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CENTRE OF PLANNING
AND ECONOMIC RESEARCH

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PREFACE

The Centre of Planning and Economic Research (KEPE), as an adviser to the Greek Ministry of the Economy and Finance on economic and social policy matters, through this study, identifies an issue that, to the extent it brings together Greece's rising imports with EU requests for import price revisions and, hence, potentially increased fiscal obligations, may undermine the country's economic performance and prospects.

The issue must be addressed, and the study points out factors that may have to be considered by both technical experts and policy makers in Greece and the European Union.

The Centre is in continuous contact with foreign scientific institutions of a similar nature by exchanging publications, views and information on current economic topics and methods of economic research, thus furthering the advancement of economic growth in the country.

Professor Panagiotis Liargovas
Chairman of the Board and
Scientific Director of KEPE

May 2024

The study presents the authors' (a) findings regarding the manner in which a statistical tool employed by the EU and national customs authorities functions, and (b) concerns about the way the application of the tool's estimates is likely to affect microeconomic and macroeconomic factors in Greece and other places across the EU, in hope that they may be considered by – and of use to – the relevant authorities.

An earlier version of the study was presented at the International Conference on Business and Economics of the Hellenic Open University in September 2023; and the current version has benefited from comments made by conference participants, Panagiotis Hatzipanayotou, Nikolaos Kanellopoulos, and an anonymous referee. These, along with the editorial suggestions of Helen Soultanakis and Nicky Spanoudis, and the design efforts of George Chatzispyros are greatly appreciated.

Próδromos Prodromídis, Pantelis Lappas

April 2024

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EXECUTIVE SUMMARY

To prevent the loss of duty revenues due to the large-scale undervaluation of imports in the EU, the European Commission promotes the use of a statistical tool that identifies low-priced imports entering into the EU, so that the said imports are inspected at all EU entry points and taxed properly. As a risk profiling initiative that caused no harm, the tool's mechanics were not scrutinized. However, in a recent court case regarding textile and footwear items imported from China to the UK at a time when the UK was a member of the EU, the tool's estimates were used to replace the transaction values on the basis of which duties are usually calculated. If this becomes EU policy, in all likelihood, it will have a number of undesirable microeconomic and macroeconomic consequences. So, herein the tool's mechanics are closely examined.

Based on the published descriptions of the tool, it appears that the tool:

1. Treats time-series data as cross-sectional data, ignoring key time-series features and tests, as if prices do not vary over time. Both via graphs and by adding a time trend regressor and seasonal dummies to the tool's econometric model, this study shows that the prices of textile and footwear imports from China to the EU vary over time.
2. Runs econometric analyses (regressions) and accepts the results, even when the regressions are based on very few (e.g., four) observations. It is highly doubtful that such an analysis will yield reliable results.
3. Assumes that the relationship between values (V) and quantities (Q) is linear: like someone who observes the quantity purchased increase tenfold and expects that the value purchased will increase tenfold, when, in fact, bulk purchasing discounts and economies of scale kick in.

4. Ignores many possible determinants of V (like quality, bulk purchasing, purchase power, shorter transportation route, etc.), which may explain low prices.
5. Both assumes that the relationship between V and Q features no constant term and evaluates the regression results based on the R^2 statistic. However, the R^2 statistic is not well defined in regressions that lack a constant term, so the tool incorrectly relies on the particular statistic.
6. Removes from the analysis monthly observations, even full sets of observations from particular countries, when they do not fit well with the rather simple model chosen for the tool. Yet, properly, observations may be removed only if they are incorrect (due to measurement or data entry error) or belong to a different population.
7. Estimates the so-called *fair* import price of a good across the EU by assigning the same weight to the import price estimate obtained from a country that imports large amounts (enjoying economies of scale, discounts, etc.) and to the import price estimate obtained from a country that imports small amounts (without economies of scale, discounts, etc.). Thus, it further removes the *fair* price from cases associated with bulk purchasing and volume discounts (i.e., widely accepted, reasonable commercial practices).

As a result, the tool's estimates are weak on scientific grounds.

It also seems that the systematic application of the tool's estimates on low transaction values, though perhaps acceptable in the EU (following the recent court ruling), is not in line with the good practices laid down by the World Trade Organization.

Interestingly, the difference observed between the values of textile and footwear products declared by exporters in China and the values of Chinese textile and footwear imports declared by importers in the EU may be largely due to the Chinese policy of export subsidies. The policy provides an incentive for exporters to overvalue the items they ship overseas.

If one rejects the above possibility, attributes the difference to the evasion of customs duties in the EU, and applies a reasonable duty rate of about 11-12%, then one arrives at the amount the Court ordered the UK to pay the Commission. Interestingly, based on the estimates of its statistical tool, the

Commission claims losses from other member states as well, but can the same loss be claimed twice over? One has to conclude that if the available statistics regarding what is being reported by exporters in China, what it being reported by importers in the EU, and what is being reported by China and by the EU to the UN are accurate, then (i) the tool's estimates are inconsistent with them, and (ii) the tool overcharges: i.e., extracts excess revenue.

In addition, the Commission's attempt to assign higher prices to imports presumed to be falsely low priced (a) pushes up the prices of imports, (b) may hinder the entry of cheap imports into the EU at the expense of competition and consumer welfare, (c) undermines ECB policy regarding inflation and (d) pushes the GDP down by artificially raising the values of imports. This may have disastrous consequences.

1 INTRODUCTION

The purpose of the study is to look at the statistical tool that the European Commission employs to prevent the loss of duty revenues from imports presumed to enter the EU undervalued. The tool was recently employed in a fiscal-turned-legal dispute between the Commission and the United Kingdom of Great Britain and Northern Ireland (UK) (*Commission v United Kingdom,* EU:C:2022:167), regarding (a) the values of a good number of Chinese textile and footwear items imported into the UK at a time when the UK was a member of the European Union (EU) and (b) the respective EU customs duty losses.

Customs duties or tariffs are taxes imposed on goods which are transported across international borders, and they are routinely based on the declared transaction values of the imported items. When customs officers have reason to doubt the truth or accuracy of the declared transaction value, the determination of the customs value (and, hence, of the associated duty) is carried out in connection with some very specific steps. The tool or a variant of the tool discussed hereinafter is not one of them (WTO, 1994). However, in 2022, in the specific case,[1] the Court of Justice of the European Union accepted the estimates of the tool in question (i) as more appropriate than a lot of declared transaction values found to be below a threshold calculated by the said tool and (ii) as a means to combat the undervaluation of goods imported in the EU. Hence, the Court decision is seen (a) as giving leeway to EU and customs authorities to reject transaction values of items imported into the EU and (b) marking a watershed in international trade and customs practices from a legal viewpoint (Schippers and de Wit, 2023).

