KOMMERSKOLLEGIUM
NATIONAL BOARD OF TRADE SWEDEN

ANALYSIS

Trade Effects of the EU-Ukraine Deep and Comprehensive Free Trade Agreement

2024

Summary

This report evaluates the impact of the EU-Ukraine Deep and Comprehensive Free Trade Agreement on trade. The analysis shows that the agreement has had a substantial positive impact on trade between Ukraine and the EU. The agreement was initialled in 2012, signed in 2014, was provisionally applied from 1 January 2016 and came into full effect on 1 September 2017. The analysis suggests that the impact of the agreement started at the point it was initialled in 2012. The observation that trade effects are seen a few years before the implementation of a free trade agreement is called 'the anticipation effect', which is a known phenomenon.

Looking at the numbers, we find that five years after the agreement was initialled, the estimated impact on trade is 71 per cent, and after ten years (in 2021), the estimated trade effect is 130 per cent. We are aware that the annexation of the Crimea and the subsequent worsening of Ukraine–Russia relations can inflate the trade effect of the agreement. As a final remark, we note that lessons from countries such as Sweden and Finland, which transitioned from a free trade agreement with the EU to become member of the EU, suggest that further economic integration could potentially be important for the Ukrainian economy to recover from the current armed conflict with Russia.

Table of contents

1   Introduction

This report explores the economic implications of the EU-Ukraine Deep and Comprehensive Free Trade Agreement (FTA). The ongoing conflict between Ukraine and Russia underscores the critical importance of assessing the potential benefits that economic integration can offer to Ukraine. Such analysis is not only pertinent in the current context but is essential for planning Ukraine's long-term economic recovery post-conflict. To this end, the examination employs the latest advancements in econometrics, specifically leveraging recent developments in difference-in-difference regression techniques. This approach enables a robust evaluation of the DCFTA's impact. The methodological updates also make the current report a useful complement to previous reports the National Board of Trade carried out to evaluate the EU-Ukraine DCFTA.

The findings provide significant insights into the dynamics of trade between the EU and Ukraine under the FTA. Notably, the impact of the FTA on trade volumes is pronounced and manifests earlier than the actual implementation of tariff reductions. The impact of the agreement is gradual and is visible from the date an advanced draft of the agreement was initialled in 2012. This early impact suggests that firms are adjusting their strategies in anticipation of future benefits, reflecting a proactive shift in behaviour in response to the impending changes in the trade landscape. In terms of magnitude, trade between Ukraine and the EU between 2011 and 2021 increased approximately 130 per cent more than for similar country pairs.

Results should, however, be interpreted with caution. Trade between Ukraine and Russia declined rapidly following Russia's annexation of Crimea, potentially incentivising Ukrainian firms to strengthen ties with European trading partners. This shift may have contributed to the observed treatment effect of the trade agreement.

Still, the significant impact of the DCFTA also begs the question if further single market integration leading to full EU membership could provide additional benefits to the Ukrainian economy. Previous analyses conducted by the National Board of Trade showed, for instance, that both Sweden's and Finland's transition from EFTA membership to full EU membership had a significant positive impact on trade and general economic integration. Therefore, the same may apply to Ukraine. Despite the FTA, there are additional gains to be made from full membership, such as the full benefits of the four freedoms. Full EU membership would remove controls related to rules of origin and would allow Ukraine to fully participate in the Single Market, promoting deeper economic integration and removing remaining trade barriers. This comprehensive integration could significantly benefit the Ukrainian economy, offering potential advantages beyond trade by stimulating investment, enhancing regulatory alignment, and improving labour mobility.

This report adds to a growing body of work by the National Board of Trade to evaluate various free trade agreements (see, e.g. Altenberg, 2018; Kasteng & Tingvall, 2019). Apart from an earlier report from the National Board of Trade, there are surprisingly few studies evaluating the impact of the EU-Ukraine DCFTA on trade

flows. Moreover, a common denominator for many analyses of various FTAs is a general inability to find a good reference group of countries to evaluate trade agreements. For instance, if the UK-Australia FTA is evaluated by comparing it to trade between Nigeria and Kenya as a benchmark, one quickly realizes that results may be driven by differences in trends between UK-Australia and Nigeria-Kenya rather than the agreement itself. This report aims to thoroughly account for this issue by implementing a rigorous matching procedure to find country-pairs that are similar to those that were affected by the EU-Ukraine DCFTA. Hence, this report fills an important gap in our understanding of the impact of this agreement and uses state-of-the-art econometric methods.

