The Impact of Brexit on European Union Agricultural Trade

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ABSTRACT

The United Kingdom's decision to leave the European Union marked a broader retreat from globalization, affecting both trade relationships and government budgets. The majority of existing research on Brexit's impact on trade focuses on the UK's experience, overlooking the realities that EU member states faced after losing one of their top budget contributors and adapting to shifts in trade agreements with a global economic power. To evaluate the impact of Brexit on European Union agricultural trade, this study follows a research design that contains both a time series and a comparative analysis. Annual data points were collected from 2015, the year before the Brexit referendum, through 2023, which is the most recent year with reliable data. To accurately represent the EU within research limitations, France, Germany, and Poland were selected for study. To assess the agricultural trade of EU member states before and after Brexit, four subjects were selected: each country's economic dependence on agriculture over time, the effects of EU agricultural policy shifts on member-states, overall bilateral agriculture trade flows by member-state over time, and international trade by agricultural product category. This research led to the conclusion that Brexit caused small trade shifts, but may have created larger consequences for the EU budget, CAP, and investment in less wealthy member states. This research adds to ongoing discussions regarding the various consequences of Brexit, as well as larger debates on the importance of European Union membership in an increasingly evolving world.

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ACRONYMS

CAP	Common Agricultural Policy
DEU	Germany
EAFRD	European Agricultural Fund for Rural Development (CAP Pillar 2)
EAGF	European Agricultural Guarantee Fund (CAP Pillar 1)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FRA	France
GBR	United Kingdom of Great Britain and Northern Ireland
GDP	Gross Domestic Product
HS	Harmonized System
HTS	Harmonized Tariff Schedule
OLS	Ordinary Least Squares
POL	Poland
PPML	Poisson Pseudo-Maximum Likelihood
RoO	Rules of Origin
UK	United Kingdom
WTO	World Trade Organization

INTRODUCTION

When the United Kingdom voted to leave the European Union, budget allocations and farms were suddenly thrust into uncertainty. Not only was the UK a major importer of agricultural goods during its European Union membership, but it was the second largest contributor to the EU budget after Germany. The EU budget largely funds research, regional development, and agriculture. Agriculture, which has historically been treated as a unique sector in need of special protection, experienced severe economic limitations since 2015. Despite Brexit, the COVID-19 pandemic, a climate crisis, rising costs, and EU bureaucracy, the agricultural industry proved to be remarkably resistant, and was able to sustain trade flows and preserve exporter surpluses. This gives rise to the central question guiding this study: how did Brexit impact the agricultural trade of the European Union?

LITERATURE REVIEW

The act of the United Kingdom leaving the European Union not only altered budgets and trading systems. It represented an ideological shift away from globalization and towards deglobalization, which is marked by decreased international economic integration and interdependence. Authors Matthew C. Klein and Michael Pettis explore the source of globalization and trade conflict, specifically within the context of economic inequality and international investment. Before the industrialization of modern global powers, international investment was driven by competition over natural resources. Today, international investment strives to match unmet consumption needs in a world of abundant idle resources. Industries, and therefore their countries, that receive more international investment are able to increase their savings, which can lead to trade surpluses through raising production relative to domestic demand. As these countries raise production, they can become a net exporter, or in other words, develop a trade surplus. Although being in a trade surplus allows for the accumulation of savings, it does not guarantee that these savings will assist in the development of living standards within that country. Additionally, being in a trade deficit for a period of time is not necessarily damaging, as the process of industrialization often requires the temporary reliance on imports to support the building of national industries. Therefore, to understand the full impact of international investment and savings on the public sector of a country, Klein and Pettis theorize it is necessary to observe how assets are collected and where they are allocated. Foreign investors consider access to markets and industry strength when determining where to invest, as investments must satisfy unmet consumption needs.[1] Therefore, in a globalized world with

[1] Matthew C. Klein and Michael Pettis. "Trade Wars Are Class Wars: How Rising Inequality Distorts the Global Economy and Threatens International Peace." *Yale University Press*, 2020. https://www.jstor.org/stable/j.ctv10sm96m.

significant foreign investment, inequality between nations cumulates as more developed countries with access to larger trading markets receive the vast majority of foreign investment.

Raffaele Giammetti, Luca Papi, Désirée Teobaldelli, and Davide Ticchi expand on this theory and apply it to the context of European deglobalization. They point out that although deglobalization has potentially negative economic effects for all European countries and regions, there are notable differences across industries and regions. They separate Europe into three main regional value chains: The Central-Eastern bloc, Northern bloc, and Southern bloc. The Central-Eastern bloc is highly integrated within the interregional production network, the Northern bloc is mainly integrated with countries outside the EU, and the Southern bloc is less dependent on regional and global supply chains. However, the agricultural industry typically has smaller and less complex supply chains, meaning that deglobalization would not have the same negative economic impact on agriculture as it does on other industries. In fact, the authors say the economic impact of a return to a less integrated trade would lead to an overall positive value added of 14.8% in EU agriculture.[2] However, they theorize that this impact could be greatly different between each regional bloc, between each country within a regional bloc, and within regions of a country.

In a 2025 article, authors Shania Bhalotia, Swati Dhingra, Danyal Arnold augment these theories on European deglobalization by applying the issue of Brexit. They reference the UK's goal of "sovereign trading nation free from EU constraints."[3] However, they find that these goals have remained incomplete, as the UK has failed to fully reposition its economy on an international scale. The authors believe that this failure is not an isolated result, and theorize that

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[2] Raffaele Giammetti, et al. "The Network Effect of Deglobalisation on European Regions." *Cambridge Journal of Regions, Economy and Society*, Volume 15, no. 2, 2022. https://doi.org/https://doi.org/10.1093/cjres/rsac006.

[3] Danyal Arnold, et al. "Deglobalisation in Disguise? Brexit Barriers and Trade in Services." *Centre for Economic Performance*, LSE, June 2025. cep.lse.ac.uk/pubs/download/dp2110.pdf.

parallel conclusions can be made for nations contemplating a future of orientation away from established trading relationships.

Two 2013 reports provide necessary context regarding agriculture and trade in the European Union before Brexit occurred. Ben Shepard highlights the importance of harmonized agricultural standards for trading within the EU. If participating states agree on the same standards, goods will be valid in all locations, and therefore can be bought and sold in all locations. Although the majority of policy focuses on agricultural relations relating to food safety, there is data that shows that within global supply chains, voluntary standards also matter. Voluntary standards may include environmentally friendly production tactics, more ethical labor laws, and packaging. Additionally, it is stated how higher processed goods are less affected by international standards, as expectations for meat, dairy, and produce are much more strict.[4] Marian Rizov introduces the argument on how important the Common Agricultural Policy is in regards to EU agricultural production. The Common Agricultural Policy, EU's economic agricultural support system, has historically used around 40 percent of the EU's total budget. In 2013, it spent around €50 billion. The primary goal of the program is to "support farmers' income and improve the environmental impact of agricultural production" through decoupled payments. The program utilizes payments instead of subsidies because it aligns with the World Trade Organization's aim of enhancing productivity and being less distortive financially.[5] These two articles introduce aspects of the EU's agricultural trade industry and highlights the

[4] Ben Shepard, and Norbert L.W. Wilson. "Product Standards and Developing Country Agricultural Exports: The Case of the European Union." *Science Direct*, October 2013. https://www.sciencedirect.com/science/article/pii/S0306919213000699.

[5]Marian Rizov, Jan Pokrivcak, and Pavel Ciaian. "CAP Subsidies and Productivity of the EU Farms." *Wiley Online Library*, August 19, 2013. https://onlinelibrary.wiley.com/doi/full/10.1111/1477-9552.12030.

importance of the Common Agricultural Industry, the WTO, and matching international standards.

The leading English language articles that dive into post-Brexit agricultural trading with the EU focus their commentary on the effects that Brexit has on agricultural-trading for the UK, and offer little details on the experiences of individual EU member states. Dieter Helm explores how the UK may adopt a similar Common Agricultural Policy structure from the EU, while possibly shifting the amount and intentions of future subsidies to minimize adjustments for their own farmers. The article lays out three distinct options for adopted structures. The first simply transfers the full Common Agricultural Policy structure over to Britain. However, this means that the CAP policy of larger farms being prioritized for funding will continue on within the UK. The second option uses the basic structure of the Common Agricultural Policy, but shifts the allocation of funding so that smaller farms are able to access equal funding. The third and final option is introducing subsidies to push environmentally friendly practices onto the agricultural industry, which is a large shift away from government payments to farms themselves. Regardless of the chosen adopted structure, there are imperfections and there are bound to be conflicts that arise from each.[6] A 2019 article by Michael Keating adds on to Helm's conclusions with additional potential actions since the UK left Common Agricultural Policy. Here, it is highlighted that the continuation of common European standards for agriculture is essential for the continuation of trade, and any successful attempt by the UK to unalign with common European standards will hurt their chances of participating in trade. Additionally, the article states that it is likely that the UK will try to form a free trade deal with the EU, or at the very least increase

[6] Dieter Helm. "Agriculture after Brexit." *OUP Academic*, March 2017. https://academic.oup.com/oxrep/article/33/suppl_1/S124/3066077.

reliance on the World Trade Organization for future trade endeavors.[7] Similarly, Valerie Hughes illustrates how the UK may lean on its previous agreements with the World Trade Organization while updating trade arrangements. However, there is a prediction that the UK will fight to make some modification to their trading deals within the WTO, most specifically in regards to the scheduling of their goods and services, as the UK can no longer be included in the EU's goods and services schedule.[8] Both of the 2017 articles and the 2019 article show how it may be easier for the UK to make small changes to previously established systems rather than create whole new systems.

Hyung Sik Choi highlights how different types of agricultural goods have various trade implications post-Brexit. It is likely that due to high standards for meat, dairy, and produce, increased restrictions on the trade of these goods will result in higher prices on the market. Additionally, there is a fear of farm income losses, which could elevate the prices of food in the UK and other locations of consumption.[9] Similarly, Alejandro G. Graziano states how Brexit impacted more of the UK's trading relationships than originally predicted. Therefore, there is a possibility of a shift of some previously made trade agreements with countries in and outside of the European continent.[10] Although these articles provide valuable insight into the UK's experience with agricultural trading post-Brexit, they lack essential information on the effects

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[7]Michael Keating. "The Repatriation of Competences in Agriculture after Brexit." *Centre on Constitutional Change*, February 2019. https://www.centreonconstitutionalchange.ac.uk/publications/repatriation-competences-agriculture-after-brexit.

[8] Valerie Hughes. "Brexit and International Trade One Year after the Referendum." *Centre for International Governance Innovation*, September 26, 2017. https://www.cigionline.org/publications/brexit-and-international-trade-one-year-after-referendum/.

[9] Hyung Sik Choi, Torbjörn Jansson, Alan Matthews, and Klaus Mittenzwei. "European Agriculture after Brexit: Does Anyone Benefit from the Divorce?" *Wiley Online Library*, August 30, 2020. https://onlinelibrary.wiley.com/doi/full/10.1111/1477-9552.12396.

[10]Alejandro G. Graziano, Kyle Handley, and Nuno Limão. "Brexit Uncertainty: Trade Externalities Beyond Europe." *American Economic Association*, May 2020. https://www.aeaweb.org/articles?id=10.1257%2Fpandp.20201021.

that EU member states experienced after trade with one of their largest partners became economically and politically muddied.

However, there is some newer literature that provides broad commentary on Brexit shifts in agricultural trading between the UK and EU. Alan Greer argues that British farmers will need to compete with EU farmers who receive Common Agricultural Policy direct payment. It is also made clear that although the UK created expectations of agricultural policy innovation after Brexit, there has been minimal policy that has been fully introduced, developed, and implemented. The report includes an additional point that Brexit has somewhat eroded the idea that agriculture is a sector that deserves special treatment and specific programming.[11] In contrast, Juan de Lucio examined Spain's trade flows after Brexit. It was discovered that Spanish trading was negatively affected, as exports and imports decreased by 24% and 27%. Additionally, the actual number of products being traded decreased, mainly due to difficulties navigating the Rules of Origin regulation under the EU–UK Trade and Cooperation Agreement.[12] Angela Cheptea predicts that as EU agriculture products are diverted to other various countries inside and outside of the EU, the market will cause an overall drop in prices. This is contrary to Hughes's position that prices will increase as higher standards for produce and meat are implemented. However, the 2021 article also foresees price fluctuations with products that have previously gone through a multistep production process across multiple countries.[13] Therefore, different types of agricultural products may experience different price shifts depending on the

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[11] Alan Greer and Wyn Grant. "Divergence and Continuity after Brexit in Agriculture." *Taylor & Francis Online*, May 3, 2023. https://www.tandfonline.com/doi/full/10.1080/13501763.2023.2204118.

[12] Juan de Lucio, Raúl Mínguez, Asier Minondo, and Francisco Requena. "The negative impact of disintegration on trade: The case of Brexit." *European Economic Review*, 2024. https://www.sciencedirect.com/science/article/pii/S0014292124000278.

[13] Angela Cheptea, Marilyne Huchet, and Lucile Henry. "How will Brexit affect the patterns of European agricultural and food exports?." *European Review of Agricultural Economics*, December 2021, https://academic.oup.com/erae/article-abstract/48/5/1031/6372173.

implementation of international standards and whether they are transported to other countries during the production process. The newest publication from Amélie Guillan and Chahir Zaki tackles a question of ongoing debate: does Brexit matter after all? However, the authors focus their investigation on if Brexit truly impacted trade in the UK, not if Brexit damaged trading systems for the rest of the EU. Through examinations of trade flows, trade margins, and manufacturing data, the authors cite a decline in UK production due to decreased access to imported inputs, as well as a failure of regional trade agreements in promoting trade. They conclude that these RTAs are unable to counterbalance the harmful effects of Brexit on the British economy, giving preference to the belief that Brexit does matter.[14] Although this information is useful in understanding an updated context of Brexit and trade systems, the UK is still at the centerpoint of the articles' focus, with trade flow of the UK and the EU being the main point of study. This perspective is valuable in understanding the greater EU trade post Brexit, however it misses essential viewpoints the individual impacts on various EU member states. Not all the EU member states have the same agricultural circumstances, so to fully understand the effect that Brexit had on individual EU member-state agricultural trade, research on the effect on individual EU member states is necessary. In focusing on France, Germany, and Poland, the majority of the little existing literature is written by their own nationals in their native languages. Through the utilization of my French language ability, alongside German and Polish translation software, I was able to uncover country-specific research.

French author Damien Broussolle finds that the loss of the EU's second largest financial contributor will have long-term consequences on the EU, even if immediate data doesn't seem very drastic. France is put in a uniquely advantageous position, as it becomes the second largest

[14] Guillin, Amélie and Chahir Zaki. "Trade flows and RTAs: Does Brexit matter after all?." *Economics Letters*, January 2026. https://www.sciencedirect.com/science/article/pii/S0165176525005889.

EU contributor and raises in influential rank, despite its annual EU payment only increasing by less than half a billion euros. Broussolle states that this rise in French rank will allow France to counter Germany and push for implementation of agricultural policies that assist the French agricultural industry.[15] Similar to Lucio's findings in Spain, German author Martin Banse states that Brexit leads to a decrease in German exports and imports, with redirections of trade towards other EU member states. Also similar to what author Cheptea mentioned in their article, Banse predicts that primary agricultural products are the most impacted in Germany. Overall production is also expected to stay fairly stable, with potentially a very slight decrease of maximum 0.5%. However, the German agricultural sector is most likely to see this decline is the pig and poultry meat sector. The beef sector is predicted to remain stable, especially as it absorbs labor from agricultural sectors that are decreasing their population of laborers. Banse disagrees with Cheptea and Hughes, and predicts almost virtually no shift in the price levels of products, while Cheptea predicts an overall drop in prices on the market and Hughes predicts an overall increase.[16] German author Wiebke Nowack finds that German farm size has been increasing due to a lack of opportunity for small farms to receive financial and administrative support, specifically from CAP. Although Nowack investigates farm size through an environmental and political framework, her research is valuable in establishing trends of German agricultural production over time. She concurs with Banse's stance that some German agricultural sectors are seeing less laborers for similar levels of productivity, with Nowack citing advances in agriculture

[15] Damien Broussolle. "Le Brexit et le budget de l'UE : quelles conséquences pour la politique agricole commune et la contribution française?" *Bulletin de l'Observatoire des politiques économiques en Europe*, 2018. https://univoak.hal.science/hal-05255892v1/document.

[16] Martin Banse and Florian Freund. "Mögliche Auswirkungen Eines Harten Oder Weichen Brexit Auf Die Deutsche Landwirtschaft - Update." *Thünen-Institut für Marktanalyse*, April 2018. https://ageconsearch.umn.edu/record/271872/?v=pdf.

technology within crop cultivation.[17] Polish authors Zbigniew Brodziński, Małgorzata Juchniewicz, Renata Marks-Bielska, and Zbigniew Nasalski look to the future of the CAP in two Polish regions, and in doing so, provides valuable insight on the relationship between CAP and farm size in Poland. The authors find that conventional farms, on average, were over two times larger in area than organic farms, therefore more conventional farms were receiving CAP funding than organic farms. They also found that over the past twenty years, the share of CAP expenditures in the EU's GDP in relation to the GDP generated jointly by the EU member states decreased to 0.32% from 0.60%. For all farms, the most frequently chosen external source of capital in financing the development of agriculture production was EU funds, followed by loans and credits from banks and state subsidies.[18] Broussolle's research also shows that further restrictions of CAP funding leads older and larger member states to receive priority in funding, putting Poland in a difficult position. Before Brexit, Poland was the largest net beneficiary of EU funds in absolute terms, when looking at CAP and CP receipts. Therefore, any loss of funding leads to forced reliance on local and national government funding for projects, who may not be prepared to properly finance necessary action due to years of stable reliance on CAP funding.[19] These four pieces of literature provide valuable insight into the rise of French influence on EU policymaking, the relationship between CAP funding in farm size in both Germany and Poland, agriculture production within more specific agricultural sectors, as well as national shifts in

[17]Wiebke Nowack. "Soziale Dimensionen landwirtschaftlicher Multifunktionalität vor dem Hintergrund des Größenstrukturwandels in der Landwirtschaft." *Lebenswissenschaftlichen Fakultät der Humboldt-Universität zu Berlin*, November 2023. https://edoc.hu-berlin.de/items/914030d9-f74d-4935-af16-e9500ab5fed2.

[18]Zbigniew Brodziński, Małgorzata Juchniewicz, Renata Marks-Bielska, and Zbigniew Nasalski. "Warunki Rozwoju Gospodarstw Rolnych Regionu Warmii i Mazur w Kontekście Planu Strategicznego Wspólnej Polityki Rolnej Na Lata 2023-2027." *Economic Publishing Platform*, 2022. https://books.economic-research.pl/index.php/eep/catalog/book/99.

[19] Broussolle, *Le Brexit et le budget de l'UE : quelles conséquences pour la politique agricole commune et la contribution française*, 2018

exports and imports. Additionally, there is disagreement among how Brexit will impact the market prices of agricultural goods within and outside of the EU. There are predictions that prices will go up, predictions that prices will go down, and predictions that prices will stay relatively the same. These predictions, many of which were made before Brexit was fully implemented, can be verified or disproven through additional research on recent market conditions and trade flows.

An important factor within analyzing economic impacts during Brexit is the significant overlap with the COVID-19 pandemic. However, research on the pandemic's impact on global agricultural trade finds that although there were distributions that arose at the beginning of 2020, the agricultural sector had recovered by 2021. A trade policy brief by the Food and Agricultural Organization of the United Nations from 2021 states that immediate movement restrictions led to agricultural labor shortages and limited availability of access to inputs and outputs such as seeds, fertilizers, and pesticides. Additionally, consumption patterns saw an immediate shift, with demand for non-food commodities like live plants and cotton declining, while demand for necessities like cereals, oilseeds, fruits and vegetables stayed strong. In much of the world, political commitments kept agricultural trade flowing smoothly, and there were active discouragements against unilateral measures that could harm other countries' food security.[20] Shawn Arita similarly found that higher end goods such as hides, skins, alcohol, and rubber saw some immediate contraction in trade during 2020, as they are extremely reliant on demand. The authors also examined agricultural supply chains and found that because they are typically

[20]C. Avesani, et al. "COVID-19: Agricultural Trade and Policy Responses During the First Wave of the Pandemic in 2020." *Food and Agriculture Organization of the United Nations*, July 2021. doi.org/10.4060/cb5406en.

smaller and less complex than the supply chains of other industries, they were able to withstand the immediate policy restrictions of the pandemic and recover after restrictions were lifted.[21]

Radovan Kastratović and Predrag Bjelic also found that most agricultural products were able to overcome disruptions from the onset of the pandemic. There were short term demand increases for staple food products as demand decreased for non-essential goods. Despite some governments placing temporary export restrictions to protect food security in their own country in the event of a food crisis, restrictions were quickly lifted and agricultural trade remained resilient while surpassing non-agricultural trade in terms of growth.[22]

Additionally, the authors theorize the impact of the COVID-19 pandemic on shifting the role that agriculture plays in globalization or deglobalization. They believe that the event may prompt governments to reevaluate their stance of agricultural globalization and invest in higher levels of self-sufficiency in their agricultural sectors to maximize food security. This would lead to a reduction in global cooperation in the world economy and the degradation of international agricultural supply chains. However, the authors believe that this act of protectionism does not guarantee food security, as a reliance on a single food source entails the risks of local crises and shocks. Furthermore, Peter A. G. Van Bergeijk presents evidence that global agricultural trade has been resilient to economic shocks of the COVID-19 pandemic, and even showed significant strength during shifts towards long-term trends due to deglobalization. Van Bergeijk theorizes

[21] Shawn Arita, et al. "Has global agricultural trade been resilient under coronavirus (COVID-19)? Findings from an econometric assessment of 2020." *Food Policy*, Volume 107, 2022. https://doi.org/10.1016/j.foodpol.2021.102204.

[22]Radovan Kastratovic and Predrag Bjelic. "The Impact of COVID-19 Pandemic On Agricultural Trade." *10th International Conference of the School of Economics and Business*, Book of Abstracts and Conference Proceedings, July 2023. https://doi.org/https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4510579.

that pushes for deglobalization will continue, especially as policy makers increasingly strive for self-sufficiency and food security.[23]

Existing English language literature, written mostly by Americans or British, is highly focused on Brexit's impact on the UK, with some broad predictions for EU implications. French, German, and Polish literature offer insight into the impact of Brexit on their agricultural trade and production. However, there is an abundance of research that proves an absence of long-term implications from the COVID-19 pandemic on agricultural trade, showing the reliability of economic agricultural data over time.

Through an application of theories of globalization to policy implications of Brexit, it is possible to reach multiple conclusions regarding impacts on agricultural trade of EU member states. Both Cheptea and Banse reveal that many agricultural products produced by EU member states that may have been previously exported to the United Kingdom may instead be diverted to other countries around the world.[24][25] This means that incomplete deglobalization, or disintegration of just one party, may just lead to redistribution. The withdrawal of a state from a multi-state trading partnership does not automatically lead to continuous deglobalization efforts by other states in that partnership .

However, the European Union establishes economic unity in addition to free trade. Therefore, when Brexit occurred, there were direct economic impacts to other member states, despite them having no deglobalization plans of their own. Economic programs that rely heavily on the budget of the EU, which are almost entirely funded by the payments of member states,

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[23] Peter Van Bergeijk. "Resilience to Deglobalisation." *The World Economy*, 10 June, 2025. https://doi.org/https://doi-org.proxy.mtholyoke.edu:2443/10.1111/twec.13734.

[24] Cheptea, *How will Brexit affect the patterns of European agricultural and food exports?*, 2021

[25] Banse, Mögliche Auswirkungen Eines Harten Oder Weichen Brexit Auf Die Deutsche Landwirtschaft - Update, 2018

were especially at high risk after the EU lost one of their top financial contributors. The Common Agricultural Policy, which is one of these programs, saw fiscal restraints.[26] Therefore, the withdrawal of a state from a multi-state economic partnership leads to economic uncertainty for member states that benefit from economic programs funded by the multi-state union. This economic uncertainty may put pressure on the state's national economy to make up for any potential loss in program funds. It may shift the strategies of receiving parties of programs, such as the agricultural industry increasing farm size to maximize their ability to receive CAP funds.[27] As discussed by Giammetti, each European regional bloc has their own unique economic, production, and trade baselines.[28] For that reason, different regions will see different amounts of pressure put on their individual states to ensure future economic stability after an act of deglobalization by a top financial contributor in an economic union.

In addition, a union that organizes economic unity and free trade, such as the EU, relies on policymaking implemented by its member states. Typically, wealthier member states who contribute more financially to the union have more political influence on the union. When a more influential member state departs a union, such as the UK leaving the EU, the influential rank shifts. Broussolle cites the UK's departure leading to France's rise in rank and being more able to counter Germany, as well as more influential member states receiving a priority in funding for programs such as CAP.[29] Therefore, a consolidation of political influence in a multi-state economic union after the departure of a member state may lead to less wealthy states, such as

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[26] Nowack, *Soziale Dimensionen landwirtschaftlicher Multifunktionalität vor dem Hintergrund des Größenstrukturwandels in der Landwirtschaft*, 2023

[27] Nowack, *Soziale Dimensionen landwirtschaftlicher Multifunktionalität vor dem Hintergrund des Größenstrukturwandels in der Landwirtschaft*, 2023

[28] Giammetti, *The Network Effect of Deglobalisation on European Regions*, 2022

[29] Broussolle, *Le Brexit et le budget de l'UE : quelles conséquences pour la politique agricole commune et la contribution française*, 2018

Poland, having a lesser influence on policy. Therefore, they are not set up to benefit from new policies. These impacts are only amplified by previously discussed pressures on state governments to make up for any unreliability of economic programs that were previously secure.

It can be concluded that deglobalization by one country does not guarantee disintegration by its neighboring countries in a free trading network. Instead, goods can be redistributed to other states in and outside of that trading network. However, when deglobalization impacts a mulit-state economic union, the reconstruction of political influence and fiscal limitations for multi-state economic programs will lead to unequal impacts between member states.

Nonetheless, across all literature, there is a lack of recent research that utilizes the most updated data on farm size, CAP funding, market price, agricultural production, exports vs imports, examines separate agricultural sectors, and assesses the data of a few selected member states. Consequently, this study's ability to address these issues in more detail will allow for a more advanced understanding of the impact of Brexit on EU agricultural trade within the context of wider deglobalization.

METHODOLOGY

In order to evaluate agricultural trade of EU member states, and how it was impacted by Brexit, a research design that contains both a time series and a comparative analysis is appropriate. The decision to select annual data points from 2015 through 2023 is defended by the fact that 2015 is the year before the Brexit referendum and 2023 is the most recent year with reliable data. A time series is necessary in evaluating quantitative data throughout the development of Brexit. When comparing whole monetary values, all data has been converted to 2015 USD. This allows for proper comparison of monterey data over time without the distortion of inflation, and permits accurate comparison between years and currencies.

Within the comparative analysis, data from three EU member states was collected. Due to research limitations, individual evaluations of each member of the EU from 2015 to 2023 is not possible. However, a selection of multiple states allows for observations of how Brexit impacted the wider EU, not just one member state. A comparative case study is appropriate, as this research explores how a specific event affected the diverse system of the EU, which holds a combination of both wealthy and less wealthy states that are affected differently by economic crises. To try to accurately represent the EU within the given limitations, France, Germany, and Poland were selected for evaluation. France and Germany are the EU's most influential and wealthy states, and they represent the wealthier states of the EU contributing largely to the annual budget. Poland, as one of the EU's less wealthy states, represents the more rural part of the EU, which contributes less to the EU budget and relies more on economic assistance programs. Although France and Germany have much larger levels of influence within the EU in comparison to Poland, they produce and export different types of agricultural goods.

