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# UKRAINE'S EXPORT POTENTIAL IN GOODS TRADE WITH THE EU: A COMPARATIVE ANALYSIS OF THE RCA AND LAFAY INDICES

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## ЕКСПОРТНИЙ ПОТЕНЦІАЛ УКРАЇНИ У ТОРГІВЛІ ТОВАРАМИ З ЄС: ПОРІВНЯЛЬНИЙ АНАЛІЗ ІНДЕКСІВ RCA ТА LAFAY

***The article investigates Ukraine's export potential in goods trade with the European Union by jointly applying the Balassa revealed comparative advantage (RCA) index and the Lafay index (LFI), which measures each product group's contribution to the bilateral trade balance. We operationalize the assessment through a 2×2 RCA×LFI quadrant matrix that distinguishes four situations — A (pure advantage), B (dissonance), C (niche opportunity), and D (weak position) — and we track movements across quadrants over 2017—2023. The empirical setting exploits UN Comtrade HS4 data for UA→EU exports, UA←EU imports, and the EU's import profile from the rest of the world (EU←World) to construct an EU-market-specific RCA and a national LFI that captures the net effect of import intensity on Ukraine's trade outcomes.***

***Our results indicate a decline in the share of dissonant product groups (quadrant B), accompanied by moderate increases in A and C, while the D-cluster remains highly inertial. This pattern implies that some previously ambiguous specialisations either consolidate into genuine strengths (C→A, B→A) or slide into structurally weak positions (B→D), depending on policy and value chains conditions. Comparing the canonical, weighted LFI with a modified, unweighted LFI* improves the detection of small but policy-relevant HS4 items whose net contribution can be masked by aggregation. The joint RCA+LFI test therefore separates "scale" from "quality": high RCA without a positive LFI signals import-dependent assembly or price-cycle exposure, whereas low RCA with a positive LFI uncovers scalable niches with robust net effects.***

***Policy implications follow directly from the quadrant logic. For A, priorities include risk insurance, green modernisation aligned with EU carbon adjustment mechanism, and moving up the value chain to lock in advantages. For B, the focus is on "dissonance therapy": localisation of components and subassemblies, EU-standard certification and compliance, and logistics upgrades to lift LFI above zero while maintaining RCA>1. For C, accelerating standard harmonisation and SME support can scale positive-balance niches into full specialisations. For D, selective pilots in contract manufacturing and engineering services may create footholds without misallocating resources. The practical contribution of the study is a prioritisation framework that translates diagnostic signals ($RCA>1 \wedge LFI\leq 0$; $RCA\leq 1 \wedge LFI>0$) into actionable sectoral roadmaps, helping policymakers and firms target transitions from $B\rightarrow A$ and $C\rightarrow A$. By anchoring the analysis in EU-market RCA and bilateral LFI at HS4 detail, the approach offers transparent metrics for monitoring progress amid volatile demand, trade-policy uncertainty, and evolving European regulatory requirements.***

