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Trade Patterns under conflict: A comparative study of "active traders" and "non active traders" throughout the Russia-Ukraine War.

(Thesis final version)

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Academic Year 2023-2024

Master in Economics – 60 credits

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Abstract :

Russia and Ukraine are significant exporters of agricultural commodities, along with the latter also specializing in mineral fuels. The literature has shown that trade patterns tend to change when wars break out. Taking that into account, the escalation of the Russia-Ukraine war threatened the global supply chain. In this research, I sought to see if countries who actively traded, or the "active traders", tended to experience a change in their import trends relative to the "non active traders", or those that do not relatively actively trade. I collected data from 32 countries for each supplier in the agricultural market, and 54 countries in the energy market, both over the time period of 2004-2023. I accounted for the first phase (2014-2021) and the second phase (2022+) of the war. Using a fixed effects model that treats the year as a continuous variable, I find in the agricultural market that with Ukraine as the supplier, when the war enters its second phase, active traders tend to experience a significant decline in trade by 82.44% relative to non-active traders while accounting for the previous period. Trade with Russia on the same market, unlike Ukraine, lacked statistical evidence to suggest that import patterns have changed for both groups. However, the energy market is a different story. Rather surprisingly, I find that active traders relative to non-active traders tended to experience a significant decline in trade of 94.81% when the war is at its first phase, whereas the deviation of the first phase, or the transition of the first to the second phase, is not statistically associated with a change of imports for active traders compared to the other group. Given the rise of oil prices that happened in the background, I was expecting a significant change in the active traders' imports compared to the non-active traders' imports. The relative change in imports of active traders from Ukraine could be explained by how countries adapted to the situation, by switching to different suppliers and to different commodities. However, alternate suppliers are not always guaranteed due to limited market share: this could explain why trade did not appear to change with Russia on the agricultural market. Changes in the energy market in the first phase of the war could be explained by a decline in oil prices, in which the latter happened due to changes in global demand and supply. As for the second phase, trade patterns appear not to change possibly due to how sanctioners that lowered their imports and non-sanctioners who increased their imports both belong to the active traders group. The effects could cancel out. Nevertheless, having sanctioners and non-sanctioners in the same group made the results harder to interpret, and so the research suggests that to capture a better and clearer understanding of the trade patterns in the energy market, it would be more optimal to split the groups based on whether a country imposed a sanction or not.

Keywords: Russia-Ukraine war, active traders, import trends, oil prices, different suppliers, different commodities, sanctions

Acknowledgments:

I would like to express my thanks to my supervisor Dr. Guilhem Cassan for his guidance and his valuable knowledge. With meetings filled with fruitful brainstorming, his patience and his mentorship played a critical role in helping me surpass my struggles in the research process.

I also would like to express my gratitude to Dr. Matthieu Crozet and Dr. Julian Hinz for providing me with the R and Stata codes they used to conduct their research on the effect of sanctions on sanctioning countries. While I did not use their codes at the end, their work served as an essential inspiration to establish the model of this paper.

I also would like to express my gratitude to my grandmother's cousin and my aunt, both of whom are researchers. Their valuable experience and insights made me carefully consider how to approach the research process, to which I would have a hard time imagining my path without them.

I also would like to thank a Reddit user I met online along the way for clarifying for me some aspects of the model. I appreciate the time they took to share their insights, especially considering that we have never met in person.

I also would like to thank a classmate of mine from my finance courses: while at the time my thesis was very different from what it is now, I appreciate his enthusiasm and the numerous ideas he gave me.

Finally, to my family back in my home country, to my other family in Belgium, and to my friends who have continuously supported me in this journey, thank you from the bottom of my heart. I dearly hold every help I received along the way. I'll never forget this journey as it helped me grow.

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1-Introduction:

1.1-Introduction of the topic and the main findings of the study

More than two years have passed since the Russia and Ukraine war escalated. Since the full-scale invasion on Ukraine, around 3.5 million of citizens are internally displaced, and those who left the country sit at almost double that number (Center for Preventive Action, 2024). Those who are in need of human assistance sit around 14.6 million (Center for Preventive Action, 2024). Consequences of the war have been felt throughout the world as well, but from the economic dimension. Ukraine is considered as a significant exporter for Europe in the agricultural market (Emediegwu, 2024). Due to the crisis, many nations who are dependent on Ukraine "face reduced imports to meet their food needs, as well as rising food import bills." (Emediegwu, 2024). Moreover, history would reveal that Europe not only engaged in trade with Ukraine, but also imported energy from Russia (McWilliams et al, 2022). In other words, both of the countries that are at war have a role in trade with Europe, as well as with the rest of the world. The European Union has been decreasing their imports from Russia and increasing their imports from other countries like Norway and the US (European Council, 2024). There can be no denying though that there was a real concern as to whether Europe could "survive painlessly" in the winter of 2022 if they decided to stop importing from Russia (McWilliams et al., 2022). This serves as an indicator of Russia's key role in the energy market (McWilliams et al., 2022). It does still play a role in that market, as it's redirecting its trade with Asia (Reuters, 2024).

This paper attempts to investigate how imports coming from Russia and Ukraine seem to change throughout the war. More specifically, the research investigates if "active traders", basically the biggest importers, tended to experience a change in their imports relative to those that import the least, or the "non active traders". I defined countries as "active traders" those who have their pre 2014 imports value bigger than the average of pre 2014 imports of several countries. Russia and Ukraine have different partners, therefore different "active traders". I used several databases throughout the research, some of which are for descriptive statistics and others for data analysis. Food and Agriculture Organization of the United Nations (FAO), and World Bank databases are used to extract production and GDP data of Russia and Ukraine. I use production data, GDP data, and export statistics from the ITC Trade Map to get a better understanding of these economies. As for the data analysis, I used data from ITC Trade Map, specifically to study the observed changes in imports of active traders relative to non-active traders throughout the war. I examined the agricultural and the energy markets. The main model is a panel regression with fixed effects while assuming year as a continuous variable. I estimate it 3 times: the first time to examine the association between the changes in imports from Ukraine and the war in the agricultural market. The second time is identical to the first except that the imports are from Russia. Finally, I estimated the model a third time to study the energy market, with Russia as the supplier. For each supplier in the agricultural market, I examined different imports of 32 different countries, among which half are the "active traders", and the other half the "non active traders". Import data in the agricultural market is at the 4-digit HS level. On the energy market, import data is at the 2-digit HS level. Since 2-digit HS level is more general than 4 HS, I used a bigger sample, with the number of countries reaching 52. Again, half are the "active traders", and the rest are the "non active traders". It could be simpler to just label them as the "treatment" and "control" group, respectively, but for this type of study no control group truly exists. While the investigation seems similar to a Difference in Difference (DiD) approach, classifying the model as a DiD could be problematic for reasons that will be explained

once the model is tackled in detail. See section 1.2 for reference. I find in this research that in the agricultural market where Ukraine is the supplier, active traders tend to experience a decline in trade by 82.44% relative to non-active traders while accounting for the previous period. From Russia's perspective, import patterns do not seem to change in the agricultural market. For the energy market, when the war enters its first phase, active traders relative to non-active traders tend to experience a significant decline in trade of 94.81%, but in the second phase the trade change is rather insignificant.

Although the research paper does not study the effects of sanctions, their role was inevitable when conducting the analysis. I find that to more accurately understand the changes in trade trends in the energy market, it is better to categorize the countries as "sanctioners" or "non sanctioners". Facts suggest that since the war escalated, Russia's trade with countries like China and Türkiye increased, while it became limited with countries imposing sanctions (Darvas et al., 2024). Moreover, Russia's total exports from 2021 to 2022 actually increased by 15.6% in value (WTO, 2023). The overall increase in exports is likely due to the increase in prices of commodities that Russia tends to export, such as fuels and cereals (WTO, 2023). At first glance, it seems that the relative change of active traders relative to non-active traders when moving to the second phase is inconsistent with the facts. The difference between them possibly has to do with sanctioners and non sanctioners being part of the same group of active traders in the energy dataset. Given that these changes were happening in one group, that is Russia exporting more to non sanctioners and exporting less to sanctioners, the overall trade between Russia and the active traders almost "did not change", which could explain why the deviation of active traders from non-active traders in the second phase while accounting for the first period is insignificant. Therefore, to clearly distinguish the changes in Russia's trend patterns, it is better to look at sanctioners and non sanctioners. Assigning the country based on whether they're an active trader or not in the energy market made it challenging to interpret the results. As a result, I could perhaps say I indirectly contributed to the literature of sanctions.

As for the agricultural market, studying the deviation of active traders from non-active traders can work, as opposed to the energy market. Back when the war escalated, Abay et al. (2022) recommended Egypt to diversify its wheat suppliers in order to meet its needs, as it tends to rely on Russia and Ukraine to get its wheat imports. Egypt eventually follows this approach (WTO, 2023). This approach appears to at least partly explain why trade for active traders relative to non-active traders seem to negatively change with Ukraine in the agricultural market. Moreover, Countries importing less from Ukraine were importing from different suppliers (WTO, 2023). Egypt as part of the active traders can be an example of that. While the thesis doesn't prove that a trade diversion happened as data from different suppliers was not collected, the report of the WTO (2023) seems to explain well what apparently happened between Ukraine and the trade partners of the dataset. Additionally, WTO (2023) further explains that depending on who has the market share, it can be difficult to find alternate suppliers. This may suggest why there was no statistical evidence for the trade changing in the agricultural market with Russia as the supplier. The research can serve as potential supportive evidence for the WTO (2023): the two appear to be consistent with one another. This is another type of contribution I believe. Additionally, I would consider accounting for the whole war period as a potential contribution, but I discuss it in more details towards the end of 1.2 under the introduction.

1.2-Motivation, literature review and its comparison with the thesis:

Inspecting the trade patterns of Russia and Ukraine could be important for several reasons. To start, their market share in the agricultural and energy market is rather significant.

Ukraine exports, along with Russia exports, represent "12% of total calories traded in the world" (Glauber & Laborde, 2022). Both states are considered to be among the biggest exporters of agricultural commodities. Examples include barley, wheat, sunflowers and maize (Glauber & Laborde, 2022). As for the energy market, Russia is classified as a worldwide leading exporter and producer of natural gas and oil (O'Neill, 2024). The IEA classifies Russia as "the world's second-largest producer of natural gas, behind the United States, and has the world's largest gas reserves." (IEA, nd). Additionally, the biggest gas exporter is Russia (IEA. nd). Although food and global fuel prices are not as high as they used to be back at their peak, they remain higher compared to their pre-war prices by roughly 12 to 13% (Emediegwu, 2024).

Secondly, the effects of the war have been felt on an international scale: Liadze et al. (2022) expected a decrease of 1% of the global GDP as a result of the escalation of the war, along with 1% decrease in Europe's GDP (Liadze et al., 2022). Moreover, the authors mention that supply chain problems were quite likely due to Russia and Ukraine significantly supplying commodities like corn and wheat, which are seen as essential (Liadze et al., 2022). One year later, Low & Millard (2023) compared the actual findings to the forecasts of Liadze et al. (2022). The global GDP growth for 2022 was around 2.9 per cent, which is higher than what was expected (World Bank, as cited in Low & Millard, 2023). Euro Area growth was at 3.5 per cent, which is lower than the forecast (Low & Millard, 2023). The point is, the invasion is severe enough to shake the world. That being said, there are other findings that show that some consequences weren't as catastrophic. This is not a contradiction because what follows is the trade dimension: The WTO (2023) shows that importers were able to substitute on a geographical scale, as well as across products. An example is imports from other sources replacing the imports that usually come from the countries that are at war. These sources include Argentina, the European Union and the United States (WTO, 2023). Apparently, "a flexible, open and rules-based multilateral trading system, supported by a restraint in the imposition of export restrictions by many commodity exporters, has been able to respond and adjust." (WTO, 2023). Additionally, while prices of certain commodities increased, their increase was below expectations: simulations from the World Trade Organization (WTO) revealed that wheat prices would increase by up to 85 per cent in some low-income regions (WTO, 2023). In reality, the real increase was 17 per cent (WTO, 2023).