The economic implications across both the UK and the rest of the EU are

[1] A case in which the UK was supported by six EU member states, namely, Belgium, Estonia, Greece, Latvia, Portugal, Slovakia.

considerable. In the UK, which exited the EU, the effects are certainly fiscal (2.7 billion euro had to be paid to the EU). In the rest of the EU (EU-27), the effects are probably more complex, for beyond this one-time influx of resources, the future use of the tool in the same manner will involve redistributions of resources. These may or may not affect friction (winner-loser friction) within the EU-27.[2] However, if prices estimated via the tool are applied on low-priced imports, then the overall price of imports will be pushed upwards in the EU-27, and free trade, competition, and the consumer surplus across the EU-27 will contract. Also, to the extent that the clothing and footwear price subindex both affects and best predicts the harmonized index of consumer prices across the EU-27 (vis-à-vis the other main subindices reported by Eurostat, see Table 1), pushing up the prices of textiles and footwear imports

Table 1

Granger causality tests involving the first differences of the monthly harmonized index of consumer prices (HICP) and of the main group subindices, Jan. 2009 - Feb. 2024 (179 observations, 2 lags)

H_o: $\Delta(HICP_{main\ group\text{-}i})$ does not Granger cause $\Delta(HICP_{all\ items})$	P-value
Clothing and footwear	2.10E-15
Alcoholic beverages, tobacco, narcotics	2.07E-09
Restaurants, hotels	3.42E-08
Food, non-alcoholic beverages	8.99E-07
Housing, water, electricity, gas, other fuels	3.83E-06
Accommodation services	5.74E-06
Recreation, culture	0.000313
Health	0.000617
Communications	0.003520
Furnishings, household equipment, routine household maintenance	0.008610
Transport	0.024924
Education	0.230705

Source: Eurostat, own calculations.

[2] In Greece, the prospect of directing elsewhere resources that are desperately needed to build from scratch the productive base of the plain of Thessaly and other places in the wake of recent natural disasters is unsettling.

may run counter to the price stability objective of the European Central Bank. Last, but not least, insofar as

$$\text{GDP} = \text{Private consumption} + \text{Investment} + \text{Government spending} + \text{Exports} - \text{Imports}, \quad (1)$$

if the values of past imports are pushed up, then past GDP figures across the EU-27 will be revised downwards. In the case of Greece, this will adversely affect the country's crucial debt-to-GDP ratio and other variables affecting economic growth and social welfare. Current and future import and GDP figures may be affected in the same way.

With these thoughts in mind, in the pages that follow, we ask the very pertinent question as to whether the Chinese textile and footwear items that are imported into the EU are undervalued or the exports overvalued (Chapter 2), describe the statistical tool employed by the Commission to estimate the *fair* import price (Chapter 3), examine the tool's weaknesses (Chapter 4), survey the features of a *fair* price (Chapter 5), and close with the conclusions (Chapter 6).

2 WERE THE IMPORTS IN QUESTION UNDERPRICED OR THE EXPORTS OVERPRICED?

A comparison between:

- the aggregate value figures of textile and footwear items exported from China to each EU member state, figures which China reported to the United Nations (UN), and
- the aggregate value figures of textile and footwear items imported from China to the EU member states, which the EU also reported to the UN,[3]

reveals an undervaluation of EU imports (absolute under-invoicing, especially in textiles during 2014-17) vis-à-vis the figures reported by China or an overvaluation of Chinese exports vis-à-vis the figures reported by the EU. See Table 2.

The origin of the misevaluation is at the core of the question as to whether duty losses occurred in the EU or not. For instance, if Chinese exports are overvalued (rather than EU imports being undervalued) then there may be no such losses. Indeed, according to reports, China used to subsidize textile exports at least up to the spring of 2016 (Bartz, 2016). Understandably, the subsidy to a producer for every additional dollar claimed to have been earned from exports provides an incentive to the said producer to overvalue the exports he or she declares to Chinese authorities (Bao et al., 2017). Thus, it is possible that some or several Chinese producers overvalued or overvalue their products, in order to get larger export subsidies. The reported policy reversal of the Chinese government on export subsidies roughly coincides with the aforementioned reduction in the misevaluation of Chinese textiles imported into the EU observed after 2017 in Table 2. Consequently, value perceived by

[3] Commencing with Bhagwati (1964), this kind of comparison is the dominant approach used by international trade economists to estimate trade mispricing (Ahene-Codjoe et al., 2022). See also Mahmood (1997), Buehn and Eichler (2011), and the sources cited therein.

the Commission as undeclared by UK or other EU-27 importers may have (i) been cooked up by exporters, and (ii) not resulted in EU duty losses.

Obviously, if the portion of EU import undervaluation compared to Chinese export overvaluation were known, then a range of figures or a ballpark figure regarding the duty losses might be determined. Without it, the Commission does not know if the goal of minimizing duty losses is valid, if the goal is close to being achieved or if it has been surpassed.

Nevertheless, if one takes the overall difference between the values of textile and footwear items that:

- China reported to have exported to the EU and
- the EU reported to have imported from China

during 2012-17, not to have been cooked up by exporters but to constitute the upper bound of the incoming value that evaded EU customs, and applies a

Table 2

The values of Chinese textile and footwear exports to the EU member states reported by China to the UN and the values of EU textile and footwear imports from China reported by the EU to the UN, 2012-19 (in US $)

	Textiles reported by		Footwear reported by		Difference between the EU and Chinese figures regarding	
	China	the EU	China	the EU	textiles	footwear
	(A)	(B)	(C)	(D)	(B-A) / (A)	(D-C) / (C)
2012	36,509,008,738	38,679,970,626	9,418,753,515	10,197,143,501	5.9 %	8.3 %
2013	40,027,355,638	38,099,255,965	10,521,206,682	10,312,153,169	-4.8 %	-2.0 %
2014	45,913,269,355	40,584,337,487	11,906,956,937	10,980,407,191	-11.6 %	-7.8 %
2015	41,197,658,087	35,985,190,632	11,131,965,322	10,252,981,852	-12.7 %	-7.9 %
2016	36,983,697,733	33,459,046,075	10,229,795,884	9,789,398,261	-9.5 %	-4.3 %
2017	36,288,236,197	33,342,465,528	10,374,950,647	9,859,805,481	-8.1 %	-5.0 %
2018	36,132,232,181	34,378,232,157	10,316,909,265	10,309,552,518	-4.9 %	-0.1 %
2019	33,927,609,572	32,703,504,625	10,256,867,827	10,146,496,295	-3.6 %	-1.1 %

Source: UN COMTRADE (accessed in June 2022); own calculations. According to the source, there may be some statistical errors between reporter and partner country trade statistics due to various factors.

reasonable (additional) duty rate of 11-12%,[4] then one obtains the amount that the Court ordered the UK to pay the Commission. See Table 3. If, based on the tool's estimates, the Commission claims considerable duty losses from other member states as well, e.g., the member states like Greece that supported the UK in the Court, can the same loss be claimed twice over? And if the tool estimates the losses to be much higher, then one has to conclude that the tool is overcharging (extracting excess revenue), asking for figures that are inconsistent with all available statistics: what has been reported by exporters in China, what has been reported by importers in the EU, and what has been reported by China and the EU to the UN. On the whole, if the latter are reported accurately and are reliable then the tool's estimates are not reliable.

Table 3
The annual amounts of duty losses relating to UK imports that the Court ordered to be paid to the Commission (in euro)

2012	173,404,943.81
2013	325,230,822.55
2014	480,098,912.45
2015	535,290,329.16
2016	646,809,443.80
2017	496,025,324.30

Source: EU:C:2022:167.

To obtain a more complete picture and assess the level and origin of misevaluation, the international literature recommends a number of analyses of microdata in the form of price comparisons that use appropriate market benchmarks (e.g., Mehrotra and Gilles, 2021; Ahene-Codjoe et al., 2022) or third-country market prices, producers' long-run cost figures or estimates of such figures (e.g., Finger et al., 1982). However, the tool employed by the Commission does not do that.

We next turn to the way the tool employed by the Commission works.

[4] The authors do not have access to the duties due per shipment and commodity that were the subject of the litigation, but only to the total values. In some cases, the duty rate is lower; in other cases, the duty rate is higher.