***Стаття досліджує експортний потенціал України у торгівлі товарами з Європейським Союзом шляхом спільного застосування індексу виявленої порівняльної переваги Баласси (RCA) та індексу Лафая (LFI), який вимірює внесок кожної товарної групи у двостороннє торговельне сальдо. Оцінювання операціоналізовано через 2×2 матрицю квадрантів RCA×LFI, що виокремлює чотири стани — A (чиста перевага), B (дисонанс), C (нішева можливість) і D (слабка позиція) — та дозволяє відстежувати переходи між квадрантами у 2017—2023 роках. Емпірична база спирається на дані UN Comtrade рівня HS4 для експорту UA→EU, імпорту UA←EU та профілю імпорту ЄС із решти світу (EU←World) з метою побудови специфічного для ринку ЄС показника RCA і національного LFI, що фіксує чистий ефект імпортомісткості на торговельні результати України. Результати засвідчують зменшення частки дисонансних груп (квадрант B) за помірного приросту A і C, тоді як кластер D залишається високоінерційним. Це означає, що раніше неоднозначні спеціалізації або консолідуються у стійкі переваги (C→A, B→A), або скочуються у структурно слабкі позиції (B→D) залежно від політики та стану ланцюгів створення вартості. Порівняння канонічного, зваженого LFI з модифікованим, незваженим LFI* підвищує виявлення невеликих, але політично релевантних позицій HS4, чий чистий внесок може маскуватися агрегуванням. Спільний тест RCA+LFI тим самим розрізняє "масштаб" і "якість": високий RCA без додатного LFI сигналізує про імпортозалежне складання або чутливість до цінових циклів, тоді як низький RCA за додатного LFI виявляє масштабовані ніші з надійним чистим ефектом. Політичні імплікації безпосередньо випливають із логіки квадрантів: для A — страхування ризиків, "зелена" модернізація з урахуванням механізму коригування вуглецевих викидів ЄС і підйом углиб ланцюга створення вартості; для B — "терапія дисонансу" через локалізацію компонентів і вузлів, сертифікацію та відповідність стандартам ЄС і модернізацію логістики для виведення LFI у "плюс" за збереження RCA>1; для C — прискорення гармонізації стандартів і підтримка МСП для масштабування ніш у повноцінні спеціалізації; для D — селективні пілоти у контрактному виробництві та інжинірингових сервісах, що створюють можливості ефективного перерозподілу ресурсів. Практичний внесок дослідження — це рамка пріоритезації, яка перекладає діагностичні сигнали ($RCA>1 \wedge LFI\leq 0$; $RCA\leq 1 \wedge LFI>0$) у прикладні секторальні "дорожні карти" й допомагає спрямовувати переходи $B\rightarrow A$ та $C\rightarrow A$. Спираючись на RCA, прив'язаний до ринку ЄС, і двосторонній LFI на рівні HS4, підхід пропонує прозорі метрики для моніторингу поступу в умовах волатильного попиту, невизначеності торговельної політики та еволюції регуляторних вимог ЄС.***

*Key words: export potential; revealed comparative advantage; Balassa index; Lafay index; quadrant matrix; EU, international trade, value chains.*

*Ключові слова: експортний потенціал, виявлені порівняльні переваги, індекс Баласси, індекс Лафе, матриця квадрантів, ЄС, міжнародна торгівля, ланцюги створення варстсті.*

## PROBLEM STATEMENT AND ITS LINKAGE TO IMPORTANT SCHOLARLY AND PRACTICAL TASKS

Under current conditions of Ukraine's integration into the European economic space, assessing export potential and identifying sectors in which the country can secure durable competitive advantages is of particular importance. Traditional indicators, notably the Balassa revealed comparative advantage index (RCA) [1], are widely used to identify such advantages on the basis of export specialization. At the same time, they have limitations because they ignore the import side and do not

reflect the net trade effect. This can lead to situations in which a country posts a high RCA while simultaneously running a trade deficit in the corresponding product group.

By contrast, the Lafay index (LFI) [2] accounts for the balance between exports and imports and enables a more comprehensive assessment of actual advantages or vulnerabilities in international trade. Using RCA and LFI in tandem opens up new possibilities for detecting so-called "dissonances": cases where formal indicators of export specialization do not coincide with actual trade outcomes. These are precisely the points at which risks of economic dependence emerge or, conversely, where niche opportunities for developing export potential arise.

For Ukraine, the issue is especially salient. On the one hand, Ukraine's export presence in the EU market has expanded, particularly in agri-food and metallurgy. According to [3], the RCA for exports of sunflower-seed oil (HS 1512) was around 144 in 2023. On the other hand, in engineering and electrical equipment, where RCA formally exceeds 1 while reliable LFI values for Ukraine are lacking, we may reasonably infer that LFI can be negative due to sizeable imports of components, which creates hidden dependence. Identifying and analyzing such contradictions makes it possible to understand the structure of Ukraine's export potential more deeply, to delineate "trap" industries, and to single out areas with unrealized opportunities.

Against this backdrop, the study is both academically and practically significant. It advances the methodology for assessing export potential by juxtaposing two indicators-RCA and LFI-and provides tools for shaping public policy aimed at diversifying and strengthening Ukraine's competitive positions in the European and global economy.

## REVIEW OF RECENT RESEARCH AND PUBLICATIONS

The assessment of Ukraine's export potential in the context of trade with the EU is well represented in the academic literature. Considerable attention is devoted to the use of the Balassa index as the primary instrument for detecting comparative advantages. In particular, [4] analyze RCA dynamics in Ukrainian-Polish trade with a detailed focus on the agri-food sector, while [5] can be considered among the early studies that performed RCA calculations for Ukraine in the context of EU integration.

