

Before Russo-Ukrainian War: How Did EU-Ukraine Association Agreement of 2014 Transform Ukraine's Economy?

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SUMMARY

In this paper is tried to identify, if exists, any qualitative divergence in Ukraine's economic structure before and after the EU-Ukraine Association Agreement, and examine whether the agreement fulfilled its promises. The way in which we investigate the issue is by employing ADL modelling, bifurcating the whole chunk of series as before agreement model (BAM) and after agreement model (AAM). It's been observed severe disruptions in the structure of export, import and foreign direct investment, transformed Ukraine's economy into less favorable position, accelerating economic downswing. Under these considerations, hypothesis that EU-Ukraine Association Agreement is transformative in an unpromising sense is scientifically substantiated, with the fact that it has been of no little effect in building up a new and unfavorable economic paradigm for Ukraine.

Keywords: EU-Ukraine Association Agreement; ADL modelling; export; import; Ukraine's economy.

Journal of Economic Literature (JEL) code: F1, F13, F51, F53, F55

DOI: <https://doi.org/10.18096/TMP.2024.02.03>

INTRODUCTION

On February 23, 2022 Vladimir Vladimirovich Putin, president of the Russian Federation (RF), announced the Special Military Operation (SMO) for the demilitarization and *denazification* of Ukraine due mostly to NATO's illegitimate eastward expansion (Nikolsky, 2022) and Ukraine's alignment with the European Union (EU), the conspicuous outcome of which is the EU-Ukraine Association Agreement — drafted on March 30, 2012, signed on March 21, 2014, provisionally and extensively implemented from November 1, 2014 to January 1, 2016, entered fully into force on September 1, 2017, promising deeper political ties along with stronger economic links, standing for a legal framework of economic integration and political affiliation between EU and Ukraine.

This paper covers concrete outcomes of the EU-Ukraine Association Agreement for Ukraine's economy, and effectiveness of bilateral trade agreements EU signed with non-member countries. Above all, it is

scientifically crucial for decomposing outputs of the agreement, separating the wheat (benefits) from the chaff (risks) at macro level. Long ago, Emerson et al. (2006) called attention to costs of possible elimination of tariffs and non-tariffs applications of the Deep and Comprehensive Free Trade Area (DCFTA), giving rise to trade-diversion effects if a candidate country, Ukraine, has an enormous trade share with another third-party country, i.e., Russia. It was recommended that EU should have formed a free trade area with Russia as well, which has yet to become an option. Sadowski (2012) opined that the reason why application of DCFTA was particularly significant for Ukraine and secondary for EU lied behind the size of Ukraine's GDP, population, number of consumers and volume of internal market incommensurate to those of EU. Dreyer (2012) assessed the benefits and agreement-engendered-costs that resulted from EU negotiations with countries of poorest economies, and from the injection of EU laws into these countries' legislative bodies. Through AGLINK-COSIMO partial equilibrium model by OECD, Nekhay

et al. (2012) simulated possible implications of DCFTA on Ukrainian agriculture sector, drawing the conclusion that DCFTA between parties, for many agricultural products, offered opportunities for EU producers, and challenges for Ukraine's due mostly to natural comparative advantages of EU countries over Ukraine in most agricultural goods. Modelling gravity model, Yatsenko et al. (2017) drew attention to the advantages, such as elimination of trade asymmetry between parties, modernization of agriculture and trade, rise of exports by abolishing duties, and such disadvantages as increase in raw material prices, decrease in state income caused by elimination of import tariffs on agricultural goods, etc. Analyzing the pros and cons of the agreement for specific sectors, Bazhenova et al. (2018) found the impact of the agreement on Ukrainian economy to be indecisive—beneficial significantly for metallurgy and mining sector, and insignificantly for imports, however, detrimental significantly to both foreign capital inflows and commodity production, and insignificantly to chemical industry.

It is worth noting that one of the well-known premises of the Agreement was to secure and uphold the transparency in Ukraine. There exist several attempts at examining Ukraine's corruption related economic problems, covering the period between 2013 and 2020 — after the Ukrainian coup d'état, i.e., the Euromaidan uprising, and before the Russian SMO. Ukraine, first and foremost, though considered a sovereign democracy by many, used to oftentimes be referred as most corrupt country in Europe, so much so that in a prominent corruption index, International's Corruption Perceptions, Ukraine ranked 142nd along with Uganda and Comoros right behind Nigeria (Bullough, 2015). Stretching back as far as early 1990s, and with some from Carnegie Institute sponsored by Open Society Foundations believing it has made certain positive reforms in several spots particularly since 2013 (see Waal, 2016), Ukraine still holds its position among the most corrupt nations ruled by venal authorities on earth, with numerous reforms against corruption, yielding zilch (Transparency International, 2014). In 2014, the Ukrainian black market was estimated to form 50% of total GDP, sending bribery among bureaucrats through the roof (Smith, 2022). As a direct consequence of its oligarchic model of economy with a high scale of monopolization, perpetual increase in economic inequality, unemployment, and impoverishment of the majority, numerous studies emphasize the volume of black market rooted in Ukraine vacillating between 28% and 40% of total economy (Kobieliyeva, 2019, p. 35). In 2023, the Kiev International Institute of Sociology reported that citizens found the corruption to be "second-most-serious" issue in the country, knowing that getting rid of oligarchs and money laundering was a requirement to gain accession to the EU (Stockman, 2023). Corruption in Ukraine is the stark combination of such societal and economic issues as institutional

infirmity, weak economic policies, insoluble public finance, dilapidated business environment with a lack of attraction to investment, persistent energy insecurity, inability to implement direly-needed social policies and conflict between the central authority and peripheral regions (Garmash & Pererva, 2020, p. 42), i.e., Donetsk and Luhansk, inter alia, within the Donbass region located in Eastern Ukraine, the majority of whom is predominantly Russian speaking population and even looking forward to reemergence of the Union of Soviet Socialist Republics (USSR) (Yang, 2023, p. 611) to which Ukraine owes its current territory to a large degree.

Even though Ukraine's economic failure with global downturn tend to be linked to political conflict with Russia that peaked in 2014 and 2022 (see *The Economist*, 2022), it had already suffered a huge economic loss by 14.8% during the financial crisis of 2008, well above average global figures of recession. Long before the Russian conflict, Ukraine was always economically performing below average compared to the Commonwealth of Independence States (CIS), with its GDP having grown only by 69.8% relative to the 1990s. Such a "provocative" operation as seeking to join NATO added to its economic and political mediocre governance (Yang, 2023, p. 603). To put it briefly, nevertheless, tenable though it might seem at first glance that the economic conflict with Russia accounts for a significant part of the recent economic instability, the underlying truth is the permanent precarious policies, tenuous reforms and widespread corruption that perpetuate the problems of which country has been in the throes for decades (*The Economist*, 2014).

In spite of which there exists an abundance of études examining the general economic and political impacts of Russo-Ukrainian conflict (Cifuentes-Faura, 2022; Khudaykulova et al., 2022; Kusa, 2022; Liadze et al., 2022; Tank, 2022; Tong, 2024), the literature is still short of the studies investigating and subsuming the vast content of Agreement into the SMO, which is what the contribution of this paper we think is. It is possible to find some papers focused on such sociological and economic specificities of ongoing war as the impact on international and national food markets and the risk for hunger (Abay et al., 2023; Ben Hassen & El Bilali, 2022), the concern mainly arising from Russia and Ukraine's position in grain exports, humanitarian crisis by deaths and injuries (Haque et al., 2022), prospective effects of the war's external shock on currencies around the world (Chortane & Pandey, 2022) and investment decisions of the firms (Novinska & Olesen, 2022), however, almost difficult to come across the papers that examine the specific macroeconomic indicators together, e.g., gross domestic product, import, export, capital formation, industrial output, foreign investments etc. in the axis of the EU trade agreement for Ukraine, further presenting a general picture of the efficiency of such agreements.