Additionally, all three states have a strong history of agricultural exportation being a notable part of their economy. Within the comparative analysis, it is valuable to select a non-EU country to evaluate alongside France, Germany, and Poland to act as a constant variable as a representative baseline for international comparisons. Canada was selected due to its institutional stability, reliable agricultural production, high involvement in global trading networks, comparable economic size, and its geopolitical removal from European and Brexit contexts. Although direct comparisons of EU member-states to Canada may not be faultless, especially when evaluating land area data, the country acts as a strong representation of a stable agricultural trading economy outside of the EU. Overall, Canada is utilized as a valuable datapoint when evaluating the international context of EU member-states throughout the time period of 2015 to 2023.

When examining measurements of the agricultural trade of EU member states before and after Brexit, we can look to four categories: the economic dependence on agriculture for each member states, the impact of shifts of EU agricultural policy on member-states, Brexit's impact on overall bilateral agriculture trade flows by member-state, and Brexit's impact on the trading of various types of agricultural products.

Economic Dependence on Agriculture:

To evaluate a country's economic dependence on a specific industry, it is useful to measure the percentage of total employment that is within that industry, the value added of that industry, the value of that industry's output, and the value added per worker in that industry. Therefore, to evaluate each country's economic dependence within the agricultural industry, essential measurements include the percentage of total employment that is within the agricultural industry, the value added of the agricultural industry to GDP, the value of agricultural output,

agricultural value added per worker. I also utilized the measurement of land percentage used for agriculture, as land use is uniquely essential to the agricultural industry and provides wider context in evaluating the other datapoints.

The Common Agriculture Policy:

To effectively assess the impact of shifts of EU agricultural policy on member-states, a comprehensive evaluation of the Common Agricultural Policy is the most logical approach. The CAP's influence is representative of larger EU globalization due to the large percentage of the EU budget it receives every year. Furthermore, the CAP represents the EU's integration, as it is almost completely financed by member states' contributions, and then redistributes those funds throughout the larger system. European farmers interested in receiving benefits from the CAP also must reapply or update their information annually, which aligns with the time series design of this study. The four specific CAP measurements for this study have been largely shaped by the available publication of data by the European Commission. The first measurement, evaluating the CAP in the larger EU budget, establishes a chief trajectory of the policy from 2015 to 2023. The second measurement assesses CAP benefits by member state alongside a comparison to Canada's equivalent of direct agricultural payments to identify country-specific patterns. The third measurement examines the division of CAP benefits of member states within Pillar 1, which are direct payments to agricultural producers, and Pillar 2, which is composed of funds for rural development and sustainability investment. The fourth measurement evaluates the connection between farm size and CAP benefits by member state over time. To do this, a commencement of a time series evaluation of average farm size establishes a baseline of change,

and then the detailed presentation data of land area, beneficiaries, and direct payments separated by country and farm size can be studied.

Within these four measurements, however, Canada can only be utilized to establish external context within the second and fourth measurements. Within the second measurement, Canada's direct agricultural payments are compared to the overall CAP benefits by country over time. Within the fourth measurement, Canada's average farm size over time is assessed alongside the other countries. The limitation of the utilization of Canada in this section is due to the incomparable nature of the CAP in relation to the larger EU budget, separation in pillars, and relationship between farm size and benefits.

Bilateral Trade Gravity Model:

The best way to evaluate Brexit's impact on overall bilateral agriculture trade flow with EU member states is through the utilization of a gravity model. Gravity models make calculations based on economic sizes and the geographical distance between two countries, providing a robust and reliable framework of measuring trade. Through these calculations, conclusions regarding the relationships between geographical distance and trade, national economic size and trade, as well as the relationship of selected dummy variables and trade, can be constructed. An OLS, or Ordinary Least Squares, gravity model is an original type of gravity model utilized for evaluating agricultural trade. However, a PPML, or Poisson Pseudo-Maximum Likelihood, gravity model has shown to give more accurate results than the OLS method. The strength of the PPML method over the OLS method is expanded on in Chapter 3.

However, this study utilizes the value of agricultural production in a country instead of a country's overall GDP. Although many studies do utilize a country's GDP to represent a

country's economic size even when evaluating a singular industry of trade, the majority of these studies are also looking at a multitude of countries, some of which may not have reliable or accessible industry-specific economic data. Additionally, many experts have argued against the singular use of GDP in gravity models, when possible, to represent a country's economic size. The 2012 report by the United Nations Conference on Trade and Development explains that GDP tends to overstate intra-national trade because a growing share of GDP is non-tradeable services. Therefore, when trying to measure extra-national trade, production data is more useful.[30] Author Ben Shepard adds onto this judgement by showing that trade values have significant variants within different trade sectors, and sectoral data cannot be accurately represented by GDP. Shepard states that it is ideal to use sectoral specific data rather than GDP. He does make one expectation, as when developing countries are included within the sample, GDP is acceptable to ensure accurate data comparisons across countries.[31] However, this study does not evaluate the trade of any developing countries and does not qualify for this exception.

There are also examples of gravity models using sector-specific data instead of or in addition to GDP. Richard Baldwin discusses Thai imports of auto parts from the Philippines, explaining that using Thai GDP to represent import demand would inaccurately focus on value-added in autos instead of purely to gross production of auto, especially in regions where production networks are emerging.[32] In addition, María-Isabel Ayuda studied the causes of the

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[30] "A practical guide to trade policy analysis." United Nations Conference on Trade and Development (UNCTAD). *International Trade Centre*, 2012. https://unctad.org/publication/practical-guide-trade-policy-analysis-volume-1.

[31]Ben Shepherd. "The gravity model of international trade: a user guide [R version]." *The Economic and Social Commission for Asia and the Pacific*, 2019. https://www.unescap.org/resources/gravity-model-international-trade-user-guide-r-version.

[32]Richard Baldwin and Daria Taglioni. "Gravity Chains: Estimating Bilateral Trade Flows When Parts And Components Trade Is Important ." *National Bureau Of Economic Research*, January 2011. https://doi.org/https://www.nber.org/system/files/working_papers/w16672/w16672.pdf.

growth in the agri-food exports of Latin America over a period of 25 years and found that agricultural production of the exporting country represented the capacity of supply much better than GDP.[33]

All the countries in this study have reliable agricultural specific economic data, including production value. Therefore, a PPML gravity model with agricultural production instead of GDP to show economic size will result in more accurate regression results. This allows for the creation of a more concrete conclusion of evaluating agricultural trade for the selected countries of the United Kingdom, Canada, France, Germany, and Poland.

Agricultural Trade by Product Category:

After examining overall bilateral trade with a gravity model, it is essential to zero in on smaller measurements and look at trade between the selected countries by agricultural product category. This allows for the evaluation of Brexit's impact on the trading of various types of agricultural products. Within existing literature, however, there are a multitude of methods to categorize agriculture products within the context of trade. Junwen Cao introduces six product categories of agricultural trade. Live animals and animal products, animal and plant fat and oils, wood products, plant products, processed agricultural products, and textile materials are listed.[34] Wenli Qiang presents eight product categories, including cereals, oil crops, sugars, fruits, livestock meats, fibers, roots and tubers, and vegetables.[35] Additionally, Graham K. MacDonald

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[33] María-Isabel Ayuda, Ignacio Belloc, and Vicente Pinilla. "Latin American Agri-Food Exports, 1994–2019: A Gravity Model Approach." *Mathematics* 10, no. 3 (January 21, 2022). https://doi.org/https://doi.org/10.3390/math10030333.

[34] Junwen Cao and Qingya Lei. "Global agricultural trade network characteristics and its influencing factors." *Humanit Soc Sci Commun*, 2025. https://doi.org/10.1057/s41599-025-05341-6.

[35] Wenli Qiang, et al. "Evolution of the Global Agricultural Trade Network and Policy Implications for China" *Sustainability* 12, no. 1: 192, 2020. https://doi.org/10.3390/su12010192.

establishes eleven specific product categories. These include wheat, soybean, maize, rice and other cereals, oil palm, rape and other oil crops, sugar cane and beet, meat and animal products, pulses vegetables and roots, fruits and nuts, as well as coffee, tea, cocoa, and spices.[36]

This study, however, seeks to utilize product specific agricultural data to expand on other bilateral trade findings. Utilizing simpler categories for agricultural products can help ensure conclusions are more accurately aligned. The World Trade Organization, however, works alongside the World Customs Organization to maintain the Harmonized System (HS) to provide standardized categorical framework for many commodity groups, including agriculture. The WTO catalogue states that the definition of agricultural products "covers products within Chapters 1 to 24 of the Harmonized System (HS 1992), with the exclusion of fish and fish products, plus certain products from HS Chapters 25-97 (e.g., mannitol, raw hides and skins, raw silk, wool, cotton, flax, hemp)."[37] The WTO takes the liberty of assigning product categories to the HS chapters dedicated towards agriculture. Chapters 1 through 5 are classified as "Section 1 - Live Animals; Animal Products," Chapters 6 through 14 are classified as "Section II - Vegetable Products," Chapter 15 is classified as "Section III - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes", and Chapters 16 through 24 are classified as "Section IV - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes."[38] The WTO Agreement on Agriculture solidifies this framework further by listing out the "certain products from HS Chapters 25-97" mentioned in the

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[36]Graham K. MacDonald, et al. "Rethinking Agricultural Trade Relationships in an Era of Globalization." *BioScience*, Volume 65, Issue 3, 2015. https://doi.org/10.1093/biosci/biu225.

[37] "WTO Definition of Agricultural and Non-Agricultural Products in the Harmonized System (HS)." *World Trade Organization*, 2025. https://data.wto.org/en/dataset/refdb_concord_agnonag.

[38] "International Trade - Schedule B 2026." *United States Census Bureau*, 2026. https://www.census.gov/foreign-trade/schedules/b/2026/index.html.

original WTO catalogue that also qualify under agricultural products. They are HS 2905.43 mannitol, HS 2905.44 sorbitol, HS 33.01 essential oils, HS 35.01 to HS 35.05 albuminoidal substances, modified starches, and glues, HS 3809.10 finishing agents, HS 3823.60 sorbitol n.e.p., HS 41.01 to HS 41.03 hides and skins, HS 41.03 raw furskins, HS 50.01 to HS 50.03 raw silk and silk waste, HS 51.01 to HS 51.03 wool and animal hair, HS 52.01 to HS 52.03 raw cotton, waste and cotton carded or combed, HS 53.01 raw flax, and HS 53.02 raw hemp.[39]

Therefore, to create a more simplistic categorization of agriculture products, we can utilize the classifications of HS Chapter 1 through 24 dedicated to agriculture, eliminate Chapter 3 and Chapter 16 fish products, and add the agricultural products from Chapter 25 through 29, either within the existing classifications or through the addition of new classifications. When looking at the agricultural products from Chapter 25 through 29, it is clear that they align into two categories. HS 2905.43 mannitol, HS 2905.44 sorbitol, HS 33.01 essential oils, HS 35.01 to HS 35.05 albuminoidal substances, modified starches, and glues, HS 3809.10 finishing agents, and HS 3823.60 sorbitol n.e.p. are processed chemical products. HS 41.01 to HS 41.03 hides and skins, HS 41.03 raw furskins, HS 50.01 to HS 50.03 raw silk and silk waste, HS 51.01 to HS 51.03 wool and animal hair, HS 52.01 to HS 52.03 raw cotton, waste and cotton carded or combed, HS 53.01 raw flax, and HS 53.02 raw hemp are textile material products. Textile materials do not fit into any of the established categories, so they should be separated into its own category. Processed chemical products, however, may be categorized alongside the classification of miscellaneous highly processed agricultural goods including food preparations, alcohol, and tobacco within “Section IV - Prepared Foodstuffs; Beverages, Spirits and Vinegar;

[39] “Agreement on Agriculture.” *World Trade Organization*, 2025. https://www.wto.org/english/docs_e/legal_e/ag_e.htm.

Tobacco and Manufactured Tobacco Substitutes." The decision for this classification can be defended by this study's interest in evaluating the trade of processed goods versus unprocessed goods before and after the disruption of a trading network. As noted in the literature review, Shepard discusses the difficulty of unprocessed goods like meat, dairy, and produce in meeting the international standards required for trade. Additionally, Cheptea discusses issues of producing highly processed goods that are assembled in multiple locations after the disruption of a trading network. These views highlight the need to compare highly processed goods to unprocessed goods and show the utility of categorizing highly processed goods together. Therefore, the five categories that are be evaluated in this study are Category 1 - Live Animals and Animal Products, Category 2 - Vegetable Products, Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes, Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products, and Category 5 - Textile Materials. The full lists of the categories of agricultural product type, alongside their HS codes, can be found in Appendix AD.

FAOSTAT, from the Food and Agriculture Organization of the United Nations, was utilized to collect all trade data. In its trade matrix dataset, FAOSTAT lists out approximately 575 types of agricultural products. I categorized these products into the determined five categories by finding the product's HS classification through the Harmonized Tariff Schedule of the United States website, which bases its classification information on the international Harmonized System. The full lists of agricultural products, alongside their HS classifications within each of the five categories can be found in Appendix AE, Appendix AF, Appendix AG, Appendix AH, and Appendix AI. Using this data, we are able to look at exports to the UK from our selected

countries and imports from the UK to our selected countries for each of the five categories over the time period of 2015 to 2023. Exports and imports of the combined agricultural product categories are also utilized to represent larger trends and supplement the gravity model's findings. Finally, Figure 4 is reintroduced in this section to provide context on country-specific annual agricultural output. However, there is an absence of sector-specific agricultural production information for Canada, France, Germany, and Poland. This limitation is due to the fact that the reporting of agricultural sectors has incredible variation, and there is an absence of production data that directly aligns with the five categories of agriculture that this study has created. However, the utilization of production data from Figure 4 is still valuable in bridging the conclusions the gravity model made regarding the relationship between production and trade.

Overall, this study's structured methodology allows for accurate data collection and analysis. Although complete objectivity is unattainable, steps were taken to reduce any potential biases. This methodology is backed by peer-reviewed literature and publicly trusted data, all of which has been transparently referenced. The quantity of data provided by the EU, its member-states, the World Bank, and the FAO also allows for a minimization of random errors in data collection. This study, regardless of its results, provides valuable knowledge to ongoing discussions regarding Brexit, agricultural, trade, and EU membership.

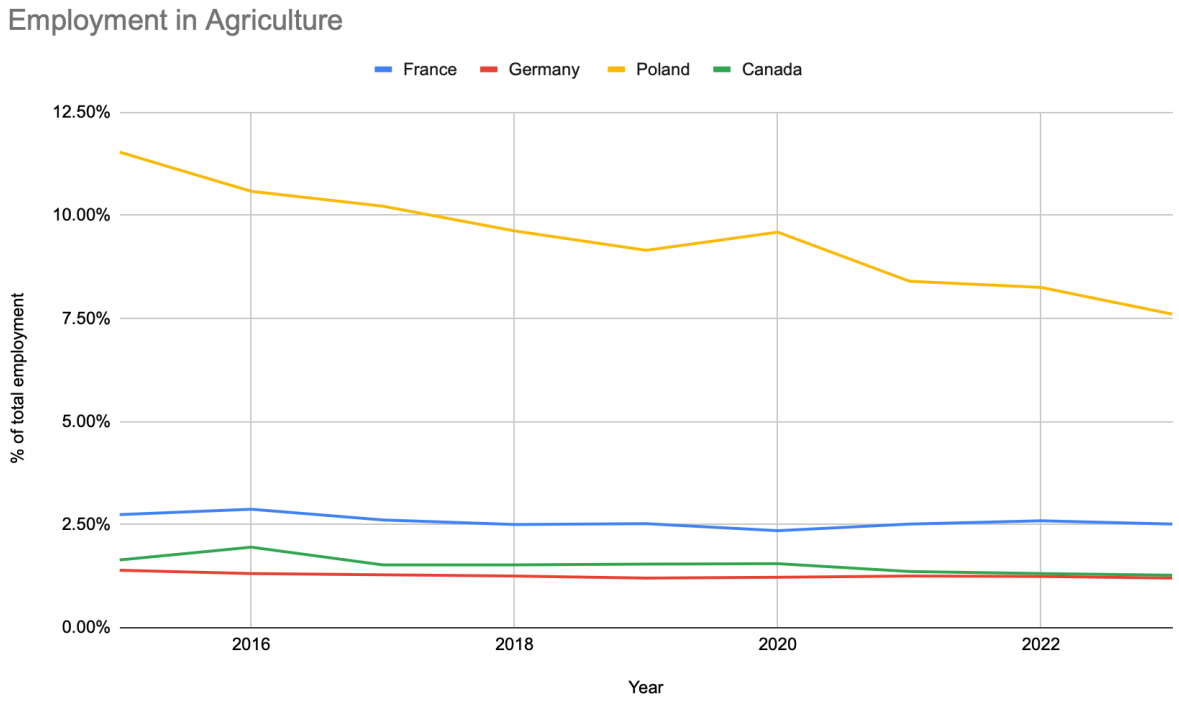
CHAPTER 1: ECONOMIC DEPENDENCE ON AGRICULTURE

To understand the economic dependence on agriculture within Canada, France, Germany, and Poland over time, we can look to five separate measurements: the percentage of total employment within the agricultural industry, the value added of the agricultural industry, agricultural value added per worker, the value of agricultural output, and the percentage of land used for agriculture. These measurements offer important insight into each country's agricultural sector and make it possible to assess any significant changes over the selected time period.

Utilizing Figure 1, employment in agriculture within the selected countries can be evaluated. Canada, France, and Germany all present lower percentages of employment in agriculture, ranging from 1.2% to 2.87%. Poland's data, on the other hand, shows an approximate average of 9.5% of employment in agriculture (see Appendix A). This reflects Poland's status as a more rural country, where agriculture remains a large part of its economy. Although agriculture is also important to Canada, France, and Germany, they are more diversified with a broader range of industries that employ their populations.

Figure 1 also shows that Canada has relatively consistent employment in agriculture, with a slight decrease from 1.64% in 2015 to 1.27% in 2023. France and Germany follow similar patterns, with France decreasing from 2.74% to 2.51%, and Germany decreasing from 1.39% to 1.2%. Poland, on the other hand, shows a different trend. Poland has a significant decrease in agricultural employment, with a shift of 11.53% in 2015 to 7.6% in 2023. To evaluate if this decrease originates from technological advancement in agriculture that reduces labor needs or a larger downturn of the agricultural sectors in these countries, it is necessary to examine agriculture's value added.

Figure 1: Employment in Agriculture by Country

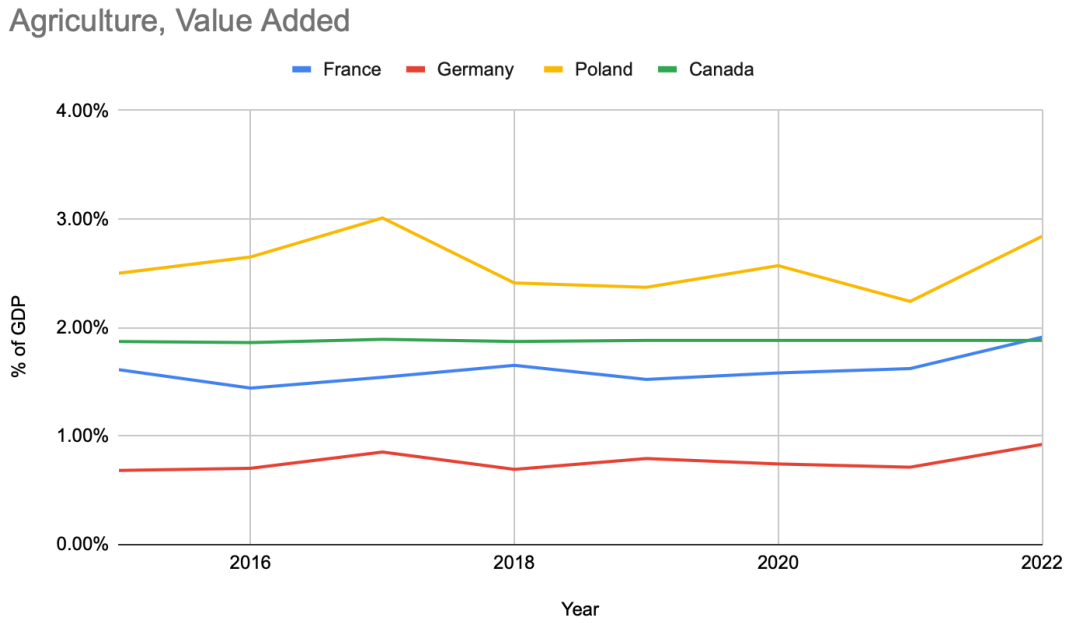


Source: Adapted by author from "Employment in Agriculture (% of Total Employment) (Modeled ILO Estimate)." World Bank Open Data, 2025. https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS.

Agricultural value added, which is shown in Figure 2, represents the percentage of national GDP that the agricultural sector is responsible for. Figure 2 does show a limitation, however, as 2022 is the most recent year with data published by the World Bank. Figure 3, showing agriculture value added per worker, also reflects the same limitation. Although this study seeks to evaluate the years 2015 through 2023, data from 2015 to 2022 is still valuable as it covers almost all of the selected time frame. Similar to the pattern observed in Figure 1, Poland again sees a higher baseline value than the other countries, reaffirming the importance of its agricultural sector to its economy. In evaluating change over time, Figure 2 shows that Canada stayed very constant from 2015 to 2022, shifting only from 1.87% to 1.88% (see Appendix B). France and Germany both saw increases over time. France's percentage of agriculture value

added increased only slightly, shifting from 1.61% in 2015 to 1.91% in 2022. However, Germany's value added increased from 0.68% in 2015 to 0.92% in 2022, reflecting almost a 50% increase. Poland did experience some moderate variation over time, however, there was an overall increase of 2.5% in 2015 to 2.84% in 2022. This data conveys an increase in the value added of agriculture sectors in all countries, with Germany seeing the largest comparative increase.

Figure 2: Agriculture Value Added

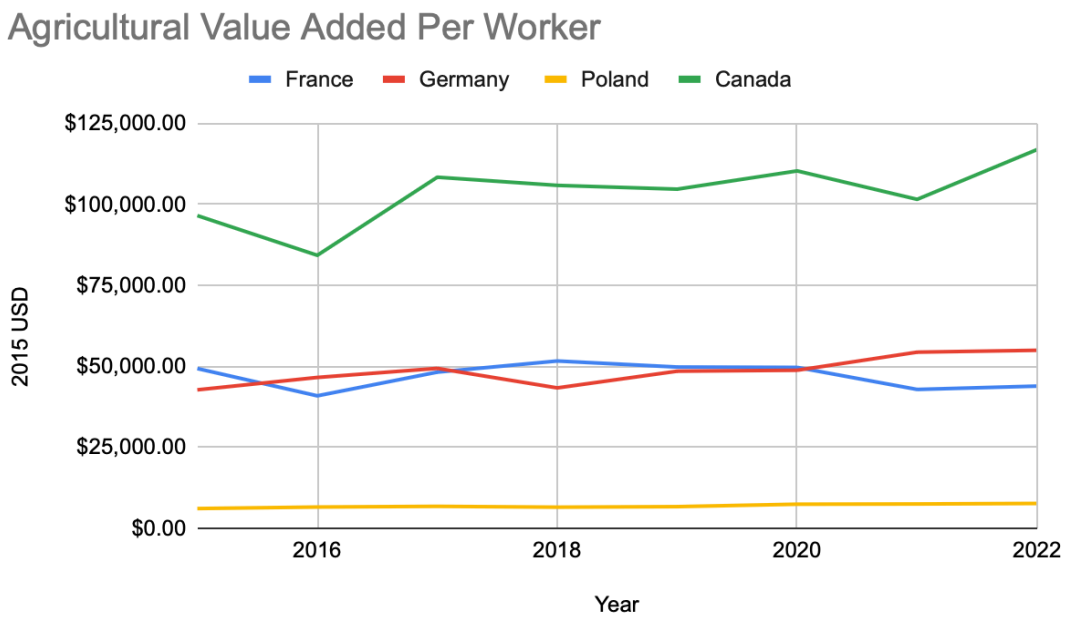


Source: Adapted by author from "Agriculture, Value Added (% GDP)." World Bank Open Data, 2022. https://data360.worldbank.org/en/indicator/FAO_AS_4113?view=trend&country=&minYear=21.

To supplement these findings, it is useful to evaluate agricultural value added per worker to measure productivity. As shown in Figure 3, Canada's agricultural value added per worker is significantly higher than our other three states. Germany and France's data is quite similar, and Poland presents with the lowest agricultural value added per worker. These baselines are likely

rooted in fundamental differences in farm size and agricultural technology. Poland's smaller and less mechanized farms limit productivity, Canada's dominated large industrial farms maximize productivity, and French and German farms fall between these two extremes.

Figure 3: Agricultural Value Added Per Worker

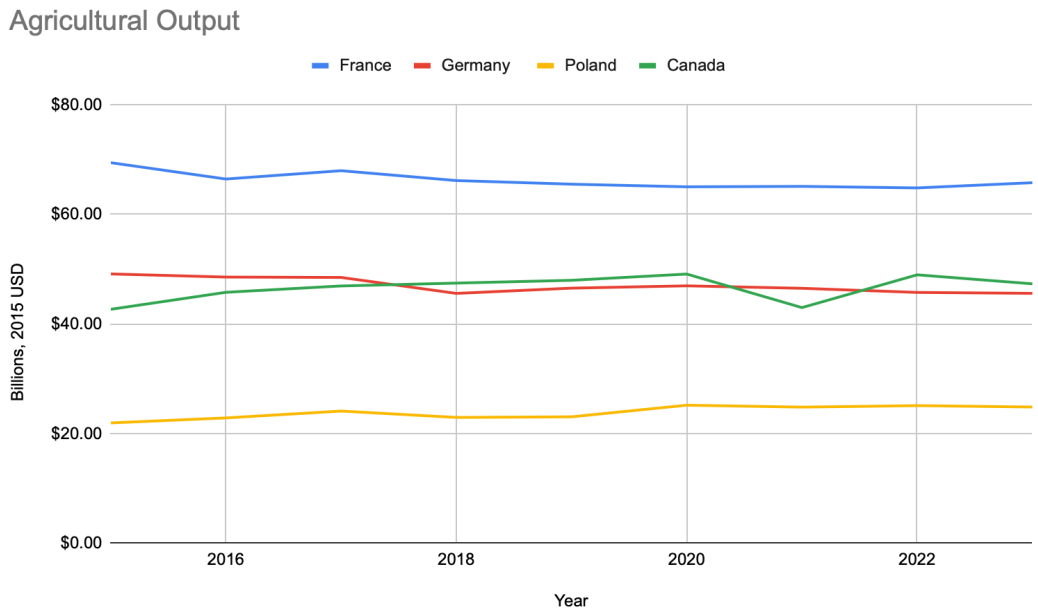


Source: Adapted by author from "Agricultural value added per worker." Our World in Data, 2022. https://ourworldindata.org/grapher/agriculture-value-added-per-worker-wdi?tab=discrete-bar&t

When evaluating change over time in Figure 3, it can be seen that Canada made noticeable increases in productivity, rising from $96,545.93 in 2015 to $116,939.69 in 2022. France experienced a slight decrease, going from $49,318.81 to $43,899.37, and Germany saw a slight increase, going from $42,747.49 to $54,958.62. Poland experienced an even smaller increase, going from $6092.55 to $7661.89 (see Appendix C). However, these changes in France, Germany, and Poland are relatively minimal. This reality, especially when contrasted with Figure 1's evidence of decreased percentages of agricultural employment and Figure 2's evidence of

increased agricultural value added, aligns with Nowack's statements that the presence of advances within agricultural technology have resulted in less laborers for similar levels of productivity.[40]

Figure 4: Agricultural Output



Source: Adapted by author from "Food - Gross Production Value." Our World in Data, 2024. https://ourworldindata.org/grapher/agricultural-output-dollars?time=2015..latest&country=.

