

Review Article

# Comparing Imports in FOB, CIF Terms of Delivery and Invoice Values and an Example on the Member States of the Economic Cooperation Organization

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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 Turkish Statistical Office (TURKSTAT) are calculated according to free on board (FOB terms of delivery) and the import data are calculated according to the cost of goods, insurance and freight (CIF terms of delivery). In the balance of payments account calculated by the Central Bank, export and import is used by FOB terms of delivery. Therefore, imports data should be calculated according to FOB terms of delivery at the same time. However, international methodological studies have concluded that valuation using invoice values is more compatible with the concepts and definitions of the system of national accounts and the balance of payments, and therefore the use of invoice values is recommended. In line with international methodological recommendations, this study compares the import balance values calculated in terms of FOB and CIF terms of delivery with the values calculated in terms of invoice value and reveals the difference between them. For this comparison, import values to the member countries of the Organisation for Economic Co-operation and Development are taken into account.

## Keywords

Outlier, Foreign Trade, Outlier Detection, FOB, CIF, Invoice Values

## 1. Introduction

Foreign trade is defined as the goods and services trading 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 governments 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 data and foreign trade statistics and indicators. Foreign trade statistics are calculated and published by Türkiye Statistical Institute (TURKSTAT) officially in Türkiye. The data source of foreign trade statistics is the customs declarations received from the Ministry of Trade.

Imports data and indicators are important resources for many economic analysis. In particular, the Central Bank of the

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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 terms of delivery respectively. In the balance of payments account calculated by the Central Bank, export and import is taken into account by FOB terms of delivery. Therefore, import data should be calculated according to FOB terms of delivery at the same time.

The current national accounts system handbook that prepared by international organizations (United Nations (UN), Organisation for Economic Co-operation and Development (OECD)) recommends calculating the import and export of goods on an FOB basis. However, according to the results of the national accounts meeting held in 2013, it was determined that the principle of output valuation with basic prices used for domestic transactions and FOB valuation did not fully reconcile. In this direction, it was suggested to use invoice values for import and export valuation in national accounts and balance of payments statistics in the following years.

In this study, the import data were analyzed by taking into account the FOB, CIF valuation and invoice values, and the analysis was made using the import data of the member countries of the Economic Development and Cooperation Organization.

First, information about international commercial terms (terms of deliveries) is given then importance of invoice values is explained according to the principle of output valuation with basic prices. Afterwards, calculating freight and insurance rates, and imports in FOB terms of delivery is explained. In the next section, the brief is given about the Economic Development and Cooperation Organization.

Finally, it was explained how the import data were analyzed in accordance with the purpose of the study, and the results of the analysis were tabulated and the differences were numerically revealed by comparing the valuation methods.

## 2. Literature

The costs associated with cross-border shipping and insurance of goods are an important determinant 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 [4] 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 estimating transport and in-

urance 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 Limao and Venables [10], Hummels and Skiba [7], Hummels and Lugovskyy [6], Pomfret and Sourdin [11, 13]. 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 Miao and Fortanier [1].

The apparent inconsistency of the 2008 System of National Accounts (SNA) recommendation to value output at basic prices and to record imports and exports at FOB values as recommended in balance of payment manual 6 (BPM6) was first addressed by Anne Harrison in a 2012 International Monetary Fund (IMF) Balance of Payments Committee (BOPCOM) paper [3] Walters [14] and Hiemstra and de Haan [5] propose to value exports and imports of goods both in the balance of payments and national accounts based on invoice values.

## 3. Data and Methodology

### 3.1. International Commercial Terms

Incoterms are also referred to as International Commercial Terms, which are published by the International Chamber of Commerce (ICC), which relate to International Commercial Law. They are accepted by governments and legal authorities around the world. Put simply, incoterms are the selling terms that the buyer and seller of goods both agrees to. The Incoterm clearly states which tasks, costs and risks are associated with the buyer and the seller. The Incoterm is agreed between the buyer and seller and states when the seller's costs and risks are then transferred onto the buyer [2].

Rules for any mode or modes of transport;

Ex-Works or Ex-Warehouse (EXW) means that the seller delivers when it places the goods at the disposal of the buyer at the seller's premises or at another named place (i.e., works, factory, warehouse, etc.). The seller does not need to load the goods on any collecting vehicle, nor does it need to clear the goods for export, where such clearance is applicable.

Free Carrier (FCA) means that the seller delivers the goods to the carrier or another person nominated by the buyer at the seller's premises or another named place. The parties are well advised to specify as clearly as possible the point within the named place of delivery, as the risk passes to the buyer at that point.

Carriage Paid To (CPT) means that the seller delivers the goods to the carrier or another person nominated by the seller

at an agreed place (if any such place is agreed between parties) and that the seller must contract for and pay the costs of carriage necessary to bring the goods to the named place of destination.

Carriage and Insurance Paid to (CIP) means that the seller delivers the goods to the carrier or another person nominated by the seller at an agreed place (if any such place is agreed between parties) and that the seller must contract for and pay the costs of carriage necessary to bring the goods to the named place of destination. ‘The seller also contracts for insurance cover against the buyer’s risk of loss of or damage to the goods during the carriage. The buyer should note that under CIP the seller is required to obtain insurance only on minimum cover. Should the buyer wish to have more insurance protection, it will need either to agree as much expressly with the seller or to make its own extra insurance arrangements.

