manufacturing industry. Ogubgbenle (2022), Kurt and Terzi (2007), Uzay et al. (2012), Aktepe and Yumuş (2023) investigated the factors affecting manufacturing industry exports. However, there is no direct study on the manufacturing of basic pharmaceutical products and pharmaceutical materials. Most of the studies are studies on manufacturing industry sectors in general. This study is expected to contribute to the literature as it focuses on the exports of basic pharmaceutical products and pharmaceutical materials manufacturing sector. In this study, the causality relationship of the factors affecting the exports of only the basic pharmaceutical products and pharmaceutical materials manufacturing sector among the manufacturing industry sectors was investigated. By performing such an analysis for other sectors, the factors affecting the exports of each sector can be determined. In addition, it would be useful to examine the relationship between capacity utilization rate, industrial production index, number of patents and imports in the manufacturing industry sectors.

References

Akarsu, Y. (2020). Patent Başvurularının Türkiye'nin İhracatına Etkisi, *Uluslararası Yönetim Eğitim ve Ekonomik Perspektiler Dergisi, 8*(2), 110-124.

Aktepe, C., & Yumuş, F. (2023). İmalat Sanayi Kapasite Kullanım Oranı İle İhracat De& ğeri Arasındaki İlişki: Türkiye İçin Bir Uygulama, İşletme Araştırmaları Dergisi, *15*(4), 3113-3120.

Altuzarra, A., Bustillo, R., & Rodriguez, C. (2016). Understanding Export Market Success: Evidence from Manufacturing Firms, *Open Economies Review*, 27, 161-181.

Avcı, Ş., & Işık, N. (2023). İleri Teknoloji İhracatı Ve Ekonomik Büyüme Arasındaki İlişki: Türkiye Üzerine Bir Uygulama, *Kırıkkale Üniversitesi Sosyal Bilimler Dergisi*, *13*(1), 157-182.

Baskak, T. E. (2023). BRICS-T Ülkelerinde Erkek ve Kadın Genç İşsizlik ile Doğuşta Beklenen Yaşam Süresi İlişkisi: Toda-Yamamoto Nedensellik Analizi, *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, *23*(1), 259-278.

Boccardo, J. (2004). *A Firm's Capacity Utilization And İts Relationship With Foreign Competition in Selected Countries*, Washington, DC.

Bozkurt, K. (2008). Türk İmalat Sanayisinde Teknolojik Gelişme ve İhracat Performansı, *Finans Politik & Ekonomik Yorumlar*, *45*(522), 91-103.

Central Bank of Türkiye Republic, https://www.tcmb.gov.tr/

Crespo Cuaresma, J., & Wörz, J. (2005). On Export Composition and Growth, *Review of World Economics*, (141), 33-49.

Doğaner, A. (2022). Türkiye'de Sanayi Üretiminin İhracat ve İthalat Üzerindeki Etkisi: ARDL Sınır Testi ile Bir Değerlendirme, *Namık Kemal Üniversitesi Sosyal Bilimler Meslek Yüksek Okulu Dergisi, 4*(2), 44-52.

Grancay, M., Grancay, N., & Dudas, T. (2015). What You Export Matters: Does it Really?, *Contemporary Economics, 9*(2), 233-244.

Hausmann, R., Hwang, J., & Rodrik, D. (2007). What You Export Matters, *Journal of Economic Growth*, *12* (1), 1-25.

Ivus, O. (2010). Do Stronger Patent Rights Raise High-Tech Exports To The Developing World?, *Journal of International Economics, 81*(1), 38-47.

Kılıç, E., & Yıldırım, K. (2015). Sektörel Reel Döviz Kuru Volatilitesinin Türk İmalat Sanayi İhracatı Üzerine Etkileri, *Anadolu Üniversitesi Sosyal Bilimler Dergisi, 15*(1), 13-25.

Kurt, S., & Terzi, H. (2007). İmalat Sanayi Dış Ticareti Verimlilik Ve Ekonomik Büyüme İlişkisi, *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, *21*(1), 25-46.

Lodefalk, M. (2014). The Role Of Services For Manufacturing Firm Exports, *Review of World Economics,* (150), 59-82.

Ogungbenle, S. (2022). Trade Openness, Manufacturing Capacity Utilization Rate and Output Expansion Nexus in Nigeria, *European Journal of Science, Innovation and Technology, 2*(1), 124-133.

Okur, M. G., & Çiçek, A. (2023). Türkiye'de Kırmızı Et Fiyatları ile Besi Yemi Fiyatları Arasındaki Nedensellik İlişkisinin Toda-Yamamoto Testi ile Belirlenmesi, ÇOMÜ Ziraat Fakültesi Dergisi*, 11*(2), 368-376.

Önder, K., & Hatırlı, S. A. (2014). Türkiye'de İmalat Sanayi İhracatı ve Büyüme İlişkisinin İktisadi Analizi, *Journal of Yasar University, 9*(34), 5851-5869.

Özbay, Ü. (2021). Türkiye'nin Sanayi Üretimi İle Dış Ticareti Arasındaki İlişki: -2001 2009 Dönemi İçin Değerlendirmeler, *Verimlilik Dergisi*, (4), 153-165.

Panda, S., Sharma, R., & Park, W. G. (2020). Patent Protection, Technological Efforts, And Exports: An Empirical Investigation, *The Journal of Developing Areas*, 54(2).

Pavitt, K. (1982). R&D, Patenting And İnnovative Activities: A Statistical Exploration, *Research Policy*, *11*(1), 33-51.

Sheridan, B. J. (2014). Manufacturing Exports And Growth: When is A Developing Country Ready To Transition From Primary Exports To Manufacturing Exports?, *Journal of Macroeconomics*, (42), 1-13.

Sumiyati, E. E. (2020). Factors Affecting Manufacturing Exports, *Journal of Economics, Business, and Accountancy Ventura*, *23*(2), 254-266.

Tian, X. (2016). Participation İn Export And Chinese Firms' Capacity Utilization*, The Journal of International Trade & Economic Development, 25*(5), 757-784.

Turkish Patent and Trademark Office, https://www.turkpatent.gov.tr/

Turkish Statistical Institute, https://www.tuik.gov.tr/

Toda, H. Y., & Yamamoto, T. (1995). Statistical İnferences İn Vector Autoregression With Possibly İntegrated*. Journal of Econometrics, 66*(1): 225-250.

Uzay, N., Demir, M., & Yıldırım, E. (2012). İhracat Performansı Açısından Teknolojik Yeniliğin Önemi: Türkiye İmalat Sanayi Örneği, *Doğuş Üniversitesi Dergisi*, *13*(1), 147-160.