

KIEL WORKING PAPER

**The Ukraine Support
Tracker:**

**Which countries help
Ukraine and how?**



No. 2218 February 2023

Christoph Trebesch, Arianna Antezza, Katelyn Bushnell, André Frank, Pascal Frank, Lukas Franz, Ivan Kharitonov, Bharath Kumar, Ekaterina Rebinskaya and Stefan Schramm

ABSTRACT



THE UKRAINE SUPPORT TRACKER: WHICH COUNTRIES HELP UKRAINE AND HOW?

Christoph Trebesch¹, Arianna Antezza, Katelyn Bushnell, André Frank, Pascal Frank*, Lukas Franz, Ivan Kharitonov, Bharath Kumar*, Ekaterina Rebinskaya* and Stefan Schramm*

NOTE: This is a considerably expanded version of the original paper and database (9th update). We are continuously improving this project and welcome feedback to ukrainetracker@ifw-kiel.de. We are greatly indebted to hundreds of readers around the world who have sent us helpful comments and suggestions.

This paper presents the “Ukraine Support Tracker”, which lists and quantifies military, financial and humanitarian aid to Ukraine in the context of Russia’s war against Ukraine. We track government commitments to Ukraine made between January 24, 2022 and January 15, 2023 by 40 governments plus the EU institutions. We find significant differences in the scale of support across countries, both in absolute terms and as percent of donor country GDP. In billions of Euros, by far the largest single bilateral supporter of Ukraine is the United States, followed by the EU institutions, the United Kingdom, and Germany. In percent of donor GDP, Eastern European countries stand out as particularly generous and even more so once we account for refugee costs. In comparison to previous wars in history, the support for Ukraine is small, especially when considering the size of donor GDP. Annual US spending during the Korea, Vietnam and Iraq wars, for example, was much higher compared to spending on Ukraine 2022. Germany’s support to liberate Kuwait during the Gulf War 1990/91 also far exceeds its help for Ukraine in 2022. Moreover, we find that Western countries clearly prioritized their own population in recent months. EU governments mobilized 10 times more funds for new domestic energy subsidies compared to what they mobilized for Ukraine. Thus, in the bigger picture, the international support for Ukraine so far has been rather limited.

Keywords: International aid, military aid, war, geoeconomics

JEL classification: F35, F51, H56, H63, H84, H81

Christoph Trebesch

Kiel Institute for the World Economy
Kiellinie 66, D-24105 Kiel; Germany
christoph.trebesch@ifw-kiel.de

Arianna Antezza*

Barcelona School of Economics

Katelyn Bushnell

Kiel Institute, University of Bayreuth
katelyn.bushnell@ifw-kiel.de

André Frank

Kiel Institute
andre.frank@ifw-kiel.de

Pascal Frank*

University of Notre Dame

Lukas Franz

Kiel Institute
lukas.franz@ifw-kiel.de

Ivan Kharitonov

Kiel Institute, University of Bayreuth
ivan.kharitonov@ifw-kiel.de

Bharath Kumar*

Geneva Graduate Institute

Ekaterina Rebinskaya*

University of Oxford

Stefan Schramm

Kiel Institute, University of Mannheim
stefan.schramm@ifw-kiel.de

The responsibility for the contents of this publication rests with the author, not the Institute. Since working papers are of a preliminary nature, it may be useful to contact the author of a particular issue about results or caveats before referring to, or quoting, a paper. Any comments should be sent directly to the author.

¹ Corresponding author: Christoph Trebesch (christoph.trebesch@ifw-kiel.de), but ideally contact us at ukrainetracker@ifw-kiel.de.

*Authors marked with an asterisk are no longer part of the current Ukraine Support Tracker team. They have greatly contributed to previous releases.

1. Introduction

Russia's attack on Ukraine has caused staggering human suffering and destruction. Since the full-scale invasion started, many Western leaders have pledged to “stand with Ukraine” and announced major military and humanitarian support. This paper asks: What do the numbers say? How large is the support for Ukraine? Who are the most supportive governments? And what type of support do countries offer – military, humanitarian, and/or financial aid? To address these questions, we create a new database, the “Ukraine Support Tracker”, which lists and quantifies the support of Western governments to Ukraine. In this ninth version we trace aid commitments between January 24, 2022 (the day several NATO countries put their troops on alert), and January 15, 2023. Building on our new dataset, we then place the foreign support for Ukraine in a bigger picture, comparing it to support in previous wars and crises.

This project fills a gap in the literature and debate. In the initial months after the invasion, the public discussion focused on sanctions and other measures to hurt Russia (e.g., Bachmann et al. 2022). Less attention was devoted to measures in support of Ukraine (a notable exception being Becker et al. 2022). Indeed, prior to the publication of this piece, most of the discussion on aid to Ukraine had been anecdotal, while systematic data had been missing.

The paper can be seen as an extension of the 200-year panorama in Horn, Reinhart and Trebesch (2020), which traces international support via government-to-government loans and grants in major wars, financial crises and natural disasters back to 1790 and worldwide. Building on this work, we add historical comparisons in the last part of this paper.

A main aim of our database is to quantify the scale of aid to Ukraine and to make the support comparable across countries and time. We trace commitments by 41 donors, including all G7 and EU member countries (31), plus Australia, New Zealand, Norway, South Korea, Switzerland, Turkey, India, China and Taiwan (9). In addition, we trace commitments by the European Union institutions meaning the EU Commission and EU Council, but also via the European Peace Facility (EPF) and the European Investment Bank (EIB). For each of these donors, we quantify support flows in millions of Euros, accounting for both financial and in-kind transfers. To do so, we set up a comprehensive “consensus” database that brings together information from official government sources, existing lists of Ukraine aid, and media reports.

We mainly focus on bilateral (government-to-government) commitments transferred to Ukraine. This means that not all types of support are covered. In particular, in our baseline figures, we do not add the costs of helping refugees having fled Ukraine, e.g. by Poland, but we do show results in supplementary figures.² Furthermore, we do not count private donations or those by non-governmental organizations (NGOs), mainly because reliable information across countries is not available. We do track aid by international financial institutions like the International Monetary Fund (IMF) or the World Bank, but report these results separately, as discussed below.

An important challenge in creating our database is to quantify non-financial transfers, such as in-kind shipments of military equipment, weapons, medicines, or foodstuff. In most cases, governments report the value of their in-kind donations, but in others they only mention a list of items supplied, such as specific weapons or several “tons of foodstuff”. To quantify this aid,

² Much of the help for refugees is in-kind and incurred by private households rather than governments, and the available statistics on fiscal expenses on Ukrainian refugees are noisy. As a proxy, we use cost estimates by the OECD, as explained below.

we assign a monetary value to each item using market prices or data on previous instances of international aid/weapon deliveries.

Another challenge is data transparency. We do our best to list and quantify all support measures that have become publicly known. But not all donations become public. For better comparability across countries, we therefore create a “data transparency” index, which measures how detailed each government’s information on its Ukraine support is. We find considerable variation across countries, with some governments being rather opaque on their support, e.g., France, Spain or Poland. The average scope of information sharing, however, is high, as many governments have set up designated websites and/or release very detailed lists on their donations, including on military equipment and weapons sent. Moreover, the data availability and transparency has clearly improved over the course of the war and several benchmarking exercises show that our aid coverage is acceptable even for (formerly) non-transparent donors.

In total, we trace over €143 billion in government-to-government commitments³ from January 24, 2022, until January 15, 2023. The United States (US) is by far the largest bilateral supporter of Ukraine having committed €73.18 billion, more than 50% of total commitments in our database. EU country governments committed a total of €19.9 billion bilaterally, plus €29.92 billion through the EU Commission and Council, €3.1 billion via the European Peace Facility and €2 billion through the EIB. This brings total EU commitments to €54.92 billion. It is remarkable that the US alone has committed considerably more than all EU countries combined, in whose immediate neighborhood the war is raging. Financial aid by multilateral organizations like the IMF, World Bank, UN and the European Bank of Reconstruction and Development (EBRD) add up to €13.27 billion. These are reported in a separate sheet in our database and are not included in the headline figures we report (see Section 2.4).⁴

When measured in percent of donor GDP, the support of Eastern European countries stands out, especially if we add OECD estimates on the cost of hosting refugees. The Baltic countries, Poland, the Czech Republic and Bulgaria rank high, but also the United States is among the top 5 donors in percent of donor GDP. The US is thus a major donor both in absolute and relative terms, which underscores the major US commitment in this war. Turning to heavy weapons, we find that EU member countries have, on average, committed about 6% of their available stocks of tanks, howitzers and multiple launch rocket systems. Eastern European countries again stand out as particularly generous, in particular Poland, and the Czech Republic. Also, the UK, and Norway have made large pledges, in excess of 25% of their average heavy weapon stocks, respectively.

Over the past 12 months, we observe a strong cyclicity in donations. Commitments spiked in the weeks after the full-scale invasion, but then new pledges declined strongly - dropping to almost to zero in the summer. Since October 2022, new commitments have again increased, with another spike at the end of 2022, with the US announcing another major aid package. Financial aid commitments have also been cyclical, as has been military aid. The US sent

³ Bilateral commitments include bilateral commitments made through the World Bank and the International Monetary Fund (IMF).

⁴ In comparison to IMF and World Bank loans, the commitments by other international organizations like the United Nations or the Red Cross are minor. Note that we count loan and grant commitments made via multilateral organizations, such as the IMF, World Bank, International Red Cross, or UNHCR as bilateral aid if these commitments are clearly designated to Ukraine.

weapons and ammunition in a steady stream, while commitments from EU countries have been harder to predict, often driven by large single pledges of individual member governments.

In the last part, we look at aid to Ukraine in a bigger picture. In a first step, we take a historical perspective and look back to earlier wars and conflicts. Good historical data on military aid during wars is hard to find, which makes the benchmarking difficult. We could, however, gather comparable data on foreign military aid during World War 2 (WW2), during the Spanish Civil War of the 1930s as well as on US military expenditures in the Korea, Vietnam, Afghanistan and Iraq. We find that the support to Ukraine is comparatively small compared to the cost of these wars, both when counting number of heavy weapons sent or when measured in percent of donor GDP (as yearly averages). For example, yearly average US military expenditures in Korea or Vietnam were 13 and 5 times higher, respectively, than US aid to Ukraine in 2022 (in % of GDP). Similarly, Germany supported the liberation of Kuwait in 1991 with three times more aid than it committed bilaterally to Ukraine in 2022 (in percent of GDP).

We then compare aid to Ukraine to domestic spending programs set up since February 2022. The results show that governments in Europe did announce very large emergency funds in response to the war and energy price spike, but the bulk of the announced support was pledged to support their own households and firms rather than to support Ukraine. In total, the domestic energy support package commitments announced by EU countries amount to €570 billion, compared to €55 billion in total EU commitments to Ukraine. A similar gap arises when comparing what the EU mobilized for its own members during the Covid-19 crisis. The EU's pandemic recovery fund Next Generation EU (NGEU) has a total volume of €807 billion, more than 14 times total EU commitments to Ukraine thus far. These comparisons suggest that European governments do have sufficient resources to respond to major shocks, but their clear spending priority after the Russian invasion was helping their own population cope with this shock rather than helping Ukraine.

The remainder of the paper is structured as follows. Section 2 presents the methodology, sources and definitions underlying our database, discusses how we treat EU and multilateral aid, as well as special cases like the US and German support for Ukraine. Section 3 presents main insights on country comparisons from our new database including country rankings in absolute and relative terms, while Section 4 presents the dynamics of aid over time looking at commitments and disbursements over 2022. Section 5 shows our results on military aid and heavy weapons. Section 6 and 7 draw comparisons between the support for Ukraine and past conflicts and wars, as well as to countries' domestic crisis response in 2022. The last section concludes.

2. The Ukraine Support Tracker database - methodology and measurement

This section provides an overview of definitions, sources, and our method of measuring aid in our database. First, we discuss the types of aid considered. We then describe the data collection process, the primary sources, and the value estimation procedure for in-kind aid like military equipment, medicines, or food. Afterwards, we discuss coding challenges, such as a lack of donor transparency and discuss additional dimensions of support, including loans by international organizations, aid raised at donor conferences, and aid committed prior to January 2022. Lastly, we discuss support schemes that are difficult to understand, like the US support patterns (presidential drawdown authority etc.) or the “circle exchange” schemes set up by Germany and others.

2.1. Bilateral aid: sample, definitions, and measurement

Our tracking starts on January 24, 2022, the day several NATO members put their troops on alert and the US government started to evacuate its embassy staff.

Country sample: We focus on government commitments from 40 countries, plus the EU institutions. The largest country group are the 27 EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. In addition, we include member countries of the Group of 7 (G7), meaning that we also code support by Canada, Great Britain, Japan, and the United States. Since the third version, we have included nine additional countries, namely Norway, Switzerland, Australia, New Zealand, South Korea, Turkey, India, China, and Taiwan.

We track government-to-government support: The database focuses on bilateral commitments made to the government of Ukraine. We only consider flows going into Ukraine and/or helping people in Ukraine.

This excludes aid or donations to neighboring countries such as Moldova or Poland. Accordingly, we also do not include support extended between fellow NATO members.⁵ Similarly, we do not count donations by private individuals, companies, churches, or non-governmental organizations (NGOs). Providing a systematic overview of these types of donations remains challenging as there is no standardized reporting or data on these types of aid, and press reporting is unsystematic.⁶

We also do not systematically collect support from international organizations like the Red Cross or the United Nations, mainly because of the lack of data and reporting by these organizations. We do provide an overview of well-identifiable commitments by international financial institutions like the IMF, World Bank, and the European Bank for Reconstruction and Development (EBRD). Commitments by the European Investment Bank (EIB) are counted as EU aid, because the “EIB is the bank of the European Union”, according to its website and statutes. Each EU-member country has a share of subscribed capital at the EIB.

Moreover, we include *bilateral* grants and loans in our main dataset even if they are channeled through the IMF or World Bank. Examples include grants and loans made to a multi-donor support fund for Ukraine set up by the World Bank, or a Canadian bilateral loan worth C\$1 billion made through the IMF. We include these contributions as they are merely channeled through these organizations and thus equivalent to a direct bilateral transfer. These cases are highlighted in the main database.

⁵ Whenever we are unable to disentangle the aid sent directly to Ukraine’s government from aid sent to neighboring countries, we assumed upper bounds and reported the total value of the aid for Ukraine. One example is the US commitment of \$13.37 billion in vital economic and budgetary support for the government of Ukraine. This aid package also includes assistance to other countries impacted by the situation in Ukraine (ID: USF4).

⁶ Some private donations are also channeled through international organizations. For example, UNHCR’s Ukraine emergency response received more than \$200 million from companies, foundations, and individuals (UNHCR 2022; reported on March 14). Furthermore, there are in-kind donations that are hard to evaluate. Private firm SpaceX reported to have sent “thousands” of Starlink satellite internet kits to Ukraine following the Russian invasion (Sheetz 2022), although these donations seem to have been financed by the US government (Lima 2022). We do not systematically track these donations.

Defining humanitarian, financial, and military support: We distinguish between military, humanitarian, and financial assistance. Military support includes all types of weapons and military equipment alongside items explicitly donated to the Ukrainian army (such as bottled water, gasoline, or foodstuff). Humanitarian aid refers to assistance supporting the civilian population, mainly food, medicines, and other relief items. Financial contributions with a clear humanitarian or military purpose are counted for the respective category and not as financial aid. Financial support includes grants, loans, and loan guarantees made to the government of Ukraine.⁷ We also consider currency swap lines extended to the Ukrainian central bank, since these are standing credit lines allowing Ukraine to pay for imports and urgent war necessities in foreign currency (Poland extended a \$1 billion line on February 24, 2022).

Bilateral aid vs total aid (incl. EU shares): Our main focus is on bilateral aid, defined as commitments by one government to another (here: Ukraine). The relevance of aid coming from the EU institutions, however, has grown over the past year so that a focus only on bilateral aid is insufficient. We therefore also reassign EU-level aid to the individual EU member countries, as discussed in more detail in Section 2.4 below. Whenever we speak of “bilateral aid” or “bilateral commitments”, we refer to government-to-government commitments excluding EU-level aid. Whenever we refer to “total aid” we mean bilateral commitments plus the respective country commitments going through EU institutions.

Commitments vs. disbursements: We generally focus on commitments instead of actual deliveries. This is because public and especially official information on commitments is plentiful and also getting better over time. In contrast, reliable information on deliveries is scarce, especially for military and humanitarian aid. For humanitarian aid we refrain completely from tracking deliveries, since the delivery information is scattered and unreliable. For military aid, we try to keep track of deliveries, which works best for heavy weapons. A main challenge for military aid delivery is that the US, as the largest military donor, is not providing sufficient data, making an international comparison difficult. As for financial aid, especially budgetary aid, we managed to link our commitment data with data on actual disbursements as by the Ukrainian Ministry of Finance, as explained in the upcoming section.

2.2. Data sources and coding procedure

Data sources: To create our new database, we follow the approach of existing trackers such as the “United Nations COVID-19 Vaccine Market Dashboard” and combine official government sources with information from international news media and existing overviews on aid to Ukraine.

The main sources for coding are government press releases and government statements, mainly published on websites of the central governments (prime ministers or governments) and by key ministries (foreign office, defense, economics, and finance). Besides searching through these websites, we also consider the Twitter accounts of governments, their departments, and ministers, which often contain detailed announcements. Across the over 1400 individual entries in our main dataset, 86% use at least one official/government source.

⁷ These include, for example, Italy’s grant of €110 million (approved on February 27); France’s loan of €300 million with a 1.04% interest rate and maturity of 15 years (committed in early March, approved on March 28), and Japan’s loan of \$100 million (committed on March 25), which is channelled as “parallel financing” by the World Bank.

Especially in the initial phases of coding our database (March and April 2022) we drew on several helpful cross-country overview lists on military and humanitarian aid to Ukraine. Two such lists are assembled and regularly updated by the British House of Commons Library (Curtis and Mills 2023; Brien and Loft 2023). We also drew on the Wikipedia page “List of foreign aid to Ukraine during the Russo-Ukrainian War”⁸, and a factsheet of EU aid by the European Civil Protection and Humanitarian Aid Operations⁹. However, neither of these lists is complete, and a systematic comparison revealed errors and inconsistencies, which is why we have used them much less in recent updates. Moreover, these lists state individual aid announcements without systematically quantifying the *value* of assistance.

Furthermore, we cross-check our entries on military donations with data collected by online sources such The Forum on the Arms Trade¹⁰ and Oryx¹¹. These sources are useful for double checking and processing, but are not used as a main source, as they are often based on photographic evidence from the battlefield rather than official or government sources.

To supplement the government sources and gather additional details, we also conduct systematic media searches using Google News and Factiva. For this purpose, we used the following keywords in various combinations: “[donor country name]”, “Ukraine”, “aid”, “military aid”, “humanitarian aid”, “solidarity”, “weapons”, “support”.

Coding procedure: The dataset merges and compares information from various sources to create a “consensus” view. In case of inconsistencies between sources or government agencies, we make an in-depth inquiry based on additional sources, which has solved the issue in all but a few cases.

We generally evaluate and rank the sources by their reliability, taking governmental press releases and government websites as the most reliable source, followed by governments’ statements on social media and, third, news articles reported in renowned international media outlets. Most large donations are very well documented by government sources and there is no need to draw on multiple sources. We nevertheless add additional sources for completeness in various cases. In total, 78% of our 1404 entries report two sources or more. A small subset of 73 entries only reports a single, non-official source, raising concerns about data quality. However, all of these 73 entries are comparatively small donations, with a total sum of €1.46 billion, or around 1% of the total donations.

To ensure data quality, each entry is coded at least by two separate coders. In case coding results differ between coders, the case is presented to a third person to ensure correct quantification. Whenever possible, new information is used to retroactively update past donations, so that our data quality improves over time. This approach is also used whenever official sources reveal aid totals for a given timeframe. These retroactive changes are noted in the dataset to ensure traceability.

⁸ See https://en.wikipedia.org/wiki/List_of_foreign_aid_to_Ukraine_during_the_Russo-Ukrainian_War.

⁹ See https://ec.europa.eu/echo/where/europe/ukraine_en.

¹⁰ See <https://www.forumarmstrade.org/ukrainearms.html>.

¹¹ See <https://www.oryxspioenkop.com/>.

We index donation announcements with a unique ID, under which all information from the available sources are subsumed. Moreover, donations are categorized into the three main categories humanitarian, financial and military, plus subcategories such as loans, grants, or guarantees. We use the announcement date and information from the best-quality sources to distinguish across entries and to make sure we are not double counting.

Quantifying in-kind donations – how we measure the value of weapons or foodstuff: Our aim is to move beyond anecdotal evidence and instead quantify the value of support to Ukraine in millions of Euros. Whenever governments report the value of their donations in their national currency, we use these numbers as the baseline value. In multiple cases, however, governments do not report the value of aid, but only the items supplied like specific weapons or several “tons of foodstuff”.

Valuing these types of in-kind donations is challenging and requires some element of judgment. We continuously improve our estimates and appreciate feedback on individual items to ukrainetracker@ifw-kiel.de.

To summarize, we value in-kind donations by drawing on government sources whenever possible, but also resort to price information available from contracts, online marketplaces and stores when unavoidable. Moreover, as a general rule, we use upper bounds of prices to avoid underestimating the true scale of support. Furthermore, we use the same unit price for identical items across donors to increase consistency.

To estimate the value of everyday items with no fixed prices like “pair of shoes” or “bottled water”, we try to approximate a reasonable value using information on unit costs or average prices as listed by large aid NGOs or international organisations. The same is true for medical supplies or “tons of medicines”.¹² As for “tons of food” delivered, we consult the literature and government information on the value of wasted food, while excluding luxury and perishable items that are unlikely to be donated (Buzby et al. 2014). “Tons of necessities” are valued at the average price over medical and food deliveries. In case no NGO or official information is available we also draw on retail prices listed in online stores.