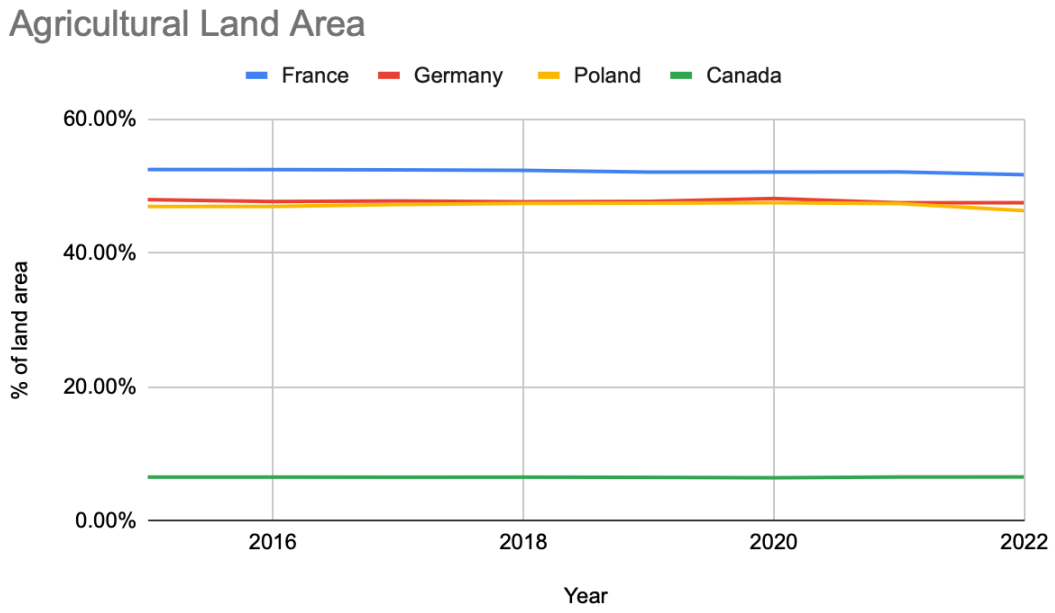
Agricultural output in value of goods and services, which is presented in Figure 4, reflects agricultural production in each country. There are some baseline differences that are seen in the agricultural output of Canada, France, Germany, and Poland. France sees the highest output at approximately $68 billion, Germany and Canada follow at approximately $46 billion, and Poland sees the lowest output at approximately $23 billion (see Appendix D). These disparities are likely due to the differences in value of the agricultural goods and services being

[40] Nowack, *Soziale Dimensionen landwirtschaftlicher Multifunktionalität vor dem Hintergrund des Größenstrukturwandels in der Landwirtschaft*, 2023

produced. France produces many expensive products like wines and cheese, while Poland produces lower priced goods like grains and poultry. Germany and Canada classify in the middle of these two extremes with similar production of red meats and vegetables, alongside more specialized goods like beer and maple syrup, respectively.

When evaluating changes over time, all four countries experienced a slight increase or decrease in agricultural output. Poland saw an overall increase of $2.9 billion and Canada saw an overall increase of $4.65 billion. France saw an overall decrease of $3.65 billion and Germany saw an overall decrease of $3.54 billion. It is possible that these decreases were from a combination of climate crises and higher prices of farm inputs.

Figure 5: Agricultural Land Area



Source: Adapted by author from "Share of land area used for agriculture." Our World in Data, 2023. https://ourworldindata.org/grapher/share-of-land-area-used-for-agriculture?tab=discrete-bar&tim

Agricultural land area is shown in Figure 5 as a percentage of overall land area. The percentage of land used for agriculture stayed extremely consistent, with none of the four states changing more or less than one percentage point from 2015 to 2022 (see Appendix E). Additionally, France, Germany, and Poland all share a similar percentage of land area dedicated towards agriculture, reflecting their relatively similar climates and geographic sizes. In contrast, Canada does have a significantly lower percentage of agricultural land. This is due to Canada having a significantly larger overall land area than France, Germany, and Poland. In addition, its harsher environment only allows for a small percentage of land to be utilized for agriculture.

In all of the measurements except for value added per worker, Canada shows extreme stability over time. This shows not only that agriculture is a stable industry, but also that Canada is a reliable constant variable to use in this study. In many of the graphs, relatively similar trends between France and Germany can be seen, showing that there are similarities between the two states in terms of their economic dependence on agriculture industries. Poland stands out, especially regarding the three measurements on employment in agriculture, agriculture value added, and agricultural output. The country's data reiterates the importance of agriculture to its economy relative to France and Germany.

None of these measurements convey systemic change occurring in the year 2020, reflecting that Brexit did not directly impact France, Germany, or Poland's economic dependence on agriculture. Although this conclusion is not unexpected due to the inherent strength of the agriculture industry, it is worth noting this stability. This data, however, does not fully explain the large decrease in Polish agricultural employment. Agricultural value added and agricultural value added per worker only slightly increased, and technological advancement alone may not be able to explain such a large drop in employment. Additionally, this data does not fully explain

the rise in France and Germany’s agriculture value added, especially Germany's almost 50% increase. Therefore, other causal factors of this decrease should be evaluated, most notably the changes in farm size within the Common Agricultural Policy.

CHAPTER 2: THE COMMON AGRICULTURE POLICY

The Common Agricultural Policy, or CAP, predates the European Union itself. Established in 1962 under the European Economic Community, it aimed to unite the European economy following World War II by increasing agricultural productivity, ensuring fair standards of living for farmers, guaranteeing the availability of supplies, stabilising the markets, establishing a secure supply chain with reasonable prices, and harmonising competition rules across all countries.[41] The CAP's current stated goals are comparable, as it strives to support European farmers in food production and sustainable management, all while uplifting the rural economies of Europe and protecting the European agricultural market.[42] The original establishment of the CAP represents European globalization. The choice of European states to protect the food security of the common European people rather than prioritize the food security of any one particular state shows a strengthening of the European community. However, the CAP has become an expensive program to maintain. Its funds require a substantial percentage of the annual EU budget, which is chiefly financed by contributions from member states. As previously discussed, the United Kingdom was a major funder of the EU budget. Therefore, its departure has economic implications for the CAP.

To evaluate the impact of Brexit on CAP spending, we can look towards time series data that shows both annual CAP spending and the annual percentage of the EU budget that is allocated towards CAP. Figure 6 evaluates annual CAP spending over time within the EU

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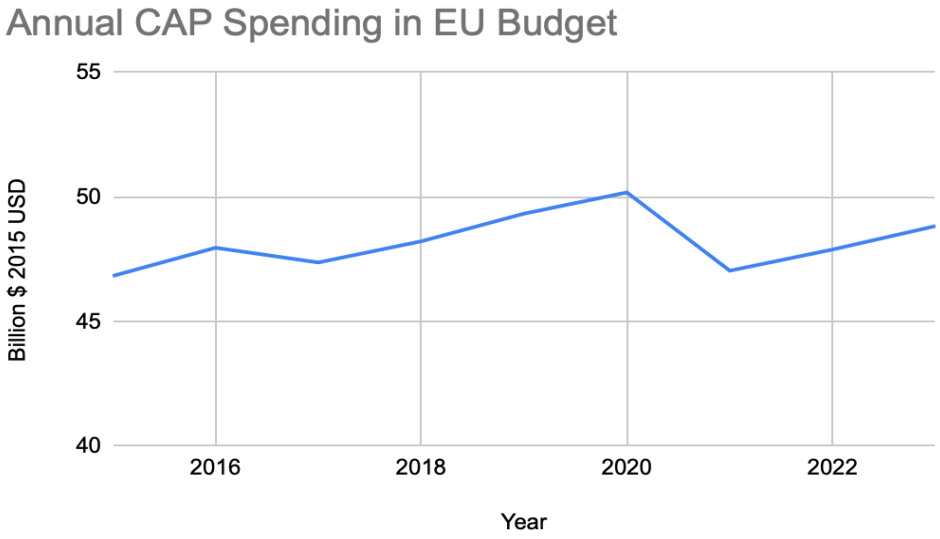
[41] "Timeline - History of the Cap." *Council of the EU and the European Council*, January 2025. https://www.consilium.europa.eu/en/policies/the-common-agricultural-policy-explained/timeline-history-of-cap/.

[42] "The Common Agricultural Policy at a Glance." *European Commission*. Accessed 2026. https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en.

budget. It can be seen that CAP spending has remained relatively stable over time, with a small increase in the years leading up to 2020. This is followed by a sharper decrease in the year 2020 and readjustments to prior levels of spending through increases in 2021, 2022, and 2023 (see Appendix F).

Figure 6: Annual CAP Spending in EU Budget

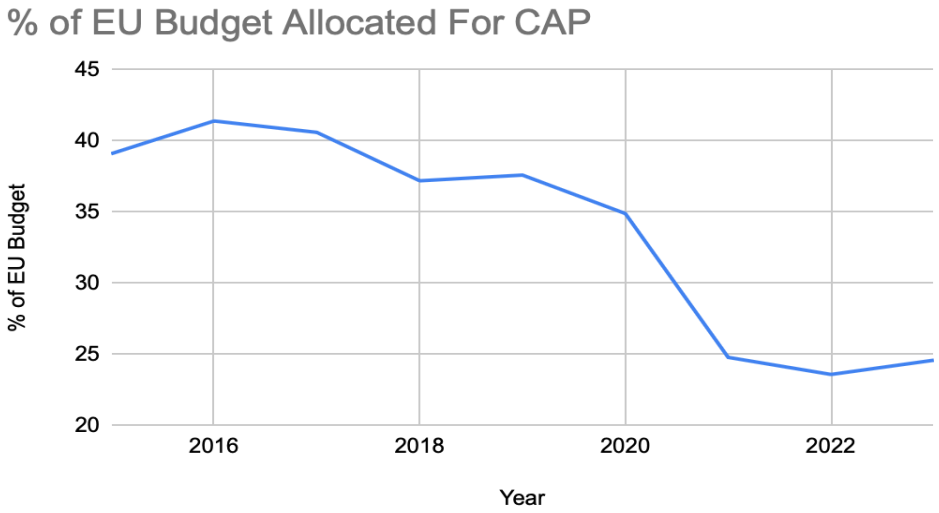


Source: Adapted by author from "Cap Expenditure." European Commission, 2024. https://agriculture.ec.europa.eu/data-and-analysis/financing/cap-expenditure_en.

Figure 7 shows the annual percent change of the EU budget allocated towards the CAP. There is an overall decrease over time, with the sharpest drop occurring around 2020 (see Appendix G). When analyzed together, these two graphs show that the EU has begun expanding its budget in areas other than the CAP. Although the CAP has not seen direct cuts in its overall budget, its lack of expansion to match the overall expansion of the EU budget is notable. It is possible that this is due to the EU expanding its capabilities within the CAP, with stable CAP spending reflecting an EU success in reaching its goals without an expansion of the budget.

Conversely, the lack of budgetary expansion may be due to a direct deprioritization of the CAP within the programs and goals of the EU.

Figure 7: Percent of EU Budget Allocated For CAP



Source: Adapted by author from "Cap Expenditure." European Commission, 2024. https://agriculture.ec.europa.eu/data-and-analysis/financing/cap-expenditure_en.

However, it is necessary to address the large allocation of funding during this time period towards economic support during the beginning of the COVID-19 pandemic, as well as financial support to Ukraine following the Russian invasion. In April of 2020, directly following the emergence of COVID-19 pandemic, the European Commission approved €8 billion towards immediate financial support for small and medium-sized enterprises within the EU. In December of 2020, the Pan-European Guarantee Fund was established to continue economic support for EU businesses, with an original €25 billion budget being expected to mobilise up to €200 billion.[43] Furthermore, Collective EU and EU Member State support to Ukraine between 2022 and 2025

[43] "Supporting European Businesses during the Pandemic." *European Commission.* Accessed 2026. https://commission.europa.eu/strategy-and-policy/coronavirus-response/supporting-jobs-and-economy-during-coronavirus-pandemic/supporting-european-businesses-during-pandemic_en.

totaled $43 billion.[44] The funds dedicated towards these two matters are substantial, indicating that it is likely that the EU has expanded its competences in the CAP overall with its existing budget. As previously discussed in the literature review, however, it is essential to assess country-specific data to fully understand a country's individual development within a larger economic union. Therefore, to analyze to what extent CAP has expanded its competences in our selected member-states, specific data between France, Germany, and Poland should be evaluated.

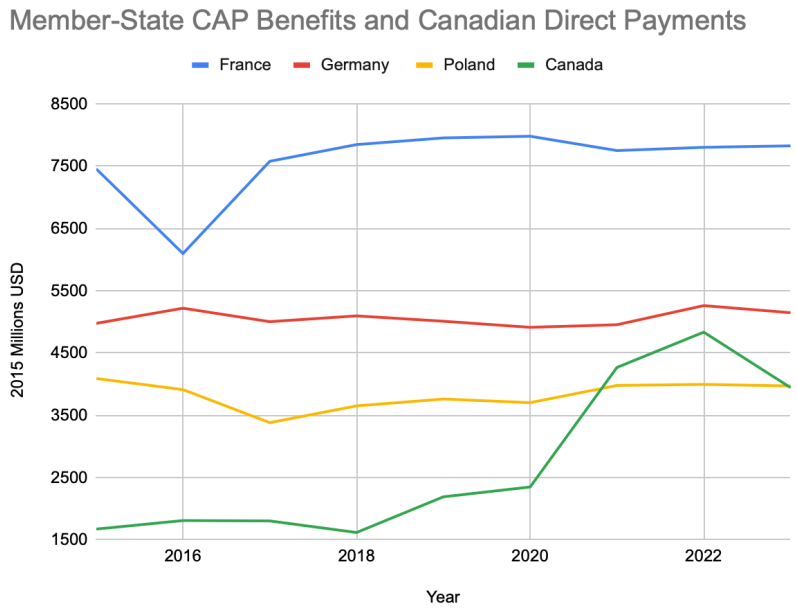
First, we can look at a time-series of direct CAP benefits to France, Germany, and Poland, alongside Canadian direct payments to its agricultural producers. As shown in Figure 8, Canada saw a significant increase in direct payments to agriculture producers, with the largest increase beginning in 2020 and the highest amount in 2022 at $4,834 million (see Appendix H). According to the Canadian Federation of Agriculture, the large increase of financial support for farmers approaching 2022 was due to a combination of balancing increasing costs of farm inputs, navigating high inflation, managing extreme climate events, mitigating high prices of using carbon for essential farming activities, and supporting the farm industry during the COVID-19 pandemic.[45] Canada was one of many countries around the world dealing with similar compounding issues during this time, reflecting essential international context. On the other hand, CAP benefits to France, Germany, and Poland stayed fairly stable. France saw a small increase over time, with a decrease in 2016 that was immediately adjusted in 2017. Germany saw relatively no change over time. Poland saw an overall slight decrease, with a larger dip in 2017 followed by gradual adjustment, but not quite returning to its highest point of $4090 million in 2015. The stability of each state's CAP benefits do reflect that the EU considers that the CAP has

[44] "EU Assistance to Ukraine (in U.S. Dollars)." *European External Action Service*, February 24, 2026. https://www.eeas.europa.eu/delegations/united-states-america/eu-assistance-ukraine-us-dollars_en?s=253.

[45] "Farm Financial Health Report 2023-2024." *Canadian Federation of Agriculture*, 2024. https://www.cfa-fca.ca/wp-content/uploads/2024/02/Farm-Financial-Health-Report-2023.pdf.

expanded its overall competences in France, Germany, and Poland. Additionally, the existence of the EU's COVID-19 specific financial assistance towards impacted businesses, which would include agricultural businesses, explains the lack of increase in CAP payments towards France, Germany, and Poland during the year 2020, especially when compared to the large increase of direct payments towards Canadian agricultural producers in 2020.

Figure 8: Member-State CAP Benefits and Canadian Direct Payments



Sources: Adapted by author from "Direct Payments to Agriculture Producers." Statistics Canada, February 2026. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210010601&cubeTimeFrame.startYear=2015&cubeTimeFrame.endYear=2025&referencePeriods=20150101%2C20250101; "EU Spending and Revenue 2021-2027." European Commission, 2024. https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/spending-and-revenue_en; "EU Spending and Revenue 2014-2020." European Commission, 2020. https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2014-2020/spending-and-revenue_en.

Despite data suggesting overall CAP competence expansion, it is also valuable to examine the different benefit amounts allocated towards the three selected EU countries,

especially in comparison to their contributions to the EU budget. As can be seen in Figure 8, France obtains the most CAP funds, followed by Germany and then Poland, with France receiving almost double the amount that Poland receives. As the largest agricultural producer in the EU, France receives the most CAP funds in the whole EU, not just compared to the three member states under review. As previously discussed within the literature review, author Broussolle hypothesized that the UK's departure from the EU will give France the ability to rise in rank, counter Germany, and expand its funds for programs such as the CAP.[46] However, the lack of increase of CAP benefits for France following Brexit conveys either that a rise in EU power does not automatically guarantee a desired increase in program benefits, or that France believes it is able to meet its CAP goals within the restraints of its existing budget. Nonetheless, France continues to receive the most CAP funding, despite being the second highest EU budget contributor with 18.85 billion euros in 2023. Germany, on the other hand, contributed 23.58 billion euros in 2023.[47] Despite having a larger national population to feed, a robust agricultural sector with an influential farming population of its own, and comparable labor and operating costs, Germany received almost 5 billion euros less annually than France in CAP benefits. This is largely due to less agricultural land area, as well as hosting a slightly smaller and less diverse agriculture sector, which is marginally less expensive to run.

Poland, however, received just under 4 billion euros in annual CAP funding following Brexit. This number becomes even more notable when compared to its annual EU contributions, which was 4.5 billion euros in 2023.[48] Almost 90% of Poland's annual contribution is returned

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[46] Broussolle, *Le Brexit et le budget de l'UE : quelles conséquences pour la politique agricole commune et la contribution française?*, 2018

[47] S. Galan. "EU Budget Contributions by Country 2023." *Statista*, November 28, 2025. https://www.statista.com/statistics/316691/eu-budget-contributions-by-country/?srsltid=AfmBOooQzlzjTb7qem637HpGtJXO2NR08vFnwd_E9AnI3zGdcb6M5C3U.

[48] Galan, *EU Budget Contributions by Country 2023*, 2025

through CAP payments, compared to approximately 40% for France and 20% for Germany. This comparison reflects the larger redistribution of financial resources across the EU. France and Germany contribute significantly more to the EU budget than they received, which highlight their role as net contributors. Poland, which received almost its full contribution back in CAP funds alone, represents the countries in the EU that depend heavily on the financial support of programs such as the CAP. Brexit was marked by the devastating loss of a major net contributor, placing more pressure on the remaining wealthier states, like France and Germany, to support the larger EU economy. To fully examine if this pressure has led to alterations within the CAP, it is essential to evaluate how funding is fully distributed between and within countries, not just the total amount of funding that each state receives.

The Common Agricultural Policy is split into two systems of distribution, named Pillar 1 and Pillar 2. Pillar 1 consists of direct payments to agricultural producers, as well as market measures, and is funded solely by the EU budget.[49] Pillar 2 consists of funds for rural development and sustainable growth through environmental advancement, and is funded by the EU budget alongside some direct efforts from member states. However, member states do have some influence over the distribution of funds between Pillar 1 and Pillar 2, with EU regulation approving member states the discretion of redistributing up to 10% of direct payments towards Pillar 2.[50] Therefore, to further analyze the distribution of the CAP to the selected member states, it is essential to evaluate any alterations within the allocation of funds for Pillar 1 and Pillar 2.

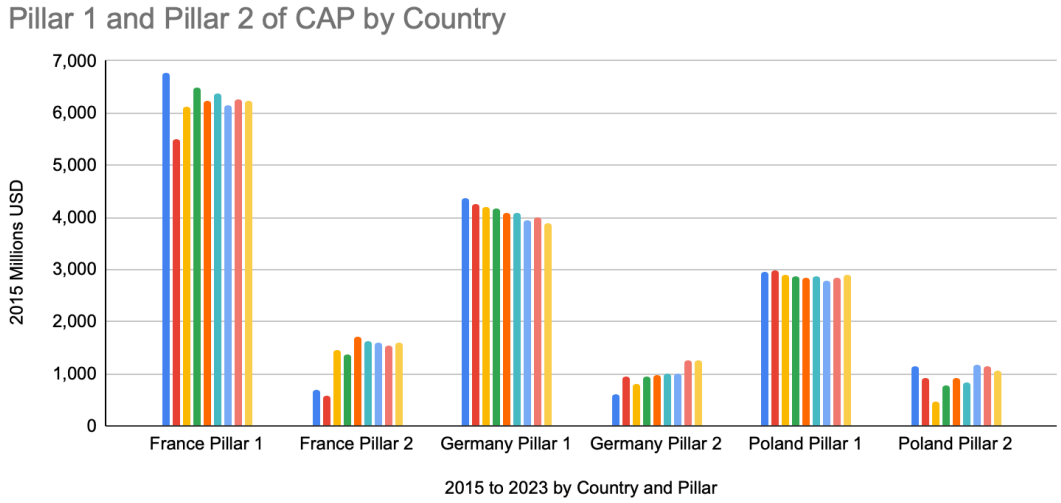
In Figure 9, France, Germany, and Poland's CAP Pillar 1 and Pillar 2 funds are visualized over time. Canada cannot be utilized within this comparison because its direct payments are not

[49] "Common Agricultural Policy – Pillar I." *European Parliament*, July 2016. https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586622/EPRS_BRI(2016)586622_EN.pdf.

[50] "Common Agricultural Policy – Pillar II." *European Parliament*, July 2016. https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586623/EPRS_BRI(2016)586623_EN.pdf.

separated into the same distinct categories as Pillar 1 and Pillar 2. Out of the two Pillars, Pillar 1 has historically utilized the majority of CAP funds. This can be seen in 2015 as France's Pillar 1 received approximately 90% of CAP funds, Germany's Pillar 1 received approximately 86% of CAP funds, and Poland's Pillar 1 received approximately 63% of CAP funds (see Appendix I).

Figure 9: Pillar 1 vs Pillar 2 of CAP by Country



Sources: Adapted by author from "EU Spending and Revenue 2021-2027." European Commission, 2024. https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/spending-and-revenue_en; "EU Spending and Revenue 2014-2020." European Commission, 2020. https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2014-2020/spending-and-revenue_en

Additionally, each set of bars shows the changes of Pillar 1 or Pillar 2 payments to each member state from 2015 to 2023. The dark blue bar on the far left represents 2015, and the light yellow bar on the far right represents 2023. France saw a slight decrease of Pillar 1 over time, with $6,773 million in 2015 shifting to $6,240 million in 2023. France's Pillar 2 benefits saw an overall increase, with a large shift of $683 million in 2015 to $1,462 million in 2017, followed by continuation of higher benefits with $1,585 in 2023. Germany also saw a slight decrease of

Pillar 1 benefits over time, with $4,373 million in 2015 shifting to $3,901 million in 2023. Germany's Pillar 2 benefits therefore saw an increase from $602 million in 2015 to $1,245 million in 2023. Poland, on the other hand, did not see substantial patterns of increasing or decreasing benefits in Pillar 1 or Pillar 2. Pillar 1 went from $2,954 million in 2015 to $2,911 in 2023, and Pillar 2 went from $1,136 million in 2015 to $1,059 million in 2023. Although Poland's Pillar 2 benefits saw a couple years with smaller benefit amounts, there is no large significant shift over time, especially in comparison to the changes seen in France and Germany. France saw around a 150% increase in Pillar 2 and Germany saw around a 100% increase in Pillar 2, showing remarkable change. This data shows that although overall CAP benefits were not significantly altered from 2015 to 2023, Pillar 2's role of funding rural development and implementing environmentally sustainable growth initiatives became unable to be completely satisfied without an increase of funding. Therefore, Pillar 1's goal of providing economic support to agricultural producers by supplying direct payments is either being satisfied within a slight decrease in funding, or there is the possibility the slight decrease in Pillar 1 funding has minimal effect on Pillar 1's overall goals and competences within France and Germany. It can be noted that this shift is due to the rising of the role of Pillar 2, not necessarily the falling of the role of Pillar 1. This is reflected in the key policy objectives of CAP in EU 2021-2027. "Climate change action", "environmental care", "to preserve landscapes and biodiversity", and "vibrant rural areas" were all cited within the list of objectives.[51]

However, the fact that Poland saw a lack of notable change leads to two possibilities. Firstly, Poland may be meeting its targets within the rising importance of Pillar 2's

[51] "Key Policy Objectives of the CAP 2023-27." *European Commission*, 2026. https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance/key-policy-objectives-cap-2023-27_en.

environmental goals without shifting the ratio of funds being Pillar 1 and Pillar 2, perhaps from local or national sources of funds, or perhaps through no increase of funds at all. Secondly, Poland may not be economically prioritizing the rising importance of Pillar 2's environmental goals in the way that France and Germany are able to. Both France and Germany have more access than Poland to local and national funds to assist with environmental sustainability initiatives, and they both still turned to an increase in Pillar 2 funds for additional assistance in financing their efforts. Additionally, due to the original divide of levels of CAP funding towards each country, Poland already started out with a much higher percentage of its CAP funds going towards Pillar 2 in comparison to France and Germany. This baseline is likely due to a foundational need of significant rural development funds, given the context of Poland being a more rural country than both Germany and France. However, with limited external funds, Poland's economic reliance on Pillar 1's direct payments to farmers led to the choice not to increase the distribution of funds towards Pillar 2. This is defended by Brodziński's findings that the most common source of external capital in financing agriculture production in Poland was EU funds, followed by loans, credits from banks, and state subsidies.[52] Given this information, the second possibility can be assumed. The long-term consequences if this pattern continues, however, is that EU countries like Poland may fall behind France and Germany in terms of environmental innovation and sustainable development, which would deepen already existing disparities within the EU. Overall, while larger CAP funding remained fairly stable between 2015 and 2023, some internal redistribution has occurred. A gradual shift from Pillar 1 to Pillar 2 in France and Germany reflects the combination of their abilities to fulfill the role of Pillar 1 with slightly less money, alongside meeting the EU's rising priority of environmental

[52] Brodziński, *Warunki Rozwoju Gospodarstw Rolnych Regionu Warmii i Mazur w Kontekście Planu Strategicznego Wspólnej Polityki Rolnej Na Lata 2023-2027*, 2022

sustainability. Poland's lack of shift reflects a continuation of a dependence on direct payments, even with an increased competence in the CAP.

The final variable within the CAP that must be evaluated is farm size, as farmers typically receive direct payments based on their farm's size in hectares.[53] A statement from the European Commission regarding CAP for the EU 2021-2027 says "it seeks to ensure a sustainable future for European farmers, provide more targeted support to smaller farms, and allow greater flexibility for EU countries to adapt measures to local conditions."[54] However, the European Parliament lays out the exact eligibility criteria for agricultural producers to receive direct payments. It is noted that CAP payments are based on region, and occasionally number of animals. Member states set minimum area and financial requirements for recipients, of which have not seen notable shifts over recent periods. Additionally, farmers that are interested in claiming direct payments must reapply or update their information every year while adhering to all newly implemented regulations. The CAP within the EU 2021-2027 introduced greener requirements of all farms, alongside social conditionality related to "social and labour-related principles."[55] An amendment to regulation also states that "redistribution of income support: member states have to dedicate at least 10% of their direct payments to the redistributive income support tool to better address the income needs of small and medium-sized farms."[56]

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[53] "Income Support Explained." *European Commission*, 2026. https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/income-support-explained_en.

