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Imports in Fob Delivery Terms

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Abstract

Foreign trade data and indicators are important resources for many economic analysis. In particular, the Central Bank of the Republic of Türkiye uses these data for the calculation of balance of payments. Export data published by TurkStat are calculated according to free on board (FOB delivery terms) and the import data are calculated according to the cost of goods, insurance and freight (CIF delivery terms). In the balance of payments account calculated by the Central Bank, export and import is used by FOB delivery terms. Therefore, imports data should be calculated according to FOB delivery terms at the same time. For this purpose, freight and insurance values should be calculated and therefore insurance and freight rates should be determined. In this study, various analyzes were performed to determine the freight and insurance ratios. First, the variables thought to have an effect on freight and insurance rates were determined, and whether this effect was statistically significant was tested with ANOVA method. The data set was grouped taking into account the variables affecting freight and insurance rates and freight and insurance ratios were calculated for each group. Before the calculation, outliers were determined for each group. Adjusted Box-Plot and median z-score methods were used for detect outliers. After determining the outliers, freight and insurance ratios were estimated using an arithmetic mean. Imports, freight and insurance values were calculated by using these ratios and compared with the values calculated by Central Bank calculated.

Keywords: Outlier, foreign trade, outlier detection, outlier detection methods, FOB

1. Introduction

Foreign trade is defined as the goods and services trade activities of a country with other countries and has a dynamic structure that is constantly changing. Foreign trade, which plays a very important role in the economic life of countries and tries to adapt rapidly to changing technology, is also effective in the development and prosperity of the countries. Many countries aim to achieve economic growth and development via foreign trade activities. Therefore, before taking decisions about foreign trade policies, foreign trade structure should be determined and developments should be followed. The most important tools used for this purpose are foreign trade statistics and indicators. Foreign trade statistics are calculated and published by Turkish Statistical Institute (TurkStat) officially in Türkiye. The data source of foreign trade statistics is the customs declarations that received from the Ministry of Trade.

Imports data and indicators are important resources for many economic analysis. In particular, the Central Bank of the Republic of Türkiye uses these data in the calculation of balance of payments. Exports and imports data published by TurkStat are calculated according to FOB and CIF delivery terms, respectively. In the balance of payments statistics calculated by the Central Bank, export and

import is taken into account by FOB delivery terms. Therefore, import data should be calculated according to FOB delivery terms at the same time.

While FOB delivery terms includes only cost, CIF includes cost, insurance and freight. Therefore, the freight and insurance costs should be deducted from the total value in order to calculate the data according to the FOB. It is possible to convert the import figures calculated according to CIF delivery terms to FOB by considering the information in the records of customs declarations. While there are insurance and freight values in some of the customs declarations, this information is missing in some others. Consequently, insurance ve freight estimations are required for these records. For this purpose, it is aimed to calculating freight and insurance rates with the most appropriate method.

In this study, various analyzes were performed to determine the freight and insurance ratios. Firstly, variables that are thought to be effective on freight rates were determined and this effect was tested that it is statistically meaningful or not by ANOVA method. After this analysis, the data set was grouped by considering the variables affecting the freight and insurance rates and these rates were calculated for each group. Before the calculation, outliers were detected for each group. Adjusted Box-Plot method and Median Z-score methods were used to detect outliers. After detection of the outliers, uutliers removed from the data freight and insurance rates were estimated by using arithmetic mean.

The TurkStat sends the import data produced according to the CIF to the Central Bank for the balance of payments statistics. The Central Bank, on the other hand, converts these data to FOB with the aim of including only the cost of goods for imports. The calculations made by the Central Bank and the results obtained from this study were compared. Moreover, in the national accounts system produced by TurkStat, imports are converted into FOB delivery terms. Thus, the comparison of exports and imports becomes more meaningful. In addition, this calculation provides consistency with the balance of payments statistics and national accounts. In order to make all these calculations in the most accurate way, import data should be converted to FOB delivery terms with the most appropriate method. Therefore, determination of the this method has great importance.

2. Literature

The costs associated with cross-border shipping and insurance of goods are important determinants of the volume and geography of international trade. While certainly not the only barrier to trade, transport and insurance costs are not insignificant and can pose barriers similar in size and effect to import tariffs [2], which highlights how the costs associated with for example poor quality infrastructure (ports, roads), geographical distance to market, and oil prices, continue to shape global production networks and the integration of countries into global value chains [1]. Few (official) data are available on the size and trends in transport and insurance costs for international trade. In addition, these data are not in product, country, etc. details. At most, and still rarely, countries publish highly aggregated information in for example their supply-use tables or auxiliary tables for balance of payment statistics [1].

There are a lot of works on estimation of transport and insurance costs of international trade in literature. Several datasets on CIF-FOB margins by product and partner country have already been

produced, mostly with the aim of explaining the size, trends, and drivers of trade costs and the importance of trade facilitation. The most remarkable examples of this literature are [5], [4], [3], [6], and [8]. Overall, the literature can be divided into a group of papers that uses what is often referred to as explicit data on transport costs, published by statistical offices (e.g. the United States), and a group of papers that uses the differences between mirrored flows (imports CIF and exports FOB), generally drawing on UN Comtrade data, to implicitly derive transport costs. These two strands are discussed in more detail by [1].

3. Data and Methodology

3.1 ANOVA

Before calculation of freight and insurance rates, in the first step, the data set was grouped by the variables that affect freight rates. After determining the variables that are thought to affect freight rates, it was tested whether the effects of these variables are statistically significant. One –way ANOVA method was used for this purpose.

Country groups, product groups and mode of transport variables are thought to have impact on freight and insurance. According to this, Türkiye's imports data were used to test the effects of these variables. Therefore, freight rates are defined as dependent variables, country groups, product groups and mode of transport variables are defined as independent variables.

Country of origin for country group was used. Country groups have 9 levels as mentioned below;

5114: European union

5190: Other European (Except E.U)

5210: North Africa

5290: Other Africa

5310: North America

5320: Middle America and Caribbean

5330: South America

5410: Near and Middle East

5510: Australia and New Zealand

Standard Classification of Goods for Transport Statistics (NST2007) is used for product group. Products groups have 16 levels as mentioned below;

01: Agricultural, hunting and forestry products; fish and other fishing products

02: Hard coal and lignite; crude oil and natural gas

03: Metal ores and other mineral and mining products; peat; uranium and thorium

04: Food products, beverages and tobacco

05: Textiles and textile products; leather and leather products

06: Wood, cork, pulp, paper, paper products, printed matter and recorded media

07: Coke and refined petroleum products

08: Chemicals, chemical products, man-made fibers; rubber and plastic products; nuclear fuel