Thirdly, trade tends to change depending on if there is a war or not. Polacheck (1980) tests microeconomic theory to check whether there is a relation between trade and conflict. It appears that countries involved in the least amount of conflict are those that engage in trade the most. The relationship could be robust (Polacheck, 1980). Glick & Taylor (2010) study how bilateral trade is affected by war, using data that goes back all the way to 1870 (p.102). The findings are that wars tend to have lasting impacts on global economic welfare, national income, and on trade (Glick & Taylor, 2010, p. 102). Their method is based on the gravity model (Glick & Taylor, 2010, p.102). While the case of Russia and Ukraine is not explored simply due to the absence of war back then, their work falls under the literature of the effects of war on trade. However, war having an effect on trade should not be interpreted as a universal law. Anderton & Carter (2001) highlights wars disrupting trade as an assumption. Via an "uninterrupted time series model", they test this assumption and find that a consequence of wars could well be a decline in trade (Anderton & Carter, 2001). Barbieri & Levy (1999), unlike Anderton & Carter (2001), use an "interrupted time series model" to study the topic, and estimate data since 1870 on seven dyads. Their findings are not in line with Anderton & Carter (2001). Conflict did not seem to significantly alter trade, and there were cases where trade seemed to increase after the start of a conflict (Barbieri & Levy, 1999). Chang et al. (2004) take a step further when studying the relation between trade and conflict by controlling for geographical distance. The control variable seems to reduce trade due to trading costs associated with the distance, and

consequently increase conflict. Where does the case of Russia and Ukraine fall in? What does the literature have to say about the variation of its imports?

It should be important to remember that the Russia-Ukraine war technically started on the 20th of February, 2014, which is more than 10 years ago at the time this paper is being written. Therefore, the literature of this war started around this time. Korovkin & Makarin (2021) analyze Ukrainian trade via a DiD, before and after the start of the 2014 war. Apparently, districts where fewer ethnic Russians lived in within Ukrainian firms traded less with Russia (Korovkin & Makarin, 2023). What is interesting in their findings is that even in areas that are relatively away from the conflict, a.k.a "noncombat areas", trade could still decrease (Korovkin & Makarin, 2023). While the thesis's main focus is on the deviation of active traders from non-active traders while accounting for the war, it would be interesting to see if non active traders, those who import the least, would tend to significantly experience less trade. The thesis differs from Korvokin & Makarin (2023) in two ways: first, the research accounts for the entire war period, and second the thesis focuses on the macroeconomic scale, and not the microeconomic scale. The lack of focus on the microeconomic scale might be a weakness to the research since micro level analysis can help us to understand how wars go: why they happen and what they can lead to (Blattman & Miguel, 2010).

Havlick (2014) examines the effects of sanctions imposed on Russia from the point of view of sanctioners. Estonia and Lithuania's GDP seem to decrease by around 0.4% as a result of a 10% decrease in exports to Russia (Havlick, 2014). The thesis only looks at countries' imports, one factor that influences GDP. This is not necessarily a weakness to the research since the goal of the research is to see whether active traders tended to experience a change in trade relative to non-active traders in different markets, and not what further implications it has on the GDP. The work on sanctions does not end here. Crozet & Hinz (2020) examine economic sanctions, but on the countries that are imposing the sanctions on Russia, following the start of the war in 2014. The sending countries' losses (those imposing the sanctions), according to Crozet & Hinz (2020), were around $42 billion dollars of exports, whereas the predicted export losses that Russia faced were higher than the sanctioning countries by $11 billion dollars between 2014 and end of 2015. Additionally, it appears that the root cause behind the losses of the sanctioning countries was due to "an increase in country risk affecting international transactions with Russia." (Crozet & Hinz, 2020). Other works have shown that sanctions seem to have a negative impact on Russia (Ahn & Ludema, 2020; Åslund, 2019; Demertzis et al., 2022; Darvas & Martins, 2022; Du & Wang, 2022). However, there are a few works that show that sanctions may not be as effective. Mbah & Wasum (2022) expect that the inflation caused by the sanctions would affect the household consumption, the supply chain, and possibly the economic growth on sanctions like Europe, the UK, Canada, and the US. Nigmatulina (2023) found that sanctioned firms compared to non-sanctioned firms earned 21% and 35% more revenue and capital, respectively. This seemed to be possible based on subsidies, loans and government contracts data (Nigmatulina, 2023). Government compensation can come at a cost of the broader economy (Nigmatulina, 2023). A work similar to Nigmatulina (2023)'s research shows that firms, despite the sanctions, could continue their business operations by using different "adaptation strategies" (Gaur et al., 2023). On a side note, while not exactly confirming failure, Felbermayr et al. (2020) point out that since 1995, the success rate of sanctions was decreasing.

One year after the war escalated, Ukraine's exports losses seem to amount around $19 billion, whereas Russia's exports seem to have reached about $68 billion in gain, which is apparently due to trade diversion: among the exports gains, $41 billion are from Asia (Steinbach, 2023). When it comes to changes in the GDP, Ukraine may have lost approximately $859 million mainly due to grain exports disruption, whereas Russia's loss due to the same disruption seems

$3.8 million, which is minimal in comparison (Chen et al., 2023). Some forecasts suggested that the global GDP growth could be affected by more than one percentage point due to the volatility of commodity prices, which could also affect the global consumer price inflation by two and a half percentage points (Orhan, 2022). Forecast of GDP growth in Europe indicated a decrease of 1% (EU, 2022, as cited in Khudaykulova et al., 2022). The thesis does not compute the loss trade for Russia and Ukraine since it does not go beyond regressing the panel data. This is perhaps a weakness as it limits potential contribution. However, the estimated model was not designed to establish causality. The goal of the research was to see if the trade seemed to change for active traders relative to non-active traders when accounting the two phases of the war. Whether a statistical association existed or not, I sought out to give possible explanations for each result obtained. Given that two groups have countries that are very different from each other, whether in terms of GDP or other factors, the "parallel trend assumption" is violated. The violated assumption prevents the model to imply causality, but since the model is more similar to an event study than a DiD, inspecting a counterfactual is not as necessary.

Chen et al. (2023) examine via a failure network model the indirect or direct dependence of countries on the grain products exported by Russia and Ukraine. Apparently more than 50% of direct imports of 30 countries was reduced due to the disruption of grain exports (Chen et al., 2023). Abdullah et al. (2023) analyze the impact of food disruption from the two countries that are at war on food access for all countries that engage in trade with them, and the impact seems to have been diverse. The most dependent countries like Armenia and Kazakhstan appear to have been affected the most (Abdullah et al., 2023). Changes in trade have a potential impact on economic development (Ruiz Estrada & Koutronas, 2022). Comparing it to the thesis, it seems that selecting countries based on whether they are an "active trader" or not did not seem the most optimal choice. Being an active trader does not strictly imply being dependent. Therefore, it can be harder to tell how "hit" a country got, assuming they got "hit". Prohorovs (2022) reports that the political tensions between Russia and the sanctioning countries add up due to the rising inflation, which would seem to impact in the long run European economies and companies. The war could reshape the state of world trade (Prohorvs, 2022). It can be hard to say whether Prohorvs (2022) is right or wrong because two years is relatively not a lot of time. How long is the "long run"?

A lot has been said about the changes in the energy market. Lai et al. (2009) also examine crude oil prices and how they are affected by "extreme events". Since Russia and Ukraine were not at war at the time, the Persian Gulf War and the Iraq War in 1991 and 2003 are used as examples. They do so by adopting an EMD based event, and they show that this method is effective in estimating the impact of such events on oil prices. However, oil prices can be affected by other factors as well, such as crises happening in the stock market (Iglesias & Rivera-Alonso, 2022) Hu et al. (2024) examined the impact of the war on crude oil prices. They found from the multiresolution causality testing a "significant one-way causality" between the Russia–Ukraine war and crude oil prices (Hu et al., 2024). They went on to use the variational mode decomposition (VMD) method: accounting beginning of October 2021 and near the end of August 2022, they found that the war led the West Texas Intermediate (WTI) crude oil prices to rise by $37.14, corresponding to a 52.33% increase (Hu et al., 2024). Moreover, in the same context, the volatility of a commodity seems positively related to Russia's global market share of the selected commodity: when the latter is high, the former will be high (Fang & Shao, 2022). According to one of the more recent contributions of this literature, households' total energy costs in 201 expenditure groups from 116 countries increased by a minimum of 62.6%, and in some cases, it reached 112.9% (Guan et al, 2023). Possible factors that explain the relatively big difference in the increased costs is the different energy needs and consumption patterns of different households (Guan et al., 2023). The thesis examines potential variations in import

trends in the energy market, and it does not stop in this market. After all, the energy market is not the only market that is affected.

Martin-Shields & Stojetz (2019) tie the notion of reverse causality to conflict and food security: both can impact each other. In the context of the Russia Ukraine war, the conflict clearly came first. Ciais et al. (2023) address the agricultural market and global food security. By using satellite and Global Trade Analysis Project (GTAP) data, their modeled results show the conflict would lead to: trade drop of 60%, increase of wheat prices by 50%, and severe food insecurity of 30% (Ciais et al.,2023). The findings, trade drop, price increase and food insecurity, are expected, but the actual numbers are debatable. As it was already explained above, WTO (2023) reported results that are quite different from what was expected.

Another aspect of the literature, while not as relevant to the thesis, should be explored, which is the financial consequences of the Russia Ukraine war. Liu et al. (2023) studied the impacts wars have on financial assets. They looked at the performance of financial assets, mainly the Shanghai Composite Index, S&P 500 index, WTI oil price, and LBMA gold price. The results of their empirical work show that the Shanghai Composite Index is relatively stable (Liu et al., 2023). Moreover, the difference-in-differences method shows that the 3 remaining assets were unstable and suffered positive shocks in their price levels. This happened within several days after the Russia Ukraine War started (Liu et al., 2023). The authors apparently managed to successfully use the DiD model since the parallel trend test is validated. Ahmed et al. (2022) also focus on the financial dimension of the war. Just slightly before the escalation started, European stocks seemed to have changed trends, by offering significant negative returns. The change in trends seems to have persisted and its magnitude seem to differ from one place to another, depending on the type of company or industry (Ahmed et al., 2022). Other factors could play a role, such as how efficient the market is, and the distance separating the country at war and the other country (Kumari et al., 2022). The only element in common between the research paper and the mentioned works is they all fall under the wider literature of the Russia Ukraine war.

Overall, the research seems to contribute to the literature in different ways. For instance, it seems to confirm WTO (2023)'s report. Moreover, this thesis attempts to account for the entire war period, that is from 2014 to 2023, to study the trade patterns. Many works in the literature mentioned above focused on one of the two phases of the war. Older works focused more on the first phase, while much recent works focused on the second phase. I try to account for both phases because I could not claim that the war "started in 2022" simply because it started around 8 years before that date. With that in mind, what the model investigates is the following: the deviation of trade from pre 2014 to the first phase of the war (2014-2021) for non-active traders, the deviation of active traders or the additional change of imports of active traders compared to non-active traders while accounting pre 2014, the deviation of trade from the first phase to the second phase of war for non-active traders, and finally the deviation or the difference in imports between active traders and non-active traders in that period while accounting for the previous one. Accounting for the whole time period of the war seems to matter to Russia, in particular when examining the energy market. Russia was going through financial difficulties in the first phase of the war (Abramov & Viktorov, 2019; Åslund, 2019; Dreger et al., 2016), which could explain its lower exports. It currently faces more sanctions in the second phase, but more sanctions don't imply that they're effective (Gaur et al, 2023; Nigmatulina, 2023). However, I would like to point out again that the countries were not split based on whether they imposed sanctions or not, which made the results hard to read. If such an approach were to be undertaken, that is splitting the countries into "sanctioners" and "non sanctioners" groups, the results could change quite a lot. I'm not saying it would negate the

effect of accounting for the entire war period. Again, Russia was going through financial difficulties (Abramov & Viktorov, 2019; Åslund, 2019; Dreger et al., 2016). This leaves room for more research on sanctions. Specifically: What determines the success of sanctions? Opening doors for research on sanctions could be a contribution on its own.