[54] "The Common Agricultural Policy at a Glance." *European Commission*. Accessed 2026. https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en.

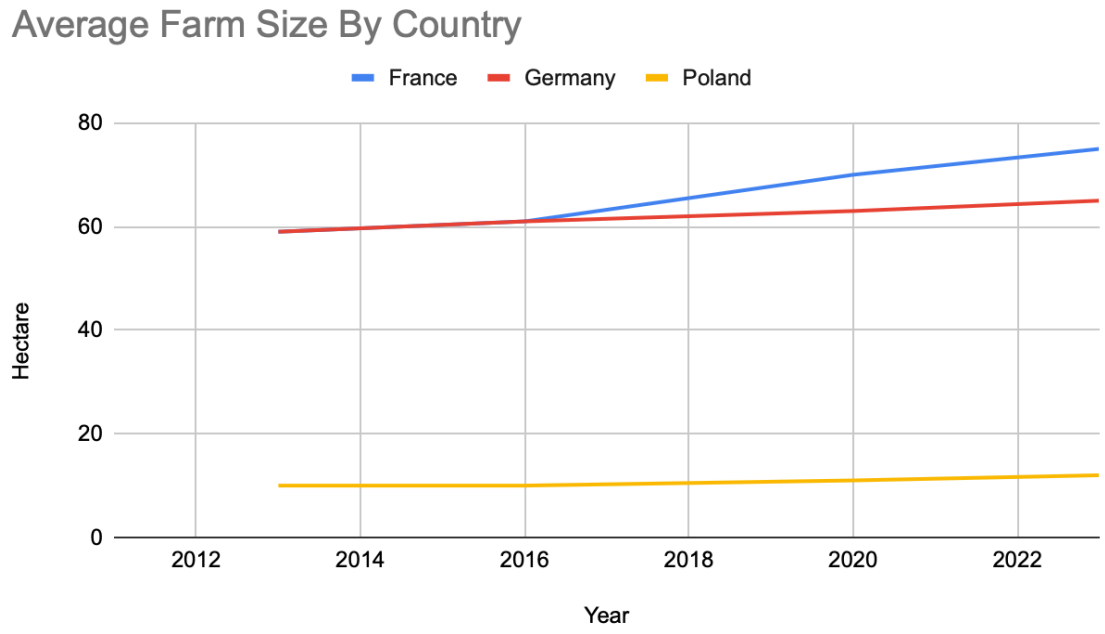
[55]Rachele, Rossi. "Direct Payments." *Fact Sheets on the European Union*, October 2025. https://www.europarl.europa.eu/factsheets/en/sheet/109/i-pagamenti-diretti.

[56] Nannucci, Lapo. "The common agricultural policy strategic plans regulation." *Fact Sheets on the European Union*, October 2025. https://www.europarl.europa.eu/factsheets/en/sheet/294068/the-common-agricultural-policy-strategic-plans-regulation.

This amendment does reflect the earlier statements from the European Commission that supporting small farmers is a priority, but it fails to differentiate between small and medium sized farms, which may bring into question the reality of how much support goes to medium sized farms instead of small farms. Farm size is significant because farm size both directly and indirectly impacts a farmer's ability to qualify for payments. At baseline, farmers do receive benefits based on the size of their farm area. Additionally, medium and larger sized farms have the ability to produce more output at a lower cost per unit, see more profit, retain more stability, and compete at the global scale. Due to these factors, medium and larger sized farms are more likely to be able to adhere to newer requirements of environmental practices and social conditionality. Given these realities, evaluating farm size and its relationship to direct payments is essential in assessing the CAP with France, Germany, and Poland.

First, it is essential to get a sense of the average farm size in the four countries of interest over the selected period of time. The European Union publishes reports on physical farm size every three or four years. For these measurements, data from 2013, 2016, 2020, and 2023 have been compiled. Although 2013 is two years before our selected base year of 2015, it is preferred to have a measurement before the Brexit referendum rather than a measurement after the Brexit referendum to be able to accurately portray the time period in question. In Figure 10, it can be seen that France's average farm size increased from 59 hectares in 2013 to 75 hectares in 2023. Germany saw an increase as well, shifting from an average of 59 hectares in 2013 to an average of 65 hectares in 2023. Poland, on the other hand, saw a marginal increase, shifting from an average of 10 hectares in 2013 to an average of 12 hectares in 2023 (see Appendix J).

Figure 10: Average Farm Size By Country

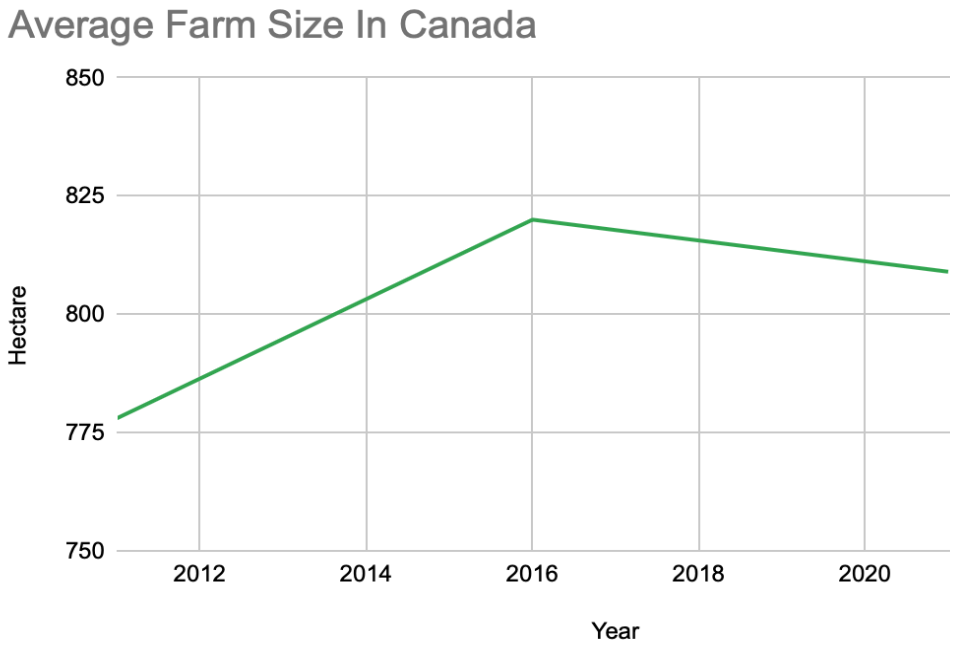


Source: Adapted by author from "Physical Size of Farms by Utilised Agricultural Area and Legal Form." eurostat, 2023. https://ec.europa.eu/eurostat/databrowser/view/ef_fsi_physz/default/table?lang=en.

Equally important though, is the baseline difference of average farm size between Poland, France, Germany. In 2013, Germany and France had the same average farm size at 59 hectares. However, Poland's average that same year was 49 hectares smaller. These numbers reflect Poland's sizable number of smaller family farms, of which are highly impacted by any shift in the CAP that may make it more difficult for them to qualify for benefits, such as quickly adjusting to environmental and social regulations. This is especially relevant when viewed in contrast to the strong presence of medium and large commercial farms in France and Germany, of which are more economically stable and more able to adhere to new mandates of environmental sustainability and social conditionality. This context is essential in evaluating why Germany and France saw larger increases in farm size than Poland. Due to the economic size and corporate structure of many of Germany and France's farms, it is easier for them to consolidate,

which has the potential to lead to a faster increase in the average farm size. Family run farms, like in Poland, however, are unable to consolidate as easily. This could correspond with limitations on increasing average farm size over time.

Figure 11: Average Farm Size In Canada



Source: Adapted by author from "Land use, Census of Agriculture historical data." Statistics Canada, 2021. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210015301

Canada's average farm size, which can be viewed in Figure 11, reflects a different reality. Similarly to the reporting patterns of the European Commission, it must be noted that Canada's Census of Agriculture only reports on average farm size once every five years. For Canada, the most recent year with reported data is 2021, and the most recent year of reported data before the Brexit referendum was 2011. Additionally, Canada has a drastically different agricultural sector construction than Europe, with significantly more land area and giant commercial farms, which can be seen in Figure 11 with Canada's average farm size in 2011 reporting at 778 hectares (see

Appendix K). This reality does make it difficult to use Canadian farm size data to analyze EU farm data, especially within the evaluation of the relationship between farm size and direct payments to agricultural producers. Despite these limitations, Canada's data presents an accurate reality for many countries during this time period, marked by an increase in average farm size, likely due to the consolidation of farms to offset harm from rising costs of farm inputs and hidden costs of environmental crises. These issues were discussed at the 2022 G7 Agriculture Ministers' Conference. German Federal Minister of Food and Agriculture Cem Özdemir spoke on the difficulties farms in Europe and around the world faced due to the climate crises, as well as higher costs of animal feed, energy, and fertilizers.[57] This shows the presence of agricultural challenges at a global scale that impacted Canada, France, Germany, and Poland during this time period.

Although average farm size is useful for evaluating overall trends, studying the relationship between farm area and CAP benefits requires further assessment through the categorization of farm size into small, medium and large. The annual Direct Aid Reports from the European Commission do present specific CAP benefit data alongside these farm size categories. Despite annual reports going back to 2002, however, it was not until the year 2020 that this farm size specific data began being published. This shift in reporting is significant, as it reflects the EU's increased awareness on the relevance of farm size for member states receiving CAP benefits. However, an absence of 2015 to 2019 data from both the European Commission and the governments of member states does limit the application of existing data for the purpose of this study. Despite these limitations, an evaluation of the existing data still provides valuable insights into the relationship between farm size and direct payments. Firstly, to supplement the

[57]Cem Özdemir. "We Will Only Be Able to Prevent a Meltdown of the Global Food System, If We Join Forces." *German Federal Ministry of Agriculture, Food and Regional Identity*, 2022. https://www.bmleh.de/SharedDocs/Reden/EN/220513-g7-agriculture-ministers-conference.html.

data presenting average farm size, the European Commission's Direct Aid Reports classify the percentage of agricultural land by hectare category. The under 5 hectare category refers to small sized farms, the 5 to 250 hectare category refers to medium sized farms, while over 250 hectare category refers to large size farms. It is important to note the large range of medium farm categorization of 245 hectares. Additionally, these reports do not share any information on the allocation of family farms or industrial farms within these categories.

Table 1: Impact of Farm Size, Area (Percent of Agricultural Land by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	0.30%	0.30%	0.30%	0.30%
France: 5-250 ha	81.60%	81.10%	79.70%	79.70%
France: >250 ha	18.00%	18.60%	20.00%	20.00%
Germany: <=5 ha	1.10%	1.10%	1.10%	1.10%
Germany: 5-250 ha	63.60%	63.30%	62.70%	62.70%
Germany: >250 ha	35.30%	35.60%	36.20%	36.20%
Poland: <=5 ha	12.20%	12.10%	11.70%	11.70%
Poland: 5-250 ha	76.30%	76.60%	77.10%	77.10%
Poland: >250 ha	11.50%	11.30%	11.20%	11.20%

Source: Adapted by author from "Direct Aid Reports." European Commission, 2025. https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/beneficiaries/direct-aid-reports_en.

In Table 1, it can be seen that Poland has the highest percentage of small farms, with a reported 12.20% in 2020 compared to 1.1% in Germany and 0.3% in France during that same year. France and Poland have comparable percentages of medium sized farms, with 81.6% and 76.3%, respectively, in the year 2020. Germany has a slightly smaller percentage of medium sized farms with 63.6% in 2020. However, it has the most percentage of large farms, with 35.3% in 2020. France followed with the second highest percentage of large farms at 18% that year,

while Poland had the smallest percentage at 11.5% (see Appendix L). This information also supplements the prior conclusions from Figure 10 measurement of average farm size, as the differentiability of small, medium, and large farms show the exact divisions of farm size within each member state.

Table 1 also lays out the shifts of the percent of agricultural land by hectare category. France's percent of small farms stayed the same, with a reported 0.3% in 2020 and 0.3% in 2023. The percent of medium farms decreased slightly, with a reported 81.6% in 2020 shifting to 79.7% in 2023. The percent of large farms increased slightly, with a reported 18% in 2020 shifting to 20% in 2023. It can be concluded that the approximate 2% loss of medium sized French farms is the 2% increase seen in large sized French farms. Germany saw similar patterns. Its percent of small farms stayed the same, from 1.1% in 2020 to 1.1% in 2023. Its medium farms saw a slight decrease, with a shift of 63.6% in 2020 to a 62.7% in 2023. Large farms saw an increase of the same caliber, with 35.3% in 2020 shifting to 36.2% in 2023. It can therefore be concluded that the 0.9% loss in the medium sized German farms is the same 0.9% increase seen in large sized German farms. Poland, however, reflects a slightly different story. Its percentage of small farms saw a 0.5% decrease, as 12.2% in 2020 shifted to 11.7% in 2023. Its percentage of medium sized farms saw a 0.8% increase, with 76.3% in 2020 shifting to 77.1% in 2023. Its percentage of large farms saw a 0.3% decrease, with 11.5% in 2020 shifting to 11.2 in 2023. It can be concluded that the 0.5% decrease in small farms and the 0.3% decrease in large farms are directly representative of the 0.8% of medium sized Polish farms. This data shows that France and Germany exhibit similar trends of farm consolidation through the merging or absorption of medium sized farms. Additionally, Poland's data conveys an increased investment in medium sized farms through the slight decreased percentages of small and large farms.

Table 2: Impact of Farm Size: Beneficiaries (Percent of Beneficiaries by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	10.00%	10.20%	10.00%	10.00%
France: 5-250 ha	85.60%	85.20%	84.90%	84.90%
France: >250 ha	4.40%	4.60%	5.10%	5.10%
Germany: <=5 ha	20.90%	21.00%	21.10%	21.10%
Germany: 5-250 ha	76.10%	76.00%	75.80%	75.80%
Germany: >250 ha	3.00%	3.00%	3.20%	3.20%
Poland: <=5 ha	51.30%	51.30%	50.90%	50.90%
Poland: 5-250 ha	48.40%	48.40%	48.80%	48.80%
Poland: >250 ha	0.20%	0.20%	0.20%	0.20%

Source: Adapted by author from "Direct Aid Reports." European Commission, 2025. https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/beneficiaries/direct-aid-reports_en.

To properly understand these impacts on the actual population of farmers, it is essential to evaluate the percentages of active farmers, or beneficiaries, who are classified within each category of farm size. Table 2 presents this information. First, is it useful to see how each country's beneficiary percentages within each farm size category have changed over the provided period of four years. The additional comparison with beneficiary data allows for complete evaluation of farm ownership, and direct payments, which will be addressed later in this section. France showed a constant percentage of beneficiaries for small farms, with 2020's 10% rising only to 10.2% in 2021, and then reporting at 10% again in 2022 and 2023. Its percentage of beneficiaries for medium farms, however, slightly decreased with 85.6% in 2020 shifting to 84.9% in 2023. In contrast, beneficiaries for large farms saw a slight increase, with 4.4% in 2020 leading to 5.1% in 2023 (see Appendix M). These numbers reflect a slight consolidation, of around 0.7%, within the medium farm category, which shifts the population from the categorization of medium farm beneficiaries to large farm beneficiaries. A similar pattern is seen

in Table 1, as the percentage of area for large farms increased alongside the decrease in the percentage of area for medium farms, even if it was more minimal.

In Table 2, Germany's data shows a slight increase in the percentage of beneficiaries of small farms, from 20.9% in 2020 to 21.1% to 2023. There also was a slight decrease in the percentage of beneficiaries of medium farms, which shifted from 76.1% in 2020 to 75.8% in 2023. The percentage of beneficiaries of large farms, however, saw a slight increase from 3% in 2020 to 3.2% in 2023. Although this pattern is similar to Table 1's data showing a slight decrease in the area for medium sized farms and a slight increase in the area for large sized farms, Table 1 showed no change within the percentage of small farm area. Germany's data from Table 2 suggests a slight shift of beneficiaries away from medium farm sizes, but its distribution towards small or large farms is not directly calculable within this data. It is possible that the shifts in the beneficiary population may not be directly correlated to farm size, but instead to eligibility criteria, as well as a proportional opening and closing of farms.

Poland's data in Table 2 shows a slight decrease in the percentage of beneficiaries of small farms, changing from 51.3% in 2020 to 50.9% in 2023. In effect, there was a slight increase in the percentage of beneficiaries of medium size farms, showing a shift from 48.4% in 2020 to 48.8% in 2023. Due to the fact that the percent of beneficiaries of large farms saw no change, with 0.2% being reported every year from 2020 to 2023, it can be assumed that the 0.4% decrease in beneficiaries of small sized farms is the same 0.4% increase in the beneficiaries of medium size farms. This data may also suggest the occurrence of some degree of consolidation among small farms, especially when considered alongside Chapter 1's findings that Polish employment in agriculture decreased. However, Table 1 does show a slight decrease of 0.3% between 2020 and 2023 for the area of large sized farms, while Table 2 does not show any

decrease. Similarly to Germany's data, though, there may be shifts in the beneficiary population of the country that are not directly tied to farm size, which could help to explain this slight change.

Additionally, this data can be compared to Table 1's measurements showing the percent of agricultural land by hectare category to understand the baseline relationship between farm size and beneficiaries. For all three members, it can be seen that smaller farms had significantly larger percentages of beneficiaries in relation to the percentage of the agricultural area that they utilized. France had approximately 0.3% of agricultural area dedicated to small farms, while small farm beneficiaries represented 10% of the beneficiary population. Germany had approximately 1.1% of agricultural area dedicated to small farms, while small farm beneficiaries represented approximately 21% of the beneficiary population. Poland had approximately 12% of agricultural area dedicated to small farms, while small farm beneficiaries represented 51% of the beneficiary population. This does reflect the reality that small farms are a notable part of the overall population of CAP beneficiaries, even if they don't take up a significant amount of land compared to their medium and large sized farm counterparts. This data also both acknowledges the importance of small farms to Polish agriculture, as well as the importance of CAP to small farm beneficiaries.

Table 1 and Table 2 also convey that the relationship between farm size and beneficiaries may be slightly more variant between the member states within the medium farm size category. Both France and Germany saw over 100% more in the amount of beneficiaries of medium farms than the percent of agricultural land area they occupy. France had approximately 80% of agricultural area dedicated to medium farms, while medium farm beneficiaries are approximately 85% of the beneficiary population, and Germany had approximately 63% of agricultural area

dedicated to medium farms, while medium farm beneficiaries are approximately 76% of the beneficiary population. Poland's data, on the other hand, shows how the percent of beneficiaries of medium farms represent 63% less than the percent of agricultural area that medium farms occupied, as Poland had approximately 77% of agricultural area dedicated to medium farms while their beneficiaries represented approximately 48.5% of the total beneficiary population. Large farms in all three countries, despite taking up a notable amount of land, have a significantly smaller percentage of beneficiaries. For example, large farms in France take up approximately 19% of agricultural land while representing approximately 5% of the beneficiary population. Large farms in Germany take up approximately 36% of agricultural land while representing approximately 3% of the beneficiary population. Large farms in Poland take up approximately 11.3% of agricultural land while representing approximately 0.2% of the beneficiary population.

Overall, Table 2 shows the true importance of CAP to medium farms in France, Germany, and Poland, in addition to the unique large reliability of CAP by small farms in Poland. The consistently lower proportion of beneficiaries of larger farms, despite their large land use, illustrates the CAP's limited emphasis on the support of large sized farms. Table 2 also shows that although there is some correlation between beneficiary percentage and land distribution, there may also be a presence of regulatory factors that impact annual beneficiary eligibility.

However, to evaluate these patterns in the larger context of Brexit, it is necessary to extend the data to look at CAP payments by category of farm size. This is due to the fact that loss of budget funding may have limited the budget of the CAP, which may have altered the priorities of member states receiving a newly limited CAP. Direct payments directly equate to

Pillar 1, which reserve the majority of CAP funds, as discussed earlier in this section. Table 3 displays the change of direct payments by farm size from 2020 to 2023.

Table 3: Impact of Farm Size: Direct Payments (Percent of Direct Payments by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	0.40%	0.50%	0.40%	0.40%
France: 5-250 ha	83.30%	82.70%	81.50%	81.50%
France: >250 ha	16.30%	16.80%	18.10%	18.10%
Germany: <=5 ha	1.20%	1.20%	1.20%	1.20%
Germany: 5-250 ha	66.00%	65.60%	65.00%	65.00%
Germany: >250 ha	32.80%	33.20%	33.80%	33.80%
Poland: <=5 ha	10.20%	10.20%	10.10%	9.90%
Poland: 5-250 ha	80.10%	80.20%	80.50%	80.60%
Poland: >250 ha	9.70%	9.60%	9.50%	9.50%

Source: Adapted by author from "Direct Aid Reports." European Commission, 2025. https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/beneficiaries/direct-aid-reports_en.

In analyzing Table 3, it is essential to first review the baseline divisions of direct payment between and within the three selected member states. France's data shows that its small farms receive approximately 0.4% of direct payments, while medium farms receive approximately 82%, and large farms receive approximately 17% (see Appendix N). This reflects that medium sized farms are heavily funded, small farms receive almost no direct payments, and large sized farms do receive some funding, despite funds being significantly less than the amount going towards medium sized farms. Germany's data shows that its small farms receive approximately 1.2% of direct payments, while medium farms receive approximately 65.5%, and large farms receive approximately 33.8%. Similar to France, Germany's data shows the most support for

medium sized farms, very little support for small farms and sufficient support for large farms. However, large German farms receive almost double the percentage of funds than large French farms receive at 16.8%. That percentile is largely differentiated from the medium sized farm category, as medium sized French farms receive 17% more direct payments than medium sized German farms. Additionally, Poland's data shows that its small farms receive approximately 10% of direct payments, medium farms receive approximately 80.3%, and large farms receive approximately 9.6%. Out of the three countries, Poland provides the largest percentage of direct payments to small farms and the least percentage of funds to large farms. This reflects its distinction from France and Germany, as the dominant presence of small farms corresponds to direct payments for those farmers.

These distinctions rise in importance when change over time is taken into account. In France, small farms saw almost no change in the percentage of direct payments, with 0.4% in 2020 rising only to 0.5% in 2021, and then going back to 0.4% in both 2022 and 2023. Medium farms saw a slight decrease in direct payment percentages, with 83.3% in 2020 shifting to 81.5% in 2023. Large farms, on the other hand, saw a comparable increase in direct payment percentages, rising from 16.3% in 2020 to 18.1% in 2023. It can be concluded that due to the lack of change in direct payment percentages to small farms, there was a direct shift of medium sized farm direct payments to large sized farm direct payments, of which was approximately 1.8%. Subsequently, Germany experienced parallel changes. German small farms saw no change in direct payment percentages, with 1.2% being recorded for 2020 through 2023. Medium farms saw a slight decrease in direct payment percentages, shifting from 66% in 2020 to 65% in 2023. Large farms, on the other hand, saw a slight increase in direct payment percentages, rising from 32.8% in 2020 to 33.8% in 2023. Due to the lack of change in direct payment percentages to

small farms, it can therefore be concluded that there was a direct shift of medium sized farm direct payments to large sized farm direct payments, of which was approximately 1%. Poland, on the other hand, saw a different pattern of change. Direct payment percentages to small farms decreased slightly, from 10.2% in 2020 to 9.9% in 2023. Direct payment percentages to medium farms, however, increased slightly from 80.1% in 2020 to 80.6% in 2023. Additionally, direct payment percentages to large farms decreased slightly from 9.7% in 2020 to 9.5% in 2023. It can be concluded that the 0.3% decrease from small Polish farms and the 0.2% decrease from large Polish farms merged to be the 0.5% increase seen in direct payments to medium sized farms.

These trends highlight member states shift in priorities and adjustment to CAP changes. This data shows that France and Germany are prioritizing the success of their larger commercial farms in comparison to their smaller and medium sized farms. This may be to reap more national profit from large farms, as their greater efficiency and ability to leverage higher yields allow for more exponential growth than most small or medium sized farms. It may also be to maximize their ability to compete in the global market. This conclusion aligns with findings from Chapter 1 that show how both France and Germany saw an increase in the value added of agriculture from 2015 to 2022, with Germany experiencing almost a 50% increase in the percentage of agriculture value added in GDP.

This conclusion is also upheld by statements from government officials. In September of 2023, French Minister of Agriculture and Food Sovereignty Marc Fesneau, while in attendance at a large agro-industry gathering, stated that "animal welfare issues only work if we find someone to pay for high-quality meat."[58] This reflects France's lack of confidence in smaller farmers to produce affordable agricultural products and meet the needs of its population.

[58] "France Pushes for More Factory Farming in Food U-Turn." *The Guardian*, September 14, 2023. https://www.theguardian.com/world/2023/sep/14/france-pushes-for-more-factory-farming-in-food-u-turn.

Additionally, in January of 2024, Vice Chancellor of Germany, Federal Minister for Economic Affairs and Climate Action Robert Habeck stated that the only way to cover farm production costs would be to increase farm production and therefore revenue, saying "this is the industrialization of agriculture."[59] This reflects Germany's turn towards industrial farming, and therefore larger farms, as a solution to the increasing economic instability within the European agricultural sector. It also aligns with Nowack's findings that German farm size increased due to fewer opportunities for smaller farms to be the recipients of financial and administrative support.[60]

Although Poland is providing higher percentages of direct payments to small farms in comparison to France and Germany, its data also shows increasing investment in medium sized farms. This could be to ensure economic viability and secure direct payments to farmers, being able to implement the CAP's updated objectives for environmental and social protections, all while still qualifying for benefits corresponding with the EU's amended economic support for small and medium sized farms. This may also be due to an increased need for medium sized farms to uplift the national economy and preserve agricultural trading competitiveness while still being sustainable, as medium farms have a greater ability to reap profit than small farms. These two conclusions are upheld by statements from Polish Director General of the Ministry of Agriculture and Rural Development Bogusław Wijatyk. "We need to ensure that small and medium-sized farms have equal opportunities for competitiveness in the increasingly changing market and climate environment" and "direct payments should remain a pillar of stabilisation of

[59]Benjamin Wehrmann. "German Farmers Kick off Protest Week against Diesel Subsidy Cuts amid Worries Far-Right Is Hijacking Cause." *Clean Energy Wire*, January 8, 2024. https://www.cleanenergywire.org/news/german-farmers-kick-protest-week-against-diesel-subsidy-cuts-amid-worries-far-right-hijacking-cause.

[60] Nowack, *Soziale Dimensionen landwirtschaftlicher Multifunktionalität vor dem Hintergrund des Größenstrukturwandels in der Landwirtschaft*, 2023

farmers' income while application procedures should be simple and transparent, CAP resources should be fairly distributed among the Member States and targeted at supporting small and medium-sized farms" were stated by Director General Wijatyk at the 2024 Peace and Agriculture conference in Berlin.[61] These accounts show Poland's inclusion of medium sized farms in CAP investment within both direct payments and environmental initiatives.