09: Other non-metallic mineral products
10: Base metals,fabricated metal products (excluding machinery and equipment)
11: Machinery and equipment not elsewhere classified; medical, precision and optical instruments,watches
12: Transport equipments
13: Furniture and other manufactured goods
14: Secondary raw materials, municipal waste and other waste
17: Transportation of household and office goods; passenger baggage and belongings, vehicles for repair, motor vehicles, other non-market goods not elsewhere classified
19: Unidentified goods;goods that cannot be identified for any reason and therefore cannot be assigned to groups 01-16
99: Personal belongings, provisions and other items not elsewhere specified
Mode of transport has 6 levels as mentioned below;
1:Seaway
2: Railway
3:Highway
4:Airway
5:Others
In the first stage, the factors were handled one by one and their effects on the dependent variable were investigated. Accordingly, the following study was conducted for the effect of product groups on freight rates. The model between product groups and freight rates is as follows.
$X_{ij}= \mu + \beta_j+\varepsilon_{ij}$
J=1,...16
$i=1,..,n_j$
X_{ij}: Freight rates
μ: General average
β_J: j. the effect of the j.level of the product group
Before applying the analysis of variance, the assumption that the distribution of the dependent variable is normal at each factor level should be checked. For this purpose, it was tested whether the freight rates are normally distributed for each level of the product group by using the SPSS program. The results are as follows:
H_0: Freight rates are normally distributed for each product group level.
H_1: Freight rates are not normally distributed for each product group level.

Table 3.1- Normality test

Tests of Normality

	NST2007_2	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
FREIGHT RATES	01	,255	190	,000	,694	190	,000
	02	,158	53	,002	,922	53	,002
	03	,198	131	,000	,785	131	,000
	04	,200	184	,000	,726	184	,000
	05	,280	219	,000	,589	219	,000
	06	,159	189	,000	,834	189	,000
	07	,174	107	,000	,846	107	,000
	08	,212	230	,000	,651	230	,000
	09	,177	179	,000	,698	179	,000
	10	,213	213	,000	,651	213	,000
	11	,168	240	,000	,772	240	,000
	12	,211	221	,000	,636	221	,000
	13	,144	193	,000	,852	193	,000
	14	,223	114	,000	,658	114	,000
	17	,268	71	,000	,746	71	,000
	19	,186	77	,000	,741	77	,000
	99	,275	60	,000	,664	60	,000

a. Lilliefors Significance Correction

Since the p value calculated for each product group level is < 0.05, the H_0 hypothesis, which states that the freight rates have a normal distribution, is rejected. Therefore, non-parametric test method will be used to test the effect of product group levels on freight rates. Accordingly, the hypothesis are as follows;

H_0: $\beta_j=0$

H_1: $At\ least\ one\ of\ the\ \beta j's\ is\ not\ zero.$

Test Statistics[a,b]

	FREIGHT RATES
Chi-Square	606,307
df	15
Asymp. Sig.	,000

a. Kruskal Wallis Test

b. Grouping Variable: NST2007_2

Since the p value calculated according to the test result is <0.05, the H_0 hypothesis is rejected. Therefore, it is possible to say that the effect of product groups on freight rates is statistically significant.

Similarly, the effects of country groups and mode of transport variables on freight rates were tested and it was concluded that these effects were statistically significant. The effects of product groups, country groups and mode of transport variables on insurance rates were tested and it found that these effects were statistically significant

After the variables affecting the freight rates were determined, the data set to be used in the calculation was grouped by these variables. Before the calculation, outliers were determined for each group. Adjusted Box-Plot method and median z-score methods were used to detect outliers. Information on these methods is given below.

3.2 Median z-score

The mean and standard deviation estimators used in the z-score method are influenced by a single outlier as previously mentioned. In order to avoid this problem, median and median absolute deviation values are used instead of mean and standard deviation in the median z-score method. The median absolute devation value is calculated according to the following formula.

MAD=median ($|X_i - \widetilde{X}|$), $\widetilde{X}$, sample median, Median z-scores are calculated as follows;

$Mi=\frac{0,6745(X_i-\widetilde{X})}{MAD}$ large for a normal data set E (MAD) = 0,6745

Iglewicz and Hoaglin (1913) stated that the observation values should be labeled as outliers in the case of | Mi | >3.5 As in the z-score method, Mi scores are effective for data sets from normal distribution [7].

3.3 Adjusted Box-Plot Method

Although Tukey's Box-Plot method is applicable to both symmetric data and skewed data, it causes a large number of observations to be determined as outliers in the data with high skewness. This is due to the use of the lower and upper quadrants and interquartile distances measured without considering the skewness of the data set. Vanderviere and Huber have defined a new rule taking into account the medcouple (MC), which is a robust skewness measure for skewed data [9]. The calculation of MC coefficient is described below;

Let Xn = {X1, ..., Xn} be an independent data set from a continuous univariate distribution. Let the data set be sorted from small to large with $X_1 \leq ... \leq X_n$. In this case the MC coefficient is calculated according to the following formula;

$MC(X_1,...,X_n)=\text{med}\ \frac{(X_j-med_k)-(med_k-X_i)}{X_j-X_i}$

med_k= Median of the X_n data set

$X_i \leq med_k \leq Xj$ ve $X_i \neq X_J$ Ranges are calculated as follows;

$[L,U]=[Q_1-1.5\exp(-3,5MC)IQR, Q_3+1,5\exp(4MC)IQR]$ $MC \geq 0$

$= [Q_1-1,5\exp(-4MC)IQR, Q_3+1.5\exp(3,5MC)IQR]$ $MC \leq 0$

L: Lower boundary

U:Upper boundary

Observation values outside the boundaries are determined as outliers. The MC value ranges from -1 to 1. When the data is symmetrical, the MC value is 0. If MC> 0, the data is skewed to the right and MC <0, the data is skewed to the left. Vanderviere and Huber (2004) calculated the average percentages of outliers from the lower and upper limits for adjusted Box-Plot and original Box-Plot methods, taking into account the different numbers and distributions of observations. In the simulation study, it was concluded that the less observation value was found to be an outlier compared to the Tukey's Box-Plot method for a right skewed dataset. Compared to the Tukey method, in the case of a slightly right skewed distribution, the lower boundary moves to the right and more observation on the left side is determined as an outlier. This difference is due to the decrease in the lower limit and the increase in the upper limit. An example is given below:

Example:

Let take the data sets consisting of values of 3,2,3,4,3,7,3,7,3,8,3,9,4,4,4,1,4,2,4,7,4,8,14 ve 15 For this data set, Tukey's Box-Plot method and the adjusted Box-Plot method were applied and results are given in the figure as follows [7].