2   Background and timeline

The Association Agreement between the European Union and Ukraine was concluded within the framework of the Eastern Partnership in 2014 and signifies a clear economic rapprochement between the two parties. The Association Agreement includes the comprehensive free trade agreement (DCFTA), which removes tariffs and brings Ukraine's technical regulations, sanitary and phytosanitary measures, and food safety measures in line with EU rules. The agreement also made it possible for Ukrainian citizens to travel to the EU without a visa. The agreement came into force gradually as the individual EU countries ratified the agreement. The Netherlands was the last country to approve the agreement on 30 May 2017.

It is important to note decisive milestones running up to the signing of any trade agreement, as firms not only act on the lowering of tariffs, but also on the information that an agreement is likely to be signed in the near future. Hence, the impact of a trade agreement can start to materialise before it is signed or fully enacted.

2008 Negotiations for the Association Agreement, which includes the DCFTA, officially started in February 2008.

2012 In July 2012, the EU and Ukraine initialled the Association Agreement, signalling the preliminary approval of the text by negotiators. However, the signature and ratification process were delayed due to political issues within Ukraine, including concerns over democratic principles and the rule of law. One major concern at the time was the imprisonment of former Prime Minister Yulia Tymoshenko. Despite initialling the agreement, the EU and Ukraine did not sign the agreement as planned, due to ongoing political concerns and pressure from Russia.

2013 In November 2013, the Ukrainian government suddenly suspended the signing of the agreement, which triggered the Euromaidan protests. In the wake of these protests and the subsequent change in Ukrainian government, the political provisions of the Association Agreement were signed. This was a crucial step, signalling the EU's support for the new Ukrainian administration and its European aspirations.

2014 On 27 June 2014, the actual DCFTA was signed. In September the same year parts of the Association were signed.

2016 The agreement started to be provisionally applied, and in January 2016 the DCFTA provisionally came into full effect. This provisional application meant that most of the agreement's terms were applied pending ratification by all EU member states.

2017 On 1 September 2017, the EU-Ukraine Association Agreement, including the DCFTA, came into full effect after the completion of the ratification process by all EU member states and Ukraine.

3   Method

To empirically evaluate the effect of the Association Agreement on trade, the so-called gravity model is used. The gravity model is an empirical standard model for studying all forms of changes that affect bilateral trade flows.[1] In the analysis, all bilateral trade flows with Ukraine and all EU countries are compared with trade flows between similar country pairs in a difference-in-difference regression framework.

In a difference-in-difference regression, all exporter-importer pairs that can be formed between Ukraine and the EU can be described as a treatment group that is affected by the Association Agreement. An example of a treated exporter-importer pair is Ukraine-Sweden. Note that trade between Sweden and Ukraine is recorded as two distinct exporter-importer pairs: Ukraine-Sweden, which captures all export from Ukraine to Sweden, and Sweden-Ukraine, which captures all export from Sweden to Ukraine. All exporter-importer flows in the world not affected by the Association Agreement are designated as untreated, such as Sweden-France or Germany-Mexico.

To evaluate the effect of the agreement in a difference-in-difference regression, treated exporter-importer pairs need to be compared to a control group of untreated exporter-importer pairs that are similar to the treatment group. For instance, trade between Zambia and Tanzania may be a poor comparison to trade between the EU and Ukraine. The underlying assumption of a difference-in-difference regression is that trade among treated exporter-importer pairs should have followed the same trends as trade among the exporter-importer pairs in the control group if the policy was never implemented. This is a key contribution of this report.

To obtain a control group that is similar to the treatment group, exporter-importer pairs are matched to untreated pairs based on country characteristics. Hence, the matched control group is a subset of the pool of untreated exporter-importer pairs. Coarsened Exact Matching (CEM), introduced by Iacus et al. (2012), is used to match treated exporter-importer pairs to suitable controls. CEM matches treated subjects to controls by coarsening a set of matching variables. Based on the coarsened matching variables, all subjects are assigned to a certain stratum. Only subjects that belong to a stratum with at least one treated subject and control subject are considered matched.

The process can be illustrated by the following example. In a medical study, where perfect randomisation is not possible, the outcome of a treatment may be dependent on blood type, age, and nicotine consumption. To evaluate the treatment effect, the subjects in the treatment and control group need to be similar in these aspects. Consequently, the coarsened matching variables may be specified to capture whether the patient has a rare blood type or not, is above or below 50 years of age, and if the patient is a smoker or non-smoker. In this context, a stratum is a type where all coarsened matching variables overlap. For instance, a person who has a rare blood type, is below 50 years of age, and does not smoke constitutes one stratum. Since there

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[1]   See Yotov et al. (2016) for an overview of the gravity literature.

are three binary matching variables, there are six possible strata. Strata that only contain treated or control subjects will be dropped from the sample.

