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The Expanded and Intensive Trade in Turkey's Automotive Sector

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ABSTRACT

Extensive trade is the export of existing foreign trade countries in a country at a higher amount or price. Intensive trade is the average of new products exported or new exports made by existing foreign trade in a country. The study found that the quantity component was 77.97% and the price component was 17.82%. Turkey's common trade share in automotive sub-industry production is 4.21%. According to these findings, it is seen that the strength of Turkey's automotive main and sub-industry exports stems from intense trade. It also appears that intense trading means a large number of pieces of the price device are being explained.

KEYWORDS

Foreign, Trade, Extensive, Intensive, Automotive, Sector, Turkey, Economics

INTRODUCTION

The automotive industry in Turkey is a sector that has an important place in the manufacturing industry and is in close relationship with other sectors. Since goods produced in many sectors, especially iron and steel, petrochemicals, and textiles, are used in vehicle production, the automotive industry is in close cooperation with many supplier companies. This cooperation also ensures that supplier companies use new technologies and that their production is carried out effectively and efficiently. On the other hand, the fact that the automotive industry provides the production of vehicles needed by many sectors, such as tourism, transportation, construction, and agriculture, has caused this sector to affect the entire country's economy. Moreover, the automotive industry contributes greatly to increasing employment both in its own field and in the areas where its suppliers operate.

Foreign producers in our country are looking for new markets for exports, and investment incentives are given to these producers, which has enabled foreign investors to invest in Turkey. Automotive production and exports increased with the investments made. Today, automotive sector exports constitute approximately 12% of Turkey’s total exports (TURKSTAT, 2021). The production capacity and exports of the automotive industry, which was established in Turkey in the early 1960s, have constantly increased over time. As shown in Figures 1 and 2, in the period from 2002 through 2020, automotive main industry exports increased from $2.415 billion to $16.269 billion, and automotive sub-industry exports increased from $1.748 billion to $9.344 billion (TURKSTAT, 2021).

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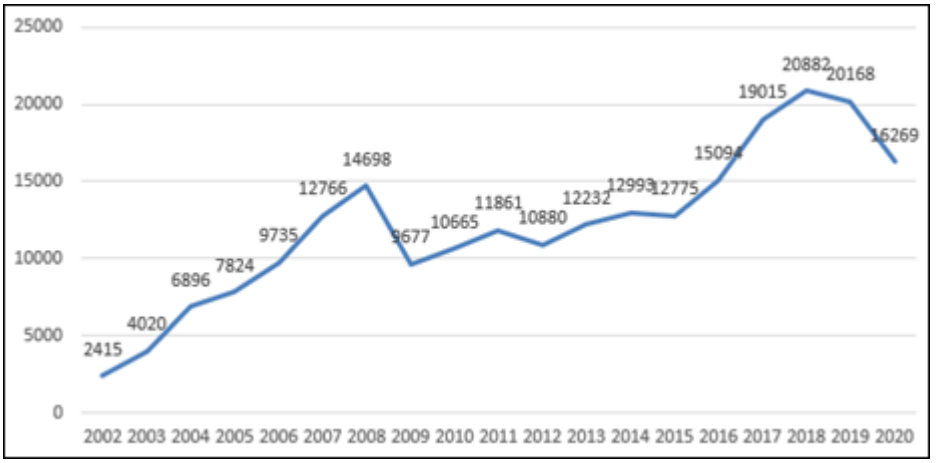
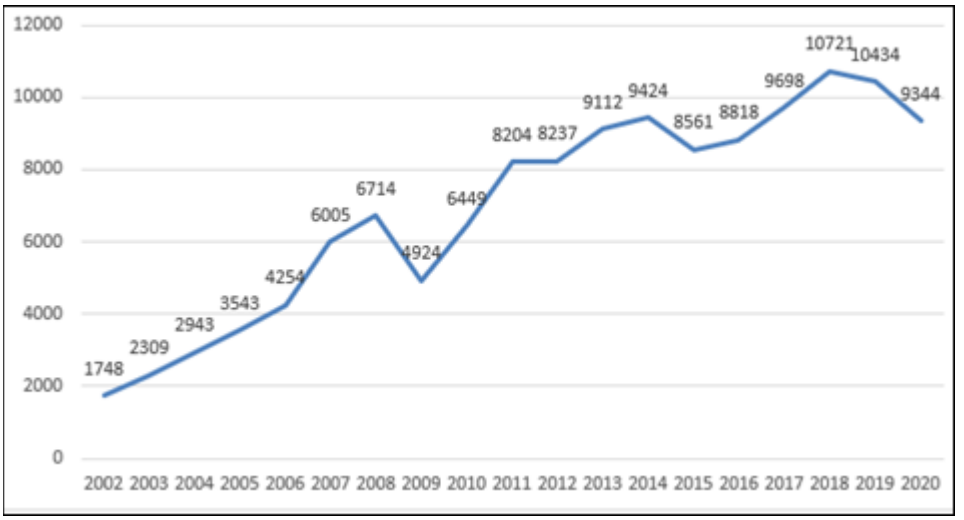
Figure 1. Major automotive industry export (In terms of $million)



