HELLYER Mark,
Doctor of Philosophy (International Economic Relations),
Director CTA Economic & Export Analysts
505 Pinner Road, Harrow, HA2 6EH, United Kingdom

ORCID: 0000-0001-5665-4052
markhellyer@me.com

PIATNYTSKA Galyna,
Doctor of Science (Economics), Professor,
Professor at the Management Department
State University of Trade & Economics
19, Kioto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-3463-133X
g.piatnytska@knute.edu.ua

PIATNYTSKYI Valeriy,
PhD (Economics), Associate Professor,
Vice President Finance
Black Sea Trade and Development Bank (BSTDB)
1, Komninon Str., 54624, Thessaloniki, Greece

ORCID: 0000-0002-7846-0571
piatnytskyiv@gmail.com

ХЕЛЛАЄР Марк,
доктор філософії (Міжнародні економічні відносини),
директор CTA Economic & Export Analysts
505, Pinner Road, Harrow, HA2 6EH, Велика Британія

ORCID: 0000-0001-5665-4052
markhellyer@me.com

П'ЯТНИЦЬКА Галина,
д. е. н., професор, професор кафедри менеджменту
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-3463-133X
g.piatnytska@knute.edu.ua

ПЯТНИЦЬКИЙ Валерій,
к. е. н., доцент, віце-президент
з фінансових питань
Чорноморського банку торгівлі та розвитку
вул. Комнінон, 1, 54624, м. Салоніки, Греція

ORCID: 0000-0002-7846-0571
piatnytskyiv@gmail.com

GROUPS OF PRODUCTS WITH IMPROVED MARKET ACCESS & IMPROVED EXPORTS

ГРУПИ ПРОДУКТІВ З УДОСКОНАЛЕНИМ РИНКОВИМ ДОСТУПОМ І ПОКРАЩЕНИМ ЕКСПОРТОМ

Introduction. *The results of Ukraine's activities within the framework of the Association Agreement between the EU and Ukraine, including provisions on the Deep and Comprehensive Free Trade Area (DCFTA), improving market access means not only the reduction of tariffs, but also the reduction of non-tariff measures through alignment with EU rules.*

Problem. *Competition between rules leads to convergence of standards in practice. However, the issue of continuation of national diversities is empirical.*

Вступ. *Результати діяльності України в рамках Угоди про асоціацію між ЄС та Україною, включаючи положення про поглиблену та всеосяжну зону вільної торгівлі (ПВЗВТ), покращання доступу до ринку означають не тільки зниження тарифів, а й зменшення нетарифних заходів шляхом узгодження з правилами ЄС.*

Проблема. *Конкуренція між правилами приводить до зближення стандартів на практиці. Однак питання про те, чи можуть національні відмінності продовжуватися, є емпіричним.*

The aim of the study is to identify the relationship between product groups with improved access and exports within the study of European perspectives for the further development of Ukraine.

Methods. The study uses general and special research methods.

Results. It is substantiated that Ukrainian business can increase the productivity and efficiency of its activities by adopting EU standards by 13–30 %. It is established that a smaller share of imports in a particular country's total imports would imply greater trade costs in that country for the exporting country, and vice versa. All products with HS4 codes which market share in EU is less than market share in the world are identified. Ineffective products within the scope of the DCFTA have been identified. In order to identify these products a special formula is proposed. An economic-mathematical approach for evaluating export growth in conditions of conflict-free trade is proposed.

Conclusions. Tariffs are not the only barrier to market entry in the EU. Some of the largest trade transaction costs have been seen to be a major barrier to export development which was addressed within the DCFTA. Further investigation could be focus on assessing the competitiveness of products with improved access.

Keywords: export, imports, market access, trade, non-tariff measures, DCFTA, regulatory barriers, EU quality infrastructure system, products and sectors of Ukraine.

Метою дослідження є визначення взаємозв'язку між групами товарів з покращеним доступом та експортом у контексті європейських перспектив подальшого розвитку України.

Методи. Використано загальні та спеціальні методи дослідження.

Результати дослідження. Обґрунтовано, що український бізнес може підвищити продуктивність та ефективність своєї діяльності завдяки прийняттю стандартів ЄС на 13–30 %. Встановлено, що менша частка імпорту в загальному імпорті конкретної країни означала б більші торгові витрати в цій країні для країни-експортера, і навпаки. Ідентифіковано всі продукти з кодами HS4, частка ринку яких в ЄС менша, ніж на світовому ринку. Виявлено неефективну продукцію в рамках ПВЗВТ. Для ідентифікації цих продуктів запропоновано спеціальну формулу. Запропоновано економіко-математичний підхід до оцінювання зростання експорту в умовах безконфліктності торгівлі.

Висновки. Тарифи самі по собі не є єдиною перешкодою для входу на ринок ЄС. Деякі з найбільших витрат на торговельні операції вважаються основною перешкодою для розвитку експорту, який розглядався в рамках ПВЗВТ. Подальші дослідження можуть бути зосереджені на оцінці конкурентоспроможності продуктів із покращеним доступом.

Ключові слова: експорт, імпорт, доступ на ринок, торгівля, нетарифні заходи, ПВЗВТ, регуляторні бар'єри, система інфраструктури якості ЄС, продукти та сектори України.

Introduction. In 2022 Ukraine received the status of a candidate of the EU membership. After the signing of the Association Agreement (AA) between EU and Ukraine, including provisions for a Deep and Comprehensive Free Trade Area (DCFTA) in 2014, it became another step on the way to the integration of Ukraine into the European economic space, which requires the harmonization of national rules with the rules of trade and other activities on the EU market. It also actualizes the task of identifying the relationship between groups of products with improved access and improved exports. Such studies will allow us to better understand the benefits that Ukraine should take of, if not during wartime (when special rules may be implemented and various types of risks are constantly unpredictably manifested), then in peacetime – during the country's reconstruction and preparation for its accession to the EU.