The matching variables can be coarsened at a finer level. For instance, a matching variable might specify all blood types or age groups defined by ten-year intervals. The benefit of having matching variables that are less coarse is that the treatment group is more similar to the control group. However, it usually comes at the cost of having fewer matched treated and control subjects. After matching, the difference-in-difference gravity equation uses all matched observations. As the number of matched controls differs by treated subject, the regression needs to be weighted by the size of each stratum.

The gravity literature provides good guidance on observables that influence trade flows. Treated exporter-importer pairs are matched to untreated pairs based on observables from 2011, before the agreement was initialled in March of 2012. Treated pairs are matched based on exporter and importer GDP, GDP per capita, and a set of dummy variables that indicate if the exporter-importer pair share a common language, a border, and have a colonial relationship. The GDP variable is coarsened into three quantiles. Hence, the GDP of the exporter and importer will be identified as small, medium sized, or large. The GDP per capita variable is coarsened by dividing all exporters and importers into four quantiles. Thus, each exporter and importer will be deemed as a poor, lower middle income, higher middle income, or high-income country. The binary variables do not need any further coarsening.

The matched sample is then used to estimate a dynamic difference-in-difference gravity regression. This means that the average trade flows among the treated exporter-importer pairs are compared to the matched control exporter-importer pairs in a reference year before the policy is implemented to other years before and after the policy is implemented. Essentially the analysis estimates if trade among the treated group has increased more or less than among the control group compared to the reference year. The reference year is set to 2011, which is the year before it was revealed that the agreement would soon be finalised. This makes it possible to estimate the treatment effect of the free trade agreement for each year before and after it was implemented. If one wishes to estimate the treatment effect in year 2015, one simply needs to calculate the difference in average trade among the treated and control countries in 2015 as $treated_{2015} - Control_{2015}$ and in the reference year, $treated_{2011} - Control_{2011}$. The treatment effect is simply the percentage change in difference between 2011 and 2015:

$$\frac{treated_{2015} - control_{2015}}{treated_{2011} - control_{2011}} - 1$$

If the difference has increased, it means that average trade has grown faster in the treated group compared to the control group, which leads to the conclusion that the Ukraine-EU trade agreement had a positive impact on trade.

We can also assess the treatment effect before treatment occurred by comparing the reference year to a year prior to 2011, such as 2009:

$$\frac{treated_{2009} - control_{2009}}{treated_{2011} - control_{2011}} - 1$$

As the study relies on the assumption of parallel trends between the treatment and control group, we would expect that the difference in average trade would be constant over time before treatment occurred. Thus, we expect that:

$$\frac{treated_{2009} - control_{2009}}{treated_{2011} - control_{2011}} - 1 = 0$$

If we see that the average trade difference before 2011 is constant, it is an indication that the parallel trend assumption is reasonable.

The impact of the EU-Ukraine free trade agreement is estimated using the following dynamic difference-in-difference gravity regression:

$$\ln export_{ijt} = \alpha + \sum_{t=2000}^{2010} \beta_t\, treated_{ij} \times \mu_t + \sum_{t=2012}^{2021} \beta_t\, treated_{ij} \times \mu_t$$
$$+ \delta_{it} + \gamma_{jt} + \omega_{ij} + \varepsilon_{ijt}$$

where $\ln export_{ijt}$ denotes the log value of exports from country i to country j in year t, $treated_{ij}$ is a dummy variable that takes the value 1 if the exporter-importer pair ij were affected by the EU-Ukraine agreement; δ_{it} and γ_{jt} capture exporter-time and importer-time fixed effects, respectively; ω_{ij} captures exporter-importer fixed effects; α is the regression intercept; and ε_{ijt} is the error term. The fixed effects of the regression controls for aspects crucial to the gravity model of trade, including exporter and importer GDP, trade costs between the exporter and importer, and multilateral trade resistance. Multilateral trade resistance is a theoretical concept that captures the general accessibility of a country from the rest of the world.

The impact of the EU-Ukraine free trade agreement is captured by β_t. It essentially captures how much more trade grew compared to the reference year 2011 among country-pairs that were affected by the free trade agreement, compared to matched country pairs that were not affected.

Finally, due to the matching procedure, the regression needs to be weighted. The reason for this is that it may be more difficult to find many control exporter-importer pairs for certain treated exporter-importer pairs and easier in other cases. In cases where there is a vast amount of control exporter-importer pairs that are matched to a single treated exporter-importer unit, these controls should receive less weight compared to cases where there are only one or a few controls that are matched to a treated pair.[2] In line with the gravity literature, the regression is estimated using a Poisson Pseudo Maximum Likelihood estimator.