Delivered At Place (DAP) means that the seller delivers when the goods are placed at the disposal of the buyer on the arriving means of transport ready for unloading at the named place of destination. The seller bears all risks involved in bringing the goods to the named place.

Delivered at Place Unloaded (DPU) means that the seller delivers when the goods, once unloaded, are placed at the disposal of the buyer at a named place of destination. The seller bears all risks involved in bringing the goods to, and unloading them at the named place of destination.

Delivered Duty Paid (DDP) means that the seller delivers the goods when the goods are placed at the disposal of the buyer, cleared for import on the arriving means of transport ready for unloading at the named place of destination. The seller bears all the costs and risks involved in bringing the goods to the place of destination and has an obligation to clear the goods not only for export but also for import, to pay any

duty for both export and import and to carry out all customs formalities.

Free Alongside Ship (FAS) means that the seller delivers when the goods are placed alongside the vessel (e.g., on a quay or a barge) nominated by the buyer at the named port of shipment. The risk of loss of or damage to the goods passes when the goods are alongside the ship, and the buyer bears all costs from that moment onwards.

Free On Board (FOB) means that the seller delivers the goods on board the vessel nominated by the buyer at the named port of shipment or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel, and the buyer bears all costs from that moment onwards.

Cost and Freight (CFR) means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. The seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination.

Cost, Insurance and Freight (CIF) means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. The seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination. ‘The seller also contracts for insurance cover against the buyer’s risk of loss of or damage to the goods during the carriage. The buyer should note that under CIF the seller is required to obtain insurance only on minimum cover. Should the buyer wish to have more insurance protection, it will need either to agree as much expressly with the seller or to make its own extra insurance arrangements.

Groups	Freight Collect Terms						Freight Prepaid Terms				
	Any Mode or Modes of Transport		Sea and Inland Waterway Transport				Any Mode or Modes of Transport				
	EXW Ex Works (Place)	FCA Free Carrier (Place)	FAS Free Alongside Ship (Port)	FOB Free On Board (Port)	CFR Cost and Freight (Port)	CIF Cost Insurance & Freight (Port)	CPT Carriage Paid To (Place)	CIP Carriage & Insurance Paid to (Place)	DAP Delivered at Place (Place)	DPU Delivered at Place Unloaded (Place)	DDP Delivered Duty Paid (Place)
Transfer of Risk	At Buyer's Disposal	On Buyer's Transport	Alongside Ship	On Board Vessel	On Board Vessel	On Board Vessel	At Carrier	At Carrier	At Named Place	At Named Place Unloaded	At Named Place
<b>Obligations &amp; Charges:</b>											
Export Packaging	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading Charges	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Delivery to Port/Place	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Export Duty, Taxes & Customs Clearance	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Origin Terminal Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading on Carriage	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Carriage Charges	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Insurance	Negotiable	Negotiable	Negotiable	Negotiable	Negotiable	*Seller	Negotiable	**Seller	Negotiable	Negotiable	Negotiable
Destination Terminal Charges	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller
Delivery to Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller
Unloading at Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Buyer
Import Duty, Taxes & Customs Clearance	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller

Figure 1. Incoterms 2020 rules responsibility quick reference guide.

Freight Collect and Freight Prepaid are common terms used in International Freight. It is very important to understand the difference, it is basically a statement of who will be paying for all the International freight charges. If you export your goods on 'Freight Collect' terms (EXW, FCA, FAS and FOB are all Freight Collect terms) that means that the importer (your buyer) will 'collect' and pay all of the freight charges on their side, you will not have to pay any freight at all. If you are the exporter and sell the goods on CFR, CIF, CPT, CIP, DAP, DPU or DDP terms, this means that you will pay for the freight charges ('Freight Prepaid' – you will pre-pay the freight charges). These are linked to the selling terms of your invoice, if you are selling your goods on 'FOB' terms (Free on Board) then you are only covering the costs to get the goods loaded on board the vessel. All charges thereafter will be charged to the receiver of the goods (consignee) – so it will be Freight Collect. These freight terms are stated on the Bill of Lading, the document issued by the shipping line or freight forwarder [2].

### 3.2. 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].

The current National accounts system handbook that prepared by international organizations (United Nations, Organisation for Economic Co-operation and Development) recommends calculating the import and export of goods on an FOB basis. However, according to the results of the national accounts meeting held in 2013, it was determined that the principle of output valuation with basic prices used for domestic transactions and FOB valuation did not fully reconcile. In this direction, it was suggested to use (invoice) valuation for import and export valuation in national accounts and balance of payments statistics in the following years [1].

FOB and basic pricing principles differ in the handling of freight and insurance services between exporting and importing countries. According to the FOB valuation principle, goods are valued excluding these services between exporting and importing countries to obtain a single valuation point. According to the basic pricing principle, goods are valued at the observed transaction price the producer will receive, and therefore freight and insurance services are included or excluded depending on whether these services are priced separately by the producer. For this reason, the principle of output valuation with basic prices used for national accounts and balance of payments does not fully reconcile with FOB valuation, and it is recommended to use invoice values. For a better understanding of the subject, a numerical example is given in the balance of payments guidance note G1 [1].