3 BRIEF DESCRIPTION OF THE TOOL

The tool used by the Commission was initially developed by the EU's Joint Research Centre (Arsenis et al., 2015; EU:C:2022:167) as a risk-profiling device for the identification of potentially undervalued goods.

It relies on the use of monthly data taken from a multiyear database (called COMEXT, managed by Eurostat) that contains detailed statistics on international trade, and estimates two things: (a) A *fair price*, **P**, for every good (i.e., for every eight-digit code item)[5] made in a particular third country (e.g., China) and imported into the EU for a period of 48 months. (b) A threshold price, **Þ**, that corresponds to 50% of **P**. This **Þ** is called the *lowest acceptable price* and was initially intended to help customs officers prioritize which shipment's items to check at the time of the shipment's entry into the EU. As a figure that (i) conveyed to customs officers some information regarding recent and not-so-recent prices from across the EU, (ii) might have helped customs officers focus on certain inspections, and (iii) did not run against WTO procedures, it caused no harm. Consequently, neither the tool nor its estimated threshold was scrutinized.

Yet, following the Court's ruling, the **Þ** has become more than that, as the Court (i) applied the **P** on all Chinese textile and footwear items imported into the UK that featured a transaction price lower than the **Þ**, and (ii) based on the

[5] Each eight-digit code stands for a number of products, in line with an internationally standardized system of classifying traded products. For instance, code 61012010 stands for men's or boys' overcoats, car coats, capes, cloaks and similar articles of cotton, knitted or crocheted, and code 63019090 stands for various blankets and travelling rugs which are not knitted or crocheted. Each of these individual products has its own 10-digit code. All of them share the first eight digits: e.g., 6301909010, 6301909021, 6301909029, 6301909091, 6301909099. Understandably, the values and quantities associated with each eight-digit code good amalgamate the values and quantities of the constituent ten-digit code goods.

difference between **P** and the declared transaction price, calculated the UK's customs duty losses owed to the EU from January 1, 2011 to October 11, 2017.

As the mechanics of the tool are intriguing, we turn to them next. We identify four steps or stages.

Step 1. Using the monthly import values and quantities, **V** and **Q**, respectively, of an individual eight-digit good (e.g., men's or boys' jackets and blazers) produced in a particular non-EU country (e.g., China), a bivariate regression is run separately for each and every EU member state, i, where the good is imported, over a period of 48 months:

$$\mathbf{V_i} = p_i \text{ x } \mathbf{Q_i} + e_i. \quad (2)$$

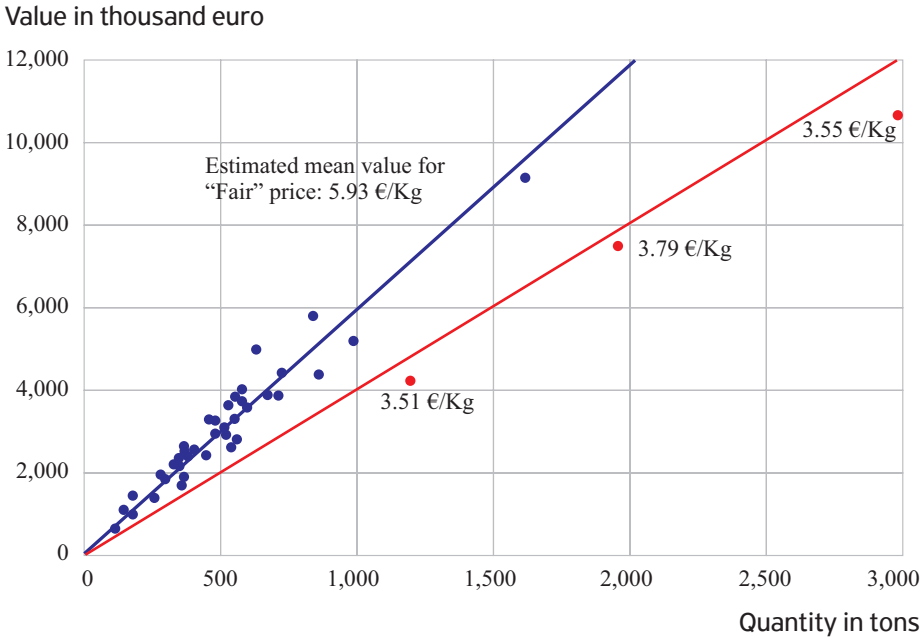
Thus, from the known values of each pair of vectors, $\mathbf{V_{UK}}$ and $\mathbf{Q_{UK}}$, comprising up to 48 monthly observations regarding the UK, a multiyear price, p_{UK}, is estimated for the UK; from vectors $\mathbf{V_{FR}}$ and $\mathbf{Q_{FR}}$, comprising up to 48 monthly observations regarding France, a multiyear price, p_{FR}, is estimated for France; and so on for all EU member states. The situation in each country appears more or less as in Figure 1. The monthly observations of the eight-digit good imported into a country are represented by the red- and blue-colored dots, and the country's estimated multiyear price, p_i, is rendered with the red line.

Step 2. Observations associated with unusually high or low values over the 48-month period in each country, for instance, the three red observations provided in Figure 1, are excluded.

Step 3. The regression is re-run without outliers so as to estimate a seemingly more appropriate measure of the EU member-state's multiyear price, $\hat{p}_i$. This is rendered in Figure 1 with the blue line. It is the so-called *cleaned average price* per kg of the 8-digit good made in the specific non-EU country and imported into the EU member state, *i*.

Step 4. Select $\hat{p}_i$*s* of the member states, all associated with a high or modest measure of model fitness ($R^2 \geq 0.7$), are used to calculate an arithmetic (unweighted) multiyear average price, the so-called *fair* price, **P**, for the entire EU.

Figure 1
Rendition of Figure 1 in Arsenis et al. (2015)



4 SOURCES OF CONCERN

Both the tool's assumptions, and the way the tool treats statistical values, raise a number of questions or issues.

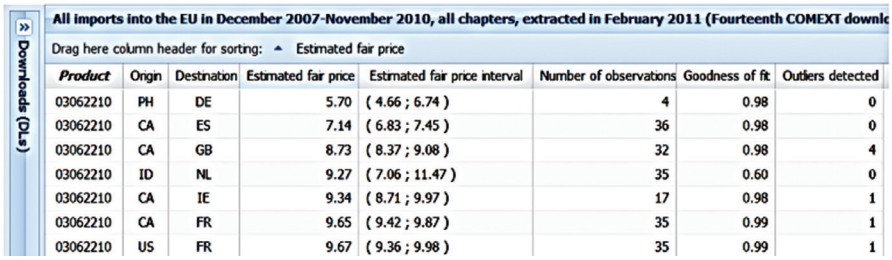
I. In Step 1 the tool runs pairs of monthly (time-series) observations as if they are cross-sectional −which they are not− and ignores any and all time-series aspects (e.g., trend, cyclical, seasonal and shock features) and tests (e.g., stationarity), as if values and prices do not vary over time. The implications are crucial. For instance, in all likelihood, expression (2) ought to be cast in terms of first differences (Δ). It goes without saying that the use of a different expression or of different (transformed, corrected) variables yields different results compared to the results put forward by the tool.