For military equipment and weapons, our aim is to find reasonable prices for as many items as possible. Throughout, we stick to our “upper bound” rule, so as to avoid underestimating the true value of support. We are aware that this can lead to criticism for using inflated prices, but we prefer overestimating rather than underestimating aid flows.

Our preferred sources for weapon prices are official statements given by the manufacturer, or official government procurement reports and military contracts. If these are unavailable, we rely on weapon prices from the widely cited SIPRI Arms Trade database (SIPRI 2022). To fill the remaining gaps, we sometimes rely on media reports on the value of weapons or military goods or use prices from online retail marketplaces, especially for military equipment or light weapons. For larger caliber rounds of artillery and rocket launchers, special ammunition types, and generally more costly projectiles, we draw information from official procurement lists of Defense Ministries. Unfortunately, ammunition prices of smaller caliber rounds are rarely given in official reports so we consult online stores and use single cartridge costs, ignoring bulk discounts, thus again choosing upper bound values. When the type of ammunition is not

¹² For example, we follow the valuation approach by Doctors Without Borders in the Bosnia war: <https://www.aerzte-ohne-grenzen.de/sites/default/files/mediathek/entity/document/1998-01-bosnia-report-donation-practices.pdf>.

specified, we assume that it is linked to the kind of weaponry delivered with the ammunition. In case of weapon systems with multiple units like missile batteries or multiple launch rocket systems (MLRS), we decompose the item so as to calculate or approximate the cost of a single ground unit and missile. This allows us to find single unit prices with more precision. When the price of a specific weapon type is not available, we approximate prices with those of similar weapon systems or models. Similarly, we infer information from the country's military stocks, in case only the weapon category is named, e.g., "anti-armor system" or "anti-armor weapon". Specifically, we assume the donor government to send the kind of item it has in stock or which it regularly uses/purchases. For this purpose, we use information on stocks from the Military Balance Studies published by the International Institute for Strategic Studies (see IISS 2022). We adjust weapon prices for inflation using the GDP Chain Price Index deflator for national defense provided by the US Bureau of Economic Analysis (BEA). This means that prices of military items are inflation adjusted to reflect modern prices.

Taken together, we find prices or price approximations for about 75% of the more than 560 in-kind items in our dataset. The remaining items with missing prices fall under three main categories. First, no price exists due to a lack of marketability or standardization, such as the cost of refitting or repairing weapons. Second, weapons or other military services that are highly specialized or customized, such as satellite or radar imagery or training. Third, a lack of detail in the sources, e.g. very broad categories such as "tank", "military ammunition", "other military equipment", which cannot be priced convincingly.

We are grateful for the feedback we received on sources and details of weapon prices and for the help in finding weapon specifications. We welcome further feedback in the future.

2.3. Data transparency index and "hidden aid"

Our database solely builds on publicly known commitments, so the information in our dataset can only be as good as the available public sources. This raises the concern about "hidden aid", as some governments point to security concerns or simply do not make the effort to share details on their support for Ukraine. In the first months of the war, several governments announced not to share this information, in particular Finland, France, Italy, Japan, Spain, and Portugal. Over the course of the year, however, the coverage and quality of official information from these and other countries has significantly increased, so that the concern of "hidden aid" is becoming less acute. Countries like Finland or Germany, which were initially opaque in their support, have set up detailed overview pages listing their bilateral support.

So far, the evidence of large-scale "hidden aid" has been limited. There are not too many instances in which we had to significantly correct our estimates upwards due to large amounts of "hidden aid" that had been unknown before. This can be seen from the "Updates and Corrections" sheet which traces this type of corrections since April 2022. In fact, given the large attention devoted to this war in both traditional and social media, it is difficult to keep large military, humanitarian or financial aid hidden. This war is "twitterized". Sooner or later, major new weapons sent to Ukraine will be reported on by either politicians in Ukraine and beyond or by specialized twitter accounts like Oryx or the "Ukraine Weapons Tracker". For example, despite France's initial public commitment not to share details on military support, government members have regularly announced major weapon deployments e.g. on the Caesar howitzers. Similarly, it is almost impossible to not report financial aid, since foreign monetary commitments and disbursements are now regularly reported by the Ukrainian authorities.

Below we report on a few benchmarking exercises, which suggest our estimates provide a reasonably good coverage, even in countries that had long been opaque.

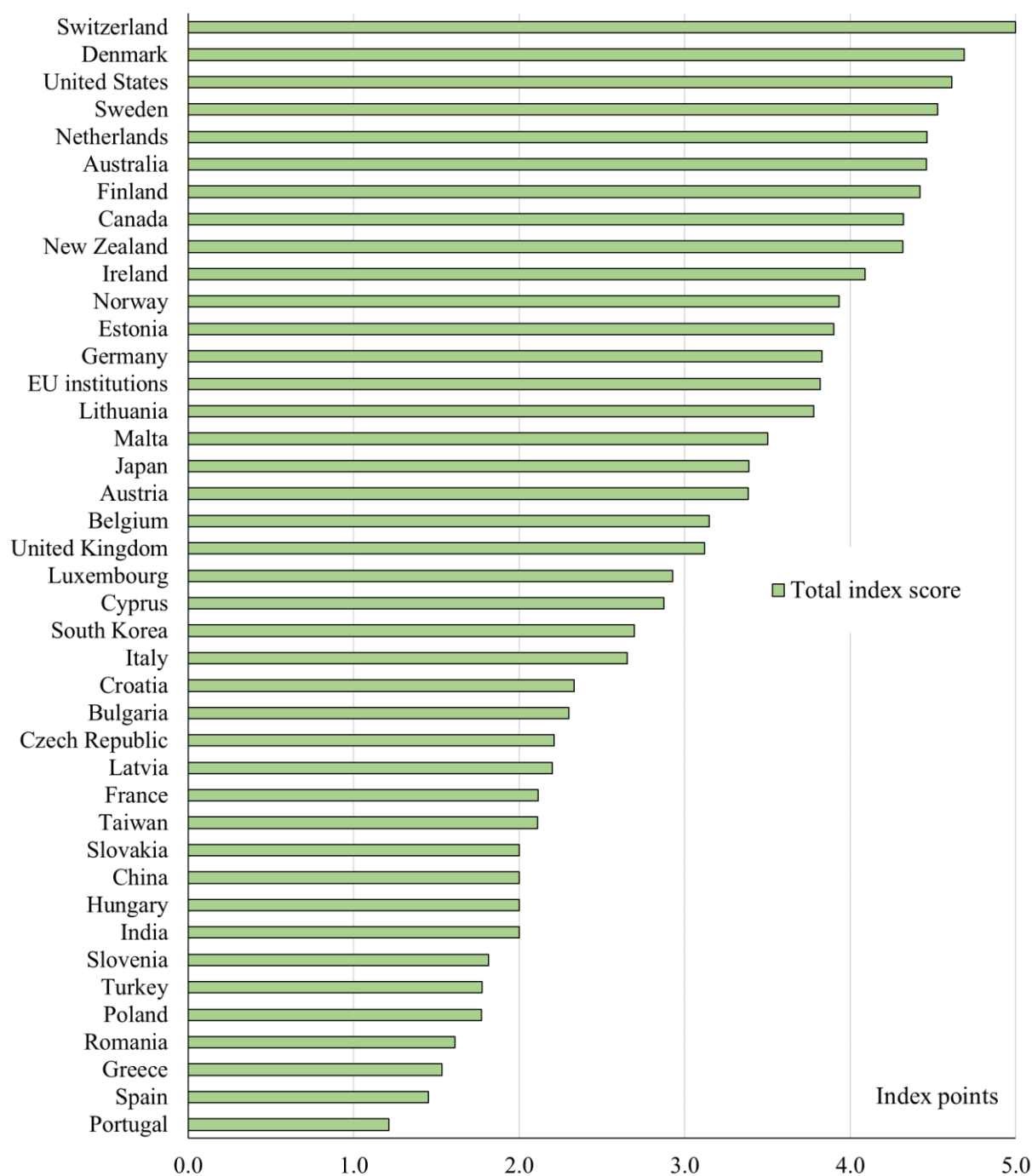
For better comparability across countries, we have created a “data transparency” index that measures government transparency in relation to its support to Ukraine. The index is based on five subindices on data quality and transparency by country, the first two being qualitative (0-1) and the remaining three being quantitative (share of items with detailed information):

1. Designated website (yes=1/no=0): Is there an official website on government aid to Ukraine?
2. Total value of commitments given (yes=1/no=0): Is the total sum of Ukraine support provided by the government?
3. Government information on individual items (share in percent): Share of committed individual items in our database for which we have an official source (shares from 0 to 1 computed for each country).
4. Monetary value of individual items given (share in percent): Share of committed individual items in our database for which we have a monetary value (shares from 0 to 1 computed for each country).
5. Exact number of weapons / military items disclosed (share in percent): Share of weapons and other in-kind military items committed for which we have the exact number of items (shares from 0 to 1 computed for each country).

The final index score per country is the sum of these five sub-indices. A score of 5 is the highest possible and suggests full data transparency, while 0 is the lowest possible score. Figure 1 shows the resulting index value by country. A more detailed version of the figure, with breakdowns for each sub-index, can be found in Appendix I as well as in our dataset.

The average index score is 3.03 points, indicating a high average transparency level. Switzerland ranks first with 5 out of 5 possible points, followed by Denmark with 4.69 points. Both countries provide a regularly updated website on Ukraine aid with links to detailed government press releases on the issue. The US comes in third with 4.61 points, owing to the extensive documentation of their Ukraine aid. The US does not get a full score of 5 because they sometimes do not disclose the exact number of military items donated. For EU countries, the average is 2.84 out of 5 points.

Figure 1. Data transparency index



Note: This figure shows the data quality and transparency ranking for all donors. Higher index values indicate higher levels of data transparency (5 = best, 0 = least transparent). For a detailed description of the index, please see the text as well as the sheet "Data Transparency Index" in our dataset.

2.4. Multilateral and EU support

The main objective of the Ukraine Support Tracker is to quantify bilateral aid flows to Ukraine plus aid by the EU institutions. In this section we discuss the various vehicles of EU-level support as well as support by multilateral organizations like the IMF.

Mechanisms of European Union support: The foreign assistance mechanisms by the European Union (Commission and Council) can be summarized as follows:

- The **European Peace Facility (EPF)** is an off-budget fund intended for the reimbursement of member countries for lethal and non-lethal military aid to Ukraine. In late February 2022, the Council of the European Union approved the creation of this new fund to finance arms and equipment for the Ukrainian army, initially worth €500 million, then doubled to €1 billion on March 23 (European Council 2022a). Through further commitments in April, May, July, and October (European Council 2022b, European Council 2022c, European Council 2022d, European Council 2022f), the total EPF budget now amounts to €3.1 billion. These funds will not flow directly to the Ukrainian government, but will instead be used over a longer time period to reimburse EU member countries for the expenses of sending weapons to Ukraine. Since October, the fund additionally finances maintenance and repair of military equipment which was already donated to Ukraine under the EPF (European Council 2022f). The exact workings of this fund remain vague and little official information has been published. A recent analysis by Fotidiadis and Schmidt (2022) provides the most detailed analysis, suggesting that there is little agreement on details between EU governments, no systematic data collection, and that “decisions on reimbursement are made unanimously by member states” on a case-by-case basis. In late 2022, first reports surfaced that reimbursement shares to donor countries may have dropped significantly, reportedly from a planned 85% to 46%. Supposedly this was due to large reimbursement demands by countries like Poland, which is reported to have handed in half of all requests (Brzozowski 2022). These, however, are little more than rumors. The reimbursement process remains unclear due to a lack of official information, and we found little evidence of how and when this facility has been used in practice, with only Ireland revealing some details.¹³ We do not consider mandatory financing shares of member countries to the EPF as bilateral aid to Ukraine, but we do add the EPF pledges to total EU-level commitments. This can result in some degree of double counting in those graphs that assign EU aid to individual EU countries. Indeed, EU countries can in principle reclaim the full amount of their mandatory financing flows to the EPF fund.
- The European Union’s **Macro-Financial Assistance (MFA)** program is a vehicle to support non-EU countries that face a balance of payment crisis via loans and grants. Between 2014 and 2021, there were six MFA operations in Ukraine. On February 1, before the start of the war, the European Commission agreed to a new emergency MFA program for Ukraine of up to €1.2 billion. After the invasion, payouts were fast-tracked, with the first loan instalment of €600 million disbursed in two tranches on March 11 and 18 and the remaining €600 million on May 20 (European Commission 2022a, 2022d). Moreover, on May 18 the Commission announced a new, large-scale MFA loan called “Exceptional MFA”, of up to €9 billion (European Commission 2022c). On November 9, an additional “Macro-Financial Assistance +” package of €18 billion in loans was announced (European Commission 2022g), increasing total MFA program commitments to Ukraine to €28.2

¹³ Ireland announced to commit €33 million of its EPF contribution in-kind and directly to Ukraine, specifically for the provision of at least 10 tons of ready-to-eat meals and 200 units of body armor (See <https://www.rferl.org/a/ukraine-ireland-visit-coveney/31803832.html> and <https://www.gov.ie/en/press-release/d6856-minister-for-defence-approves-the-provision-of-specific-additional-support-to-ukraine-including-body-armour-and-meals/>). To avoid double counting we do not attribute this contribution to Ireland but rather count it as EU aid.

billion until January 15, 2023. Large parts, however, remain undisbursed, see Section 3.3. As of January 18, 2023, only €7.7 billion in MFA funds had been disbursed, through tranches in March (European Commission 2022a), May (European Commission 2022d), October (European Commission 2022f), December (European Commission 2022i) and January (European Commission 2023). We report MFA loans as part of the EU Commission and Council commitments in the main dataset.

- The **European Investment Bank (EIB)** presents itself as “the Bank of the European Union”, but is legally a separate entity from the European Commission, with its own funding and decision-making process. In March 2022, the EIB announced an emergency solidarity loan for Ukraine of €2 billion plus a humanitarian package worth €2.5 million. The €2 billion commitment includes the immediate provision of €668 million as liquidity assistance to the Ukrainian authorities, plus €1.3 billion of commitments made for infrastructure projects and reconstruction to be paid out “as soon as conditions allow”. Part of the emergency funding seems to have been committed already before the war, “originally granted to support SMEs and the agricultural sector in Ukraine”, but details are hard to find (European Union 2022). EIB commitments are listed in the main dataset and are considered part of the EU institutions commitments.
- The **EU Civil Protection Mechanism** is an instrument aimed to improve the prevention, preparedness, and response to disasters. For Ukraine, our data shows that roughly €171 million have been committed through this channel since the start of the war. Since this is a coordinating mechanism rather than a fund of its own, we attribute the aid through this instrument to the country providing aid and not to the European Commission.

We assign EU aid commitments to individual member countries in various parts of the analysis (e.g. in Figures 6, 23, 24) as follows: Commitments by the EU Commission and Council, in particular via the European Peace Facility and the Macro-Financial Assistance programs, are assigned based on each member country’s relative contribution to the EU budget in 2020 (Clark 2022). EIB commitments are assigned using each country’s weight in the EIB’s capital subscription shares as of 2012 (European Union 2012; Protocol (No. 5), Article 4).

Support by international organizations: While it is our main goal to capture bilateral support to Ukraine, we next summarize what we know about multilateral aid by international organizations (the overview here is not exhaustive):

- **IMF programs:** On March 9, the International Monetary Fund announced and disbursed an emergency assistance loan of \$1.4 billion to Ukraine under the umbrella of its Rapid Financing Instrument. The purpose is “to help meeting urgent financing needs including to mitigate the economic impact of the war” (IMF 2022a). Moreover, Canada on April 8 provided around C\$1 billion through the Administration Account (IMF 2022b). This account enables countries to provide financial assistance to Ukraine (IMF 2022b). An additional \$1.3 billion was approved on October 7 (IMF 2022c). According to the Ministry of Finance of Ukraine, the IMF has disbursed \$2.69 billion as of January 18, 2023, thus releasing its commitment under the umbrella of its Rapid Financing Instrument (Ministry of Finance of Ukraine 2023b).

- The **World Bank** mobilized a \$742 million emergency package for Ukraine in early March (World Bank 2022a). The package consists of a \$350 million concessional loan by the World Bank, grant financing of \$134 million (\$100 million by Great Britain, the rest from Denmark, Latvia, Lithuania, and Iceland), as well as loan guarantees by the Netherlands (\$89 million) and Sweden (\$50 million) and \$100 million of “parallel financing” in the form of a loan by Japan. On March 14, the World Bank provided an additional amount of \$200 million to bolster social services in Ukraine for vulnerable people (World Bank 2022b). Additional assistance amounting to \$1.49 billion (Lawder and Shalal 2022) was announced on April 12, and was approved on June 7 (World Bank 2022c). On August 8, the World Bank announced \$4.5 billion in additional financing mobilized for Ukraine under the Public Expenditures for Administrative Capacity Endurance in Ukraine (PEACE) Project, which aims to help the Government of Ukraine meet urgent needs created by the ongoing war. The financing package is comprised entirely of a \$4.5 billion grant provided by the United States (World Bank 2022d). On September 30, additional loan guarantees by the United Kingdom (\$500 million) and Denmark (\$30 million) were mobilized under the PEACE project (World Bank 2022e). According to the data provided by the Ministry of Finance of Ukraine as of January 18, 2023, \$1.39 billion out of the \$7.45 billion announced has been disbursed so far, a share of roughly 19% (Ministry of Finance of Ukraine 2023).

- On March 9, the **European Bank for Reconstruction and Development (EBRD)**, an international organization owned by European and non-European shareholder countries, announced a support package for Ukraine and neighboring countries totaling \$2 billion. The package includes deferred loans, liquidity support, and trade finance (Porter 2022), but there are few further details available. Additional planned support was announced during the G7 meeting in Petersburg on May 20, increasing the initial commitment by up to €1 billion (G7 Germany 2022). We expect this additional sum to be part of a longer-term reconstruction plan presented by the European Commission on May 18 (European Commission 2022c).

- **United Nations** programs tend to be funded by multiple donor countries and multinational institutions, thus making a distinction on direct aid to Ukraine difficult. On February 24, 2022, the Central Emergency Response Fund (CERF) was announced, a humanitarian fund established by the United Nations General Assembly but funded through voluntary contributions by individual nations and institutions (United Nations Central Emergency Fund 2023). Through the CERF, \$60 million for humanitarian assistance in Ukraine and neighboring countries has been allocated (United Nations Central Emergency Fund 2022). A further \$30 million was pledged for the Ukraine Humanitarian Fund (United Nations Office for the Coordination of Humanitarian Affairs 2023). From these packages we count \$58 million in our dataset as this amount is pledged directly for Ukraine. Additionally, the UN, together with partners, launched a so called “emergency appeal” in early March to provide emergency humanitarian assistance to people in Ukraine and refugees in neighboring countries. As of April 26, 2022, this appeal had helped to raise funds totaling \$2.24 billion (United Nations 2023), but precise information on funding and allocation of the emergency appeal is hard to find. The UN disburses additional support through packages like the World Food Program (WFP), the United Nations Development Program (UNDP) and the UN Food and Agriculture Organization (FAO) (United Nations 2023).

Donor conferences: Over the course of 2022, international donor conferences saw huge media coverage and aid announcements. We give a small summary of the biggest conferences. The bilateral aid announcements can be found in our dataset.

- **“Stand up for Ukraine” Event:** On April 9, Ursula von der Leyen, President of the European Commission, and Justin Trudeau, Prime Minister of Canada, convened the “Stand Up for Ukraine” event in Warsaw. Its aim was to raise money for refugees fleeing Ukraine and internally displaced people. The organizers state that €10.1 billion in donations were raised for Ukraine (European Commission 2022b). Some of the funds, however, had already been pledged in earlier announcements and by far the largest part will not flow to Ukraine proper, but is intended to support European countries welcoming Ukrainian refugees. In line with our approach, we count commitments that are intended to help Ukraine directly, mainly to support internally displaced people. These Ukraine-directed commitments account for €1.15 billion of the €10.1 billion total, which represents less than 10%. Specifically, we count €600 million by the European Commission, €60.6 million by Belgium, €440 million by Germany, and €53 million by Ireland. The remaining €8.95 billion are not considered bilateral aid by our definitions, since they are going to European countries receiving refugees having fled Ukraine, but not to Ukraine itself (European Commission 2022b).
- **International donors conference in Warsaw:** A second, follow-up international donors’ conference for Ukraine was arranged on May 5, but no longer under the “Stand Up for Ukraine” header. This event was co-hosted by the Prime Minister of Sweden and the Prime Minister of Poland in partnership with the Presidents of the European Council and the European Commission (Republic of Poland 2022). The conference reportedly raised around \$6.5 billion (€6.2 billion), as stated by the Polish Prime Minister in his concluding statement (Ministry of Foreign Affairs Republic of Poland 2022). Having gone through all individual commitments, we included a total of €2.33 billion pledged by individual countries and €200 million by the European Union.¹⁴ We did not include the remaining commitments of €5.19 billion because they are not directed to Ukraine but for hosting refugees outside Ukraine or for international organizations. For consistency, we also exclude aid by private corporations.¹⁵

¹⁴ Specifically, for individual countries, we included €366.2 million pledged by the U.S. Agency for International Development, €415 million by Germany, €300 million by France, €283.88 million by Japan, €256.11 million by the United Kingdom, €200 million by Italy, €100 million by Poland, €73.69 million by Canada, €70 million by Romania and Finland, €41.96 million by Austria, €37 million by Hungary, €29.77 million by Belgium, €21.76 million by Sweden, €20.82 million by Denmark, €18 million by the Czech Republic, €8.54 million by the Netherlands (€5 million financial aid and the remainder through an in-kind donation consisting of 17 ambulances), €5 million by Croatia, €2.9 million by Estonia, €2 million by Lithuania, €1.89 million by New Zealand, €1.1 million by Portugal, €1 million by Slovenia and €1 million by Luxembourg.