Internationally, the Lafay index (LFI)-first proposed by G. Lafay in 1992 [2]-has been used to uncover "net" advantages across various economies. In the case of Ukraine, however, its application is encountered only in narrow domains; for example, [6], [7] investigate agri-trade aspects. Existing works mention, at best indirectly, the possibility of using LFI to assess trade dissonances, which leaves room for further research. Surveys by the WTO [8] and UNCTAD [9], [10] confirm that a comparative analysis combining RCA and LFI is a promising avenue for a deeper understanding of the structure of external trade.

Thus, the contemporary scholarly discourse lacks studies that integrate RCA and LFI for Ukraine. This confirms the novelty of the present article, which is aimed at identifying and analyzing inconsistencies between indicators of specialization and the actual trade balance in Ukraine-EU trade.

## RESEARCH AIM AND TASKS

The aim of the study is to provide a quantitative and qualitative assessment of Ukraine's export potential in trade with the EU by comparing RCA and LFI in order to identify sectoral strengths, weaknesses, and dissonances between formal specialization and actual trade outcomes.

To achieve this aim, the article: reviews existing theoretical and methodological approaches to defining export potential (this sets the conceptual frame); compiles and systematizes comparable statistics on Ukraine's and the EU's exports and imports by product groups (this ensures representativeness and comparability); computes RCA and LFI for the main product groups (this quantifies specialization and the "net" trade effect); compares the results to identify matches and mismatches between the indicators (this makes it possible to detect dissonances and niches); singles out sectors with "pure" advantages, sectoral traps, and unrealized opportunities (this forms policy priorities); and, finally, formulates recommendations to enhance the effectiveness of Ukraine's external economic policy.

The methodological design follows a logical sequence of steps that allows us to test the hypothesis that only the joint use of RCA and LFI yields a comprehensive picture of Ukraine's export potential in trade with the EU. RCA reveals formal specialization, whereas LFI evaluates the net trade position while accounting for import dependence. The key element of this study is therefore not the isolated use of these indicators but their juxtaposition. We employ an EU-market variant of RCA in which the "world" structure is replaced by the EU's import structure from the rest of the world, which aligns with the goal of assessing comparative advantage specifically on the EU market:

$$\mathrm{RCA}_{UA,j}^{EU} = \frac{X_{UA\to EU,j} / X_{UA\to EU}}{M_{EU,\,World,j} / M_{EU\leftarrow World}} \quad (1).$$

Where, X(UA→EU,j) — export of Ukraine to the EU of product j,

X(UA→EU) — total export of Ukraine to EU countries,

M(EU←World,j) — EU imports from the World of product j,

M(EU←World,) — total EU imports from the World.

A value of RCA>1 is taken to indicate a revealed comparative advantage on the EU market. To assess the "net" competitive position of each product j, we use the classical Lafay index (LFI) in a bilateral (national) setting — Ukraine's exports to and imports from the EU — normalized by Ukraine's total bilateral trade turnover with the EU:

$$LFI_j = 100 * \left[\frac{X_{UA\to EU,j} - M_{UA\leftarrow EU,j}}{X_{UA\to EU,j} + M_{UA\leftarrow EU,j}} - \right.$$

$$\left. - \frac{\sum_k \left(X_{UA\to EU,\ k} - M_{UA\leftarrow EU,k}\right)}{\sum_k \left(X_{UA\to EU,\ k} + M_{UA\leftarrow EU,k}\right)}\right] *$$

$$* \frac{X_{UA\to EU,\ j} + M_{UA\leftarrow EU,j}}{\sum_k \left(X_{UA\to EU,\ k} + M_{UA\leftarrow EU,k}\right)} \quad (2).$$

**Table 1. Threshold (quadrant) matrix**

| | RCA ≤ 1 | RCA > 1 |
|---|---|---|
| **LFI > 0** | **C. Niche opportunity** — (RCA≤1 and LFI>0): positive trade balance without established specialization; scalable potential. | **A. Pure advantage** — (RCA>1 and LFI>0): revealed specialization and a positive net effect; a robust competitive position. |
| **LFI ≤ 0** | **D. Weak position** — (RCA≤1 and LFI≤0): no specialization and a negative net effect. | **B. Dissonance** — (RCA>1 and LFI≤0): formal specialization combined with a negative net effect; import-intensity/vulnerability. |

Source: author's compilation.