Note. Turkish Statistical Institute, official webpage, 2021.

Figure 2. Automotive sub-industry exports (Figures are in $million)



Note. Turkish Statistical Institute, official webpage, 2021.

It is of great importance to determine whether the export increase in the automotive sector, which has such an important place in our country's economy, is a healthy increase. In this study, the sources of the increase in automotive sector exports for the period 2002 through 2020 are analyzed by calculating widespread and intensive trade, with the aim of determining whether the increase in exports in the automotive sector is a healthy increase.

LITERATURE REVIEW

Many studies have been carried out in international economics scholarship attempting to reveal the reasons for the increase in exports. In this section, studies examining export growth in terms of extensive trade and intensive trade will be evaluated.

In the study conducted by Armington (1969), a general demand theory was used for products, determined by considering both their types and production locations. According to traditional international trade theories, increasing production is sufficient to increase exports. Moreover, according to traditional theory, the goods produced are homogeneous. However, since the goods subject to foreign trade are not homogeneous in reality, new theories had to be developed. The first theory developed on this subject is the horizontal intra-industry trade theory developed by Krugman. Krugman (1979) stated that the change in trade was due to economies of scale rather than changes in factor endowments and technology. Accordingly, the market has the characteristics of monopolistic competition, and although the prices of the goods produced are the same, there are differences between the goods. The increase in exports was based on increasing product diversity.

Flam and Helpman (1987) tried to explain trade between the north and the south with vertical intra-industry trade theory. According to this theory, northern countries produce higher quality products, and southern countries produce lower quality products, so trade between the north and south is determined by the differing quality of the products. The structure of international trade is determined by differences in technology, income, and income distribution between countries. The qualities and prices of the products cause the differentiation of the products; therefore, the increase in exports is possible with the increase in the quality of the products and the corresponding price.

Melitz (2003) developed the dynamic industry model to analyse the impact of intra-industry trade on international trade. In this model, companies are heterogeneous; companies with higher productivity can enter the export market, while companies with lower productivity continue to produce in the domestic market. Export increase depends on increasing the production or number of more productive companies. For this reason, the source of widespread trade is only exporting companies.

Hummels and Klenow (2005) used country-level data in their study to investigate the effects of extensive trade and intensive trade on countries' export increases. In their study, using 1995 data for 5,000 product categories from 126 countries, they found that countries with large economies, export a larger group of products than countries with small economies, that these products are of higher quality, and they stated that 62% of the increase was due to widespread trade.

Bernard et al. (2006) analysed the behaviour of companies producing more than one product in a free trade environment using the general equilibrium model approach in international trade. Although the efficiency of the companies for each product is assumed to be constant in the study, efficiency at both the company and industry level is possible by reducing costs. The reduction of costs is determined by the distribution of resources within and between companies. They stated that there is a positive correlation between extensive and intensive trade of exporting companies.

Felbermayr and Kohler (2006) investigated the reasons for the increase in trade for the period between 1950 and 1997 after World War II, in the context of widespread trade and intensive trade.

Feenstra and Kee (2007) examined the impact of China’s and Mexico's exports to the US on product diversity as a result of the reduction of tariffs on a sectoral basis for the period between 1990 and 2001. They concluded that as a result of the liberalization of trade, the diversity of products exported by both Mexico and China increased for the examined period.