¹⁵ Specifically, we omitted €3.4 billion pledged by Poland for Ukrainian refugees in Poland, €300 million by Italy for Ukrainian refugees in Italy, €20 million by Google, €10 million by Latvia committed to the EBRD, €7 million by Georgia, €3 million by Iceland, Serbia, and Astra Zeneca, €1 million by Albania, €1 million by Portugal to the United Nations, €946,000 by the International Business Machine Corporation, €389,000 by Liechtenstein and €189,000 by Colombia.

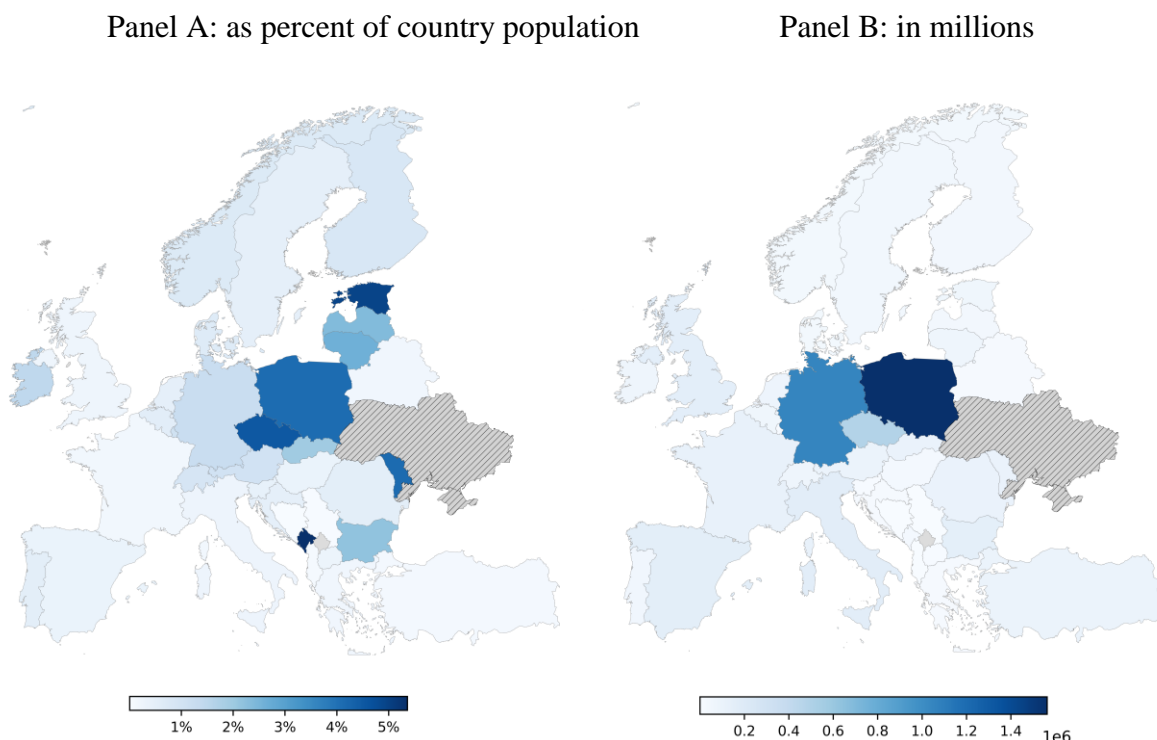
- **Ukraine Recovery Conference in Lugano:** Following the “Ukraine Reform Conferences” (URC) in London (2017), Copenhagen (2018), Toronto (2019) and Vilnius (2021), the fifth URC took place in Lugano, Switzerland, on July 4 and 5, 2022. The 2022 conference was initially supposed to focus on *Stability and Prosperity*, but was redesigned as a conference on *Reconstruction* and renamed “Ukraine Recovery Conference” (Ukraine Recovery Conference 2022a). The conference resulted in a so-called “Ukraine’s National Recovery Plan”, an agenda for a post-war reconstruction that will be coordinated by the National Recovery Council, an institution established by Ukrainian President Zelensky for this specific purpose (National Recovery Council 2022). During the conference, all 58 participating governments and international organizations reiterated their public support to Ukraine. But the new aid sums pledged fell short, at least when compared to the previous two donor conferences. Taken together, governments announced €1.58 billion in new commitments, of which we include €0.86 billion in our dataset (Ukraine Recovery Conference 2022b).¹⁶
- **Copenhagen Conference:** On August 11, 2022, the Copenhagen donor conference was organized by Denmark, the Minister of Defense of Ukraine and the United Kingdom. The aim of the meeting was to strengthen military cooperation between the European countries and Ukraine and to mobilize additional military aid for Ukraine (International Press Centre Denmark 2022)). Taken together, 26 countries attended the conference, raising total donations of €1.5 billion according to official statements (Gronholt-Pedersen 2022). In our dataset, we count €400 million of these, mainly due to a lack of transparency. In contrast to earlier conferences, no joint statement and no breakdown of donations was released. We can therefore only count those bilateral pledges that have been publicly announced in relation to this conference, namely: £250 million (around €291 million) by the United Kingdom for a weapon procurement fund (Government of United Kingdom 2022b) as well as DKK 820 million (around €110 million) pledged by Denmark for a joint procurement project of Zusana-2 howitzers (Cabinet of Denmark 2022).
- **Paris Aid Conference:** On December 13, 2022, an international aid conference took place in Paris, co-hosted by France and Ukraine, with the participation of over 70 countries and multilateral actors. The main focus was humanitarian support, including reconstruction and winter aid. In total, €1 billion in aid was announced (Irish and Rose 2022), but there is little transparency and no final statement or aid breakdown was released. We could clearly identify €125 million in humanitarian aid by France (President of France 2022), C\$115 million from Canada, €50 million from Germany (Brest 2022) and €30 million by the EU (European Commission 2022h). The sources also mention \$400 million in loans to support the Ukrainian energy system. However, we could not find additional information on these loans, in particular on whether these loans are newly pledged financial aid (fresh money) or whether these are previously committed loans that were merely repurposed for supporting Ukraine's energy grid. Given the lack of detail we could thus only count about 30% of the total claimed €1 billion raised in Paris.

¹⁶ We do not report the €50 million promised by Switzerland, since this constituted the announcement of a future commitment which was to be made by the end of the year 2023, and not a commitment in itself. We also do not report the €71 million promised by Iceland, since the country is not included in our sample.

2.5. Support for Ukrainian refugees

Russia's attack on Ukraine has caused the largest European refugee crisis since World War 2. More than 10 million Ukrainians were forced to flee their homes, and almost five million of these left Ukraine to search for refuge in other countries (Harding 2022). To count the number of refugees hosted by country, we rely on the United Nations estimates (UNHCR 2023).¹⁷ Figure 2 uses this data to show the distribution of Ukrainian refugees across Europe as of January 31, 2023. The left panel shows inflows as a share to each country's population, while the right panel shows the number of Ukrainian refugees in millions.

Figure 2. Refugees from Ukraine recorded across Europe as of January 31, 2023



Note: This figure shows the number of incoming individual Ukrainian refugees by country (right panel) and the corresponding population share in welcoming countries (left panel) between February 24 2022 and January 31, 2023. We use data from UNHCR (2023).

In absolute numbers, Poland clearly ranks first among European countries, hosting over 1.56 million Ukrainian refugees. Germany comes second with 1.06 million refugees, while the Czech Republic (486,133), Italy (169,306) and Spain (161,012) are in 3rd, 4th, and 5th place respectively. Taking into account the population size of each welcoming country, Estonia tops the list (with a share of 4.96%), the Czech Republic comes 2nd (4.54%), followed by Moldova (4.15%) and Poland (4.12%).

To account for the cost of hosting refugees we draw on the OECD Migration Report 2022, which was published in October 2022 and which provides an annual cost estimate on the total cost of hosting Ukrainian refugees for all OECD countries starting in end-February 2022 and

¹⁷ In previous releases, we have used the number of border crossings from Ukraine to estimate the total cost of hosting refugees in Ukraine's direct neighbor countries. UNHCR (2023) now also reports the (typically lower) number of recorded individual refugees for these countries, which we now use in this section.

until the end of 2022 (OECD 2022).¹⁸ The estimates build on OECD data on refugee numbers and account for the living costs, primary and secondary education costs, and healthcare costs in each country. For non-OECD countries covered in our dataset (Bulgaria, Cyprus, Malta, Turkey), we use the country-level data on refugee numbers by the UNHCR and then approximate the total cost of hosting this number of refugees by using the OECD estimates for countries with a very similar number of Ukrainian refugees.¹⁹ In Section 3.2, we add the resulting estimates on refugee costs to our main analysis, which has a relevant impact on country donor rankings.

2.6. Aid to Ukraine prior to January 24, 2022

This section offers a brief overview over bilateral assistance to Ukraine prior to the timeframe covered by our dataset, which starts on January 24, 2022. We start by summarizing the aggregate support between 2014 and 2021 and then highlight individual commitments made in early January 2022.

Support to Ukraine between 2014 and 2021: Since its independence in 1991, Ukraine has been a regular recipient of bilateral and multilateral support. Russia's occupation of Crimea in 2014 and its subsequent invasion of the Donbass motivated a new wave of commitments by Western governments, with the United States, the IMF, and EU institutions standing out (Mills 2022).

The EU institutions have been by far the largest financial supporters of Ukraine in the years 2014-2021. EU aid took the form of grants and loans for financial and humanitarian support, but included little to no military aid. The EU's scope of support was increased drastically after March 2014, following Russia's occupation of Crimea. Specifically, the EU announced a major new financial aid package of up to €11 billion to Ukraine, which was partly motivated to counter Russia's \$15 billion financial aid offer to President Yanukovich in December of 2013. That package contained €1.6 billion in MFA loans, €1.4 billion of grants, up to €8 billion in loans from the EBRD and the EIB, and potentially another €3.5 billion through the "Neighborhood Investment Facility" (European Commission 2014). Since then, total aid was further increased to a volume of €17 billion, mostly in the form of loans and including several more MFA programs (European Parliament 2023).

With a view to international financial institutions, the IMF approved several major support packages, starting with a March 2014 announcement of up to \$18 billion in new financial aid (Zachmann 2014) and a renewed IMF program in 2015. Also, the World Bank and the EBRD offered major packages.

Turning to individual countries, the US has been by far the largest bilateral supporter, including large amounts of military aid (see King 2019 for a country comparison until 2019). According to the United States' Congressional Research Service (2021), the US government has provided more than \$2.5 billion in security assistance to Ukraine between 2014 and 2021, mainly through the Ukraine Security Assistance Initiative and Foreign Military Financing. In addition, the US Department of State and USAID provided more than \$3 billion in bilateral, non-military aid

¹⁸ The time period covered by the OECD Migration Report data (February to December 2022) does not perfectly coincide with that of our dataset (end-January 2022 to mid-January 2023). We nevertheless rely on this data, as these are the most comprehensive estimates available and because the discrepancy is only a few weeks.

¹⁹ Specifically, for Cyprus we approximate the costs using the OECD cost estimate for Croatia, for Malta we use the estimates for Luxembourg, and for Bulgaria and Turkey we use the estimates for the UK. Changing the counterfactual countries does not alter the overall results much.

since 2014. Other important bilateral supporters include Germany with more than €2 billion (Government of Germany 2022a) and Canada with around C\$890 million (Government of Canada 2022e).

Commitments in January 2022: In the three weeks of 2022, prior to January 24 when our tracking starts, there have been few aid announcements. In total, we quantify aid worth €273 million in January 2022. This amount was entirely committed by Canada, with military aid worth €238 million for military assistance and for the extension and expansion of Operation UNIFIER, and humanitarian aid worth €35 million for funding humanitarian and developmental assistance (Government of Canada 2022b). Moreover, on January 21, Canada announced a loan of up to C\$120 million and a technical assistance grant of up to C\$6 million (Government of Canada 2022a), however the issued amount was extended mid-February to C\$500 million, leading to a classification as February aid. On January 17, the British government signaled its intention to supply military equipment and weapon systems to the Ukrainian Armed Forces, including 2,000 new light anti-tank weapons. This first, vague statement was followed by a more credible announcement on February 1, which is the day we assign this pledge to (Allison 2022, Government of United Kingdom 2022a).

2.7. Special cases: Unites States and Germany (“Circle Exchange”)

In this section we delve into special cases, in particular the complicated anatomy of US aid, as well as so called “circle exchange” schemes for weapons that have mainly been arranged by Germany.

United States: The United States is a large and transparent donor, but the timing, structure, and size of US commitments can be confusing, which can result in contradictory press coverage. The US is a special case because it can only provide relevant amounts of military and financial aid overseas through an act from Congress. For Ukraine, this resulted in four pieces of legislation: two so-called “Ukraine Supplemental Appropriations Acts” (March 2022 and September 2022) which were each complemented by a so called “Additional Ukraine Supplemental Appropriations Act” (May 2022 and December 2022). As a general rule, the appropriated budgets can only be spent during the respective fiscal year, which starts on October 1 and ends on September 30 (unless otherwise specified in the law). A more detailed look into each act can be found in Appendix I.

A first challenge is that the volume of US aid reported in the press is often inflated. This is because there is a large difference between actual commitments to Ukraine and the official headline numbers or the sum of all positions in each act. Indeed, if we sum up all individual positions in the four acts, we get to a total of \$144.49 billion. Other US sources, like the CSIS (Cancian 2023) and the Congressional Research Service (2023c) report a total of \$113 billion in total funding covered in the acts. The difference between these two amounts arises from certain positions that require corrections as they would otherwise appear multiple times. An example for that would be the entry “Replenishment of US stocks”, which is a budget to refill US equipment stocks that was sent to Ukraine via “Presidential Drawdown Authority.” Both entries are listed with funding in the acts, but essentially handle similar matters. After correcting for these positions, we get to roughly \$113 billion, the amount that is also references by the CSIS (Cancian 2023) and the Congressional Research Service (2023c).

However, a large portion of the \$113 billion will not flow directly to Ukraine but are instead allocated towards a broad variety of spending purposes. Examples include spending for

preemptive natural disaster funds, research on military or nuclear purposes, the prevention of terrorism and cybercrime, national infrastructure investments, large-scale purchases of military goods intended to remain in the US (not for the Presidential Drawdown Authority), or funds devoted to host Ukrainian refugees in the US. We also do not count almost \$17 billion earmarked for European Command operations in support of US troops and US operations, as well as more than €5 billion earmarked for neighboring countries but not Ukraine. In a further step, we dropped \$11.98 billion in commitments that were unused and therefore expired with the end of the fiscal year on September 31st 2022. A detailed overview on which exact positions we count can be found in the “Summary of US acts” sheet in the dataset. Finally, we are left with \$76.25 billion, which is roughly \$590 million less than the amount we report as US aid in the dataset (\$76.84 billion or €73.18 billion).²⁰ To stick to our upper bound approach, we do not correct for this amount and continue to use the \$76.84 billion.

A second challenge is that the White House regularly announces new commitments which, however, are not really new but are instead drawdowns of aid that had already been committed earlier, in the respective Congressional acts. The reason for the confusion is the so-called *Presidential Drawdown Authority*. Through this scheme, US Congress gives the US President the authority to transfer military equipment and weapons to foreign allies up to a predefined maximum value. This includes military assistance/services and the delivery of weapons from Department of Defense stocks (Congressional Research Service 2022, see also US Foreign Assistance Act of 1961).

The drawdowns for Ukraine have been frequent and many of them triggered a news announcement. Specifically, over the past year and a half (between August 27, 2021 and January 15, 2023) 29 drawdowns occurred, with a total value of \$15.58 billion (Congressional Research Service 2023b):

- 19 drawdowns took place in the fiscal year 2022, between January 24 and September 30, 2022, with a total volume of \$9.025 billion.²¹
- 8 occurred in the fiscal year 2023 thus far (October 2022 – January 15, 2023). The value of these drawdowns sums up to \$6.55 billion, out of \$14.5 billion in appropriations for 2023 (which could be spent until September 30, 2023)
- 2 drawdowns occurred prior to the start of this database (August & December 2021).

Besides these drawdowns, US aid to Ukraine goes through the following main vehicles:

- The Ukraine Security Assistance Initiative (USAI) program provides training, equipment and other services to enhance Ukraine’s defensive capabilities (Congressional Research Service 2023b). Between February 2022 and January 2023, four packages of USAI have been appropriated for Ukraine. The used USAI funds amount to \$7.55 billion, out of total USAI commitments of \$18.3. This means that, as of January 2023, more than \$10 billion of Ukraine-related USAI funds remain unused.

²⁰ This difference might be caused by the appropriated but ultimately unused US budgets for humanitarian aid in the fiscal year 2022. It is not entirely clear which of the smaller positions have not been used, or only partially disbursed. Due to this uncertainty, we keep these positions in our dataset, most likely overestimating US bilateral aid, but being consistent with our general approach.

²¹ More precisely, US Congress had appropriated \$10.8 billion for the fiscal year 2022, but only \$9.025 billion were ultimately drawn down until September 30. The difference of \$1.775 billion expired and can therefore no longer be counted as US commitments to Ukraine.

- The Foreign Military Financing (FMF) program allows partner nations to either purchase U.S. defense articles or services and trainings (Defense Security Cooperation Agency). According to the Congressional Research Service (2023b), \$1.547 billion FMF funds have been used for Ukraine in the fiscal years 2022 and 2023, out of total potential Ukraine-related FMF commitments of \$4.73 billion (\$3.18 billion remain unused).
- US financial aid: Like military aid, financial aid to Ukraine is committed through the Ukraine Appropriation Acts. Under these acts the financial aid to Ukraine takes the form of budget support, i.e. loans and grants to the Ukrainian government. In practice, the US Agency for International Development (USAID) mainly extends grants (not to be paid back) via the World Bank. In total, the US has so far committed \$22.9 billion, out of \$26.37 billion of announced direct financial support (Congressional Research Service 2023a).
- US humanitarian aid: US humanitarian aid is granted through the US Agency for International Development (USAID) as well as through the State Department. Between January 24, 2022 and January 15, 2023, the US has so far disbursed humanitarian aid worth \$3.9 billion, out of total commitments of \$16.64 billion.

Germany: Germany’s aid to Ukraine can be confusing due to the government’s communication strategy and schemes such as the “Ringtausch” (circle exchange) or the “Ertüchtigungshilfe”, a special weapon purchase vehicle. In the first months, the German government was opaque about its commitments, but transparency has improved. Indeed, in June of 2022, the government published a detailed and frequently updated list of military aid items²² and in December 2022 it published a broader overview document across aid types. In total, we track €6.15 billion of bilateral support by Germany, consisting of €2.36 billion in military aid, €2.5 billion in humanitarian aid, and €1.3 in financial aid.

The explanation here focuses on the intricacies of Germany’s military aid, which has three main parts. The first is the so called “Ertüchtigungshilfe”, a weapon purchase funding vehicle to enable partner countries, like Ukraine, to acquire weapons from the German defense industry. The funds provided to Ukraine were initially announced as €1.2 billion (Tagesschau 2022a). As of December 5, 2022, the government reports a total value of €1.36 billion in “Ertüchtigungshilfe” intended for Ukraine, which is the value we include in our database (Government of Germany 2022d).

The second part of Germany’s military aid are shipments from Bundeswehr stocks (German Armed Forces). To value these shipments, the government uses current values or time values using predetermined depreciation rates.²³ This is likely to result in underreporting, as the value of weapons that are 20 or more years old will be very low, often a fraction of their replacement or market values. In December, the government cited the Bundeswehr stock shipments to Ukraine to be worth €534 million (Government of Germany 2022d). To be methodologically consistent, we use that number in the current update of our database (for Bundeswehr stocks

²² See <https://www.bundesregierung.de/breg-en/news/military-support-ukraine-2054992>.

²³ Specifically, the website says ”The values stated for used material from the German Armed Forces are also based on current values which can be significantly lower than the corresponding values for new or replacement goods.”

January to December 22).²⁴ However, we are aware that this is unsatisfactory, since the market value of the shipped items is certainly higher.²⁵

At the same time, it was difficult to estimate our own reliable value of German military aid, because the government does not provide details on its calculations. We do not know how individual weapons are valued, which depreciation rates are used, and we also lack details on the number or important items sent, in particular on the scope of ammunition provided for the high-value MARS II and IRIS-T systems. To inform parliament, the government also provides a “license value” for all military goods exported to Ukraine in 2022, but that number is no less confusing. The disclaimer explains that the value includes some goods from the government's military aid list, but not all, with no indication which items are counted and which ones are not.²⁶ Moreover, the “license value” also covers arms exports to Ukraine from commercial contracts, again without further details. All of this makes replication and benchmarking for the case of German military aid difficult.

Circle exchange (“Ringtausch”) schemes: Over the course of 2022, several governments, in particular that of Germany, have announced weapon replacement arrangements, which have become known as “Ringtausch” or “circle exchange” in the German debate. In essence, these schemes envisage countries delivering weapons to Ukraine to receive replacement weapons or reimbursement funds. On the European level this takes the form of the European Peace Facility (EPF). For Germany, the scheme meant that countries like Slovakia or Slovenia would send their old, Soviet-era tanks or fighting vehicles to Ukraine and would receive replacements from Germany in the form of Western weapons.

From public sources, we identify four German-led weapon replacements as well as a scheme led by the US and the UK each (not listed here).²⁷

²⁴ Military in-kind items committed between December 5, 2022 and January 15, 2023 are valued based on our own estimates, since no official value is given for them.