#### Example

Let the value of the goods produced in country A be 10 000, the freight from the factory to the border in country A is 200, the freight between country A and country B is 300, and the freight in country B from the border to the importer is 100. In this case;

Cost of goods = 10 000

FOB value = 10 200

CIF value = 10 500

Freight in country A = 200

Freight between A-B = 300

Freight in country B = 100

This example considers trading partners contracting on an "ex works" (EXW) basis (ie the invoice price is 10,000 and the importer in Country B pays separately for all shipping from the seller's facility to him).

If the carrier is located in country B;

Country B's international merchandise trade statistic indicates a CIF record of 10,500 to be included in the supply table, and the record of transport services depends on the nationality of the carrier. In this case, no imports of services are recorded,

as the shipping service is considered a domestic transaction and the CIF registration of the goods results in a low trade balance of -500. An adjustment of -500 in the import flow of transport services is needed to offset this inconsistency. Re-

ording based on transaction value (EXW) is limited to trading in goods only. The balance of trade will not include a record of services relative to the actual transaction between trading parties.

**Table 1.** Recording supply table.

	Initially recorded		Suggested treatment (invoice value)		
	Value(\$)	Imports	Value(\$)	Imports	
Goods	10 000	Goods(CIF)	10 500	Goods(EXW)	10 000
Services		Services	-	Services	-
		Exports		Exports	
		Goods	-	Goods	-
		Services		Services	-
Balance of imports	- 10 000		- 10 500		- 10 000

As seen in Table 1, If the import of country B is registered according to CIF, it is recorded as if it has made this payment, although the carrier of country B is resident in country B, although it does not actually import 500 for transportation. Therefore, it has to make a correction of -500 on its imports. However, if the invoice value is used directly instead, there is no need for such an adjustment in the supply table [8].

If the carrier is not located in country B;

The EXW contract leads to a separate recording of all transport services of 600, likely captured in ITS. As a result, the CIF recording of imports of goods in the supply table leads to an overstated import of 500, corresponding to the transport services included in the CIF value. The CIF recording requires a counter balancing adjustment of the same amount (-500) in the import of services.

**Table 2.** Recording supply table.

	Initially recorded		Suggested treatment (invoice value)		
	Value(\$)	Imports	Value(\$)	Imports	
Goods	10 000	Goods(CIF)	10 500	Goods(EXW)	10 000
Services	600	Services	600	Services	600
		Exports		Exports	
		Goods	-	Goods	-
		Services		Services	-
Balance of imports	- 10 600		- 11 100		- 10 600

As seen in Table 2, If the import of country B is registered according to CIF, the transport fee will be recorded twice and it will be recorded as if an overpayment of 500 has been made for the import. However, if the invoice value is used directly

instead, there is no need for such an adjustment in the supply table [8].

### 3.3. Calculating Freight and Insurance Rates, Import in FOB Delivery Terms

In this section, it's calculated 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, 3 years before the relevant year were taken into account, The rates were calculated as 3-year rates, and import values in FOB were computed for both rates [9]. The following were applied for each data set;

The data set is grouped by considering the variables of product, country group and mode of transportation.

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 from the data set.

Then, the number of records in the product-country- mode of transportation type 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. Two estimators used in the Z-Score, the sample mean and sample standard deviation, can be affected by a few extreme values or by even a single extreme value. To avoid this problem, the median and the median of the absolute deviation of the median (MAD) are employed in the modified z-score instead of the mean and standard deviation of the sample, respectively [12]. Therefore, median z-score was used in this study The Adjusted Box-Plot method is used here instead of the Box-Plot method because 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 inter-quartile distances measured without considering the skewness of the data set [15]. The Adjusted Box-Plot method takes into account the skewness of the data set.

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 transportation, country group-mode of transportation) for groups with less than 10 registrations.

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

$$\text{FOB import} = \text{CIF import} - \text{Freight} - \text{Insurance}$$

### 3.4. Economic Cooperation Organization

The Economic Cooperation Organization (ECO) was established in 1985 on the legal basis of the Regional Cooperation for Development, which was established in 1964 to develop regional economic cooperation by Türkiye, Iran and Pakistan.

With the participation of Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan and Afghanistan in 1992, the ECO turned into a regional economic organization that covers a population of approximately 500 million on a total area of 8 million km<sup>2</sup>.

Member States of ECO are Türkiye, Iran and Pakistan (Founding Members), Afghanistan, Azerbaijan, Kazakhstan, Kyrgyz Republic, Uzbekistan, Tajikistan and Turkmenistan.

Objectives of the organization are contributing to the development of the Member States, removal of trade barriers within the ECO region, and developing intra-regional trade and promoting the ECO region's integration with global markets, strengthening cultural and historical ties among the Member States.

### 3.5. Data

In this study, the import data between Türkiye and member states of ECO for 2022 and 2023 years were taken into account when comparing the values calculated by taking into account different valuation methods. Since the most reliable invoice values data can be obtained from 2022 in foreign trade data obtained from different data sources, the study was carried out with data from these years and the macro level data of the Ministry of Trade were used in the study, special permission was obtained from the Ministry. Freight and insurance values are also taken into account in the data set in order to compare with the logic of recording to the supply usage tables given in the previous sections. Invoice values are recorded in the customs declarations at the declaration level, therefore, there is no invoice information at the item level. The following procedures were applied to calculate the invoice value on item basis.