In their study, Helpman et al. (2008) explained the development of world trade with widespread and intensive trade. Their studies consist of two parts: theoretical and quantitative. With the model they developed in the theoretical section, they tried to explain the situation of countries that do not trade with each other and countries that trade with each other. In the quantitative section, they stated that for the period 1970 through 1997, all 158 countries did not trade with each other between the mentioned period and that there were countries in the world that did not trade with

each other at all. They explained the effects of widespread and intensive trade on trade volume by using country-level data.

In their study, Eaton et al. (2008) examined the sales of French companies to 113 different markets and stated that the increase in the number of companies and product variety made a positive contribution to exports. In the study conducted by Amiti and Freund (2008), it was concluded that the source of China's export increase was intensive trade rather than extensive trade. Amurgo-Pacheco and Pierola (2008), in a study conducted for 24 developed and developing countries between 1990 and 2005, stated that the source of export growth was intensive trade.

Berthou and Fontagné (2008), in their study based on French companies for the years 1998 through 2003, stated that the source of export growth was widespread trade. In the 2009 study conducted by Bernard et al. for the years 1993 through 2004, the development of US trade was explained by widespread and intensive trade, and it was concluded that widespread trade was more important in increasing US exports.

In the study conducted by Besedeš and Prusa (2011) for 46 countries in the period 1975 through 2003, it was stated that the source of export growth was intensive trade. Bingzhan (2011), in his study on China's export increase in the period 2001 through 2007, stated that 69% of this increase was due to intensive trade and 15% to extensive trade. Dutt et al. (2011) concluded in their study for 148 countries in the period 1970 through 1999 that the source of the growth of countries' exports was widespread trade.

In the study conducted by Kehoe and Ruhl (2013), it was stated that widespread trade is an important factor in the development of world trade. Cheong et al. (2016) examined the effects of widespread and intensive trade on exports for 150 to 200 countries and 3,100 goods between 1980 and 2009. The study stated that the effect of distance between countries on extensive trade decreased, while its effect on intensive trade increased. Abdul Wahab and Jalil (2017) stated that after the termination of the Agreement on Textiles and Clothing (ATC) for the period 2003 through 2014, widespread and intense trade occurred between the countries of Pakistan, India, and Bangladesh, which compete for the two main target markets of the EU and the US. This study empirically examined its effects on ready-made clothing exports. In addition, in their study, they examined the impact of the removal of Chinese export quotas applied in the EU and US markets on the exports of South Asian textile and clothing products and the trade preferences margins calculated for the same product groups. They concluded that the decrease in costs can encourage trade in products that were not previously traded or least traded; therefore, as trade costs decrease, the rate of intensive and widespread trade in exports increases. Their study confirmed that the implemented policies had differential effects on sectoral exports, subsector exports, and their margins in the two markets.

Delrosal (2019) examined the effects of new member states that accessed the EU for the between the period of 2004 – 2007 and stated that the extensive trade of new EU member states increased from 10% to approximately 50%.

Elliott et al. (2020) examined the causal relationship between innovation and extensive and intensive trade for French firms and concluded that innovation has a positive effect on total exports.

Bista and Sheridan (2021) used a gravity model to find the relationship between exports and economic growth, stating that extensive trade is important in export growth and economic growth, and that at the beginning of the growth of developing countries, extensive trade in exports increases and intensive trade decreases.

There are not many studies on whether the source of export increase for Turkey stems from extensive or intensive trade. Aldan and Çulha (2013) carried out a study revealing the role of intensive trade in Turkey’s export increase. Methods developed by Hummels and Klenow (2005) and Kehoe and Ruhl (2013) were used in their study. The impact of widespread trade on Turkey’s exports was discussed by examining the period 1993 through 2011. The study concluded that widespread trade increased and that this increase is due to entering new markets rather than exporting new products.