Table 3's direct payment data, when compared to Table 1's land area data, shows significant parallels. The pattern of change is similar, as France and Germany show stability in the small farm category while slightly decreasing their medium farm percentile to slightly increase their large farm percentile. Poland also saw parallel changes, as both Table 1 and Table 2 show a slight increase in the medium farm size category with slight decreases in the small and large farm size categories. Additionally, the exact percentages within each country and category are comparable. Table 1's French data presents approximately 0.3% area for small farms, 81% for medium farms, and 19% for large farms. Table 3's French data shows 0.4% of direct payments for small farms, approximately 82% for medium farms, and approximately 17% for large farms. Table 1's German data presents approximately 1.1% area for small farms, 63% for medium farms, and 36% for large farms. Table 3's German data presents approximately 1.2% direct payments for small farms, 65.5% for medium farms, and 33.8% for large farms. Table 1's Polish data presents approximately 12% area for small farms, 76.6% for medium farms, and 11.3% for large farms. Table 3's Polish data presents approximately 10% direct payments for small farms, 80.3% for medium farms, and 9.6% for large farms. These proportionate numbers highlight the close corresponding relationship between farm size and Pillar 1's direct payments, reflecting the CAP's structure of balancing economic support with agricultural land usage.

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[61] "Peace and Agriculture – Conference in Berlin." *Website of the Republic of Poland*, October 3, 2024. https://www.gov.pl/web/agriculture/peace-and-agriculture--conference-in-berlin.

However, Table 3's direct payment data, when compared to Table 2's beneficiary data, demonstrates imbalances. Table 3's French data shows approximately 0.4% of direct payments for small farms, alongside 82% for medium farms and 17% for large farms. Table 2's French data reflects approximately 10% of beneficiaries within the small farm category, 85% within the medium farm category, and 5% of the large farm category. This relationship represents a discrepancy between the share of direct payments and the distribution of beneficiaries across farm size in France. Large farms receive a disproportionately large share of direct payments while small farms receive a disproportionately small share of economic support.

Table 3's German data shows approximately 1.2% direct payments for small farms, 65.5% for medium farms, and 33.8% for large farms. Table 2's German data shows approximately 21% of beneficiaries within the small farm category, 76% within the medium farm category, and 3% within the large farm category. Similar to France, this relationship also represents a discrepancy between the share of direct payments and the distribution of beneficiaries across farm size in Germany. Large farms see a disproportionately large share of direct payments while small farms receive a disproportionately small share of assistance.

Table 3's Polish data shows approximately 10% direct payments going to small farms, 80.3% to medium farms, and 9.6% to large farms. Table 2's Polish data shows approximately 51% of beneficiaries within the small farm category, 48.5% within the medium farm category, and 0.2% within the large farm category. Although in comparison to France and Germany, Poland provides a larger percentage of direct payments to small farms, there is significant inequality when compared to the large percentage of small farm beneficiaries, representing an astounding 51% of all beneficiaries. Beneficiaries of medium farms however, are proportionally overrepresented in direct payments.

Data that evaluates farm size can be defended as representative through the prior findings. Within Chapter 1 - Economic Dependence of Agriculture, it is found that land use for agriculture stayed consistent in all of the selected countries. Therefore, shifts in percentage is due to redistribution or consolidation of farms rather than overall increases or decreases in agricultural land area. Additionally, due to the reality that farm redistribution and consolidation is difficult and time consuming, the small percentile changes within the data are not random, but rather can reflect the impact of EU policy on farmers. This is further defended by the evidence that the data within Table 1, Table 2, and Table 3 show significant stability, with multiple examples of percentages staying exactly the same, down to the tenth of a decimal point, over a period of four years. Moreover, timeline changes in the datapoints are not arbitrary, except for a couple minor instances, as they generally show a gradual increase or decrease in the data. Consequently, these small percentile changes are systemic, even if their actual significance for the agricultural sector can be challenged.

Overall, farm sizes have unquestionably increased in France and Germany, while Poland's farm sizes have grown more slowly, reflecting its higher number of small and medium-sized farms. These smaller farms are more vulnerable to changes in the CAP, especially in meeting environmental and social rules, unlike the larger farms in France and Germany. Poland showed some slight shifts towards investing more in medium farms, likely to stay competitive and meet CAP's sustainability goals. However, farm consolidation has the ability to decrease agricultural employment opportunities. As farms become larger they often become more industrialized and require less labor. Additionally, the CAP amendment focuses on supporting small and medium farmers but doesn't clearly separate small from medium farms, which is advantageous for medium farms. France and Germany, however, showed some slight

shifts towards greater investment in the already dominant large farms, likely to preserve global competitiveness and economic growth. Furthermore, the general stability of CAP benefits in France, Germany, and Poland indicates overall increased competence in managing agricultural support, even with some internal shifts in the distribution of CAP funds. France and Germany have gradually moved funds from Pillar 1 to Pillar 2, reflecting their ability to meet basic agricultural needs with slightly less funding while also addressing growing environmental sustainability goals. In contrast, Poland has not made this shift, continuing to rely heavily on direct payments despite its overall increased competence with the CAP. However, it is important to note the redistribution of Pillar 1 and 2 funds is likely due to the EU's new environmental goals, not Brexit. Nonetheless, it can be argued that Brexit, marked by the loss of a major net contributor of the EU budget, furthered the actions of the EU to make changes within the CAP to increase competence with a more limiting budget. Subsequently, member states who rely on Pillar 1 direct payments, such as Poland, may use its ability to transfer, or not transfer, a proportion of funds between Pillar 1 and Pillar 2 to meet national priorities and maintain Pillar 1's direct payments. Over time, these actions may lead to the further division of wealthier and poorer member states, as poorer member states will not invest in Pillar 2's sustainable and rural development goals at the cost of lowering their Pillar 1 direct payments. This conclusion is upheld by Broussolle's notion that the loss of the UK within the EU budget will have long term economic consequences, especially for member states with a strong historical reliance on CAP funds and may not be prepared to finance additional economic initiatives on the national or local level to uplift agriculture.[62]

[62] Broussolle, Le Brexit et le budget de l'UE : quelles conséquences pour la politique agricole commune et la contribution française?, 2018

This data does raise the question if slightly increased CAP support for large farms in France and Germany had an impact on their abilities to succeed in the agricultural trading market, especially following Brexit. Additionally, there is an inquiry if Poland, with a slight increased focus on medium farms, has altered its ability to compete with more powerful states in trading agricultural goods. These issues will be discussed within the next two chapters through the utilization of a gravity model and an examination of sector specific trade data.

CHAPTER 3: BILATERAL TRADE GRAVITY MODEL

To understand if agricultural trade in the selected countries changed due to Brexit, the determinants of bilateral agriculture flows of Canada, France, Germany, and Poland are identified through the utilisation of the gravity model with agricultural trade. With the estimations using a PPML gravity model technique, the impact of the determinants on agricultural exports, as well as imports, are measured.

The gravity model, derived from Newton's universal law of gravitation, asserts that trade between two countries is directly related to their economic size and inversely determined by the distance between them.[63] Jan Tinbergen,[64] was the first to use this model to explain bilateral trade. However a multitude of research has used the gravity model to explain international trade between countries throughout the world. The original gravity equation of international trade (1) is expressed as:

$$Trade_{ij} = GDP_i^{\beta} * GDP_j^{\Upsilon} * Dis_{ij}^{-\delta} \quad \textbf{(1)}$$

where $Trade_{ij}$ indicates the flow of agricultural trade from exporting country (i country) to importing country (j country), GDP_i indicates the GDP of the exporting country,

[63]Tariq Ahad Nengroo, et al. "Determinants of Bilateral Agricultural Trade of SAARC Region: A Gravity Model Approach." *Statistika: Statistics and Economy Journal* 103, no. 2 (June 16, 2023). https://doi.org/10.54694/stat.2022.40.

[64]Jan Tinbergen. "Shaping the world economy suggestions for an international economic policy." *American Journal of Agricultural Economics*, 1962. https://doi.org/10.2307/1236502.

GDP_j indicates the GDP of the importing country, and Dis_{ij} indicates the distance between the importing and exporting countries. The model can expressed in logarithmic form (2) as:

$$ln\,(Trade_{ij}) = \beta_0 + \beta_1 ln\,GDP_i + \beta_2 ln\,GDP_j - \beta_3 ln\,Dis_{ij} + \varepsilon ij \quad \textbf{(2)}$$

where β acts as an elasticity coefficient for GDP and distance, and εij acts as an error term. This equation has been utilized for OLS, or Ordinary Least Squares, linear estimators. However, this model is not as effective for analyzing trade within a specific sector, such as agriculture.[65] The OLS method may present with heteroskedasticity, when the error variance of independent variables is not constant. This can cause the method to yield biased estimates.[66] Additionally, the OLS method does not include the natural log of zero, or a zero-trade observation. This means that the numerical estimates may show diminishing dependent variables. To solve these issues, the PPML, or Poisson Pseudo Maximum Likelihood can be used. The PPML model deals with the problem of zero trade flow, provides unbiased estimates in any presence of heteroskedasticity, and all observations are equally weighted.[67] Although OLS and PPML can be specified using the same formulas, they correspond to different underlying models, and therefore their inputs are interpreted differently by the R programming language.

[65] Nazir Muhammad Abdullahi, et al. "Do Institutions Matter for Agri-Food Imports and Exports between China and Africa? A Gravity Model Analysis." *Estudios económicos* 41, no. 83 (July 2, 2024). https://doi.org/10.52292/j.estudecon.2025.4316.

[66] J. M. C. Silva Santos, and Silvana Tenreyro. "The Log of Gravity." *The Review of Economics and Statistics* 88, no. 4 (November 1, 2006). https://doi.org/10.1162/rest.88.4.641.

[67] Estrella Gómez-Herrera. "Comparing Alternative Methods to Estimate Gravity Models of Bilateral Trade." *Empirical Economics* 44, no. 3 (March 28, 2012). https://doi.org/10.1007/s00181-012-0576-2.

Although the PPML model provides great accuracy in measuring bilateral trade, there is some debate over the use of GDP in calculating the economic mass of trading partners. As expanded on in the methodology chapter, there is evidence that conveys how gravity models that focus on a specific trade sector may make more accurate conclusions when the value of national production in that specific sector is utilized as an independent variable instead of GDP. Therefore, this study, which centers on solely agricultural trade, will heed more accurate results when equation (2) is rewritten as:

$$ln\,(Trade_{ij}) = \beta_0 + \beta_1 ln\,Prod_i + \beta_2 ln\,Prod_j - \beta_3 ln\,Dis_{ij} + \varepsilon ij \quad \textbf{(3)}$$

where GDP_i is replaced by $Prod_i$, and GDP_j is replaced by $Prod_j$. Here, $Prod_i$ indicates the value of agricultural production in the exporting country while $Prod_j$ indicates the value of agricultural production in the importing country.

Next, equation (3) can be completed by implementing the dummy variables as seen below:

$$ln\,(Trade_{ij}) = \beta_0 + \beta_1 ln\,Prod_i + \beta_2 ln\,Prod_j - \beta_3 ln\,Dis_{ij} + \beta_4 NoBrexit + \beta_5 Covid + \varepsilon ij \quad \textbf{(4)}$$

where $NoBrexit$ indicates a lack of Brexit presence, while $Covid$ indicates the year 2020, where the onset of the COVID-19 pandemic. This equation can be properly understood by looking at Table 4, showing the descriptions and sources of each variable.

Table 4: Gravity Model Variables

Variable	Description	Source
ln Prod	Log production value of exporter and importer	FAO
ln Dis	Log population weighted geographic distance	GPD Data Repository
Trade flow	Bilateral trade flow value	FAO
No Brexit	Indicator for absence of Brexit	
Covid	Indicator for presence of Covid	

Sources: "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM; "Geographic Distance." The Geo-Political Distance Data Repository, 2025. https://www.geopoliticaldistance.org/.

Next, R is used to read the collected data from the selected countries over the given time period of 2015 to 2023 (Table 6), take the log of all variables except distance, and do a PPML regression. These results, including estimates, standard errors, and significance, can be viewed in Appendix Q.

Table 5: Gravity Model Results

	Estimate	Standard Error	Significance
ln Dis	-1.01092	0.1305	***
ln Prod i	0.5626	0.18719	**
ln Prod j	-0.5552	0.21149	*
No Brexit	0.08332	0.11934	
Covid	0.067	0.18181	

Notes: Standard errors: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.
Source: Author's calculation

The variables of *distance*, *production i*, and *production j* show how much trade changed relative to those variables. For *distance*, the results show that a 1% increase in distance leads to 1% decrease in trade. This means that as the geographical distance between two locations

increases, they are less likely to trade. The proportionally of the 1% to 1% ratio in these results also shows how trade in this system is significantly sensitive to distance. For *production i*, the results show that a 0.56% increase in production in the origin country leads to a 1% increase in trade. This means that as an exporting country increases its production, they are more likely to trade. Furthermore, extra production is being exported instead of consumed by the domestic population. As for *production j*, the results show that a 0.55% increase in production in the destination country leads to a 1% decrease in trade. This means that as an importing country increases its production, they are less likely to trade. As the country becomes more self-sufficient, it has less of a need for imported goods. When looking at the p-values, all three of these variables show to have statistical significance. *Distance* has the most significance with $p<0.001$, followed by *production i* with $p<0.01$, and then *production j* with $p<0.05$. It can then be concluded that these findings are indeed not random, but rather accurately represent distance and production in the bilateral trade between the United Kingdom and our selected countries of Canada, France, Germany, and Poland over the time period of 2015 to 2023.

However, the two dummy variables of *No Brexit* and *Covid* produced different results. Both of these values showed to be not statistically significant with comparatively large standard errors. Using the formula *100 * (e^(coefficient) - 1)* to calculate a percentage change of each variable, without a standard error, it could be argued that there was around 8% more trade before Brexit and that Covid caused a 6% increase in agricultural trade in the year 2020. However, due to that lack of statistical significance, these results still show that the variables of *No Brexit* and *Covid* have an inconclusive impact on the bilateral trade between the United Kingdom and our selected countries of Canada, France, Germany, and Poland over the time period of 2015 to 2023. These inconclusive results are potentially due to a relatively small number of data points,

as gravity models are designed to be able to measure trade with dozens of countries over decades, while this study only measures five countries over a period of nine years.

With this data, we can conclude that distance and agricultural production both have strong impacts on overall bilateral agricultural trade between the selected countries and the United Kingdom. However, both COVID-19 and Brexit had an unknown impact on overall trading patterns. It is also important to note the limitations of this gravity model's inability to provide country-specific conclusions. Therefore to fully evaluate these agricultural trading relationships, the next chapter, Agricultural Trade by Product Category, can be turned to.

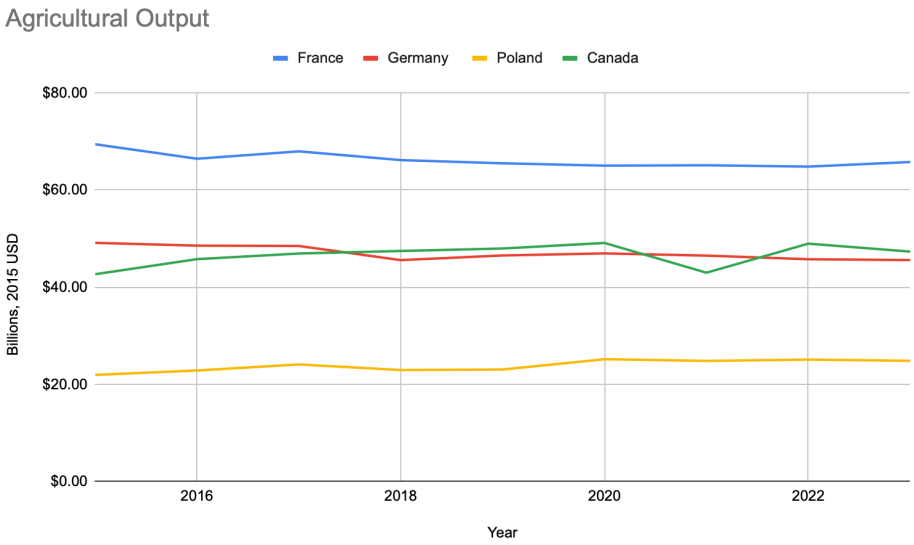
CHAPTER 4: AGRICULTURAL TRADE BY PRODUCT CATEGORY

Despite Chapter 3's strong conclusions regarding geographical distance and agricultural production, the gravity model was unable to establish Brexit-related impacts on UK agricultural trade with Canada, France, Germany, and Poland. The gravity model was also unable to differentiate findings based on country. However, to properly evaluate trade by country, it is useful to compare data from various types of agricultural product categories. Different types of agricultural goods behave differently on global markets, especially when trade unions are broken or economic crises occur. As discussed within the methodology, in addition to country specific data over time, this chapter evaluates trade within five different categories of agricultural products: Category 1 - Live Animals and Animal Products, Category 2 - Vegetable Products, Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes, Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products, and Category 5 - Textile Materials.

It is essential to reflect on the context of UK-EU trade policy shifts relating to Brexit. When the UK departed the EU in 2020, their trading relationship was not completely abandoned. In 2021, the EU-UK Trade and Cooperation Agreement was put in place. Although it did not match the economic integration experienced before Brexit, the agreement set out to protect mutual interests, including trade. Provided rules of origin regulations are met, it does not establish any tariffs or quotas. However, UK imports no longer benefit from free movement of goods, leading to significant red tape and customs formality barriers.[68]

[68] "The EU-UK Trade and Cooperation Agreement."*European Commission*, 2021. https://commission.europa.eu/strategy-and-policy/relations-united-kingdom/eu-uk-trade-and-cooperation-agreement_en.

Figure 4: Agricultural Output



Source: Adapted by author from "Food - Gross Production Value." Our World in Data, 2024. https://ourworldindata.org/grapher/agricultural-output-dollars?time=2015..latest&country=.

Figure 4, which was first utilized in Chapter 1, is reintroduced to provide essential information on the relationship between production and trade. As discussed in Chapter 3, the gravity model found that increased production in exporting countries is associated with an increase in trade, while increased production in importing countries is associated with a decrease in trade. All countries saw fairly stable production over time, as predicted by Banse.[69] From 2015 to 2023, Poland saw an overall increase of $2.9 billion while Canada saw an overall increase of $4.65 billion. In the same time frame, France saw an overall decrease of $3.65 billion and Germany saw an overall decrease of $3.54 billion (see Appendix D). These shifts may be relatively small, but they are important to take into account during evaluations of trade by

[69] Banse, *Mögliche Auswirkungen Eines Harten Oder Weichen Brexit Auf Die Deutsche Landwirtschaft - Update*, 2018

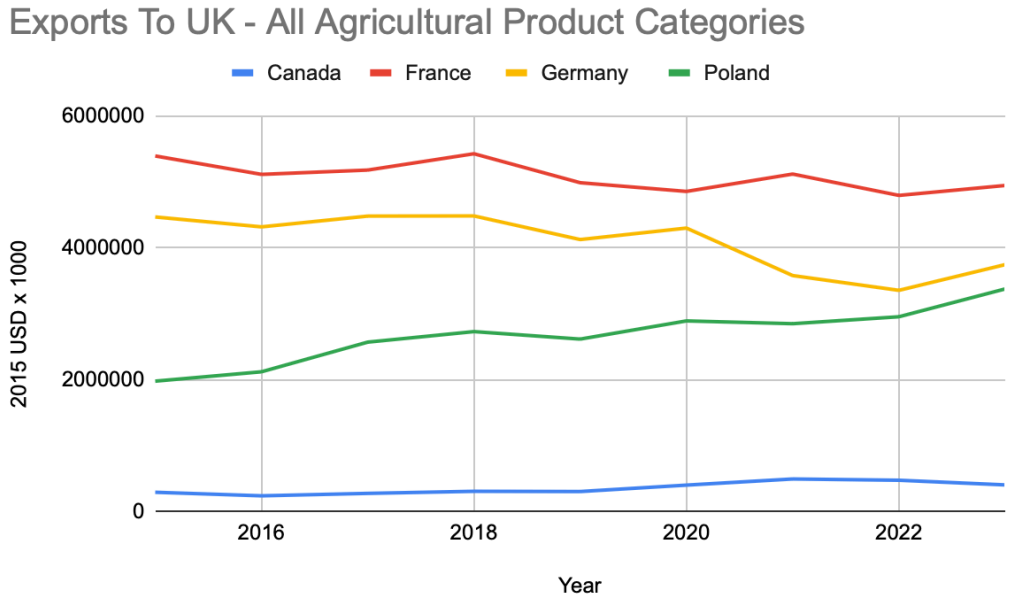
agricultural product category, as it is possible that the majority of these changes may possibly be confined to a specific agricultural product category.

Figure 12 and Figure 13 visualize exports to the UK and imports from the UK for all five categories of agricultural products. At the 2015 baseline, France shows the most trade in terms of value, as France reported the highest value of exports and imports out of the three selected member states. Germany's baseline reflects the second most trade in terms of value, with exports and imports being measured just below France. Poland's baseline reflects the third most trade in terms of value, as its exports and imports are reported to be just below Germany. Canada is noted to have the least amount of trade with the UK, which is consistent with the gravity model's finding that an increase in geographical distance is associated with a decrease in trade. Additionally, Canada showed relative stability over time with a small increase in imports, shifting from approximately $397,000,000 in 2015 to approximately $412,000,000 in 2023 (see Appendix S). Canada also saw a slightly larger increase in exports, shifting from approximately $287,000,000 in 2015 to approximately $398,000,000 in 2023 (see Appendix R). Canada's slight increase in production, as noted in Figure 4, is likely associated with this increase in exports to the UK.

In a similar fashion, Poland showed an increase in exports, from approximately $1,974,000,000 in 2015 to approximately $3,374,000,000 in 2023. With Poland seeing an overall increase in agricultural production, this pattern again aligns with the gravity model's findings that increased production of the exporting country is associated with increased trade. France and Germany, in contrast, experienced the opposite pattern. Both countries saw a decrease in agricultural production throughout the time period, which are associated with a decrease in exports to the UK. France went from exporting approximately $5,393,000,000 in 2015 to

approximately $4,944,000,000 in 2023. Germany went from exporting approximately $4,466,000,000 in 2015 to approximately $3,743,000,000 in 2023. These patterns establish that the levels of agricultural production, not Brexit, is responsible for shifts in exports from France, Germany, and Poland when combining the five agricultural product categories. This is also defended by the fact that there is no large shift reported just following the year 2021, which would mark a possible interference of Brexit and the shift to the EU-UK Trade and Cooperation Agreement.

Figure 12: Exports to UK, All Agricultural Product Categories

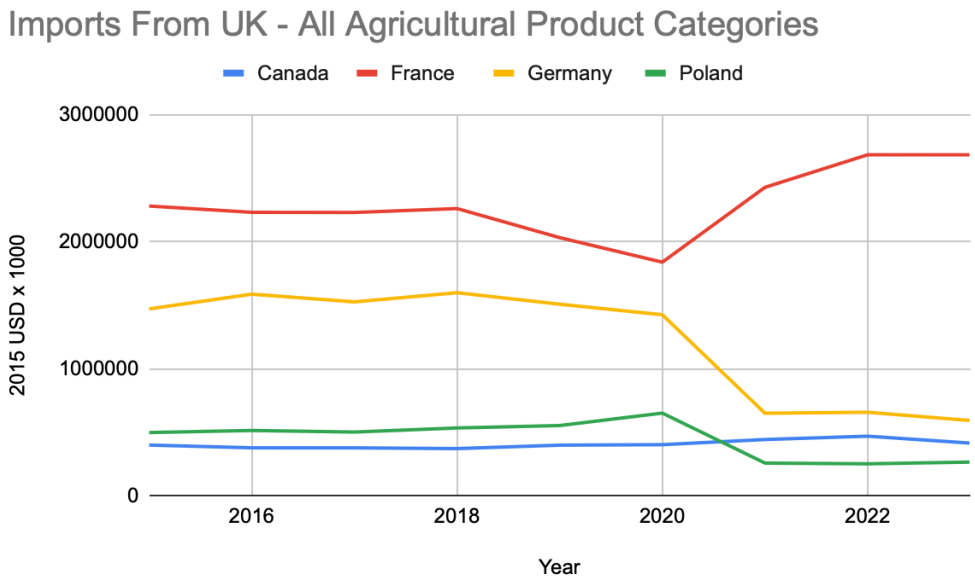


Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

However, when analyzing imports from the UK to France, Germany, and Poland, large shifts reported in 2021 convey there is an impact from Brexit, corresponding with the year the EU-UK Trade and Cooperation Agreement was put in place. Germany saw a decrease of imports with approximately $1,470,000,000 in 2015 decreasing to approximately $1,507,000,000 in

2019, and then decreasing to approximately $590,000,000 in 2023. This reflects a 60% decrease in imports. Poland also saw a decrease of imports with approximately $496,000,000 in 2015 decreasing to approximately $551,000,000 in 2019, and then decreasing to approximately $263,000,000 in 2023. This reflects an almost 50% decrease in imports. France, on the other hand, saw an increase in imports with approximately $2,280,000,000 in 2015 shifting to $2,031,000,000 in 2019 and then increasing to $2,684,000,000 in 2023. This represents an approximate 15% increase in imports.

Figure 13: Imports From UK, All Agricultural Product Categories



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

These shifts are not random, as publicly trusted sources from the UK have stated that following Brexit, UK exporters utilized France's Regime 42 to import their goods into France, declare France as the goods' destination state, and then use the EU's free flow of goods to ship the goods elsewhere in the EU. This was completely within regulation, as UK exporters were not

mandated to pay a supply chain value-added tax or register for the French value-added tax.[70] [71] [72] This shows that the reported increase of UK imports to France following Brexit includes both the imports to France and the imports that traveled through France to reach other parts of the EU. Unfortunately, the data is unable to specify the proportion of these two types of imports, preventing a direct confirmation of a presence of imports that travel through France to reach other parts of the EU.

However, some assumptions on this presence can be inferred through an application of the gravity model towards the data of Germany and Poland from Figure 13. The model concludes that for destination countries, an increase in production is associated with a decrease in trade. However, Poland saw an increase in production while Germany saw a decrease in production, but both countries experienced a decrease in import trade. This inconsistency indicates that it is possible that there is an external factor impacting imports from the UK during this period: Brexit and its repercussions.

Brexit and its repercussions were not significant for French, German, or Polish exports to the UK in the way that they were for UK exports. The United Kingdom showed strong agriculture import dependence before Brexit, with France, Germany, and Poland all exporting significantly more agricultural goods to the UK than they received in return. The existence of this import reliance continued post Brexit, which could be seen as exports to the UK remained

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[70] "Make Sure You're Ready for French Vat Changes." *North East Chamber of Commerce*, October 13, 2025. https://www.necc.co.uk/make-sure-youre-ready-for-french-vat-changes/.

[71] "Crucial Vat Changes for UK Exporters Using France's Regime 42." *Essex Chambers of Commerce*, January 13, 2026. https://www.essexchambers.co.uk/international-trade-newsletter/international-trade-newsletter-november-2025/crucial-vat-changes-for-uk-exporters-using-frances-regime-42/.

[72] "Events - Delivery Duty Paid: Understand the Changes of Regime 4200 in France." *UK Government*, 2026. https://www.business.gov.uk/business-academy/events/delivery-duty-paid-understand-the-changes-of-regime-4200-in-france-24-march-2026/.

high, with decreases from France and Germany being offset by Poland's larger increase. Klein discusses the complexities of being in an industry trade deficit, as reliance on importers is difficult to reverse, especially as international investment continues to favor already thriving industries.[73] This reliance was advanced due to the UK's own decline in production due to difficulty accessing essential imported inputs.[74] Therefore, the UK's need for agricultural imports overpowers, in this time series, the complexities in navigating trade post-Brexit.