The paper is split into three chapters plus with the conclusion. I display in chapter 1 descriptive statistics of Russia and Ukraine's economies, along with setting up the model. In chapter 2, I display the results in 3 tables, with an interpretation for each. In the last chapter before the conclusion, I discuss the limits and weaknesses of the research. The conclusion serves as a summary of the results obtained along with opening some doors for research. Finally, there is the references section and the appendix section. The latter contains descriptive statistics of each data set along with some graphs.

Chapter 1: Assessing Russia and Ukraine's economies and establishing the model

1.1-Some descriptive statistics

Russia's GDP, as of 2023, is around 2.02 trillion USD (World Bank). The agriculture, industry, and services sector contributed 3.3%, 30.6%, and 56.9% to the GDP respectively as of (World Bank). Natural resources tend to be Russia's main source of income, suggesting a lack of diversification (Lyubimov, 2019). In fact, a transition report published by the European Bank for Reconstruction and Development (EBRD, 2023) mentions that Russia's economy is struggling due to being reliant on a specific set of commodity exports.

Ukraine's GDP as of 2022 is 178.76 billion USD (World Bank), an amount much lower compared to the GDP of Russia. The agriculture, industry, and services sectors contributed 7.4%, 18.8%, and 61.3% respectively as of 2023 (World Bank). This country is not only a key supplier to Europe but also on a global scale: When it comes to sunflower seed oil, Ukraine supplies around 50% of the global market (Glauber & Laborde, 2022). As for barley, maize, sunflower, and wheat, Ukraine supplies about 12.6%, 15.3%, 4.3% and 10% for the global market respectively. Concerning Russia, they supply for the global market 14.2%, 2.1%, 19.6%, 23.1% and 24.1% for barley, maize, sunflower, sunflower oil, and wheat (Glauber & Laborde, 2022). The EU, China, along with many North African markets like Egypt and Libya, tend to import maize from Ukraine (Glauber & Laborde, 2022).

Other facts to keep in mind: the ILO (2010) in its policy paper affirms that its economy is not considered to be highly diversified. Ukraine's economy has always been reliant on a few sectors, such as agriculture. The selective activities in selective sectors have made Ukraine vulnerable to external shocks (ILO, 2010).

Below is a table that shows the GDP breakdown by sectors.

Table 1: GDP breakdown by sectors in 2023

GDP breakdown by sectors	Russia	Ukraine
GDP (2023)	2.02 trillion USD	178.76 billion USD
Agriculture	3.3%	7.4%
Industry	30.6%	18.8%
Services	56.9%	61.3%

Below is another table that shows the global market shares of Russia and Ukraine, according to Glauber & Laborde (2022) in 2018-2020:

Table 2: Global market shares of Russia and Ukaine in 2018-2022

Global market shares	Russia	Ukraine
Barley	14.2%	12.6%
Wheat	24.1%	10%
Maize	2.1%	15.3%
Sunflower	19.6%	4.3%
Sunflower seed oil	23.1%	49.6%

To see how important suppliers like Russia and Ukraine are to the world, descriptive statistics will be given. When a country produces a good, they can either export it or consume it. Here is the total production for some of the food products that we mentioned earlier. Data is reported from the Food and Agriculture Organization of the United Nations (FAO):

Barley: Total production in 2022 amounted to around 154.877 million metric tons. Russia is the top producer, and Ukraine is the 5th producer globally. They produce respectively 17.53 million metric tons and 8.680 million metric tons (1994-2022 average). In 2022, they produced 23 393 510 and 5 608 170 metric tons respectively.

Wheat: Total production in 2022 amounted to around 808.441 million tons. Russia and Ukraine are the 4th and 10th producers of wheat globally. They produced 104 233 944 and 20 729 240 tons respectively in 2022. By looking at the 1994-2022 average, they amount to around 53 million and 19 million tons respectively.

Maize: Total production in 2022 amounted to around 1 163 497 383 tons. Only Ukraine made it to the top 10 producers list. Its 1994-2022 average is around 15 million tons. In 2022, Ukraine produced 26 186 930 tons, while Russia produced 15862434.06 tons.

Sunflower seed: Total production in 2022 amounted to around 54 million tons. Russia and Ukraine are the 1st and 2nd top producers of sunflower seed in the world. Their 1994-2022 averages are 7.4 and 7.2 million tons respectively. As for their 2022 production value, they amount to 16362214.63 tons and 11328740 tons respectively.

Below is a table that shows the production values of commodities:

Table 3: Production values of commodities

Production value of agricultural commodities	World production value	Russia's production value in 2022	Russia's 1994-2022 average production value	Ukraine's production value in 2022	Ukraine's 1994-2022's average production value
Barley	154.877 million metric tons	23 393 510 metric tons	17.53 million metric tons	5 608 170 metric tons	8.680 million metric tons
Wheat	808.441 million tons	104 233 944 tons	53 million tons	20 729 240 tons	19 million tons
Maize	1 163 497 383 tons	15862434.06 tons	N/A	26 186 930 tons	15 million tons
Sunflower seed	54 million tons	16362214.63 tons	7.4 million tons	11328740 tons	7.2 million tons

Note: For Sunflower seed oil crude, data for 2022 is unavailable for some reason. 2021 data is the latest. Total production in that year was around 18 million. Russia and Ukraine are again the 1st and 2nd top producers of sunflower seed oil crude. Their 1994-2021 average is 2.639 and 2.625 million tons respectively. As for their 2021 production value, they amount to 5248935 tons and 4928742 tons respectively.

To look at exports data, ITC database will be used. In 2022, Ukraine's exported value is 44 443 214 thousand dollars, among which cereals (which contain barley, wheat and maize) and oil seeds (which contain sunflower seed) are at 9 117 551 thousand dollars and 1 263 155 thousand dollars. In terms of volume, this amounts to 38 544 218 tons and 2 767 006 tons respectively. More specifically, 25 176 648 tons of maize or corn were exported among 26 186 930 produced maizes. 11 223 215 tons of wheat and meslin were exported among 20 729 240 tons of wheat, and 2 144 355 tons of barley were exported from 5 608 170 tons of barley.

Here is a table that shows Ukraine's export values and % of volume exported compared to its production quantities:

Table 4: Ukraine's exports values and % of volume exported compared to its production quantities in 2022

Ukraine's export values and volumes	Values	% Volume exported compared to production quantity
Barley	447 049 000 USD	2 144 355 tons/5 608 170 tons=38.24%
Wheat and meslin	2 678 054 000 USD	11 223 215 tons/20 729 240 tons=54.14%
Maize or corn	5 992 448 000 USD	25 176 648 tons/26 186 930 tons=96.14%

Sunflower seed "whether or not broken"	1 263 155 000 USD	2 767 006 tons/11328740 tons=24.42%

Half of these commodities (wheat and meslin, maize/corn) tend to be more exported and less consumed by the Ukrainian population.

Let's look at Russia's exports. Note that 2022 findings are mirror data for Russia's case, meaning that it is data of non-reporting countries (here Russia being the non-reporting country) which was reconstructed based on the data supplied by reporting countries. Its total exported value in 2022 is 577 794 366 thousand dollars. Energy, or more specifically mineral fuels, is the biggest export component, sitting at 386 170 622 thousand dollars. Fertilizers are the 4th biggest component, sitting at 20 901 009 thousand dollars. Barley, maize/corn, wheat and meslin make up 9 962 953 thousand dollars of Russia's total exports. The individual exported quantities of wheat and meslin are 21 597 224 tons out of 104 233 944 tons, maize or corn 2 478 999 tons out of 15 862 434.06 tons and barley 1 716 215 tons out of 23 393 510 tons

Below is a table that shows Russia's exports in values and volumes:

Table 5: Russia's exports values and % of volume exported compared to its production quantities in 2022

	Values	% Volume exported compared to its production quantities
Barley	583 740 000	1 716 215 tons/23 393 510=7.34%
Wheat and meslin	8 546 228 000	21 597 224 tons/104 233 944 tons=20.72%
Maize/corn	832 985 000	2 478 999 tons/15 862 434.06 tons=15.63%

When it comes to agricultural products, Russia consumes it more than it exports it.

According to the IEA, the second world largest producer of gas and the biggest exporter of gas is Russia. It exported roughly 30% of its produced gas (IEA, nd).

Some useful background information to consider before going to the next section. This might help in the analysis:

As a result of Russia's attack, the European Union (EU) has put in place several sanctions (The European Council, 2024). Concerning the economic dimension, trade between the EU and Russia is very limited. The point of the economic sanctions is, as the European Council states, "to maximise the negative impact of the sanctions on the Russian economy" (The European Council, 2024). Moreover, business-relevant services to the Russian Federation or to any legal entity are also prohibited. That way, the EU hopes to harm the economy that is highly dependent on European countries as trade partners (The European Council, 2024).

Energy prices drastically increased. The energy crisis led members of the EU to make the decision "to phase out the EU's dependence on Russian fossil fuels as soon as possible" (The European Council, 2024): towards the end of May 2022, around 90% of oil imports were banned by the European Council till the end of 2022, while crude oil being an exception (The European Council, 2024). To directly tackle energy bills, members of the EU implemented a regulation with three initiatives, among which are "reducing electricity use, capping revenues of electricity producers, securing a solidarity contribution from fossil fuel businesses" (The European Council, 2024). Since then, energy prices have gradually decreased, in which the European Commission claims that the EU's actions played a role in controlling energy prices (The European Commission). However, they're still higher than the prices prior to the conflict. In Britain, Smeeton (2023) reports that the country uses gas to heat 85% of homes and to provide electricity to 40% of homes. Moreover, £1,690 corresponds to the average annual bill for electricity and gas consumption, falling under the April to June 2024 direct debit price cap (Bolton, 2024). While it is below its peak level, which sits at £2,380, it is higher than what it was in Winter 2021/22 by around 39% (Bolton, 2024). In the third quarter of 2024, Bolton (2024) reports that the price cap will decrease to £1,568, in other words by 7%, but it will increase by 12% at the end of 2024.

1.2-Data cleaning and preparing the model

For the data analysis part, ITC Trade Map was the main database that was used for the research. It's a database that displays exports/imports statistics for several countries. The data can be split by commodity. Since I established the importance of the agricultural market in Russia and Ukraine, I sought to collect import data related to agricultural commodities, in particular to barley, wheat/meslin, maize/corn, and sunflower seed (at the 4-product digit level).

The way countries were selected is as follows: first, I collected cereal data (2-digit HS level) for more than 100 countries from 2004 till 2023. To decide whether a country is an "active trader" or not, I summed countries' imports from 2004 until 2013, the year before the war started. Then, I computed the average of the sum of each country's imports. Afterwards, I compared the average of the sum and the country's total imports from 2004 till 2013. If the sum is bigger than the average, then the country is classified as an "active trader", otherwise it is considered as a non-active trader. When computing the average, I excluded countries that had a sum of 0 imports from 2004 till 2013 so that the average does not become relatively small: in theory with a smaller average, countries that usually do not import could be classified as an "active trader", which would not be as realistic. Also, the reason why I used cereal data at the

2-product digit level in this step is simply due to the fact that cereals, with a 2-digit HS code of 10, comprises many agricultural commodities, among which are barley, wheat/meslin, and maize/corn, the commodities of interest in this research. Sunflower seeds, however, fall under the 2-digit code HS of 12.