II. According to the tool's manual (Arsenis et al., 2015), regressions may run with just four observations. (See Table 4, column 6, first entry).[6] This is ill advised (e.g., Hanley, 2016; Jenkins and Quintana-Ascencio, 2020). Indeed, it is highly unlikely that such an analysis will yield reliable results and that one will find regressions relying on fewer than ten observations in a scientific peer reviewed publication.

III. The bivariate approach employed is conditioned to yield straight lines. However, there is no good reason for the monthly **Q** and **V** combinations of non-hypothetical, actual goods (i.e., quantities and values that reflect the diverse factors that enter people's supply and demand) to be placed invariably along a straight line (Oren et al., 1983). For instance, the **V-Q** relationship may very well be curved if discounts and economies of scale kick in as quantities increase (e.g., Dolan, 1987). Elsewhere the European Committee (2024) suggests that one may, indeed, make savings by buying a

[6] Paradoxically, the tool's developers both accept the fair price estimate that results from a regression that involved just four observations, on the grounds it exhibited a very high R^2, and argue that they trust more the fair prices which are estimated using a larger number of observations (Arsenis et al., 2015: 14).

Table 4
The top part of the example provided in the tool's manual, Figure 2
(Arsenis et al., 2015)



All imports into the EU in December 2007-November 2010, all chapters, extracted in February 2011 (Fourteenth COMEXT downlo

Drag here column header for sorting: ▲ Estimated fair price

Product	Origin	Destination	Estimated fair price	Estimated fair price interval	Number of observations	Goodness of fit	Outliers detected
03062210	PH	DE	5.70	(4.66 ; 6.74)	4	0.98	0
03062210	CA	ES	7.14	(6.83 ; 7.45)	36	0.98	0
03062210	CA	GB	8.73	(8.37 ; 9.08)	32	0.98	4
03062210	ID	NL	9.27	(7.06 ; 11.47)	35	0.60	0
03062210	CA	IE	9.34	(8.71 ; 9.97)	17	0.98	1
03062210	CA	FR	9.65	(9.42 ; 9.87)	35	0.99	1
03062210	US	FR	9.67	(9.36 ; 9.98)	35	0.99	1

larger-size box rather than a smaller-size box of a product (see Appendix). Econometrically, this may be probed/tested by adding $\mathbf{Q^2}$ as an explanatory variable (e.g., in Table 5). And if the **Q** is associated with a positive parameter while the $\mathbf{Q^2}$ is associated with a negative parameter (as often seems to be the case), then the **V-Q** schedule will resemble the grey colored schedule in Figure 2: a schedule that comes close to the presumed outliers (the red observations), and, indeed, the latter no longer look like outliers.

IV. The exclusion of high or low value observations in Step 2 is not something treated lightly. To the extent that these high or low value observations stand for natural variations in the population, and do not arise due to data entry errors, data processing errors, measurement errors or poor data sampling, they should be left as they are in the dataset and not be removed (e.g., Dodge, 2008: 404; Wohlin et al., 2012: 1723; Borah et al., 2022: 202). The three red colored observations in Figure 1 correspond to relatively large quantities, so the estimation of a low or discount price (the flatter red line) associated with them may be perfectly reasonable in the usual transaction of business. By contrast, the exclusion of the three red observations makes the price (slope) steeper, thus contributing to a wrongly overestimated, high **P.** The same criticism applies to the removal of full sets of observations (country observations) in Step 4 on the grounds that they (the observations) seem unfit not to a sophisticated, but rather to the simple bivariate regression setting that the tool employs.

Table 5

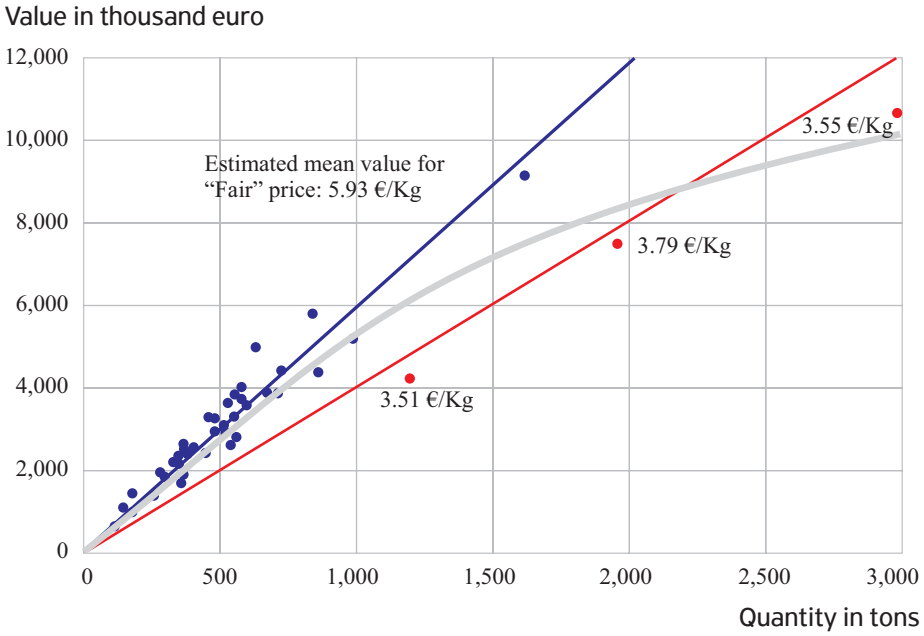
OLS regressions with robust standard errors and no constant, regarding the total values of the first thirty eight-digit textile and footwear coded products imported into the EU-28 from China (in euro), Sep. 2012 - Dec. 2019 (88 monthly observations, quantities are in 100 kgs)