Where, M(UA←EU,j) is Ukraine's import from the EU of product j (CIF);

X(UA→EU, k) and M_(UA←EU,k) are, respectively, Ukraine's total exports and imports in trade with the EU.

Interpretation. LFI>0 means product j makes a positive net contribution to the trade balance; LFI<0 indicates vulnerability or import dependence.

In our subsequent calculations, we build on Lafay's approach as presented in [2], but apply a "modernized" variant that focuses on each product's contribution to the balance. For every j we take the difference between the contribution to the trade balance $CTB_j = \frac{X_{UA\to EU,j} - M_{UA\leftarrow EU,j}}{\sum_k (X_{UA\to EU,\ k} + M_{UA\leftarrow EU,k})}$ and the aggregate normalized balance

$$NTB = \frac{\sum_k (X_{UA\to EU,\ k} - M_{UA\leftarrow EU,k})}{\sum_k (X_{UA\to EU,\ k} + M_{UA\leftarrow EU,k})}:$$

$$LFI'_j = 100 * \left[CTB_j - NTB\right] \qquad (2').$$

This specification preserves the sign interpretation of a "net" advantage, but deliberately dispenses with the weighting factor $\mathrm{ctor}\frac{X_{UA\to EU,j} + M_{UA\leftarrow EU,j}}{\sum_k (X_{UA\to EU,\ k} + M_{UA\leftarrow EU,k})}$ of the canonical LFI [2], which can mute signals for small HS4 items. The modification draws on the standardized definition of CTB (contribution to the trade balance) in Laursen [11]. We adopt it because our focus is quadrant classification of HS4 and the detection of dissonances (RCA>1; LFI≤0), where the sign and relative deviation from the aggregate balance matter more than the sheer size of a product category.

Comparing RCA and LFI results enables a sectoral position matrix: "RCA>1, LFI<0" is interpreted as a sector with formal specialization but real risks, whereas "RCA<1, LFI>0" reveals niche export opportunities. Thus, the methodology combines empirical data with comparative-analytical tools and provides a logical bridge from the theoretical understanding of comparative advantages to a practical assessment of Ukraine's export potential in trade with the EU.

Presentation of the main research material. The empirical analysis is anchored in 2017, when the practical phase of implementing the EU-Ukraine Association Agreement (the DCFTA) began, substantially transforming the institutional conditions of access to the European market. Calculations are performed at the HS4 product level for two benchmark years-2017 and 2023-which makes it possible to trace structural shifts as integration deepened.

The empirical base is constructed from UN Comtrade (TradeFlow) [9], which ensures cross-country and intertemporal comparability. For both benchmark years (2017, 2023) we assemble three harmonised HS4 panels:

— Ukraine's exports to the EU (valued FOB);

— Ukraine's imports from the EU (valued CIF);

— the EU's imports from the rest of the world (CIF), which serves as the EU-market benchmark in the RCA calculation.

The pooled sample contains 2,334 HS4 observations (2017 — 1,161; 2023 — 1,173), which is sufficient to identify stable regularities.

Quadrant framework. Juxtaposing RCA and LFI places each product group in one of four RCA×LFI quadrants. See Table 1.

Quadrant A (RCA>1 and LFI>0) identifies areas of "pure" comparative advantage. Quadrant B (RCA>1 and LFI≤0) signals dissonances, where formal specialization is paired with a negative net trade effect. Quadrant C (RCA≤1 and LFI>0) reflects niche opportunities with a positive balance that have potential to scale up. Quadrant D (RCA≤1 and LFI≤0) captures weak positions.

A dynamic comparison for 2017—2023 reveals several stable patterns. Some agri-food items move from C to A, converting niches into full specializations. Metallurgy generally remains in A or B, depending on external constraints and logistics. By contrast, machinery and electrical equipment are concentrated in B or D, driven by high import content and technological dependence. Certain chemical and wood-processing groups display C↔A and D↔C paths, indicating the accumulation of niche advantages under EU standards harmonisation.