RETROSPECTION INTO THE AGREEMENT

First and foremost, the concept of association and trade agreements with an external partner as the direct consequence of EU's ambition in enlargement towards eastern countries derives from any attempts at constructing European Economic Area (EEA) and Single European Market in the 1980s and 1990s (Dabrowski & Taran, 2012, p. 7). Retrospection of the bilateral negotiations between EU and Ukraine formally dates back to *December 18, 1989* when a partnership treaty was signed between European Economic Community (EEC), European Atomic Energy Community (Euratom) and the USSR to have established close trade linkages. After an agreement came to pass on *March 23, 1994*, an interim agreement on *December 4-20, 1995* was concluded between the European Coal and Steel Community (ECSC) and the European Community (EC), on one side, and Ukraine, on the other side that imports of goods between Ukraine and EC respectively would be conducted free from quantitative restrictions ("Interim Agreement on Trade", 1995, p. 3). On *February 19, 1998* another agreement was established, dwelling on the EEC's willingness to deliver technical assistance in order for Ukraine to carry out economic reforms ("Partnership and Cooperation Agreement", 1998, p. 2). Following negotiations on *December 8, 2003*, another protocol to the Partnership and Cooperation Agreement (PCA) dated *April 29, 2004* was initiated and new adjustments were adapted to the agreement. On the heels of *Pomarancheva Revoliutsiia 2004*, Ukraine was acknowledged on *February 21, 2005* as the first country of European Neighborhood Policy (ENP), aim of which was to ensure the liberalization of the trade of goods and services, and on which Ukraine expended utmost effort to take advantage as a "springboard" towards full-fledged EU membership (Dragneva & Wolczuk, 2014, p. 218). On *June 13, 2005*, a protocol germane to the exchange of "classified information" on security basis was settled at Luxembourg ("Agreement on the Security Procedures", 2005, p. 84). After a series of negotiations from *December 22, 1994* to *November 19, 2004*, an agreement was concluded that both parties were poised to accomplish perfect liberalization of trade referring to products of steel ("Agreement on Trade in Certain Steel Products", 2005, p. 43). Another co-operation agreement on *April 4, 2006* was founded between Euratom and Ukraine's cabinet ministers pertaining to peaceful utilization of nuclear energy in an attempt to bolster up previous co-operation association ("Agreement for Co-operation in the Peaceful Uses of Nuclear Energy", 2006, p. 26). An accord regarding trade on textile products between EEC and Ukraine was initiated on *May 5, 1993* and implemented on a large

scale on *January 22, 2007* when tariff rates, concluded, imposed by Ukraine on exports of EC origin products of HS chapters 50 to 63 would not have exceeded the main quotas previously agreed upon ("Agreement on Trade in Textile Products", 2007, p. 18). Through missives between parties dated to *December 11, 2007*, government of Ukraine guaranteed that duties charged on goods originated in Ukraine and exported to EC would have been abolished ("Agreement in relation to Export Duties", 2008, p. 15). On *January 1, 2008* an agreement was settled that EU citizens would have been exempted from any visa necessities when travelling to Ukraine for a period of time not exceeding 90 days ("Agreement on Facilitation of Visas", 2008, p. 68).

Shortly after *Pomarancheva Revoliutsiia*, Viktor Yushchenko, third president of Ukraine, was in heatedly favor of deep and comprehensive political and economic alignment with the EU, started negotiations for a new Association Agreement in *March 2007*. Following Ukraine's membership of World Trade Organization (WTO) on *May 16, 2008*, DCFTA was initiated. On the heels of the elections, as the fourth president of Ukraine, Viktor Yanukovich, former governor of Donetsk Oblast, announced that Ukraine would have been looking for a foreign policy that would have helped Ukraine get maximum results from mutually and equally beneficial relations with Russia and EU ("Yanukovich's Inaugural Speech", February 25, 2010). Yanukovich, at the same speech, manifested that they were ready to become a "European non-aligned state".

After DCFTA segment was established in *July 2012*, EU announced, on *15 May 2013*, to have been technically ready to sign the Association Agreement with DCFTA in the near future ("Signature of Association Agreement", 2013), which would have later been suspended on the eve of Vilnius summit by the Ukrainian prime minister Mykola Azarov on *November 21, 2013* to restore economic and political ties with Russia and aligning with Eurasian Economic Union (Petrov & Holovko-Havrysheva, 2021, p. 7). Indeed, since nineties Ukraine has been used to oscillating between two camps: Moscow and Brussels (Van der Loo & Elsuwege, 2012, p. 422). Likewise, the political turmoil in Odessa where the Trade Union House was set on fire by pro-Euromaidan protesters in *May 2014*, resulted in 42 victims of anti-agreement activists, led to *coup d'état* having overthrown Yanukovich's government. A provisional pro-agreement government led by Arseniy Yatsenyuk was established right after the coup, manifesting that proceeding with the ratification of the agreement was only the case for short-run (Petrov & Holovko-Havrysheva, 2021, p. 8). The entire text of the EU-Ukraine Association Agreement was signed by Petro Poroshenko on *June 27, 2014* at Brussels, having launched the approval process (Van der Loo et al., 2014, p. 6) depending on 28 EU member states approval.

On September 1, 2017, the EU-Ukraine Association Agreement came fully into force with some objectives: stimulating rapprochement between EU and Ukraine based on “common values”, strengthening regional stability, ameliorating economic circumstances, in turn, leading to Ukraine’s integration into EU market, consummating full-blown market economy (Association Agreement, 2014, p. 6). DCFTA stands for the complete elimination of tariffs and non-tariffs in agricultural and manufacturing goods, comprehensive liberalization of Ukrainian trade for European service providers, providing foreign companies with an economic shield, and reliefs for international capital. Opening up Ukraine’s economy towards competition with aggressive European multinationals is one of most striking articles in agreement (Kravchuk et al., 2016, p. 4).

IDIOSYNCRASIES OF THE AGREEMENT

In the EU’s eastern neighborhood, Ukraine is the largest country in terms of its population, location and economic attraction along with the geopolitical properties (Smith, 2016, p. 7), which is why the EU is “far more Machiavellian than Kantian” (Smith, 2016, p. 14) in the Ukraine matter. Conditional and large in scope, the EU-Ukraine Association Agreement is conducive for the EU to shape internal and external relations with Ukraine, predicated upon Ukraine’s allegiance to EU’s polity and economic principles (Petrov, 2018, p. 59).

The Agreement is so idiosyncratic as to be made up of the bulk of 1,000 pages from 43 annexes, 486 articles, 28 chapters, and 7 titles with novelties, most prominent of which is DCFTA —the main idiosyncrasy as exhaustive outline of trade-related regulations germane to EU standards (Bazhenova et al., 2018, p. 4). Accordingly, the agreement falls roughly under the category of “integration-centered-agreements” with third-party country (Petrov, 2018, p. 50). However, to some scholars, the agreement with Ukraine had never aimed at accession to the union, having only been qualified to framework for cooperation in some economic and political matters (Spiliopoulos, 2014, p. 256). EU-Ukraine Association Agreement with DCFTA — far-reaching trade liberalization, sanitary standards for agricultural products, better conditions for domestic and foreign companies, rehabilitation of Ukraine’s gas and oil transportation network (“Eastern Partnership”, 2008, p. 5 and 8), is a novel phenomenon in theoretically terms of building up a political and economic approximation (Van der Loo, 2014, p. 63), providing a fresh model for some sort of *anschluss* without membership despite Ukraine’s ambition, so keen to deeply advertise its pro-European ardor (Delcour & Wolczuk, 2015, p. 503). Nevertheless, provisions of

agreement prudently evade unequivocal indication to membership chance of Ukraine (Van der Loo et al., 2014, p.10).

Additionally, DCFTAs do not only stipulate abolishing the tariffs on manufactured goods, but insinuate total elimination of them on imports of services, reduction in such non-tariff barriers as quotas, levies, embargoes, sanctions (Dabrowski & Taran, 2012, p. 6), security barriers and asymmetric information—at least as important determinant of trade as standard tariffs per se (von Cramon-Taubadel et al., 2010, p. 3). Likewise, DCFTA goes beyond economic matters, comprising socio-economic and institutional integration since new generation agreements are also set to encourage the adoption of *acquis Communautaire* (von Cramon-Taubadel et al., 2010, p. 10), alleviating production chain rupture, expediting know-how transfer, widening scale economies, guaranteeing fair increments in productivity (Evans et al., 2004, p. 14).

Although Ukrainian elites regard any accord with EU as nothing but a compelling political and security matter rather than an economically binding case (Langbein & Wolczuk, 2012, p. 867) DCFTA is the indispensable economic segment of new generation agreements. It is worth adding, some reports came to indicate that DCFTA was literally premature and rife with problems in which the only party benefitting from the agreement was the Ukrainian elites at a cost to the grassroots (Kravchuk et al., 2016, p. 4). In a nutshell, political alignment, of the superstructure, and economic approximation as substructure was subsumed into a new generation Association Agreement.

RESEARCH METHODOLOGY

Hypothetical Construction

The objective of this paper is to shed some light on the effects of EU-Ukrainian Association Agreement of 2014 on Ukraine economy well before the special military operation of Russian Federation gotten off the ground in February 2022. The hypothetical construction of this study is built up as below:

H₀: EU-Ukraine Association Agreement is not transformative, having little effect in building up new economic paradigm for Ukraine.

H_A: EU-Ukraine Association Agreement is transformative, having no little effect in building up new economic paradigm for Ukraine.

H_{A1}: EU-Ukraine Association Agreement is transformative in a promising sense, having no little effect in building up new and favorable economic paradigm for Ukraine.

H_{A2}: EU-Ukraine Association Agreement is transformative in an unpromising sense, having no

little effect in building up new and unfavorable economic paradigm for Ukraine.