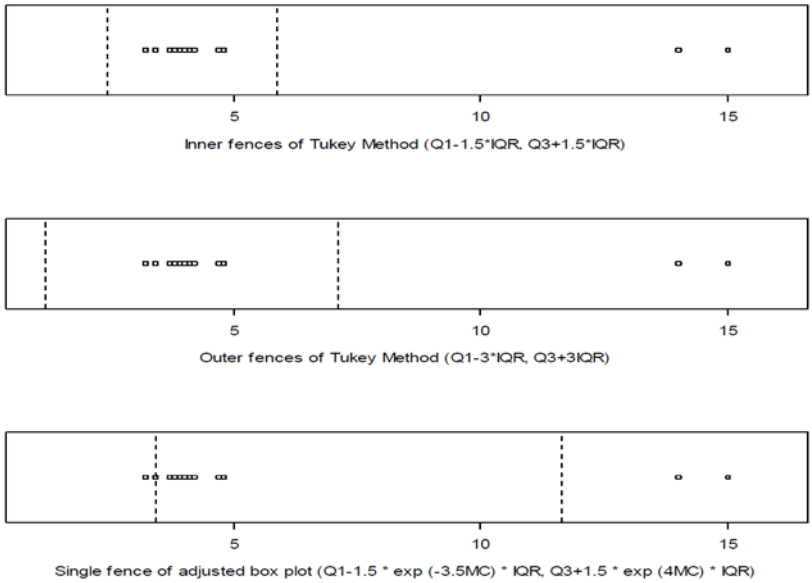

Figure 1. Change of the intervals of two diffirent box-plot methods

The first figure in Figure 1 represents the internal boundaries of the Tukey's Box-Plot method calculated for the data set in the sample, the second figure shows outer boundaries of Tukey's Box-Plot and the final figure shows the boundaries calculated using the adjusted Box-Plot method. According to the Tukey's Box-Plot method, the internal borders are calculated as [2.45; 5.85] and the external boundaries are calculated as [1,18; 7,13]. When we look the inner and lower limits are calculated according to the Box-Plot method, we can see that only 14 and 15 values in the data set are detected as outliers. Boundaries are calculated according to the adjusted Box-Plot method as [3,41; 11,62]. Therefore, when the results of the adjusted Box-Plot method were examined, the lower boundary was moved to the right and 2 of the observation values to the left of the data set were detected as outliers. According to the results of the first method, no observation value to the left of the data set can be detected as an outlier, while the second method can also detect the observation values on the left side. This is because the second method takes into account a boundary calculation that is free of the effect of skewed the data set. Therefore, a healthier result is obtained than the first method.

3.4 Common price valuations for international merchandise trade

Before calculating freight and insurance rates, common price valuations for international merchandise trade are given below.

Free on board (FOB): This term means that the seller’s obligation to deliver is fulfilled when the goods have passed over the ship’s rail at the named port of shipment. This means that the buyer has to bear all costs and risks of loss or of damage to the goods from that point. The FOB term requires the seller to clear the goods for exports. This term can only be used for sea or inland waterway transport [1].

Cost, insurance and freight (CIF): The seller has the same obligations as under CFR, but with the addition that he/she has to procure marine insurance against the buyer's risk of loss of or damage to the goods during the carriage. The seller contracts for insurance and pays the insurance premium. The buyer should note that, under the CIF term, the seller is required to obtain insurance only on minimum coverage. The CIF term requires the seller to clear the goods for export. This term can only be used for sea and inland waterway transport [1].

Free alongside ship (FAS): This term means that the seller's obligation to deliver is fulfilled when the goods have been placed alongside the vessel on the quay or in lighters at the named port of shipment. The buyer must bear all costs and risks of loss or of damage to the goods from that moment. The FAS term requires the seller to clear the goods for exports. This term can only be used for sea or inland waterway transport [1].

Cost and freight (CFR*)*: This term means that the seller's obligation to deliver is fulfilled when the goods have passed over the ship's rail in the port of shipment. The seller must pay the costs and freight necessary to bring the goods to the named port of destination, but the risk of loss or of damage to the goods, as well as any additional costs due to events occurring after the time of delivery, are transferred from the seller to the buyer. The CFR term requires the seller to clear the goods for export. This term can only be used for sea and inland waterway transport [1].

3.5 Calculation of Freight and Insurance Rates

The Ministry of Trade applies standard rates for records with missing freight and insurance values, regardless of product, country and mode of transportation. Freight and insurance values are calculated using standarts values. The aim of this study is to calculate the average freight and insurance rates by using the existing freight and insurance values taking into account the product, country and mode of transportation variables. Thus, it will be possible to calculate freight and insurance values for missing values by applying these average rates. While calculating freight and insurance rates in the first stage, 2 years before the reference year were taken into account, and then the previous 3 years were taken into account. The rates were calculated as 2-year and 3-year rates, and import values in FOB were calculated for both rates. When calculating the 2-year rates, the foreign trade data were combined for the years 2014-2015, 2015-2016, 2016-2017 and 2017-2018. Then, for the calculating 3-years rates, the data were combined by bringing together the years 2013-2014-2015, 2014-2015-2016, 2015-2016-2017, 2016-2017-2018 in 3-year rates. The following were applied for each data set;

- The data set is grouped by considering the variables of product, country group and mode of transport.
- Then, records without freight and insurance rates were removed from the data set.
- Freight rates between 9.9-10.1 and insurance rates between 2.9-3.1 in the data set were excluded.
- Then, the number of records in the product-country- mode of transport groups were determined and groups with 10 and more than 10 records were determined and groups with

less than 10 records were excluded from the data set. This is done because the number of records must be at least 10 for outlier detection methods to work effectively.

- In order to prevent outliers affecting the freight and insurance rates in the final data set, outlier detection was performed using the first Adjusted Box-Plot and then the Median Z-Score Methods. Two different methods were applied because the other method detect the outliers that one method could not detect.
- After determining the outliers, these values were removed from the data set and the freight and insurance rates were calculated by taking the ratio of the total freight and total insurance values to the total dollar values for each group.
- Freight and insurance rates were calculated from a higher group (product-country group, product-mode of transport, country group-mode of transport for groups with less than 10 registrations.
- Non-monetary gold, crude oil, natural gas, aircraft and ships are evaluated separately in the special goods category.
- In freight and insurance calculations, other foreign expenses that are not actually the subject of payment are not included.
- Calculated with the formula FOB import = CIF import - Freight - Insurance.
- After estimation of freight and insurance rates, FOB type import values were calculated for each calculated rate and comparisons were made.

3.6 Results

In the table 3.2, the number of records in the data set used when calculating freight and insurance rates are given by years.

Table 3.2 Number of records

Number of records used in calculations,2014-2018

Year	Total number of records	Total number of groups	Freight Rates Number of Records	Freight Rates Number of Groups	Insurance Rates Number of Records	Insurance Rates Number of Groups
2014-2015	36,587,410	768	8,390,600	505	7,113,936	495
2015-2016	40,345,090	795	5,713,445	360	6,091,678	382
2016-2017	47,502,679	769	8,573,481	371	6,617,894	369
2017-2018	55,725,146	788	8,600,437	364	6,285,994	365
2013-2014-2015	53,233,534	776	12,451,382	532	10,537,319	698
2014-2015-2016	57,833,701	742	11,384,520	503	10,691,537	502
2015-2016-2017	66,601,478	715	12,495,598	515	12,017,904	508
2016-2017-2018	76,971,437	710	13,213,670	513	12,220,635	508

The table 3.3 includes the FOB type import values by months and years, calculated by taking into account the freight and insurance rates obtained using 2-years data. The calculated FOB type import values were compared with the FOB type import values calculated by the Turkish Central Bank to be used in the balance of payments Statistics.