In examining the performance of Ukraine under the DCFTA, improved market access does not only mean a reduction in tariffs but also a reduction in non-tariff measures (NTMs) through alignment to EU regulations. A fundamental difference between DCFTA and traditional FTA is regulatory alignment which allows for improved market access beyond tariffs alone and are expected to result in significant increase in exports. Therefore, sectors and/or products that improved market access through regulatory alignment should also improve exports to the EU. In general, NTMs such as Technical regulations and Sanitary and Phytosanitary (SPS) measures are imposed by governments for a variety of legitimate objectives that may have nothing to do with international trade, but still create trade frictions and restricts trade.

In order to minimize the negative impact of differences in national regulations on export development, some free trade agreements pursue a strategy of regulatory alignment. For example, since 1986, the European Union has implemented the Single Market program that aligns and harmonizes the regulation across most sectors whilst in non-harmonized sectors, a system of mutual recognition is encouraged. Mutual coordination and harmonization of regulatory activities takes place on the background of the development of international rules to reduce the protectionist influence of regulatory acts in the system of multilateral trade.

Regulatory alignment can be achieved either through mutual recognition of national rules, or, can be based on complete harmonisation of regulations and standards. Harmonization eliminates the negative effect on exports of differences in national standards due to both parties in the FTA adopting the same regulations and standards. However, in practice, such harmonization can take a very long time, as evidenced by the experience of regulations and standards harmonization within the EU. Mutual recognition of national standards and conformity assessment procedures within the framework of an FTA is a viable alternative approach to harmonisation. As noted in some studies earlier, "in both instances, states must have confidence in each other's testing and enforcement procedures, but the mutual recognition approach involves, in addition, the possibility of competition among rules leading to a 'race to the bottom'. This may occur if firms within the FTA lobby for less stringent regulation in the face of competition from firms located in more lax regulatory jurisdictions, or threaten to relocate from high - to low-standard countries" [1].

Problem. Unfortunately, today there is little evidence on the extent to which differences in national rules may persist. The question of determining the extent to which competition between the rules of different countries leads to convergence of standards in practice requires further investigation.

In modern realities, the creation of a single international space is no longer considered as a choice between regulatory harmonisation and mutual recognition of the rules. In fact, a scenario of following a parallel approach where mutual recognition of some rules supplements harmonisation of rules

of other sectors. At the same time, it should be emphasized that although mutual recognition can certainly become the basis for alignment of some national rules, it is only viable when the difference between national approaches is small. This, in particular, is evidenced by the experience of the EU.

Analysis of recent research and publications. There have been different publications [2–4] in recent years examining the impact of the AA and DCFTA. However, they mainly related to the general characteristics of the change in trade rules and the determination of the Ukraine's exports to EU countries trends. Some articles [5; 6] also mentioned the negative impact of Russia's military aggression on trade between Ukraine and the EU. Other publications [7; 8] presented assessments of the competitiveness of Ukrainian exporters, factors influencing the development of trade between Ukraine and the EU, etc. In one of our previous studies, it is substantiated that "…the increase in new exports of Ukraine to the EU post DCFTA were due to tariff liberalization" [9, p. 1].

Within the defined research issues, it is necessary to mention the scientific publications of Mattoo and Fink [10; 11], which were presented still at the beginning of the 21st century. These scientists suggested the following as majors motivations for regularly alignment [1, p. 26; 11]:

• If national standards are not optimal, then international harmonization can be a way of improving national standards.

• If national standards have been captured by protectionist interests, then international harmonization can be a liberalizing device.

• If national standards are optimal, then there is a trade-off between the gains from integrated markets and the costs of departing from nationally optimal standards. This trade-off is likely to be most severe in Regional trade agreements (RTAs) involving both developed and developing economies. The low-income country may have a low level of mandatory standards reflecting its optimal trade-off between price and quality, while the high-income country may have higher standards.

Paying tribute to the results of different researches, it is worth emphasizing that the aforementioned studies have not identified and examined the relationship between groups of products with improved access and improved exports under the context of European benchmarks in the development of Ukraine.

The aim of this study is to identify the relationship between groups of products with improved access and improved exports within the study of European perspectives for the further development of Ukraine.

Methods. The study uses general and special research methods. These are methods of systematization, comparative and statistical analysis, economic & mathematical description, graphic method. Theoretical basis are concepts of general international trade, the results of own previous research and publications of other scientists. The study also uses data from European Commission, Eurostat, World Integrated Trade Database, etc.

Results. In an integrated market, harmonization of standards creates greater competition. However, this comes at the expense of social costs to at least one of the partner countries. Such situation is problematic. As noted by Schiff and Winters [12], this problem can be particularly serious when it comes to social or environmental standards and where there may be significant economic reasons for the existence of differences. Because the aggregate costs of harmonization depend on the gap between the policy-related standards of the countries, scientists Mattoo and Fink [10; 11] pioneered the concept of an optimum harmonization area. According to this concept, the optimal zone of harmonization consists of a set of countries for which aggregate welfare will be maximized through regulatory harmonization.

Research by Mangelsdorf et al. [13] on the impact of trade from outside the EU on business having to adopt new EU technical regulations and harmonized standards (that differ from their respective national standards) shows a negative impact on trade (*Table 1*).

With the exception of medical devices (whose manufacturers around the world are more sophisticated in general), compliance with the EU technical requirements and standards (existing and introduction of new standards) has an adverse effect on trade from countries outside the EU.