From the active traders, the top 16 were selected, and the bottom 16 were selected from the non -active traders. With 32 entities, their import data of barley, wheat/meslin, maize/corn, and sunflower seed were collected and summed together. Here's an equation to illustrate that:

$$Imports_{it}=Importsbarley_{it}+Importswheat_{it}+Importsmaize_{it}+Importssunflowerseed_{it} \quad \textbf{(1)}$$

Where the subscripts of i and t correspond to country and year. The aggregation was done as a first step to get the dependent variable that will be estimated.

The time spans from 2004 till 2023, so 20 years. For the agricultural market, I did all of this procedure for Ukraine and for Russia.

As for the energy market, where Russia is the supplier, I collected energy data again from ITC Trade Map. However, unlike in the agricultural market, the data extracted is only at the 2-digit level, its level being 27. Since it is not as precise as the 4-digit level, I decided to extend the number of entities up to 52 to make it up. The technique used to determine who is an active trader and who is not is the same technique used when gathering data from the agricultural market. 27 are active traders, and the rest are not.

The log linear model is mainly a panel regression with fixed effects. The equation that is estimated is as follows:

$$Y_{it}= \beta_0+\beta_1 W2014+\beta_2 W2022+\beta_3 INT2014+\beta_4 INT2022+\mathcal{T} Year+\alpha_i+\varepsilon_{it} \quad \textbf{(2)}$$

Where:

Y_{it}: Imports of the countries are the dependent variable, measured in dollars. They correspond to the aggregate imports of the agricultural commodities computed in (1). Note that no aggregation was needed for the energy market since data is at the 2-digit HS level. It is log transformed.

β_0: The intercept or the constant. In this model, the intercept represents the average level of imports pre-2014, while taking into account fixed effects and time trends.

β_1: The change of imports or the deviation of non-active traders from pre 2014

W2014: Dummy variable indicating the first phase of the war, 1 if year>=2014, 0 otherwise.

β_2: The deviation or the change of imports of non-active traders from 2014-2021 to 2022 and beyond.

W2022: Dummy variable indicating the start of the full-scale war, 1 if year>=2022, 0 otherwise.

β_3: The deviation or the difference in imports between active traders and non-active traders while accounting for pre 2014.

INT2014: Interaction term between W2014 and being an active trader.

β_4: The difference in imports or the deviation of active traders from non-active traders while accounting for 2014-2021.

INT2022: Interaction term between W2022 and being an active trader.

α_i: Country fixed effects. This term captures characteristics of countries that do not change with time.

$\mathcal{T}$Year: In the model, year is treated as a continuous variable, which captures a linear trend over time. This is helpful to understand how imports change over time.

In the main model, I decided not to include year fixed effects because since the model already has year based dummy variables, adding a dummy variable for each year would create a problem of multicollinearity. Additionally, assuming that the year is a continuous variable means that there are less parameters to estimate compared to when each year is a dummy variable: less parameters make the model simpler to estimate, especially in a type of model where the variables of interest are based on year dummy variables. In theory, it is possible to assume a continuous variable for the year, and adding year fixed effects to the model, but the problem of multicollinearity will still be present. Nevertheless, I do display on the tables results of a fixed effect regression assuming year fixed effects, but I will elaborate more in table 1 as to why I prefer the model with year as a continuous variable over year fixed effects.

Overall, there are 3 tables. Table 1 and 2 show the variation in imports of traders from Ukraine and Russia in the agricultural market respectively, and table 3 show the variation in imports of traders from Russia in the energy market.

A possible link can be established between this model and the well-known gravity model. In fact, I drew inspiration from Crozet & Hinz's working paper (2016) and Hufbauer & Oegg (2003): both works examine the effects of sanctions by estimating an adjusted gravity model. My research, however, does not look at the effects of sanctions. The goal of the model is to see how imports appear to change within countries throughout the war, by focusing on deviations. It is not made to establish a causal relationship nor to predict trade flows like the gravity model. Therefore, I do not define my model as a "gravity model".

This model can be interpreted as an event study with heterogeneous effects. While it seems similar to a DiD model, there are at least two major problems that would arise if this model were to be defined under the scope of DiD. First, the DiD approach assumes the treatment group and the control group to be similar in characteristics, which is not the case here. For example, Egypt from the "active traders" group and Australia from the non-active traders group are arguably very different from each other, or Japan from the active traders and Finland from the non-active traders. There are entities within the same group that are quite different from each other, such as Italy and Jordan, both belonging in the active traders group, or Brazil and Norway, both belonging in the non-active traders group. Second, in this context, the war here affects the international scale, so every country is affected in one way or another. Therefore, the non-active traders group is not a "real" control group because they technically took the "treatment" of the war, just like the active traders group. This is different from studying sanctions because there could clearly be unsanctioned firms as opposed to sanctioned firms. Compared to the war, sanctions do a much better job at being the "treatment".

Chapter 2: Results and interpretation

Datasets of table 1 and 2 have 640 observations (32 entities * 20 years). Dataset of table 3 has 1040 observations (52 entities * 20 years). However, due to missing data, 367 and 388 observations are estimated in table 1 and 2 respectively, while table 3 has 742 observations estimated. List of active traders and descriptive statistics are in the appendix.

2.1- Trends in imports in the agricultural market with Ukraine as the supplier

Table 1: Changes in agricultural commodities imports from Ukraine among non-active traders and active traders.

Variable	(1)	(2)
War (2014-2021)	-.3780524	2.986276**
	(.7918369)	(.9699537)
Full scale war (2022+)	-.1392273	1.113064
	(.5210211)	(.8072854)
Active trader x War	-.8859778	-.9885371
	(.7818218)	(.8135087)
Active trader x Full scale war	-1.739343**	-1.666657*
	(.6225606)	(.6494581)
Year	.226363***	
	(.0304974)	
Constant	-437.8598***	15.22369***
	(61.35015)	(.4256954)

Observations	367	367
R^2	0.1901	0.2635
Adjusted R^2	0.1789	0.2554
Standard deviation of residuals within country	1.4997745	1.4655395
Clustering	Country	Country

1) is a FE model assuming Year as a continuous variable, and (2) is a FE model using Year fixed effects (dummies for each year). * p<.05; ** p<.01; *** p<.001

According to the table, the interaction term between the full-scale war and being an active trader, along with the year coefficient and the constant are significant, with levels of significance varying. More precisely, the additional change of the active traders' imports compared to non-active traders' from 2014-2021 to 2022 and beyond correspond to a (EXP^(-1.739343)-1)*100=82.44% decrease, and given the p value there is reasonable evidence to believe that. The year coefficient, in parallel, suggest that the passing of time is associated with an increase of imports by (EXP^(.226363)-1)*100=25.40%. It is very significant.

The additional change of the active traders' imports compared to non-active traders from 2014-2021 to 2022 and beyond is relatively similar when running the FE regression, a second time, but assuming with it dummies for each year. The differential effect in the 2nd regression is (EXP^(-1.666657)-1)*100=81.11%, a decrease, significant at the 5% level. However, there are massive differences between the changes in imports for non-active traders between the first and second regression. In the second regression, the change in imports for non-active traders during the first stage of the war is linked to an increase of (EXP^(2.986276)-1)*100=1881.18%, significant at the 1% level, as opposed to a decrease of (EXP^(-.3780524)-1)*100=31.48%, though the latter is insignificant. When the war enters its second stage, if year were to be a continuous variable, the change of imports for non-active traders becomes (EXP^(-.1392273)-1)* 100=13.00% decrease, insignificant, as opposed to an increase of (EXP^(1.113064)-1)* 100=204.37%, insignificant as well. Having said all of that, it is important to point out that the interaction terms, which are the main variables of interest in this research, remain relatively similar between (1) and (2), in terms of numbers. The relatively massive difference between the war and full-scale war coefficients in (1) and (2) deserve an explanation.

(2) is based on year fixed effects. In other words, (2) does not account for a trend. Essentially, when the year variable is assumed to be continuous, it captures the general increase or decrease of imports over time, or in other words the general time trend. So, when a continuous year

variable is controlled for, the war and full-scale war coefficients should only capture the deviations from the general time trend due to the war. Following this line of reasoning, given that (2) deals with time only via year fixed effects, the war and full-scale war coefficients would capture not only the effects of the war, but also any time trend that happens at the same time as the war. Consequently, this leads to inflated coefficients of the war and full-scale war, which makes them susceptible to bias.

Inflated coefficients could indeed cast doubt on the results obtained in (2). Some other statistics, however, could defend it from being "inferior" to (1). In short, its adjusted R^2 is higher than (1)'s adjusted R^2, which means that (2) has a higher explanatory power than (1). Despite this, it is not enough to say that (2) is the better model among the two. Perhaps a pure mathematical point of view would strongly hold on the adjusted R^2, but numbers are not just numbers in the context of economics. There is a story behind the database, and to explain the story as concretely as possible, (1) is the way to go, at least compared to (2). (2)'s war coefficient is too huge to be true. This applies also to the full-scale war coefficient. Tables comparing different regression results will still be provided in the sections of Russia for the sake of comparison and identifying similarities. However, just like in this section, (1) will be the main model that will be examined.

(1)'s coefficients have a story behind them. The war is associated with a negative change of imports of (EXP^(-.3780524)-1)*100=-31.48% for non-active traders, an additional negative change of imports of (EXP^(-.8859778-1)*100=-58.77% for active traders compared to non-active traders, all of them being insignificant. The change in imports from the first to the second stage of the war for non-active traders is also insignificant, (EXP^(-.1392273)-1)*100=13.00% decrease, whereas the difference of imports for active traders compared to non-active traders when the war escalates corresponds to (EXP^(-1.739343)-1)*100=82.44% decrease, significant at the 1% level. The year variable interestingly shows to be significant at the 0.1% level, (EXP^(.226363)-1)*100=25.40%). At first glance, the year coefficient and the rest of the coefficients may seem to contradict each other, since imports increase and time passing are associated together, while in parallel imports seem to slow down for both parties when the war happens, be it at the first or second stage. For clarification, this is not a contradiction because the continuous variable captures the general time trend, which is positive in this case, while the war dummies deviate from the general trend. Basically, imports tend to trend upwards, but the war coefficients slowed or disrupted the general trend.

Non active traders are by definition, countries that do not actively engage in trade with Ukraine. Some countries like Tuvalu and Brazil, for example, never traded, whether before or after the war. It's entirely possible some are not in essence active importers of cereal commodities, and some others have different suppliers. If that were true, unless a sudden change happened in consumer preferences, they would have less incentive to significantly alter their behavior when the war starts. This could explain the lack of evidence that claims that these traders behaved differently throughout the war. Since they were not active importers before the war, it is possible that they were, more or less, not affected.

The active traders' case is quite different from the non-active traders. Given that by definition, they are countries that actively import agricultural commodities from Ukraine, it is expected that their response will be stronger than the non-active traders. This happens to be the case only for the second phase of the war and not the first phase, which is not surprising. Their significant change in behavior could be explained by a "resilience in the multilateral trading system" (WTO, 2023). In the WTO's (2023) report of the assessment on global trade one year after the start of the full-scale war, trade between countries appeared to remain resilient. Countries that actively imported from Ukraine managed to change suppliers (WTO, 2023). WTO (2023) gives

some examples, one of which is Egypt, a country belonging to the active traders group of the dataset. Egypt in 2019 imported 48% of its wheat imports from Russia and 26% of its wheat imports from Ukraine (WTO 2022, as cited in WTO, 2023). Between March and November 2022, Egypt's wheat imports rose in value by 90%, but that increase cannot be attributed to its trade with Ukraine since Egypt decreased its wheat imports from Ukraine by 81% in terms of volume (WTO, 2023). While it increased its wheat imports from Russia, Egypt switched suppliers in order to fully compensate for its wheat imports: it started importing from the European Union and from the United States (WTO, 2023). To convey that into numbers, Egypt's imports increased by 128% and by 9x from the European Union and the United States respectively (WTO, 2023). When looking at the database in question, Egypt's imports decreased from 1.386e+09 to 5.365e+08 dollars. The fact that it decreased relatively considerably its imports from Ukraine hints that Egypt changed suppliers following the start of the full-scale war. This observation is in line with what the WTO reported in 2023. However, the imports in the database consist not just of wheat, but also of barley, maize, and sunflower seed. So, Egypt changing suppliers could at least partially explain its change in imports from 2021 to 2022.