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Table 3.3 Import values in FOB terms of delivery according to the ratios obtained from the data of 2 years

Import values in FOB terms of delivery, 2016-2018

Calculations were made according to the ratios obtained from the data of 2 years.

Value: Million $

Year/month	Released imports (CIF)	Calculated imports (FOB)	Calculated freights	Calculated insurance	Balance of payments defined import	Balance of payments defined import (FOB)	Balance of payment (freight+ insurance)	Balance of payments adjustment - other goods	Balance of payment (freight)	Balance of payment (insurance)	TURKSTAT (FOB) -TR Central Bank	Freight difference	Insurance difference	Net error
2016	**198,618**	**190,476**	**7,349**	**794**	**184,595**	**189,630**	**8,989**	**5,035**	**7,747**	**1,242**	**846**	**-398**	**-448**	**11,104**
2016-01	13,453	12,895	505	53	12,507	12,860	592	354	508	85	34	-3	-31	-1,020
2016-02	15,578	14,934	582	62	14,697	14,835	743	138	645	98	99	-63	-37	2,414
2016-03	17,766	17,036	662	68	16,885	16,953	814	67	707	107	83	-45	-38	1,084
2016-04	16,188	15,525	596	66	15,168	15,452	736	284	635	101	74	-39	-35	-1,607
2016-05	17,197	16,493	634	70	15,958	16,439	758	481	650	108	55	-17	-38	2,275
2016-06	19,476	18,685	716	76	18,201	18,582	895	380	777	117	103	-62	-41	-1,164
2016-07	14,695	14,090	548	57	13,898	13,990	705	92	615	90	100	-67	-33	1,548
2016-08	16,614	15,934	617	63	15,603	15,900	714	297	616	97	34	1	-34	763
2016-09	15,298	14,663	575	60	14,353	14,621	677	268	586	91	42	-11	-31	-511
2016-10	17,009	16,299	636	73	15,374	16,232	777	858	659	117	67	-23	-44	1,577
2016-11	16,935	16,231	638	65	15,799	16,167	767	369	668	99	64	-31	-33	3,143
2016-12	18,410	17,690	641	79	16,152	17,599	811	1,447	680	132	91	-39	-52	2,602
2017	**233,800**	**221,862**	**10,198**	**1,740**	**208,537**	**222,544**	**11,255**	**14,008**	**9,651**	**1,605**	**-682**	**547**	**135**	**614**
2017-01	15,592	14,818	667	107	14,519	14,817	774	299	678	96	0	-10	10	-2,369
2017-02	15,826	15,067	648	110	14,411	15,105	721	694	616	105	-38	32	6	-553
2017-03	19,018	18,063	815	140	16,855	18,107	911	1,252	778	133	-44	36	8	-853
2017-04	17,788	16,901	756	130	16,009	16,941	847	932	729	118	-40	28	12	-4,442
2017-05	20,923	19,874	895	155	18,028	19,925	999	1,896	841	158	-51	54	-3	1,711
2017-06	19,174	18,244	787	142	16,467	18,250	923	1,784	776	147	-6	11	-5	1,283
2017-07	21,491	20,457	873	161	17,960	20,420	1,071	2,460	899	172	37	-26	-12	153
2017-08	19,162	18,139	872	151	17,309	18,222	939	914	813	126	-83	59	24	1,504
2017-09	19,978	18,903	916	160	17,882	18,998	981	1,115	846	134	-95	69	25	852
2017-10	21,217	20,082	977	158	19,718	20,226	991	508	862	129	-145	115	29	3,089
2017-11	20,547	19,434	964	148	19,074	19,561	986	487	862	124	-127	103	24	935
2017-12	23,085	21,879	1,027	178	20,305	21,972	1,113	1,667	952	161	-93	76	17	-696
2018	**223,047**	**213,794**	**7,689**	**1,564**	**205,215**	**213,859**	**9,188**	**8,644**	**8,032**	**1,156**	**-65**	**-343**	**408**	**19,023**
2018-01	21,522	20,621	719	183	18,526	20,556	967	2,029	795	172	65	-75	11	-816
2018-02	18,937	18,155	650	132	17,454	18,189	748	735	655	93	-34	-5	39	1,791
2018-03	21,435	20,575	714	147	19,260	20,632	803	1,372	704	99	-57	10	47	2,795
2018-04	20,557	19,723	690	143	18,574	19,763	793	1,190	700	93	-40	-10	50	671
2018-05	22,067	21,170	749	148	19,959	21,279	788	1,320	691	97	-109	58	51	4,239
2018-06	18,449	17,672	649	128	17,386	17,698	751	312	662	89	-26	-13	39	876
2018-07	20,058	19,230	692	135	18,728	19,177	881	449	781	100	53	-88	35	3,751
2018-08	14,804	14,144	561	99	14,055	14,124	680	69	612	68	20	-51	30	4,768
2018-09	16,327	15,649	567	111	15,437	15,651	675	215	597	78	-3	-31	33	-376
2018-10	16,174	15,475	580	119	15,234	15,435	739	201	653	86	40	-73	32	-733
2018-11	16,164	15,480	572	112	15,124	15,483	681	359	591	89	-3	-20	23	-585
2018-12	16,554	15,900	547	108	15,478	15,871	683	393	593	90	28	-46	17	2,642

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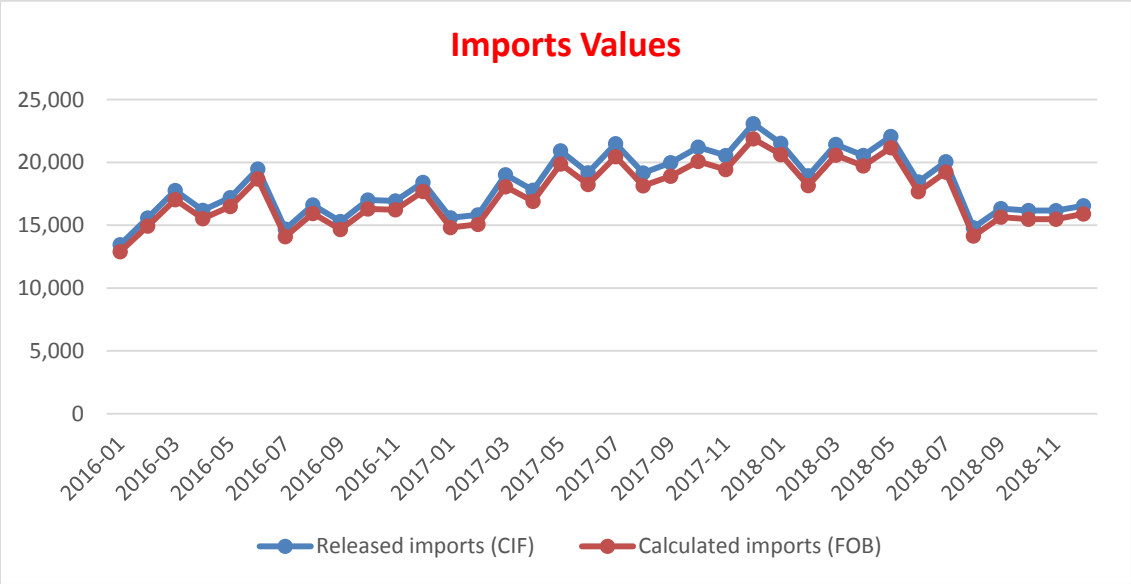