Data Composition

To carry on, the data have been compiled for the Ukraine over a period of 21 years-84 observations from 2001-2021 with the quarterly organized frequency. The investigation assumes the following variables: Ukraine's Gross Domestic Product, Export to EU, Import from EU, Industrial Production, Gross Capital Formation and Foreign Direct Investment. Data for the

Gross Domestic Product and Industrial Production are obtained from World Bank Global Economic Monitor and Ukraine Statistical Institute by the Classification Type of Economic Activity, Import and Export data from EUROSTAT-EU trade since 1988 by HS2, 4, 6 and CN8 (DS-645593), Gross Capital Formation from EUROSTAT International Data Cooperation, and Foreign Direct Investment from Balance of Payments Analytic Presentation by Country from International Investment Position Statistics (BOP/IIP) in IMF. (See Table 1)

Table 1.

Explanatory information on model

Variable	Explanation	Form
LNGDP	The Natural Logarithm of Gross Domestic Product of Ukraine (Billion € 2010=100)	Dependent Variable
LNEXPEU	The Natural Logarithm of Ukraine's Export to EU (Billion € 2010=100)	Regressor
LNIMPEU	The Natural Logarithm of Ukraine's Import from EU (Billion € 2010=100)	Regressor
LNIP	The Natural Logarithm of Ukraine's Industrial Production (Billion € 2010=100)	Regressor
LNGCF	The Natural Logarithm of Ukraine's Gross Capital Formation (Billion € 2010=100)	Regressor
FDI*	Foreign Direct Investment Inflow into Ukraine (Million € 2010=100)	Regressor
SYN₂₀₀₉	Structural Shift for BAM in 2009Q1, Q2, Q3 by the 2008 Global Financial Crisis	Synthetic Variable
SYN₂₀₁₄	Structural Shift for AAM in 2014Q4 and 2015Q1, Q2 by 2014 EU-Ukraine Association Agreement	Synthetic Variable
SYN₂₀₂₀	Structural Shift for AAM in 2020 by 2020 Supply Shock	Synthetic Variable
TOTAL SAMPLE SIZE: 2001Q4-2021Q4 OBSERVATION: 84		

Note: All series are deflated, and seasonally adjusted through US Bureau Census X-13ARIMA-SEATS. BAM is acronym of "Before Agreement Model" and AAM "After Agreement Model". (*) Unlike BAA, and having negative observations, FDI in AAM is not logarithmically transformed.

Source: EUROSTAT, IMF, Ukraine Statistical Institute, and World Bank

Some authors have argued that the seasonality blurs the relationship among time series, exogenous events, and exogenous variables (Bell & Hillmer, 1984, p. 300) despite the problem in deleting important data during the execution of seasonal adjustment (Oh, 2005, p. 40). Facilitated to peruse relationships, variables have seasonally been adjusted. Helped diminish variance, converge series to normal distribution (Lütkepohl & Xu, 2012, p. 620), alleviate heteroscedasticity problem (Shawa & Shen, 2013, p. 15) and make the model linear

(Nguyen, 2017, p. 522), natural logarithm of the variables has implemented.

Variable Analysis

In this article, time series analysis—the set of observations belonging to the values of a variable at various times (Gujarati, 2004, p. 25-26), is employed. Seemed more convenient, entire model will be bifurcated as "Before Agreement Model (BAM)" and

“After Agreement Model (AAM)” to look into Ukraine’s economic transformation triggered by the agreement concerned. AAM includes the frequency over a period of 12 years-48 observations from 2010Q1-2021Q4 as does BAM model over a period of 12 years-48 observations but from 2001Q1-2012Q4, which

suffice to avoid any possible small sample problem, frequently ending up with bias in variance estimation (Montgomery et al., 2015, p. 158) and low statistical power. Descriptives are provided in Table 2.

Table 2.

Descriptive information on models

	LNGDP	LNEXPEU	LNIMPEU	LNIP	LNGCF	LNFDI ^(*)
Before Agreement Model						
Mean	10.0986025	8.00643881	8.39337458	8.93444292	8.59406107	6.758678662
Median	10.1305024	8.01482894	8.42057271	8.98032680	8.60557053	6.900736310
Maximum	10.3165815	8.30719705	8.79870124	9.11305217	9.15084425	8.845926783
Minimum	9.77834803	7.52446856	7.95549162	8.69888399	8.16526520	4.875531461
Std. Dev.	0.14454956	0.15808102	0.21326534	0.13023981	0.25505632	0.776744848
Obs.	48	48	48	48	48	48
After Agreement Model						
Mean	10.1304411	8.10442528	8.39512866	8.81877664	8.32056950	766.3343623
Median	10.1286381	8.14312685	8.41025519	8.80645946	8.43175494	887.5682141
Maximum	10.2277259	8.33017059	8.51691289	9.06449110	8.83199053	2726.170191
Minimum	10.0182452	7.79409616	8.18779158	8.59479344	7.39188956	-3337.96483
Std. Dev.	0.05934917	0.14340328	0.07972551	0.13332992	0.35988433	908.8079220
Obs.	48	48	48	48	48	48

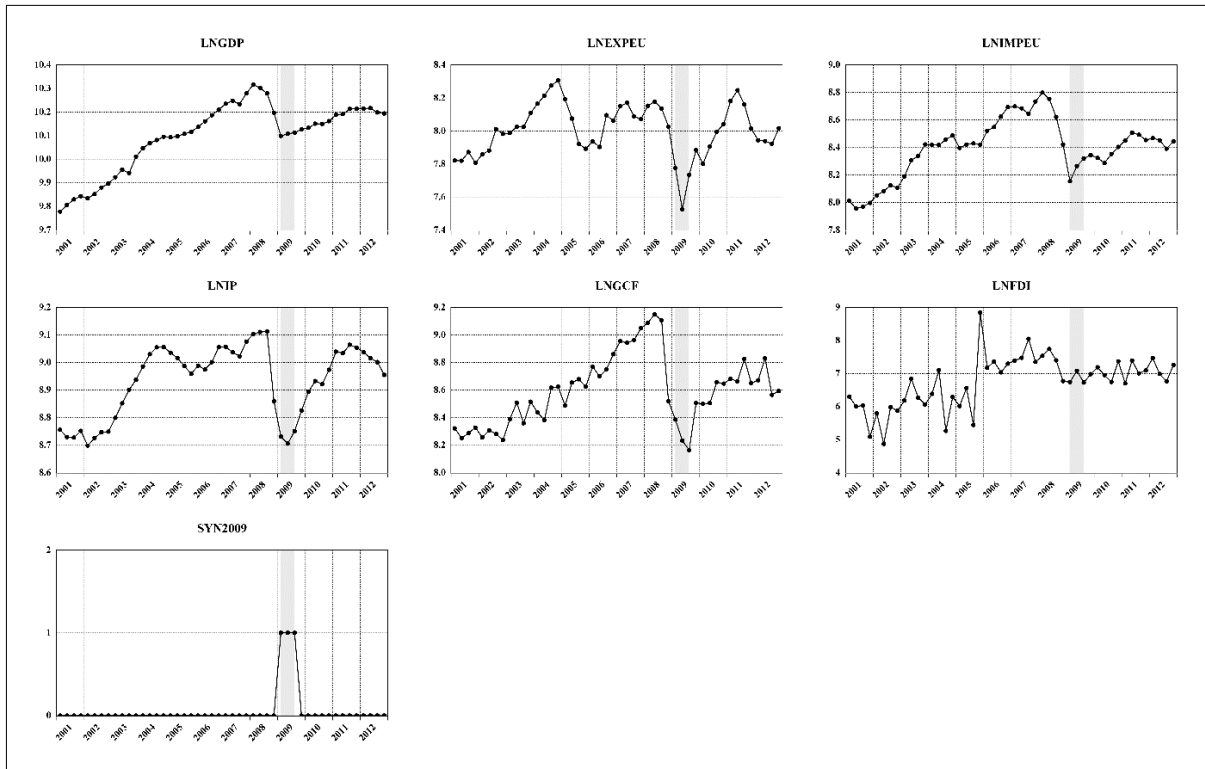
Note: (*) Having negative observations, FDI in AAM is not logarithmically transformed.

Source: Author's calculations

As important as descriptive analysis is the visual representation of the series, being first step into time series analysis (Gujarati & Porter, 2004, p. 795), which is introduced for BAM variables in Figure 1 and AAM in Figure 2.