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[2]   It should be noted that alternative matching strategies exists, such as Synthetic Control Matching (see Abadie et al., 2010), and Propensity Score Matching (see King & Nielsen, 2019). However, Synthetic Control Matching is difficult to combine theoretically as it is founded in gravity estimation, and King and Nielsen (2019) question the efficacy of Propensity Score Matching.

4   Results

The results of the analysis show that the effect of the agreement seems to start to materialise after 2012 (see Figure 1). Note that in 2012, the agreement only had preliminary approval. The agreement was signed in 2014, provisionally applied in 2016, and ratified in 2017. The dynamics of the trade flows suggest that that 2012 can be used as a reference year. Moreover, the observation that trade starts to increase before the completion of the agreement provides evidence of an anticipation effect, where trade costs are expected to be lower in the near future. This so-called anticipation effect is not unique to this agreement but is often seen in the analysis of free trade agreements (Kommerskollegium, 2019). Following the dynamics of trade flows, we also do not see a negative effect after negotiations were suspended in November of 2013. The reason for this is that negotiations resumed quickly after Viktor Yanukovych left office in February of 2014.

The impact of the agreement seems to have come into effect gradually after it was signed in 2014, well before it started to come into effect in 2016. It is too early to tell if the effect is levelling out. The treatment coefficient in 2021 was 0.83 which translates into a treatment effect of 130 per cent. This means that trade between Ukraine and the EU increased more than twice as much as trade between similar country-pairs that were not affected by the trade agreement. This also means that trade increased by 59 per cent from 2017–2021, suggesting that trade will continue to increase in the years after the completion of the agreement. This is also in line with the existing literature on trade and FTAs where it has been observed, in many cases, that it takes ten years or more for the impact of a free trade agreement to fully mature.

It is also reassuring that the treatment and control group seem to be on similar trends prior to 2012. Results are also robust for a wide variety of alternative specifications carried out in Section 6 of this report. The cumulative effect of the agreement over time is presented in Table 1 and depicted in Figure 1.

Table 1. Percentage impact on trade

After 1 year	+11 %
After 2 years	+20 %
After 5 years	+71 %
After 10 years	+130 %

Note: This Figure captures the cumulative impact of the EU-Ukraine DCFTA on trade after 2011.

Results should, however, be interpreted with some caution. Trade between Ukraine and Russia declined rapidly after Russia's annexation of Crimea. This may have provided incentives for Ukrainian firms to seek closer ties with trading partners in Europe. This shift could have added to the observed treatment effect of the trade agreement.

However, while acknowledging the geopolitical shift following Russia's annexation of Crimea and its potential influence on Ukrainian trade patterns, it is imperative to highlight the substantial increase in trade between the European Union and Ukraine that directly corresponds with the implementation of the trade agreement. The observed treatment effect, showing a more than doubling in trade relative to similar country pairs, indicates a significant impact that is difficult to attribute solely to changes in Ukraine's trade relations with Russia. Thus, while the annexation of Crimea may have played a role in intensifying Ukraine's pivot towards European markets, the robust and significant data suggest that the trade agreement itself was a key driver in expanding trade relations between the EU and Ukraine.

Figure 1. Impact of the agreement on trade between the EU and Ukraine
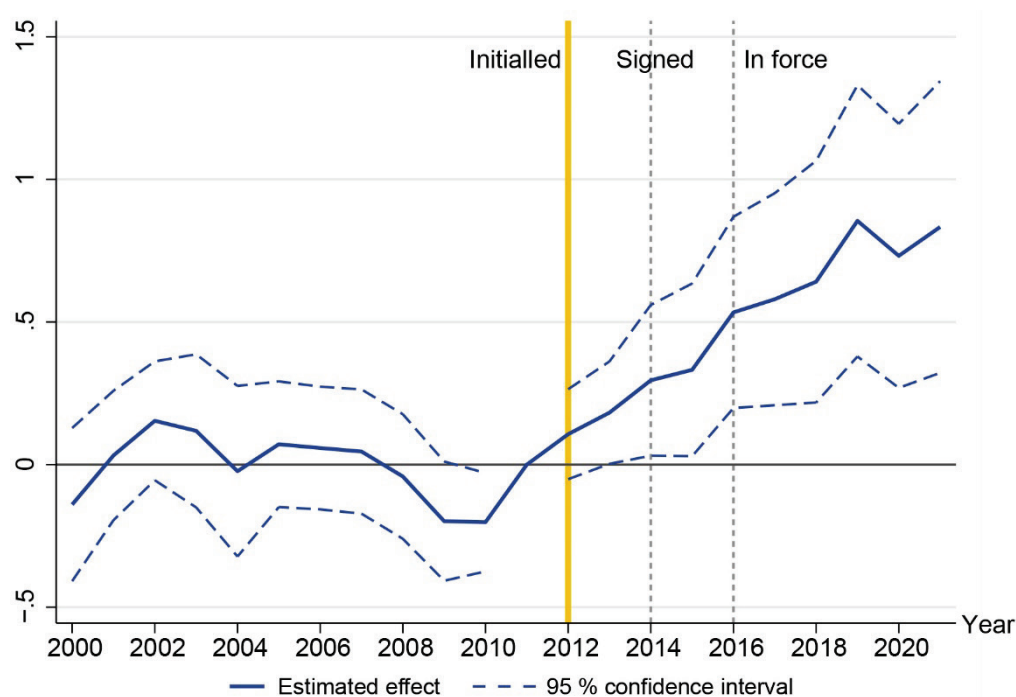
Note: This Figure captures the impact of the EU-Ukraine DCFTA using 2011 as the reference year. In 2012, an advanced draft of the agreement was first presented, and in 2014, the agreement was signed. The agreement gradually went into effect after that. The agreement was fully implemented in 2017.