Table 1

**Effects of new or changes in technical regulations/standards
on Extra EU Imports**

Products	Coefficient effect on Change in Trade
Medical Devices	0.069
Toys	−1.110
Electronics	−0.079
Construction	−0.096
Machinery	−0.202

Source: Mangelsdorf et al. [13].

Therefore, in aligning Ukraine's system of quality infrastructure (technical regulations, conformity assessment procedures, metrology, standards and market surveillance) with that of the EU, SMEs will face no difference in compliance with national and EU requirements and therefore, no difference in selling in Ukraine or Warsaw (given zero tariffs on majority of non-agricultural exports from Ukraine) and hence, these effects negative effects will be reversed.

Moreover, studies on the impact of the EU quality infrastructure system within the creation of the Single Market [14–16] show that European firms have enjoyed gains in productivity and growth resulting from both adoption and alignment of technical regulations and standards (*Table 2*).

Table 2

Impact of Adopting EU harmonized standards in the Single Market, %

Country	Impact on GDP Growth	Impact on productivity
Germany	+0.9	+30.1
UK	+0.3	+13.0
France	+0.8	+27.1

Source: Selected European Standards Bodies.

Therefore, there could be productivity and efficiency gains amongst Ukrainian business and SMEs from adoption of the EU standards of between 13 and 30 %.

The above references show that removing selected NTMs (most look at standards and technical regulations) would likely increase trade. Ronan [17] states that a particular NTM will increase trade if its demand-enhancing effect dominates its trade-cost effect, either through removing or reducing the trade cost of that NTM. Therefore, the assessment of the trade effects of NTMs among and within regions, countries or firms, is important in assessing impact of legislative alignment. However, due to data limitations, availability and availability, estimating these effects remains a significant challenge for scholars worldwide.

Most scientific authors attempt to isolate different effects by type of NTM such as Gruebler et al. [18] who shows the difference between the impact of NTMs on imported products which are used for final consumption, compared to intermediate inputs and that technical regulation measures play a more significant role for the manufacturing sector, especially for intermediate goods.

However, the EU-Ukraine Association Agreement and DCFTA has a wide range of legislative alignment, harmonisation and mutual recognition across all the EU business acquis [19, p. 30–47], so in the first instance, this separation of measures is less relevant.

There has a body of work that has investigated the extent to which actual world trade is much below expected trade, with some estimates as low as 10 % of actual trade [20]. These are largely based on gravity models that examines trade potential and compare to actual trade. The theoretical framework for examining trade potential has a useful application in our case as it creates a frictionless trade benchmark. Anderson [21] in early work began the concept of "natural frictionless benchmark" from an initial point of describing a completely smooth homogeneous world in which all frictions (and associated trade costs) disappear. A frictionless world implies that each good has the same price everywhere. In a homogeneous world, economic agents everywhere might be predicted to purchase goods in the same proportions when faced with the same prices. Therefore, in a completely frictionless and homogeneous world, the natural benchmark prediction is based on a number of assumptions:

- demand at each destination for goods from all origins;
- market clearance;
- perfect arbitrage with, no trade costs.

In the Anderson [22] framework, a completely smooth homogenized world, the exports flow from country *i* to *j*, are equal to countries *i* world exports as a share of total world imports as a proportion of country *j*'s (that is all countries' demand a product equally amongst the different sources of supply). This Bilateral Exports under frictionless trade is thus expressed as follows:

$$X_{ij} = \frac{X_{iW}}{M_W} M_{jW}, \qquad (1)$$

where X_{ij} – is the export of country *i* to country *j* (or *j*'s imports from country *i*); X_{iW} – is country *i*'s global total exports; M_W – is global imports; M_{jW} is global imports by country *j*. Following on from this formulation, the share of *j*'s imports from country *i* is equal to the share of world expenditure (imports) from country *i*.

However, trade in the real world is not frictionless and there is a big difference shown in reality between actual bilateral trade and expected frictionless trade. Therefore, in both actual bilateral trade and the global benchmark, trade costs are present which relax the frictionless concept. Anderson and van Wincoop [22; 23] quantify some of these "Trade Costs" which limit or restrict frictionless trade including:

- Tariffs;
- Iinformation costs;
- Non-monetary barriers – regulation, licensing etc.;
- Taste differences;
- Extortion, insecure contracts;
- Transport and border costs.

Although it should be noted that within gravity model formulations (which Anderson is mainly concerned with), transport and border costs are captured through distance parameters.

Given that trade frictions exist within the benchmark (share of country *i* exports in global imports) as well as in bilateral trade, the inference is that any difference in market shares of country *i* would result from differences in trade costs. That is a smaller share of imports in a particular country's total imports would imply greater trade costs in that country for the exporting country, and vice versa. The Market Share under reduced friction is expressed as follows formula:

$$\frac{X_{ij}}{M_{jW}} \geq \frac{X_{iW}}{M_W}. \qquad (2)$$

So, based on this framework, it would be expected that Ukraine's market share in EU imports should be better (or at least as good) as its market share in other countries as there have been removal of both tariff and non-tariff barriers under the DCFTA.

Anderson [22] extended this analysis to goods at a disaggregated level so in order to identify residual "frictions" and trade costs after the implementation of the DCFTA at a product level. Since we then can isolate products that have had improved tariff market access, if the share in EU markets are less than global market shares then other non-tariff trade costs exist that are greater in the EU.

Therefore, in the following analysis, the share of Ukrainian exports of any product in global markets sets the benchmark proxy for relative "friction" of Ukrainian exports. It would then be expected that under the DCFTA, with greater preferential market access than any other market that Ukraine exports to, Ukraine's exports to the EU should be proportionately greater than Ukraine's global market share, ceteris paribus. If this is not the case, then there must be some tariff or non-tariff barriers (persistent tariffs, TRQs, minimum pricing, SPS or TBT, RoO or marketing/information constraints) [24, p. 4–5].