In the study carried out by Ekmen Özçelik and Erlat (2013), the methods developed by Amiti and Freund (2008) and Feenstra and Kee (2007) were used. Turkey's exports to 15 EU countries in the period from 1996 through 2006 were examined, and it was stated that most of the export increase was due to intensive trade. Additionally, in the study conducted by Türkcan and Pişkin (2014), the method applied by Bingzhan (2011) was used. Turkey's exports to 211 countries in the period 1998 through 2011 were evaluated by considering 5,111 product groups. Accordingly, it was concluded that 99% of Turkey's export increase was due to intensive trade, 66% of this increase was due to quantity and 33% to price increase. Türkcan and Pişkin (2016) analysed the effects of the Customs Union and Free Trade Agreements on Turkey's extensive and intensive trade for 172 countries in the period 1996 through 2011. The study found that the impact of Customs Union and Free Trade Agreements were negative on extensive trade and positive on intensive trade. They concluded that the Customs Union had a greater impact on widespread and intensive trade than Free Trade Agreements.

METHOD

In this section, information will be given about the method used in the study. Many methods have been used in the literature to determine whether the source of exports is widespread trade or intensive trade. In this study, the Bingzhan (2011) method, which is based on the studies conducted by Feenstra (1994) and Hummels and Klenow (2005), is used. With the method developed by Bingzhan (2011), the net contribution of extensive trade and intensive trade to the growth rate of exports can be calculated. In addition, the results obtained are more understandable, since it can be calculated separately how much of the intense trade is due to price increase and how much is due to quantity increase.

According to this method, the export increase for periods t and t+1 consists of two parts. These divisions are extensive trade, caused by the increase in the number of products or products traded, and intensive trade, caused by the increase in the exports of the common product group in periods t and t + 1.

In the model the following symbols are used:

- Ω_t: product group exported in period t
- Ω_{t+1}: the product group exported in period t+1
- Ω_c: the common product group exported in periods t and t+1
- $\Omega_c = \Omega_t \cap \Omega_{t+1}$ (the overlapped exporting products set)
- V_{it}: the export value of product group i in period t
- V_{it+1}: the export value of product group i in period t+1.
- V: the export value
- s_i: the value ratio
- P: price
- Q: quantity
- EX: extensive trade
- IM: intensive trade
- g_R: the growth rate of total export
- g_{EX}: the growth rate of extensive trade
- g_P: the growth rate of price
- g_Q: the growth rate of quantity
- R: the export rate for periods t and t+1

The export rate R for periods t and t+1 is calculated by the following formula, Equation 1:

$$R = \frac{\sum_{i\epsilon\Omega_{t+1}} V_{it+1}}{\sum_{i\epsilon\Omega_t} V_{it}} \tag{1}$$

Accordingly, the export rate is equal to the ratio of the export value of product group i in period t + 1 to the export value of product group i in period t.

This equality, as shown in Equation 2:

$$R = \frac{\sum_{i\epsilon\Omega_{t+1}} V_{it+1}}{\sum_{i\epsilon\Omega_t} V_{it}} = \left[\frac{\frac{\sum_{i\epsilon\Omega_{t+1}} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it+1}}}{\frac{\sum_{i\epsilon\Omega_t} V_{it}}{\sum_{i\epsilon\Omega_c} V_{it}}}\right] x \left[\frac{\sum_{i\epsilon\Omega_c} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it}}\right] \tag{2}$$

If written in the form $\left[\frac{\frac{\sum_{i\epsilon\Omega_{t+1}} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it+1}}}{\frac{\sum_{i\epsilon\Omega_t} V_{it}}{\sum_{i\epsilon\Omega_c} V_{it}}}\right]$, extensive trade (EX) and $\left[\frac{\sum_{i\epsilon\Omega_c} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it}}\right]$ shows intensive trade.

If more products were exported in period t+1 than in period t, extensive trade will be greater than 1.