²⁵ Our own, imperfect, “bottom up” estimate on the value of all Bundeswehr stocks committed in 2022 is €1.22 billion compared to the official estimate of just €534 million (Government of Germany 2022d). This large difference is likely due to the fact that we use upper-bound prices from current contracts and marketplaces rather than heavily-depreciated values as the Bundeswehr does.

²⁶ Specifically, the website states that “The total license value includes the goods listed above insofar as their export is subject to licensing requirements under German foreign trade laws. This is not the case for all of the goods listed above. In order to speed up the processing of certain deliveries, the Federal Government has also eased certain licensing processes, e.g. with regard to military protective goods. These deliveries are also not included in the total license value.”

²⁷ These include the following. First, the British-Polish exchange in which Poland announced to send an undisclosed amount of T72 tanks to Ukraine and in return received Challenger 2 tanks as replacement. The scheme was announced in April 2022, but no further details could be found (Grylls and Swinford 2022, Adamowski 2022). Second, the US-Slovakia exchange in which a S-300 Soviet-era air defense system was sent to Ukraine by Slovakia, while the US sent one battery of their Patriot systems to Slovakia as a replacement (Higgins 2022). Next to these cases, the US provides significant assistance to numerous states within the Foreign Military Financing framework, which, however, are not to be confused with direct reimbursement or “Ringtausch” schemes.

- Germany-Slovakia exchange (30 BMP-1 Infantry fighting vehicles (IFV) to Ukraine replaced by 15 Leopard 2A4 tanks from Germany): At the end of April, Germany announced a weapon swap with Slovakia. According to the initial plan, Slovakia would have received 15 German Leopard 2A4 as a replacement for 30 T-72 tanks sent to Ukraine. However, it took until the end of August to reach a final deal. Ultimately, Slovakia agreed to send 30 BMP-1 IFVs to Ukraine (Galeon 2022) and is reimbursed with 15 Leopard 2A4 tanks including ammunition, training, and logistic services (German Ministry of Defense 2022a).
- Germany-Slovenia exchange (28 M-55S tanks to Ukraine replaced with 40 army trucks from Germany): The first details on this scheme became public on May 6th, when the Slovenian government announced to send 30 T-72 tanks and 35 BMP-1 tanks to Ukraine in exchange for adequate replacements provided by Germany (Gebauer and von Hammerstein 2022). After months of negotiations, a letter of intent was signed between both governments in September 2022. Slovenia agreed to send 28 M-55S main battle tanks, a modified version of the Soviet-style T-55 tank, to Ukraine (Government of Slovenia 2022) and will be reimbursed with 40 army trucks of the model “15t mil gl MULTI” of which 5 are equipped with fuel containers (German Ministry of Defense 2022b).
- Germany-Czech Republic (Undisclosed number of T-72 tanks replaced with 14 Leopard 2A4 tanks and one armored recovery vehicle Büffel from Germany): The initial scheme was proposed in May 2022, when the Czech Republic announced to send at least 12 T-72 tanks and 5 BPM-1 infantry fighting vehicles to Ukraine and Germany offered 15 Leopard 2A4 tanks as replacement (Tagesschau 2022b). Ultimately, it took until October for the German delivery to take place, in the form of 14 Leopard 2A4 main battle tanks as well as one Advanced Recovery Vehicle Büffel. However, the final number of Czech T-72 tanks sent as part of the scheme remains undisclosed (Ministry of Defense and Armed Forces of the Czech Republic 2022). Reliable sources suggest that the Czech Republic has delivered a total of 40 T-72 tanks in April (Roblin 2022), which is the upper bound.
- Germany-Greece exchange (40 BMP-1 IFVs replaced with 40 Marder IFV from Germany): On May 31 2022, it was announced that Greece would send Soviet-style weapons in exchange of German infantry fighting vehicles (Reuters 2022). In September, the German Ministry of Defense announced it would reimburse 40 delivered Greece BMP-1 IFV (The National Herald 2023) with 40 Marder IFV (German Ministry of Defense 2022c).

Given the low number of weapons exchanged in these schemes, the German “Ringtausch” is of minor relevance in the bigger picture of military aid to Ukraine. We estimate that the total value of weapons sent to Ukraine as part of German “Ringtausch” is between €82 and €127 million (depending on whether we assume 12 or 40 T-72 tanks sent by the Czech Rep.), while the total value of German replacements is estimated at €90 million. In more detail, we checked how country commitment numbers change depending on whether and how we count the “Ringtausch” deals. For example, we can treat Germany’s donations to Slovakia, Slovenia, Greece and the Czech Republic as additional aid in the context of the Ukraine war and thus add it to Germany’s total military aid commitments for Ukraine. Doing so changes little, however, with an increase of just 4% in total German military commitments. The impact is somewhat larger if we subtract the value of the replacement items by Germany from each of the Eastern European partner country's aid to Ukraine. Doing so reduces Slovakia's total military aid

commitments by 13%, Slovenia's by 24%, Greece's by 11%, and the Czech Republic's by 6%. The resulting country rankings change little or not at all.

2.8. Benchmarking our coding results

To check the quality and reliability of our data collection and aid valuation, we conducted a series of benchmarking exercises. This section summarizes the most important cases, in particular those in which we could benchmark our own estimates against newly released information of large countries or country groups:

May 2022 – the G7 publishes data on total financial aid: On May 20, 2022, the G7 finance ministers and central bank governors issued a press release stating that the G7 had committed a total of €19.8 billion in financial support to Ukraine during 2022 (G7 Germany 2022). This compares to our own estimate of G7 financial commitments of €19.13 billion at the time, which comes close. Specifically, as of May 20, we had counted €11.15 billion in financial aid by the United States, €2.33 billion by the United Kingdom, €1.89 billion by France, €1.46 by Canada, €1.37 billion by Germany, €602.3 million by Japan and €325.5 million by Italy. Section 3.3 contains a more granular overview on financial aid, focusing on budgetary support and comparing commitments and disbursements.

June 2022 – Germany publishes a detailed list of military donations: On June 21, the German government published a detailed list of military items sent or committed to Ukraine. This offered an ideal opportunity for benchmarking purposes. Prior to June 21, the government had refused to provide details of its military aid to Ukraine, pointing to security concerns. Given the opacity, we had therefore counted and quantified Germany's military commitments using the approach described above, i.e. by pulling together political statements, media reports or press leaks, such as the detailed list published by Der Spiegel of March 24 (Gebauer and von Hammerstein 2022). The comparison of mid-June showed that our database covered 85.9% of the items already sent to Ukraine as well as 75.1% of additional items that had been committed more recently. Most importantly, our dataset covered all large military items of relevance, namely all infantry weapons and heavy weapons promised or sent to Ukraine. Among the items we missed are vehicles such as pick-ups as well as a range of smaller or low-value items such as personal equipment, tents, or OP-lights. Overall, this check suggests that our approach yields a satisfactory data coverage even for those countries that are non-transparent.

November 2022 – The European Union provides an estimate of EU military aid: In mid-November, Josep Borrell, the High Representative of the European Union for Foreign Affairs and Security Policy, communicated the first aggregate estimate of EU-wide military aid. His statement reads as follows: “I asked my military staff to do the best estimation of which is the amount of our military support to Ukraine, and I can advance a figure that tomorrow will be discussed with the Defense Ministers. I think I can say that at least €8 billion in military equipment have already been provided to Ukraine by the European Union and the Member States.” (European Union External Action Service 2022). This estimate of “at least” €8 billion is very close to our own estimate at the time. Specifically, as of November 20, we counted €8.61 billion in total military aid from EU countries and institutions. This result is reassuring and suggests that we are not systematically under-estimating the true scope of European military aid, despite the lack of details on military support by some member countries such as France, Italy, or Spain.

December 2022 – Germany publishes the total value of its military, humanitarian and financial aid: On December 27, 2022, Germany released a detailed report on its entire aid to Ukraine, covering commitments across all ministries and government agencies (Government of Germany 2022d). Besides its comprehensiveness in terms of items, an important novelty of this report is that it contains information on the value of the government’s military, humanitarian and financial aid, which is ideal for benchmarking purposes. The government quantifies its total bilateral aid at €5.01 billion as of December 5 (the report also adds EU aid and aid to neighboring countries, which is not the focus here). This official estimate of €5.01 billion is not far from our own estimate of German bilateral aid which is €5.58 billion (a difference of 10%). The likely explanation for the discrepancy is that we double-counted some positions that are first committed as part of a large aid package (e.g. during the “Stand Up for Ukraine” event) but are then communicated again as separate new commitments. This type of double-counting is especially likely for humanitarian aid, as the underlying official statements are often ambiguous and conflicting. Indeed, not even the detailed December 2022 list is sufficiently clear to disentangle the scale and sequencing of Germany’s humanitarian aid pledges. All in all, however, we view the result of this benchmarking exercise as reassuring given the complexity and the large number of German donations (the government report extends over 20 pages while our database contains more than 140 entries for Germany alone).

January 2023 – benchmarking the value of US military commitments: The case of US military aid offers an excellent opportunity to check whether our approach to value military goods is appropriate. For this benchmarking exercise we compare the total value of US military aid given by the US Department of State and the Congressional Research Service (CRS) with the total value estimated “bottom up” by us, i.e. using the detailed lists of US weapon commitments in combination with our own prices and valuation approach.

The CSR values the US in-kind military contributions between February 24, 2022 and January 26, 2023 at \$27.1 billion total, while the US Department of State claims “approximately \$27.2 billion” at the end of January 2023 (US Department of State 2023). This sum compares to our own “bottom up” estimate of \$24.53 billion for total US military aid between February 24, 2022 and January 15, 2023, i.e. using our own valuations across listed US items. The difference of approximately \$2.6 billion can be explained by a large new drawdown of \$2.5 billion on January 19th, 2023, a few days after our coverage period ends. Once we subtract that \$2.5 billion package from the CSR total, the numbers are \$24.6 billion (official US source) versus \$24.53 (our own estimates). We thus underestimate total US military aid by about \$100 million, or 0.4% of total. This shows that our valuation approach produces reasonable results for transparent donors with detailed donation lists.

3. Main results: international comparisons

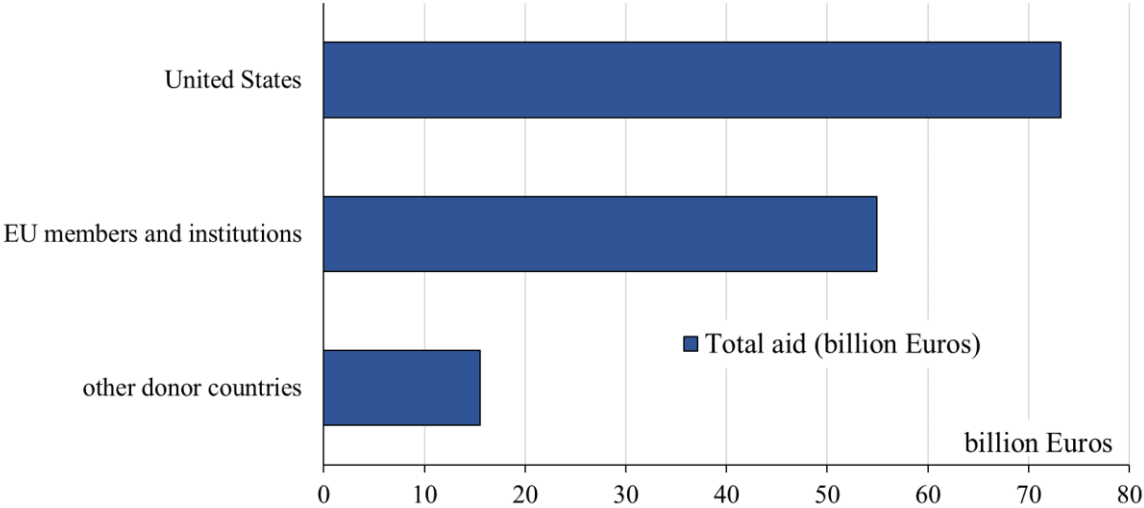
This section provides a comprehensive international comparison of aid to Ukraine. We summarize the main results on bilateral aid from our dataset and compare the contributions by donor countries in both absolute and relative terms.

3.1. Overview: all aid types

In total, our main database tracks €143.63 billion of humanitarian, military, and financial commitments made between January 24, 2022 and January 15, 2023 by 41 donors.

In Figure 3, we compare the size of total commitments to Ukraine across the US, the EU members and institutions, and the remaining countries we cover (in billion Euros).

Figure 3. Aid commitments to Ukraine across donor groups (billion Euros)
total bilateral commitments January 24, 2022, to January 15, 2023

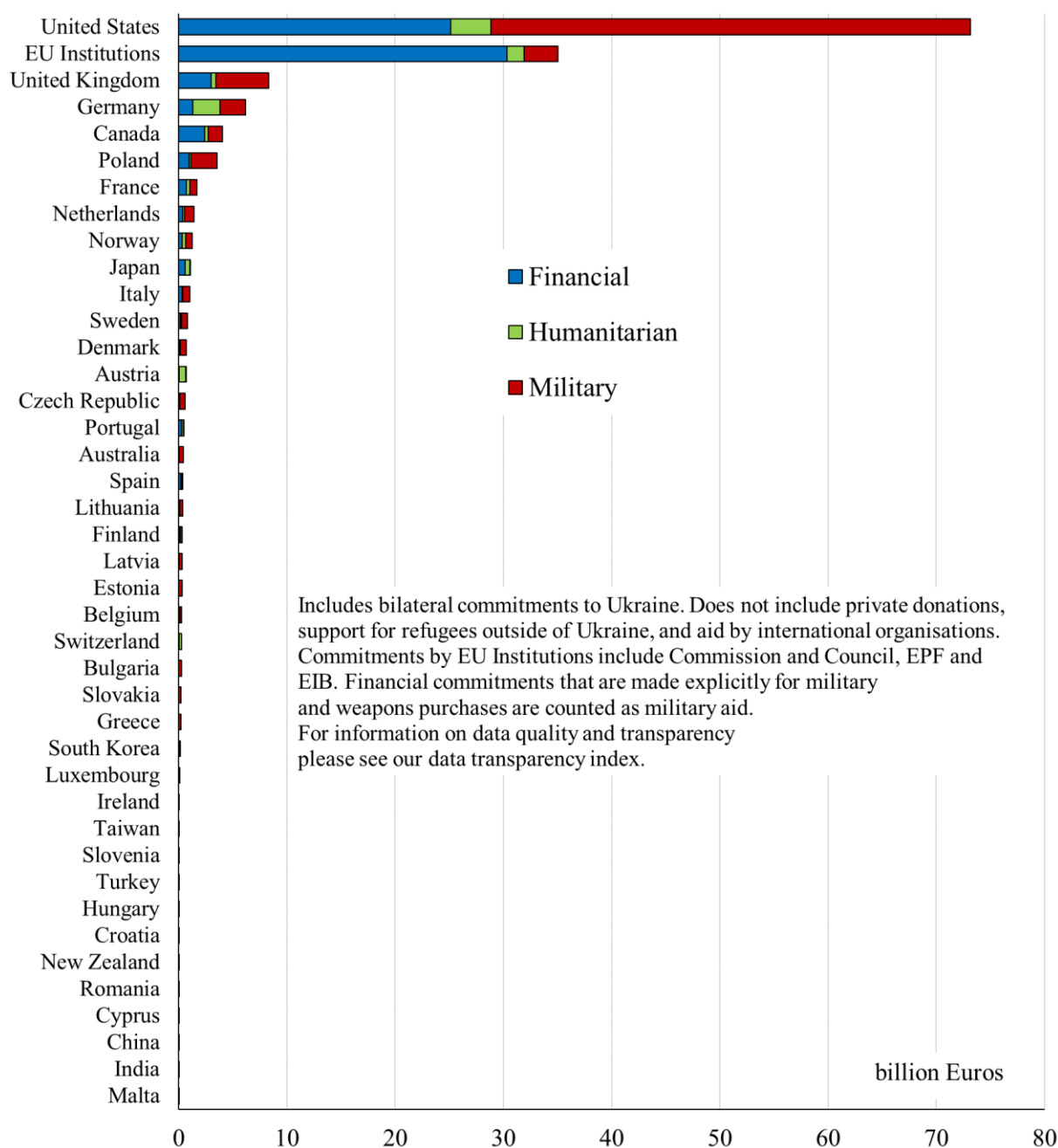


Note: This figure shows total bilateral aid commitments to Ukraine in billion Euros across different donor groups between January 24, 2022 and January 15, 2023. Other donor countries include the Anglo-Saxon countries (except the US), as well as China, Japan, South Korea, Taiwan, Turkey, Norway, Switzerland, and India.

The United States government is by far the largest bilateral donor to the Ukraine, committing a total of €73.18 billion. This is considerably more than the combined commitments by all EU member countries and EU institutions, namely €54.92 billion. This sum consists of €19.9 billion in bilateral commitments from individual EU countries plus €29.92 billion from the EU Commission and Council. The EU-level aid again can further be broken down to €28.32 billion commitments via the Macro-Financial Assistance (MFA) program, €3.1 billion from the European Peace Facility (EPF), and €2 billion by the European Investment Bank (EIB).

“Other” donor countries, beyond the EU and the US, committed a total of €16.1 billion according to our data, with most of that coming from the UK (€8.31 billion) and Canada (€4.02 billion).

Figure 4. Total bilateral commitments - by type of assistance (billion Euros)
bilateral commitments January 24, 2022, to January 15, 2023

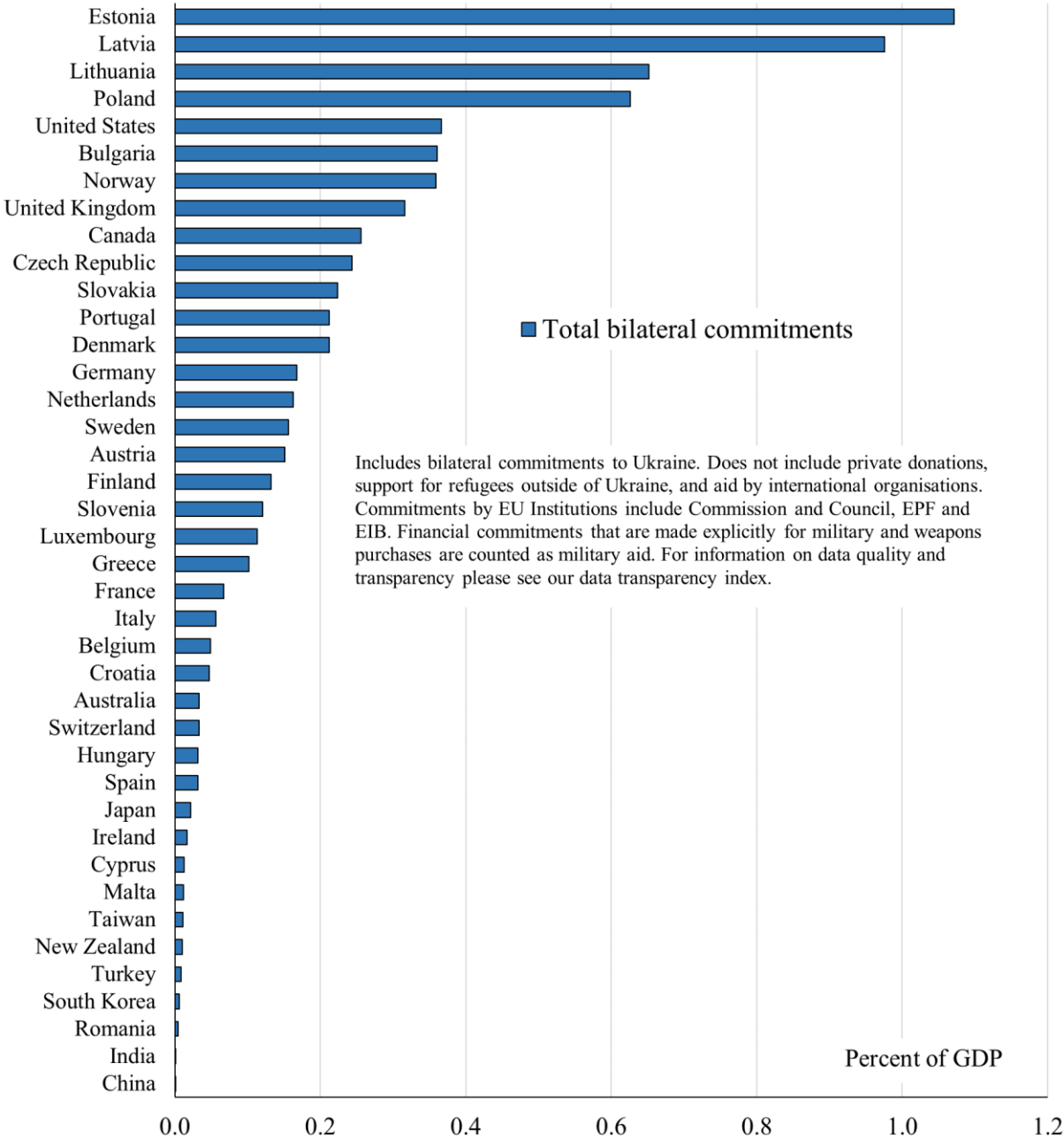


Note: This figure shows total bilateral aid commitments to Ukraine across donors in billion Euros, covering aid announcements between January 24, 2022 to January 15, 2023. Each bar shows the type of assistance, i.e., financial (blue), humanitarian (green), and military (red) aid. Cost estimates for hosting refugees are added in Figure 7 below.