So, a using Andersons framework and benchmark formulation, it is possible to identify underperforming products under the DCFTA. In order to identify these products, a simple formula was developed to estimate the relative market shares of Ukraine's product exports to EU and world. This formula is expressed the Measure of Underperformance in Exports to the EU of product i (I_i):

$$I_i = \frac{S_{iUKREU}}{S_{iUKRWrd}},\qquad(3)$$

where i – Performance indicator of product; S_{iUKREU} – Share of EU Imports from Ukraine in total EU Imports of product i; $S_{iUKREWrd}$ – Share of Ukrainian global exports of product i in World Imports of product i.

If $I_i < 1$ then Ukraine's export of product i to the EU are less than expected, that is the aforementioned export is underperforming in the EU market relative to performance in the rest of the world.

All products at HS4 which market share in EU is less than market share in the world are identified. To make the analysis manageable in terms of products, a set of criteria based on significant levels of Ukrainian exports globally, significant and growing EU market and relative large potential increase (gap between EU and global markets) was applied to identify [24, p. 5]:
- products which global exports are greater than USD 10 million;
- products which EU imports are significant relative to Ukraine's potential (EU demand more than USD 50 million; or 5 times Ukraine's global exports of that product);
- products which EU imports have been consistently growing over the last 3 years.

In 2021, Ukraine was the 17th largest partner for EU exports of goods and the 15th largest partner for EU imports of goods. Total trade between the EU and Ukraine reached almost EUR 52.4 billion in 2021, almost doubling since the entry into force of the DCFTA [25]. Our previous studies [9; 19; 24] have shown that Ukraine exports 920 products to the EU at a HS4 digit customs code level (HS 8 digit level is not possible due to lack of global demand data at this level of disaggregation). Let's emphasize that around one quarter of product lines, or 242 products have market shares in the EU lower than

global market shares. That is are underperforming in the EU market under the DCFTA. Of these, 69 have large global exports, over USD 10 million as given in. Given that in total only 298 product lines have exports greater than USD 10 million, it also means that around one quarter of Ukraine's largest global export products are underperforming under the DCFTA [19, p. 378–381].

Table 3 summarizes the largest global exports of Ukraine that are currently underperforming under the DCFTA.

Table 3

Largest Exports of Ukraine that are underperforming under the DCFTA

Products & HS 4 digit customs code	Average EU Imports from Ukraine (*EUR million*)	Share of EU Imports from Ukraine in total EU Imports	Ukraine's Global Exports (*USD million*)	Share of Ukrainian global exports in World Imports	Share in EU cf. Share in World Imports (I_i)
7214 Bars And Rods, Of Iron Or Non-Alloy Steel, Not Further Worked Than Forged, Hot-Rolled, Hot-Drawn Or Hot-Extruded, But Incl. Those Twisted After Rolling (Excl. in Irregularly Wound Coils)	43.072	5.039	1 076.940	6.013	0.838
8411 Turbojets, Turbopropellers And Other Gas Turbines	19.821	0.065	789.862	0.666	0.098
2818 Artificial Corundum, Whether Or Not Chemically Defined; Aluminium Oxide / Hydroxide	10.603	1.891	449.926	2.919	0.648
7204 Ferrous Waste And Scrap; Remelting Scrap Ingots Of Iron Or Steel (Excl. Slag, Scale and Other Waste From the Production of Iron Or Steel; Radioactive Waste and Scrap; Fragments of Pigs, Blocs Or Other Primary Forms of Pig Iron Or Spiegeleisen)	8.068	0.710	289.694	0.817	0.868
2402 Cigars, Cheroots, Cigarillos And Cigarettes Of Tobacco Or Substitutes	0.260	0.135	265.030	1.138	0.119
3004 Medicaments Consisting Of Mixed Or Unmixed Products For Therapeutic Or Prophylactic Uses, Put Up in Measured Doses "Incl. Those in the Form of Transdermal Administration" Or in Forms Or Packing for Retail Sale (Excl. Goods of Heading 3002, 3005 Or 3006)	8.032	0.024	187.141	0.054	0.451
2517 Pebbles, Gravel, Broken Or Crushed Stone, For Concrete Aggregates, For Road Metalling Or For Railway Ballast, …	6.560	1.937	169.352	4.635	0.418
8413 Pumps For Liquids, Whether Or Not Fitted With A Measuring Device …	6.735	0.174	168.261	0.265	0.658
8802 Powered Aircraft "E.G. Helicopters And Aeroplanes"; Spacecraft …	10.822	0.051	160.915	0.109	0.468
8602 Rail Locomotives (Excl. Those Powered From An External Source of Electricity Or by Accumulators); Locomonive Tenders	2.129	4.363	159.736	9.223	0.473

Source: Authors's Calculations from World Integrated Trade Database (USD) and EURstat (EUR).

Iron and non-alloy steel bars (HS7214) are Ukraine's largest global export that is underperforming under the DCFTA. However, Ukrainian global exports of Iron and non-alloy steel bars amount to almost USD 1.1 billion. Ukraine's market share of these products in the EU is around 0.8 of its global market share, despite the DCFTA and therefore, exports to the EU are only EUR 43 million (that is, approximately USD 48 million).

Taking into account the results of our study and some previous publications and research [9; 19; 24], it is clear that similarly, Ukraine exports EUR 20 million (USD 22.4 million) of gas turbines (HS 8411) to the EU, which is about one tenth (0.098) of its global market share at USD 800 million. Therefore, if Ukrainian exports to EU of gas turbines performed the same in EU as in global markets, then exports to the EU would total USD 224 million; given the DCFTA provides a market opportunity, it could be argued that we would expect exports to be much larger than global export share and therefore the expected increase would be even higher.