1. Item weights are calculated by dividing the value in dollars of each item in the declaration by the sum of the values in dollars of all items in the declaration.
2. Then, the invoice value is distributed for each item in the declaration, taking into account the item weights. Thus, invoice values are estimated at item level.

Example: Consider a customs declaration with 10 items.

**Table 3.** Calculation invoice values at item level.

Custom Declaration Number	Item No	CIF value (\$)	Invoice Value	Weight	Item Invoice Value
1	1	10	1400	0.9	13.3
1	2	20	1400	1.9	26.5
1	3	25	1400	2.4	33.2
1	4	30	1400	2.8	39.8
1	5	35	1400	3.3	46.4
1	6	40	1400	3.8	53.1
1	7	45	1400	4.3	59.7
1	8	400	1400	37.9	530.8
1	9	200	1400	19.0	265.4
1	10	250	1400	23.7	331.8

For this customs declarations in Table 3, total CIF value is 1055 \$. In order to calculate the weight for each item; the item's CIF value divided by the total CIF value.  $10/1055*100=0.9$  is the first item weight. After the calculation weights, invoice value is distributed according to weights for each items. For the first item, the invoice value is  $0.9*1400/100=13.3$  \$. Thus, invoice values are estimated at the item level.

### 3.6. Results

Comparing the values calculated by taking into account different valuation methods and the results were given in the annex by tables. Tables have been created by taking into account the country, flag and delivery methods. First of all, the import structure between Türkiye and the countries of the Economic Cooperation Organization was examined. Accordingly, in the table below, import values by chapters are given.

**Table 4.** Imports by chapters.

2022					
HS Code	Chapters	Total Imports Eco Value	Total Imports Value	Imports Eco/Total Imports Ratio %	HS Imports ECO/Total ECO Imports Ratio %
74	Copper and articles thereof	2 486 377	5 510 359	45.10	22.4
27	Mineral fuels, minerals oils and product of their distillation	2 075 611	96 548 874	2.10	18.7
52	Cotton, cotton yarn and cotton textiles	1 328 822	4 841 968	27.40	12
76	Aluminium and articles thereof	1 188 910	7 683 174	15.50	10.7
79	Zinc and articles thereof	765 542	1 377 684	55.60	6.9
39	Plastic and articles thereof	708 800	18 975 915	3.70	6.4
31	Fertilisers	370 110	3 031 474	12.20	3.3
72	Iron and steel	364 407	28 367 022	1.30	3.3
71	Precious stones, precious metals, pearls and articles thereof	272 581	23 457 673	1.20	2.5
28	Inorganic chemicals, organic or	141 347	3 474 630	4.10	1.3

inorganic compounds

2023

HS Code	Chapters	Total Imports Eco Value	Total Imports Value	Imports Eco/Total Imports Ratio %	HS Imports ECO/Total ECO Imports Ratio %
27	Mineral fuels, minerals oils and product of their distillation	3 781 016	69 113 811	5,5	34,8
74	Copper and articles thereof	2 065 798	5 651 900	36.60	19
76	Aluminium and articles thereof	1 044 527	6 292 612	16.60	9.6
52	Cotton, cotton yarn and cotton textiles	844 183	2 746 157	30.70	7.8
39	Plastic and articles thereof	516 912	16 215 325	3.20	4.8
79	Zinc and articles thereof	482 440	863 496	55.90	4.4
72	Iron and steel	370 378	24 160 165	1.50	3.4
8	Edible fruits and nuts, peel of melons or citrus fruits	191 840	1 264 136	15.20	1.8
31	Fertilisers	173 135	2 387 377	7.30	1.6
71	Precious stones, precious metals, pearls and articles thereof	156 725	33 912 165	0.50	1.4

Import values are sorted and the first ten chapters with the highest rate are taken in the [Table 4](#). The chapter with the highest import rate is copper and articles thereof for 2022 and mineral fuels, minerals oils and product of their distillation for 2023 as seen in the [Table 4](#). For 2022, total copper and articles

thereof import is 2 billion 486 million dollars. That means that 45.1% of the chapter named copper and articles thereof imports were made from the countries of the Organization of Economic Cooperation. This rate was %36.6 in 2023.