Our analytical strategy combines two complementary metrics. First, the Balassa index (RCA) reflects Ukraine's revealed specialization on the EU market as the relative share of a product in exports vis-a-vis its weight in the EU's imports from the world. Second, the Lafay index (LFI) measures the net competitive advantage, normalised by total external trade turnover, thereby avoiding bias linked to import dependence. Joint use of RCA and LFI allows us to construct a sectoral position matrix and to distinguish not only areas of pure advantage, but also dissonances and latent niches.

Year-by-year summary (macro level) — see Table 2. This is a "static snapshot" of the distribution of HS4 items across quadrants separately for 2017 and 2023. In 2017 we have A=163 (≈14.0% of 1,161 items), B=23 (≈2.0%), C=155 (≈13.4%), D=820 (≈70.6%). In 2023, respectively, A=170 (≈14.5% of 1,173), B=14 (≈1.2%), C=175

**Table 2. Distribution of HS4 product lines across quadrants**

| Quadrant | Count_2017 | Count_2023 |
|---|---|---|
| A. Pure advantage | 163 | 170 |
| B. Dissonance | 23 | 14 |
| C. Niche opportunity | 155 | 175 |
| D. Weak position | 820 | 814 |

Source: author's calculations based on [9].

(≈14.9%), D=814 (≈69.4%). Thus, over six years we observe a decline in the share of dissonances (B) and a modest shift from D toward A and C, while the "core" of weak positions remains large.

The aggregated results point to a deepening of Ukraine-EU interdependence in goods trade. In 2017, Ukraine's exports to the EU (FOB) amounted to about USD 17.07 bn, while imports from the EU (CIF) were about USD 19.47 bn. By 2023, the corresponding figures had increased to approximately USD 23.40 bn and USD 32.49 bn, respectively [9]. Thus, over 2017-2023 exports to the EU rose by roughly 37%, while imports grew by 67%. Alongside the quantitative expansion, a structural reshaping of the product basket occurred, as reflected in the reallocation of items across the cells of the RCA×LFI matrix.

Rows show the quadrant a given HS4 item occupied in 2017. Columns show the quadrant of that same item in 2023. Each cell counts HS4 items that made exactly that transition. Diagonal cells indicate persistence; off-diagonals capture actual moves. Row sums equal the number of items present in 2017 that are also observed in 2023; they may differ from annual totals because the matrix covers only HS4 codes common to both years.

The key flows are as follows. From A: 68.5% remained A (A→A = 111/162), 18.5% moved to C, 12.3% to D, and only 0.6% to B. From B: 26.1% moved to A, 26.1% stayed in B, and 47.8% deteriorated to D. From C: 54.4% stayed C, 15.0% upgraded to A, and 30.6% slipped to D. From D: 87.7% remained D, 7.7% upgraded to C, 3.7% to A, and 0.9% to B. Overall, this implies moderate upward mobility (D→C, C→A, B→A) alongside strong inertia within D. The numerical decline of B stems from two opposite processes: some dissonances are resolved (B→A), while others worsen (B→D), with the latter quantitatively dominant.

The static picture (Table 2) and the dynamic one (Table 3) jointly indicate that dissonance reduction is occurring, but slowly. The main reserve for progress lies in scaling C→A and a systemic therapy of B that avoids "slippage" into D.

Leaders (quadrant A). The most stable leaders include oil-fat subgroups, several ferrous-metal items, and selected higher-processed agri-food products. These groups show RCA>1 and LFI>0 simultaneously, which signals not only revealed specialization on the EU market but also a positive net contribution to the trade balance. In oils (notably, sunflower-seed processing), production scale meets complementary EU demand. In metallurgy, long-standing competitive positions persist, though they are sensitive to external shocks and logistics. In agri-processing, we observe niches gradually "maturing" into full specializations, consistent with C→A trajectories over 2017—2023.

Scalable niches (quadrant C). Quadrant C brings together products that are not yet the "core" of specialization by RCA but already post a positive LFI and therefore make economic sense for export expansion. These include parts of agri-food processing (ingredients, prepared foods), wood/paper, and selected chemical products. Given the EU's technical-regulation barriers, standards harmonisation and certification yield a disproportionately large payoff for these groups because they convert local niches into scalable market segments.