Table 4 presents the products that have the worst performance in the EU in terms of global market share (where I_i is the lowest).

Table 4

Worst Performing Large Exports of Ukraine

Products & HS 4 digit customs code	Average EU Imports from Ukraine (*EUR million*)	Share of EU Imports from Ukraine in total EU Imports	Growth in Average EU Imports, *%*	Ukraine's Global Exports (*USD million*)	Share of Ukrainian global exports in World Imports	Share in EU cf. Share in World Imports (I_i)
9028 Gas, Liquid Or Electricity Supply Or Production Meters, Incl. Calibrating Meters	0.029	0.005	12.15	19.545	0.319	0.016
1901 Malt Extract; Food Preparations Of Flour, Groats, Meal, Starch ….	0.105	0.041	4.83	110.402	0.644	0.064
8415 Air Conditioning Machines Comprising A Motor-Driven Fan …	0.144	0.005	15.62	18.081	0.047	0.096
8411 Turbojets, Turbopropellers And Other Gas Turbines	19.821	0.065	13.79	789.862	0.666	0.098
8501 Electric Motors and Generators (Excl. Generating Sets)	1.100	0.021	11.73	99.550	0.195	0.110
2402 Cigars, Cheroots, Cigarillos and Cigarettes Of Tobacco Or Substitutes …	0.260	0.135	37.76	265.030	1.138	0.119
6402 Footwear With Outer Soles And Uppers Of Rubber Or Plastics …	0.506	0.011	2.81	23.384	0.080	0.134
3904 Polymers Of Vinyl Chloride Or Halogenated Olefins, Primary Forms	0.125	0.017	4.97	21.924	0.118	0.147
7108 Gold, Incl. Gold Plated With Platinum, Unwrought Or Not Further Worked ..	1.471	0.004	79.25	73.467	0.028	0.156
8526 Radar Apparatus, Radio Navigational Aid Apparatus and Radio Remote Control	0.852	0.038	9.35	43.676	0.239	0.160

Source: Authors's Calculations from World Integrated Trade Database (USD) and EURstat (EUR).

Ukraine has the worst indicators of exports to the EU for product groups HS 9028, HS 1901, HS 8415, HS 8411, whose relative market share in the EU does not even reach 0.1 share of the global market (see *Table 4*).

As mentioned earlier, the benefits of the DCFTA are derived principally from two elements [24, p. 8]:

• improved market access (preferential tariffs and duty free tariff rate quotas) that provide Ukraine with a margin of preference over other third country suppliers;

• alignment of national regulations (SPS and technical regulations) to those of the EU so that producers in Ukraine, de facto, already comply with EU regulations and can export more easily without product adaptation.

Where there are remaining tariff obstacles, including tariff rate quotas, amongst the largest underperforming sectors, these tariffs could explain all or most of the residual frictions and therefore, explain the underperformance of Ukraine in EU markets under the DCFTA compared with Ukraine's global exports.

Therefore, in order to identify products where non-tariff frictions exist, the largest exports from Ukraine globally that perform worse in the EU, whereby these products face no tariffs or tariff preferences over major suppliers. For underperforming sectors where Ukraine has a tariff advantage, underperformance must be due to the existence of other trade costs especially where a margin of preference. However, it should be noted that the persistence of trade costs in these under performing products does not necessarily mean that these result from non-alignment of technical and SPS regulations, but rather "could be" one of the reasons for underperforming (other internal and external factors could also play a role).

From the 69 large (with global exports from Ukraine greater than USD 10 million) underperforming sectors of Ukraine in the EU under the DCFTA, there are a total of 39 sectors that are underperforming and have tariff free or margin of preference in the EU. However, given that Ukraine actually exports 920 sectors (at 4-digit level), only 5 % of sectors totalling EUR 95.2 million (or 6.9 %) of average exports to the EU (2017–2019) are underperforming with tariff free or margin of preference as shown in *Table 5* below.

On average, these products are underperforming in the EU versus the rest of the world by 0.49 (simple average) which means that, assuming that these are globally competitive products (as Ukraine has significant exports of these in global markets), there is potential for increasing exports to the EU of these by more than two times under frictionless trade.

To get a more accurate figure, the export potential (if Ukrainian exports to the EU were to match its global market share), of these products was estimated for the specific under performance. Assuming that Ukraine could potentially trade with the EU at global levels in all products with no tariff barriers at global market share levels, then using the underperformance index, the increase in potential exports under frictionless trade would be (at least):

$$\Delta X = \left(\frac{1}{I_i}\right) X, \tag{4}$$

where ΔX – is the increase in exports under frictionless trade in product i; $\left(\frac{1}{I_i}\right)$ – is the multiple of trade potential in product i; X – is the existing exports to the EU of product i.

Table 5 calculates the total level of under performance of Ukrainian exports in the EU market for products enjoying tariff free access to the EU.