*Table 5. Imports by chapters.*

2022

Country	Chapters	Country Imports	Chapter Total Imports	Ratio %
Kazakhstan	Mineral fuels, minerals oils and product of their distillation	1 409 827	96 548 874	1.5
Kazakhstan	Copper and articles thereof	1 289 256	5 510 359	23.4
Iran	Aluminium and articles thereof	821 543	7 683 174	10.7
Uzbekistan	Cotton, cotton yarn and cotton textiles	586 430	4 841 968	12.1
Uzbekistan	Copper and articles thereof	574 425	5 510 359	10.4
Iran	Copper and articles thereof	546 929	5 510 359	9.9
Iran	Plastic and articles thereof	454 125	18 975 915	2.4
Iran	Zinc and articles thereof	374 136	1 377 684	27.2
Turkmenistan	Mineral fuels, minerals oils and product of their distillation	367 286	96 548 874	0.4
Turkmenistan	Cotton, cotton yarn and cotton textiles	220 600	4 841 968	4.6

2023

Country	Chapters	Country Imports	Chapter Total Imports	Ratio %
Turkmenistan	Mineral fuels, minerals oils and product of their distillation	1 414 946	69 113 811	2

Kazakhstan	Copper and articles thereof	1 262 275	5 651 900	22.3
Kazakhstan	Mineral fuels, minerals oils and product of their distillation	1 205 886	69 113 811	1.7
Azerbaijan	Mineral fuels, minerals oils and product of their distillation	935 833	69 113 811	1.4
Uzbekistan	Copper and articles thereof	473 617	5 651 900	8.4
Kazakhstan	Aluminium and articles thereof	464 717	6 292 612	7.4
Iran	Aluminium and articles thereof	396 369	6 292 612	6.3
Uzbekistan	Cotton, cotton yarn and cotton textiles	340 336	2 746 157	12.4
Iran	Plastic and articles thereof	332 314	16 215 325	2
Iran	Copper and articles thereof	302 875	5 651 900	5.4

Imports values are sorted by countries and chapters and the top ten countries are taken in the Table 5. According to this mineral fuels, minerals oils and product of their distillation was imported mostly from Kazakhstan in 2022. Its rate in total mineral fuels, minerals oils and product of their distillation imports was 1.5%. Aluminium and articles thereof was imported mostly from Iran in 2022. Its rate in total aluminium and articles thereof was 10.7%.

In 2023, minerals oils and product of their distillation was imported mostly from Turkmenistan (values in the table are in 1000 dollars).

Foreign trade statistics covers cross border trade in goods between Türkiye and other countries. International trade in services statistics are not covered in statistics. The “general trade system” (GTS) rules are applied both for production and publication of foreign trade statistics. The general trade system covers all goods enter the country's economic area and goods leave from country's economic area. Thus, customs warehouses and free zones in Türkiye data is included in trade statistics. Free zones and customs warehouses are not included in foreign trade statistics in the special trade system (STS), on the other hand, only the goods entered or left a country's free circulation area is included. According to the STS, customs warehouses and free zones are not considered inside of the country's statistical territory. Thus, goods entered

in or left from customs warehouses and free zones of the country are included in the calculations, while international trade between customs warehouses and free zones to abroad are excluded. Data sources of foreign trade statistics by general trade system:

- 1) "Free zone transaction form-SB" used in international transactions of free zones,
- 2) "Customs declaration-GB" used in direct transactions with abroad from Türkiye's free circulation area, free zones and warehouses,
- 3) "Warehouse declaration-AN" used for goods entering to warehouses from abroad,
- 4) "Warehouse declaration-AO" used for goods sent to abroad from warehouses,
- 5) The common transit system -"TI"new computerized transit system" and "TIR Carnet" used for goods sent from warehouses abroad.
- 6) Data obtained from the Simplified Customs Declarations=ET, issued electronically by air cargo carriers, ie operators, for import and export are included in statistics. Different data sources were examined and it was determined that some of the data sources did not have invoice value information. According to the data sources the numbers of records are given the table below.

Table 6. Records numbers.

Years	Exports		Imports	
	2022	2023	2022	2023
Sources				
Total	44 812 402	59 879 687	22 450 199	28 863 746
AN	-	-	7 992 989	9 598 362
AO	2 737 105	5 383 668	-	-
ET	18 033 355	30 478 845	7 119 665	10 442 097

Years	Exports		Imports	
	2022	2023	2022	2023
GB	23 459 698	23 412 199	6 850 999	8 120 264
SB	544 069	554 111	486 546	703 023
TI	38 175	50 864	-	-

According to the data sources the numbers of records with invoice value are given the table below.

*Table 7. Records with invoice value numbers.*

Years	Exports		Imports	
	2022	2023	2022	2023
Data sources				
Total	42 063 067	54 886 271	22 167 363	28 456 640
AN	-	-	7 992 955	9 598 339
ET	18 603 369	31 474 072	7 324 641	10 739 249
GB	23 459 698	23 412 199	6 849 767	8 119 052

According to [Table 7](#), there are no invoice values in free zone transaction forms, customs warehouse declarations-AO and TIR Carnet declarations. Some customs declarations (detailed declarations) haven't got invoice values according to table but this number is very small. If invoice value will be used in balance of payments statistics in the future, work should be done to complete this information.

For calculating invoice value in item level, all import data

between Türkiye and member states of ECO for 2022 and 2023 are taken into account first. According to this, there were 22 450 199 records for 2022, 28 863 746 records for 2023 in imports. Number of records with invoice value information was 22 167 363 for 2022, 28 456 640 for 2023. While some of invoice values are at declarations level, some of invoice values are items level. Especially in simplified customs declarations, invoice values are at items level.