However, due to the lack of country-specific agricultural production data for each of the five categories of agricultural products, and because the gravity model was based on overall trade data, it is not possible to utilize the direct relationship between the gravity model and national agricultural production to investigate which of the agricultural product exports were impacted by Brexit. However, it is still possible to make more general inferences on production when marked by higher or lower exports or imports, as well as make inferences regarding potential Brexit impacts by examining a potential sharp increase in UK export values to France reported in 2021 onward.

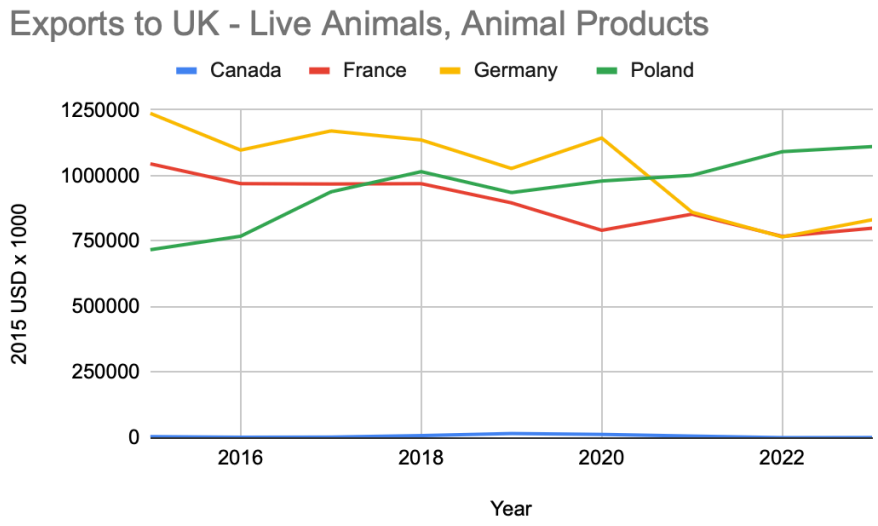
The first category, Live Animals and Animal Products, includes agriculture products like meat, dairy, eggs, and live animals (see Appendix AE). Similarly to figures 12 and 13, Canada showed fairly stable data over the selected time period, while also seeing significantly less exports and imports in comparison to France, Germany, and Poland, likely due to its geographical distance from the UK. Poland's baseline data in Figure 14 and Figure 15 reflect a large export surplus within this category, with 2015 seeing $717,423,000 in exports and $153,033,000 in imports (see Appendix T and Appendix U). Germany sees a similar trend of

[73] Klein, *Trade Wars Are Class Wars: How Rising Inequality Distorts the Global Economy and Threatens International Peace*, 2020

[74] Guillin, Trade flows and RTAs: Does Brexit matter after all?, 2026

baseline export surplus, as in 2015 it reported $1,237,609,000 in exports compared to $298,432,000 in imports. France also showed similar data of baseline export surplus, reporting $1,045,145,000 in 2015 exports compared to $658,703,000 in 2015 imports. This consistent data shows the inclusion of Category 1 - Live Animals and Animal Products into the overall export surplus of the selected EU member states.

Figure 14: Exports To UK - Live Animals, Animal Products

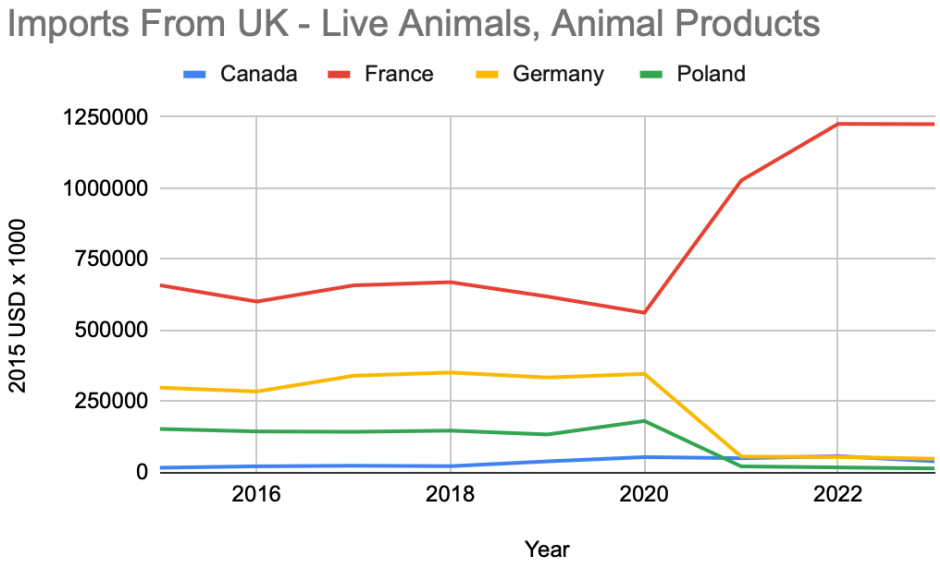


Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

Figure 14 does show some change over time. Poland increased its value of exports to the UK, rising from $717,423,000 in 2015 to $1,110,912,000 in 2023. Germany decreased its value of exports to the UK, falling from $1,237,609,000 in 2015 to $832,009,000 in 2023. France also decreased its value of exports, decreasing from $1,045,145,000 in 2015 to $799,616,000 in 2023. These changes are extremely similar to Figure 12's overall exports pattern of change, with Poland increasing exports while Germany and France decrease exports. The main difference

between Figure 12 and Figure 14, besides product category, is the country with the highest exportation baseline. In Figure 12, it is France, reflecting France's place as the highest exporter of agricultural products in the European Union. Conversely, Figure 14 shows that Germany exports the most in value, potentially reflecting a high German production of animal products in comparison to its French and Polish counterparts.

Figure 15: Imports From UK - Live Animals, Animal Products



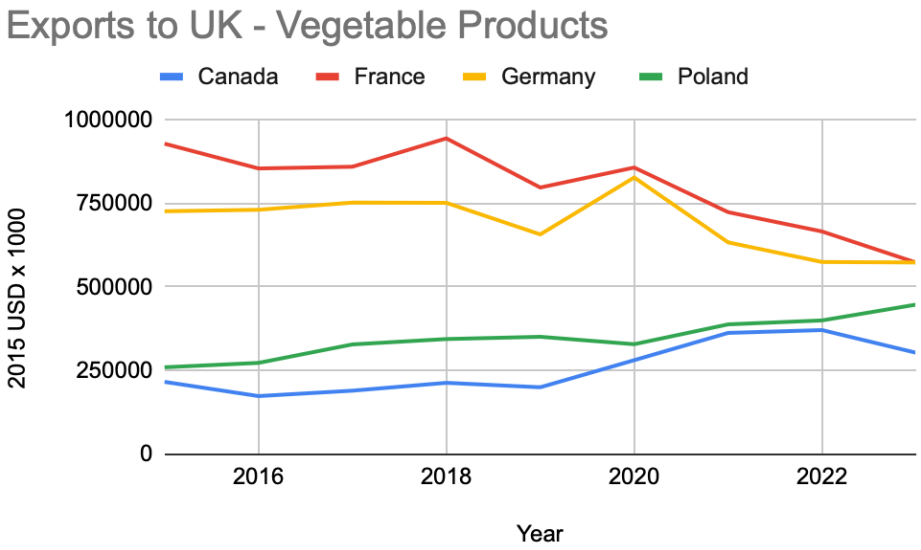
Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

Figure 15 also shows patterns of change similar to Figure 13's overall imports, with sharp decreases of imports to France and Germany originating in 2021 in concurrence with a sharp increase in import value to France (see Appendix U). German imports fell from $298,432,000 in 2015 to $48,227,000 in 2023, while Polish imports fell from $153,033,000 in 2015 to $14,242,000 in 2023. French imports increased from $658,703,000 in 2015 to $1,225,373,000 in 2023. This reflects that animal products were likely included in the UK imports to France that

were being redistributed to the rest of the EU. This shows a feasible impact from Brexit for trade of goods of live animals and animal products.

This data shows that Category 1 - Live Animals and Animal Products largely represents overall trading patterns between the UK with France, Germany, and France, including baseline levels of trade by country, changes of exports, changes in imports, with the one exception of a higher baseline of German exports. France, Germany, and Poland also maintained an export surplus over the UK within this category, except for 2021 through 2023, when UK exports to France exceeded French exports to the UK. However, as just discussed, it is believed that at least some of these goods are being redistributed to other EU countries.

Figure 16: Exports To UK - Vegetable Products

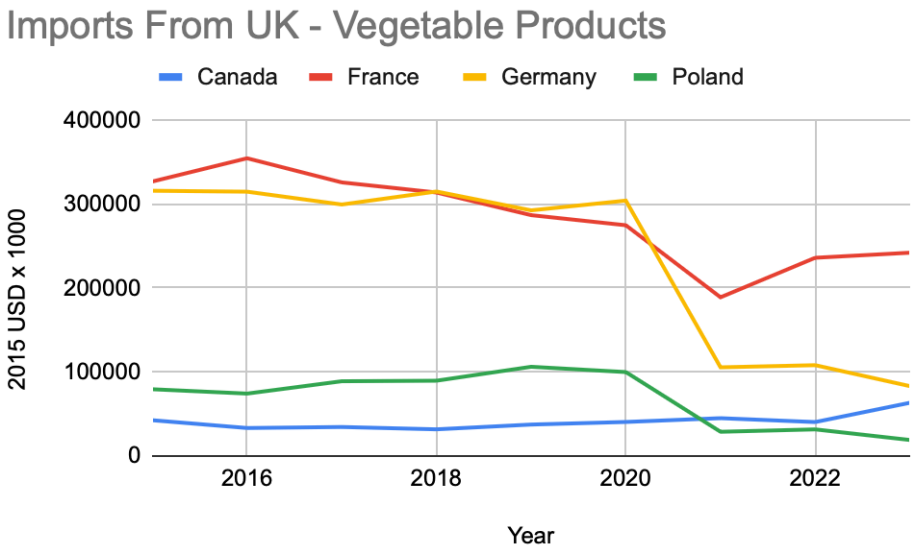


Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

The second category, Vegetable Products, includes goods like fruits, vegetables, nuts, cereales, and wheat (see Appendix AF). In figures 16 and 17, Canada, despite having a lower baseline level of trade with the UK, shows some increase of both imports and exports over time.

This may suggest an increase in production or demand for vegetable products in Canada and the UK. In addition, Figure 16 shows similar patterns to Figure 12, with exports from France and Germany decreasing while exports from Poland increase (see Appendix V). France's exports fell from $928,049,000 in 2015 to $572,755,000 in 2023. Germany's exports fell from $726,036,000 in 2015 to $573,079,000 in 2023. Polish exports rose from $259,740,000 in 2015 to $447,009,000 in 2023. Also similar to figure 12, France exports the most in value, followed by Germany, and then Poland. This may reflect similar production levels, if relying on conclusions from the gravity model connecting production with exportation.

Figure 17: Imports From UK - Vegetable Products



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

Similar to figure 13, Figure 17 shows France sees the most imports the most in value, followed by Germany, and then Poland. However, Figure 17 shows some different patterns regarding the change of imports, of which was not seen in Figure 13. Germany and Poland both show a decrease in the value of imports from the UK starting in 2021, alongside the introduction

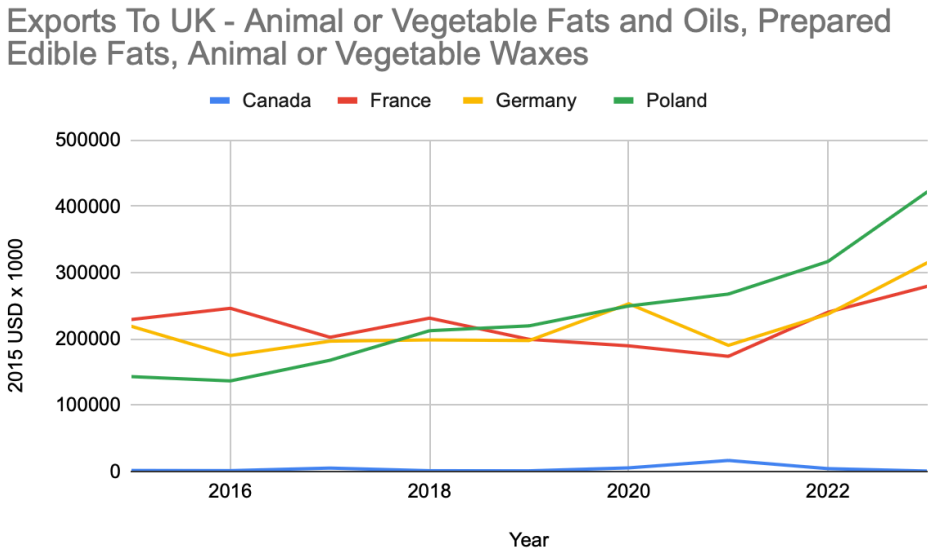
of the EU-UK Trade and Cooperation Agreement. France shows a decrease in import value in 2021, unlike the increase seen in figure 13's overall imports (see Appendix W). Imports were largely decreasing in the years approaching 2021, and years 2022 and 2023 did show a slight increase in import value, however they did not reach levels of 2020 and years prior. German imports decreased from $325,785,0000 in 2015 to $82,999,000 in 2023. Poland imports decreased from $79,274,000 in 2015 to $18,847,000 in 2023. French imports decreased from $326,815,000 in 2015 to $241,961,000 in 2023. Therefore, vegetable products may not be largely included in the imports that were redistributed to other EU member states though France, at least not to the extent that other agricultural products are included.

This data shows that Category 2 - Vegetable Products shows similar patterns to overall agricultural trade in terms of baseline levels of trade by country, as well as export changes. However, the absence of a sharp increase in imports to France in the year 2021 shows the likeness of vegetable products not being a notable percentage of the products being redistributed to the EU through France during the years 2021 to 2023. Additionally, France, Germany, and Poland maintained an export surplus over the UK throughout 2015 to 2023.

The third category, Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes**,** includes goods such as olive oil, palm oil, and animal fats (see Appendix AG). In Figure 18, Similar to figures 12 and 13, Canada shows extreme stability in both exports and imports while also representing a small percentage of trade with the UK. Figure 18 does show similar baselines of trade to Figure 12, with France reflecting the high value of exports, followed by Germany and then Poland (see Appendix X). Poland does show a similar increase in Figure 12 with a rise in exports in value over time. However, France and Germany also show an increase in exports in value, despite overall exports decreasing for

France and Germany. France rose from $229,232,000 in 2015 to $279,591,000 in 2023. Germany increased from $219,331,000 in 2015 to $315,325,000 in 2023. Poland increased from $143,173,000 in 2015 to $422,337,000 in 2023. There was a possibility that this was due to a sector-specific rise in production alongside an increased need for the already export deficit UK. Due to the lack of sector-specific production data, however, this cannot be confirmed.

Figure 18: Exports To UK - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes

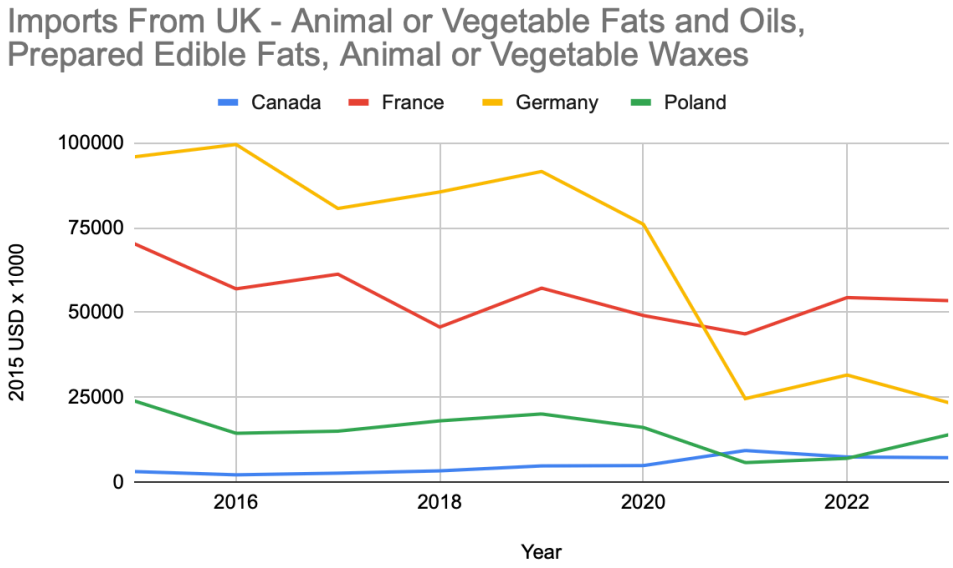


Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

Figure 19, showing sector imports, reflected some change from Figure 13's overall imports. Germany at baselines reports more imports than France and Poland, while overall imports show that France reports the most. This may reflect a lack of production in this sector for Germany in comparison to France. Similar to Figure 13 both Germany and Poland report a decrease of imports in value starting in 2021 (see Appendix Y). Germany decreased from $95,912,000 to $23,375,000 in 2023. Poland decreased from $23,914,000 in 2015 to $13,944,000 in 2023. However, in contrast to Figure 13, France does not see an increase of

imports in value during the year 2021. Instead, France decreased from $70,291,000 in 2015 to $43,660,000 in 2021, then increased to $54,397,000 in 2022, then shifted to $53,490,000 in 2023. Therefore, products of fats, waxes, and oils may not be largely included in the imports that were redistributed to other EU member states though France, at least not to the extent that other agricultural products are included.

Figure 19: Imports From UK - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

This data shows that Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes shows different patterns than are represented in overall trade. France and Germany show an increase in exports, Germany presents the highest UK imports at baseline, and France does not increase in imports during and following the year 2021. By contextualizing these results with previously discussed patterns that show an impact of Brexit, it can be concluded that there is a likelihood of this sector's products not being

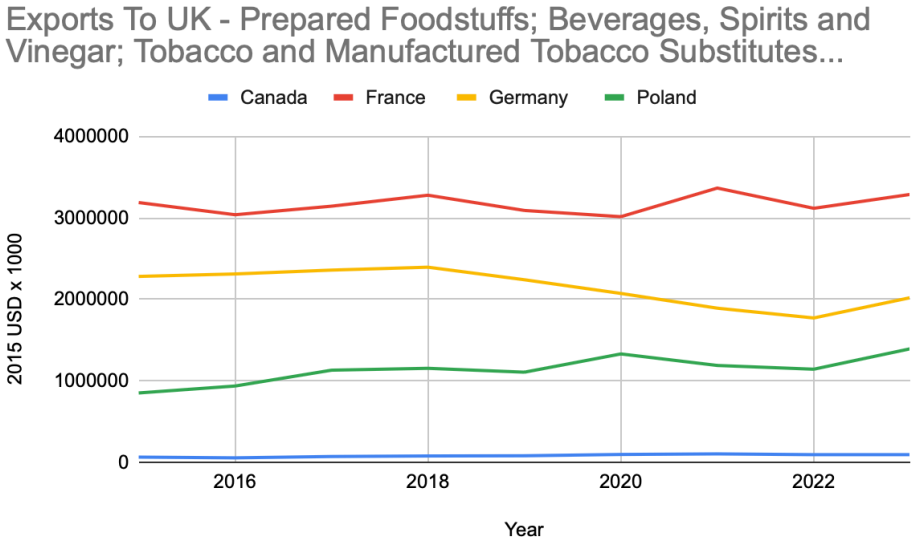
a large percentage of the products being redistributed to the EU through France during the years 2021 to 2023. Additionally, France, Germany, and Poland maintained an export surplus over the UK throughout 2015 to 2023.

Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products includes goods such as wine, beer, juice, nut butter, breakfast cereals, uncooked pasta, and baby food. Higher processed foods typically are less affected by differences across international standards, often making them more stable.[75] Canada shows stability within Figure 20 and Figure 20. However, for the first time, it can be seen that Canada is not the country with the lowest value of imports, as Figure 20 shows that Poland receives less imports in value than Canada every year except 2020. This could reflect low Canadian production or higher demand for UK goods in this category, in comparison to Poland.

Figure 20 aligns with Figure 12 with Germany decreasing in export value and Poland increasing value (Appendix Z). Germany fell from $2,281,566,000 in 2015 to $2,020,282,000 in 2023, while Poland increased from $850,878,000 in 2015 to $1,393,128,000 in 2023. In Figure 20, France, however, sees little change from 2015 to 2023, with a small increase from $3,188,297,000 to $3,288,191,000. This may not align with the overall decrease of exports seen in Figure 12 due a slight increase of production in this category.

[75] Shepard, *Product Standards and Developing Country Agricultural Exports: The Case of the European Union*, 2013

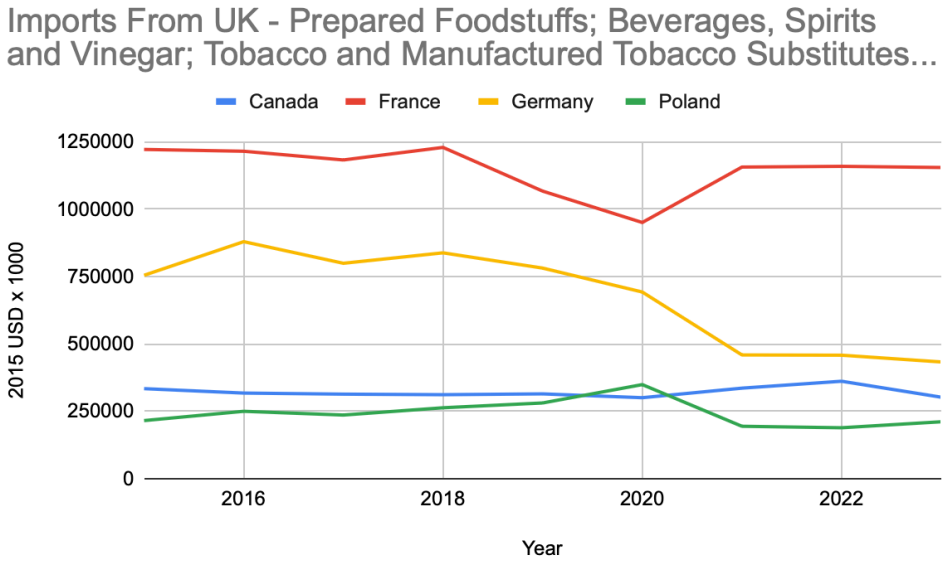
Figure 20: Exports To UK - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

The patterns of change seen in Figure 21's imports align fairly closely with Figure 13's overall imports. Both Germany and Poland see decreases originating in the year 2021. Germany decreased from $754,953,000 in 2023 to $459,243,000 in 2019, while Poland decreased from $215,612,000 in 2023 to $281,054,000 in 2019. France did see an increase from $950,830,000 in 2020 to $1,156,572,000 in 2021, but it was not large enough to show an overall increase from 2015, which was reported to be at $1,221,994,000 (Appendix AA). This shows that these products may not be a very substantial percentage of the products being redistributed to the EU through France during the years 2021 to 2023.

Figure 21: Imports From UK - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

This data shows that Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products reflects similar patterns of trade than the ones reflected in overall trade. French export stability, in comparison to a decrease, could reflect slight production increases, and the absence of a sharper increase in imports to France in and following the year 2021 may show that prepared food products are not as large of a percentage of the agriculture being sent to France and then redistributed to other member states. Additionally, France, Germany, and Poland maintained an export surplus over the UK throughout 2015 to 2023.

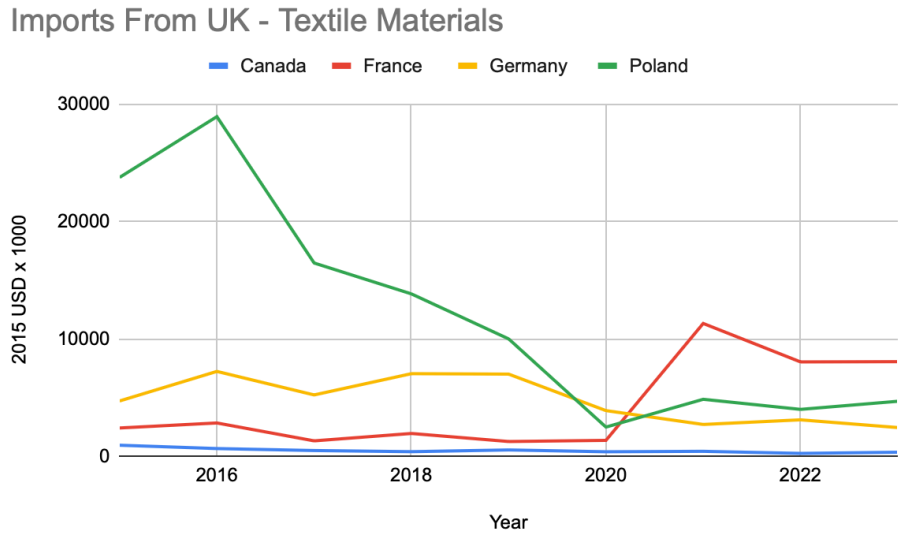
Figure 22: Exports To UK - Textile Materials

Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

Category 5 - Textile Materials includes goods like hides, wool, silk, cotton, flax, and hair (see Appendix AI). Canada shows the least amount of trade in Figure 22 and Figure 23 compared to the EU countries, and also showed stability in Figure 23's imports. In Figure 22, however, Canada saw a significant decrease in exports to the UK from 2019 onward, which could reflect a decrease in production. Additionally, Figure 22 shows little similarities to Figure 12's overall export data. In baseline 2015, Poland saw the highest exports in value, followed by France, Germany, and Canada, respectively. France saw significant variation over time with a large overall increase from 2015 to 2023 of $1,778,000 to $4,181,000, respectively. Germany saw some variation as well, with a smaller overall increase from $1,675,000 in 2015 to $2,097,000 in 2023. Finally, Poland saw a significant decrease over time, from $2,295,000 in 2015 to $361,000 in 2023 (see Appendix AB). Larger fluctuations may show notable changes in production over time, reflecting a more unstable sector within the agriculture industry.

In addition, Figure 23 shares some similarities with Figure 13's data on overall imports. At baseline in 2015, Poland reports the most imports in value, followed by Germany, France, and Canada, respectively. Like Figure 13, Figure 12 does report France showing a sharp increase of imports in value in 2021 and onward. The shift from 2020 to 2021 alone was $9,967,000. Additionally, Germany does report a decrease of imports in value over time from $4,698,000 in 2015 to $2,430,000 in 2023, although the decrease in 2021 is not as sharp as in Graph 13. Poland also shows an overall decrease over time, with the lowest reported value of $2,471,000 in 2020 (see Appendix AC). These results of imports may also reflect some of the instability of the textile material industry. However, it should still be noted that due to France's sharp increase in 2021 that textile materials may be a more significant part of the goods that are sent to France from the UK to be redistributed around the EU.

Figure 23: Imports From UK - Textile Materials



Source: Adapted by author from "Detailed Trade Matrix." FAOSTAT, 2024. https://www.fao.org/faostat/en/#data/TM.

This data shows that Category 5 - Textile Materials is a more elastic type of agriculture and is subject to larger shifts over time. However, there is evidence that suggests a notable percent of the agricultural goods being imported to France from the UK to be redistributed to the EU are textile materials. Additionally, the UK actually reports an export surplus with France, Germany, and Poland for all years except for France from 2016 to 2019. This conveys that the textile material industry in the UK has historically been more productive than the other countries.

Overall, it is likely that France, Germany, and Poland's agricultural production and exports were largely from Category 1, Category 2, and Category 4, although all categories contributed to exports and production. Additionally, it is likely that all goods are included in some redistribution of UK imports to the EU through France, however the categories that were more likely to contribute proportionally more imports were Category 1 and Category 5.