Products	Simple bivariate model			A variant: Multivariate model that allows for non-linear pricing and time effects (trend and seasonal effects: t, S from month 01 to 12) with month 01 serving as reference											
	Coefficients of	Model fitness		Coefficients of										Model fitness	
	Q	R^2	adj R^2	Q	Q^2	time trend, t	t^2	*months*	S_1	*months*	S_2	*months*	S_3	R^2	adj R^2
# 61012010	486.09	0.7414	0.7384	468.19	-0.07	12009.65	-125.64	*04, 06*	-147503.50	*07, 09-10*	238722.50			0.9328	0.9279
# 61012090	1593.14	0.9601	0.9596	2018.60	-0.15	10424.52		*02-06*	-486775.30	*11*	-282258.30			0.9881	0.9874
# 61013010	972.33	0.8586	0.8570	779.96	-0.12	13832.21		*03-06*	-461739.40	*07, 10*	624191.20	*08-09*	1227241.00	0.9445	0.9405
# 61013090	1163.03	0.9095	0.9085	1036.14	-0.03	95775.45	-723.54	*04-05*	-1099470.00	*07-10*	3005084.00			0.9827	0.9814
# 61019020	747.35	0.7337	0.7306	978.54	-0.39	1906.59		*02, 05-06*	-136208.90	*09-11*	191212.10			0.8820	0.8749
# 61019080	541.00	0.7307	0.7276	251.67		8351.09	-52.66	*04-05*	-112112.30	*08-10*	332634.20	*12*	88023.38	0.9338	0.9289
# 61021010	2674.16	0.8826	0.8810	1372.57		22205.35	-193.04	*02, 04-05*	-300771.60	*03*	-457161.20	*07-09*	813385.60	0.9953	0.9949
# 61021090	2948.83	0.9051	0.9040	1836.23				*02, 04*	25777.30	*05-06, 10-12*	66664.61	*07-09*	255051.80	0.9467	0.9442
# 61022010	840.72	0.8077	0.8055	1226.36	-0.29	2463.90		*03-05*	-138073.80	*06*	-373281.60			0.8997	0.8924
# 61022090	1464.65	0.9513	0.9507	2152.10	-0.11									0.9794	0.9789
# 61023010	1288.95	0.9825	0.9823	1294.46				*02, 05-06*	-1120889.00	*11*	801504.50			0.9859	0.9854
# 61023090	1539.68	0.9858	0.9856	1534.59	-0.01	54824.78		*02-03, 11- 12*	-928766.70	*04-06*	-1975639.00	*08-09*	1761994.00	0.9953	0.9949
# 61029010	589.19	0.7126	0.7093	715.29	-0.32			*07, 11*	176507.20	*08-10*	388633.40			0.8165	0.8077
# 61029090	395.51	0.6522	0.6482	501.16	-0.17	1687.63		*04-06*	-66397.36	*08-09*	160048.10			0.8674	0.8595
# 61031010	225.35	0.2810	0.2727	285.28	-0.08	5976.36	-60.94	*02-03, 08*	148578.10					0.7156	0.6984
# 61031090	281.07	0.6535	0.6495	295.03	-0.04	-8865.57	128.10	*04-08*	198836.80	*λοιποί*	321538.30			0.8759	0.8668
# 61032200	352.98	0.8210	0.8190	449.38	-0.06	2209.29		*05*	-165779.30					0.8960	0.8910
# 61032300	809.75	0.9627	0.9623	1067.34	-0.10	-3339.76		*08, 10, 12*	248819.60	*09*	536273.30			0.9821	0.9811
# 61032900	768.91	0.6114	0.6069	1069.57	-0.92	2849.88	-34.00							0.7498	0.7379
# 61033100	2740.91	0.8844	0.8830	2293.95		990.62		*07*	138687.60					0.9061	0.9028
# 61033200	1189.8	0.9013	0.9002	1748.60	-0.35	19013.75	-192.36	*04-06, 10-12*	-236260.50	*07-08*	674732.20			0.9650	0.9624
# 61033300	1124.9	0.9576	0.9571	1322.11	-0.05	16442.88		*02, 04-06*	-527384.50	*03, 12*	-352215.80			0.9870	0.9863
# 61033900	578.09	0.6452	0.6412	966.30	-0.27	4014.03		*05-07*	-160382.60	*08-09*	178947.20			0.9476	0.9444
# 61034100	2006.38	0.7076	0.7042	2316.43	-6.35	1113.28		*04-05*	-48493.42	*09*	33398.54			0.8694	0.8615
# 61034200	802.04	0.9609	0.9605	1232.26	-0.03	47903.20		*02-04, 06, 09-10, 12*	-2193379.00	*05, 11*	-2865048.00			0.9901	0.9895
# 61034300	942.74	0.9569	0.9565	1037.90	-0.03	71856.06		*04-05, 11-12*	-1382975.00	*07-09*	1532852.00			0.9927	0.9922
# 61034900	287.47	0.7417	0.7387	231.70	-0.03	23593.31	-201.00	*03, 07*	153300.50	*04-05, 12*	-195176.40			0.9513	0.9477
# 61041300	276.49	0.4955	0.4897	241.80	-0.04	6694.44		*02, 04-07*	-155725.10					0.8943	0.8892
# 61041920	223.18	0.6464	0.6423	379.94	-0.12			*03, 05-08*	85378.23					0.7322	0.7227
# 61041990	483.51	0.6386	0.6344	409.71	-0.18	7066.94	-59.20	*04-05*	-84895.83					0.8573	0.8487

Notes: All p-values are below 0.01 except for the following eight: 0.049 (# 61032900, column Q_2), 0.046 (# 61034100, column S_2), 0.039 (# 61033100, column S_1), 0.037 (61023010, column S_2), 0.021 (61012090, column S_2), 0.020, 0.017 (# 61031090, columns t and S_1, respectively), 0.016 (# 61019080, column t^2). The correlation coefficient between Q and t is less than ±0.4. The R^2s are supplied because they are employed by the statistical tool. To the extent the regression is estimated without a constant, the R^2s are not well defined.

Source: Eurostat (DS-045409) as accessed in January 2023; own calculations.

Figure 2
A rendition of Figure 1 in Arsenis et al. (2015) with an additional quadratic expression regarding value as a function of quantity



V. The tool ignores the role of several transaction value determinants that enter the supply or demand functions and the bargaining process, such as the impact (a) of purchase orders placed far in advance,[7] of the product's quality,[8] of shifts from brand to other (non-brand) items and vice versa[9] or from new fashion styles to older fashion styles, etc.; (b) of consumer income or buyer's purchasing power and preferences, as well as of past orders (lags of the dependent variable); (c) of market structure and intrafirm trade; as well as the impact (d) of other product, seller,

[7] Such imports are likely to be low-priced compared to rushed orders for goods that arrive at the port at the same time (a) with a tighter/shorter timescale that is harder to execute, and (b) higher processing, packaging and shipping costs.

[8] See Nelson (1991: 1204), and the sources cited therein.

[9] According to the European Commission (2024) prices per unit may very well vary from brand to brand. See Appendix.

buyer or transportation features (e.g., the terms of commerce,[10] the distance and mode of shipment [by air or sea, etc.] −features and factors that are available in the data). These are all factors suggested by economic theory and common sense. To the extent they are not considered in the analysis, and the analysis employs bivariate regressions that rely solely on the values and quantities for each and every eight-digit textile or footwear import, one concludes that the analysis is oversimplified and almost certainly wrong. Indeed, the omission of the aforesaid factors from the econometric analysis may violate a basic regression assumption and cause the recovered estimator of the *fair* price to be biased and inconsistent (e.g., Hastie et al., 2001: chapters 3, 5 and 7; Gujarati and Porter, 2009: 471-473).[11] By contrast, the inclusion of additional factors (explanatory variables or regressors) would require a larger (a so-called, multivariate) kind of expression (function or regression) compared to expression (2). And if time (to which a good number of the effects of these factors may be channeled) is considered as a regressor, then one or more time-related aspects turn out to enter the function in a statistically significant way, and a manner that is very much uncorrelated to **Q**. See Table 5, where a multivariate model,

$$\mathbf{V} = c_1 \times \mathbf{Q} + c_2 \times \mathbf{Q}^2 + c_3 \times \mathbf{t} + c_4 \times \mathbf{t}^2 + c_5 \times \mathbf{S}_1 + c_6 \times \mathbf{S}_2 + c_7 \times \mathbf{S}_3 + e, \quad (3)$$

with **S** denoting seasonal (dummy) variables for three different levels and **t** denoting the time-trend variable, is set against the simple model of expression (2) proposed by the Commission.

VI. The R^2 statistic, on the basis of which the $\hat{p}_i s$ used for the calculation of **P** are selected in Step 4, is not well defined in regressions without a constant term, like expression (2). See Barten (1987). As a result, the R^2 statistic cannot be used as a criterion, as the tool's developers assert.[12] In

[10] I.e., CFR, CIF, CIP ,CPT, DAF, DAP, DDP, DDU, EXW, FAS, FCA, FOB, etc.

[11] There is no mention in Arsenis et al. (2015) whether the initial regressions were tested for omitted variables, and what treatment was considered.