*Table 8. Impots value by countries and terms of delivery.*

2022

Country	Terms of Delivery	Invoice Value	Rate %	Imports CIF	Rate %	Imports FOB	Rate %	Freight	Rate %	Insurance	Rate %
Azerbaijan	CIF	279 752	14.1	284 709	34.0	259 998	33.7	20 695	38.3	4 016	36.6
Kazakhstan	CIF	2 249 983	48.9	2 250 626	64.0	2 089 355	64.5	154 739	61.6	6 531	27.7
Turkmenistan	CIF	498 647	38.0	499 943	51.7	458 180	51.8	36 294	51.5	5 469	44.8
Uzbekistan	FCA	529 474	30.4	578 467	34.4	538 926	35.1	31 913	25.5	7 627	33.4
Tajikistan	CIF	50 044	21.9	50 044	29.2	46 924	29.8	2 844	24.5	276	12.7
Kyrgyzstan	FCA	29 708	13.9	31 715	26.5	30 174	27.3	1 297	16.2	244	22.8
Iran	CIF	1 164 200	34.4	1 184 159	35.3	1 092 910	35.6	66 691	31.0	24 558	34.9
Afghanistan	CIF	11 624	29.3	12 927	41.0	11 712	44.0	1 065	24.7	150	24.6

Pakistan	CIF	249 619	4.4	248 059	57.4	236 803	58.5	10 790	44.3	466	14.0
2023											
Country	Terms of Delivery	Invoice Value	Rate %	Imports CIF	Rate %	Imports FOB	Rate %	Freight	Rate %	Insurance	Rate %
Azerbaijan	DAP	718 506	31.3	717 313	49.8	651 387	49.7	56 403	51.5	9 523	49.3
Kazakhstan	DAP	1 960 219	49.1	1 957 448	55.9	1 767 331	55.8	156 021	55.8	34 096	64.3
Turkmenistan	CIF	804 041	40.3	804 411	48.5	746 164	48.8	57 335	46.7	912	9.5
Uzbekistan	FCA	345 798	27.0	356 535	29.5	332 079	30.1	19 375	22.1	5 081	25.2
Tajikistan	FCA	36 826	15.0	39 723	32.2	36 936	32.7	2 626	28.4	162	13.4
Kyrgyzstan	DPU	160 341	53.8	160 338	58.5	138 557	56.9	21 656	73.6	125	11.6
Iran	CIF	716 682	30.3	727 997	33.4	655 529	33.5	56 974	32.2	15 495	32.6
Afghanistan	CIF	11 557	31.4	13 075	42.0	11 871	43.0	1 022	34.7	182	29.2
Pakistan	CIF	216 052	2.9	212 456	46.6	195 558	46.9	15 553	48.1	1 343	21.8

Table 8 shows the highest import values according to the terms of deliveries of the countries. According to this, in 2022, the highest imports from Azerbaijan were made by CIF terms of delivery, with a rate of 34.0% in total Azerbaijan imports and in 2023 the highest imports from Azerbaijan were made by DAP terms of delivery. The highest import rate in Kazakhstan was in the CIF terms of delivery in 2022 and in 2023 the highest rate was DAP terms of delivery. The highest import rate in the remaining ECO countries was realized in imports according to the CIF terms of delivery. In 2022, the highest import rate was in the FCA terms of delivery in Uzbekistan and Kyrgyzstan, while the highest import rate in the

remaining ECO countries was in the CIF terms of delivery.

Example: Let's re-register the imports of Azerbaijan for the years 2022 and 2023, taking into account the registration method in the Azerbaijan example given above.

In Table 9, Azerbaijan's imports are divided according to the modes of delivery and the flags of the vehicles used in transport. While the first table shows the import figures where the transport is carried out by Türkiye, the other table shows the figures where foreign flagged vehicles are involved. In addition, the goods value column in the table shows only the goods value. According to this table we calculated balance of imports as given below.

Table 9. Azerbaijan imports according to terms of delivery and flags.

Türkiye 1000\$							
Year	Terms of Delivery	Total Imports CIF	Total Goods Value	Invoice Value	Total Freight	Total Insurance	Total Imports FOB
2022	CFR	8 377	8 205	8 207	385	172	7 820
	CIF	92 477	92 477	93 190	6 343	825	85 309
	CIP	46 939	46 930	46 985	2 314	782	43 843
	CPT	90 279	89 813	89 814	4 952	465	84 861
	DAP	50 444	50 424	52 958	2 526	1 125	46 793
	DDP	44	44	44	5	1	38
	DPU	5 883	5 883	5 883	250	145	5 487
	EXW	7 021	6 410	6 878	493	118	6 409
	FCA	136 935	126 752	126 820	8 357	1 826	126 752
	FOB	18 947	17 326	17 315	1 416	205	17 326