Table 5

Underperforming Ukrainian Exports with Duty Free Access to EU

Products & HS4 digit customs code	Average EU Imports from Ukraine, *EUR million*	Share in EU cf Share in World Imports (Ii)	Under Sales, *EUR million*
1803 COCOA PASTE, WHETHER OR NOT DEFATTED	1.239	0.16	6.5
1901 MALT EXTRACT; FOOD PREPARATIONS OF FLOUR, GROATS, MEAL, STARCH OR MALT …	0.105	0.06	1.5
2001 VEGETABLES, FRUIT, NUTS AND OTHER EDIBLE PARTS OF PLANTS, PREPARED OR PRESERVED …	1.487	0.98	0.0
2005 OTHER VEGETABLES PREPARED OR PRESERVED OTHERWISE THAN BY VINEGAR OR ACETIC ACID, NOT FROZEN ….	1.301	0.53	1.1
2008 FRUITS, NUTS AND OTHER EDIBLE PARTS OF PLANTS, PREPARED OR PRESERVED, ….	2.108	0.58	1.6
2106 FOOD PREPARATIONS, N.E.S.	1.895	0.57	1.4
2505 NATURAL SANDS OF ALL KINDS, WHETHER OR NOT COLOURED (EXCL. GOLD-, PLATINUM-BEARING SANDS, …	0.120	0.20	0.5
2517 PEBBLES, GRAVEL, BROKEN OR CRUSHED STONE, FOR CONCRETE AGGREGATES, FOR ROAD …	6.560	0.42	9.1
3004 MEDICAMENTS CONSISTING OF MIXED OR UNMIXED PRODUCTS FOR THERAPEUTIC PROPHYLACTIC USES,..	8.032	0.45	9.8
3303 PERFUMES AND TOILET WATERS (EXCL. AFTERSHAVE LOTIONS, DEODORANTS AND HAIR LOTIONS)	0.622	0.35	1.1
3304 BEAUTY OR MAKE-UP PREPARATIONS AND PREPARATIONS FOR THE CARE OF THE SKIN, …	1.468	0.59	1.0
3901 POLYMERS OF ETHYLENE, IN PRIMARY FORMS	0.520	0.93	0.0
3904 POLYMERS OF VINYL CHLORIDE OR OF OTHER HALOGENATED OLEFINS, IN PRIMARY FORMS	0.125	0.15	0.7
4804 UNCOATED KRAFT PAPER AND PAPERBOARD, IN ROLLS OF A WIDTH > 36 CM …	0.517	0.74	0.2
4821 PAPER OR PAPERBOARD LABELS OF ALL KINDS, WHETHER OR NOT PRINTED	0.268	0.36	0.5
4911 PRINTED MATTER, INCL. PRINTED PICTURES AND PHOTOGRAPHS, N.E.S.	0.963	0.56	0.8
6115 PANTYHOSE, TIGHTS, STOCKINGS, SOCKS AND OTHER HOSIERY, INCL. GRADUATED COMPRESSION HOSIERY	1.018	0.39	1.6
6212 BRASSIERES, GIRDLES, CORSETS, BRACES, SUSPENDERS, GARTERS AND SIMILAR ARTICLES AND PARTS ….	3.435	0.86	0.5
7108 GOLD, INCL. GOLD PLATED WITH PLATINUM, UNWROUGHT OR NOT FURTHER WORKED …	1.471	0.16	8.0
7210 FLAT-ROLLED PRODUCTS OF IRON OR NON-ALLOY STEEL, OF A WIDTH >= 600 MM, …	2.351	0.50	2.3
7225 FLAT-ROLLED PRODUCTS OF ALLOY STEEL OTHER THAN STAINLESS, OF A WIDTH OF >= 600 MM, ..	3.733	0.97	0.1
7312 STRANDED WIRE, ROPES, CABLES, PLAITED BANDS, SLINGS AND THE LIKE, OF IRON OR STEEL …	0.593	0.51	0.6
7321 STOVES, RANGES, GRATES, COOKERS, INCL. THOSE WITH SUBSIDIARY BOILERS …	1.339	0.57	1.0
7612 CASKS, DRUMS, CANS, BOXES AND SIMILAR CONTAINERS, INCL. RIGID OR COLLAPSIBLE TUBULAR CONTAINERS. .	0.466	0.66	0.2
8108 TITANIUM AND ARTICLES THEREOF, N.E.S.; TITANIUM WASTE AND SCRAP …	17.056	0.73	6.3
8413 PUMPS FOR LIQUIDS, WHETHER OR NOT FITTED WITH A MEASURING DEVICE ..	6.735	0.66	3.5
8415 AIR CONDITIONING MACHINES COMPRISING A MOTOR-DRIVEN FAN AND ELEMENTS …	0.144	0.10	1.4
8419 MACHINERY, PLANT OR LABORATORY EQUIPMENT WHETHER OR NOT ELECTRICALLY HEATED …	2.953	0.65	1.6
8421 CENTRIFUGES, INCL. CENTRIFUGAL DRYERS (EXCL. THOSE FOR ISOTOPE SEPARATION); ….	3.266	0.85	0.6
8426 SHIPS' DERRICKS; CRANES, INCL. CABLE CRANES (EXCL. WHEEL-MOUNTED CRANES …	0.270	0.72	0.1
8481 TAPS, COCKS, VALVES AND SIMILAR APPLIANCES FOR PIPES, BOILER SHELLS, TANKS, VATS …	5.417	0.74	1.9
8501 ELECTRIC MOTORS AND GENERATORS (EXCL. GENERATING SETS)	1.100	0.11	8.9

End of the Table 5

Products & HS4 digit customs code	Average EU Imports from Ukraine, EUR million	Share in EU cf Share in World Imports (Ii)	Under Sales, EUR million
8523 DISCS, TAPES, SOLID-STATE NON-VOLATILE STORAGE DEVICES, "SMART CARDS" AND OTHER MEDIA ….	0.349	0.47	0.4
8526 RADAR APPARATUS, RADIO NAVIGATIONAL AID APPARATUS AND RADIO REMOTE CONTROL APPARATUS	0.852	0.16	4.5
8701 TRACTORS (OTHER THAN TRACTORS OF HEADING 8709)	0.869	0.65	0.5
8704 MOTOR VEHICLES FOR THE TRANSPORT OF GOODS, INCL. CHASSIS WITH ENGINE AND CAB	0.405	0.19	1.8
8802 POWERED AIRCRAFT "E.G. HELICOPTERS AND AEROPLANES"; SPACECRAFT, …	10.822	0.47	12.3
8803 PARTS OF AIRCRAFT AND SPACECRAFT OF HEADING 8801 OR 8802, N.E.S.	3.231	0.31	7.2
9028 GAS, LIQUID OR ELECTRICITY SUPPLY OR PRODUCTION METERS, INCL. CALIBRATING METERS THEREFOR	0.029	0.02	1.8

Source: Authors's Calculations based on World Integrated Trade Database and EURstat.