5   Summary

This report evaluates the impact of the EU-Ukraine Deep and Comprehensive Free Trade Agreement (DCFTA) on trade. The analysis demonstrates that the agreement had a substantial positive effect on trade between Ukraine and the EU. The impact of the agreement starts to manifest at the point it was initialled in 2012, two years before it was signed and five years before it came into full effect in September 2017. This suggests that firms adjust their behaviour in anticipation of future tariff reductions. By 2021, trade between Ukraine and the EU had increased approximately 130 per cent more than for similar country-pairs over a ten-year period, highlighting the significant potential benefits of further economic integration.

The ongoing conflict between Ukraine and Russia underscores the critical importance of assessing the potential benefits that economic integration can offer Ukraine. Such analysis is not only pertinent in the current context but also essential for planning Ukraine's long-term economic recovery post-conflict. To this end, the report employs the latest advancements in econometric methodology, specifically, recent developments in difference-in-difference regression techniques. This approach allows for a robust evaluation of the DCFTA's impact and provides a useful complement to previous reports the National Board of Trade has performed to evaluate the EU-Ukraine DCFTA.

The findings reveal significant insights into the dynamics of trade between the EU and Ukraine under the agreement. Notably, the impact on trade volumes is pronounced and manifests earlier than the actual implementation of tariff reductions. The gradual impact of the agreement is visible starting from the date an advanced draft was initialled in 2012. This early response suggests that firms proactively adjust their strategies in anticipation of future benefits, reflecting a shift in behaviour in response to impending changes in the trade landscape.

The significant impact of the DCFTA also raises the question of whether further integration, such as full EU membership, could provide additional benefits to the Ukrainian economy. Previous analyses by the National Board of Trade have shown that both Sweden's and Finland's transition from EFTA membership to full EU membership had a significant positive impact on trade and economic integration. While the EU-Ukraine DCFTA already contains some single market commitments that Sweden and Finland only took on when they became members, additional gains can be expected from full membership. Full EU membership would remove rules of origin controls and allow Ukraine to participate fully in the Single Market, promoting deeper economic integration and removing remaining trade barriers. This comprehensive integration could significantly benefit the Ukrainian economy, offering potential advantages beyond trade by stimulating investment, enhancing regulatory alignment, and improving labour mobility.

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Appendix

To show the importance of matching, Figure 2 presents the estimated impact of the EU-Ukraine DCFTA without matching. In this specification, the control group is made up of all country-pairs in the world that were not affected by the agreement. The most notable difference to the main results is that the estimated magnitude of the impact is much smaller without matching. Hence, when the control and treatment group are allowed to differ in many key respects, the impact of the agreement is underestimated. This highlights the importance of finding a suitable control group when evaluating any form of trade policy.