In Figure 4, we focus on individual donors, ranking countries by their total bilateral commitments. We also differentiate by type of aid. The United States clearly remains the largest donor to Ukraine. Next come the EU institutions (€35.02 billion, mostly MFA, EPF and EIB commitments) and the UK (€8.31 billion). Germany is the largest EU donor (€6.15 billion) followed by Poland (€3.56 billion), which has delivered a large amount of military aid. In addition, Poland has welcomed millions of Ukrainian refugees and adding those costs brings Poland to third place in absolute terms, with almost €12 billion in support (Figure 7 below).

As a next step, we scale bilateral aid commitments by donor country GDP (in percent) to account for the size of each country’s economy.

Figure 5. Bilateral commitments in percent of donor country GDP
bilateral commitments January 24, 2022, to January 15, 2023



Note: This figure shows total bilateral aid commitments to Ukraine in percent of donor country GDP. GDP data for 2021 is from the World Bank.

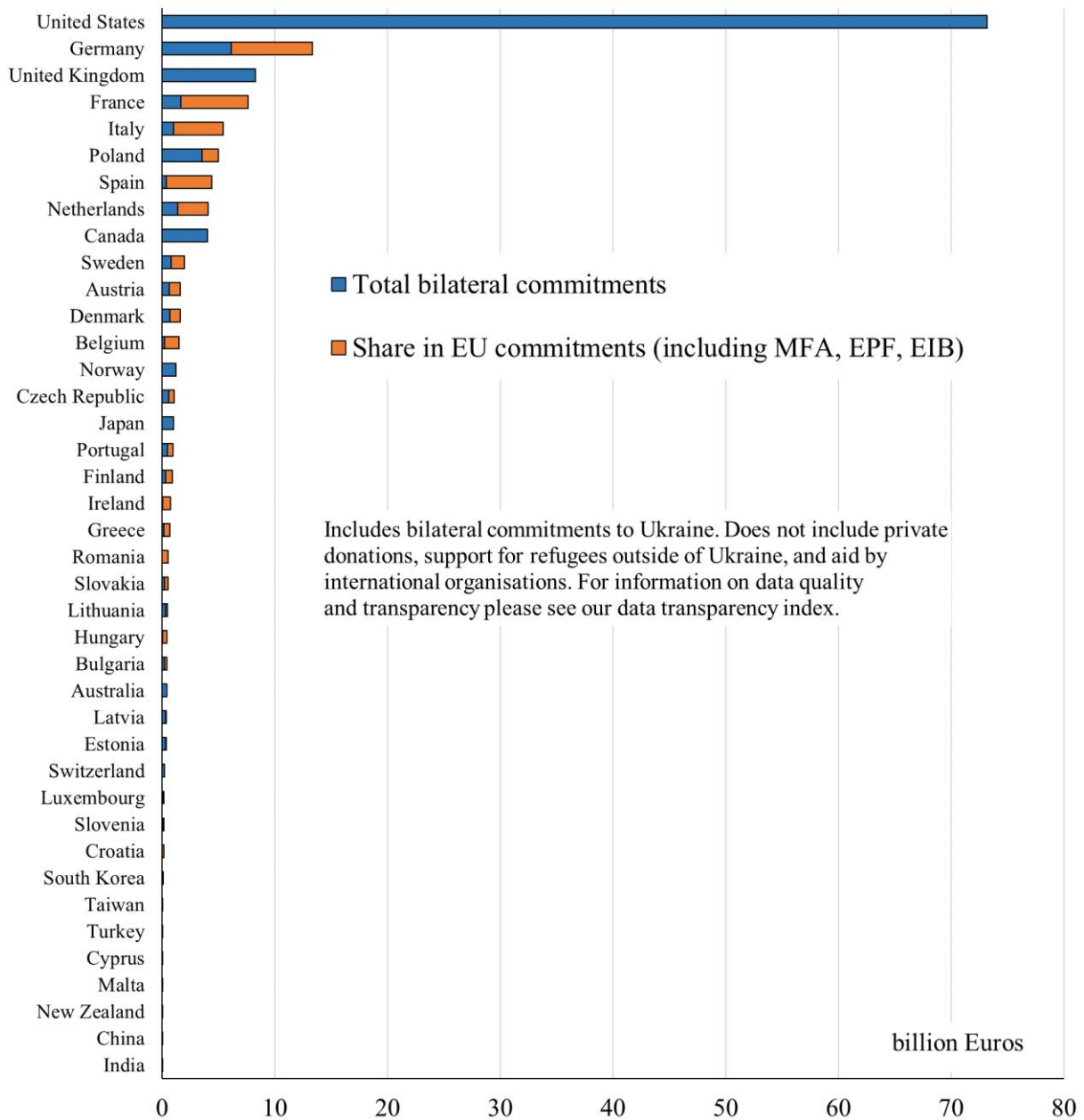
Figure 5 shows that Eastern European countries stand out as particularly generous when considering the size of their economy. Estonia, Latvia, Lithuania, and Poland are the leading donors. The United States comes in 5th, with total commitments worth around 0.37 percent of its 2021 GDP. Given the large size of the US economy, it is striking that the United States is among the top donors both in absolute and relative terms.

In Figure 6, we take a different approach than in our baseline Figure 4 by reassigning EU commitments to each of the EU member countries. This means that we no longer show the large donor bar for “EU Institutions” as in Figure 4 but instead allot EU commitments across EU countries using each member country’s relative contribution to the EU budget in 2020 or EIB subscription shares (see Section 2.4 for details).

Overall, the patterns of Figure 6 look similar to the baseline Figure 4, albeit some of the larger and richer countries, such as France, Italy, or Spain, move up the ranking once we assign EU-level aid by country. We further complement this overview with Figure A2 in the Appendix I, which shows total (bilateral + EU) commitments as share of donor country GDP.

When adding EU aid, the US remains the largest individual donor (€73.18 billion), but European countries see a significant increase in contributions. Germany moves to 2nd place (€13.33 billion), followed by the UK (€8.31 billion), France (€7.66 billion), Italy (€5.44 billion), and Poland (€5.02 billion). Spain has pledged very limited bilateral aid, but moves from 18th to 7th place when taking its indirect contributions through the EU into account. Notably, we observe that only six EU countries, namely Poland, the Czech Republic, Lithuania, Bulgaria, Latvia, and Estonia, committed more to Ukraine through direct bilateral aid than through EU aid shares. On average, EU countries commit €737 million bilaterally, but almost 1.8 times as much – €1.3 billion – through the EU.

Figure 6. Reassigning EU-level aid to individual EU countries - totals (billion Euros)
bilateral plus EU commitments January 24, 2022 to January 15, 2023



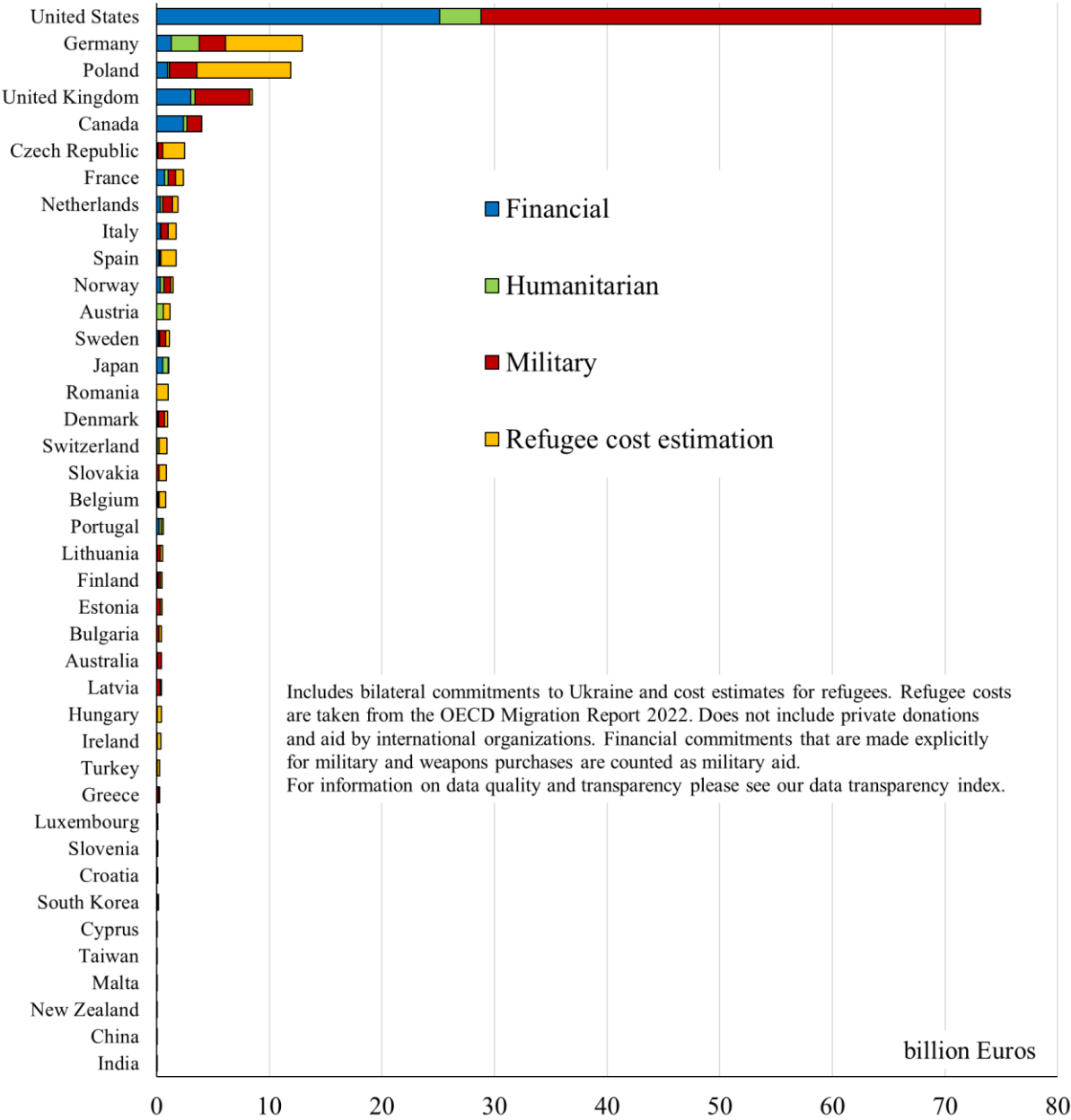
Note: This figure (on aid in billion Euros) builds on the main Figure 4 but assigns EU-level commitments to each EU country using their respective EU shares. We no longer show the donor bar for “EU Institutions” as in Figure 4 and instead allot EU commitments across EU countries as follows: EU commitments are assigned based on each member country’s relative contribution to the EU budget. EIB commitments are assigned using each country’s weight in the EIB’s capital subscription.

3.2. Adding refugee support

In a next step we account for humanitarian support by hosting large numbers of Ukrainian refugees using the data and refugees cost estimates from the UNCR and OECD, as described in Section 2.5. We start by adding estimated refugee costs in billions of Euros (Figure 7) and then show results with refugee costs as percent of donor country GDP (Figure 8).

The United States remains in first place (€73.18 billion), now followed by Germany with €12.96 billion (incl. €6.81 billion in refugee costs) and Poland with €11.92 billion total (incl. €8.36 billion in refugee costs). Also, the Czech Republic moves up to 6th place, with estimated costs of €1.96 billion for hosting refugees.

Figure 7. Total bilateral commitments plus refugee costs (billion Euros)
bilateral commitments January 24, 2022, to January 15, 2023



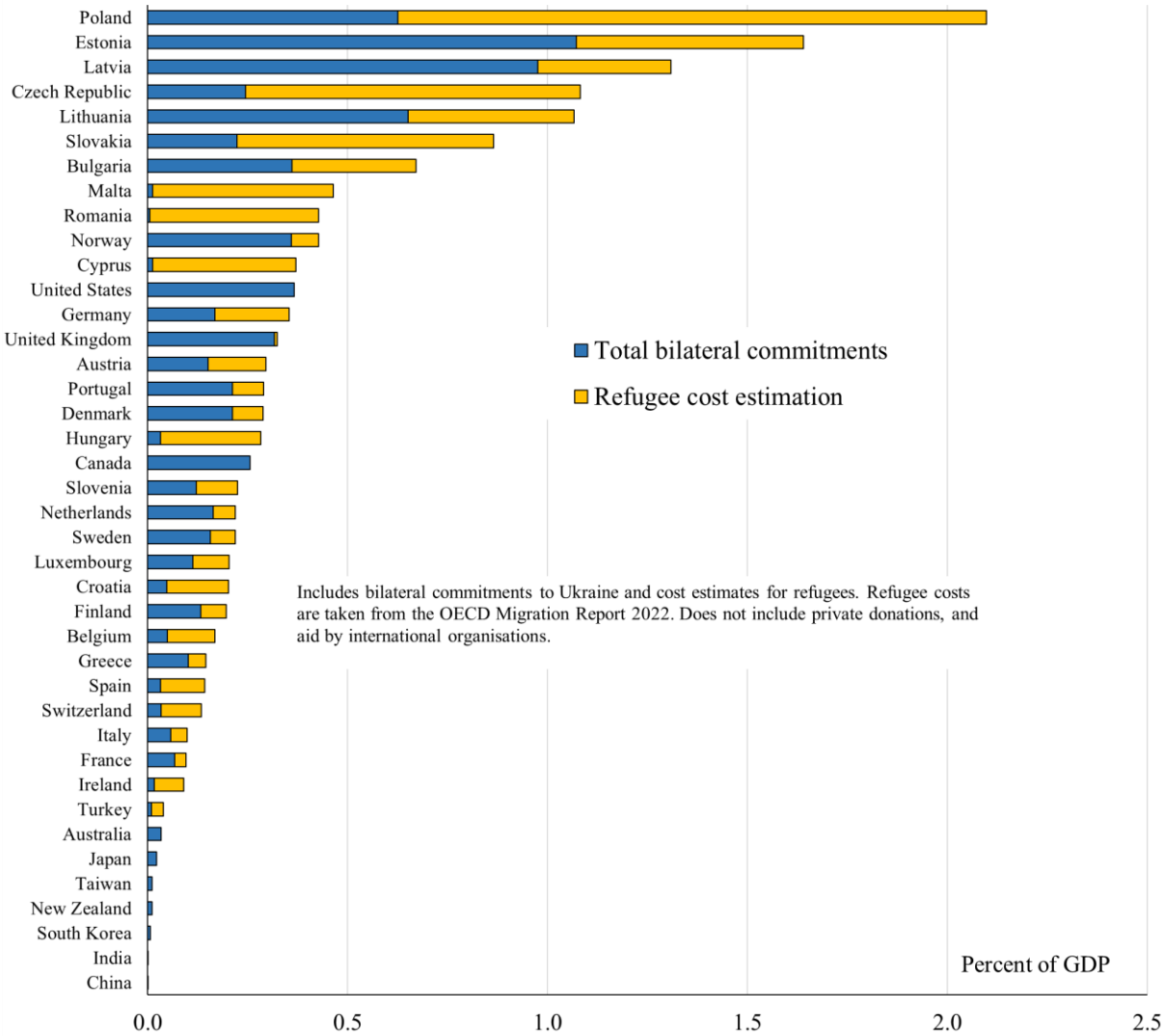
Note: This figure (on bilateral aid in billion Euros) complements the main Figure 4 by adding the estimated costs of hosting Ukrainian refugees as provided by the OECD Migration Outlook 2022.

It is important to point out that governments can receive compensation for their refugee expenses through a variety of external sources, be it multi- or bilateral. These commitments are difficult to track and do not constitute bilateral aid to Ukraine, which is why we do not incorporate them into this analysis. Moreover, as mentioned above, much of the help to Ukrainian refugees abroad is in-kind and incurred by private households rather than

governments, and the available statistics on fiscal expenses on Ukrainian refugees are imperfect. In the following, we therefore use cost estimates by the OECD, as explained in Section 2.5.

In Figure 8, we scale commitments including refugee costs by the donor country’s GDP. Compared to Figure 5 above, the upper part of the ranking does not change much. Poland is now on top of the list, with total support corresponding to 2.1% of its GDP. Estonia and Latvia are second and third, with commitments totaling 1.64% and 1.31% of GDP, respectively. The rank change is largest for those countries that sent only limited bilateral aid to Ukraine, but received large numbers of Ukrainian refugees. Examples are Cyprus, Hungary, Malta or Romania for which total refugee costs are a multiple of other support.

Figure 8. Total bilateral commitments plus refugee costs (percent of GDP)
commitments January 24, 2022 to January 15, 2023

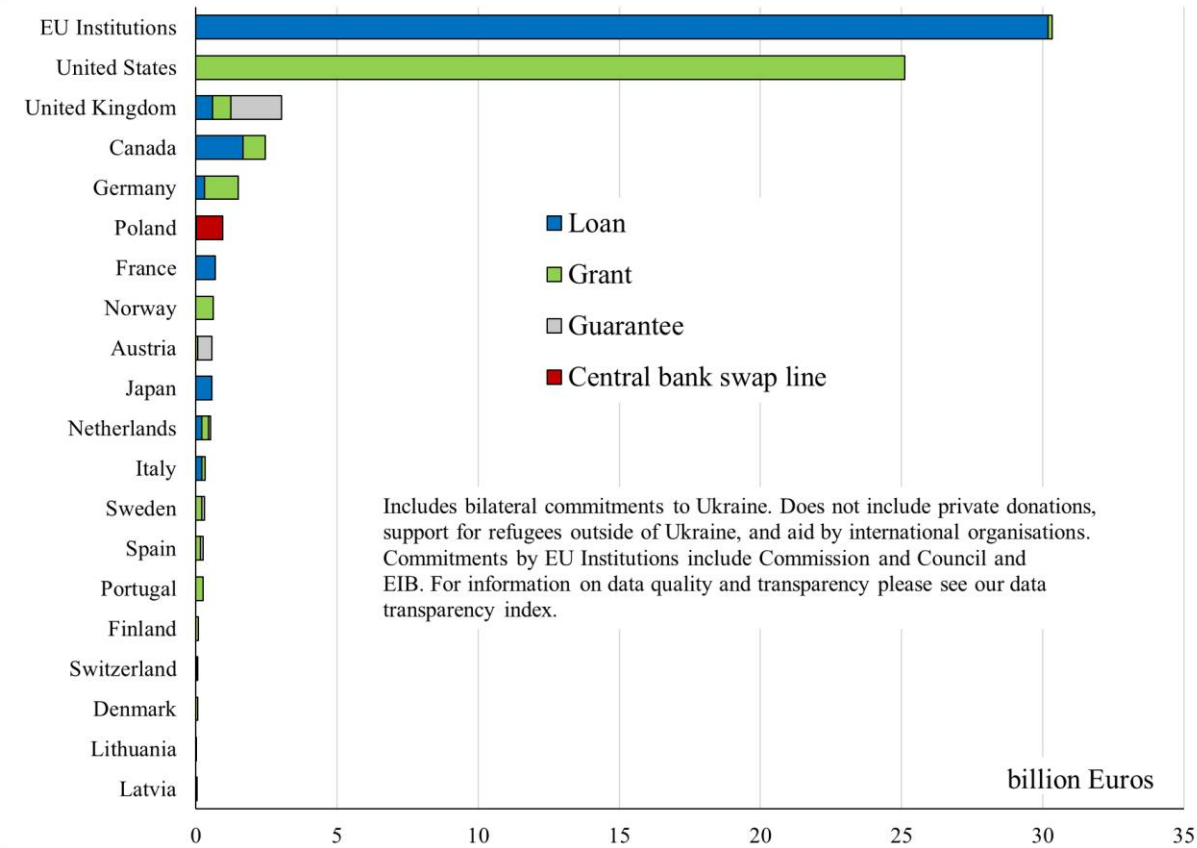


Note: This figure complements Figure 5 (aid in percent of donor GDP) by adding the estimated costs of hosting Ukrainian refugees as provided by the OECD Migration Outlook 2022. GDP data for 2021 is from the World Bank.

3.3. Financial aid

We now dive deeper into financial aid. Figure 9 gives an overview on the bilateral financial aid committed, distinguishing between grants and loans as well as in rarer cases financial guarantees and central bank swap lines (for the case of Poland). The largest financial commitments come from the EU institutions, with a total of €30.32 billion. This sum is committed almost exclusively in the form of loans and the largest chunk (€28.32 billion) comes from the Macro-Financial Assistance (MFA) program. The United States is the second largest financial donor to Ukraine, with a total of €25.11 billion, and that entire sum comes in the form of grants that do not need to be repaid. Next come the UK and Canada, with financial aid worth between €2 and €3 billion each.