Dissonances (quadrant B). Electrical goods, machine parts, and certain metal products display the typical quadrant — B configuration (RCA>1; LFI≤0), where revealed specialization coexists with a negative net trade effect. The mechanisms behind this divergence include high import content of components (an "assembly-for-export" model), global price volatility (for metals), and regulatory/logistics wedges. Diagnostically, quadrant B corresponds to the combination RCA_j>1, LFI_j≤0, and, as a rule, X_j/M_j<1. Policy interventions should reduce dissonance through localising value-chain nodes, co-production with EU manufacturers, EU-standards certification and compliance, and logistics optimisation-with the aim of shifting positions into quadrant A.

A comparison of 2017 and 2023 shows that quadrant — B remains a structural problem for "component-heavy" industries. After the practical phase of the Association Agreement began (2017), the share of B-type positions in the agri-food block declined moderately thanks to deeper processing and improved logistics for shipments to the EU, whereas in machinery, electrical equipment, and some metal products the dissonance often persists or intensifies. Shocks in 2020—2023 (value-chain disruptions, metals/energy price volatility, higher insurance and freight premia) raised import intensity and pushed LFI down, while partial specialization (RCA>1) remained inertial. At the same time, we observe B→A

**Table 3. Transition (movement) matrix between RCA×LFI quadrants (2017→2023)**

| Quadrant 2023 Quadrant 2017 \ | A. Pure advantage | B. Dissonance | C. Niche opportunity | D. Weak position |
|---|---|---|---|---|
| **A. Pure advantage** | 111 | 1 | 30 | 20 |
| **B. Dissonance** | 6 | 6 | 0 | 11 |
| **C. Niche opportunity** | 22 | 0 | 80 | 45 |
| **D. Weak position** | 30 | 7 | 62 | 704 |

Note: The movement matrix is computed on the intersection of HS4 codes observed in both 2017 and 2023 (N=1,135). Consequently, column totals (2023) and row totals (2017) may differ from the annual snapshots in Table 2 (e.g., A(2023)=169 here vs 170 in Table 2) because codes present in only one year are excluded.

Source: author's calculations based on [9].

**Table 4. Selected HS4 with dissonance: 2023 status and indicative targets for 2026–2028**

| HS4 | Short description | 2023 status (RCA; LFI; X/M) | Target 2026 | Target 2028 |
|---|---|---|---|---|
| 5601 | Wadding and articles thereof | 3.98; −0.03; 0.34 | X/M ≥ 0.8; LFI ≥ −0.01 | X/M ≥ 1.0; LFI > 0 |
| 4107 | Tanned leather | 2.68; −0.05; 0.34 | X/M ≥ 0.7; LFI ≥ −0.02 | X/M ≥ 1.0; LFI > 0 |
| 8437 | Machines for cleaning/sorting grain | 3.74; −0.00; 0.48 | X/M ≥ 0.9; LFI ≥ 0.00 | X/M ≥ 1.1; LFI > 0 |
| 9619 | Sanitary articles | 1.58; −0.09; 0.31 | X/M ≥ 0.7; LFI ≥ −0.02 | X/M ≥ 1.0; LFI > 0 |
| 8450 | Washing machines | 2.13; −0.02; 0.59 | X/M ≥ 0.9; LFI ≥ 0.00 | X/M ≥ 1.1; LFI > 0 |
| 4411 | Fibreboard | 1.89; −0.06; 0.36 | X/M ≥ 0.8; LFI ≥ −0.01 | X/M ≥ 1.0; LFI > 0 |
| 1806 | Chocolate and other food preparations containing cocoa | 1.49; −0.05; 0.58 | X/M ≥ 0.9; LFI ≥ 0.00 | X/M ≥ 1.1; LFI > 0 |

Source: author's calculations based on [9].

trajectories in subgroups that localised value-chain nodes, as well as A→B in segments exposed to price cycles-confirming the complementarity of RCA (structural specialization) and LFI (net effect).

Indicative thresholds for moving problem items from B to A: rationale. Benchmarks are calibrated from the minimum conditions for crossing quadrant boundaries:

— maintaining RCA>1 and reaching LFI>0 as the hallmark of a "pure" advantage; a practical proxy is X/M ≥ 1.0, which-under 2017—2023 ratios-is usually sufficient to turn LFI positive;

— empirical anchoring in observed B→A cases in our 2017—2023 sample (e.g., HS 1206, 8474, 8309, 6806, 6805), where X/M rose to ≈1 or above and LFI moved into positive territory;

— sectoral feasibility on a 2026—2028 horizon (time for EU-standard certification, component localisation, long-term contracts for raw materials/energy, and lower logistics premia).