**Figure 2. Impact of agreement without matching**
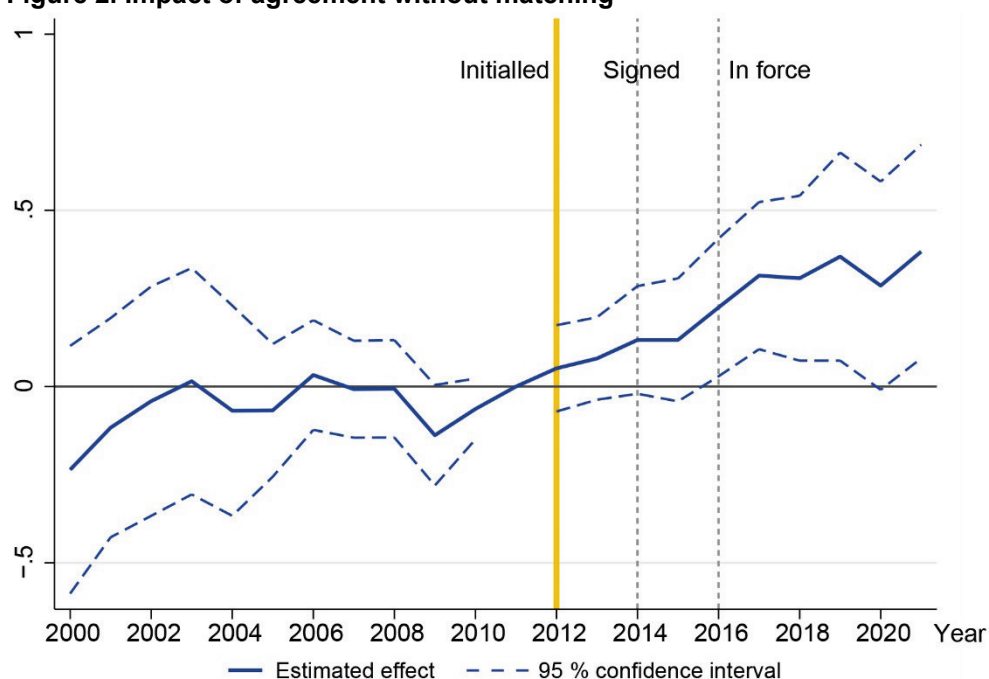
It is important to note that no single matching procedure is the only correct procedure. Hence, reliable results should be consistent when the matching procedure is carried out in slightly different ways. Subsequent figures show the estimated impact of the EU-Ukraine DCFTA when matching is carried out in alternative ways.

Figure 3 shows results when treated country-pairs are matched more closely to controls on the basis of income per capita. One could argue that four income groups is too few for matching and that it makes the treatment and control group too different in terms of economic development. Below, results are presented when the main matching procedure is the same as in the main analysis, but where the number of income groups is increased from four to six. It is reassuring to see that the results do not change significantly when doing this.

Figure 3. Impact with more exact matching on income

**Figure 4. Impact when matching on values from 2007**
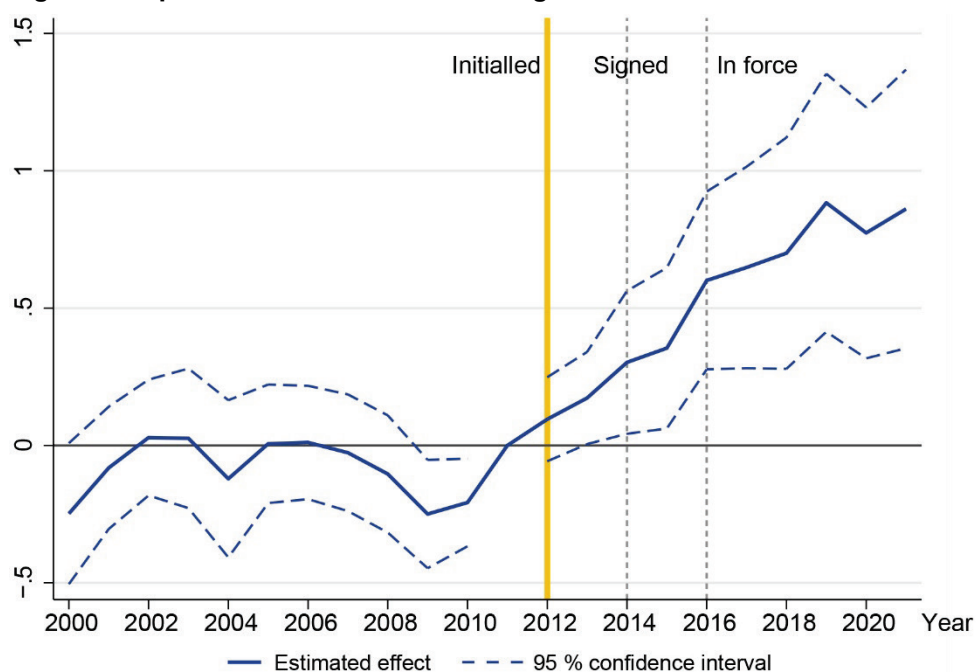
Another concern is that the main results are matched on variables from 2011. A different matching year could yield different results. Figure 4 shows results when instead matching on values from 2007. These results are similar to the main results.
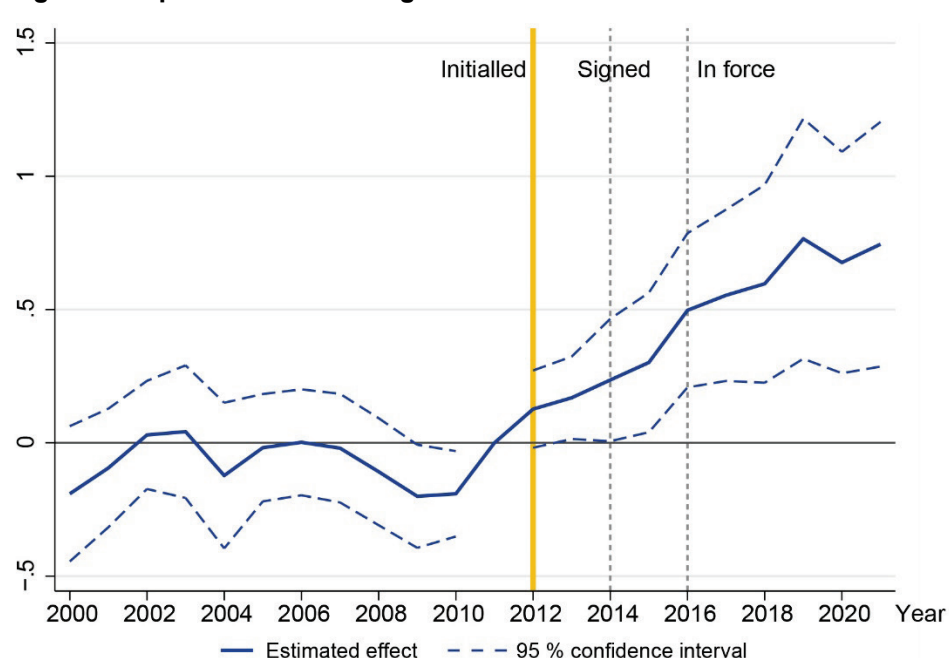
In Figure 5, results are presented when also matching on the distance between countries. It can be argued that the distance between countries could affect what they trade. Hence, close and long-distance trading partners may be on different trends. No treated country-pair has a bilateral distance of more than 5,000 kilometres. Hence, under this procedure, all control country-pairs that have a bilateral distance of over