Figure 9. Financial bilateral commitments – top 20 donors (billion Euros)
bilateral commitments January 24, 2022 to January 15, 2023

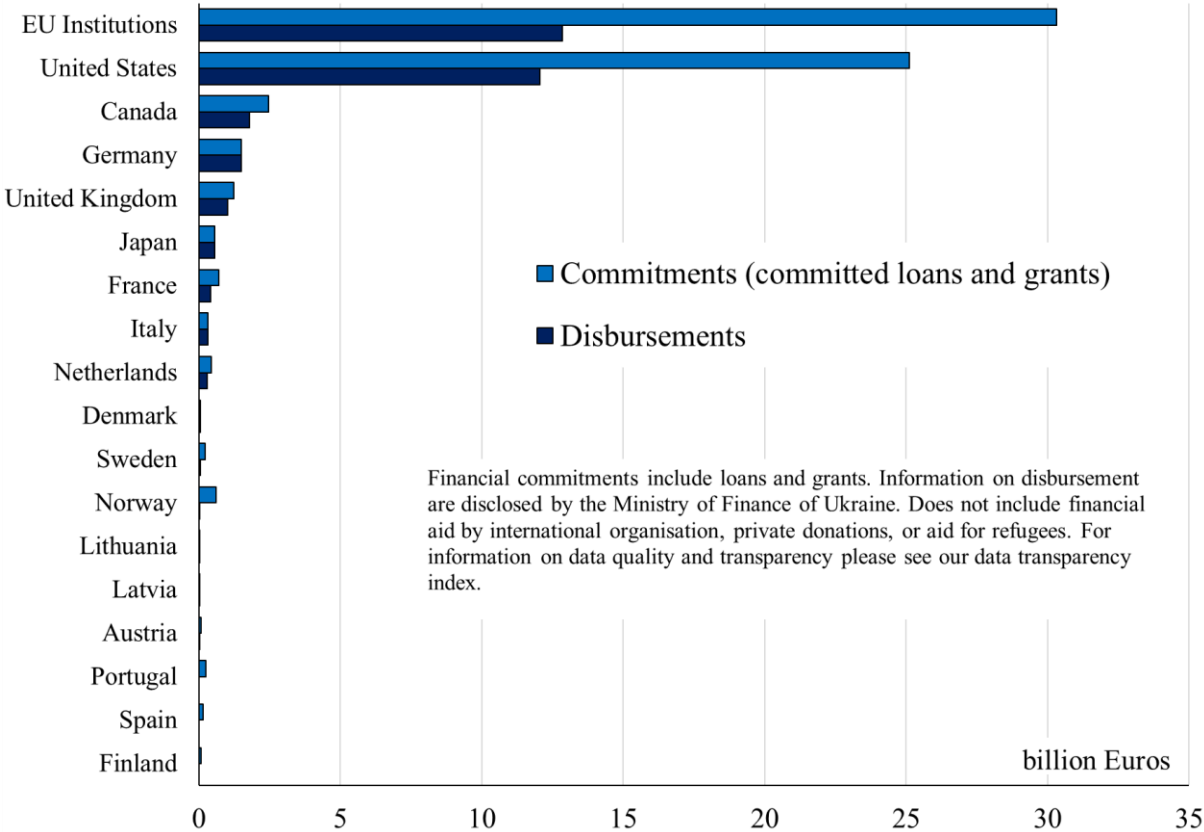


Note: This figure shows financial aid commitments to Ukraine across the top 20 donors in billion Euros between January 24, 2022 and January 15, 2023. Financial aid includes loans, grants, guarantees, and central bank swap lines.

In a next step, we show the gap between financial commitments and disbursements. For this purpose, we compare our data on financial commitments with data on received external budget financing from the regularly updated website by the Ministry of Finance of Ukraine (2023b). Specifically, we use their data on wartime budget financing from domestic and external sources between February 24, 2022 and January 18, 2023. Importantly, this data only tracks budgetary support from abroad but not all types of financial aid, as we do in our main database. To make sure that we properly compare our data to those by the Ukrainian authorities, we therefore drop all commitments from our database that are not given for general budgetary support. This means that the numbers on financial aid in Figure 10 differ from those in Figure 9. Figure 10 focuses

on the narrower category of budgetary support and no longer counts loans and grants that have a designated purpose, e.g. grants given for military or humanitarian projects (which are included in Figure 9).

Figure 10. Foreign budgetary support: commitments vs. disbursements (billion Euros)
total financial commitments January 24, 2022 to January 15, 2023



Note: This figure shows a ranking of financial donors, measured by the volume of external grants and loans given for budgetary support to the government of Ukraine (in billion Euros). Light blue bars indicate commitments (from our dataset), while the darker blue bars show disbursements (using data from the Ministry of Finance of Ukraine).

The resulting Figure 10 shows a large gap between committed financial aid (light blue bars) and disbursed financial aid (dark blue bars). As of January 15, 2023, a mere 48% of the committed foreign budgetary support had been disbursed (€30.99 out of €64.16 billion total commitments). The gap is most pronounced for the two main financial donors – the US and the EU. The EU institutions, for example, have thus far disbursed only slightly more than a third of their total financial promises (€12.85 billion out of €30.32 billion committed) and the United States disbursed only about half (€12.06 billion out of €25.11 billion committed). In the next section, we track financial commitments and disbursements over time, which further illustrates how small actual disbursements have been compared to the promises made.

5. Aid over time: commitment dynamics in 2022

For the purpose of tracking commitment and disbursement dynamics over time, we assign commitment entries in our database to the month of its announcement, which was possible for 99% of cases.²⁸ For consistency, we only consider months for which we have complete

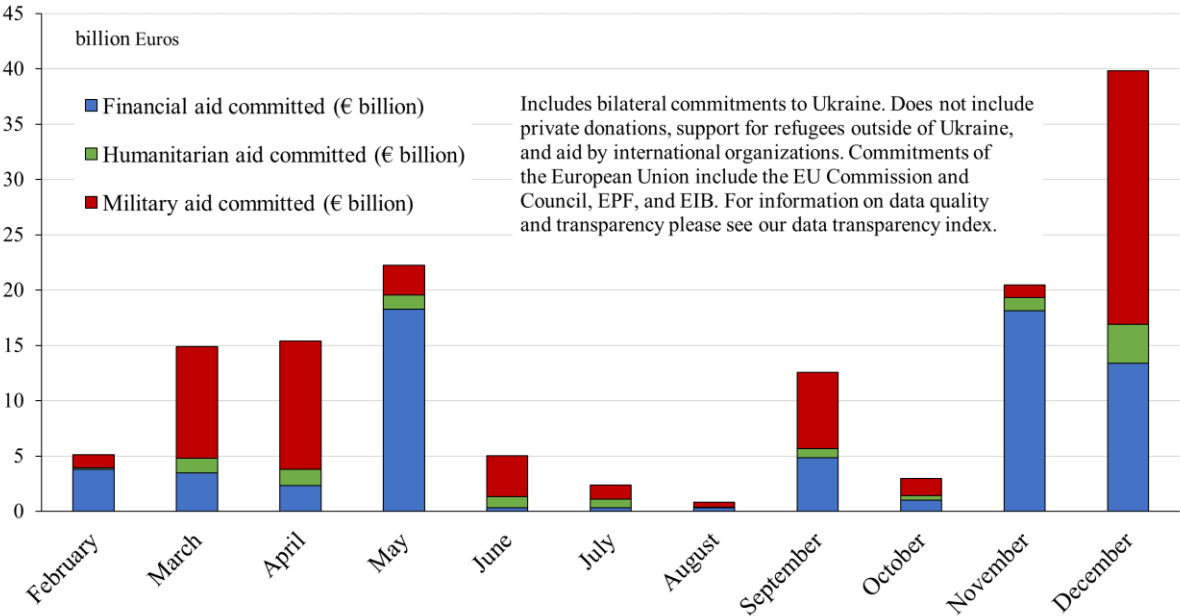
²⁸ We lack the information on commitment dates for 12 small donations with a total volume of just €20.15 million.

coverage, so that we exclude the months of January 2022 and January 2023 (our data collection starts on the 24th of January 2022 and ends on the 15th of January 2023).

Figure 11 shows the resulting breakdown by month. The main take away is that new commitments are highly cyclical, with large, announcements driving much of the dynamics. Most of the aid is being committed in large single bursts, largely driven by the US’s Ukraine Supplemental Acts as well as due to large new EU packages. Indeed, it is striking that the bulk of Ukraine’s total aid was announced in just a few months with record commitments. Specifically, for military aid, the aid pledged in March, April, September, and December account for over 80% of total commitments. For financial aid, May, November, and December account for 75% of total pledges of 2022. This “spikiness” of new commitments makes support inflows hard to predict. From the perspective of Ukraine, it is likely to make long-term planning much more difficult.

The dynamics of 2022 can be summarized as follows: After a strong increase in pledges after February 2022, newly announced aid fell to almost zero over the summer, only to increase strongly again towards the end of the year. The mid-year low is remarkable. Between June and October, we see almost no new aid, with the exception of a new US package of €10.7 billion in late September. During these five months, the majority of countries in our dataset made no or only minor new commitments. November and December, however, then see a very strong increases in aid commitments, with €18 billion in new EU loan pledges and €37 billion from the US’s Additional Ukraine Supplemental Appropriations Act 2023.

Figure 11. Dynamics of support: total commitments by month in 2022 (billion Euros)
total commitments February 1 to December 31, 2022



Note: This figure shows total bilateral aid commitments to Ukraine in billion Euros over time between February 1, 2022 and December 31, 2022.

Figure 12 shows the dynamics of financial aid. To track disbursements over time, we use the regular updates by the Ukrainian Ministry of Finance (2023a) and then draw on our own data for commitment months.²⁹ The graph confirms just how cyclical new commitments have been, with large spikes in May, November, and December. Moreover, one can see that the disbursements have been far lower than what has been promised so far. Interestingly, however, the time pattern of disbursement is less erratic than that of commitments. This shows how important it is to collect data on both commitments and disbursements, which however, is not always possible due a lack of donor transparency.

Figure 12. Dynamics of support: budget support by month in 2022 (billion Euros)
bilateral commitments February 1 to December 31, 2022



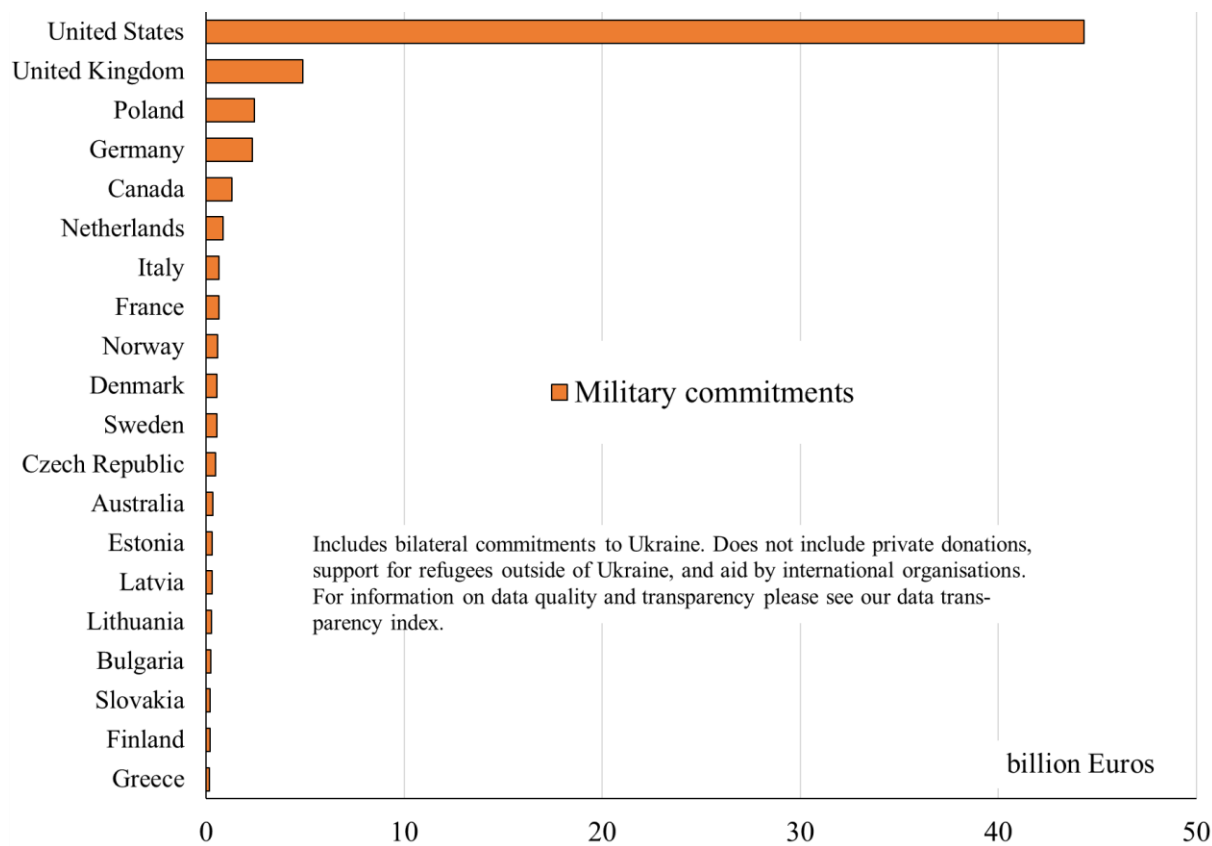
Note: This figure shows the budget support commitments to Ukraine by month and in billion Euros. Information on disbursements is from the Ukrainian Ministry of Finance.

5. Military aid and heavy weapons

This section turns to military aid and the commitment of heavy weapons. We start with Figure 13, which shows military aid commitments from our database for the top 20 donor countries. We count specific in-kind military aid (weapons and equipment that can be counted) as well as non-specified commitments to be spent for military purposes (including financial aid for military expenditures). As can be seen, the US leads by a very large margin, with military commitments of €44.34 billion. Next come the UK (€4.89 billion), Poland (€2.43 billion), and Germany (€2.36 billion).

²⁹ Because the official website does not provide easily access to information on past disbursements, we rely on the Twitter posts by the Ukrainian Ministry of Finance (2023a) as this allows more convenient tracking over time.

Figure 13. Military bilateral commitments - top 20 donors (billion Euros)
bilateral commitments January 24, 2022, to January 15, 2023



Note: This figure shows military bilateral aid commitments to Ukraine across the top 20 donors in billion Euros between January 24, 2022 and January 15, 2023. Military aid includes financial assistance tied to military purposes.

We next drill deeper into military aid, by focusing on heavy weapons committed over the past year. Since the start of the invasion, Ukraine’s president Volodymyr Zelensky repeatedly emphasized the country’s need for heavy weapons, in particular tanks, artillery (howitzers of 152mm and 155mm caliber), and multiple launch rocket systems (MLRS).

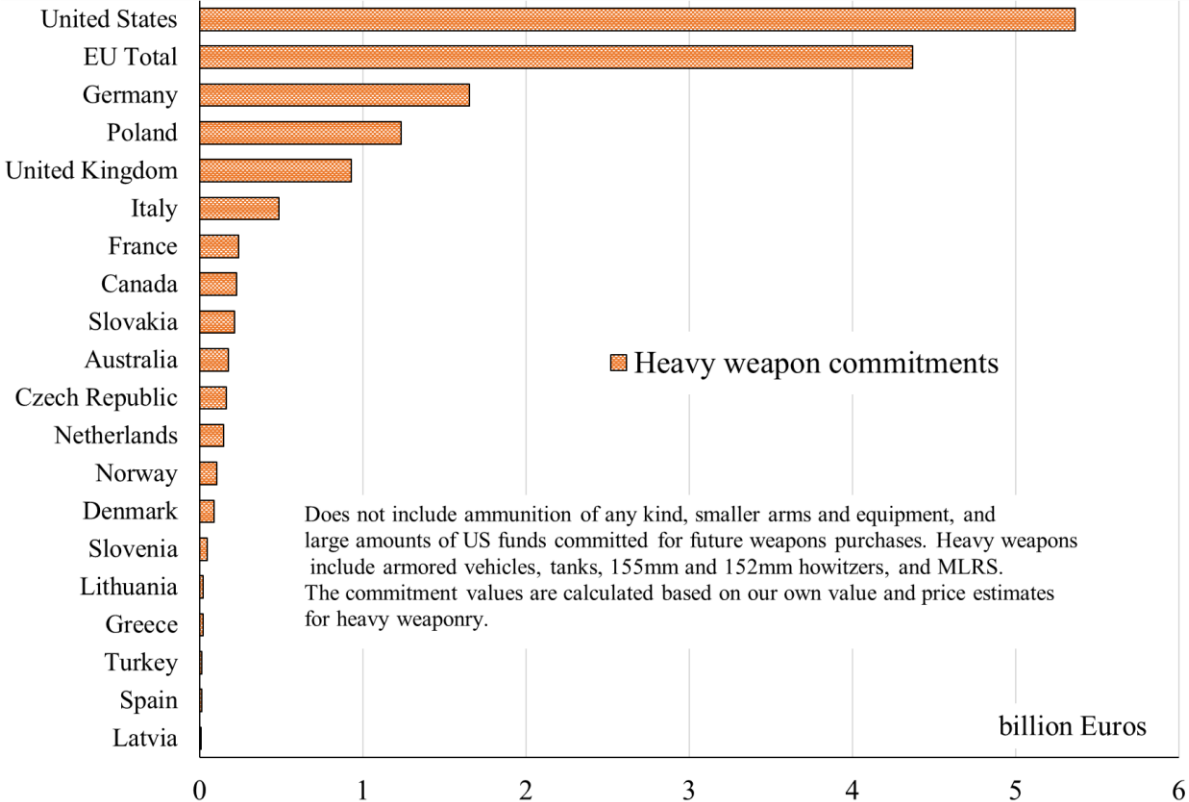
In total, until January 15, 2023, we count that Ukraine received 368 tanks (104 more to be delivered), 293 howitzers (122 more to be delivered), as well as 49 multiple launch rocket systems (27 more to be delivered). When valuing heavy weapon commitments using our methodology, we get to a total of €11.19 billion, of which €5.37 billion comes from the US (almost 48%) and €4.37 billion (roughly 39%) comes from EU countries.

Figure 14 shows a breakdown by country, focusing on heavy weapons only and using our prices to estimate total values. The volumes differ notably from those of total military aid shown in Figure 13. The main reason is that Figure 14 focuses only on the largest, highly visible weapons, but ignores all other military support. Figure 13 also takes budgets into account that are only earmarked for military aid, but not yet actual weapon donations. Moreover, in Figure 13, we largely use official government statements on the value of military aid, while in Figure 14 we use our own “bottom up” valuation method given the granular focus here. The majority of heavy weapon values are estimated using weapon prices given by governments and/or from the well-known SIPRI arms trade database. For the remainder, we draw on military publications like Global Security and other military sources.

There is a large gap in US commitments between Figure 13 and 14. This is largely because half of the military commitments (€20.85 billion) are open budgets, bookmarked for military support, but not yet designated to specific weapons that we can count. The US is also the largest provider of ammunition to Ukraine, especially for heavy weapons (worth more than €11 billion), in addition to small firearms and light anti-armor weapons, which are all not counted in Figure 14. Moreover, Figure 14 does not capture those types of items that are provided in “bulk” or weapons for which there is no information on the number sent, as these cannot be counter or valued.

The main take away from Figure 14 is that the EU countries as a whole have committed almost as much heavy weapon aid as the United States (not counting ammunition etc., see above). The EU-US gap is much smaller than in Figure 13. Thus, when it comes to key weapon systems, Europe has done more than what the aggregate aid data suggests. The large commitment of Europe with regards to heavy weapons is confirmed again in Figure 17 below (pledges as a share of own stocks) as well as in Appendix II where we show an overview of all donors for each heavy weapon category.

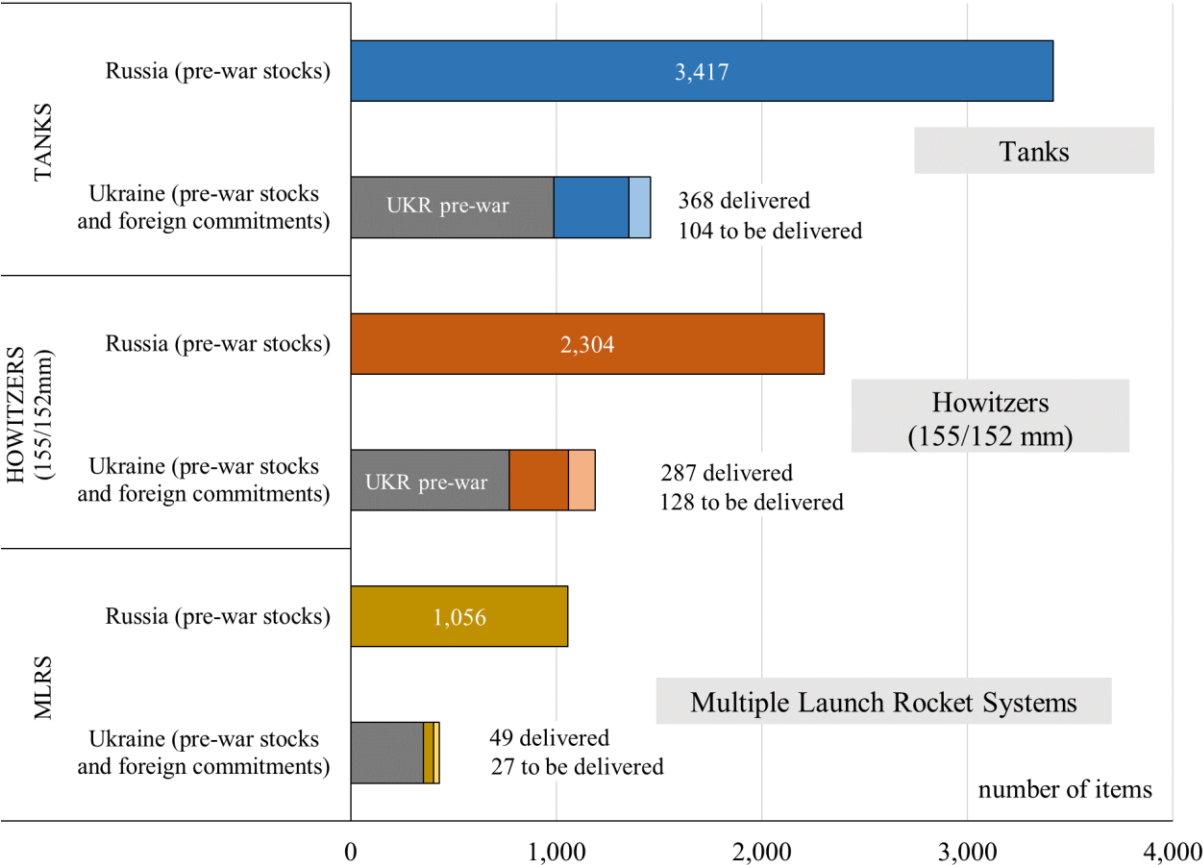
Figure 14. Heavy weapon commitments - top 20 donors (billion Euros)
bilateral commitments January 24, 2022, to January 15, 2023, own value estimates



Note: A key difference to Figure 13 is a narrower focus on heavy weapons, valuing those weapon commitments that have become public. These commitments do not include ammunition of any kind, smaller arms or equipment. Moreover, large amounts of US aid committed for future weapons purchases are not included. Unlike in Figure 13, the commitment values are calculated based on our own estimates for heavy weapon values (taken from government sources, SIPRI and military media). This differs from our baseline numbers, which rely heavily on government information on the value of aid pledges (see Section 2).