Intermediate targets for 2026 (X/M ≈ 0.8-0.9; LFI around zero) chart a gradual route to quadrant-A status given volatility and financing constraints; final targets for 2028 (X/M ≥ 1.0; LFI > 0) correspond to the formation of a durable net advantage.

In the event of accession to the EU customs union/common customs territory (without full access to the Single Market), tariff barriers and part of customs procedures would effectively disappear, while a substantial share of non-tariff requirements would remain. Accordingly, the proposed intermediate targets for 2026 remain realistic, whereas achieving the final thresholds by 2028 would require additional localisation and certification. Under a full-membership scenario (with acquis implementation and access to the internal market), the combined effect of removing NTBs (non-tariff barriers), mutual recognition, and lower "at-the-border" costs could accelerate B→A transitions; for some items it is therefore reasonable to raise the targets (e.g., X/M ≥ 1.1; LFI > 0) or shorten the horizon to 2027. At the same time, intensified competition in the EU internal market may depress RCA unless productivity increases, so liberalisation should be accompanied by industrial policy instruments (localisation, supplier clusters, financial guarantees).

Table 4 lists HS4 subgroups that best illustrate actionable dissonances and have a realistic pathway to B → A over 2026—2028. The selection is based on four criteria. First, diagnostic value: in 2023 these subgroups pair high RCA with zero or negative LFI, i.e., precisely the gap between formal specialisation and net effect that calls for policy action. Second, heterogeneous trajectories over 2017→2023: the set includes persistent B→B, new → B, and threshold cases with LFI close to zero, highlighting different facets of the problem. Third, the presence of practical levers — component localisation, EU-standard certification, logistics optimisation. Fourth, sectoral coverage and materiality: the choice spans light industry, wood processing, machinery, and food products and sits close to operational X/M and LFI thresholds, so policy responses can yield tangible effects.

Segment synthesis. In brief, materials subgroups such as wadding and articles thereof (HS 5601) and tanned leather (HS 4107) are vulnerable to quality and chemical-safety requirements and therefore require institutional support for standards and origin traceability. Fibreboard (HS 4411) combines energy intensity with regulatory barriers and thus responds to the stabilisation of energy costs and logistics. Machines for cleaning and sorting grain (HS 8437) and washing machines (HS 8450) reflect an assembly-for-export model, where the depth of localising value-chain nodes and cooperation with EU manufacturers are critical. Consumer segments-sanitary articles (HS 9619) and chocolate products (HS 1806)-are sensitive to imported components and certification, yet can improve LFI quickly provided reliable value-chains and brand presence in the market. Taken together, the selected HS4 codes trace practical trajectories toward quadrant A, making the targets in the table operational for policy and business.

Achieving these thresholds requires a package of instruments: localisation of components (agreements with EU suppliers and industrial parks); reduction of transaction costs (EU-standards certification and logistics optimisation); longer-term contracts for raw materials and energy; and export support for products with a high domestic value-added share.

Weak positions (quadrant D). Capital-intensive and higher-tech segments form the core of weak positions on the EU market. These include parts and accessories of motor vehicles (HS 8708); parts suitable for internal-combustion engines (HS 8409); parts for lifting/handling equipment (HS 8431); electrical components-transformers (HS 8504) and apparatus for switching electrical circuits (HS 8536)-as well as engines (HS 8408), transmission elements (HS 8483), and passenger cars (HS 8703). Over 2017—2023, these groups mostly remained in quadrant D (RCA≤1 and LFI≤0), reflecting high import intensity and technological barriers, the

effect of EU technical-regulation requirements, and limited access to long-term finance. Changing their trajectory requires durable subcontracting links with EU manufacturers, localisation of higher value-added nodes, and financing instruments that lower compliance costs.

The proposed framework delivers on all stated tasks. First, it substantiates a methodology that combines RCA (revealed specialization) with LFI (net trade effect), yielding a coherent scheme for assessing export potential. Second, using UN Comtrade data (HS4; 2017 and 2023), it builds three panels (UA→EU, UA←EU, EU27←World) that ensure computational consistency. Third, it computes RCA and LFI for all HS4 positions, enabling construction of the quadrant matrix and identification of areas of pure advantage (A), dissonance (B), niche opportunity (C), and weak position (D). Fourth, it performs a comparative indicator analysis and clearly identifies RCA>1 & LFI≤0 mismatches, with illustrative HS4 cases and 2017→2023 dynamics. Finally, it formulates targeted policy recommendations that flow directly from the quadrant diagnosis.