5,000 kilometres are dropped. As can be seen, matching on distance does fundamentally alter the results.

Figure 5. Impact when adding distance as matching variable
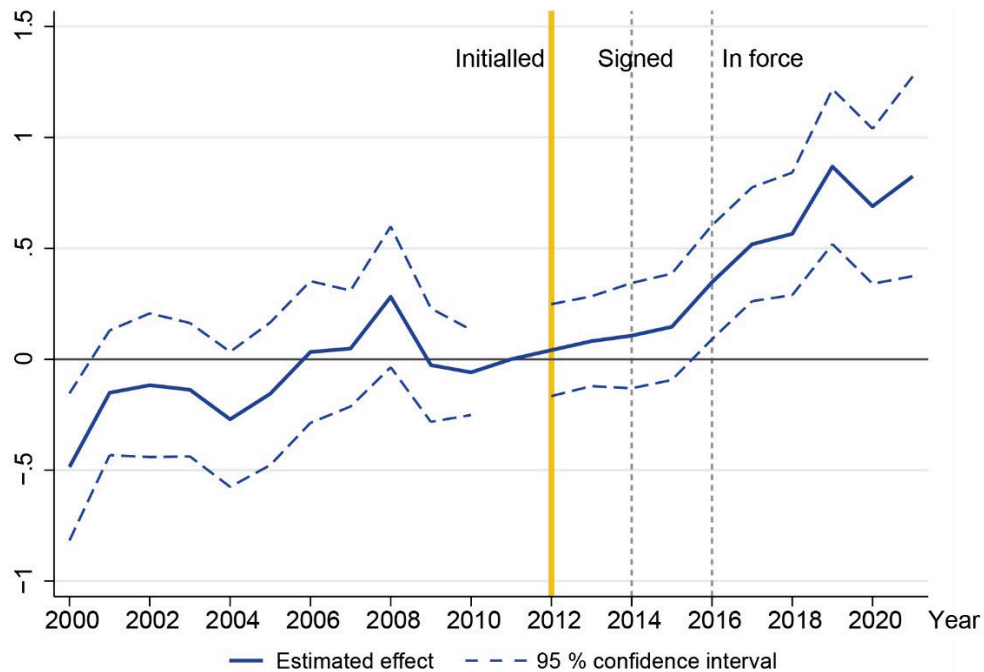
Finally, in Figure 6, the control group is extended by reducing the matching variables to only GDP and GDP per capita. Doing this does not significantly alter the results.