Additionally, Chapter 2 - The Common Agricultural Policy discussed questions regarding potential shifts in the agricultural trading abilities of France, Germany, and Poland in relation to CAP's effect on increasing farm size. France and Germany saw slight decreases in production and overall exports to the UK, while Poland saw slight increases in production and overall exports to the UK. It is possible that the increase in the amount of medium farms in Poland led to the increased production, however it cannot be confirmed with this data alone. Conversely, the slightly increased CAP support for large farms in France and Germany was not likely to be a contribution to the slight decrease in French and German agricultural production and exports to the UK. It was likely due to a combination of climate crises and higher prices of farm inputs.

As discussed in the literature review, there is significant research proving the resilience of agricultural trade during the economic struggles due to the onset of the COVID-19 pandemic in

2020.[76] [77] However, it is important to discuss potential short-term impacts on specific categories of agricultural products. The main type of agricultural trade that was negatively impacted in 2020 was non essential, higher end goods. It was stated that hides and skins specifically saw a decrease in trade during 2020.[78] This reality undoubtedly impacted Category 5 - Textile Materials, and it can be seen that 2020 was a point of low exports and imports for all countries. Despite this, it can be seen that there is a recovery in 2021, showing how those constrictions did not last long term, and therefore do not make a large impact on the conclusions from this data.

As mentioned in Chapter 2, the early 2020s also saw issues of environmental change and high prices for farm inputs. In a 2026 briefing, the European Environment Agency discussed the environmental struggles seen by the EU, including heatwaves, droughts, floods, storms and compound risks. However, France, Germany, and Poland were not specifically discussed as the countries most impacted, of which were namely Romania, Spain, Greece.[79] The European Commission also released a short-term outlook for EU agricultural markets in 2023. The outlook included a map showing areas of concern for extreme weather events, of which did not display issues for Poland, displayed a rain deficit for a small part of southeastern France, and displayed a rain surplus for a section of east Germany.[80] However, countries like Spain, Italy, Slovenia, Hungary, Romania, Greece, and Bulgaria are almost completely covered in high risk factors

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[76] Kastratović, The Impact of COVID-19 Pandemic On Agricultural Trade, 2023

[77] Van Bergeijk, Resilience to Deglobalisation, 2025

[78] Arita, *Has global agricultural trade been resilient under coronavirus (COVID-19)? Findings from an econometric assessment of 2020*, 2021

[79] "Building Climate-Resilient Agriculture in Europe: An Economic Perspective." *European Environment Agency*, 2026. https://www.eea.europa.eu/en/analysis/publications/building-climate-resilient-agriculture-in-europe-an-economic-perspective.

[80] "Short-Term Outlook for EU Agricultural Markets in 2023 ." *European Commission*, 2023. https://agriculture.ec.europa.eu/system/files/2023-04/short-term-outlook-spring-2023_en.pdf.

including drought, rain surplus, and rain deficit. Therefore, although the presence of a climate crisis is undeniable and could definitely have contributed to France and Germany's fall in production, its impact for the selected time period does not overly disrupt the provided data, and the conclusions from this data is still valuable.

The outlook also discussed the issues of higher priced farm inputs having the potential that higher product prices could lower EU competitiveness in some markets. However, the overall continuation of a French, German, and Polish export surplus over the UK in all categories except Textile Materials shows that the EU was able to maintain overall competitiveness with the UK market, even with the presence of higher prices.

Additionally, the main factor within this data that saw real change due to Brexit was the shift in UK imports in 2021, reflecting the UK's act of using France as an entry point to distribute goods in the EU. Polish and German imports fell, while French imports rose. The categories of agricultural products that likely saw the largest impact of this shift were Category 1 and Category 5. This conveys that animal products and textile materials were more likely to see redistribution throughout the EU, however it is likely that redistribution occurred across categories. It is not possible to measure where the redistributions go or how much is redistributed, making it unknown to what extent these goods reached Germany or Poland.

CONCLUSION, LIMITATIONS, AND IMPORTANCE

Conclusion:

It can be concluded that Brexit did have an impact on agricultural trade of the EU, even though it was not substantial. The gravity model found valuable relationships between geographical distance and trade, as well production and trade. However, its results regarding any relationship of Brexit with trade was inconclusive. Through an evaluation of trade by country and agricultural product category, it was found that the introduction of the EU-UK Trade and Cooperation Agreement in 2021 allowed for UK exporters to utilize France's Regime 42 to export their goods to France, declare France as the goods' destination state, and then use the EU's free flow of goods to ship the goods elsewhere in the EU, all while obeying EU regulations. This action was associated with decreases of imports for Poland and Germany in 2021, while French imports sharply increased. The agricultural product categories most likely to see larger shifts in imports were Category 1 - Live Animals and Animal Products and Category 5 - Textile Materials, however redistribution was likely within all categories. This data also conveyed that France, Germany and Poland are largely in an export surplus with the UK in four out of five agricultural categories, allowing for financial investments back into the EU.

However, Brexit has larger implications for the future of the EU budget and economic policy. Data showed that agriculture is an important part of the national economies for France, Germany, and Poland. Poland showed the most national dependence on agriculture. Through the examination of the Common Agricultural Policy, it is possible that Brexit was a compounding factor in limitations of the larger CAP budget. This, in turn, led to the investment in larger French and German farms, while Poland saw a consolidation from predominantly small-sized farms to more medium-sized farms. These shifts in Poland may lead to less agricultural

employment opportunities and reduced investment in environmental sustainability initiatives, furthering economic divisions between member states.

Limitations:

However, this study does have limitations that should be acknowledged. The use of Canada as a representative for international comparison is imperfect, especially when evaluating farm size. Additionally, the European Commission only released information on CAP reciprocity by farm size starting in 2020, limiting all of this study's evaluation to after Brexit had occurred. The categorization of farm size by the European Commission is also imperfect, as the definition of medium farm shows a wide variance in hectares. Farms are only categorized by size, and there is no indication what percentage of medium farms are family farms or corporate farms.

Furthermore, the gravity model was unable to create country-specific measurements, and the results regarding Brexit's impact on trade were not statistically significant and therefore inconclusive. When evaluating trade by agricultural product category, there was an absence of production data that fit into the five created categories, allowing only for the loose usage of overall production in data analysis. Within the same set of measurements, the amount of UK exports traveling to France for redistribution to the rest of the EU was unavailable, forcing a limited analysis on patterns of export data. Moreover, this study was unable to properly evaluate changes in the prices of agricultural goods and their interactions on the global market.

Additionally much of the drafted language from the European Commission and other governing bodies of the EU is largely influenced by more powerful EU states such as France and Germany. It is unclear the extent to which Poland, or other less influential member states, value the presented perspectives. Detailed qualitative research should be conducted in the future to

assess country-specific goals regarding trade, agriculture, budgetary constraints, and environmental innovation.

Importance:

There are ongoing debates regarding the actual power of the EU, and if Brexit had an actual impact on the Union. These debates, alongside the research in this study, are especially important when considering the true value of EU membership or considering the introduction of new member states. For example, the discussions of establishing Ukraine as a member state relies on an understanding of the responsibility of wealthier states like France and Germany to uplift a budget that will go on to support the less wealthy, rural, and agricultural based economy of Ukraine. Poland's experience within the CAP can be loosely translated to Ukraine's potential experience, marked by dependence on direct payments and an important history of family farms. Finally, this study attempts to fill gaps within literature that is typically not published in English, connecting knowledge across languages and across the world.

APPENDIX

Appendix A

Figure 1: Employment in Agriculture

Country	2015	2016	2017	2018	2019	2020	2021	2022	2023
France	2.74%	2.87%	2.61%	2.50%	2.52%	2.35%	2.51%	2.59%	2.51%
Germany	1.39%	1.31%	1.28%	1.25%	1.20%	1.22%	1.25%	1.24%	1.20%
Poland	11.53%	10.58%	10.22%	9.62%	9.15%	9.59%	8.40%	8.25%	7.60%
Canada	1.64%	1.95%	1.52%	1.52%	1.54%	1.55%	1.36%	1.31%	1.27%

Appendix B

Figure 2: Agriculture Value Added

Country	2015	2016	2017	2018	2019	2020	2021	2022
France	1.61%	1.44%	1.54%	1.65%	1.52%	1.58%	1.62%	1.91%
Germany	0.68%	0.70%	0.85%	0.69%	0.79%	0.74%	0.71%	0.92%
Poland	2.50%	2.65%	3.01%	2.41%	2.37%	2.57%	2.24%	2.84%
Canada	1.87%	1.86%	1.89%	1.87%	1.88%	1.88%	1.88%	1.88%

Appendix C

Figure 3: Agricultural Value Added Per Worker

Country	2015	2016	2017	2018	2019	2020	2021	2022
France	$49,318.81	$40,899.98	$48,211.39	$51,655.25	$49,786.14	$49,673.46	$42,866.56	$43,899.37
Germany	$42,747.49	$46,572.15	$49,376.91	$43,345.32	$48,504.10	$48,792.11	$54,380.94	$54,958.62
Poland	$6,092.55	$6,558.76	$6,773.87	$6,514.41	$6,681.54	$7,431.50	$7,501.51	$7,661.89
Canada	$96,545.93	$84,289.22	$108,400.63	$105,879.70	$104,712.22	$110,345.18	$101,563.69	$116,939.69

Appendix D

Figure 4: Agricultural Output

Country	2015	2016	2017	2018	2019	2020	2021	2022	2023
France	$69.40	$66.42	$67.94	$66.14	$65.48	$65	$65.08	$64.80	$65.75
Germany	$49.11	$48.54	$48.47	$45.56	$46.52	$46.94	$46.49	$45.74	$45.57
Poland	$21.94	$22.85	$24.10	$22.94	$23.05	$25.17	$24.82	$25.09	$24.84
Canada	$42.66	$45.76	$46.92	$47.44	$47.95	$49.09	$42.97	$48.95	$47.31

Appendix E

Figure 5: Agricultural Land Area

Country	2015	2016	2017	2018	2019	2020	2021	2022
France	52.46%	52.45%	52.41%	52.34%	52.08%	52.09%	52.10%	51.69%
Germany	47.96%	47.68%	47.76%	47.64%	47.70%	48.13%	47.49%	47.50%
Poland	46.93%	46.94%	47.23%	47.40%	47.44%	47.50%	47.37%	46.31%
Canada	6.47%	6.47%	6.45%	6.46%	6.43%	6.37%	6.48%	6.49%

Appendix F

Figure 6: Annual CAP Spending in EU Budget

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
2015 Billion USD	46.83	47.96	47.37	48.22	49.33	50.18	47.04	47.89	48.83

Appendix G

Figure 7: % of EU Budget Allocated For CAP

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
% of EU Budget	39.1	41.4	40.6	37.2	37.6	34.9	24.8	23.6	24.6

Appendix H

Figure 8: Member-State CAP Benefits and Canadian Direct Payments

Country	2015	2016	2017	2018	2019	2020	2021	2022	2023
France	7456	6096	7577	7845	7952	7979	7749	7801	7825
Germany	4975	5218	5002	5095	5009	4911	4953	5260	5146
Poland	4090	3911	3381	3650	3760	3702	3978	3995	3970
Canada	1,672	1,809	1,803	1,617	2,190	2,348	4,267	4,834	3,944

Appendix I

Figure 9: Pillar 1 vs Pillar 2 of CAP by Country

Country + Pillar	2015	2016	2017	2018	2019	2020	2021	2022	2023
France Pillar 1	6,773	5,510	6,115	6,478	6,229	6,367	6,155	6,260	6,240
France Pillar 2	683	586	1,462	1,367	1,723	1,612	1,594	1,541	1,585
Germany Pillar 1	4,373	4,267	4,209	4,163	4,099	4,077	3,955	4,008	3,901
Germany Pillar 2	602	951	793	932	970	1,009	998	1,252	1,245
Poland Pillar 1	2,954	2,996	2,902	2,863	2,850	2,868	2,795	2,847	2,911
Poland Pillar 2	1,136	915	479	787	910	834	1,183	1,148	1,059

Appendix J

Figure 10: Average Farm Size By Country

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
France			59			61				70			75
Germany			59			61				63			65
Poland			10			10				11			12

Appendix K

Figure 11: Average Farm Size In Canada

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Canada	778					820					809

Appendix L

Table 1: Impact of Farm Size, Area (Percent of Agricultural Land by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	0.30%	0.30%	0.30%	0.30%
France: 5-250 ha	81.60%	81.10%	79.70%	79.70%
France: >250 ha	18.00%	18.60%	20.00%	20.00%
Germany: <=5 ha	1.10%	1.10%	1.10%	1.10%
Germany: 5-250 ha	63.60%	63.30%	62.70%	62.70%
Germany: >250 ha	35.30%	35.60%	36.20%	36.20%
Poland: <=5 ha	12.20%	12.10%	11.70%	11.70%
Poland: 5-250 ha	76.30%	76.60%	77.10%	77.10%
Poland: >250 ha	11.50%	11.30%	11.20%	11.20%

Appendix M

Table 2: Impact of Farm Size: Beneficiaries (Percent of Beneficiaries by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	10.00%	10.20%	10.00%	10.00%
France: 5-250 ha	85.60%	85.20%	84.90%	84.90%
France: >250 ha	4.40%	4.60%	5.10%	5.10%
Germany: <=5 ha	20.90%	21.00%	21.10%	21.10%
Germany: 5-250 ha	76.10%	76.00%	75.80%	75.80%
Germany: >250 ha	3.00%	3.00%	3.20%	3.20%
Poland: <=5 ha	51.30%	51.30%	50.90%	50.90%
Poland: 5-250 ha	48.40%	48.40%	48.80%	48.80%
Poland: >250 ha	0.20%	0.20%	0.20%	0.20%

Appendix N

Table 3: Impact of Farm Size: Direct Payments (Percent of Direct Payments by Hectare Category)

Country and Hectare	2020	2021	2022	2023
France: <=5 ha	0.40%	0.50%	0.40%	0.40%
France: 5-250 ha	83.30%	82.70%	81.50%	81.50%
France: >250 ha	16.30%	16.80%	18.10%	18.10%
Germany: <=5 ha	1.20%	1.20%	1.20%	1.20%
Germany: 5-250 ha	66.00%	65.60%	65.00%	65.00%
Germany: >250 ha	32.80%	33.20%	33.80%	33.80%
Poland: <=5 ha	10.20%	10.20%	10.10%	9.90%
Poland: 5-250 ha	80.10%	80.20%	80.50%	80.60%
Poland: >250 ha	9.70%	9.60%	9.50%	9.50%

Appendix O

Table 4: Gravity Model Variables

Variable	Description	Source
ln Prod	Log production value of exporter and importer	FAO
ln Dis	Log population weighted geographic distance	GPD Data Repository
Trade flow	Bilateral trade flow value	FAO
No Brexit	Indicator for absence of Brexit	
Covid	Indicator for presence of Covid	

Appendix P

Table 5: Gravity Model Results

	Estimate	Standard Error	Significance
ln Dis	-1.01092	0.1305	***
ln Prod i	0.5626	0.18719	**
ln Prod j	-0.5552	0.21149	*
No Brexit	0.08332	0.11934	
Covid	0.067	0.18181	

Appendix Q

R Input Data

Year	Origin Country	Destination Country	Trade Flow (2015 Billions USD)	Production: Origin Country	Production: Destination Country	FTA: No Brexit	COVID-19	Distance (Population Weighted Average Distance, km)
2015	GBR	CAN	0.50	30.55	42.66	1	0	5841.6035
2015	GBR	FRA	2.60	30.55	69.40	1	0	669.34076
2015	GBR	DEU	1.71	30.55	49.11	1	0	773.29779
2015	GBR	POL	0.39	30.55	21.94	1	0	1418.9078
2015	CAN	GBR	0.30	42.66	30.55	1	0	5841.6035
2015	FRA	GBR	5.69	69.40	30.55	1	0	669.34076
2015	DEU	GBR	4.92	49.11	30.55	1	0	773.29779
2015	POL	GBR	2.11	21.94	30.55	1	0	1418.9078
2016	GBR	CAN	0.44	29.91	45.76	1	0	5841.6035
2016	GBR	FRA	2.35	29.91	66.42	1	0	669.34076
2016	GBR	DEU	1.69	29.91	48.54	1	0	773.29779
2016	GBR	POL	0.44	29.91	22.85	1	0	1418.9078
2016	CAN	GBR	0.25	45.76	29.91	1	0	5841.6035
2016	FRA	GBR	5.38	66.42	29.91	1	0	669.34076
2016	DEU	GBR	4.73	48.54	29.91	1	0	773.29779
2016	POL	GBR	2.23	22.85	29.91	1	0	1418.9078
2017	GBR	CAN	0.41	31.09	46.92	1	0	5841.6035
2017	GBR	FRA	2.27	31.09	67.94	1	0	669.34076
2017	GBR	DEU	1.69	31.09	48.47	1	0	773.29779
2017	GBR	POL	0.46	31.09	24.10	1	0	1418.9078
2017	CAN	GBR	0.28	46.92	31.09	1	0	5841.6035
2017	FRA	GBR	5.44	67.94	31.09	1	0	669.34076
2017	DEU	GBR	4.86	48.47	31.09	1	0	773.29779
2017	POL	GBR	2.68	24.10	31.09	1	0	1418.9078
2018	GBR	CAN	0.39	30.30	47.44	1	0	5841.6035
2018	GBR	FRA	2.26	30.30	66.14	1	0	669.34076
2018	GBR	DEU	1.76	30.30	45.56	1	0	773.29779
2018	GBR	POL	0.49	30.30	22.94	1	0	1418.9078
2018	CAN	GBR	0.32	47.44	30.30	1	0	5841.6035
2018	FRA	GBR	5.67	66.14	30.30	1	0	669.34076
2018	DEU	GBR	4.90	45.56	30.30	1	0	773.29779
2018	POL	GBR	2.86	22.94	30.30	1	0	1418.9078
2019	GBR	CAN	0.39	31.69	47.95	1	0	5841.6035
2019	GBR	FRA	2.13	31.69	65.48	1	0	669.34076
2019	GBR	DEU	1.68	31.69	46.52	1	0	773.29779
2019	GBR	POL	0.50	31.69	23.05	1	0	1418.9078
2019	CAN	GBR	0.32	47.95	31.69	1	0	5841.6035
2019	FRA	GBR	5.23	65.48	31.69	1	0	669.34076
2019	DEU	GBR	4.53	46.52	31.69	1	0	773.29779
2019	POL	GBR	2.77	23.05	31.69	1	0	1418.9078
2020	GBR	CAN	0.42	30.23	49.09	1	1	5841.6035
2020	GBR	FRA	1.88	30.23	65.00	0	1	669.34076
2020	GBR	DEU	1.61	30.23	46.94	0	1	773.29779
2020	GBR	POL	0.54	30.23	25.17	0	1	1418.9078
2020	CAN	GBR	0.42	49.09	30.23	1	1	5841.6035
2020	FRA	GBR	5.18	65.00	30.23	0	1	669.34076
2020	DEU	GBR	4.68	46.94	30.23	0	1	773.29779
2020	POL	GBR	3.06	25.17	30.23	0	1	1418.9078
2021	GBR	CAN	0.44	30.51	42.97	1	0	5841.6035
2021	GBR	FRA	2.03	30.51	65.08	0	0	669.34076
2021	GBR	DEU	1.12	30.51	46.49	0	0	773.29779
2021	GBR	POL	0.48	30.51	24.82	0	0	1418.9078
2021	CAN	GBR	0.52	42.97	30.51	1	0	5841.6035
2021	FRA	GBR	5.34	65.08	30.51	0	0	669.34076
2021	DEU	GBR	3.97	46.49	30.51	0	0	773.29779
2021	POL	GBR	2.99	24.82	30.51	0	0	1418.9078
2022	GBR	CAN	0.46	30.88	48.95	1	0	5841.6035
2022	GBR	FRA	2.00	30.88	64.80	0	0	669.34076
2022	GBR	DEU	1.10	30.88	45.74	0	0	773.29779
2022	GBR	POL	0.46	30.88	25.09	0	0	1418.9078
2022	CAN	GBR	0.51	48.95	30.88	1	0	5841.6035
2022	FRA	GBR	5.02	64.80	30.88	0	0	669.34076
2022	DEU	GBR	3.74	45.74	30.88	0	0	773.29779
2022	POL	GBR	3.10	25.09	30.88	0	0	1418.9078
2023	GBR	CAN	0.37	29.94	47.31	1	0	5841.6035
2023	GBR	FRA	1.90	29.94	65.75	0	0	669.34076
2023	GBR	DEU	1.04	29.94	45.57	0	0	773.29779
2023	GBR	POL	0.44	29.94	24.84	0	0	1418.9078
2023	CAN	GBR	0.43	47.31	29.94	1	0	5841.6035
2023	FRA	GBR	5.12	65.75	29.94	0	0	669.34076
2023	DEU	GBR	4.08	45.57	29.94	0	0	773.29779
2023	POL	GBR	3.44	24.84	29.94	0	0	1418.9078

Appendix R

Figure 12: Exports to UK, All Agricultural Product Categories

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	286525	232761	269673	301305	297905	395162	488481	469198	398366
France	5392501	5112766	5178321	5426127	4986202	4853964	5117743	4793561	4944334
Germany	4466217	4315965	4479483	4482094	4123253	4297504	3576690	3352336	3742792
Poland	1973509	2115740	2565991	2725896	2612065	2888091	2845833	2951240	3373747

Appendix S

Figure 13: Imports From UK, All Agricultural Product Categories

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	397146	375259	374920	369127	396348	400092	440693	466876	412406
France	2280197	2230815	2229595	2260327	2031349	1837918	2427722	2684103	2683855
Germany	1469780	1586059	1525120	1597436	1506762	1423773	647628	655456	590262
Poland	495590	511874	499550	531758	550884	648710	255109	249177	262954

Appendix T

Figure 14: Exports To UK - Live Animals, Animal Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	4404	2,032	2,659	8,249	16,210	12,796	6,429	500	877
France	1045145	969,510	968,167	969,429	896,231	791,559	853,053	768,372	799,616
Germany	1237609	1,097,454	1,170,679	1,136,152	1,027,285	1,143,636	860,720	766,237	832,009
Poland	717423	768,921	938,137	1,015,288	935,439	979,525	1,001,232	1,091,503	1,110,912

Appendix U

Figure 15: Imports From UK - Live Animals, Animal Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	16656	21,690	23,801	22,210	39,136	54,092	50,204	57,426	39,377
France	658703	601,217	658,347	669,473	618,907	561,951	1,027,341	1,226,432	1,225,373
Germany	298432	284,900	340,366	351,681	334,141	347,036	55,720	54,521	48,227
Poland	153033	144,378	143,080	147,251	133,721	181,204	21,450	17,783	14,242

Appendix V

Figure 16: Exports To UK - Vegetable Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	216130	173,657	189,833	213,280	199,986	280,970	362,506	370,912	303,236
France	928,049	854,007	859,130	943,880	796,981	856,722	723,355	665,609	572,755
Germany	726036	730,472	751,969	751,249	656,885	826,943	633,048	574,426	573,079
Poland	259740	272,863	328,095	344,129	350,890	328,702	388,001	399,827	447,009

Appendix W

Figure 17: Imports From UK - Vegetable Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	42362	33,083	34,301	31,523	37,208	40,300	44,806	40,179	63,148
France	326815	354,501	325,737	313,701	286,722	274,695	188,843	235,928	241,961
Germany	315785	314,678	299,400	314,897	292,434	304,045	105,398	107,962	82,999
Poland	79274	74,103	88,825	89,442	106,058	99,758	28,611	31,446	18,847

Appendix X

Figure 18: Exports To UK - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	1525	1290	5,122	1,155	999	5,437	16,632	4,288	643
France	229232	246,248	202,486	231,453	199,382	189,581	173,770	240,409	279591
Germany	219331	174,982	196,616	198,540	197,594	253,105	190,330	237,534	315325
Poland	143173	136,673	167,841	212,452	219,779	249,773	267,739	316,913	422337

Appendix Y

Figure 19: Imports From UK - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	3067	2,102	2,597	3,277	4,737	4,836	9,273	7,374	7158
France	70291	56,965	61,297	45,688	57,188	49,103	43,660	54,397	53490
Germany	95912	99,558	80,678	85,548	91,593	76,006	24,573	31,551	23375
Poland	23914	14,359	14,983	18,027	20,063	16,071	5,708	6,964	13944

Appendix Z

Figure 20: Exports To UK - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	63272	54,248	70,762	77,231	79,806	95,906	102,844	93,396	93,566
France	3188297	3,038,641	3,143,865	3,278,351	3,091,186	3,014,813	3,366,249	3,117,668	3,288,191
Germany	2281566	2,311,759	2,359,202	2,394,753	2,240,552	2,072,560	1,891,492	1,771,514	2,020,282
Poland	850878	936,078	1,130,504	1,153,422	1,105,864	1,329,951	1,188,424	1,142,434	1,393,128

Appendix AA

Figure 21: Imports From UK - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	334137	317,744	313,750	311,743	314,745	300,497	336,005	361,670	302,396
France	1221994	1,215,311	1,182,918	1,229,539	1,067,292	950,830	1,156,572	1,159,319	1,154,984
Germany	754953	879,706	799,465	838,286	781,608	692,811	459,243	458,333	433,231
Poland	215612	250,098	236,204	263,212	281,054	349,206	194,500	189,004	211,251

Appendix AB

Figure 22: Exports To UK - Textile Materials

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	1194	1,534	1,297	1,390	904	53	70	102	44
France	1778	4,360	4,673	3,014	2,422	1,289	1,316	1,503	4,181
Germany	1675	1,298	1,017	1,400	937	1,260	1,100	2,625	2,097
Poland	2295	1,205	1,414	605	93	140	437	563	361

Appendix AC

Figure 23: Imports From UK - Textile Materials

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Canada	924	640	471	374	522	367	405	227	327
France	2394	2,821	1,296	1,926	1,240	1,339	11,306	8,027	8,047
Germany	4698	7,217	5,211	7,024	6,986	3,875	2,694	3,089	2,430
Poland	23757	28,936	16,458	13,826	9,988	2,471	4,840	3,980	4,670