Global context and implications. Amid a spike in tariffs and trade-policy uncertainty (TPU), the revised 2025 outlook foresees a 0.2% contraction in world goods trade, followed by a 2.5% partial rebound in 2026 (versus baseline +2.7% and +2.9%), which flattens European demand and raises the cost of error for supplier countries' export strategies, including Ukraine. In this scenario, Europe remains a positive but smaller driver of global growth (≈0.5 pp), while the weakness of intra-European trade in 2024 already "ate" into the global gain: instead of a potential 4.3%, realised growth was 2.9%. For commercial services, growth of 4.0% in 2025 and 4.1% in 2026 is expected (below baseline paths), as weaker goods flows weigh on transport, logistics, and investment services. The revision relies on the WTO Global Trade Model [8], which embeds tariff and TPU shocks into trade costs, aligning with our logic of the LFI net effect alongside formal RCA specialization. At the same time, the forecast US-China re-routing of flows opens niche opportunities for third markets in textiles, apparel, and electrical equipment-precisely where we observe dissonances (RCA>1; LFI≤0) and where localisation and certification policies can move items into A.

Policy differentiated by quadrants. Policy to enhance Ukraine's export potential should be quadrant-specific. For quadrant A, the priority is retention and deepening: safeguarding logistics and arranging war-risk insurance, investing in green modernisation (including alignment with the CBAM, the EU Carbon Border Adjustment Mechanism), and promoting exports of processed products to reinforce the durability of advantages. For quadrant B, the priority is dissonance therapy: localisation of components and production nodes (through industrial parks, co-production mechanisms with the EU, and frameworks such as IPCEI, Important Projects of Common European Interest), combined with lower transaction costs via EU-standards certification, logistics optimisation, and long-term contracts for raw materials. For quadrant C, appropriate action is scaling niches through accelerated standards harmonisation (including HACCP — Hazard Analysis and Critical Control Points — and REACH — the EU's Registration, Evaluation, Authorisation and Restriction of Chemicals), certification programmes, and SME support. This enables C→A transitions. For quadrant D, targeted selective support is warranted: pilots in contract manufacturing with European transnational corportions, technical assistance for value-chain integration, and the development of engineering services. A direct push to raise exports without such linkages rarely delivers lasting effects.

## CONCLUSIONS AND AVENUES FOR FURTHER RESEARCH

In sum, the RCA+LFI test distinguishes growth in export volume from growth in quality. Over 2017—2023, exports to the EU grew by roughly 37% and imports by 67%, yet structural shifts were uneven. Some HS4 items converted niches into durable advantages (C→A). At the same time, a specialisation paradox emerged in "component-heavy" industries: high RCA paired with negative LFI. This is not a statistical artefact; it signals import-intensive chains that externalise value added. The next strategic choice is binary: integrate into European value chains with localised nodes and certification, or watch dissonances drift into weak positions. Anticipated deepening of EU integration opens a window of opportunity to accelerate B→A and C→A transitions while simultaneously raising the competitive bar. Industrial policy that reduces import dependence and anchors domestic value added therefore becomes decisive.

The core policy vector should be scaling positions with positive LFI (quadrant C) and a systemic dissonance therapy (quadrant B) through localisation, cooperation with EU manufacturers, standardisation, and logistics solutions. Hitting indicative thresholds ($X/M \geq 1.0$ and $LFI > 0$) for a set of high-RCA products will shift them into quadrant A and increase the resilience of Ukraine's export potential on the EU market.

Further work should focus on five practical avenues: verification of results with firm-level microdata that pin down the import share in costs; parsimonious forecasting of quadrant transitions (B→A, C→A) over a two- to three-year horizon that accounts for localisation, certification, and logistics; measurement of the domestic value-added share in exports to the EU and the impact of non-tariff barriers; case studies for selected HS4 dissonances to build sectoral roadmaps; and robustness checks against alternative indicators and EU-integration scenarios (customs union versus full membership).

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