This means that if Ukraine/EU could remove the costs to trade on all underperforming exports (become frictionless or at least trade costs equal to global average trade costs faced by Ukraine), there would be an increase in exports of EUR103 million (or an increase in total exports of Ukraine to EU of 0.75 %). This suggests that costs to trade (arising from differences in regulatory structures) are significant as it is unlikely that transport and other trade costs in the EU are higher than other global markets that Ukraine export to.

The Association Agreement foresees alignment with EU regulations (technical regulations, sanitary and phyto sanitary measures, amongst others) over a 10 year period so that for exporters, there will be no difference in exporting to the EU or selling nationally, thus eliminating these barriers. Therefore, for sections of the tariff that are underperforming in the EU market, these barriers should be gradually removed. In the data, which looks at the first 3 "effective" years of regulatory alignment, it is not surprising that there have been no effects yet and in the future, a more significant increase in exports to the EU could be seen from removing barriers to trade.

Moreover, this under performing also identifies products where Ukrainian exports to the EU are less than the "benchmark" global market share. However, these global markets also have frictions, and under the AA/DCFTA, these regulatory trade costs would mean that market shares of Ukraine in EU for many products should not be equal but actually much higher than the EU. Since the level of increased relative market share expected from regulatory alignment would differ by product, the underperformance index relative to global benchmark would likely be a gross under-estimate of the future potential from regulatory alignment. Moreover, since the benchmark is incorrect measure of frictionless trade, many more exports to the EU would be expected to be included in the group of underperforming products and as result, the calibration estimates are much smaller in scope and value and the "multipliers" to frictionless trade of those increased value of products also much higher. Finally, this is a static analysis, focusing on under performing products in existing trade and does not include the dynamic effects.

Studies on the impact of European Integration on trade growth and the disaggregated effects such as the Chen and Novy [23] found that in areas with high levels of technical regulations, up to 85 % of trade growth (internally and

externally) by the EU member states is due to removal of TBT and 45 % for sectors with lower technical requirements. This shows that Ukraine's alignment with the EU quality infrastructure has even greater trade potential growth with the EU than in simple underperformance. A European Commission Staff Working Paper [26] details how regulatory obstacles are prevented and removed through relevant EU legislation on specific products (i.e. through EU harmonised legislation) such as in the case of toys, cosmetic products or pyrotechnical articles. The Commission demonstrates the benefits of harmonisation within the EU by examining the share of trade within the EU of harmonised and non-harmonised goods in total consumption (*Table 6*).

Table 6

Intra EU Exports as a share of Domestic Consumption: Harmonised vs Non-Harmonised Or Partially Harmonised Products, 2008–2015, %

Year	Harmonised	Partial/Non-harmonised
2008	50.6	32.9
2009	51.8	32.5
2010	52.9	34.5
2011	54.2	35.6
2012	54.8	35.8
2013	56.5	37.1
2014	57.9	37.7
2015	59.2	37.4

Source: European Commission [26].

For harmonised products, the average value of intra EU exports is 54.7 % of domestic consumption, while for the non-harmonised and partially harmonized goods intra EU exports represent only 35.4 %.

The effects of harmonisation of the EU technical regulations means there are no (or few) barriers to trade within the EU compared to non-harmonised. Therefore, the Commission concludes [26] that EU enterprises on average trade 54.4 % more in harmonised areas than non-harmonised areas.

Based on this, and assuming Ukrainian enterprises are able to take advantage of opportunities at the same rate as EU companies in other EU markets, and no other barriers exist (frictionless trade assumption), then trade in each sector which Ukraine harmonises with the EU should rise by 54.4 % (ceteris paribus).

Conclusions. The results of identification of the relationship between groups of products with improved access and improved exports showed that tariffs alone are not the only barrier to market entry in the EU and some of the largest trade transaction costs have been seen to be a major barrier to export development which was addressed within the DCFTA. To determine the extent to which residual barriers to trade exist, the "frictionless" trade benchmarking theory was adapted to measure the expected market share in the EU of Ukraine (the benchmark) and actual market share for all products. Given that transport costs are another major friction which does not apply to Ukraine's exports to the EU compared to global exports, given Ukraine's proximity to the EU, any underperformance in trade (market share in EU less than global market shares) would indicate a residual constraint exists in the EU that is limiting market penetration. The measure shows a small, but significant level of Ukrainian export sectors that are underperforming in the EU.

It should be noted that this is probably an underestimate as the benchmark level of trade (Ukraine's world market share) has significant barriers (transport, tariff and regulatory costs) so the actual underperformance is much higher. This is to be expected as the regulatory alignment under the DCFTA is a 10-year process of legal adoption followed by implementation so that, the effects of regulatory alignment are likely only to be observed in the longer term. Anderson's frictionless trade benchmark is only ever used for identifying barriers before negotiation of an agreement. The use of this technique linked to a specific agreement, will be a useful tool for policy makers to identify residual barriers post implementation, especially if other frictions (tariffs and transport costs) can be isolated to provide a measure of residual barriers. This analysis can then be used to focus government dialogue and negotiation to eradicate any non-tariff barriers and address informational frictions on those specific sectors. This could be used as a very powerful policy analysis tool for governments.

Based on the results of this study, further investigation could be focus on assessing the competitiveness of products with improved market access.