[12] Besides, most economists would argue that the statistic that tells us whether a slope estimate is reliable or not is not the R^2 or the adjusted R^2, but the *p-value* (e.g., Gujarati and

addition, the tool calculates the **P** as an unweighted average of $\hat{p}_i s$ −as opposed to a weighted average of $\hat{p}_i s$ in terms of **Q.** That is, it assigns the same weight to the import price estimate obtained from a country that imports large or vast amounts (enjoying economies of scale, discounts, etc.) and to the import price estimate obtained from a country that imports small or trivial amounts (without economies of scale, discounts, etc.). This further removes the so-called *fair* price from cases associated with bulk purchasing and volume discounts −a practice widely accepted in commerce− thus contributing to a wrongly overestimated, rather high **P.**

VII. The workflow presented in the tool's manual suggests a number of additional sources of bias.[13] So the tool's results may be suffering from:

(a) *Aggregation bias.* This arises during the model development process from the way the data are partitioned (aggregated). For instance, Arsenis et al. (2015, sections 2 and 5) group the data with respect to the product, the country of origin, and the country of destination. However, multiple combinations should have been considered simultaneously in order to explore the data in depth, identify hidden patterns and discover knowledge regarding prices (e.g., analyse prices by keeping the same EU member state of destination and considering different origins simultaneously, etc.). In this direction, clustering approaches could have been used in a preliminary stage, and models could have been built per cluster to measure data bias and detect useful and non-useful outliers, to the extent that the identification of outliers is crucial to the model's developers.

(b) *Evaluation bias***.** This occurs during model iteration and evaluation (e.g., in case of overfitting, a model seems to have a very good performance in the training phase, but in the inference phase, its performance using new/unseen data is very poor). Depending on the mod-

Porter, 2009).

[13] Understanding biased data and biased models is a crucial factor that should be carefully considered towards robust, accurate and reproducible pricing modeling. See Loyola-Gonzalez, 2019; Mehrabi et al., 2019; Bertossi and Geerts, 2020; Kuang et al., 2020; Shahbazi et al. 2023.

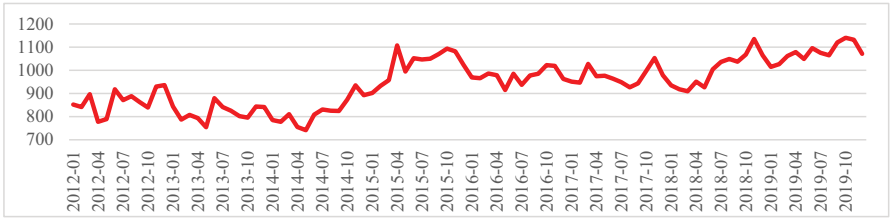
els considered for *fair* price estimation, a trade-off between bias and variance should have been found by multiple datasets and multiple performance measures towards robust modelling. Considering simultaneously the simple linear regression model reported in Arsenis et al. (2015, section 2, expression (1)), the small number of observations mentioned in their section 5 (Figure 2), and the single performance measure of R^2 suggested in their section 4 (expression (4), final conclusions regarding the effectiveness of the suggested model are difficult to make. More data and multiple models (linear and non-linear) should be investigated for better parameter tuning, testing and model selection.

(c) *Deployment bias*. This arises when there is a mismatch between the problem a pricing model is intended to solve and the way in which it is actually used (Wohlin et al., 2012). A number of questions arise regarding the maintenance and versioning of both models and data: How often are the models retrained? According to which metrics/indicators is a training process triggered? How are the trustworthiness and explainability of the models approached and measured? Is there a release management process to keep model and data versioning per EU country?

VIII. The tool estimates a so-called *fair* price of a particular textile or footwear item imported from China over a 48-month period: a period featuring considerable price fluctuation. Indeed, one notes that the overall monthly EU price proxy for footwear (=**V**/**Q**) is far from stable over time due to trend, seasonal, cyclical patterns, and shocks (see Figure 3.) If the highest price proxy of the average footwear article imported from China to the EU between January 2013 and January 2016 is set to 100% (April 2015), then the lowest average price stands 33 percentage points lower (in May 2013 and May 2014): many months prior to the said maximum. The maximum, like many other high prices observed up to November 2015, both (a) belongs to a different phase in the cycle and (b) shapes the 48-month average −if one wishes to estimate such an average− but could not have been anticipated in May of 2013 and 2014 by

Figure 3

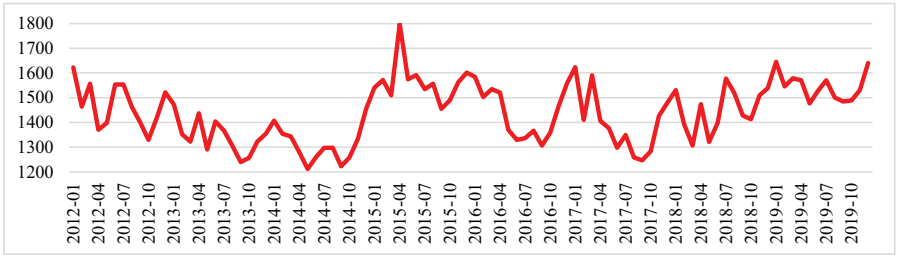
The values of Chinese footwear, gaiter and similar imports into the EU-28 divided by the corresponding quantities (in euro per 100 kgs), Jan. 2012 - Dec. 2019



Source: Eurostat (DS-045409), as accessed in July 2023, own calculations.

Figure 4

The value of Chinese apparel and clothing accessories, knitted or crocheted, imported into the EU-28 divided by the corresponding quantities (in euro per 100 kgs), Jan. 2012 - Dec. 2019



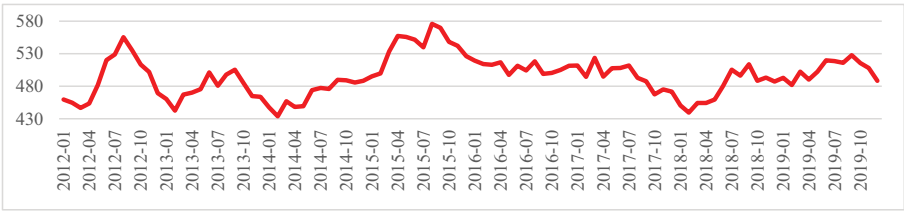
Source: Eurostat (DS-045409), as accessed in January 2023, own calculations.

Figure 5

The value of Chinese apparel and clothing accessories, not knitted or crocheted, imported into the EU-28, divided by the corresponding quantities (in euro per 100 kgs), Jan. 2012 - Dec. 2019

Source: Eurostat (DS-045409), as accessed in January 2023, own calculations.