Are these weapon commitments large or small? To get a rough sense of Ukraine’s needs, we compare weapon stocks of Ukraine (pre-war stocks plus new commitments from abroad) to those of Russia (pre-war). To estimate Russia’s and Ukraine’s pre-war stocks of heavy weapons we draw on data from the widely cited “Military Balance” publication by the IISS (2022). Specifically, we use IISS data on weapons that are ready to be deployed, but not those that need maintenance or repair. The resulting Figure 15 shows that the newly committed heavy weapons amount to less than half of Ukraine’s pre-war stocks and only a fraction of Russia’s pre-war stocks.

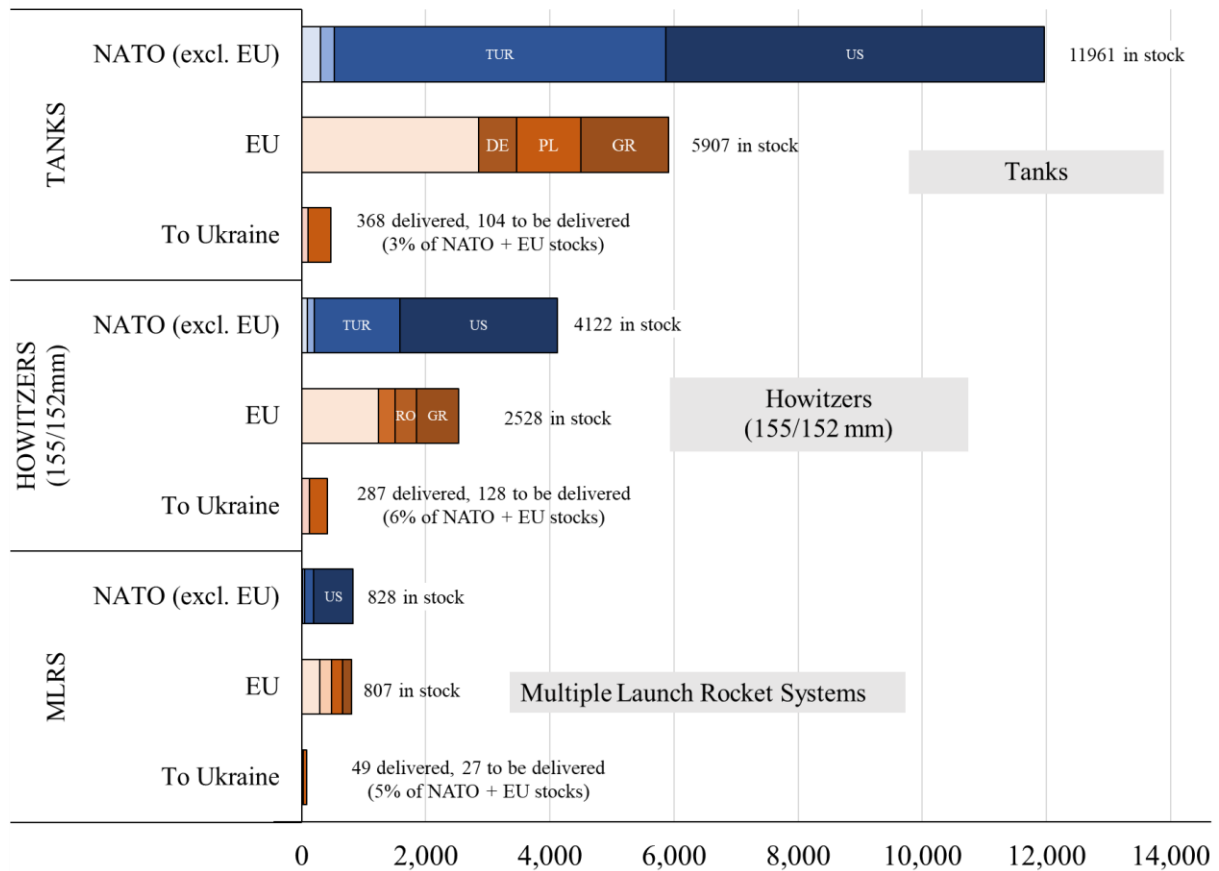
Figure 15. Ukrainian weapon stocks and weapon support vs. pre-war Russian stocks
bilateral commitments January 24, 2022, to January 15, 2023



Note: This figure shows the number of items of Ukrainian pre-war stocks and in-kind military aid commitments to Ukraine between January 24, 2022 and January 15, 2023 (from our dataset) in comparison to pre-war Russian and Ukrainian weapon stocks (from the IISS dataset). Heavy weapons are separated in three categories: tanks, howitzers (155mm/152mm), and MLRS. Pre-war stocks of the Russian army are taken from the IISS Military Balance (2022) study. Darker shades indicate the number of delivered weapons; lighter shades indicate weapons committed but not yet delivered.

In a next step, we look at NATO weapon stocks, again using IISS data. The resulting Figure 16 shows that the estimated NATO stocks are very large - with almost 18,000 tanks, more than 6,000 howitzers, and more than 1,500 MLRS. Most of these stocks are held by the US, followed by Turkey and Greece. In aggregate, NATO countries have thus far committed about 3% of their tanks, 6% of their howitzers, and 5% of their MLRS to Ukraine (all stock figures rely on IISS data).

Figure 16. Aggregate heavy weapons: NATO stocks vs. units sent to Ukraine
bilateral commitments January 24, 2022, to January 15, 2023

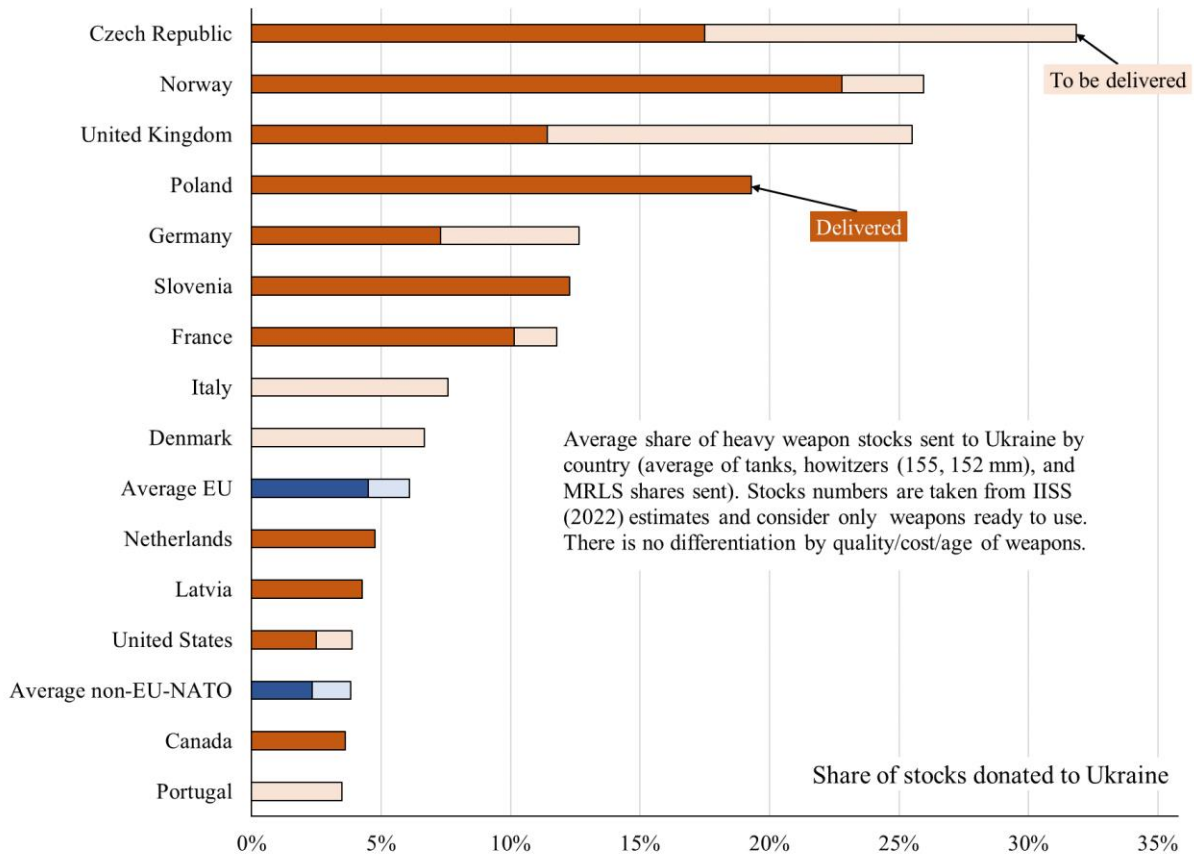


Note: This figure shows weapon stock estimates of tanks, howitzers, and MLRS compared with donations to Ukraine between January 24, 2022 and January 15, 2023. The data on stocks is taken from IISS Military Balance (2022) and considers only weapons ready to use.

Furthermore, we use the IISS data to study weapon commitment ratios by country. For this purpose, we focus on the same three main types of heavy weapons, namely (i) tanks, (ii) howitzers (155mm/152mm), and (iii) multiple launch rocket systems (MLRS). For each country we compare the number of weapons in stock to those committed and/or delivered to Ukraine, computing the ratio of stocks pledged. In a last step, we average the country shares for tanks, howitzers and MLRS to build an aggregate “heavy weapon” commitment ratio, averaged across the three weapon groups.

Figure 17 shows large differences in commitment ratios across countries and again gives a very different picture than Figure 13 on aggregate military aid. When accounting for available weapon stocks, European countries, rather than the US, top the ranking. The Czech Republic tops the list with 32% of stocks committed, closely followed by Norway, the UK, and Poland. On average, EU members committed 6.1% of their stocks compared to an average of 3.4% for non-EU NATO countries. The US share is below that of EU countries, standing at 3.9%. Additional tables on heavy weapon pledges by country and weapon type are shown in Appendix II.

Figure 17. Share of own stocks committed to Ukraine - country overview
bilateral commitments January 24, 2022, to January 15, 2023



Note: This figure shows the average share of heavy weapon stocks committed to Ukraine between January 24, 2022 and January 15, 2023, as percent of country stocks. The average is computed across the same three main categories of heavy weapons, meaning the average commitment to stock shares of (i) tanks, (ii) howitzers (155, 152 mm), and (iii) multiple launch rocket systems (MLRS). Data on stocks is taken from IISS Military Balance (2022) estimates. Only weapons that are ready to be used are considered. There is no differentiation between weapon age, quality, or cost.

Box 1: A preview – battle tanks committed in early 2023 (January 1st – February 15th)

Our data collection ends in mid-January 2023. Since then, however, there has been a new wave of commitments for Western battle tanks such as Leopard 2. This box provides a preview on all tank commitments of early 2023 (January 1st through February 15th).

While many countries are rumored to send tanks, commitments often remained vague.

The following list gives an overview of the publicly known commitments we could trace:

- Belgium - 50 Leopard 1A5
- Canada - 4 Leopard 2A4
- Denmark & Netherlands (together) - approx. 78 Leopard 1A5
- Finland - unknown amount of Leopard 2A4
- Germany - 14 Leopard 2A6, and approx. 100 Leopard 1A5
- Norway - unknown amount of Leopard 2A4
- Poland - 30 PT-91 Twardy and 14 Leopard 2A4
- United Kingdom - 14 Challenger 2
- United States – 31 M1A2 Abrams

In our next data update, these tank commitments will be counted alongside all other aid items in the database. At this point, it is helpful to place the size of these new tank announcements in relation to total aid. To do so, we value new tank pledges for those eight countries that have announced the exact number of tanks intended for Ukraine: Belgium, Canada, Germany, Denmark, the Netherlands, Poland, the UK, and the US. For each tank type and country, we estimate values using our usual methodology. The resulting total value is €1.28 billion, with almost half of that coming from the US Abrams tanks (estimated at €590 million). In comparison, the value of the newly committed tanks corresponds to about 5% of total military aid to Ukraine between January 24, 2022 and January 15, 2023 (that total is €12.53 billion).

6. A historical perspective: Aid to Ukraine in comparison to previous wars

In this section, we put aid to Ukraine in 2022 into historical perspective. Our aim is to understand how large the current support measures to Ukraine have been in comparison to previous historical wars. Identifying comparable cases is not straightforward and we were surprised by how scarce the data on foreign support during wars is. We therefore took a pragmatic approach and focus on those wars that (i) share similarities with the current Ukraine-Russian war, i.e., which involved a large military power (in particular the US), and (ii) which are well researched and offer reliable data for comparison purposes.

To identify the comparison cases, we start with the Correlates of War database (Sarkees and Wayman 2010) and then focus on major inter-state conflicts taking more than six months as well as major proxy wars (Berman and Lake 2019). We further limit our search to wars of the past century, thus starting in the 1920s. To identify wars with international aid we relied on the codebook on war financing by Zielinski (2016), as well as on Horn, Reinhart and Trebesch (2020) who trace government-to-government loans and grants in peace and wartime.

The final comparison sample is small and not complete, but covers some of the best-known wars of the past century:

- We start with World War 2, for which detailed data on the US Lend-Lease support to the Allies exists, in particular to Great Britain, the USSR and France (Executive Office of the President 1945, US Department of State 1945, US Department of War 1946, Allen 1946, UK Parliament 1946).³⁰
- We also gather data on foreign military support in the Spanish Civil War (1936-39), a typical case of a proxy war. Support to Franco's Nationalists came from Fascist Germany and Italy, while the Republicans were supported by the USSR. Our main sources are Alpert (2013), Rybalkin (2000), Martín-Ageña et al. (2012), and Viñas (1984).
- We further collect US expenditures in major US wars of the 20th century, as estimated by the US Congressional Research Service (Daggett 2010). This data allows us to cover the Korean War (1950-53), the Vietnam War (focusing on 1965-1975), the war in Afghanistan (focusing on 2001-2010), and the war in Iraq (2003-10).
- In addition, the Gulf War (1990/91) is an interesting case of international support within a Western Alliance. The war was largely waged by US forces, but non-participants like Germany, Japan, and South Korea, provided large financial and military assistance in defense of Kuwait. Our data on this war comes from multiple official sources (US Department of Defense 1992; Foreign Ministry of Affairs Japan 1991; German Embassy of Kuwait 2014).

We aim to make the data across these different wars as comparable as possible. We rely on GDP data from the US Bureau of Economic Analysis (2017) until 1980, chain linked to IMF data (IMF-WEO 2017) for later years. For the UK, we use nominal GDP estimates by Dimsdale and Thomas (2016). For the Gulf War, the World Bank WDI database provides all the necessary coverage.³¹ To convert between different years and currencies, we start by converting national currencies into US\$, if not already given by the source, and then adjust for inflation using the GDP deflator by the US Bureau of Economic Analysis (BEA). Since the deflator uses 2012 as a base year, this gives us military expenditures in constant 2012 US\$. We further transform these, first into 2022 US\$ and then into 2022 Euros using the current exchange rate. To adjust for war duration, we calculate annual average expenses and assistance, except for the case of the Gulf War, which lasted only seven months (for Ukraine we use the period between January 24, 2022 and January 15, 2023).

The two resulting main series for comparison thus capture annual average expenses in 2022 Euros and annual average expenses in percent of GDP. To set the stage, however, we start by looking at the plain number of weapons committed by foreign powers during these wars. High-quality data on weapon donations is available for WW2 and for the Spanish Civil War. Figure 18 shows a comparison of the total number of weapons provided during these two wars compared to what was promised to Ukraine in the past year (not adjusted for war length).

The difference in the scale of weapons committed is drastic. During 1941-45, the US sent more than 25,000 tanks and more than 15,000 airplanes to Great Britain alone. The USSR and

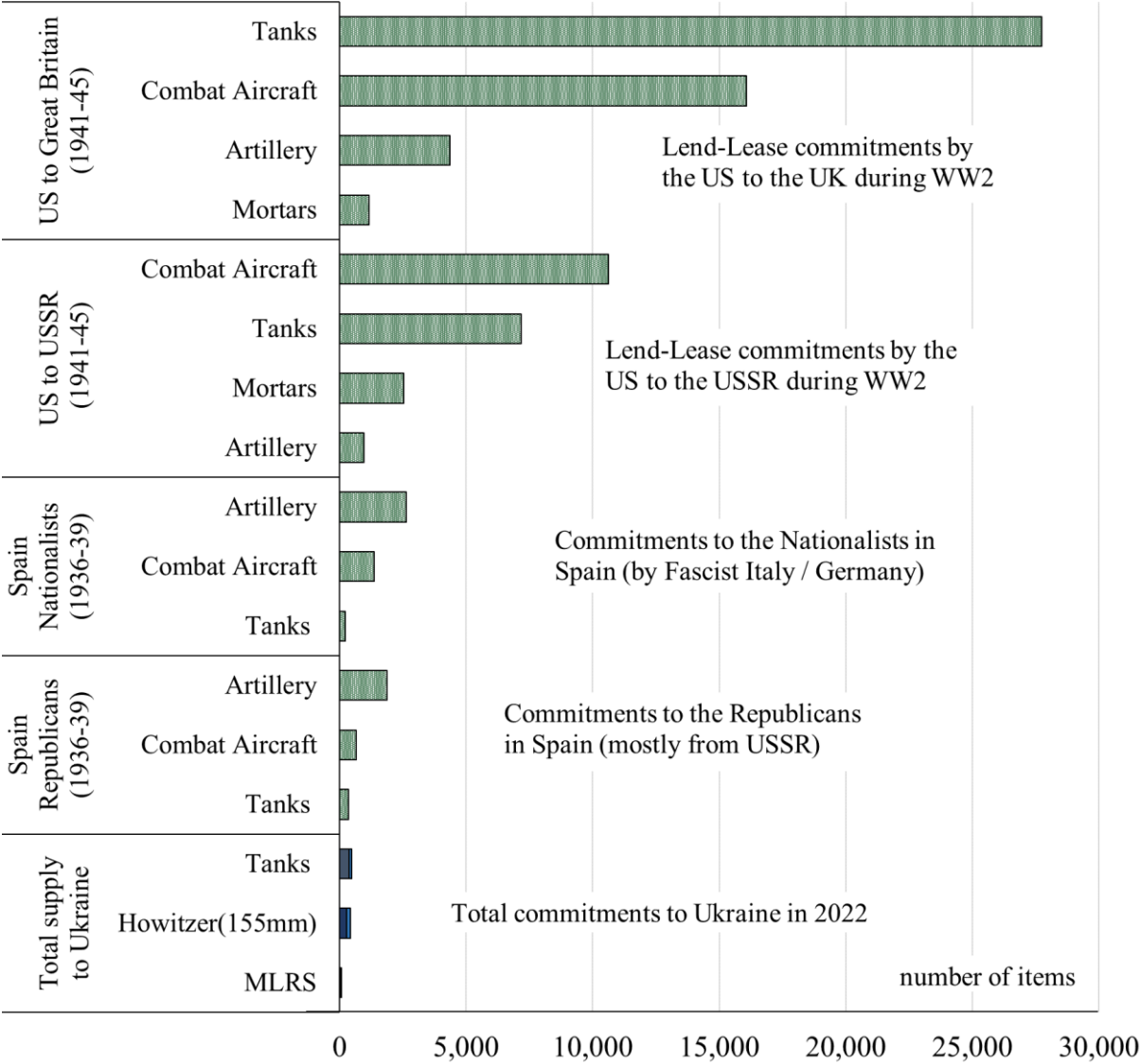
³⁰ The US did provide additional Lend-Lease support to multiple countries including China, Belgium, the Netherlands, and many more. However, the largest share (around 90%) of military aid went to the UK, the USSR and France.

³¹ All our sources provide GDP in current US\$. We apply the BEA deflator to them and convert the series into 2022 Euros.

France also received thousands of heavy weapons through the US Land-Lease program. Compared to that, the total number of heavy weapons to Ukraine are just a fraction - less than 500 tanks and howitzers, respectively, and less than 100 MRLS. Also, the tally of weapons sent by foreign powers during the Spanish Civil War clearly outnumber that sent to Ukraine.

Merely comparing item numbers has limitations, also because weapons have become more expensive and more technologically sophisticated over the past 100 years. The remainder of this section therefore focuses on monetary values as well as aid relative to GDP, which has the additional advantage that we can better account for conflict duration in the comparisons.