In order to calculate how much of the intense trade is due to price changes and how much to quantity changes, the expression $\left[\frac{\sum_{i\epsilon\Omega_c} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it}}\right]$ can be rewritten as in Equation 3:

$$\frac{\sum_{i\epsilon\Omega_c} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it}} = \frac{\sum_{i\epsilon\Omega_c} p_{it+1} q_{it+1}}{\sum_{i\epsilon\Omega_c} p_{it} q_{it}} = \pi_i \left(\frac{p_{it+1}}{p_{it}}\right)^{w_i} \pi_i \left(\frac{q_{t+1}}{q_t}\right)^{w_i} \tag{3}$$

The w_i ratio can be written as in Equation 4:

$$w_i = \frac{\frac{s_{it+1} - s_{it}}{\ln s_{it+1} - \ln s_{it}}}{\sum_i \left(\frac{s_{it+1} - s_{it}}{\ln s_{it+1} - \ln s_{it}}\right)}. \tag{4}$$

s_i, representing the value ratio, can be written as in Equation 5:

$$s_i = \frac{p_i q_i}{\sum_i p_i q_i} \tag{5}$$

In conclusion, the source of the change in the export rate for the periods t and t+1 is expressed in three parts: price (P) and quantity (Q) components that constitute extensive trade (EX) and intensive trade, as shown in Equation 6:

$$R = EX \times P \times Q = \left[\frac{\frac{\sum_{i\epsilon\Omega_{t+1}} V_{it+1}}{\sum_{i\epsilon\Omega_c} V_{it+1}}}{\frac{\sum_{i\epsilon\Omega_t} V_{it}}{\sum_{i\epsilon\Omega_c} V_{it}}}\right] \times \pi \left(\frac{p_{it+1}}{p_{it}}\right)^{w} \times \pi \left(\frac{q_{it+1}}{q_{it}}\right)^{w_i} \tag{6}$$

The growth rates of export rate, extensive trade, price, and quantity, obtained by taking the logarithm of the R, EX and Q values in Equation (6) and multiplying them by 100, are given below:

$$g_R = g_{EX} \times g_P \times g_Q$$

The contribution of the increases in the g_{EX}, g_P and g_Q components in the above equation to the export growth rate is calculated by the following formulas:

Table 1. Automotive main industry product description

8701	Tractors
8702	Bus, minibus
8703	Passenger cars
8704	Truck, pickup truck

Note. From *Automotive Main and Subsidiary Industry Sector, Sector Reports*, Ministry of Economy (2016). https://www.orhangazitso.org.tr/webFiles/1488897381.pdf

$$r_{EX} = 100 \times \left(\frac{g_{EX}}{g_R}\right)$$

$$r_P = 100 \times \left(\frac{g_P}{g_R}\right)$$

$$r_Q = 100 \times \left(\frac{g_Q}{g_R}\right)$$

DATA SET

In the study, analysis was conducted using data obtained from the Turkish Statistical Institute. With this data set, inconsistencies in the data regarding trade between countries were eliminated, and a consistent data set was created by calculating unit values. On the basis of Türkiye's six-tier position for the period 2002 through 2020, the automotive main industry product list and the automotive sub-industry product list are included in Table 1 and Table 2. In the study, the period 2002 through 2020 was examined because the data in the period between the February 2001 Crisis in Turkey and the pandemic that occurred after 2021 was more consistent and stable.

The period examined covers the period after the economic crisis and before the pandemic in Turkey. The study, which covers the period 2002 through 2020, when relatively stable economic policies were implemented, can be applied to the post-pandemic period for the automotive sector, which is of great importance for Turkey. In future studies, the two periods can be compared. Thus, it can be examined whether the pandemic has changed the foreign trade structure of the automotive industry.

FINDINGS

In this study, the method used by Bingzhan (2011) for countries was used for products within the scope of the automotive main industry and automotive sub-industry. In Tables 3 and 4, which contain the results of the study, it is explained how much of the total export increase within the scope of Turkey's automotive main industry and automotive sub-industry in the period 2002 through 2020 is due to extensive trade and how much of it is due to intensive trade representing price and quantity increases.

The variables used in the study are as follows: R represents the total exports in 2020 divided by the exports in 2002. EX, IM, P, and Q represent the ratios for extensive trade, intensive trade, price, and quantity, respectively. g_R, g_{EX}, g_P, and g_Q are the growth rates of total export, extensive trade, price, and quantity. They are calculated as follows: $g_R = 100 * \ln(R) / (2020–2002)$. The calculation method is similar for g_{EX}, g_P, and g_Q. r_{EX}, r_P, and r_Q are the contribution factor of each margin. Because the elasticity of each margin's growth to overall export growth is one, the contribution factor is calculated as follows: $r_{EX} = 100 * g_{EX} / g_R$.