Appendix AD

Five Categories of Agricultural Product Type By HS Codes

Category 1 - Live Animals; Animal Products
HS 01: Live Animals
HS 02: Meat and Edible Meat Offal
HS 04: Dairy Produce; Birds' Eggs; Natural Honey; Edible Products of Animal Origin, Not Elsewhere Specified or Included
HS 05: Products of Animal Origin, Not Elsewhere Specified or Included
Category 2 - Vegetable Products
HS 06: Live Trees and Other Plants; Bulbs, Roots and the Like; Cut Flowers and Ornamental Foliage
HS 07: Edible Vegetables and Certain Roots and Tubers
HS 08: Edible Fruit and Nuts; Peel of Citrus Fruit or Melons
HS 09: Coffee, Tea, Maté and Spices
HS 10: Cereals
HS 11: Products of the Milling Industry; Malt; Starches; Inulin; Wheat Gluten
HS 12: Oil Seeds and Oleaginous Fruits; Miscellaneous Grains, Seeds and Fruit; Industrial or Medicinal Plants; Straw and Fodder
HS 13: Lac; Gums, Resins and Other Vegetable Saps and Extracts
HS 14: Vegetable Plaiting Materials; Vegetable Products Not Elsewhere Specified or Included
Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes
HS15: Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes
Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products
HS 17: Sugars and Sugar Confectionery
HS 18: Cocoa and Cocoa Preparations
HS 19: Preparations of Cereals, Flour, Starch or Milk; Bakers' Wares
HS 20: Preparations of Vegetables, Fruit, Nuts or Other Parts of Plants
HS 21: Miscellaneous Edible Preparations
HS 22: Beverages, Spirits and Vinegar
HS 23: Residues and Waste from the Food Industries; Prepared Animal Feed (Fodder)
HS 24: Tobacco and Manufactured Tobacco Substitutes
HS 29.0543: Mannitol
HS 29.0544: Sorbitol
HS 33.01: Essential oils (terpeneless or not), including concretes and absolutes
HS 35.01: Casein, caseinates and other casein derivatives; casein glues.
HS 35.02: Albumins
HS 35.03: Gelatin
HS 35.04: Peptones and their derivatives; other protein substances and their derivatives
HS 35.05: Dextrins and other modified starches
HS 38.0910: Finishing agents with a basis of amylaceous substances
Category 5 - Textile Materials
HS 41.01: Raw hides and skins of bovine (including buffalo), or equine animals (fresh, or salted, dried, limed, pickled or otherwise preserved, but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
HS 41.02: Raw skins of sheep or lambs (fresh, or salted, dried, limed, pickled or otherwise preserved, but not tanned, parchment-dressed or further prepared), whether or not with wool on or split
HS 41.03: Other raw hides and skins (fresh, or salted, dried, limed, pickled or otherwise preserved, but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
HS 50.01: Silk-worm cocoons suitable for reeling
HS 50.02: Raw silk (not thrown)
HS 50.03: Silk waste (including cocoons and unsuitable for reeling, yarn waste and garnetted stock)
HS 51.01: Wool, not carded or combed
HS 51.02: Fine or coarse animal hair, not carded or combed
HS 51.03: Waste of wool or of fine or coarse animal hair, including yarn waste but excluding garnetted stock.
HS 52.01: Raw cotton
HS 52.02: Cotton Waste (including Yarn Waste And Garnetted Stock
HS 52.03: Cotton, carded or combed
HS 53.01: Flax, raw or processed but not spun; flax tow and waste (including yarn waste and garnetted stock
HS 53.02: True hemp (Cannabis sativa L.), raw or processed but not spun; tow and waste of true hemp (including yarn waste and garnetted stock)

Appendix AE

Category 1 - Live Animals; Animal Products (Agricultural Products by HS Code)

Category 1 - Live Animals; Animal Products	
HS Code	Product
0101.30.00	Asses
0201.00.00	Beef and veal preparations nes
0106.41.00	Bees
0201.00.00	Bovine meat, salted, dried or smoked
0102.31.00	Buffalo
0405.00.00	Butter and ghee of sheep milk
0405.00.00	Butter of cow milk
0405.00.00	Butter of goat milk
0403.90.20	Buttermilk, curdled and acidified milk
0403.90.20	Buttermilk, dry
0106.13.00	Camels
0102.00.00	Cattle
0405.00.00	Cattle fat, unrendered
0405.00.00	Cattle, butcher fat
0406.00.00	Cheese from milk of goats, fresh or processed
0406.00.00	Cheese from milk of sheep, fresh or processed
0406.00.00	Cheese from skimmed cow milk
0406.00.00	Cheese from whole cow milk
0105.11.00	Chickens
0401.00.00	Cream, fresh
0105.00.00	Ducks
0206.00.00	Edible offal of buffalo, fresh, chilled or frozen
0206.00.00	Edible offal of cattle, fresh, chilled or frozen
0206.00.00	Edible offal of goat, fresh, chilled or frozen
0206.00.00	Edible offal of pigs, fresh, chilled or frozen
0206.00.00	Edible offal of sheep, fresh, chilled or frozen
0206.00.00	Edible offals and liver of chickens and guinea fowl, fresh, chilled or frozen
0206.00.00	Edible offals and liver of ducks, fresh, chilled or frozen
0206.00.00	Edible offals and liver of geese, fresh, chilled or frozen
0206.00.00	Edible offals and liver of turkey, fresh, chilled or frozen
0206.00.00	Edible offals of horses and other equines, fresh, chilled or frozen
0407.00.00	Eggs from other birds in shell, fresh, n.e.c.
0408.11.00	Eggs, dried
0408.00.00	Eggs, liquid
0209.90.00	Fat of camels
0209.10.00	Fat of pigs
0209.00.00	Fat of poultry
0511.99.40	Food wastes
0208.00.00	Game meat, fresh, chilled or frozen
0105.00.00	Geese
0403.00.00	Ghee from buffalo milk
0403.00.00	Ghee from cow milk
0104.20.00	Goats
0407.21.00	Hen eggs
0205.00.00	Horse Meat
0101.00.00	Horses
0206.22.00	Liver preparations

Category 1 - Live Animals; Animal Products (Agricultural Products by HS Code) *(continued)*

Category 1 - Live Animals; Animal Products	
HS Code	Product
0210.00.00	Meat meal
0205.00.00	Meat of asses
0202.30.00	Meat of buffalo
0208.50.00	Meat of camels
0201.30.00	Meat of cattle boneless
0201.10.00	Meat of cattle with bone
0207.11.00	Meat of chickens
0207.41.00	Meat of ducks
0207.51.00	Meat of geese
0204.50.00	Meat of goat
0203.19.00	Meat of pig boneless
0203.11.00	Meat of pig with bone
0105.99.00	Meat of pigeons
0208.10.00	Meat of rabbits and hares
0204.10.00	Meat of sheep
0207.24.00	Meat of turkeys
0208.00.00	Meat prepared n.e.c.
0101.00.00	Mules and hinnies
0409.00.00	Natural honey
0511.99.00	Offals n.e.c. (non-mammal), fresh/chilled/frozen
0106.90.00	Other live animals (non-food)
0106.90.00	Other live animals, n.e.c.
0210.99.00	Other meat & edible offal, salted/dried/smoked
0208.90.00	Other meat of mammals, fresh/chilled
0106.19.90	Other rodents
0203.00.00	Pig meat preparations
0210.12.00	Pig meat, bacon and ham
0209.00.00	Pig, butcher fat
0406.30.00	Processed cheese
0106.19.00	Rabbits and hares
0401.20.00	Raw milk of cattle
0401.40.00	Raw milk of sheep
0402.99.00	Reconstituted milk
0208.00.00	Sausages (beef/veal)
0208.00.00	Sausages (pig meat)
0104.10.00	Sheep (live)
0209.90.00	Sheep fat, unrendered
0404.90.00	Skim milk and whey powder
0401.30.00	Skim milk of cows
0402.10.00	Skim milk, condensed
0402.91.00	Skim milk, evaporated
0103.10.00	Swine (pigs live)
0406.30.00	Whey cheese
0404.10.00	Whey, condensed
0404.90.00	Whey, dry
0404.10.00	Whey, fresh
0402.21.00	Whole milk powder
0402.91.00	Whole milk, condensed
0402.99.00	Whole milk, evaporated
0403.00.00	Yogurt
0403.20.90	Yoghurt, with additives hydrogenated oils and fats

Appendix AF

Category 2 - Vegetable Products (Agricultural Products by HS Code)

Category 2 - Vegetable Products	
HS Code	Product
0802.11.00	Almonds, in shell
0802.12.00	Almonds, shelled
0909.00.00	Anise, badian, coriander, cumin, caraway, fennel and juniper berries, raw
0808.10.00	Apples
0809.10.00	Apricots
0813.00.00	Apricots, dried
0802.80.10	Areca nuts
0709.91.00	Artichokes
709.20.00	Asparagus
0804.40.00	Avocados
1301.00.00	Balata and natural gums
0713.34.00	Bambara beans, dry
0803.00.00	Bananas
1003.00.00	Barley
1104.19.10	Barley flour and grits
1104.29.10	Barley, pearled
0708.20.00	Beans, dry
0706.00.00	Beet pulp
0706.90.30	Beets for fodder
0810.40.00	Blueberries
0801.00.00	Brazil nuts, in shell
0801.00.00	Brazil nuts, shelled
0713.50.00	Broad beans and horse beans, dry
0713.50.00	Broad beans and horse beans, green
1008.10.00	Buckwheat
0704.00.00	Cabbages
1203.00.00	Cake of copra
1203.00.00	Cake of hempseed
1203.00.00	Cake of kapok
1008.30.00	Canary seed
1212.93.00	Cane sugar, non-centrifugal
1212.93.00	Cane tops
0807.19.00	Cantaloupes and other melons
0706.10.00	Carrots and turnips
0801.31.00	Cashew nuts, in shell
0801.32.00	Cashew nuts, shelled
0714.00.00	Cassava, dry
0714.00.00	Cassava, fresh
1207.30.00	Castor oil seeds
0704.10.00	Cauliflowers and broccoli
1103.00.00	Cereal preparations
1213.00.00	Cereal straw, husks, unprepared, ground, pressed, or in the form of pellets

Table 9: Category 2 - Vegetable Products (Agricultural Products by HS Code) *(continued)*

Category 2 - Vegetable Products	
HS Code	Product
1008.00.00	Cereals
0813.40.30	Cherries
0802.41.00	Chesnuts (in shell)
0710.29.05	Chickpeas
0601.00.00	Chicory roots
0709.60.20	Chillies and peppers, dry (Capsicum spp., Pimenta spp.), raw
0709.60.20	Chillies and peppers, green (Capsicum spp. and Pimenta spp.)
0906.00.00	Cinnamon and cinnamon-tree flowers, raw
1214.00.00	Clover for forage
0907.00.00	Cloves (whole stems), raw
0708.20.90	Cocoa beans
0801.00.00	Coconut oil
0801.11.00	Coconuts, desiccated
0801.19.01	Coconuts, in shell
0901.90.00	Coffee extracts
0901.90.10	Coffee husks and skins
0901.90.20	Coffee substitutes
0901.22.00	Coffee, decaffeinated or roasted
0902.10.00	Coffee, green
1109.00.10	Compound feed n.e.c.
1203.00.00	Copra
1404.90.00	Cotton lint, ginned
1404.20.00	Cotton linters
1207.21.00	Cotton seed
0708.20.20	Cow peas, dry
0810.40.00	Cranberries
0701.90.50	Crude organic material
0707.00.00	Cucumbers and gherkins
0804.10.00	Dates
0711.59.10	Dried mushrooms
0601.00.00	Edible roots and tubers with high starch or inulin content, n.e.c., dry
0601.00.00	Edible roots and tubers with high starch or inulin content, n.e.c., fresh
0709.30.00	Eggplants (aubergines)
0804.20.00	Figs
0804.00.00	Figs, dried
1102.90.20	Flour of buckwheat
1102.90.60	Flour of cassava
1102.00.00	Flour of cereals n.e.c.
1102.90.60	Flour of fonio
1102.90.60	Flour of fruits
1102.20.00	Flour of maize
1102.90.60	Flour of millet
1102.90.30	Flour of mixed grain
1102.90.60	Flour of mustard seed
1102.90.60	Flour of pulses
1102.90.25	Flour of rice
1102.90.60	Flour of roots and tubers n.e.c.
1102.90.27	Flour of rye
1102.90.60	Flour of sorghum
1105.00.00	Flour, meal, powder, flakes, granules and pellets of potatoes

Category 2 - Vegetable Products (Agricultural Products by HS Code) *(continued)*

Category 2 - Vegetable Products	
HS Code	Product
1102.90.60	Flours and meals of oil seeds or oleaginous fruits, except those of mustard
1008.40.00	Fonio
1209.21.00	Forage and silage, alfalfa
1005.00.00	Forage and silage, maize
1104.30.00	Germ of maize
1104.30.00	Germ of wheat
0910.11.00	Ginger, raw
1109.00.10	Gluten feed and meal
0810.30.00	Gooseberries
0806.10.00	Grapes
0806.10.00	Grapes, marc
0709.99.00	Green corn (maize)
0703.20.00	Green garlic
1202.10.00	Groundnuts, in shell
1202.20.00	Groundnuts, shelled
1214.90.00	Hay for forage from legumes
1214.90.00	Hay for forage from other crops
1214.90.00	Hay non-leguminous
0802.21.00	Hazelnuts, in shell
0802.22.00	Hazelnuts, shelled
1207.99.00	Hempseed
1210.10.00	Hop cones
1006.20.00	Husked rice
1404.90.10	Kapok fibre, raw
1207.99.03	Kapokseed in shell
1207.99.03	Kapokseed, shelled
1207.99.03	Karite nuts (sheanuts)
0810.50.00	Kiwi fruit
0802.00.00	Kola nuts
0703.90.00	Leeks and alliaceous vegetables
0805.50.00	Lemons and limes
0713.40.00	Lentils, dry
705.11.00	Lettuce and chicory
1204.00.00	Linseed
1212.99.00	Locust beans
1214.90.00	Lucerne (alfalfa) meal
0713.90.00	Lupins
1005.90.00	Maize (corn)
1107.00.00	Malt (roasted or not)
0804.00.00	Mangoes, guavas, mangosteens
0709.99.90	Maté leaves
1207.99.90	Melonseed
1008.29.00	Millet
1008.90.00	Mixed grain
0709.59.00	Mushrooms and truffles

Category 2 - Vegetable Products (Agricultural Products by HS Code) *(continued)*

Category 2 - Vegetable Products	
HS Code	Product
1207.50.00	Mustard seed
0908.00.00	Nutmeg, mace, cardamoms (raw)
1004.90.00	Oats
1104.12.00	Oats, rolled
0709.99.00	Okra
0709.92.00	Olives residues
0711.20.00	Olives
0709.92.00	Olives preserved
0703.10.00	Onions and shallots, dry
0703.20.00	Onions and shallots, green
0805.10.00	Oranges
0708.20.00	Other beans, green
0810.40.00	Other berries (Vaccinium n.e.c.)
0106.19.00	Other camelids
0805.90.00	Other citrus fruit n.e.c.
1214.90.90	Other forage products n.e.c.
0813.40.00	Other fruit n.e.c., dried
0810.90.00	Other fruits n.e.c.
1214.90.10	Other grasses for forage
1214.90.20	Other legumes for forage
0802.90.90	Other nuts (in shell, n.e.c.)
1207.99.90	Other oil seeds n.e.c.
0713.90.00	Other pulses n.e.c.
0910.99.00	Other stimulant/spice/aromatic crops n.e.c.
0809.29.00	Other stone fruits
1212.99.90	Other sugar crops n.e.c.
0813.50.00	Other tropical fruit, dried
0810.90.50	Other tropical fruits n.e.c.
0709.99.90	Other vegetables, fresh n.e.c.
0711.90.00	Other vegetables provisionally preserved
0604.20.00	Palm kernels
0807.20.00	Papayas
0809.30.00	Peaches and nectarines
0808.30.00	Pears
0713.10.00	Peas, dry
0708.10.00	Peas, green
0904.11.00	Pepper (Piper spp.), raw
1211.90.00	Peppermint, spearmint
0810.70.00	Persimmons
0713.60.00	Pigeon peas, dry
0804.30.00	Pineapples
0802.52.00	Pistachios, in shell
0803.10.00	Plantains and cooking bananas
0809.40.00	Plums and sloes
0813.20.00	Plums, dried (prunes)
0805.40.00	Pomelos and grapefruits
1207.91.00	Poppy seed
0701.90.00	Potatoes
0710.10.00	Potatoes, frozen
0709.93.00	Pumpkins, squash and gourds

Category 2 - Vegetable Products (Agricultural Products by HS Code) *(continued)*

Category 2 - Vegetable Products	
HS Code	Product
1211.90.00	Pyrethrum, dried flowers
0808.40.00	Quinces
1008.50.00	Quinoa
0806.20.00	Raisins
1205.10.00	Rape or colza seed
0810.20.00	Raspberries
1006.00.00	Rice
1006.10.00	Rice (paddy)
1006.30.00	Rice, milled (husked)
1006.40.00	Rice, broken
1006.30.00	Rice, milled (white rice general)
1002.90.00	Rye
1207.60.00	Safflower seed
1207.40.00	Sesame seed
1007.90.00	Sorghum
0809.21.00	Sour cherries
1201.90.00	Soya beans
0709.70.00	Spinach
1108.14.00	Starch of cassava
0810.10.00	Strawberries
0708.20.00	String beans
1212.91.00	Sugar beet
1212.93.00	Sugar cane
1206.00.00	Sunflower seed
1214.90.00	Swedes for fodder
0710.40.00	Sweet corn, frozen
0714.20.00	Sweet potatoes
0805.21.00	Tangerines, mandarins, clementines
1106.20.00	Tapioca of cassava
1106.20.00	Tapioca of potatoes
0714.40.00	Taro
0902.10.00	Tea leaves
0702.00.00	Tomatoes
1008.60.00	Triticale
1207.99.00	Tung nuts
1214.90.00	Turnips for forage
0905.10.00	Vanilla, raw
1214.90.00	Vegetable products for feed n.e.c.
1404.90.00	Vegetable products, fresh or dry n.e.c.
1214.90.00	Vegetables and roots fodder
0710.80.00	Vegetables frozen
0713.90.00	Vetches
0802.31.00	Walnuts, in shell
0802.32.00	Walnuts, shelled
0807.11.00	Watermelons
1001.99.00	Wheat
1101.00.00	Wheat and meslin flour
0714.30.00	Yams
0714.50.00	Yautia

Appendix AG

Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Agricultural Products by HS Code)

Category 3 - Animal of Vegetable Fats and Oils and their Cleavage Products...	
HS Code	Product
1506.00.00	Animal oils and fats n.e.c.
1518.00.00	Animal or vegetable fats and oils and their fractions, chemically modified...
1521.00.00	Beeswax
1512.00.00	Cake of cottonseed
1512.00.00	Cake of groundnuts
1514.91.90	Cake of mustard seed
1513.00.00	Cake of palm kernel
1514.00.00	Cake of rapeseed
1512.00.00	Cake of safflower seed
1515.50.00	Cake of sesame seed
1512.00.00	Cake of sunflower seed
1512.00.00	Cake, oilseeds nes
1517.90.90	Cottonseed oil
1522.00.00	Degras
1516.00.00	Fat preparations
1516.10.00	Fatty liver preparations
1508.10.00	Groundnut oil
1515.90.00	Jojoba oil
1517.90.00	Liquid margarine
1517.00.00	Margarine and shortening
1514.91.00	Mustard seed oil, crude
1515.30.00	Oil of castor beans
1515.90.90	Oil of kapok
1515.11.00	Oil of linseed
1515.21.00	Oil of maize
1510.00.00	Oil of olive residues
1513.21.00	Oil of palm kernel
1515.90.00	Oil of poppy seed
1515.90.20	Oil of rice bran
1515.50.00	Oil of sesame seed
1515.90.60	Oil of tung nuts
1509.10.20	Olive oil
1515.90.90	Other oil of vegetable origin (crude n.e.c.)
1511.00.00	Palm oil
1501.10.00	Pig fat, rendered
1501.90.00	Poultry fat, rendered
1506.00.00	Poultry meat preparations
1514.11.00	Rapeseed or canola oil, crude
1512.11.00	Safflower-seed oil, crude
1502.10.00	Sheep fat, unrendered
1507.10.00	Soya bean oil
1521.10.00	Spermaceti
1512.11.00	Sunflower-seed oil, crude
1502.10.00	Tallow
1516.20.00	Vegetable tallow
1521.90.00	Vegetable waxes (other than triglycerides)
1505.00.00	Wool grease and lanolin

Appendix AH

Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products (Agricultural Products by HS Code)

Category 4 - Prepared Foodstuffs...	
HS Code	Product
2009.00.00	Apple juice
2009.00.00	Apple juice, concentrated
2303.20.00	Bagasse
2203.00.00	Beer of barley, malted
2203.00.00	Beer of sorghum, malted
2302.00.00	Bran of barley
2302.00.00	Bran of buckwheat
2302.00.00	Bran of cereals n.e.c.
2302.00.00	Bran of fonio
2302.00.00	Bran of maize
2302.00.00	Bran of millet
2302.00.00	Bran of mixed grain
2302.00.00	Bran of oats
2302.00.00	Bran of pulses
2302.00.00	Bran of rice
2302.00.00	Bran of rye
2302.00.00	Bran of sorghum
2302.00.00	Bran of wheat
1905.90.10	Bread
1904.00.00	Breakfast cereals
2303.00.00	Brewing or distilling dregs and waste
1904.30.00	Bulgur
2007.00.00	Butter of karite nuts
2308.00.93	Cake of linseed
2302.10.00	Cake of maize
2302.40.01	Cake of rice bran
2003.00.00	Canned mushrooms
1704.00.00	Chocolate products
2206.00.00	Cider and other fermented beverages
2402.20.00	Cigarettes
2402.10.00	Cigars and cheroots
2009.00.00	Citrus juice, concentrated n.e.c.
1801.00.00	Cocoa beans
1804.00.00	Cocoa butter, fat and oil
1802.00.00	Cocoa husks and shells
1803.00.00	Cocoa paste not defatted
1805.00.00	Cocoa powder and cake

Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products (Agricultural Products by HS Code) *(continued)*

Category 4 - Prepared Foodstuffs...	
HS Code	Product
1905.00.00	Communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products.
2308.00.00	Cotton waste
2309.90.10	Dog or cat food, put up for retail sale
3301.00.00	Essential oils n.e.c.
2101.00.00	Extracts, essences and concentrates of tea or mate, and preparations with a basis thereof or with a basis of tea or maté
2309.90.70	Feed additives
2309.90.70	Feed minerals
2309.90.70	Feed supplements
2309.90.10	Feed, compound, cattle
2309.90.10	Feed, compound, pigs
2309.90.10	Feed, compound, poultry
2308.00.00	Feed, food waste preparations
2309.90.10	Feed, other concentrates nes
2106.00.00	Food preparations n.e.c.
2106.00.00	Food preparations of flour, meal or malt extract
2001.00.00	Fruit prepared n.e.c.
2005.00.00	Fruit, nuts, peel, sugar preserved
1702.00.00	Glucose and dextrose
2009.00.00	Grape juice
2009.00.00	Grapefruit juice
2009.00.00	Grapefruit juice, concentrated
2007.10.00	Homogenized cooked fruit
2104.20.00	Homogenized meat
2005.10.00	Homogenized vegetables
2105.00.00	Ice cream and other edible ice
1901.10.00	Infant food preparations
1702.60.00	Isoglucose
2009.90.00	Juice of citrus fruit n.e.c.
2009.89.00	Juice of fruits n.e.c.
2009.31.00	Juice of lemon
2009.89.00	Juice of mango
2009.89.00	Juice of pineapple, concentrated
2009.89.00	Juice of plum
2009.89.00	Juice of plum, concentrated
2009.89.00	Juice of tangerine
1702.00.00	Lactose
2009.31.60	Lemon juice, concentrated
1901.90.00	Malt extract

Category 4 - Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes; Processed Chemical Products (Agricultural Products by HS Code)
(continued)

Category 4 - Prepared Foodstuffs...	
HS Code	Product
2008.99.80	Mango pulp
1901.20.00	Mixes & doughs for baking
1703.10.00	Molasses
2009.69.00	Must of grape
3301.29.50	Oil of citronella
2009.11.00	Orange juice
2009.12.00	Orange juice, concentrated
1702.50.00	Other fructose and syrup
2403.99.00	Other manufactured tobacco
2202.99.00	Other non-alcoholic caloric beverages
2009.90.50	Other vegetable juices
2005.99.00	Other vegetables preserved (not vinegar/acetic acid/sugar)
2002.90.00	Paste of tomatoes
1905.90.00	Pastry
2008.11.00	Peanut butter
2009.41.00	Pineapple juice
2008.20.00	Pineapples, otherwise prepared or preserved
2303.10.00	Potato offals
2008.11.00	Prepared groundnuts
2008.19.00	Prepared nuts
2308.10.00	Pulp, waste of fruit for feed
3808.91.00	Pyrethrum extract
1701.14.00	Raw cane or beet sugar (centrifugal)
2304.00.00	Residues of fatty substances
1701.99.00	Refined cane or beet sugar (solid)
1701.99.00	Refined sugar (general)
2206.00.00	Rice-fermented beverages
2106.90.00	Soya curd tofu
2103.90.00	Soya paste
2103.10.00	Soya sauce
1702.90.00	Sugar and syrups n.e.c.
1704.90.00	Sugar confectionery
2005.80.00	Sweet corn, prepared/preserved
0702.00.00	Tomato juice
2002.10.00	Tomatoes, peeled (other than vinegar)
1902.00.00	Uncooked pasta, not stuffed or otherwise prepared
2208.90.00	Undenatured ethyl alcohol (<80% vol), spirits & liqueurs
2401.10.00	Unmanufactured tobacco
2004.90.00	Vegetables preserved (frozen)
2005.99.00	Vegetables preserved n.e.s. (o/t vinegar)
2004.00.00	Vegetables, dehydrated
2001.90.00	Vegetables, pulses and potatoes preserved by vinegar/acetic acid
2205.10.00	Vermouth and flavoured wine
2936.00.00	Vitamins
2204.10.00	Wine

Appendix AI

Category 5 - Textile Materials (Agricultural Products by HS Code)

Category 5 - Textile Materials	
HS Code	Product
5305.00.00	Abaca, manila hemp, raw
5102.00.00	Coarse goat hair
5308.10.00	Coir, raw
5203.00.00	Cotton, carded or combed
5109.00.00	Fine animal hair, n.e.c.
5301.00.00	Flax, processed but not spun
5301.10.00	Flax, raw or retted
5301.30.00	Flax, tow and waste
5105.10.00	Hair, carded/combed
5105.29.00	Hair, coarse nes
5105.29.00	Hair, goat, fine
5105.29.00	Hair, horse
4101.20.30	Hides nes
4101.20.30	Hides camel
4101.20.10	Hides cattle
4101.20.10	Hides cattle salted
4101.20.10	Hides buffalo
4101.20.10	Hides horse
4101.90.10	Hides horse wet
4101.90.10	Hides wet salted nes
4101.90.10	Hides wet cattle
5303.10.00	Jute, raw or retted
5303.90.00	Kenaf and other textile bast fibres, raw or retted
4115.00.00	Leather used & waste
4001.10.00	Natural rubber (primary forms)
4001.22.00	Natural rubber (other forms)
5303.90.90	Other fibre crops, raw n.e.c.
4103.90.00	Other raw skins (other animals, fresh)
4103.90.90	Other raw skins (preserved)
5305.19.00	Ramie, raw or retted
4101.20.00	Raw hides and skins of buffaloes
4101.50.00	Raw hides and skins of cattle
4106.21.00	Raw hides and skins of goats/kids
4105.10.00	Raw hides and skins of sheep/lambs
4105.21.00	Raw hides and skins of sheep/lambs (wool)
5002.00.00	Raw silk (not thrown)
5101.11.00	Shorn wool, greasy
5003.00.00	Silk waste
5001.00.00	Silk-worm cocoons
5305.10.00	Sisal, raw
4106.22.00	Skins, calve (n.e.s.)
4106.22.00	Skins, calve, dry salted
4105.30.00	Skins, dry-salted sheep
4301.80.00	Skins, fur
4106.21.00	Skins, goat (n.e.s.)
4106.21.00	Skins, goat, dry salted
4301.80.00	Skins, karakul
4103.90.00	Skins, pig (n.e.s.)
4103.90.00	Skins, pig, dry salted
4103.90.00	Skins, pig, wet salted
4301.80.00	Skins, rabbit
4105.10.00	Skins, sheep (n.e.s.)
4106.22.00	Skins, wet-salted calves
4106.21.00	Skins, wet-salted goats
4105.30.00	Skins, wet-salted sheep
5302.10.00	True hemp, raw or retted
5105.21.00	Wool, degreased or carbonized
5103.10.00	Wool, hair waste
5103.10.00	Wool, shoddy

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