Figure 3.1 Imports values obtained from data of 2-years

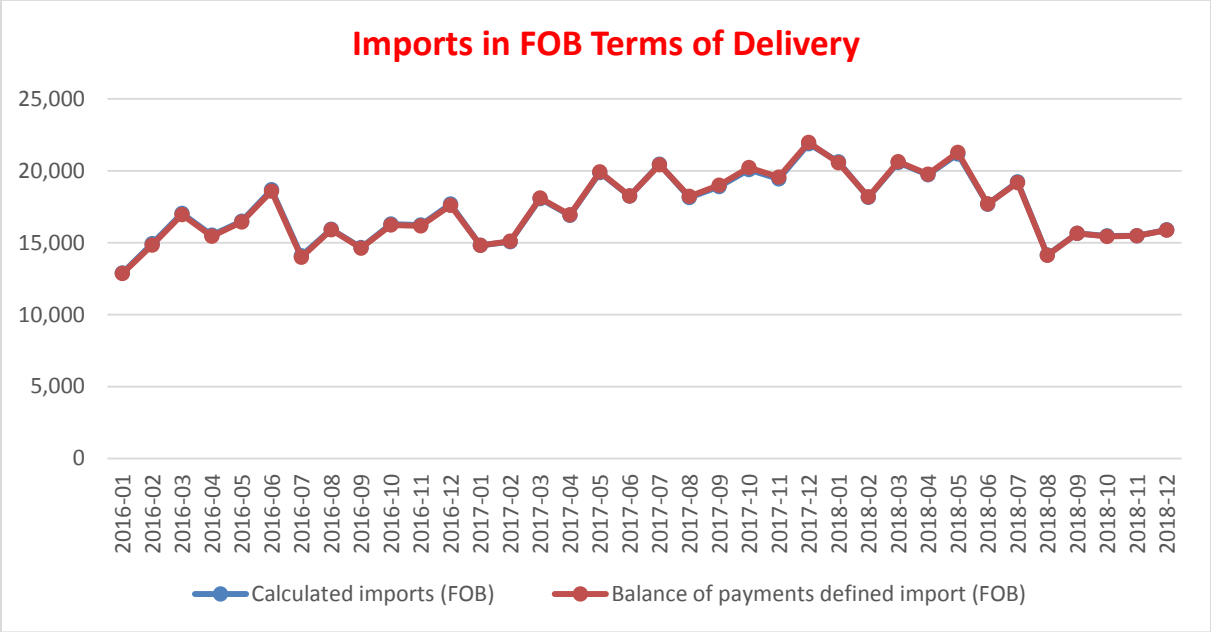

Figure 3.2 Imports values in FOB terms of delivery obtained from data of 2-years

Imports in Fob Delivery Terms

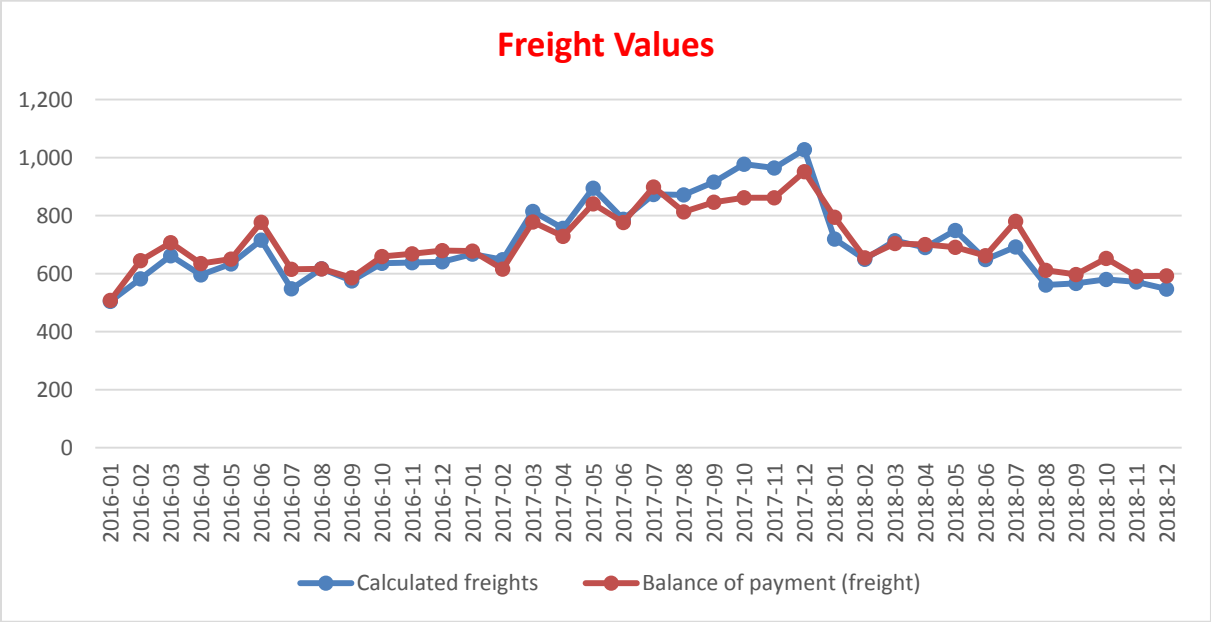

Figure 3.3 Freight values obtained from data of 2-years

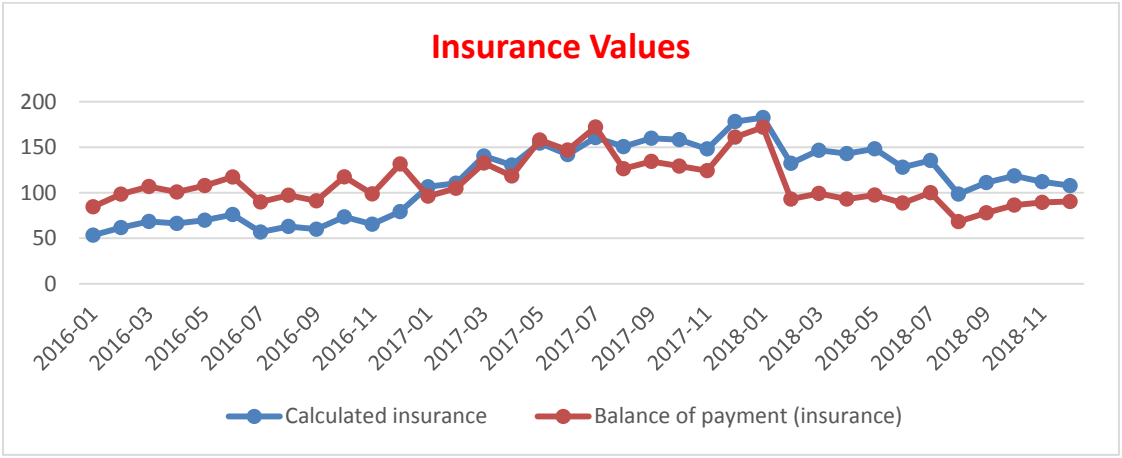

Figure 3.4 Insurance values obtained from data of 2-years

The table 3.3 includes the FOB import values by months and years, calculated by taking into account the freight and insurance rates obtained using 3-years data.

Table 3.3 Import values in FOB terms of delivery according to the ratios obtained from the data of 3 years

Import values in FOB terms of delivery, 2016-2018

Calculations were made according to the ratios obtained from the data of 3 years.

Value: Million $

Year/month	Released imports (CIF)	Calculated imports (FOB)	Calculated freights	Calculated insurance	Balance of payments defined import	Balance of payments defined import (FOB)	Balance of payment (freight+ insurance)	Balance of payments adjustment - other	Balance of payment (freight)	Balance of payment (insurance)	TURKSTAT (FOB) -TR Central Bank (FOB)	Freight difference	Insurance difference	Net error
2016	**198,618**	**190,510**	**7,340**	**768**	**184,595**	**189,630**	**8,989**	**5,035**	**7,747**	**1,242**	**881**	**-407**	**-474**	**11,104**
2016-01	13,453	12,895	506	52	12,507	12,860	592	354	508	85	34	-2	-32	-1,020
2016-02	15,578	14,936	582	60	14,697	14,835	743	138	645	98	101	-63	-38	2,414
2016-03	17,766	17,038	661	67	16,885	16,953	814	67	707	107	86	-46	-40	1,084
2016-04	16,188	15,527	596	64	15,168	15,452	736	284	635	101	75	-38	-36	-1,607
2016-05	17,197	16,496	633	68	15,958	16,439	758	481	650	108	57	-17	-40	2,275
2016-06	19,476	18,691	712	73	18,201	18,582	895	380	777	117	109	-65	-44	-1,164
2016-07	14,695	14,093	547	55	13,898	13,990	705	92	615	90	103	-68	-35	1,548
2016-08	16,614	15,936	617	61	15,603	15,900	714	297	616	97	36	0	-36	763
2016-09	15,298	14,667	573	58	14,353	14,621	677	268	586	91	46	-13	-34	-511
2016-10	17,009	16,303	635	71	15,374	16,232	777	858	659	117	71	-24	-46	1,577
2016-11	16,935	16,235	637	62	15,799	16,167	767	369	668	99	68	-31	-37	3,143