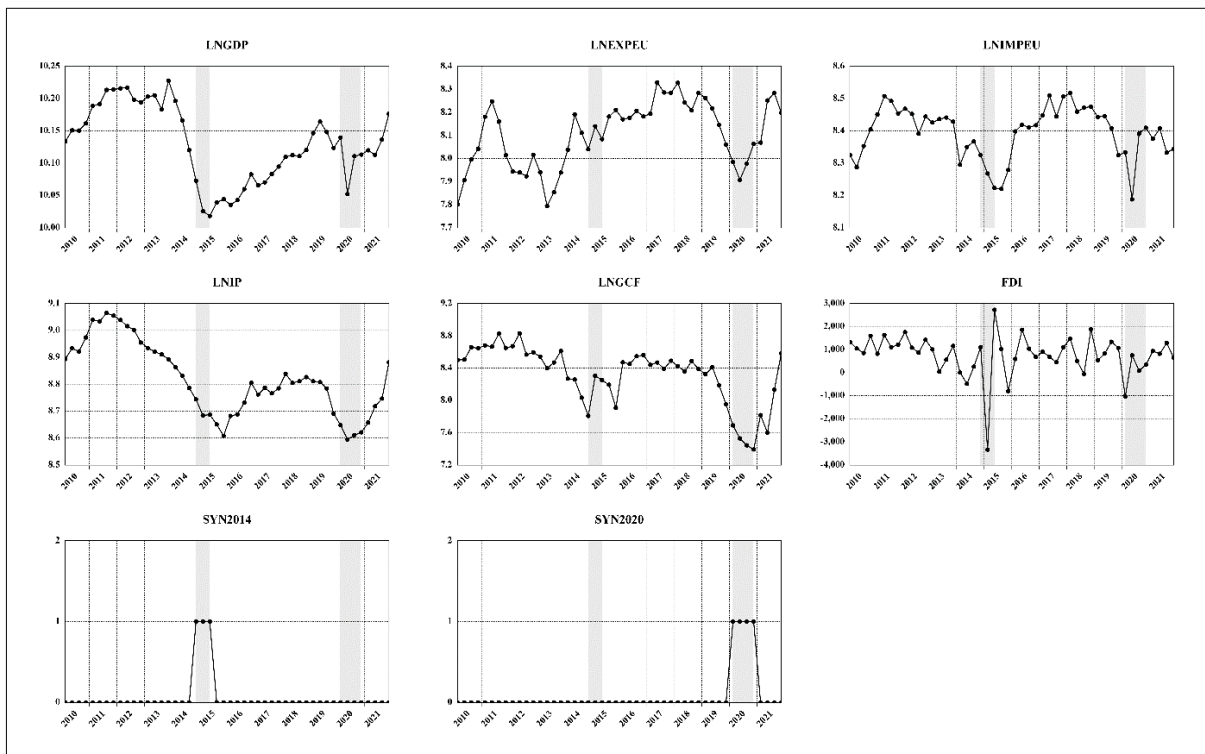
Before formal introspection into the existence of unit roots, graph of each variable gives some hints at the variance based upon the spread, and stability relied upon

the mean of the variables. Some appear to have stable trajectory, fluctuating around the mean with less variance and outlier, e.g., Foreign Direct Investment in both models and slightly Export in the first model, and Import and slightly Gross Capital Formation in the second model, other variables posit instability, being under effect of trend and breaks, most of which are both in intercept and trend, e.g., Gross Domestic Product in both model, Import and Industrial Production in the first.



Source: Authors' calculation based on data kindly provided by Ukraine Statistical Institute, World Bank, EUROSTAT and IMF.
Shaded areas denote economic breakdown.

Figure 1. Visual representation on BAM variables



Source: Authors' calculation based on data kindly provided by Ukraine Statistical Institute, World Bank, EUROSTAT and IMF.
Shaded areas denote economic breakdowns.

Figure 2. Visual representation on AAM variables

Unit Root Tests

Visual representation on both models above adumbrates that most variables are unstable, bearing stochastic trend, a phenomenon leading to “spurious regression”, which is pervasive in time series (Yule, 1966, p. 12), and leading to incorrect interpretations because of which F statistical value does not fit to Fisher’s F distribution under the nil hypothesis (Granger & Newbold, 1973, p. 114). Unit root tests are implemented to this end — results are provided in Table A-1 in the appendix.

The table illustrates the results of traditional Phillips & Perron (1988) test, which, compared to Augmented Dickey Fuller test, gives more effective results in the case of linear trend that must be included in regression analysis for unit root tests— thus is of great significance in taking this possibility into consideration (Phillips & Perron, 1998, p. 336), along with structural unit root tests, which are Zivot & Andrews (2002) and Enders & Lee (2012), latter of which employs Fourier LM test and allows for sharp as well as smooth shifts for unknown number of breaks.

For both BAM and AAM, Phillips & Perron results show all the variables at level being nonstationary except LNFDI. After first difference, stabilization in series is ensured. However, structural shifts might pervasively exist in time series, and, if not reckoned with, have serious consequences — even if series seem to be stationary, unit root tests often tend to reject alternative hypothesis of no unit root. Analyzes without considering structural shifts end up with illative errors, bias in estimators, in turn, misleading policy recommendations (Hansen, 2001, p. 127). Accordingly, the existence of structural shifts in BAM variables in 2009 caused by 2008 global financial crisis, and in AAM variables in 2014 engendered by the agreement of interest and in 2020 incited by global supply shock as a direct impact of COVID-19 pandemic, are highly probable. Structural unit root tests are also conducted along with traditional ones, shown in Table A-1 in which some variables, unlike the rest, have unit roots with structural shifts, including LNGDP and some other variables.

Empirical Modelling

Unit root tests concluded that some variables are integrated at level [I(0)] with others stable at first order [I(1)], pointing out the case for which Ordinary Least Squares (OLS) method is not applicable whatsoever. Fortunately, linear combinations of two or more series might possess stationary process even as all are not integrated at level (Gujarati, 2004, p. 830). In this case, Pesaran’s (2001) Autoregressive Distributed Lag (ADL) model comes to the fore as a general dynamic specification technique (Kanjilal & Ghosh, 2014, p.

138). Dynamic specification technique stands for the methods that employ lagged values of dependent variable with lagged and simultaneous values of regressors while synthetic, i.e. exogenous, variables are kept unlagged. Dynamic specification by which long- and short-term effects could be decomposed, is what ADL model does, estimating short term effects directly while producing long-run equilibrium indirectly. By means of ADL model Abakumova & Primierova (2018) in their study examined long-run relationship between income equality and growth in the axis of globalization and Kuznets curve for Ukraine, and hit upon a “hidden” cointegration among variables. Yatsenko (2020) built ADL model so as to decide whether weather conditions had significant effects on such economic sectors as agriculture, manufacturing, construction, and energy in Ukraine. Their findings brace for the view that weather is of a noticeable but short-term impact on the dynamics of individual economic activities. Ziernhold & Jung-Ivannikova (2021) using ADL method and looking into the relationship between corruption, economic growth and financial development in Ukraine stumbled upon the long-term relationship among variables, revealing that corruption played negative influence on financial development while economic growth had positive effect on financial sector. Stryzhak et al. (2022) by exploiting ADL model investigated the long-run relationship between Geopolitical Risk Index (GPR), Ukraine’s GDP and its Tourism revenues, and found out the less geopolitical risks the more tourism revenues with economic growth. Oleksiv & Mirzoleva (2022) developed an ADL/Error Correction Model (ECM) to decompose the impacts of remittances to the exchange rate appreciation in the short- and long-term perspectives. They discovered remittances produced positive outcome for the exchange rate appreciation in Ukraine.

In this paper, it’s been investigated how Ukraine’s economy was transformed by the EU Association Agreement of 2014 before the Ukro-Russian War. To this end, bifurcated regressions would be modelled by means of ADL technique to peruse short- and long-term effects of the agreement. ADL model seems convenient to employ since it allows to include synthetic variables for structural shifts as well as it doesn’t demand specify regressions’ integration degrees before the tests for any kind of level relationship between dependent and independent variables (Pesaran et al., 2001, p. 315).

The formulation of the conditional error correction model of the ADL bounds test-Case 4: Constant restricted with no trend for BAM is as below:

$$\begin{aligned}
 \Delta LNGDP = & \mu_0 + \alpha_1 LNGDP_{t-1} + \alpha_2 LNEXPEU_{t-1} + \alpha_3 LNIMPEU_{t-1} + \alpha_4 LNIP_{t-1} + \alpha_5 LNGCF_{t-1} + \alpha_6 LNFDI_{t-1} \\
 & + \omega_1 LNEXPEU_t + \omega_2 LNIMPEU_t + \omega_3 LNIP_t + \omega_4 LNGCF_t + \omega_5 LNFDI_t + \sum_{i=0}^{p-1} \varpi_{1t} \Delta LNGDP_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{2t} \Delta LNEXPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{3t} \Delta LNIMPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{4t} \Delta LNIP_{t-i} + \sum_{i=0}^{p-1} \varpi_{5t} \Delta LNGCF_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{6t} \Delta LNFDI_{t-i} + \lambda_1 SNT_{2009} \\
 & + v_t
 \end{aligned} \tag{1}$$