Figure 6
The value of other Chinese made-up textile articles, sets, worn clothing and worn textile articles and rags imported into the EU-28, divided by the corresponding quantities (in euro per 100 kgs), Jan. 2012 - Dec. 2019



Source: Eurostat (DS-045409), as accessed in January 2023, own calculations

traders and customs officers. How reasonable is to charge for lost duties in May of 2013 and 2014, based on an average price that includes prices (high prices) observed at a different phase in the cycle that were not yet known by the parties involved or were irrelevant at the time a particular order was placed? And is it fair to compare (a) the individual prices observed in any one country (including a country that may enjoy economies of scale in transportation or by buying in bulk) at a month that prices were low across the EU to (b) an EU-wide average price estimated from data spanning the whole period (including months that prices were high across the EU), and mechanically charge a tax or an extra tax based on the (b)-(a) difference? If the tool operates with the assumption that the prices of imports do not vary significantly over time, and ignores long-term price trends, seasonal or cyclical patterns, and other temporary price variations over time, then the assumption is not supported by the facts. The same holds true for the other goods in question. See the price patterns of Figures 4-6: If the highest figure of each article imported from China is set to 100%, then the lowest stands, respectively, 33, 33, 25 percentage points lower (all in the same 48-month period). In reality, prices of goods and services vary both across time[14] and space

[14] As the reader recalls, the regressions of individual goods estimated in Table 5 suggest

(across urban, rural localities, across central and peripheral regions, regions closer to the Suez Canal and others, etc.). For instance, it is conceivable that in Greece, due to the country's long recession, a switch to relatively cheap imports by the country's economically strained consumer base, brought the average price proxies of imports from China down. Furthermore, to the extent that:

- the traditional maritime route between China and Europe runs through the South China Sea, the Malacca Strait, the waters of the Indian Ocean and the Suez Canal;
- Greek ports are closer to the Suez Canal compared to Valeta (Malta), Burgas, Varna (Bulgaria) and all other EU entry-points west or north of Greece; and
- transportation costs by and large depend on distances;

ceteris paribus, it is quite reasonable to expect the prices of imports from China to Greece to generally be below the prices of imports from China to several other EU member states.

that the time trend and seasonal features are statistically significant.

5 WHAT ARE THE FEATURES OF A *FAIR PRICE*?

The notion of the *fair* or *just* price is almost as old as the earliest surviving commercial records in cuneiform script, and probably as old as economic exchange itself.[15] However, the notion developed as an economic concept in the Middle Ages (Baldwin, 1959; Ekelund and Hebert, 1975). The *just* price is estimated in a particular place and time by production and other associated costs (e.g., risk and carriage charges) in a regime of free competition that does not depend on the will of an individual who may want to exploit his fellow human beings. The concepts involved are not contradictory since in a free competition regime the price equals the (marginal) cost;[16] and, indeed, the notion of fairness in exchange seems to have survived to our days.

Nowadays, the *fair* price (or *just*, *acceptable* price) of a good or service, is described as a price different from usual prices in that it does not (a) respond to demand shifts or (b) increase at times of shortages (especially, when the product is already in stock), and natural disasters. Instead, it covers the average costs of sustainable production, is associated with the practice of passing on cost savings, and ideally falls as quantity (volume) goes up. See Rabin (2003), Heyman and Mellers (2008), Rotemberg (2011), Reinecke and Ansari (2015), Earl (2018), WHO (2021). Generally, from a personal and social fairness viewpoint, to be considered *fair*, a price (or a tax) has to be or to be seen as *low* or *lower* (Maxwell, 2007). This is at variance with the *fair* price proposed by the Commission: a price of a good or service that (a) is obtained via

[15] In some languages there may exist one adjective and one noun for the notion. In English the adjectives *fair* (of Germanic origin) and *just* (of Latin origin) are synonyms. The former means: impartial and just, without favoritism or discrimination, marked by impartiality and honesty, conforming with the established rules, clean, pure. The latter means: based on or behaving according to what is morally right and fair, having a basis in or conforming to fact or reason, conforming to a standard of correctness, acting or being in conformity with what is morally upright or good, being what is merited, legally correct.

[16] Pirenne (1937) describes how such a price was affected in society.

a process that trims down low-priced combinations like the red observations in Figure 1, (b) takes into account all sorts of prices (including product prices observed in distant countries, with different supply and demand conditions, at different seasons or phases of the cycle), (c) exceeds the declared transaction price, and (d) is assigned to products regardless of their quality, transportation cost, and other characteristics.

In international trade the term *fair* is employed not so much in connection with the word *price* as with the word *value*: In cases of exports that are priced below the price charged at the home country and/or below the producer's long-run cost of production. Such cases are *termed less than fair value* cases (e.g., Finger, 1981; Finger et al., 1982.) However, the tool employed by the Commission neither engages in such comparisons nor determines whether the textile and footwear imports from China to the EU were/are underpriced or the exports were/are overpriced, and by how much.

6 CONCLUSIONS

There is a good chance that the difference observed between the values of Chinese textile and footwear products (a) reported by China as exported to the EU and (b) reported by the EU as imported from China to the EU is explained by the export subsidies offered by the Chinese government. In such a case, there may have been no import duty losses for the EU.

The statistical tool employed by the Commission is not designed to trace the origin of this difference, i.e., whether the former was (or is) overvalued or the latter undervalued. Instead, it is designed to calculate an average import price of sorts, and to the extent there are always negative deviations from the average measure, to identify cases associated with large negative deviations, thus, helping customs service staff identify potentially underpriced merchandise so that the said merchandise is inspected. As such, the tool caused no harm and was not thoroughly examined. If, however, the tool is going to be used to estimate revenue losses, there is a good chance it overestimates losses −hence, extracting considerably more resources from the member states, pushing prices up, and adversely affecting free trade and competition, inflation, the consumer surplus, and the GDP.

A close inspection of the way the tool works reveals both economic and statistical flaws: (a) It easily runs econometric regressions on inordinately few observations and evaluates the results using a criterion that is not well defined in the setting the tool's developers select. (b) It treats time-series data as cross-sectional data. Thus, overlooks key time-series features and tests as if prices do not vary over time, when in fact they may vary considerably. Indeed, in the case under consideration the difference is statistically significant. (c) It ignores many possible value determinants (like quality, bulk purchasing, purchase power, shorter transportation routes, etc.) which may explain low prices. (d) It assumes a relationship between values and quantities that turns the cases associated with bulk purchasing discounts, etc. into outliers. It then re-

moves the outliers, even full sets of observations from countries whose data do not fit well with the rather simple model selected for the tool. (NB: Observations may be removed only if they are incorrect, due to measurement or data entry errors, etc.) (e) It estimates the so-called *fair* import price by assigning the same weight to the import price estimate obtained from a country that imports large amounts (enjoying economies of scale, discounts, etc.) and to the import price estimate obtained from a country that imports small amounts (without economies of scale, discounts, etc.). Thus, it further removes the *fair* price from cases associated with bulk purchasing and volume discounts (i.e., widely accepted and reasonable commercial practices), increasing the odds the latter appear as undervaluations and re-priced (re-priced higher) by the Commission.

In view of the above, the tool cannot be used as a basis for serious scientific discussion on customs revenues, and using it to estimate such revenues is unwise.

REFERENCES

Ahene-Codjoe A.A., Alu A.A. and Mehrotra R. (2022). Abnormal pricing in international commodity trading: Evidence from Ghana. *International Economics,* 172: 331–348.

Arsenis S., Perrotta D. and Torti F. (2015). *The estimation of fair prices of traded goods from outlier-free trade data*. European Commission, Joint Research Centre Technical Report # *100018.* Ispra.

Baldwin J.W. (1959). The Medieval Theories of the Just Price: Romanists, Canonists, and Theologians in the Twelfth and Thirteenth Centuries. *Transactions of the American Philosophical Society, New Series*, 49.4: 1–92.

Bao Q., Hou J., Li K. and Wang X. (2017). The impact of tax rebates on export performance: China's textile exports to the USA. *Asian-Pacific Economic Literature*, 31.1: 79–89.

Barten A.P. (1987). The Coefficient of Determination for Regression without a Constant Term. *The Practice of Econometrics*. Edited by R. Heijmans and H. Risto. Dordrecht: Kluwer, pp. 181–189.

Bartz D. (2016). U.S. says China to scrap some export subsidies. *Reuters*. Report dated April 14, 2016. (Accessed via https://www.reuters.com/article/us-usa-china-trade-idUSKCN0XB1UQ.)