2016-12	18,410	17,693	640	77	16,152	17,599	811	1,447	680	132	94	-39	-55	2,602
2017	**233,800**	**224,674**	**7,919**	**1,207**	**208,537**	**222,544**	**11,255**	**14,008**	**9,651**	**1,605**	**2,130**	**-1,732**	**-398**	**614**
2017-01	15,592	14,992	526	73	14,519	14,817	774	299	678	96	174	-152	-23	-2,369
2017-02	15,826	15,230	518	78	14,411	15,105	721	694	616	105	124	-98	-27	-553
2017-03	19,018	18,274	645	99	16,855	18,107	911	1,252	778	133	167	-133	-34	-853
2017-04	17,788	17,092	603	93	16,009	16,941	847	932	729	118	151	-125	-26	-4,442
2017-05	20,923	20,110	703	110	18,028	19,925	999	1,896	841	158	185	-138	-48	1,711
2017-06	19,174	18,456	620	98	16,467	18,250	923	1,784	776	147	205	-156	-49	1,283
2017-07	21,491	20,683	696	112	17,960	20,420	1,071	2,460	899	172	263	-203	-60	153
2017-08	19,162	18,379	679	104	17,309	18,222	939	914	813	126	156	-134	-22	1,504
2017-09	19,978	19,170	700	109	17,882	18,998	981	1,115	846	134	172	-147	-25	852
2017-10	21,217	20,373	741	103	19,718	20,226	991	508	862	129	147	-121	-26	3,089
2017-11	20,547	19,731	717	99	19,074	19,561	986	487	862	124	170	-144	-25	935
2017-12	23,085	22,185	771	129	20,305	21,972	1,113	1,667	952	161	213	-181	-32	-696
2018	**223,047**	**213,253**	**9,126**	**668**	**205,215**	**213,859**	**9,188**	**8,644**	**8,032**	**1,156**	**-605**	**1,094**	**-489**	**19,023**
2018-01	21,522	20,608	806	109	18,526	20,556	967	2,029	795	172	52	11	-63	-816
2018-02	18,937	18,137	735	65	17,454	18,189	748	735	655	93	-52	80	-28	1,791
2018-03	21,435	20,501	876	57	19,260	20,632	803	1,372	704	99	-130	172	-42	2,795
2018-04	20,557	19,662	840	55	18,574	19,763	793	1,190	700	93	-101	139	-38	671
2018-05	22,067	21,110	898	59	19,959	21,279	788	1,320	691	97	-169	207	-39	4,239
2018-06	18,449	17,611	787	50	17,386	17,698	751	312	662	89	-87	125	-38	876
2018-07	20,058	19,174	831	53	18,728	19,177	881	449	781	100	-3	50	-47	3,751
2018-08	14,804	14,111	655	37	14,055	14,124	680	69	612	68	-13	44	-31	4,768
2018-09	16,327	15,618	666	42	15,437	15,651	675	215	597	78	-34	69	-36	-376
2018-10	16,174	15,436	691	47	15,234	15,435	739	201	653	86	1	38	-40	-733
2018-11	16,164	15,430	687	46	15,124	15,483	681	359	591	89	-53	96	-43	-585
2018-12	16,554	15,854	653	47	15,478	15,871	683	393	593	90	-17	60	-44	2,642