Another factor that arguably played a role in altering the behavior of active traders is the increase of price commodities, and the presence of substitute commodities. In the same report, WTO (2023) revealed that contrary to what was expected, trade value for several commodities like wheat, maize, sunflower oil, rapeseed oil, fertilizers, rice, fuels and palladium, increased in 2022. This increase was possible via an increase in their prices (WTO, 2023). WTO (2023) gives the example of Türkiye, a country among the active traders. According to WTO (2023), Türkiye's wheat imports rose in value by 31% compared to the year preceding the full-scale war. The price of wheat at the time increased by 37% (WTO, 2023). This could explain why Türkiye's imports from 2021 to 2022 increased from 9.229e+08 to 1.063e+09 dollars. That being said, WTO (2023) emphasizes on importers substituting products: Türkiye's rice imports rose by 53% in volume as a response to the supply chain disruption. The rise in price likely led Türkiye to change strategy. While the country's imports increased in value, it did decrease in volume by around 4.5% (WTO, 2023). To compensate, it decided to import rice. It is possible that some countries decided to import more substitutes than what they usually import as a result of an increase in price, thus possibly explaining the behavior of active traders relative to non - active traders. Türkiye's imports did increase in value, but some countries could have imported less in value due to substituting more.

2.2-Trends in imports in the agricultural market with Russia as the supplier:

Table 2: Changes in agricultural commodities imports from Russia among non-active traders and active traders.

Variable	(1)	(2)
War (2014-2021)	.0376703	2.178493*
	(.8820392)	(.9894792)

Full scale war (2022+)	.5375281	1.076191
	(.7144478)	(.7372006)
Active trader x War	-.3989138	-.4267459
	(.8780029)	(.8533141)
Active trader x Full scale war	-.7370365	-.8134637
	(.75504420)	(.7825665)
Year	.1139762***	
	(.0289086)	
Constant	-212.6766***	15.23263***
	(58.1183)	(.3676679)
Observations	388	388
R^2	0.1466	0.1994
Adjusted R^2	0.1354	0.1910
Standard deviation of residuals within country	1.2646875	1.2538929
Clustering	Country	Country

(1) is a FE model assuming Year as a continuous variable, and (2) is a FE model using Year fixed effects (dummies for each year). * p<.05; ** p<.01; *** p<.001

None of the main variables of interest appear to have significantly altered the value of imports. During the first phase of the war, the difference in imports of active traders compared to non-active traders seems to be (EXP^(-.3989138)-1)*100=32.90%, a decrease, and the estimated change in imports of active traders compared to non-active traders from the first to the second phase corresponds to (EXP^(-.7370365)-1)*100=52.15% decrease.

Both interaction terms suggest a negative deviation for active traders relative to non-active traders, despite the lack of statistical evidence. This particular dataset failed to show any statistical association between the behavior of active traders and the level of imports throughout the war, but does it mean that a statistical association does not exist?

The point of the European Union's economic sanctions on Russia is "to maximise the negative impact of the sanctions on the Russian economy while limiting the consequences for EU businesses and citizens." (The European Council, 2024). There is a wide range of products forbidden by the EU to be imported from Russia, among which are coal, steel, wood, and more. However, agricultural products are not part of the list. In fact, the European Union makes it clear that agricultural commodities are excluded from the sanctions (The European Council, 2024). According to the European Council, securing food is a top priority. They go on to affirm that Russian exports of agricultural commodities to global markets are not sanctioned, meaning that "Anyone can operate, buy, transport and ensure food and fertilisers coming out of Russia." (The European Council, 2024). So, it cannot be declared that sanctions affected the trade happening in the agricultural market simply because there are no sanctions in that market to begin with. Therefore, countries could "normally" continue trading with Russia. But taking into account the results obtained in table 1, countries seem to have adapted to the situation by switching to different suppliers or by getting different products. Why don't we observe a statistical change in this table? Could there be another explanation?

There is, and it comes from the same report that was used to analyze the earlier results. WTO (2023) emphasizes that while world trade managed to persist on a general level, there are certain commodities where suppliers are not easily accessible. This is related to the global market share: in 2019, the combined market share of Russia and Ukraine for sunflower commodities was 45%, with crude sunflower oil constituting 73% (WTO, 2022, as cited in WTO, 2023). Other exporters of barley, in contrast, had market shares of 5% which is much lower in comparison (WTO, 2023). Data of sunflower seed is included in the import value. It could be that some members of the active trader happen to highly import sunflower seed, or other commodities and could not find other suppliers. So, they had little choice but to continue their trade.

One more factor could explain the insignificant results. WTO (2023) admits that for global trade to be resilient, one assumption of the trading system has to be met: the system should be "open and inclusive" (WTO, 2023). Taking this into account, countries should be willing to cooperate with each other. Additionally, the WTO (2023) claims that a country would experience more difficulties in diversifying its imports should nearshoring happen. More countries isolated from global trade that become self-sufficient would reduce the number of alternate suppliers in the global trade system. Perhaps this is why some countries could have experienced difficulties when switching suppliers

2.3- Trends in imports in the energy market with Russia as the supplier

Table 3: Changes in mineral fuel imports from Russia among non-active traders and active traders in the energy market.

Variable	(1)	(2)
War (2014-2021)	1.796581***	3.734154***
	(.4829098)	(.6593487)
Full scale war (2022+)	-.7506671	.2961392
	(.8206912)	(.6956678)
Active trader x War	-2.958208***	-2.992964***
	(.5198355)	(.5209927)
Active trader x Full scale war	-.7820009	-.5496504
	(.865227)	(.9138944)
Year	.1178362***	
	(.0224812)	
Constant	-217.5546***	18.35778***
	(45.20247)	(.2809412)

Observations	742	742
R^2	0.2318	0.2903
Adjusted R^2	0.2266	0.2864
Standard deviation of residuals within country	1.3785726	1.340757
Clustering	Country	Country

(1) is a FE model assuming Year as a continuous variable, and (2) is a FE model using Year fixed effects (dummies for each year). * p<.05; ** p<.01; *** p<.001

The variation of imports among non-active traders, and active traders relative to the former, are quite different from what has been discussed so far. Unlike the previous two tables, the start of the war in 2014 is statistically associated, at the 0.1% level, with a change of imports for non-active traders. In numbers, it corresponds to a (EXP^(1.796581)-1)*100=502.90% increase. In simpler numbers, imports for non-active traders seem to have increased by 1+502.90/100=6.029 times. This is not the only coefficient that is statistically significant. What's statistically associated with the start of the war is the relative change of imports of active traders compared to non-active traders, which appears to be a negative drop of (EXP^(-2.958208)-1)*100=94.81% in import value. Interestingly enough, these same coefficients are significant in the model where year fixed effects are assumed.

The actual real change of imports that is associated with the start of the war looks questionable, but how far away is it from reality? Åslund (2019) explains in his article that sanctions were being imposed on Russia by the European Union and the United States since March 2014 with the goal of stopping Russia's attack on Crimea, as well as to economically isolate the latter. Sanctions originally consisted of asset freeze and visa bans for any person or company "accused of undermining democracy, misappropriating Ukrainian property, and violating human rights." (Åslund, 2019). These sanctions eventually took a step further as they started to target three sectors of Russia's economy, which are defense technology, finance and oil (Åslund, 2019). State banks and companies that were sanctioned were prevented from receiving any type of lending (Åslund, 2019). The oil sector was particularly targeted for oil development, in which according to Åslund (2019), this harmed Russia in the long term. Åslund (2019) makes it clear however that sanctions at the time did not target trade in the energy market: The European Union admitted that due to it being dependent on Russia gas, no sanctions should be imposed on it. Otherwise, oil prices will drastically increase (Åslund, 2019). So, if trade in theory was not affected by sanctions, it could have continued "normally" assuming everything else remains constant, which was not the case at the time. In parallel, oil prices were going through a decline.

Between July 2014 and January 2015, the Bureau of Labor Statistics (BLS) import crude petroleum index dropped by 51.7% (Mead & Stiger, 2015). Apparently, this was the biggest drop in prices since the end of 2008 (Mead & Stiger, 2015). Petroleum price was decreasing worldwide, going from $107.95 a barrel in the summer to $44.08 in January 2015 (Mead & Stiger, 2015). The decrease in petroleum price is due to two major factors. First, there was an oversupply of petroleum (Mead & Stiger, 2015). Over the years, the US started to produce more petroleum, and became less dependent on foreign petroleum. There was a point where the country was producing "1.0 million barrels a day" from 2012 to 2013 (Mead & Stiger, 2015). This was the first time in 20 years where US production of petroleum exceeded US petroleum imports (Mead & Stiger, 2015). OPEC was also contributing to the increased global supply of petroleum. OPEC members met in November 2014 to address the decreasing prices, but they decided to keep production levels just the way they are (Mead & Stiger, 2015). Members of OPEC like Venezuela and Iran were in favor of cutting production levels to tackle potential financial problems they could face, but Saudi Arabia affirmed that "that OPEC should allow the market to stabilize and ensure that the cartel protects market share against non-OPEC producers" (Mead & Stiger, 2015).

Second, there was less global demand for petroleum. Mead & Stiger (2015) specify that Europe and China were demanding less petroleum. The main driver behind the decreased demand is the promotion of energy efficiencies (Mead & Stiger, 2015). Transportation vehicles, like airplanes, along with households for instance have become more fuel efficient as time passed (Mead & Stiger, 2015). Mead & Stiger (2015) also highlighted that some world economies were experiencing an economic slowdown which also contributed to the drop in demand. The revised 2015 projection of global demand, according to the EIA, decreased to 0.2 million barrels per day due to the economic slowdown that some countries were facing (EIA, as cited in Mead & Stiger, 2015). The decline in oil prices, as stated by Åslund (2019), led to the decrease of Russian exports. This was, however, not the only consequence that Russia faced.

Dreger et al. (2016) examine the potential drivers that led to the depreciation of the Ruble. At the time the Russian currency depreciated by 50% compared to the US dollar (Dreger et al., 2016). By examining oil prices, interest rates, nominal exchanges, as well as sanctions data, and analyzing them via "cointegrated VAR models", Dreger et al. (2016) find that oil prices played a major role in the decline of the Russian currency. Moreover, Abramov & Viktorov (2019) indicate that the inaccessibility of companies and banks owned by the Russian state to the international market could have undermined the value of the ruble in the long run. This could have been possible due to capital outflow and foreign debt repayment, which happened as a result of the incapability of the sanctioned players of refinancing their debt (Abramov & Viktorov, 2019).