The formulation of the conditional error correction model of the ADL bounds test-Case 2: Constant unrestricted with trend restricted for AAM is as below:

$$\begin{aligned}
 \Delta LNGDP = & \mu_0 + \eta TREND + \alpha_1 LNGDP_{t-1} + \alpha_2 LNEXPEU_{t-1} + \alpha_3 LNIMPEU_{t-1} + \alpha_4 LNIP_{t-1} + \alpha_5 LNGCF_{t-1} \\
 & + \alpha_6 FDI_{t-1} + \omega_1 LNEXPEU_t + \omega_2 LNIMPEU_t + \omega_3 LNIP_t + \omega_4 LNGCF_t + \omega_5 FDI_t \\
 & + \sum_{i=0}^{p-1} \varpi_{1t} \Delta LNGDP_{t-i} + \sum_{i=0}^{p-1} \varpi_{2t} \Delta LNEXPEU_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{3t} \Delta LNIMPEU_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{4t} \Delta LNIP_{t-i} + \sum_{i=0}^{p-1} \varpi_{5t} \Delta LNGCF_{t-i} + \sum_{i=0}^{p-1} \varpi_{6t} \Delta FDI_{t-i} + \lambda_1 SNT_{2014} \\
 & + \lambda_2 SNT_{2020} \\
 & + v_t
 \end{aligned} \tag{2}$$

The error correction (conditional) results for BAM and AAM are given in Table A-2, which illustrates that the parameters, to wit, the coefficients of most variables optimally lagged by ADL (4, 4, 2, 5, 5, 2) for BAM and ADL (1, 5, 5, 3, 2, 5) for AAM are significant, including those of synthetic variables injected into models that represent structural shifts incited by the financial crisis of 2008 for BAM, and political shift of 2014 agreement of interest as well as global supply shock of 2020 pandemic for AAM. Significance of synthetic variables' coefficients adds up to the clear fact that shocks engendered by the financial crisis, 2014 agreement, and global supply chain rupture are permanent, having no little bearing upon the series.

General equation of the Error Correction Form of the ADL bounds test-Case 4: Constant restricted with no trend for BAM is as below:

$$\begin{aligned}
 \Delta LNGDP = & \sum_{i=0}^{p-1} \varpi_{1t} \Delta LNGDP_{t-i} + \sum_{i=0}^{p-1} \varpi_{2t} \Delta LNEXPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{3t} \Delta LNIMPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{3t} \Delta LNIMPEU_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{4t} \Delta LNIP_{t-i} + \sum_{i=0}^{p-1} \varpi_{5t} \Delta LNGCF_{t-i} + \sum_{i=0}^{p-1} \varpi_{6t} \Delta LNFDI_{t-i} + \lambda_1 \text{SNT}_{2009} + \Pi \text{ECT}_{t-1} \\
 & + u_t
 \end{aligned} \tag{3}$$

General equation of the Error Correction Form of the ADL bounds test-Case 2: Constant unrestricted with trend restricted for AAM is as below:

$$\begin{aligned}
 \Delta LNGDP = & \mu_0 + \sum_{i=0}^{p-1} \varpi_{1t} \Delta LNGDP_{t-i} + \sum_{i=0}^{p-1} \varpi_{2t} \Delta LNEXPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{3t} \Delta LNIMPEU_{t-i} + \sum_{i=0}^{p-1} \varpi_{4t} \Delta LNIP_{t-i} \\
 & + \sum_{i=0}^{p-1} \varpi_{5t} \Delta LNGCF_{t-i} + \sum_{i=0}^{p-1} \varpi_{6t} \Delta FDI_{t-i} + \lambda_1 \text{SNT}_{2014} + \lambda_2 \text{SNT}_{2020} + \Pi \text{ECT}_{t-1} \\
 & + u_t
 \end{aligned} \tag{4}$$

Not merely having provided short-term coefficients but also described how much of deviations from short-term equilibrium would be rectified in the long-term, the Error Correction Form is illustrated for BAM and AAM in Table A-3.

The Error Correction Term (ECT_{t-1}) is the benchmark representing speed of adjustment towards long-term equilibrium, and meets the assumption $-1 < \Pi < 0$. That means deviation among variables emerged one period earlier would be adjusted by 73% for BAM and 74% for AAM closely after one period. In other words, for both models over 70% of disparity is ruled out, i.e., about 75% of any deviance toward imbalance would be eliminated within a period.

Before the agreement paradigm, in the same table, Ukraine's exports to EU, imports from EU, industrial production, and gross capital formation in Ukraine have a significant and simultaneous bearing on its GDP. When it comes to foreign direct investment inflows to Ukraine, it starts influencing GDP after only one quarter. As an indicator of the structural shift caused by global financial crisis, it turns out that the synthetic variable sheds a permanent shock on Ukraine's economy.

After the agreement paradigm, first and foremost, structural shift marked by the agreement of 2014 is proved to be *datum*, as is structural shift engendered by the supply shock of 2020 now that both of their coefficients are highly significant. Moreover, Ukraine's export to EU, import from EU, and gross capital formation in Ukraine keep concurrently bearing upon GDP, except industrial production that stops significantly and simultaneously affecting Ukraine

economy. Industrial production and foreign direct investment inflows belatedly affect GDP. It turned out that the EU-Ukrainian Association Agreement, provisionally applied in the last quarter of 2014, laid the foundation for a novel paradigm, at least in the short-term.

It is necessary to carry out hypothetical examination to detect any kind of valid cointegration among BAM and AAM variables to corroborate former and following results. In Table A-4 are illustrated the hypothetical examinations to test valid cointegration for BAM and AAM.

Evident in first compartment of Table A-4 that F-test statistic exceeds lower and upper bound critical values, meaning nil hypothesis of no level relationship is rejected at 1% significance, certifying the presence of long-run cointegration for BAM variables. Regarding second compartment of the table, F-test statistic, as is former, is greater than lower and upper bound critical values, rejecting nil hypothesis of no level relationship, and bearing out the long-run cointegration for AAM at 1% significance. Holistically, detection of cointegration through bounds test ends up with corroborating the soundness of both BAM and AAM's level equation, coefficients of which are provided in Table A-5.

To derive coefficients of variables for level equation in Table A-5, parameters of all level regressors in the conditional error correction form demonstrated in Table A-2 are divided by an additive inverse of the coefficient belong to " $\Delta \text{LNGDP}_{t-1}$ ", to wit, " $-\alpha_1$ " whose values are 0.73018451701966 for BAM and 0.74217484204578 for AAM. Only after long-run derivative coefficients

hinged upon the conditional error correction form are allotted, the long-run equation could be established. Based on the conditional error correction model, the

final long-term equation of the OLS method, which is built up through a technique adapted to ADL, is as follows:

Long-run level equation for BAM is:

$$\begin{aligned} \text{LNGDP}_t = & 3.8511 - 0.3094\text{LNEXPEU}_t + 0.0909\text{LNIMPEU}_t + 0.6640\text{LNIP}_t \\ & + 0.2180\text{LNGCF}_t + 0.0293\text{LNFDI}_t + v_t \end{aligned} \quad (5)$$

Long-run level equation for AAM is:

$$\begin{aligned} \text{LNGDP}_t = & 0.0102\text{Trend}_t - 0.3601\text{LNEXPEU}_t - 0.2689\text{LNIMPEU}_t \\ & + 1.1333\text{LNIP}_t + 0.1731\text{LNGCF}_t - 0.0001\text{FDI}_t + v_t \end{aligned} \quad (6)$$

Before the agreement paradigm, Ukraine's export to EU, its industrial production, gross capital formation, and foreign direct investment flows into it have produced significant effect on GDP. Surprisingly, Ukraine's export to EU countries does negatively affect its economy, by the by, "Ukraine's import from EU produces positive and insignificant influence on GDP"—common property of many third world countries that must first import intermediates to export and grow. **After the agreement** paradigm, Ukraine's export to EU, its industrial production, gross capital formation, and foreign direct investment flux into it as well as Ukraine import from EU have no little effect upon GDP, which means all regressors produce significant influence for the Ukrainian economy, a kind of influence that cannot be taken for granted. As it is, industrial production and gross capital formation do positively affect Ukraine's GDP whereas import from EU and foreign direct investment inflows have passed through somehow transformations of which the association agreement in question afflicted on the economy. Another outcome is that coefficient of the Ukraine's exports to EU is negatively higher than that of it in BAM. Holistically, after the agreement, almost all indicators have worsened.

DISCUSSION AND CONCLUSION

In this paper, the possible transformative effects of EU-Ukrainian Association Agreement along with its idiosyncrasies are examined. The agreement of which deep and comprehensive trade deal is indispensable part, was drafted on March 30 in 2012, signed on March 21 in 2014, provisionally implemented on November 1, 2014, and extensively put into practice on January 1, 2016, standing for the legal framework of economic integration and political affiliation between EU and Ukraine. The attractiveness for foreign investments,

sophisticated technologies, recovery based on competition for Ukrainian goods, modernization of national enterprises, varied financial supplies for the economic development of Ukraine and improvements in living standards, diversity in exports of goods and considerable increase in growth were among the featured premises that the agreement was built upon. Nonetheless, the results of this paper show that association agreement under review has been of challenging impacts on Ukraine's economy — apart from the industrial production level, all economic indicators of Ukraine under investigation go through numerous disruptions. Negative effect of exports to EU countries on growth gets worse, the positive outcome of the import from EU for the Ukrainian economy in "before-agreement model" turns out to be not the case for "after-agreement paradigm" — benefits from imports fade away after-agreement. Accordingly, positive sign of imports' parameter turned into negative, same as the foreign direct investment's. In addition, positive influence of Ukraine's gross capital formation after-agreement is slightly weaker than the before-agreement. There seem to be several dynamics responsible for the general results operating behind the scene that require expatiation, *ad seriatim*.