REFERENCES

1. Matthews, A. (2003). Regional Integration and Food Security in Developing Countries. Rome, Food and Agriculture Organization of the United Nations. https://www.fao.org/3/y4793e/y4793e05.htm#fn7 [in English].
2. Duginets, G., Diachenko, O., Mazaraki, N., & Golovachova, O. (2019). *Deep and comprehensive free trade agreement with the EU: advantages and downsides for the Ukrainian society. Ed. Ganna Duginets.* Kyiv: Kyiv National University of Trade and Economics [in English].
3. VOŠTA, ILAN & U IYENK, ITLANA & ABR Á, J EF (2016). Ukraine-EU Deep and Comprehensive Free Trade Area as Part of Eastern Partnership initiative. *Journal of International Studies* [in English].
4. Petrov, R. (2018). The impact of the EU-Ukraine association agreement on constitutional reform and judicial activism in Ukraine. *Review of Central and Central East European Law, 43 (2),* 99-115 [in English].
5. Rabinovych, M. (2022). EU-Ukraine "deep" trade agenda: the effectiveness and impact perspectives. *Int Polit.* https://doi.org/10.1057/s41311-022-00384-x [in English].
6. Baležentis, O., & Yatsenko (2018). Trade Integration As etries of Ukraine and the EU. *The Journal of International Economic Policy*, *1(28),* 33-63. http://iepjournal.com/journals_eng/28/2018_2_Basenentius_Yatsenko.pdf [in English].
7. Hlibko, S., Matyushenko, I., & Petrova, M. (2020). Assessment of the development of foreign trade in high-tech production of Ukraine under the association with the EU. *Business Management and Education.* Vol. 18. Issue 1, (pp. 157-182). 10.3846/bme.2020.11578 [in English].
8. Shnyrkov, O., Rogach O., Reznikova N., & Nanavov A. (2020). Ukraine's export diversification: the impact of economic integration and disintegration. *Journal Global Policy and Governance.* Vol. 9. Issue 1, (pp. 3-18). https://transitionacademiapress.org/jgpg/article/view/297 [in English].

9. Hellyer, M., Piatnytskyi ,V., & Piatnytska, G. (2021). Effect of Tariff Liberalization under the DCFTA with the EU on Ukraine's Extensive Margin of Trade. *International Journal of Entrepreneurship.* Vol. 25. Issue 3, (pp. 1-13). https://www.abacademies.org/articles/effect-of-tariff-liberalization-under-the-dcfta-with-the-eu-on-ukraines-extensive-margin-of-trade.pdf [in English].

10. MATTOO, A., & FINK, C. (2002). Regional Agreements and Trade in Services: Policy Issues, World Bank Policy Research Working Paper 2852. June. https://doi.org/10.1596/1813-9450-2852

11. Mattoo, A., & Fink, C. (2004). Regional Agreements and Trade in Services: Policy Issues. *Journal of Economic Integration*, *19*(4), 742-779. http://www.jstor.org/stable/23000721 [in English].

12. Schiff, M., & Winters, A. (2003). Regional Integration and Development. Washington, D.C., World Bank and Oxford, Oxford University Press [in English].

13. Mangelsdorf, A., Ferro, E., & Wilson, J. S. (2014). The Trade Impact of European Regulatory Standards for Developing Countries. European Trade Study Group Conference [in English].

14. AFNOR (2009). The Economic Impact of Standardization – Technological Change, Standards and Long-Term Growth in France. Paris [in English].

15. DIN (2000). Economic Benefits of Standardization. Vol. 3. Berlin: Beuth [in English].

16. DTI (2005). The Empirical Economics of Standards. *DTI ECONOMICS PAPERS*, 12. London [in English].

17. RONEN, Eyal (2017). Quantifying the trade effects of NTMs: A review of the empirical literature. *Journal of Economics and Political Economy*. Vol. 4. Issue 3. September [in English].

18. GRUEBLER, J., GHODSI, M., & STEHRER, R. (2016). Assessing the impact of non-tariff measures on imports. *The Vienna Institute for International Economic Studies* [in English].

19. Hellyer, M. (2021). *Effectiveness of European integration provisions for Ukraine's Exports. Dissertation of obtaining a scientific degree of PhD in specialty 292 – International Economic Relations*. Kyiv [in Ukrainian].

20. ANDERSON, JAMES E. (2019). Trade, Size, and Frictions: the Gravity Model. *NBER Working Papers*, January [in English].

21. ANDERSON, James E. (2011). The Gravity Model. Annual Review of Economics. Vol. 3 [in English].

22. ANDERSON, JAMES, E., & ERIC VAN WINCOOP (2004). Trade Costs. *Journal of Economic Literature*, *42 (3)*. 691-751 [in English].

23. Chen, Natalie & Novy, Dennis (2009). International Trade Integration: A Disaggregated Approach. *CEP Discussion Paper*, *908*, January [in English].

24. Hellyer, M. (2017). Support for the implementation of the EU-Ukraine Association Agreement: A4U Project (Project Identification No. EuropeAid/137074/DH/SER/UA. Contract N°: 2015/370-128). GFA Consulting Group GmbH. https://eu-ua.kmu.gov.ua/sites/default/files/inline/files/identification-of-underperforming-sectors-under-the-dcfta.pdf [in English].

25. European Commission (2022). EU trade relationships by country/region: Ukraine. https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/ukraine_en#:~:text=Ukraine's%20main%20exports%20to%20the,%E2%82%AC28.3%20billion%20in%202021 [in English].

26. EUROPEAN COMMISSION (2017). Impact Assessment accompanying Proposal for a Regulation of the European Parliament and of the Council on the mutual recognition on goods lawfully marketed in another Member State. *Commission Staff Working Document*, December [in English].