Bertossi L. and Geerts F. (2020). Data quality and explainable AI. *ACM Journal of Data Management and Information Quality*, 12.2: 1–9.

Bhagwati J. (1964). On the underinvoicing of imports. *Oxford Bulletin of Economics and Statistics*, 27.4: 389–397.

Borah S., Mishra S-K., Mishra B-K., Balas V-M. and Polkowski Z. (2022). *Advances in Data Science and Management: Proceedings of ICDSM 2021.* Singapore: Springer Nature.

Buehn A. and Eichler S. (2011). Trade misinvoicing: The dark side of world trade. *The World-Economy* 34.8: 1263–1287.

Dodge Y. (2008). *The Concise Encyclopedia of Statistics*. New York NY: Springer.

Dolan R. J. (1987). Quantity Discounts: Managerial Issues and Research Opportunities. *Marketing Science*, 6.1: 1–22.

Earl P.E. (2018). Richard H. Thaler: A Nobel Prize for Behavioural Economics. *Review of Political Economy*, 30.2: 107–125.

Ekelund R.B. Jr. and Hebert R.F. (1975). *A History of Economic Theory and Method*. New York: McGraw-Hill.

EU:C:2022:167. *Commission v. United Kingdom (Action to Counter Undervaluation Fraud)*. Judgement of 8.3.2022 – Case C-213/19.

European Commission (2024). *Unfair Pricing*. Directorate General for Internal Market, Industry, Entrepreneurship and SMEs. Last checked 18/03/2014. Accessed via *Source*: https://europa.eu/youreurope/citizens/consumers/unfair-treatment/unfair-pricing/index_en.htm.

Finger J.M. (1981). The Industry-Country incidence of "less that fair value" cases in U.S. Import trade. *Quarterly Review of Economics and Business,* 21.2: 260–279.

Finger J.M., Hall H.K. and Nelson D.R. (1982). The political economy of administered protection. *American Economic Review,* 72.3: 452–466.

Gujarati D.N. and Porter D.C. (2009). *Basic Econometrics*. 5th edition. New York NY: McGraw-Hill.

Hanley J.A. (2016). Simple and multiple linear regression: sample size considerations . *Journal of Clinical Epidemiology*, 79: 112–119.

Hastie T., Tibshirani R. and Friedman J. (2001). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction.* New York NY: Springer.

Heyman J.E. and B.A. Mellers (2008). Perceptions of fair pricing. *Handbook of consumer psychology.* Edited by C.P. Haugtvedt, P.M. Herr and F.R. Kardes. New York and London: Taylor & Francis, 683–697.

Jenkins D.G. and Quintana-Ascencio P.F. (2020). A solution to minimum sample size for regressions. *PLoS ONE*, 15(2): e0229345.

Kuang K., Lian L., Geng Z., Xu L., Zhang K., Liao B., Huang H., Ding P., Miao W. and Jiang Z. (2020). Causal inference. *Engineering*, 6.3: 253–263.

Loyola-Gonzalez, O. (2019). Black-Box vs. White-Box: Understanding their advantages and weaknesses from a practical point of view. *IEEE Access,* 7: 154096–154113.

Mahmood Z. (1997). Determinants of under-invoicing of imports in Pakistan. *Journal of International Development*, 9.1: 85–96.

Maxwell S. (2007). *The price is wrong: Understanding what makes a price seem fair and the true cost of unfair pricing*. Hoboken NJ: Wiley.

Mehrabi N., Morstatter F., Saxena N., Lerman K. and Galstyan A. (2019). A survey on bias and fairness in machine learning. http://arxiv.org/abs/1908.09635.

Mehrotra R. and Gilles C. (2021). Abnormal pricing in international commodity trade: Empirical evidence from Switzerland. *Resources Policy*, 74: 102352.

Nelson J. A. (1991). Quality Variation and Quantity Aggregation in Consumer Demand for Food. *American Journal of Agricultural Economics*, 73.4: 1204–1212.

Oren S., Smith S. and Wilson R. (1983). Competitive nonlinear tariffs. *Journal of Economic Theory,* 29.1: 49–71.

Pirenne H. (1937). *Economic and Social History of Medieval Europe*. Translated from the French by I.E.Clegg. New York: Harcourt, Brace & World.

Rabin M. (2003). The Nobel Memorial Prize for Daniel Kahneman. *Scandinavian Journal of Economics*, 105.2: 157–180.

Reinecke J. and Ansari S. (2015). What Is a "Fair" Price? Ethics as Sensemaking. *Organization Science*, 26.3: 867–888.

Rotemberg J. (2011). Fair Pricing. *Journal of the European Economic Association*, 9.5: 952–981.

Schippers M. and de Wit W. (2023). The use of statistical values to combat undervaluation in the European Union. *Journal of World Trade*, 57.2: 253–276.

Shahbazi N., Lin Y., Asudeh A. and Jagadish H. V. (2023). Representation bias in data: A survey on identification and resolution techniques. *ACM Computing Surveys*, 55.13s: 1–39.

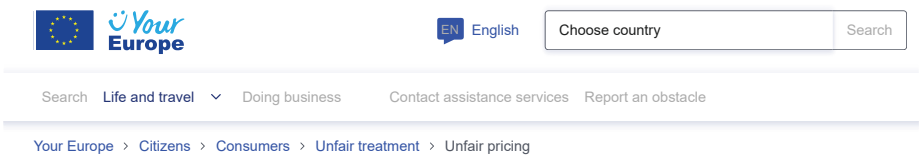
WHO (2021). *Fair Pricing Forum 2021*. Geneva: World Health Organization.

Wohlin C., Runeson P., Höst M., Ohlsson M., Regnéll B. and Wesslen A. (2012). *Experimentation in Software Engineering*. Berlin, Heidelberg: Springer - Verlag.

WTO (1994). *The Agreement on Implementation of Article VII of the General Agreement on Tariffs and Trade*. Geneva: World Trade Organization.

APPENDIX

Appendix: It is likely to (a) save money when buying a large-size box of a product instead of a small box, and (b) for prices per unit to vary across brands



Unfair pricing

[...]

Easy comparison – price per unit

You should also be able to compare prices between brands and between package sizes – to see, for example, what saving you'd make buying a large-size box of breakfast cereal instead of a small box.

To help you do this, all products must be marked not only with the selling price, but also the **price per unit** – for example, the price per kilo or per litre. This information **must be understandable, easy to read, and easily identifiable**.

This rule also applies to adverts that mention a selling price.

[...]

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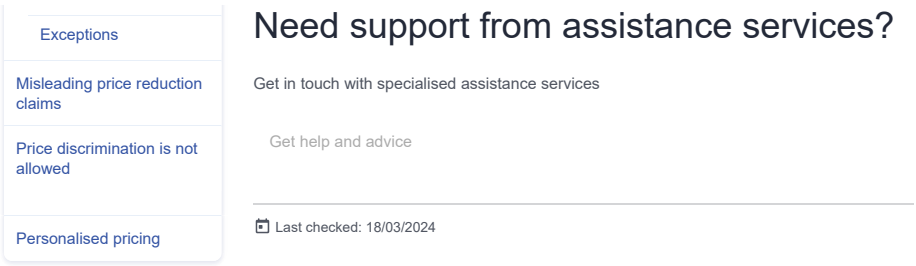

Source: https://europa.eu/youreurope/citizens/consumers/unfair-treatment/unfair-pricing/index_en.htm

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