The first of which must be associated with the fact that the goods Ukraine **exports to EU** are those of which have low technological substance. Ukraine exports to EU such agricultural and low tech-goods as sunflower meal, oil and seed. With a depreciated hryvnia, Ukraine export structure does not seem to be able to produce theoretically expected positive outcome for the economy due probably to the exported commodities of low-tech, which are not determined to activate transmission channel of transferring knowledge and technology that the exported high-tech goods used to. Besides this and in parallel with the findings of Emerson et al. (2006), we think, should be connected to Ukraine's trade with Russian Federation, the volume of which

significantly decreased after the agreement, that is what is called *trade diversion effect* by which agreement must somehow have triggered. Trade diversion effect is when trade routes significantly and suddenly get shifted from the most effective partner to the less efficient one, destabilizing export pattern to a large extent. It is a *datum* that Ukraine significantly suffered from the diversion, unlike Russia remarkably gaining significant trade returns from Europe and Asia thanks to jacked up mineral prices (Steinbach, 2023, p. 5). On top of this is the Ukraine, despite having relatively a sound agricultural sector, whose farmers would hardly be competing with EU where, in contrast to its counterparts, farmers enjoy the incommensurate number of agricultural subsidies and large volume of market demand as pointed out by Sadowski (2012) and Nekhay et al. (2012). Another challenge is the high product standards of EU, difficult to meet for Ukrainian small-sized producers. All those predicaments probably disable Ukraine in even using some agricultural products with competitive advantage in foreign trade. Having been disproportionately subsidized, cheap but high-quality EU products likely push Ukrainian producers out of business through predatory pricing. It is also worthy of discussion that war inflicted heavy sufferings on Ukraine manufacture because of which annexed eastern regions of Ukraine, unlike agricultural western parts, were known to be industrial strongholds for the economy (Wolczuk, 2002; Wolczuk, 2006; Kokko & Kravtsova, 2012), particularly southeastern parts of Ukraine, e.g., Donbass, which is why Ukraine export sector, we think, seemed to lose its manufacturing foundations of high value, transformed into bare low value agricultural economic base.

The second of which probably is Ukraine's **imports from EU** that turn into negatively affecting the economic performance due high likely to the insurmountable change in the content of commodities imported. It is likely that Ukraine has begun importing from EU, along with other countries, more and more military equipment, gears, war machines and other associated hardware rather than such commodities as machinery, electrical machinery in particular, and vehicles that used to enhance economic growth through the imports of production means, which directly take part in self-valorization process of capital. It is within the realm of possibility that military defense expenditure has replaced the imports of intermediate and capital goods that are of crucial role in the economy of a developing country— Ukraine's share in EU's exports of explosives, arms and ammunition was around 25% in 2023Q2, jacked up to approximately 60% within a year (Eurostat, 2024). It was also estimated of Ukraine defense expenditure having increased from \$4.7 billion in 2021 to \$35 billion in 2022. Other estimations pointed out 640% rise in total military spending in 2022. With that being said, it was way before 2022 that Ukraine military spending started gaining momentum, mainly

triggered by annexation of Crimea (Tian et al., 2023, p. 553). The other side of the coin is the trade liberalization counteracting against trade barriers, customs and tariffs that allow EU goods to flock into Ukrainian market at much lower prices, paralyzing domestic market and crippling down local producers, which applies not merely to agricultural sector but also industrial one, partially compatible with the results of Yatsenko et al. (2017). Having exported agricultural products and raw materials and tried to import value-added commodities such as machinery, vehicles and electronics in trade with EU, and with the removal of trade barriers, such a trade pattern of Ukraine would likely become stronger and continue to “contribute” to its trade structure.

The study shows that **foreign direct investment's** sign has turned into negative after the agreement, which is clearly because of the political atmosphere producing instability in Ukraine, leading to severe fluctuations in the investment flows into it, supported by the findings of Bazhenova et al. (2018). It is probable that the escalation between Russia and Ukraine posed a huge investment risk to foreign investors, excluding the investments made into Ukrainian military industry complex. During the Russian SMO in Ukraine, investment in agricultural sector saw an unprecedented decrease — attracted less investment by 39% than it did in 2021, still remains less lucrative (Tomashuk et al., 2024). Some regions of Ukraine, particularly northeastern and southeastern part of it, where war is still going on, offer almost nothing but mounting risk, crumbling infrastructure and unbearable uncertainty. The same holds, more or less, for the other regions of Ukraine that suffer from underpopulation caused by conscriptions and emigration, i.e., outward migration — As of September 2024, total number of Ukrainian refugees amounts to approximately 7 million, 6 million of whom are recorded in Europe (United Nations, 2023); the most migrated to Germany (1.2 million), Poland (958,000), and Czechia (347,000) (Cuibus et al., 2024). Another contributing factor can be associated with the economic overreliance on EU and implementation of EU-based policies that reasonably produce some sort of “crowding-out” effects for the foreign investors of non-EU countries, significantly limiting Ukraine's FDI diversification structure. Last of all, undoubtedly, is the corruption that brings Ukraine to its knees. It looks like EU standards have produced nothing, and being “most corrupt nation in Europe” still persists for Ukraine. The problems regarding “property rights” and absence of some vital regulations can have posed an additional danger to the foreign investor, another deterrent for the FDI.

With regard to further research could be the specific investigation as to how the agreement affected income distribution between eastern and western parcels of Ukraine, where the economic benefits of the trade deal might have accumulated more in the west because of its proximity to EU and relatively developed infrastructure,

excluding the political tendencies of Ukrainian elites, ending possibly up with the increase in regional inequality within the country *per se*. Other contributing factor could be deeply embedded in the change of trade intensity different regions previously had and lost with the political atmosphere after the agreement, which adds to income disparity.

All in all, it is concluded that association agreement has no little bearing upon the Ukraine economy, created a novel paradigm, and negatively transformed Ukrainian economy into less favorable position, exasperating the

economic predicament. Under these considerations, H_{A2} hypothesis which stands for the assertion operating under the theory that EU-Ukraine Association Agreement is transformative in an unpromising sense, and it has been of no little effect in building up new and unfavorable economic paradigm for Ukraine, is scientifically substantiated, calling as a whole the efficiency of the EU Association Agreement(s) into question.

Author's contribution

Hakan Erpolat: Created ideas and hypotheses for study 50%, conceived and designed the study 50%, collected the data 60%, performed the analysis 70%, wrote the paper 50%, logical explanation and presentation of findings 50%, overall: 55 %.

Nurtaç Yildirim: Created ideas and hypotheses for study 50%, conceived and designed the study 50%, collected the data 40%, performed the analysis 30%, wrote the paper 50%, logical explanation and presentation of findings 50%, overall: 45 %.

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APPENDIX

Table A-1. Unit Root Tests on Variables

	LNGDP	LNEXPEU	LNIMPEU	LNIP	LNGCF	LNFDI ^(*)
Traditional Unit Root Test						
Phillips & Perron^{T-stat.}						
Before Agreement Model						
At Level						
Cons. & Trend	-1.464	-2.364	-1.479	-2.034	-2.261	-5.739***
At First Difference						
	-4.374***	-4.979***	-4.616***	-4.135***	-7.029***	-16.056***
After Agreement Model						
At Level						
Cons. & Trend	-1.592	-2.801	-2.765	-1.749	-2.560	-8.114***
At First Difference						
	-6.439***	-5.357***	-7.818***	-4.264***	-7.081***	-19.964***
Structural Unit Root Tests						
Zivot & Andrews^{ADF-stat.}						
Before Agreement Model (<i>One Break</i>)						
Level	-3.365	-3.842	-2.933	-2.793	-3.403	-5.422***
Level & Trend	-5.778***	-4.762	-5.732***	-8.176***	-7.299***	-10.067***
After Agreement Model (<i>One Break</i>)						
Level	-3.462	-4.249	-3.433	-5.039**	-3.845	-8.570***
Level & Trend	-4.497	-4.618	-4.159	-4.653	-4.549	-9.567***
Enders & Lee^{LM-stat.}						
Before Agreement Model						
-	-4.293**	-4.642**	-4.376**	-1.225	-1.849	-3.543
After Agreement Model						
-	-2.570	-3.437**	-4.952***	-1.118	-0.171	-1.715

Table A-2. Conditional Error Correction Forms
BEFORE AGREEMENT MODEL: ADL (4, 4, 2, 5, 5, 2)
Case 4: Constant Restricted with No Trend