Imports in Fob Delivery Terms

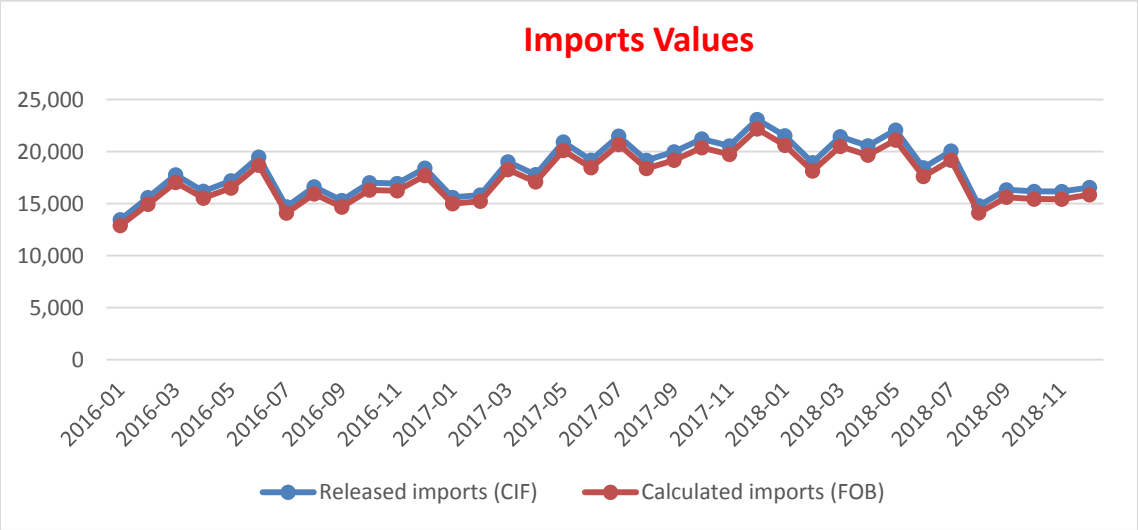

Figure 3.5 Imports values obtained from data of 3-years

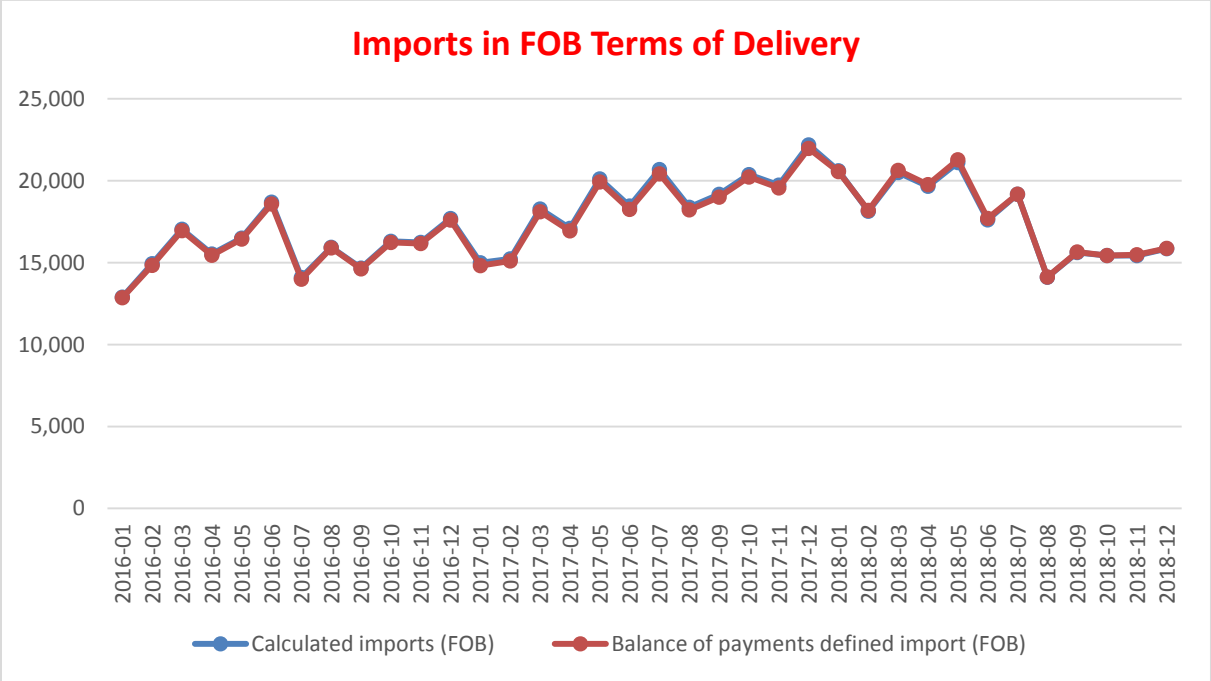

Figure 3.6 Imports values in FOB terms of delivery obtained from data of 3-years

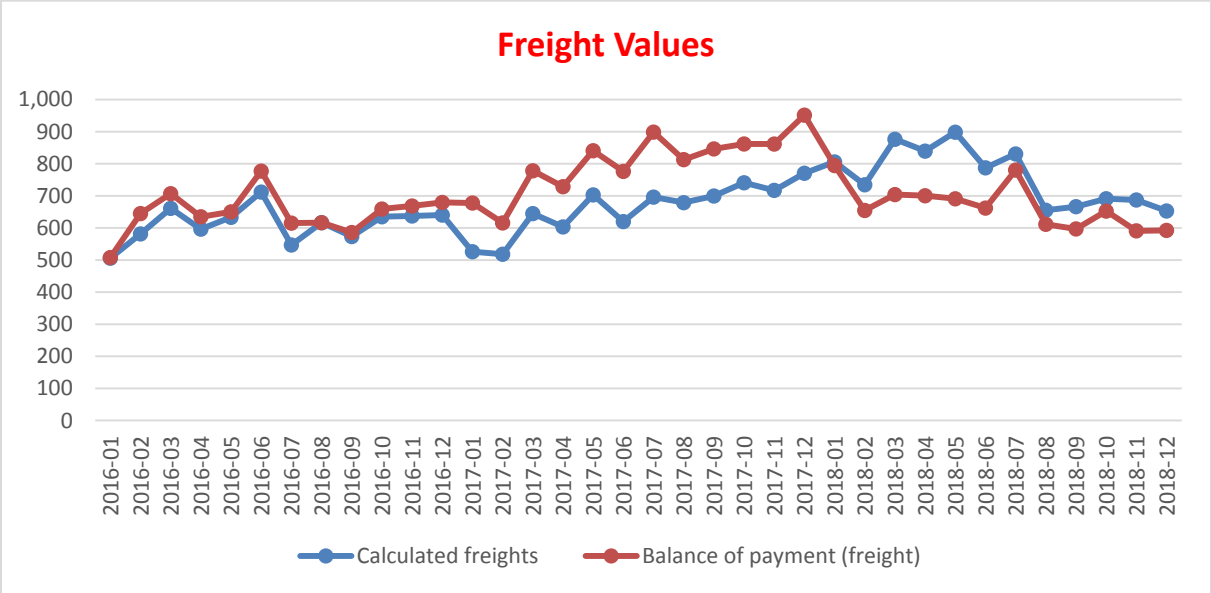

Figure 3.7 Freight values obtained from data of 3-years

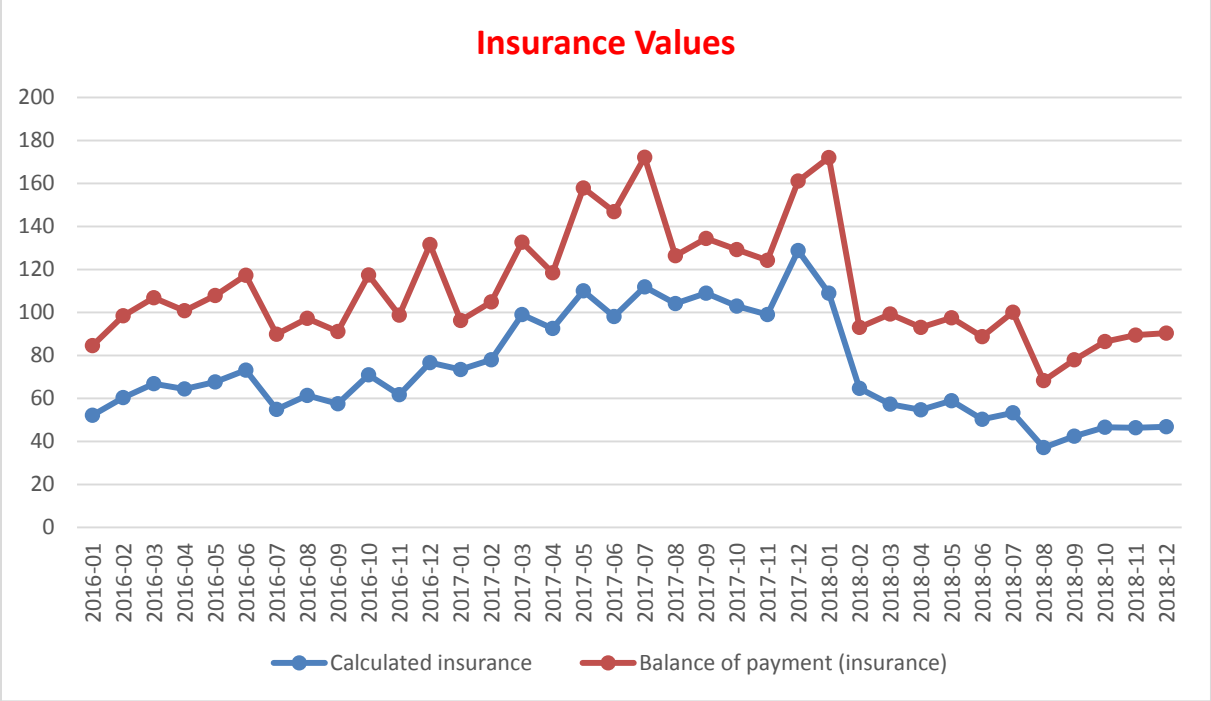

Figure 3.8 Insurance values obtained from data of 3-years

In the table 3.2 and 3.3, the column named released imports shows imports values in CIF that are released by TurkStat. The column named calculated imports (FOB) shows imports values in FOB that

are calculated by using the ratios obtained from the data of 2 years and 3 years. In other words, it shows the import values calculated by the rates obtained as a result of this study. In the same way the columns calculated freights and insurance show freights and insurance values that calculated using the rates obtained as a result of this study. The columns named balance of payment import and balance of payment import (FOB) show imports values that calculated by the Central Bank for balance of payments statistics. When the figures created according to both accounts are examined, it has been observed that there is not much difference. However, the values calculated by using the ratios obtained from this study reflect the reality more accurately. Because these rates are calculated by taking into account the actual insurance and freight rates. Therefore, when calculating the import data according to the FOB delivery terms usage of the rates obtained as a result of this study has provided a more accurate calculation.

The figures 3.1 and 3.5 show calculated imports values in FOB according to 2-years and 3-years data, respectively. In these figures, a comparasion was given for calculated imports values in FOB and imports values released in CIF by monthly.

The figures 3.2 and 3.6 show calculated imports values in FOB according to 2-years and 3-years data respectively. In these figures, a comparasion was given between calculated FOB type imports values that are results of this study and FOB type imports values calculated by the Central Bank for balance of payments statistics by monhts.

The figures 3.3 and 3.7 show calculated freight values according to 2-years and 3-years data respectively. In these figures, a comparasion was given between calculated freight values that are results of this study and freight values calculated by the Central Bank for balance of payments statistics by monhts.