<b>Türkiye</b>							
<b>1000\$</b>							
<b>Year</b>	<b>Terms of Delivery</b>	<b>Total Imports CIF</b>	<b>Total Goods Value</b>	<b>Invoice Value</b>	<b>Total Freight</b>	<b>Total Insurance</b>	<b>Total Imports FOB</b>
2023	CFR	21 075	20 536	20 536	1 628	539	18 908
	CIF	121 987	121 987	122 507	9 065	1 090	111 832
	CIP	56 949	56 949	57 251	3 898	1 024	52 027
	CPT	93 561	91 755	91 759	6 228	1 799	85 533
	DAP	150 620	149 895	154 630	11 135	1 902	137 584
	DDP	0	0	0	0	0	0
	DPU	0	0	0	0	0	0
	EXW	16 185	14 585	18 352	1 271	330	14 583
	FCA	70 689	66 473	66 657	4 079	675	65 936
	FOB	89 559	80 772	80 748	7 782	1 004	80 773
<b>Foreign Flags</b>							
<b>1000\$</b>							
<b>Year</b>	<b>Terms of Delivery</b>	<b>Total Imports CIF</b>	<b>Total Goods Value</b>	<b>Invoice Value</b>	<b>Total Freight</b>	<b>Total Insurance</b>	<b>Total Imports FOB</b>
2022	CFR	30 321	29 730	29 726	3 034	531	26 757
	CIF	192 207	192 207	186 538	14 352	3 192	174 664
	CIP	19 475	19 317	17 637	941	349	18 185
	CPT	30 995	30 760	29 546	1 822	235	28 938
	DAP	37 876	37 828	38 392	3 345	346	34 185
	DPU	329	329	329	14	8	307
	EXW	14 189	12 473	3 590	1 230	364	12 595
	FCA	40 141	38 215	33 757	1 659	267	38 215
	FOB	13 538	12 955	12 955	576	8	12 955
2023	CFR	21 354	21 137	20 586	1 500	117	19 737
	CIF	107 915	107 915	107 000	8 022	668	99 225
	CIP	19 723	19 723	19 327	1 479	449	17 795
	CPT	67 706	66 266	63 961	4 876	1 439	61 391
	DAP	566 693	566 041	563 875	45 268	7 621	513 803
	DDP	24	24	24	2	0	22
	EXW	9 365	8 351	4 379	793	220	8 351
	FCA	11 792	10 371	6 149	1 168	252	10 372
	FOB	14 855	13 280	13 382	1 387	187	13 281

Firstly, let's consider Azerbaijan imports according to CFR terms of delivery method. Take into account the data that the

transport is carried out by Turkish flagged vehicles. Accordingly, the total import values of 2022 are given in the table below.

**Table 10.** Azerbaijan's imports via using Turkish company for transport.

Imports	Value (\$)	Initially recorded		Suggested treatment (invoice Value)		
		Imports	Value (\$)	Imports	Value (\$)	Imports
Goods	8 205	Goods (CIF)	8 377	Goods (CFR)	8 207	Goods (FOB)
Services	-	Services	-	Services	-	
Exports		Exports		Exports		
Services	557	Services	557	Services	557	
Balance of imports	8 762		7 820		7 650	7 820

While the import value of goods in Table 10 expresses only the value of goods, CIF, CFR and FOB values express the import values according to these delivery methods. According to the CFR delivery method, the freight cost belongs to the seller and the insurance cost belongs to the buyer. Therefore, freight cost should be deducted from the total value. Since the transport service is carried out by a Turkish flag company, the freight value should also be deducted from the total import value based on the assumption that the insurance service is

also received by a company belonging to Türkiye Accordingly, the import balance is calculated as in the table. The FOB figure in the table is obtained by subtracting freight and insurance from the CIF figure.

The import figures obtained according to CIF and invoice value show a difference of 170 thousand USD.

When the same delivery methods are evaluated for imports carried out by foreign-flagged transport, the results in the table below are obtained.

**Table 11.** Azerbaijan's imports via using foreign company for transport.

Imports	Value (\$)	Initially recorded		Suggested treatment (invoice Value)		
		Imports	Value (\$)	Imports	Value (\$)	Imports
Goods	29 730	Goods (CIF)	30 321	Goods (CFR)	29 726	Goods (FOB)
Services		Services	3 034	Services	3 034	
		Services	531	Services	531	
Exports		Exports		Exports		
Services	-	Services	-	Services	-	
Balance of imports	33 295		27 818		27 223	26 757

Accordingly, when calculating the import balance, transport cost is subtracted from the total value and insurance cost is added. Since the transport service is performed by a foreign flagged vehicle, the insurance service is considered within the scope of service imports under the assumption that the insurance service is also purchased from a foreign company. When the import figure according to FOB delivery method is compared with the figure calculated using the

invoice value, it is observed that there is a difference of 466 thousand USD. Freight and insurance value is deducted when calculating FOB value. However, since the cost of insurance service is covered by the buyer in imports carried out according to the CFR delivery method agreement, this value must be added as imports. Therefore, the use of FOB in balance calculations here may cause deviation.