Dependent Variable: ΔLNNGDP_t				
Variables	Coefficients	Std. Errors	$T_{\text{STAT.}}$	Prob.
C	2.81202318735248	0.70425430444750	3.99290876831565	0.00133448012742***
LNGDP _{t-1}	-0.73018451701966	0.16258168556642	-4.49118555067110	0.00050768719781***
LNEXPEU _{t-1}	-0.22597103686268	0.06536147516957	-3.45725117550439	0.00384875206781***
LNIMPEU _{t-1}	0.06640275035548	0.04990569018737	1.33056471328575	0.20459926772013
LNIP _{t-1}	0.48485264796607	0.12795623323172	3.78920694772282	0.00199283607613***
LNGCF _{t-1}	0.15920263493022	0.06824943961595	2.33265849252510	0.03510376713385**
LNFDI _{t-1}	0.02141406282618	0.00973026851306	2.20076792304823	0.04503542184044**
$\Delta \text{LNNGDP}_{t-1}$	-0.06609286462681	0.15582160416508	-0.42415725971341	0.67789642281877
$\Delta \text{LNNGDP}_{t-2}$	-1.08482355587444	0.23534304800242	-4.60954153981751	0.00040504479433***
$\Delta \text{LNNGDP}_{t-3}$	-0.65753899308381	0.23049107367500	-2.85277422070997	0.01277980120983***
$\Delta \text{LNEXPEU}_{t-1}$	-0.11858474227122	0.04620629900805	-2.56641940205058	0.02239242558488**
$\Delta \text{LNEXPEU}_{t-2}$	0.17308486029698	0.05525348400187	3.13256011677222	0.00734175693828***
$\Delta \text{LNEXPEU}_{t-3}$	0.12760820700802	0.04762380449853	2.67950467947090	0.01796292854725**
$\Delta \text{LNEXPEU}_{t-4}$	0.07208514582463	0.02862199394568	2.51852285209176	0.02457080979906**
$\Delta \text{LNIMPEU}_{t-1}$	0.11743089575928	0.05227419378925	2.24644106866014	0.04133027065006**
$\Delta \text{LNIMPEU}_{t-2}$	-0.12928881762800	0.06854616097617	-1.88615694572511	0.08019188529491*
ΔLNIP_{t-1}	0.23373901437449	0.07554144968837	3.09418227130558	0.00792341969233***
ΔLNIP_{t-2}	0.01432119481657	0.08911035884880	0.16071301924473	0.87461541946868
ΔLNIP_{t-3}	0.21145861116309	0.11310159545551	1.86963420198844	0.08259365616909*
ΔLNIP_{t-4}	0.25129344221018	0.10900941828646	2.30524523624014	0.03698054100289**
ΔLNIP_{t-5}	0.17496471118864	0.12615500538097	1.38690264932627	0.18715807615252
$\Delta \text{LNGCF}_{t-1}$	0.15384186358266	0.04876041199921	3.15505667969212	0.00702071374573***
$\Delta \text{LNGCF}_{t-2}$	-0.11419618542904	0.04117019201405	-2.77375887365501	0.01493148438131**
$\Delta \text{LNGCF}_{t-3}$	-0.12164115204183	0.05127272397599	-2.37243396896139	0.03254023932531**
$\Delta \text{LNGCF}_{t-4}$	-0.20022733289939	0.06373655448371	-3.14148347869277	0.00721270487413***
$\Delta \text{LNGCF}_{t-5}$	-0.05541355418746	0.05169492521462	-1.07193412036870	0.30188088559024
$\Delta \text{LNFDI}_{t-1}$	0.00411635179152	0.00416346599820	0.98868389781561	0.33959831775925
$\Delta \text{LNFDI}_{t-2}$	-0.00871205128007	0.00493830286775	-1.76417921569189	0.09949992004132
SYN ₂₀₀₉	-0.06346759647626	0.02359037560968	-2.69040211679482	0.01758397523762**

AFTER AGREEMENT MODEL: ADL (1, 5, 5, 3, 2, 5)
Case 2: Constant Unrestricted with Trend Restricted

Dependent Variable: ΔLNNGDP_t				
Variables	Coefficients	Std. Errors	$T_{\text{STAT.}}$	Prob.
C	2.75105142577500	1.18089488984807	2.32963276361448	0.03658785269672**
Trend	0.00756198373182	0.00153235259528	4.93488493125070	0.00027265285952***
LNGDP _{t-1}	-0.74217484204578	0.17943456713385	-4.13618654365614	0.00117107470787***
LNEXPEU _{t-1}	-0.26723044479480	0.06518518349231	-4.09955806638657	0.00125418118682***
LNIMPEU _{t-1}	-0.19959810813135	0.14517774449784	-1.37485334836783	0.19241093223044
LNIP _{t-1}	0.84113607069726	0.18685091506956	4.50164276896433	0.00059549752470***
LNGCF _{t-1}	0.12849870053827	0.03099425608523	4.14588755364636	0.00115002748692***
FDI _{t-1}	-0.00009355955518	0.00002459973718	-3.80327458298125	0.00219364830930***
$\Delta \text{LNEXPEU}_{t-1}$	-0.08694428626180	0.04627507516134	-1.87885780754908	0.08286912803680*
$\Delta \text{LNEXPEU}_{t-2}$	0.20934205988293	0.05511516573187	3.79826599635699	0.00221461739373***
$\Delta \text{LNEXPEU}_{t-3}$	0.08201430085745	0.05275484499224	1.55463068594964	0.14403395750852

Δ LNEXPEU _{t-3}	0.05072059047710	0.04951441084944	1.02436017327020	0.32434965408325
Δ LNEXPEU _{t-4}	0.06617752718604	0.03872127613678	1.70907402308405	0.11118525219509
Δ LNIMPEU	0.28413483419755	0.05397165431794	5.26451964069429	0.00015296705991***
Δ LNIMPEU _{t-1}	0.37348787613245	0.15366282149278	2.43056760577579	0.03029861469028**
Δ LNIMPEU _{t-2}	0.43749005729483	0.12239249872754	3.57448423590683	0.00339354683030***
Δ LNIMPEU _{t-3}	0.21217600946920	0.08199222055799	2.58775781440323	0.02252294154257**
Δ LNIMPEU _{t-4}	0.15197279600253	0.06787485165780	2.23901477926931	0.04327584558556**
Δ LNIP	0.07269044043088	0.11948626817638	0.60835811127333	0.55343124238879
Δ LNIP _{t-1}	-0.68655869286416	0.14464498000863	-4.74650895470535	0.00038182349209***
Δ LNIP _{t-2}	-0.36599851350561	0.09690273047198	-3.77696801445085	0.00230609357234***
Δ LNIGCF	0.05016811730196	0.01604630625579	3.12645891847320	0.00802731728317***
Δ LNIGCF _{t-1}	-0.03387468194058	0.02864872925880	-1.18241481618826	0.25821693987473
Δ FDI	0.00000152531991	0.00000446474851	0.34163624361339	0.73808394414538
Δ FDI _{t-1}	0.00009464848325	0.00001947159244	4.86084964739260	0.00031106547856***
Δ FDI _{t-2}	0.00007499903600	0.00001608256867	4.66337421056413	0.00044364327904***
Δ FDI _{t-3}	0.00004044100194	0.00001098942185	3.67999358799410	0.00277389041089***
Δ FDI _{t-4}	0.00001574471381	0.00000565544766	2.78399072214694	0.01549728508001**
SYN ₂₀₁₄	-0.03100270589219	0.01354973057839	-2.28806806990139	0.03952376697185**
SYN ₂₀₂₀	0.05943011298078	0.01825409057472	3.25571480745722	0.00625900920055***

Note: *, ** and *** denote significant at 10%, 5% and 1% respectively.