The figures 3.4 and 3.8 show calculated insurance values according to 2-years and 3-years data respectively. In these figures, a comparasion was given between calculated insurance values that are results of this study and insurance values calculated by Turkish Republic of Central Bank for balance of payments accounts by monhts.

4. Conclusions

In foreign trade statistics, the import value is calculated according to the CIF (cost of goods + freight + insurance) delivery terms. The recommendations of the United Nations are taken as basis in the production of foreign trade statistics. In International Merchandise Trade Statistics, the UN's methodological handbook, it is recommended that countries produce their imports value according to the CIF delivery terms, but also it is recommended that countries produce their imports value according to the FOB delivery terms in order to be an auxiliary data source for national accounts and balance of payments. It is stated that FOB type import data is necessary for reconciliation studies with mirror statistics and for bilateral trade balance and trade negotiations. Besides this in the balance of payments statistics published by the Central Bank of the Republic of Türkiye (CBRT), imports are calculated according to the FOB delivery terms to show only the cost of goods. The balance of

payments statistics are calculated by the CBRT and the import data sent by TurkStat are converted to FOB delivery terms so that the import data includes only the cost of goods However, the Central Bank cannot make this transformation on a record basis. Since there is a need for a more detailed and continuous record-based transformation, this subject has been investigated in this study. At the same time, in the national accounts system produced by TurkStat, foreign trade data obtained according to CIF includes freight and insurance service costs and is converted to FOB delivery terms in order to see only the cost of goods. In this way, the comparison of exports and imports becomes more meaningful. In addition, this usage provides consistency with the balance of payments Statistics and national accounts. On the other hand, in the supply-use tables, the CIF import value is converted to FOB with correction items. Besides, "freight imports" data made by enterprises that are not included in the International Service Trade Statistics Survey are needed.

For all the above-mentioned studies, imports data by FOB is very important so this study was carried out in line with the need for the production of foreign trade data on the basis of registration according to the FOB, and it was revealed by which method these data could be produced in the most accurate way.

The views expressed are of the authors and do not reflect those of TurkStat.

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