Figure 6. Impact when only matching GDP and GDP per capita
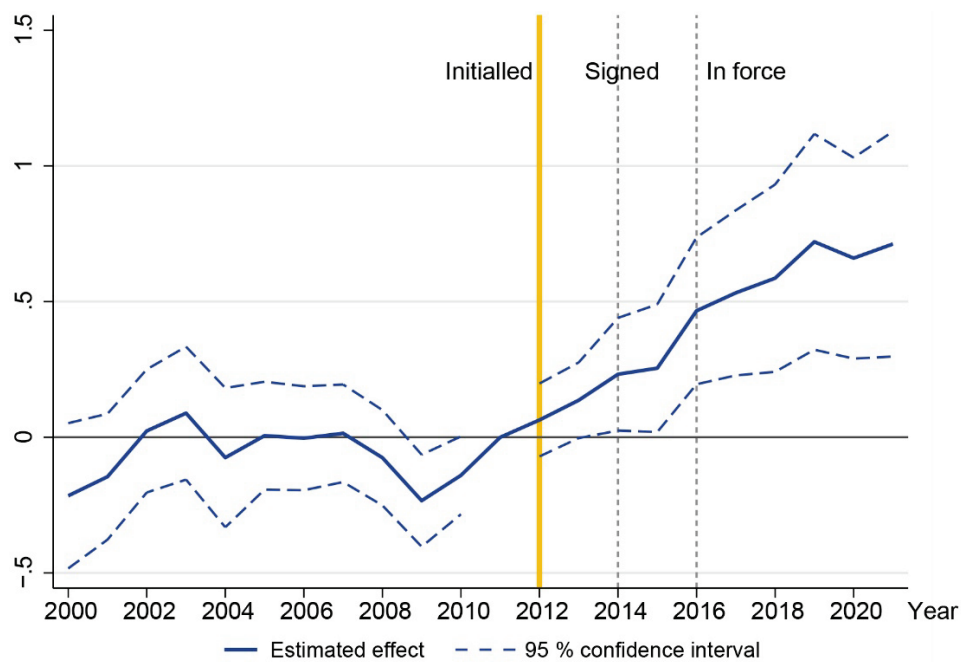
In summary, the main findings remain consistent across various alternative matching procedures, affirming their validity and demonstrating that they are not merely the result of a specific matching algorithm.

Sammanfattning
Summary in Swedish

Denna rapport utvärderar effekterna av det djupgående frihandelsavtalet mellan EU och Ukraina. Analysen visar att avtalet hade en betydande positiv påverkan på handeln mellan Ukraina och EU. Dessutom börjar avtalets effekter visa sig vid den tidpunkt då det paraferades 2012, två år innan det undertecknades och fem år innan att det trädde i full kraft i september 2017. Detta tyder på att företag verkar anpassa sitt beteende i väntan på framtida tullsänkningar.

År 2021 hade handeln mellan Ukraina och EU ökat med ungefär 130 procent mer än för liknande länderpar under en tioårsperiod. Vi är medvetna om att annekteringen av Krim och den efterföljande försämringen av Ukrainas relationer med Ryssland kan medföra att den effekten av avtalets handelspåverkan överskattas. Som en slutlig anmärkning noterar vi att lärdomar från länder som Sverige och Finland, som övergick från ett frihandelsavtal med EU till att bli fullvärdiga medlemmar i EU, tyder på att ytterligare ekonomisk integration potentiellt kan vara viktig för den ukrainska ekonomin och dess möjlighet att återhämta sig från den nuvarande väpnade konflikten med Ryssland.

The National Board of Trade Sweden is the government agency for international trade, the EU internal market and trade policy. Our mission is to facilitate free and open trade with transparent rules as well as free movement in the EU internal market.

Our goal is a well-functioning internal market, an external EU trade policy based on free trade and an open and strong multilateral trading system.

We provide the Swedish Government with analyses, reports and policy recommendations. We also participate in international meetings and negotiations.

The National Board of Trade, via SOLVIT, helps businesses and citizens encountering obstacles to free movement. We also host several networks with business organisations and authorities which aim to facilitate trade.

As an expert agency in trade policy issues, we also provide assistance to developing countries through trade-related development cooperation. One example is Open Trade Gate Sweden, a one-stop information centre assisting exporters from developing countries in their trade with Sweden and the EU.

Our analyses and reports aim to increase the knowledge on the importance of trade for the international economy and for the global sustainable development. Publications issued by the National Board of Trade only reflect the views of the Board.