Table A-3. Error Correction Form: Short Run Equations

BEFORE AGREEMENT MODEL: ADL (4, 4, 2, 5, 5, 2)

Case 4: Constant Restricted with No Trend

Dependent Variable: Δ LNIGDP _t				
Variables	Coefficients	Std. Errors	TSTAT.	Prob.
Δ LNIGDP _{t-1}	-0.06609286509699	0.10765952917075	-0.61390631749985	0.54912342042994
Δ LNIGDP _{t-2}	-1.08482355531489	0.16276936304275	-6.66478958346726	0.00001070040052***
Δ LNIGDP _{t-3}	-0.65753899252924	0.16084267646881	-4.08808785681186	0.00110760829876***
Δ LNEXPEU	-0.11858474213372	0.02504269930760	-4.73530192081691	0.00031917777122***
Δ LNEXPEU _{t-1}	0.17308486016813	0.03309728113593	5.22957941642599	0.00012750706807***
Δ LNEXPEU _{t-2}	0.12760820693904	0.03079862935953	4.14330798456641	0.00099445233994***
Δ LNEXPEU _{t-3}	0.07208514589966	0.01905545456044	3.78291400349461	0.00201776307702***
Δ LNIMPEU	0.11743089568502	0.03484260879346	3.37032443182249	0.00457516886438***
Δ LNIMPEU _{t-1}	-0.12928881750622	0.04968803749488	-2.60201094719290	0.02089538811068**
Δ LNIP	0.23373901454594	0.05546691652457	4.21402575069026	0.00086659562615***
Δ LNIP _{t-1}	0.01432119481578	0.06839863284292	0.20937837820055	0.83716898547742
Δ LNIP _{t-2}	0.21145861083050	0.06725349819822	3.14420240575835	0.00717383272934***
Δ LNIP _{t-3}	0.25129344182150	0.06466959756966	3.88580494181733	0.00164714766767***
Δ LNIP _{t-4}	0.17496471076952	0.07111624904809	2.46026348565156	0.02749526882367**
Δ LNIGCF	0.15384186337980	0.02515545081723	6.11564724073424	0.00002670369877***
Δ LNIGCF _{t-1}	-0.11419618532092	0.02246369179701	-5.08358939184397	0.00016665841393***
Δ LNIGCF _{t-2}	-0.12164115193486	0.02856077669489	-4.25902815019165	0.00079412025198***
Δ LNIGCF _{t-3}	-0.20022733264838	0.03085930438775	-6.48839423379461	0.00001428945271***
Δ LNIGCF _{t-4}	-0.05541355401706	0.02850110761923	-1.94425966728625	0.07223817784621*
Δ LNFDI	0.00411635179734	0.00261585172059	1.57361816992068	0.13789707375179
Δ LNFDI _{t-1}	-0.00871205126505	0.00273536142358	-3.18497262919760	0.00661530850348***
SYN ₂₀₀₉	-0.06346759648844	0.01234444225313	-5.14139036717742	0.00014984396549***
ECT _{t-1}	-0.73018451653664	0.09035645956502	-8.08115457435777	0.00000121740807***

AFTER AGREEMENT MODEL: ADL (1, 5, 5, 3, 2, 5)

Case 2: Constant Unrestricted with Trend Restricted

Dependent Variable: $\Delta \text{LN}GDP_t$				
Variables	Coefficients	Std. Errors	T_{STAT.}	Prob.
C	2.75861340745543	0.35591797544801	7.75069987398942	0.00000315704121***
$\Delta \text{LNEXPEU}$	-0.08694428627521	0.03031391462634	-2.86813126403849	0.01319031286353***
$\Delta \text{LNEXPEU}_{t-1}$	0.20934205983360	0.03165622236709	6.61298298344181	0.00001681302582***
$\Delta \text{LNEXPEU}_{t-2}$	0.08201430078690	0.03452595831650	2.37543879405344	0.03359298858808**
$\Delta \text{LNEXPEU}_{t-3}$	0.05072059042056	0.02781429901217	1.82354372469968	0.09128789354236*
$\Delta \text{LNEXPEU}_{t-4}$	0.06617752715258	0.02931545856584	2.25742766410936	0.04182960599998**
$\Delta \text{LNIMPEU}$	0.28413483424133	0.02864035762173	9.92078513802402	0.00000019730181***
$\Delta \text{LNIMPEU}_{t-1}$	0.37348787613736	0.06271172734316	5.95563050103225	0.00004779855431***
$\Delta \text{LNIMPEU}_{t-2}$	0.43749005730749	0.05933398291036	7.37334720927874	0.00000539806537***
$\Delta \text{LNIMPEU}_{t-3}$	0.21217600950578	0.03656707189029	5.80237898572600	0.00006150952268***
$\Delta \text{LNIMPEU}_{t-4}$	0.15197279603853	0.03615927584670	4.20287166930093	0.00103401203912***
ΔLNIP	0.07269044046156	0.07353348689839	0.98853520385891	0.34093349694986
ΔLNIP_{t-1}	-0.68655869276780	0.11014992864648	-6.23294723114420	0.00003053721353***
ΔLNIP_{t-2}	-0.36599851348173	0.07051782017924	-5.19015636829711	0.00017404726853***
ΔLNGCF	0.05016811730176	0.00955362914985	5.25121045781160	0.00015653404638***
$\Delta \text{LNGCF}_{t-1}$	-0.03387468194207	0.01657062642845	-2.04426079414306	0.06173198396601*
ΔFDI	0.00000152531991	0.00000193062112	0.79006693193151	0.44366220548131
ΔFDI_{t-1}	0.00009464848325	0.00001147040054	8.25154125333324	0.00000159074411***
ΔFDI_{t-2}	0.00007499903599	0.00001044309761	7.18168485904553	0.00000713722501***
ΔFDI_{t-3}	0.00004044100193	0.00000722957651	5.59382722670270	0.00008715268802***
ΔFDI_{t-4}	0.00001574471381	0.00000362597985	4.34219561062766	0.00079842806632***
SYN_{2014}	-0.03100270588239	0.00857031707670	-3.61745144373553	0.00312579661823***
SYN_{2020}	0.05943011296987	0.01015395729287	5.85290160828234	0.00005658181843***
ECT_{t-1}	-0.74217484175788	0.09582666618070	-7.74497195131862	0.00000318243530***

Note: *, ** and *** denote significant at 10%, 5% and 1% respectively.

Table A-4. Detecting Cointegration through Bounds Test

BEFORE AGREEMENT MODEL: ADL (4, 4, 2, 5, 5, 2)

Case 4: Constant Restricted with No Trend

Nil Hypothesis: *There is no level relationship betwixt variables*

Test Statistic	Value	Significance	Lower Bound	Upper Bound
F_{STAT.}	6.530505925	10%	2.276	3.297
		5%	2.694	3.829
		1%	3.674	5.019

Size of actual sample: 43 | Number of regressors lagged: 5

AFTER AGREEMENT MODEL: ADL (1, 5, 5, 3, 2, 5)

Case 2: Constant Unrestricted with Trend Restricted

Nil Hypothesis: *There is no level relationship betwixt variables*

Test Statistic	Value	Significance	Lower Bound	Upper Bound
F_{STAT.}	5.863155466	10%	2.750	3.739
		5%	3.211	4.309
		1%	4.251	5.596

Size of actual sample: 43 | Number of regressors lagged: 5

Table A-5. Level Form: Long Run Equations

BEFORE AGREEMENT MODEL

Case 4: Constant Restricted with No Trend

Dependent Variable:

LNGDP_t

Variables	Coefficients	Std. Errors	T _{STAT.}	Prob.
C _t	3.85111313779089	0.26961753985099	14.28361500486680	0.0000000097072 ^{**}
LNEXPEU _t	-0.30947114273536	0.05675141730374	-5.45309980681278	0.00008508678148 ^{***}
LNIMPEU _t	0.09093968575828	0.05988338879527	1.51861288393652	0.15111593259997
LNIP _t	0.66401387158537	0.07003755635011	9.48082580531624	0.00000018005845 ^{***}
LNGCF _t	0.21803069090844	0.03812145617712	5.71936942532869	0.00005301938680 ^{***}
LNFDI _t	0.02932691987199	0.00901648205052	3.25259005759391	0.00578282816575 ^{***}

JB_{prob.} = 0.893194 | **BG_x²** = 0.0000^(*) | **BPG_x²** = 0.4835 | **RR_{Fprob.}** = 0.4487

AFTER AGREEMENT MODEL

Case 2: Constant Unrestricted with Trend Restricted

Dependent Variable:

LNGDP_t

Variables	Coefficients	Std. Errors	T _{STAT.}	Prob.
Trend _t	0.01018895185525	0.00110243482076	9.24222608303163	0.00000044534763 ^{***}
LNEXPEU _t	-0.36006400334301	0.04171269762364	-8.63199993900623	0.00000096344318 ^{***}
LNIMPEU _t	-0.26893677464162	0.11001621669847	-2.44451938734373	0.02951532852488 ^{**}
LNIP _t	1.13333950873715	0.07923584943244	14.30336794336390	0.00000000247859 ^{***}
LNGCF _t	0.17313804416568	0.03432880550951	5.04352078657994	0.00022500109951 ^{***}
LNFDI _t	-0.00012606134015	0.00001975536826	-6.38111820884857	0.00002414105251 ^{***}

JB_{prob.} = 0.453572 | **BG_x²** = 0.0000^(*) | **BPG_x²** = 0.7010 | **RR_{Fprob.}** = 0.7420

Notes: ** and *** denote significant at 5% and 1% respectively. “**JB_{prob.}**”: Jarque & Bera normal distribution probability. “**BG_x²**”: Breusch & Godfrey serial correlation LM test ChiSquare probability. “**BPG_x²**”: Breusch & Pagan & Godfrey heteroskedasticity ChiSquare probability. “**RR_{Fprob.}**”: Ramsey Regression Equation Specification Error Test (RESET). (*) denotes that heteroskedasticity and autocorrelation consistent Newey-West estimator is carried out due to the presence of serial correlation in error terms.

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