The crisis that was happening in Russia after the start of the war in 2014 could have contributed to the decline in the value of exports. In other words, this could explain why the association between the additional change of imports of active traders relative to non-active traders and the start of the war is extremely significant. That being said, the coefficient reflects a relative change of imports for active traders and not an absolute change. Since the war is associated with what appears to be a significant increase of the change in imports for non-active traders, it is hard to tell whether the absolute change for active traders followed the same direction or not as non-active traders. The change in imports for non-active traders is tricky to explain. Given all of the facts discussed above, countries that do not actively trade with Russia might have taken advantage of the depreciated ruble and started to import more: depreciated ruble would make Russian goods cheaper on the international market. If that were true, a country who has never imported from Russia suddenly started to import from the major petroleum supplier

would be in Russia's benefit. Moreover, one reason why non-active traders may seem to experience a positive change in trade when entering the first phase is due to Russia intensifying its trade with non-sanctioning partners. Darvas et al. (2024) explain that China, along with many emerging countries, have been intensifying their trading activities with Russia. China and India, both non-sanctioning countries, increased their fossil fuels imports from Russia (McWilliams et al, 2024, as cited in Darvas et al., 2024). Some countries in Africa engage actively in trade with Russia (Davies, 2024). Although Russia tends to supply arms to sub-Saharan Africa, the energy supplier also exports oil to West Africa (Davies, 2024). If that were the case, it would not be the first time that sanctions lead to export deflection: after Iran got sanctioned, around 66% of its exports went to non-sanctioners (Haidar, 2017). However, setting lower prices and exporting to new partners may not lead to gains in welfare (Haidar, 2017). However, the idea of Russia intensifying its trade with non-sanctioning is perhaps more relevant to after the start of the full-scale war. It could still be that Russia decided to trade more with non-sanctioning partners after 2014, but it should be reminded that Russian exports were not the main target of the sanctions. Oil not being sanctioned in the first phase of the war is proof. Also, some countries not imposing sanctions belong to the "active traders" group and not in the "non-active" traders group. Therefore, the argument probably doesn't explain the variations of imports within non-active traders when entering the first phase.

The results are yet not very clear. Why did the change in trade seem significant in the first phase, but not the second phase? The insignificant full scale war interaction term is surprising. Given the drastic increase of gas and oil prices in 2022, a positive and significant interaction term of the full-scale war coefficient can be expected. WTC (2023) reported that Russia's total exports increased by 15.6% from 2021 to 2022 in value, and that increase is due to the drastic increase in prices of goods like fuel. In the research, however, the deviation of active traders from non-active traders in the second phase while taking into account the first phase can correspond to an absolute negative. The deviation of non-active traders when entering the second phase from the first phase, although insignificant, is negative, which can make the other deviation likely negative in terms of absolute numbers. Is there, therefore, a discrepancy with the results and WTC's report?

The members of the active traders' group in the particular dataset are diverse. There are countries from the European Union like Italy, Sweden, along with the United States, the United Kingdom. China, Türkiye and others. In other words, there are sanctioning and non-sanctioning countries belonging in the same group. After the war entered its second phase, many sanctioning countries limited their trade with Russia, while non sanctioning countries like China and Türkiye increased their trade with the gas supplier (Darvas et al., 2024). If we were to consider this fact, Russia appears to compensate for its decline in trade with the sanctioning countries by increasing its exports to non-sanctioning countries (Darvas et al., 2024). The increase in trade with the latter countries did not offset the decrease in trade with sanctioning countries, but it can eventually cancel it out (Darvas et al., 2024). So, if trade was "normally" happening between Russia and all the active traders pre-2022, and then the trade took two opposite directions between countries, depending on who traded more or less, it is as if "nothing" happened for Russia.

To test whether or not trade patterns diverged between active traders, I graphed the log of imports of 8 active traders. I also produced the same graph but with the original import values. See Appendix 6.7 for reference. Not all of the active traders were included as many lines would make it harder to visualize, especially in the graph with the original import values. 2021, though not written in the year axis, serves as the cut-off point, as it corresponds to the transition from the first to the second phase of the war. Trade from 2019 to 2020 declined for all countries,

which is possibly attributed to the pandemic. It bounces back one year later, until different patterns start to show up between 2021 and 2022. The graph is possibly in line with trade patterns diverging, which could confirm that almost "nothing" happened for Russia. Therefore, this could explain why the relative or potential absolute change of imports for active traders is statistically indifferent from 0.

Chapter 3- The weaknesses and limits of the research

3.1-Splitting the dummies

The "surprising" result obtained when regarding the association of the change of imports for non-active traders to post 2014 may raise the question of how the war dummy set up. As it is stated before, the "war" coefficient is =1 if year>=2014, in other words until 2023. The fact that 2022 and 2023 are included in the coefficient may raise the question as to whether or not the inclusion of the last two recorded years influenced the result, considering that the year 2022 is the year where Russia started to increase its trade with non-sanctioning countries (Darvas et al., 2024).

Was the model supposed to separate the war and full-scale war coefficients more distinctly, by making war=1 for year>=2014 and year<=2021 and full-scale war=1 for year>=2022? It is completely possible in practice, and the results would probably not change much, should they change. However, the interpretation of the full-scale war coefficient and the interaction term related to the full-scale war would change. The full-scale war coefficient would still correspond to the change of imports of non-active traders following the start of the full-scale war, but their deviation from pre-2014. It is no longer the deviation from 2014-2021, the first phase of the war. The same logic would apply to active trader x full scale war coefficient: the deviation of active trader from non-active traders in the second phase while accounting for pre-2014, and not the first phase of the war. While minor changes could happen on the surface, the implications behind those changes become quite different. Arguably, setting the war and full-scale war dummies as year>=2014 and year>=2022 respectively just like I did in the model separates the war into two clear phases. The full-scale war coefficient corresponds to the deviation of non-active traders from the first phase. That would make the interaction term of the full-scale war the deviation of active traders from non-active traders, or the difference between the two, while accounting for the first phase of the war.

In the middle of the research, subdividing the active traders and non-active traders was an idea that was considered. Given the "big" difference between the two groups, subdividing them into continents would make the two groups more similar to one another. An example is assigning a dummy variable of Europe, 1 if the country is part of it or 0 otherwise. While that would make the two groups more similar, this would come at the cost of reducing the number of observations. Fewer observations weaken the statistical power and could lead to inconclusive results. Besides, there is no "true" control group in this study, for reasons already explained above, so aiming for subdivision with the aim of making both groups similar is not useful.

Even with how the active traders and non activers were split, analyzing the energy trade consequences of Russia became tricky. Graphing trade patterns for active traders admittedly was not the best statistical way to prove whether trade patterns diverged among active traders. A more "formal" way to prove it is to perform another regression concerning only the active traders. Alternatively, given that there are sanctioners and non sanctioners, studying the difference between these two types of groups might have been more appropriate for Russia's case. What was obtained from the energy market regression was not easily interpretable given how countries are separated based on whether or not they're an "active trader" or not. The reason for that is due to how sanctioners and non sanctioners were part of one group. Had these two been separated, the results could have been quite different. Estimating the model of this study for energy imports from Russia showed to be rather ineffective. The first two tables, in contrast to table 3, had more "interpretable" results. Context almost without a doubt plays a role.

That being said, studying sanctions needs different research on its own since the research question would change. The conducted study was not about sanctions, but rather studying the behavior of "active traders" relative to those who do not actively trade with Russia and Ukraine. The main reason for that has to do with the role of Russia and Ukraine in the agricultural and energy market. Many tend to be reliant on these two countries for their agricultural or energy needs. So, the goal of the study was to see if the active traders had their imports significantly changed compared to the non-active traders.

But, "being active" does not imply being dependent. Suppose country A imports wheat from country B the most, and alternative suppliers exist in the market, like C or D. A could import wheat due to B offering the cheapest wheat, and not necessarily because it is strictly "dependent" on B. If B suddenly goes through an economic shock, A would start importing from C or D. The distinction between being an active trader and being dependent should be clear, as this can affect the analysis. That on its own is a weakness to the research.

3.2- The limits of the results

One limit of the research could be that the 3 tables in the results section do not contain enough regressions. The model was only run assuming fixed effects, and depending whether the year was assumed continuous or as fixed effects. I initially thought of including results of a Pooled OLS estimation for additional comparison, but decided not to. The reason why is because this estimation relies on the assumption that there are no differences between the countries, and that all of the data belong to the same individual. Given the panel data, which contains countries that are different in different levels, this assumption does not hold. Therefore, unless all entities are very similar or almost identical to one another, which is clearly not the case here, Pooled OLS is not helpful for the panel data.

A major weakness to the research is the lack of observations. The three datasets suffer from lack of observations due to missing values. The datasets concerned with the agricultural market originally contain 640 observations, but only 367 observations were estimated for the case of Ukraine, and 388 for the case of Russia. This means that the model only estimated around 57% of the data in the Ukraine regression, and 60% of the data in the Russia regression in the agricultural market. The situation is better when estimating the data of the energy market: 742 among 1040 observations was estimated, in other numbers around 70%. Missing observations are due to the logarithm transformation of values: some non-active traders had imports value of 0 for some years, making their log of imports non-existent. There were few instances where active traders had 0 imports in a few years. Had I taken this into account earlier, I probably would have looked at non active traders that have non zero import values all the way for more completeness. Though at the same time, keeping values of "0" comes in line with the research question. The point of this study was to see if active traders significantly diverted from non -active traders throughout the two different phases of the war. The findings differed from one regression to the other.

One way to deal with missing observations is to simply gather more observations. The dataset of the energy market mitigated the issue of the lack of observations by having much more observations than the other two datasets. However, it is important to point out that more observations were collected with ease by extracting data at the 2-digit code. Using data at the 2 -digit code relatively saves a lot of time in data cleaning simply because it is the aggregate of all imports that fall under the corresponding category. However, for this study, it could be preferable to analyze 4-digit code data in order to study specific import changes. Analyzing exactly the relevant products in question should lead to more precise estimates. This is what

was done for the Ukraine section and the Russian section that falls under the agricultural market. That being said, extracting 4-digit code data comes at the cost of time: for the agricultural market, gathering imports data of barley, wheat, maize/corn, and sunflower seed of each country, and then adding up the 4 different imports for each country together to constitute one import value (the import value representing then the sum of each import commodity) for each year takes time. Having more countries is optimal since there would be more observations, but the more they add up, the more time it would take to perform the data cleaning. Nevertheless, for the 4-digit data I aimed for 32 countries as it seemed a "decent" number for a time span of 20 years in a panel data. My flaw is that I overlooked the 0s values that would cause a missing data problem due to the logarithmic transformation.

Moreover, there tends to be a concern for endogeneity and omitted variable bias. Other variables could be relevant to the model. GDP was initially considered as a control variable, but I decided to drop it later on. The reason why is because net exports are part of the GDP equation, so I feared potential multicollinearity between imports and GDP. Although GDP is used in the gravity model to determine trade, the model estimated here technically is not a gravity model, so this is different. Another potential candidate could be the exchange rate. A depreciation of a local currency would make foreign goods more expensive, which in turn could affect imports. However, some countries have a fixed exchange rate regime. A fixed exchange rate with time would make it a time invariant characteristic, therefore making it omitted from the fixed effect model. There could be other useful control variables that are better candidates than the exchange rate.

When it comes to data cleaning, the import data from Ukraine collected at the direct level from ITC were approximations. ITC bases its statistics from UNComtrade and from countries' national statistics reporters. The former provides more precise data. ITC was chosen still due to time efficiency: from one page an entire table depicting the import values of several countries of a specific product from a specific supplier can be downloaded, which is helpful for data collection. Russia data was collected at the mirror level as this is the only type of data that is available. Mirror data might not reflect true values since it's not the supplier who is reporting but rather the partners. However, in some contexts, mirror data can be more reliable than direct data. Given the ongoing war, WTO (2023) for instance theorized that Ukraine's data could be "distorted", so they preferred to use mirror data for their analysis. Perhaps mirror data could have been used for Ukraine for possibly more reliable results.

On a final note, while the interpretation showed possible consistency between the results and some of the existing findings, what the study has done was not more than offering possible explanations without "concrete" evidence. For instance, the main finding of table 1 could hint at a "resilience in the multilateral trading system" (WTO, 2023). However, it is not an affirmation. Import data from the European Union and the United States was not collected to confirm whether or not Egypt for instance switched suppliers or not (WTO, 2023). Only one supplier was examined for each table, leaving the rest of suppliers excluded.