In the automotive main industry, the export rate for the period 2002 through 2020 is 6.74%, the extensive trade rate is 1.28%, and the intensive trade rate is 5.26%. 1.54% of the intensive trade rate is due to price, and 3.42% is due to quantity, as shown in Equation 7.

Table 2. Automotive main industry product description

4011	New tires made of rubber
4012	Rubber retreaded or used tires
4013	Rubber inner tires
401699	Rubber parts for motor vehicles of headings 87.01 to 87.05
681320	Brake pads containing asbestos
681381	Asbestos-free brake pads
7007	Safety glasses
700910	Rearview mirrors
8407	Internal combustion engines
8408	Diesel and semi-diesel engines
8409	Parts and parts of engines
841330	Fuel, oil or cooling pumps for internal combustion piston engines
841520	Air conditioners
842123, 842131	Filters
8482	Bearings
8483	Transmission shafts and cranks
8484	Gaskets
8507	Batteries
8511	Firing devices
8512	Lighting and signaling devices
8706	Chassis for motor vehicles of headings 87.01 to 87.05
8707	Bodywork of motor vehicles in headings 87.01 to 87.05
870810	Bumpers and parts
870821	Safety belts
870829	Body parts
870830	Brakes and servo - brakes and their parts
870840	Gearboxes and their parts and accessories
870850	Drive axles with differentials
870870	Wheels and their parts and accessories
870880	Suspension systems and parts (including shock absorbers)
870891	Radiators and their parts and accessories
870892	Exhaust silencers and exhaust pipes; their parts
870894	Steering wheels, steering columns and steering boxes
870895	Inflatable airbags
870899	Other parts and accessories
9104	Clocks for vehicle instrument panels
940120	Seating furniture of a type used in motor vehicles

Note. From *Automotive Main and Subsidiary Industry Sector, Sector Reports*, Ministry of Economy (2016). https://www.orhangazitso.org.tr/webFiles/1488897381.pdf

Table 3. Automotive main industry (%) (2002-2020)

R	EX	IM	P	Q	g_R	g_{EX}	g_P	g_Q	r_{EX}	r_P	r_Q
6.74	1.28	5.26	1.54	3.42	19.08	2.48	4.31	12.29	13.00	22.59	64.40

Table 4. Automotive supply industry (%) (2002-2020)

R	EX	IM	P	Q	g_R	g_{EX}	g_P	g_Q	r_{EX}	r_P	r_Q
6.43	1.08	5.94	1.39	4.27	18.61	0.78	3.32	14.51	4.21	17.82	77.97

$$R=EX*IM=EX*P*Q=1.28*1.54*3.42=6.74 \quad (7)$$

The growth rate of exports, obtained by taking the logarithm of R, EX and Q values and multiplying them by 100, is 19.08%. The growth rate of extensive trade is 2.48%. The growth rate of the price, which is the component of intensive trade, is 4.31%. The growth rate of quantity is 12.29%. The sum of the price and quantity growth rates, which are the components of extensive trade and intensive trade, is equal to the export growth rate, as shown in Equation 8:

$$g_R = g_{EX} + g_P + g_Q=2.48+4.31+12.29=19.08 \quad (8)$$

13% of the export increase in the automotive main industry was due to extensive trade, and approximately 87% was due to intensive trade. 22.59% of the export increase resulting from intensive trade was due to price increase, and 64.40% was due to quantity increase. Thus, the export increase in the automotive main industry resulted from intense trade and the quantity effect of intense trade. Explaining the increase in exports with an increase in quantity shows that the increase in exports of certain products in these sectors depends only on increasing the quantity of these products and that the diversity of products in these sectors increases, as shown in Equation 9:

$$r_{EX}+ r_P+ r_Q = 13+22.59+64.40 = 100 \quad (9)$$

For the period 2002 through 2020, the export rate in the automotive sub-industry is 6.43%, the extensive trade rate is 1.08%, and the intensive trade rate is 5.94%. 1.39% of the intensive trade rate was due to price and 4.27% was due to quantity, as shown in Equation 10:

$$R = EX*IM = EX*P*Q = 1.08*1.39*4.27 = 6.43 \quad (10)$$

The export growth rate of the automotive sub-industry is 18.61%, and the growth rate of extensive trade is 0.78%. The growth rate of price, which is a component of intensive trade, is 3.32%, and the growth rate of quantity is 14.51%, as shown in Equation 11:

$$g_R = g_{EX} + g_P + g_Q = 0.78 + 3.32 + 14.51 = 18.61 \quad (11)$$

4.21% of the export increase in the automotive sub-industry was due to extensive trade, and approximately 95.79% was due to intensive trade. 17.82% of the export increase resulting from intensive trade was due to price increase, and 77.97% was due to quantity increase. Therefore, the export increase in the automotive sub-industry resulted from intensive trade and the quantity effect of intensive trade. Explaining the increase in exports with an increase in quantity shows that the increase

in exports in the automotive sub-industry depends on the increase in quantity and the increase in the diversity of products. For the period 2002 through 2020, 95.79% of Turkey's automotive sub-industry originates from intensive trade, showing that Turkey's exports are concentrated in certain products and countries. The quantity increase of 77.97% is affected by Turkey's average growth rate of 5.4%. In the period 2002 through 2020, the inflation rate in Turkey was 409%. In addition, the increase in exchange rates in Turkey in the same period was effective in the 17.82% increase in exports, as shown in Equation 12:

$$r_{EX} + r_P + r_Q = 4.21 + 17.82 + 77.97 = 100 \quad (12)$$

RESULT AND CONCLUSION

Starting from the 1960s, great developments have been experienced in the production and exports of the automotive industry in Turkey, and the automotive industry has become the locomotive sector of the Turkish economy. In this study, the source of exports of the automotive sector's main and sub-industry was determined, and the export structure was revealed. In the study, annual export data for the years 2002 through 2020, obtained from the Turkish Statistical Institute, were used, and the contribution of widespread and intensive trade to exports was calculated. The contribution of intensive trade to exports is detailed by calculating the price and quantity components separately. Since the period, countries, and sectors studied in the previous research on this subject for Turkey are different, a one-to-one comparison of the article with previous articles cannot be made. This study is an original study because it specifically examines the automotive main and sub-industry, which has an important place in Turkey's exports.

It has been determined that 13% of the increase in automotive main industry exports was due to extensive trade, and approximately 87% was due to intensive trade. 22.59% of the intensive trade was due to price increase, and 64.40% was due to quantity increase. A similar situation is observed in the automotive sub-industry. 4.21% of the export increase was due to extensive trade, and approximately 95.79% was due to intensive trade. 17.82% of the export increase resulting from intensive trade was due to price increase, and 77.97% was due to intensive trade.

The fact that the increase in exports in both the automotive main industry and the automotive sub-industry stems from intensivetrade shows that intensive trade has a significant share in the increase in exports and that there is not much product and country diversity in the automotive industry. There is an increase in exports to certain product groups and certain countries in the automotive main and sub-industry, but product and country differentiation is not made. These findings show that exports may be negatively affected, especially if there is an economic crisis in the exporting countries. For this reason, it is important to increase the rate of widespread trade. In addition, the fact that the intensive trade increase stems from the increase in quantity shows that the increase in exports in the automotive main and sub-industry depends on increasing the volume of exports.

The fact that the export increase of the automotive main and sub-industry, which is the driving force of the Turkish economy, is explained by quantity growth rather than price growth means that new resources, especially labour and capital, must be allocated to this sector for sustainable growth. In addition, since the rate of price increase in this sector is limited, care should be taken to follow new technologies.

Theoretically, the Bingzhan method was applied to Turkey's automotive main and sub-industry, and the structure of the automotive sector's exports was examined in the study. The results obtained support the theoretical framework. Looking at the literature, the absence of a specific study for the automotive industry once again reveals the importance of this study. Therefore, the results of this study show that the export of the automotive sector is a very important sector for sustainable growth. In this context, it is recommended that tax reductions, export incentives, digitalization, utilization of

technological developments and trade facilitation practices, and simplification of customs procedures are important measures to increase production and exports in the automotive sector.

CONFLICTS OF INTEREST

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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