**Table 12.** Imports balance according to CIF, FOB and invoice values.

	2022		1000\$
Terms of Delivery	Imports Value (CIF)	Imports Value (invoice)	Imports Value (FOB)
CFR	35 639	34 873	34 578
CIF	259 973	255 017	259 974
CIP	62 032	60 238	62 029
CPT	114 269	112 356	113 799
DAP	81 579	84 698	80 978
DDP	38	38	38
DPU	5 811	5 811	5 795
EXW	22 192	11 450	19 004
FCA	168 820	152 321	164 967
FOB	31 448	29 134	30 283
TOTAL	781 803	745 935	771 445
	2023		
Terms of Delivery	Imports Value (CIF)	Imports Value (invoice)	Imports Value (FOB)
CFR	38 879	37 573	38 646
CIF	211 057	210 662	111 057
CIP	69 822	69 727	69 822
CPT	149 802	143 987	146 924
DAP	666 630	667 823	651 388
DDP	0	0	0
DPU	22	22	22
EXW	24 962	22 143	22 934
FCA	79 148	69 474	76 308
FOB	97 203	86 918	94 054
TOTAL	1 337 524	1 308 330	1 211 154

Table 12 shows that calculated imports balance values according to CIF, FOB and invoice values for each terms of delivery. According to the data announced by the Turkish Statistical Institute, total imports from Azerbaijan is 836 million 443 thousands dollars in 2022. Considering only the records containing invoice values, this figure is 836 million 418 thousands dollars. The balance of imports was calculated on the basis of these records. Accordingly, when the import balance in Table 12 is calculated by taking CIF values into account, it is seen that imports in 2022 are 781 million 803 thousands dollars. According to the calculation made by using invoice values, this value is 745 million 935 thousands dollars, and according to the FOB import value obtained as a result of CIF/FOB adjustment, it is 771 million 445 thousands dollars. The difference between invoice values and CIF/FOB adjustment methods is 25 million

510 thousands dollars. According to the data announced by the Turkish Statistical Institute, total imports from Azerbaijan is 1 billion 440 million dollars in 2023. Considering only the records containing invoice values, this figure is approximately the same. Accordingly, when the import balance in Table 12 is calculated by taking CIF values into account, it is seen that imports in 2023 are 1 million 337 billion dollars. According to the calculation made by using invoice values, this value is 1 billion 308 million, and according to the FOB import value obtained as a result of CIF/FOB adjustment, it is 1 billion 211 million dollars. The difference between two methods is 97 million 176 thousands dollars. As a result of the calculations made using the two methods, it was observed that there was not a great difference. It can be said that the most accurate FOB/CIF adjustment is also a factor here.

## 4. Conclusions

In foreign trade statistics, the import value is calculated according to the CIF (cost of goods + freight + insurance) delivery method. The recommendations of the United Nations are taken as basis in the production of foreign trade statistics. In IMTS 2010 (International Merchandise Trade Statistics), the UN's methodological handbook on the subject, it is recommended that countries produce their imports value according to the CIF terms of delivery, but also it is recommended that countries produce their imports value according to the FOB terms of delivery in order to be an auxiliary data source for national accounts and balance of payments. But it was determined that the principle of output valuation with basic prices used for domestic transactions and FOB valuation did not fully reconcile. The IMF and other organisations have argued that it may be more accurate to use invoice values instead of FOB in import and export valuations. The reason for this is that in import and export valuation processes, especially the conversion from CIF (Cost, Insurance, and Freight) value to FOB value is carried out with different methods in different countries and customs records are not in the same standards in all countries, which leads to data incompatibilities. Conceptually, the use of invoice values is favoured because this method can reduce asymmetries between imports and exports and allow for more accurate calculations. However, access to invoice values varies for each country and it is assessed that access to these data is limited in some countries, the quality of CIF-FOB conversion calculations is low, but additional costs, data source changes and updating of information communication systems are required to implement the new method. Consequently, it was suggested to use (invoice) valuation for import and export valuation in national accounts and balance of payments statistics in the following years.

In Türkiye, imports values are produced according to CIF and FOB terms of delivery. For producing imports values according to FOB terms of delivery, special analysis is used mentioned previous section. Because of the principle of output valuation with basic prices used for domestic transactions and FOB valuation did not fully reconcile, instead of FOB valuation, it's suggested using invoice values. Based on this recommendation, three different valuation methods are discussed in this study and the differences between them are revealed.

As a result of the study, it was determined that there was no significant difference between the balance calculations using the invoice values and the values calculated using the values obtained as a result of the CIF/FOB adjustment. It is thought that the calculation of the ratios used for the CIF/FOB adjustment by taking into account important variables such as product and country route is effective in this.

The use of invoice values in balance calculations will give the most accurate result under conditions where freight and insurance data are healthy, whether these services are provided by resident or non-resident firms is determined in the most accurate way and invoice values can be compiled completely and accu-

rately. Therefore, data compilers should firstly investigate and provide the most accurate ways of compiling these data.

The views expressed in this article do not necessarily reflect those of the Ministry of Trade and Turkish Statistical Institute.

## Abbreviations

BPM6	Balance of Payments Manual 6
BOPCOM	Balance of Payments Committee
CFR	Cost and Freight
CIF	Cost of Goods, Insurance, Freight
CIP	Carriage and Insurance Paid to
CPT	Carriage Paid to
DAP	Delivered at Place
DDP	Delivered Duty Paid
DPU	Delivered at Place Unloaded
ECO	The Economic Cooperation Organization
EXW	Ex-works
FAS	Free Alongside Ship
FCA	Free Carrier
FOB	Free on Board
ICC	International Chamber of Commerce
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
SNA	System of National Accounts
TURKSTAT	Turkish Statistical Office
UN	United Nations

## Author Contributions

Aylin Kolbaşı is the sole author. The author read and approved the final manuscript.

## Conflicts of Interest

The authors declare no conflicts of interest.

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