4-Conclusion :

In conclusion, the paper's main findings are that active traders relative to non-active traders tended to experience a significant decline in trade with Ukraine of 82.44% after the war escalated. This decline could be attributed to the "resilience of the multilateral trading system" (WTO, 2023). Additionally, the presence of alternate suppliers may have allowed importers of Ukraine to change their trading strategy. When it comes to studying import patterns in the agricultural market from Russia, the research did not seem to find any statistical evidence that would suggest a change of behavior among traders in the agricultural market. This could be due to suppliers not always being available for various reasons like limited market share for instance (WTO, 2023).

The energy market may have more complex implications. The research finds the difference between the active traders' trade and the non-traders' trade in the first phase of the war to be significant: a decrease of 94.81%. Given that the change of non-active traders' imports seems positive and significant after the start of the first phase, it can be hard to tell whether the change of trade for active traders corresponds to non-active traders is a loss in absolute terms. Either way, in the first phase of the war Russia was going through financial difficulties, among which a decline in oil prices likely led to lower exports (Abramov & Viktorov, 2019; Åslund, 2019; Dreger et al., 2016). The financial difficulties of Russia possibly have a role behind the meaning of the first phase coefficients. However, it is important to remember that there are sanctioners and non-sanctioners that both belong in the active traders group.

This possibly matters because the change of imports for active traders relative to non-active traders when the war enters its second phase seems insignificant. The difference in trade between the sanctioners and the non-sanctioners would cancel each other out, which suggests that almost "nothing happened". This term could be negative in absolute terms since the change for non-active traders seems negative during the transition. A welfare loss might have been possible: diversifying exports to other suppliers may not compensate the loss made with the usual suppliers (Haidar, 2017). I suggest for a future study that when examining the changes in trade trends in the energy market, it could be better to split the countries based on who imposed the sanctions and who did not in order to get clearer results. Countries being split based on whether they're active or not made the table more difficult to interpret, especially considering that Russia gained in exports value due to increase in prices following the escalation (WTO, 2023).

As it was stated in the introduction of this paper, more doors for research can be opened. Although this paper was not about sanctions, given the "hard to discern" results of table 3 can lead to a possible research question: What determines the success of sanctions? From one perspective, sanctions seem to negatively affect Russia (Ahn & Ludema, 2020; Åslund, 2019; Darvas & Martins, 2022; Demertzis et al., 2022; Du & Wang, 2022). From another and more recent perspective, sanctions on Russia seem to fail or not be as effective (Gaur et al., 2023; Nigmatulina, 2023).

I also would like to open the door for another research question, though it is completely unrelated to the research question studied. It's a question that could fall under counterfactual history: if the economies of Russia and Ukraine were more diversified before the full invasion, would there be an energy crisis and food insecurity? As I explained above, Russia and Ukraine's economies are relatively not diversified since they mainly rely on energy and agricultural commodities respectively as their main export revenue (EBRD, 2023; ILO, 2010). This implies

for instance that they have significant market shares in the agricultural market (Glauber & Laborde, 2022). Taking this into account, if it were to be assumed that these two economies do not concentrate their exports onto specific products, and that they export a bit of everything, this could imply in an alternate scenario that countries importing food or energy from these two countries would import relatively smaller quantities than what they import in the real scenario since Russia and Ukraine are exporting all types of products more or less equally. What this further implies is that countries would not be dependent on these two countries to secure their needs. Therefore, switching suppliers should be relatively much easier, and a global crisis may not happen.

There's no way to provide concrete proof for it since it is not a scenario that materialized. I can however think of one possible reference that could support the idea of a global crisis not happening. One year after the war escalated, countries managed to adapt their trading patterns by either switching suppliers or getting different commodities from different suppliers (WTO, 2023). This seemed rather surprising as economists predicted a worse outcome (WTO, 2023). In reality, despite the threat posed by the war, countries managed to adapt (WTO, 2023). So, does it imply in the alternate scenario that adapting would happen more easily?

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6-Appendix:

6.1-Table showing the active traders and non-active traders of the agricultural market, with Ukraine as the supplier

Active Traders	Non-Active Traders
Egypt	Hong Kong
Saudi Arabia	Brazil
Spain	Chile
Iran, Islamic Republic of	Honduras
Syrian Arab Republic	Mauritius
Tunisia	Equatorial Guinea
Korea, Republic of	Finland
Libya, State of	Costa Rica
Italy	Australia
Jordan	Dominican Republic
Türkiye	Guinea
Japan	Saint Kitts and Nevis
Portugal	Norway
Netherlands	Marshall Islands
Bangladesh	Liberia
Kenya	Tuvalu

6.2-Table showing the average, minimum, maximum and standard deviation of the active traders and non-active traders' import values in the agricultural market, with Ukraine as the supplier

Variable	Active trader	Non-Active trader

Average of imports	212904309.4	223746.875
Minimum	0	0
Maximum	1435947000	25690000
Standard deviation	253786879.7	1616221.466

6.3-Table showing the active traders and non-active traders of the agricultural market, with Russia as the supplier

Active Traders	Non-Active Traders

Egypt	Mali
Türkiye	Serbia
Saudi Arabia	Cameroon
Yemen	Slovakia
Iran, Islamic Republic of	Afghanistan
Azerbaijan	Switzerland
Bangladesh	Hungary
Jordan	Iceland
Tunisia	Niger
Georgia	Croatia
Italy	Czech Republic
India	Côte d'Ivoire
Armenia	Cambodia
Lebanon	Australia
Kenya	New Zealand
Greece	Singapore

6.4-Table showing the average, minimum, maximum and standard deviation of the active traders and non-active traders' import values in the agricultural market, with Russia as the supplier

Variable	Active trader	Non-Active trader
Average of imports	244153693.8	3314156.25
Minimum	0	0

Maximum	3354234000	178896000
Standard deviation	473899926.5	16499937.92

6.5-Table showing the active traders and non-active traders of the energy market, with Russia as the supplier

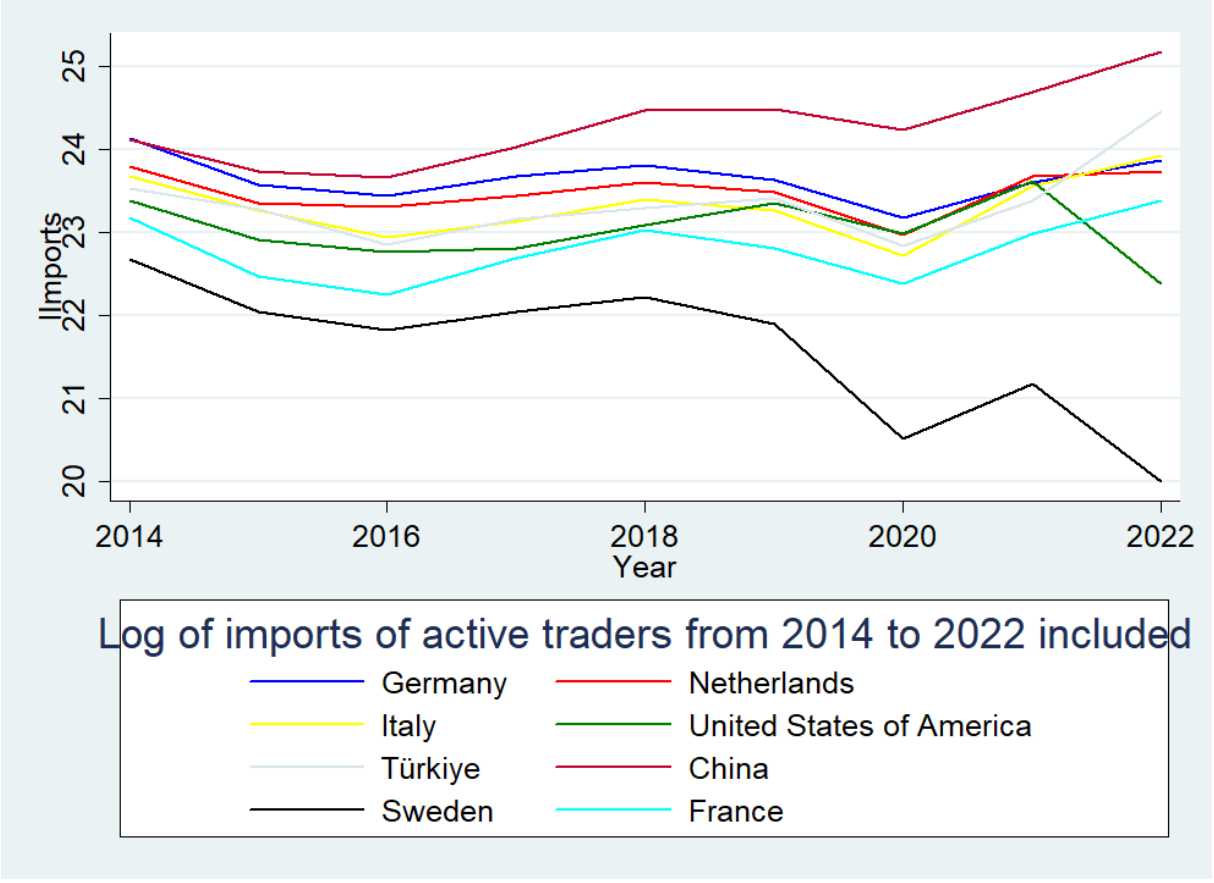
Active Traders	Non-Active Traders

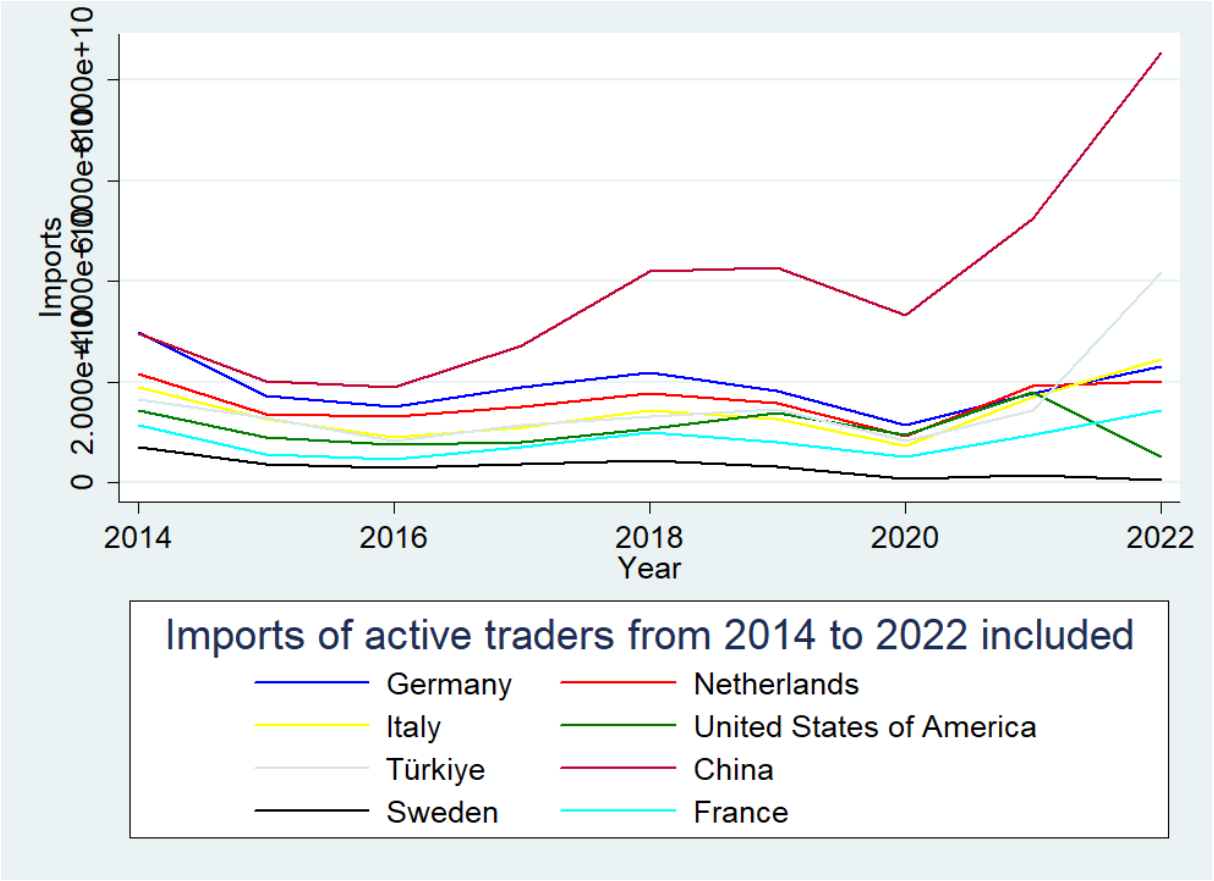
Germany	Kuwait
Netherlands	Cuba
Italy	Tanzania, United Republic of
United States of America	Bolivia, Plurinational State of
Türkiye	Namibia
China	Madagascar
Poland	Bangladesh
France	Guinea
Ukraine	Yemen
Belarus	Bahrain
Finland	Guinea-Bissau
Japan	Cameroon
Spain	Mozambique
United Kingdom	Nicaragua
Hungary	Faroe Islands
Lithuania	Myanmar
Slovakia	Chile
Czech Republic	Luxembourg
Greece	Ghana
Sweden	Rwanda
Korea, Republic of	Mali
Belgium	Sri Lanka
Bulgaria	Nepal
Kazakhstan	Palestine, State of
Romania	Ethiopia
Singapore	Libya, State of

6.6-Table showing the average, minimum, maximum and standard deviation of the active traders and non-active traders' import values in the energy market, with Ukraine as the supplier

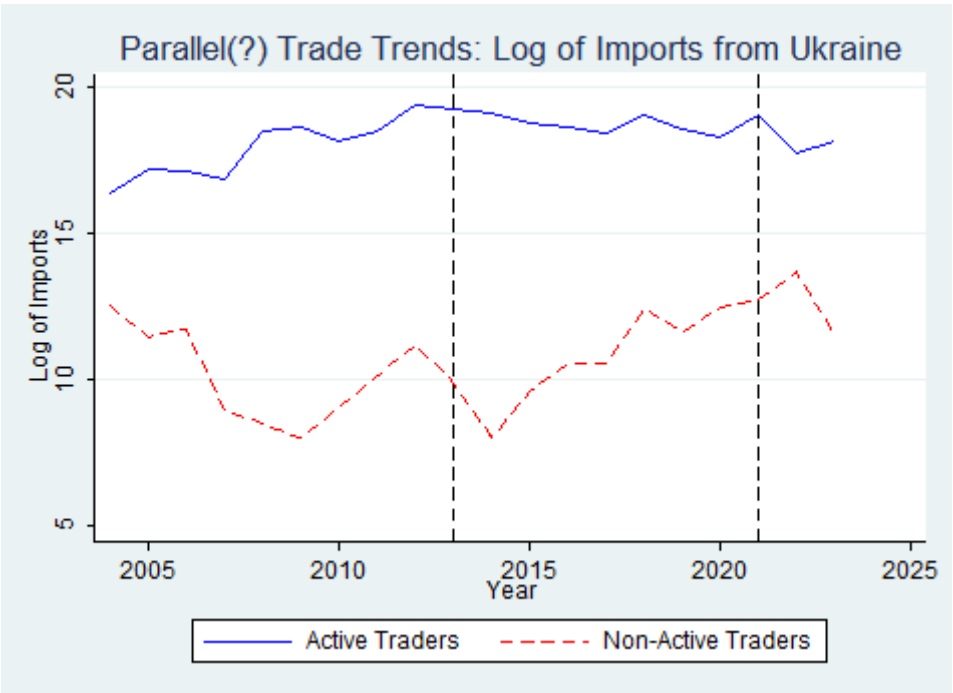
Variable	Active trader	Non-Active trader
Average of imports	8641531873	7662585.74
Minimum	0	0
Maximum	94035767000	955665000
Standard deviation	8778000097	53837393.5

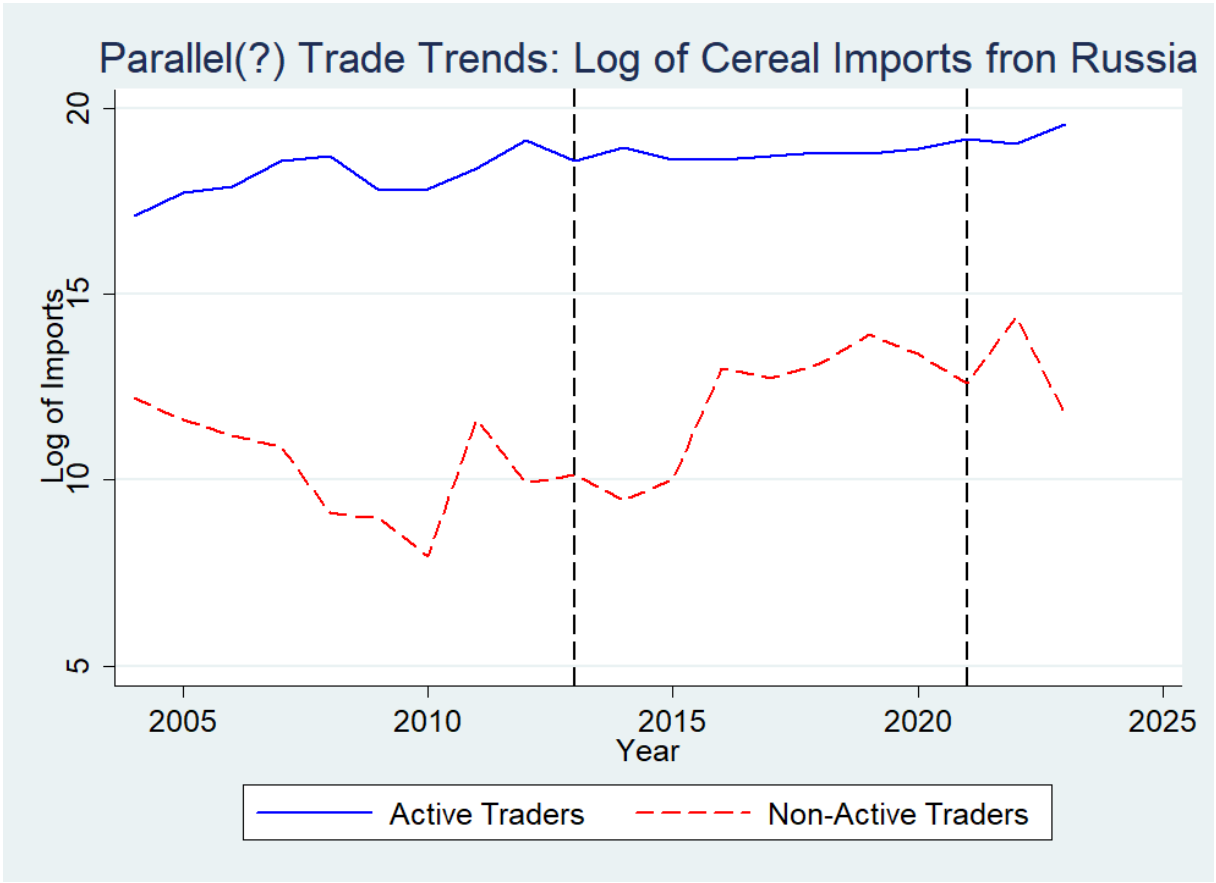
6.7-Graphs showing the changes of imports of some active traders throughout the first phase of the war and the transition in the energy market.

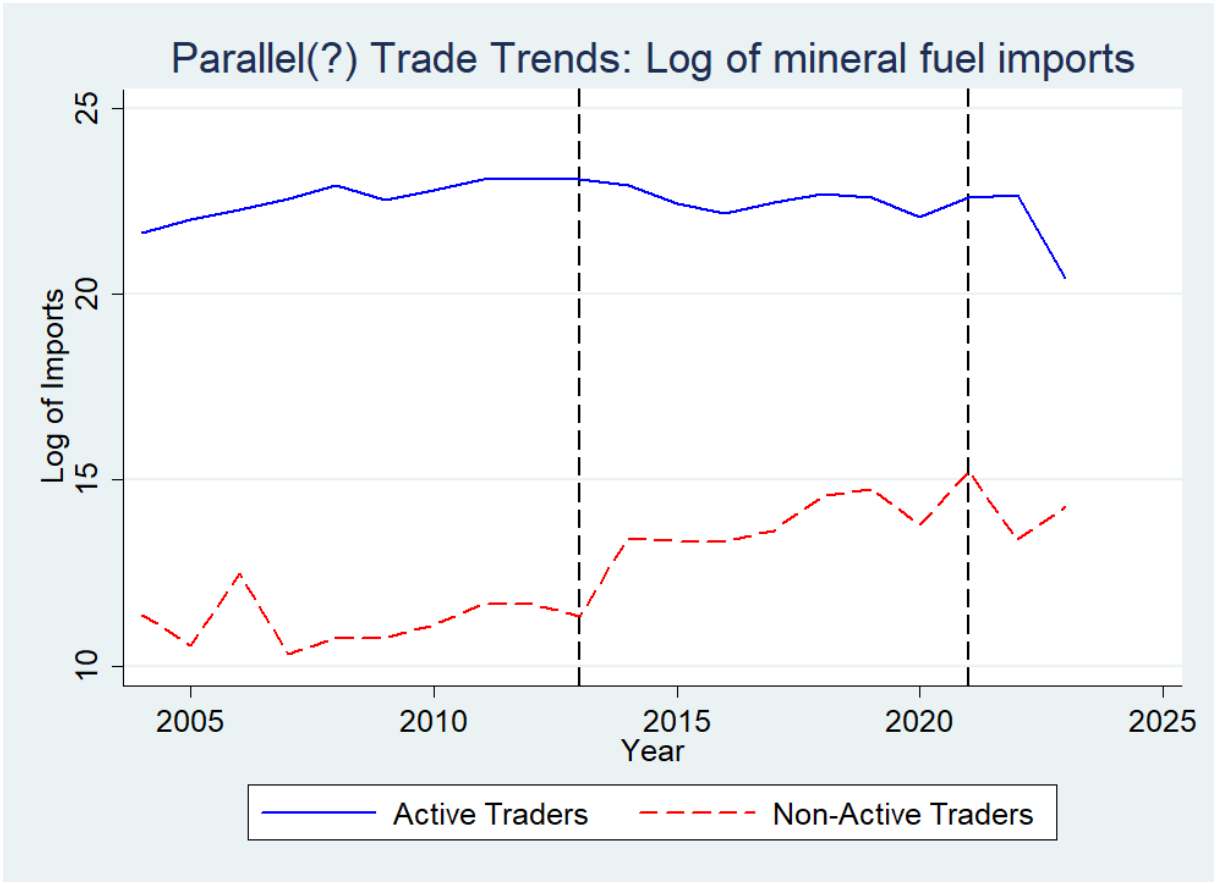




6.8-Graphs showing "parallel" trends




Parallel(?) Trade Trends: Log of Cereal Imports fron Russia
Log of Imports
5
10
15
20
2005
2010
2015
2020
2025
Year
Active Traders
Non-Active Traders


Parallel(?) Trade Trends: Log of mineral fuel imports
Log of Imports
10
15
20
25
2005
2010
2015
2020
2025
Year
Active Traders
Non-Active Traders