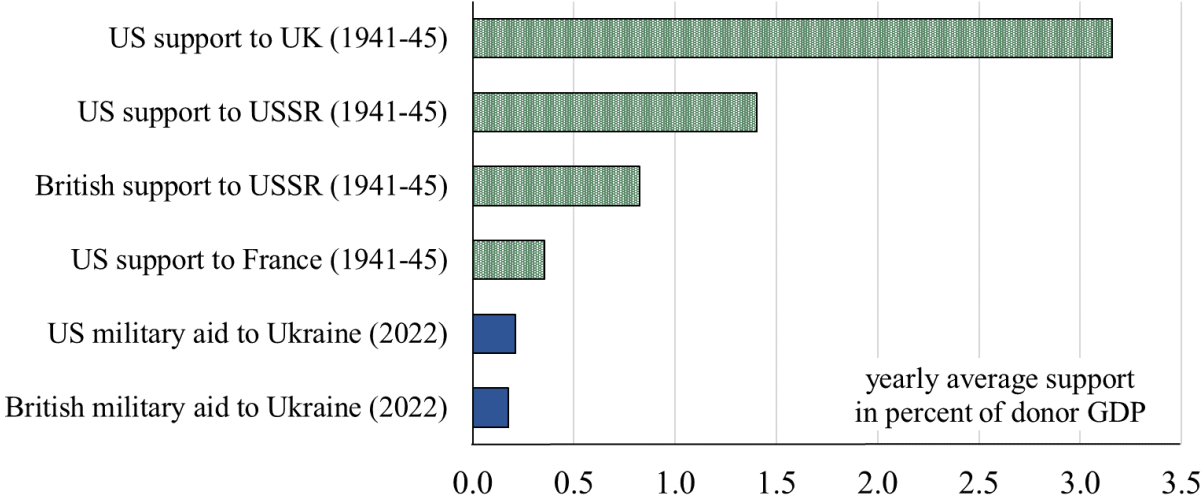
Figure 18. Weapon support in major conflicts: WW2, Spanish Civil War and Ukraine 2022 *in-kind military aid from foreign powers (number of items)*



Note: This figure compares the number of weapons sent by foreign powers during WW2 and during the Spanish Civil War (green bars) to the number of weapons committed to Ukraine thus far (blue bars). Historical data on weapon support for the US Lend-Lease program of WW2 comes from the US Department of State (1945) and US Department of War (1946). For the Spanish Civil War we use data from Alpert (2013) and Rybalkin (2000). Weapon support to Ukraine is from our database.

Figure 19 compares the Allied support during WW2 in percent of donor GDP (by the US or the UK). In today's Euros (inflation-adjusted), the US Lend-Lease support to Great Britain totaled ca. €315 billion, or ca. €70 billion when averaged by year (see Figure A6 in Appendix III for an overview figure). In percent of GDP, the support of Great Britain through the Lend-Lease scheme corresponds to 14.2% in total, or 3.2% of US GDP when averaged by year. Next comes the USSR, which received Lend-Lease support in the magnitude of 5.6% of US GDP in total, or 1.4% when averaging per year. The annual averages are significantly higher than the total support of the US or the UK committed to Ukraine in 2022 (0.21% and 0.18% of GDP, respectively).

Figure 19. Foreign support during WW2 vs. Ukraine 2022
estimated annual average support in percent of donor GDP

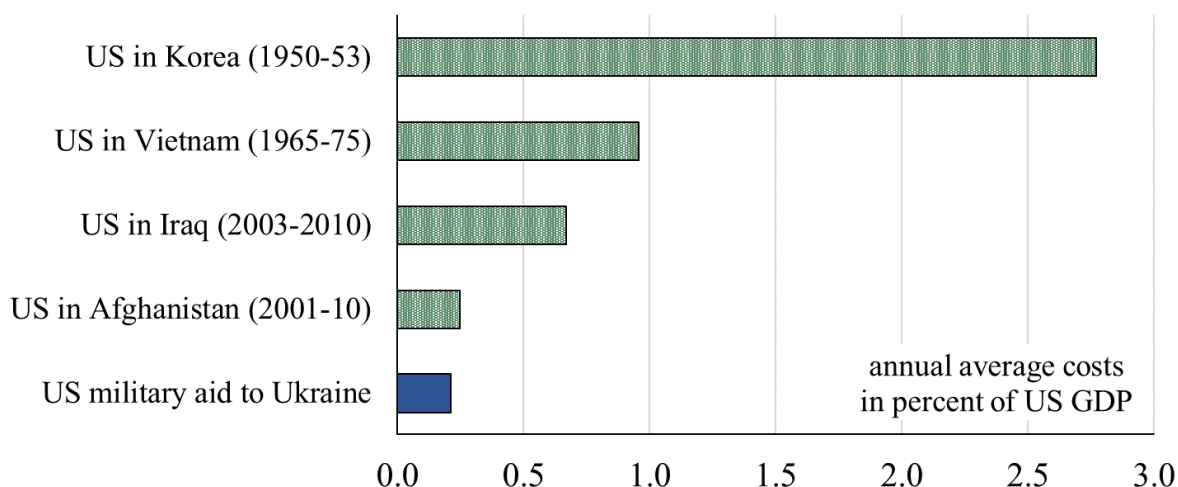


Note: This figure compares the scale of foreign military support by the US and the UK during the Second World War (green bars, Lend-Lease program) to their military support to Ukraine 2022 (blue bars). We report total aid divided by the number of years during which aid was provided (WW2: 1941 to 1945). The sources on Lend-Lease support and GDP are reported in the main text above. US military aid to Ukraine is from our database.

WW2 was a massive war on a global scale, so it is difficult to draw conclusions in a comparison with Ukraine 2022. In a next step, we look at more recent wars, in particular wars involving the US, for which approximate cost estimates are available from the Congressional Research Service (Daggett 2010). We again average costs on a yearly basis and use US GDP at the time for the comparison.

Figure 20 shows the result. The costliest war, in terms of yearly US military expenses to GDP, was Korea 1950-53, followed by the wars in Iraq, Vietnam and Afghanistan. In each of these wars, US military expenditures far outweigh the size of US military aid committed to Ukraine in 2022. Specifically, the estimates suggest that the US expenses for the Korean war (2.8% of GDP per year) were more than 13 times higher than the amount committed to Ukraine in 2022 (0.21%). Similarly, the yearly expense numbers were almost 5 times higher in Vietnam, 3 times higher in Iraq, after 2003, and similar to expenditures in Afghanistan (0.25%). Figure A7 in Appendix III makes the same comparison, but as expenses in billion Euros.

Figure 20. US military expenditures in major wars vs. Ukraine 2022
estimated annually averages in percent of donor GDP



Note: This figure compares average annual US military expenditures in US wars to total US military aid to Ukraine in 2022 (both computed in % of US GDP at the time). Estimates on US military spending are from the US Congressional Research Service (Daggett 2010). US GDP Data is from the U.S. Bureau of Economic Analysis (2017) and IMF-WEO (2017). US military aid to Ukraine is from our database.

The last comparison focuses on the Gulf War 1990/91, which has similarities to the Ukraine war. In both wars, a much larger neighboring state started an unprovoked invasion, and in both wars Western countries formed an Alliance to repel the aggressor state. Specifically, Iraq invaded Kuwait in early August 1990. After a UN Resolution authorized the use of force to drive Iraq out of Kuwait in end-November, the US attacked Iraq with a large-scale aerial bombing campaign in January 1991, supported by smaller forces sent by the UK and France. The war ended with an Iraqi defeat and retreat from Kuwait in the end of February 1991.

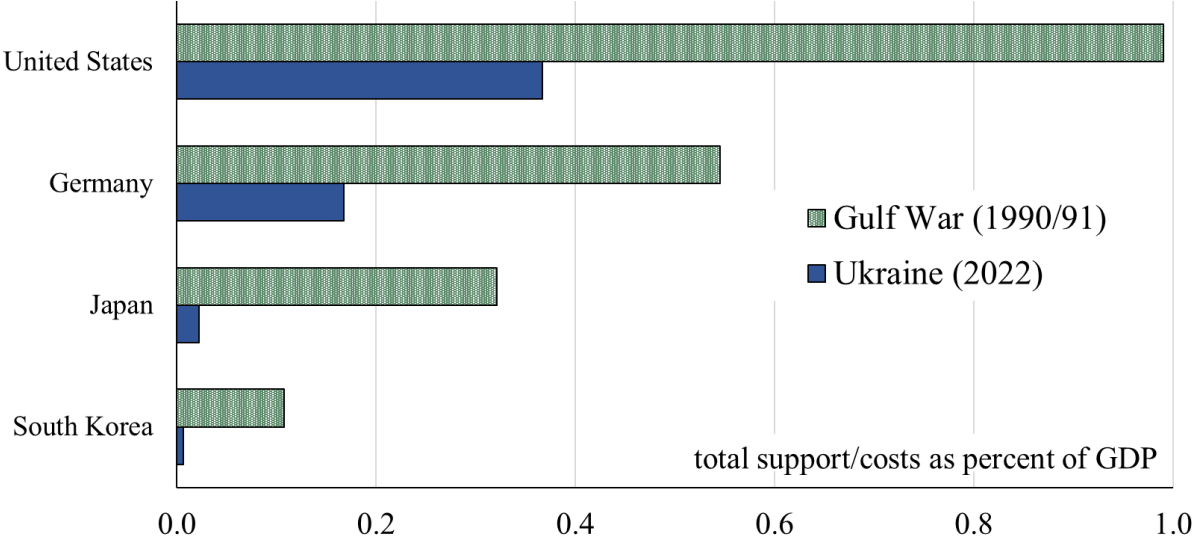
In 1990/91, the coalition against Iraq consisted of 35 countries, including a small number of states actively engaged in the war (like the US, UK and France) and many non-participating states that granted financial and military support. As a result of this large-scale foreign aid, the US was able to cover most of its own war expenses. Specifically, in a report to US Congress, the Department of Defense estimated that from the \$61 billion of total incremental cost of the Gulf War (1991 dollars), US taxpayers only paid \$7 billion (US Department of Defense 1992). According to the same source, the largest cash transfers to the US came from Saudi Arabia (\$16.8 billion), Kuwait (\$16.1 billion), Japan (\$10 billion) and Germany (\$6.57 billion). These numbers, however, only cover direct support going to the US budget.

For total aid numbers we could draw on the following country-specific sources. For Japan, the Ministry of Foreign Affairs published a detailed list on every pledge made (Ministry of Foreign Affairs Japan 1991). Total commitments to Kuwait and the US-led alliance are worth a total of ¥1.5 trillion, to \$11.5 billion at the time. For Germany, we rely on official estimates summarized by the German Embassy in Kuwait (2014) as well as by the Bundeswehr (Andrade et al. 2020). According to these sources, total financial and military aid amounted to 16.9 billion German Mark (DM), which correspond to \$10.5 billion in 1991 US\$. Andrade et al. (2020) further reports that around DM 3 billion were military assistance, partly coming from stocks of the German Democratic Republic (GDR). For South Korea, official numbers on aggregate support are hard to come by. We thus use the Korean transfers to the US budget as counted by the US

Department of Defense (1992). The resulting sum of \$355 million are a lower bound of actual support.

Figure 21 uses this data to compare the war support of these three countries in 1990/91 to their support to Ukraine in 2022, both as a share of country GDP at the time. For completeness, we also show estimated total US expenses to the war, although a large part of this cost was covered by transfer from allied states. We do not use yearly averages, since the Gulf War lasted for a few months only. We thus compare total aid in 1990/91 to total aid to Ukraine from our database.

Figure 21. Gulf War 1990/91 vs. Ukraine 2022, expenditures in percent of donor GDP



Note: This figure compares the value of support by Germany, Japan, and South Korea during the Gulf War 1990/91 as well as total US war costs, with the size of bilateral aid to Ukraine, scaled by country GDP. GDP is from the World Bank WDI database. To convert into US\$ we use exchange rates from the US Federal Reserve. For more details and the data sources on country support/costs during the 1990/91 Gulf War see text. For bilateral aid to Ukraine, we use our own database.

The differences are large. Germany has committed bilateral aid worth 0.17% of its GDP to Ukraine, but it has committed three times as much to liberate Kuwait in 1990/91 (0.55% of German GDP in 1991).³² The gap is even larger for Japan and South Korea, which thus far have given only limited bilateral aid to Ukraine, especially when compared to the sizable commitments in the context of the Gulf War (0.02% and 0.01%, respectively). Figure A9 in Appendix III also shows the same comparison converted to billion of 2022 Euros.

7. A comparison to other crises: 2010 Euro crisis, Covid-19 crisis, 2022 energy crisis

This final section compares the international support raised for Ukraine to the support mobilized in other major crises of the past decade, with a focus on Europe. We start with a big picture comparison with the Eurozone crisis and the Corona shock of 2020 and then focus on 2022,

³² If we add EU shares, total German commitments to Ukraine increase to 0.37% of GDP, but this number counts large amounts of undisbursed EU-aid to be paid out over the course of 2023 and possibly later. Moreover, we do not have data on EU-level support in 1990/91. To keep costs comparable it is therefore more appropriate to use bilateral aid in both episodes.

comparing support to Ukraine with the size of domestic spending program announcements, in particular to cope with the energy price spike.

7.1. Ukraine support vs. support in the Eurozone and Covid-19 crises

Russia's attack on Ukraine can be seen as the third major crisis hitting Europe over the past 15 years. The first big shock was the Eurozone crisis that accelerated after 2010 and that had its roots in the US financial crash of 2008/09. The second major shock was the global Covid-19 crisis after February of 2020. In both of these crises, European countries mobilized large amounts of funding to support each other. This section asks: How does the European response in those crises compare to the European response to Russia's invasion in Ukraine?

To measure the foreign support during the Eurozone crisis, we focus on the four largest recipients of financial aid commitments in the crisis years of 2010-12, namely Greece, Ireland, Portugal, and Spain. To be consistent with our approach above, we do not count multilateral aid, e.g. through the IMF, but only measure commitments by EU institutions and bilateral support from EU members. Total EU commitment to these four countries in 2010, 2011, and 2012 amount to €394.6 billion, which can be decomposed as follows.

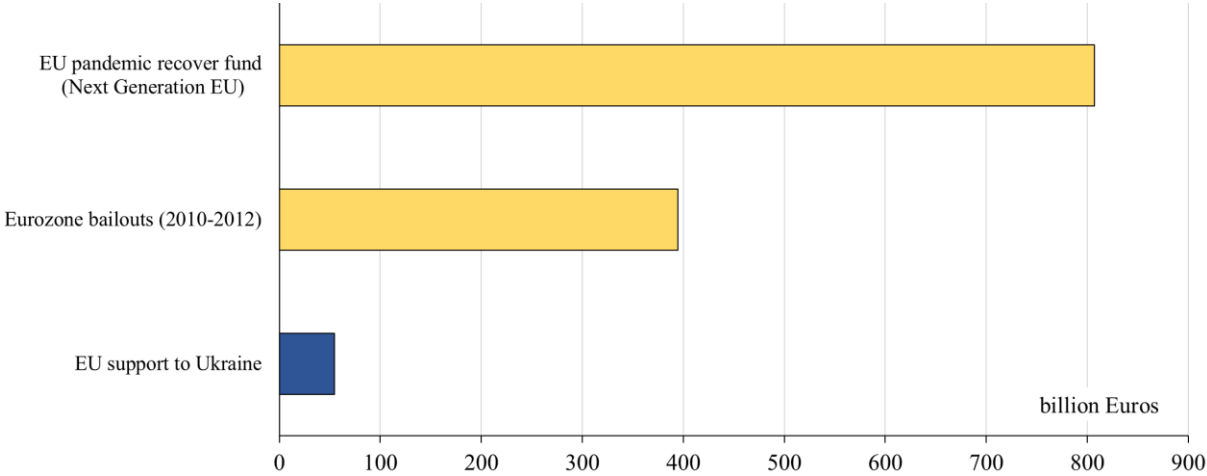
- Greece received commitments of €52.9 billion in May 2010 through bilateral loans from other EU member countries (European Council 2019). A second financial assistance program of €144.7 billion was committed through the European Financial Stability Facility (EFSF) in March 2012 (European Council 2022e).
- Ireland received commitments of €17.7 billion from the EFSF between 2011 and 2013 plus €22.5 billion from the European Financial Stabilization Mechanism (EFSM), both announced in December 2010 (European Union 2017). Additionally, €4.8 billion in bilateral loans were granted by the United Kingdom, Sweden and Denmark (European Union 2017), which we consider as part of the overall EU support.
- For Portugal, we count €26 billion by the EFSF and €26 billion committed by the EFSM, both announced in May 2011 (European Stability Mechanism 2011).
- Spain received a €100 billion commitment by the European Stability Mechanism (ESM) in July 2012 (European Stability Mechanism 2013).

To capture the EU's response to the Covid-19 crisis we focus on the so-called Next Generation EU (NGEU) recovery program, which was announced by the European Council in July 2020 and was set up to help EU countries to recover from the pandemic. The NGEU fund has a total value of €806.9 billion and enables the EU Commission to disburse up to €385.8 billion in loans and €338 billion in grants to member countries (European Commission 2022e). The remaining €83.1 billion will be directed towards various programs "making Europe healthier, greener, and more digital" (European Union 2021). The NGEU is financed by authorizing the EU Commission to issue bonds on international capital markets that are backed by a guarantee by EU member countries (European Commission 2022e, Christie et al. 2021).

Figure 22 compares the volume of Eurozone bailout loan commitments to Greece, Ireland, Portugal and Spain in 2010-12 with the size of the NGEU pandemic recovery fund of 2020, as well as total EU commitments to Ukraine between January 24, 2022 and January 15, 2023 (amounting to €54.92 billion). As can be seen, the EU's total commitments to Ukraine are considerably smaller than the commitments mobilized during the Eurozone crisis or the Corona crisis. It is striking, in particular, that total EU financial aid to Ukraine (€34.74 billion) accounts

for less than 5% of the large NGEU money that will be disbursed across Europe in the coming years. Could a share of these large-scale NGEU grants and loans not be forward to Ukraine?

Figure 22. Europe’s response to major crises – commitments in billion Euros



Note: This figure compares the EU country’s total commitments to for Ukraine between January 24, 2022 and January 15, 2023 to the commitments announced during the Eurozone crisis (bailout funds for Greece, Ireland, Portugal and Spain 2020-12) as well as to the EU Commission’s NGEU pandemic recovery fund announced in July 2020. See text for details and sources.

7.2. Spending priorities in the crisis of 2022: domestic energy subsidies vs. Ukraine

This section compares aid to Ukraine to other European spending programs announced in 2022, in particular new fiscal measures that were announced in response to the war and the ensuing energy price hike. We want to understand what European governments announced to shield their own population from the fallout of the war and the energy price spike at home, compared to what was done to support Ukraine.

For an EU-wide comparison, we draw on data on energy subsidy commitments gathered by Bruegel (2022), who count the volume of committed relief programs and energy subsidies in response to the energy crisis for European countries. We then combine this data on fiscal commitments for energy subsidies with our data on support for Ukraine, both in billions of Euros and as percent of country GDP in 2021. To measure total support to Ukraine we add bilateral aid plus the respective EU aid shares by country and take into account all commitments, thus including large amounts of promised but undisbursed financial EU aid that is expected to be paid out over the course of 2023 and possibly 2024. Importantly, we do not capture actual energy subsidy transfers here, but rather what was put on the table ex-ante, and compare this to what was put on the table for Ukraine.

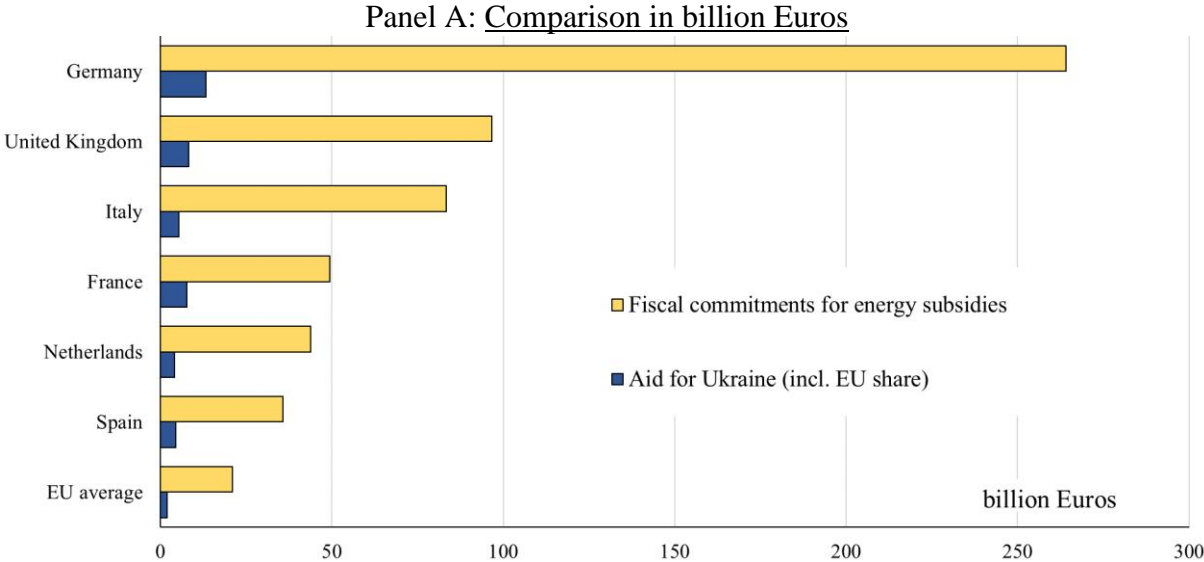
Figure 23 shows the result, with a focus on the five EU countries with the highest commitments for energy subsidies, namely Germany, Italy, France, Netherlands and Spain, plus the UK. Panel A illustrates that governments committed vastly more to shield their own populations from the consequences of the war than what they committed for Ukraine. Germany, for example, announced a total of €264.2 billion for various energy support and relief packages for German households and industry (including the so called €200 billion “Doppelwumms” or economic defense shield). This newly mobilized commitment of more than €200 billion is more than 20 times the amount that Germany committed for Ukraine, thus far €13.33 billion, despite the fact

that we count all aid types to Ukraine (bilateral, via the EU, non-delivered aid, and all categories: financial, humanitarian, and military). The gap is similarly large for other countries as well. When aggregating over all EU countries, we find that €569.88 billion were committed to domestic relief efforts against a total of €54.92 billion towards supporting Ukraine, a share slightly below 10% (the average shown in Panel A is €21.11 billion vs. €2.03 billion).

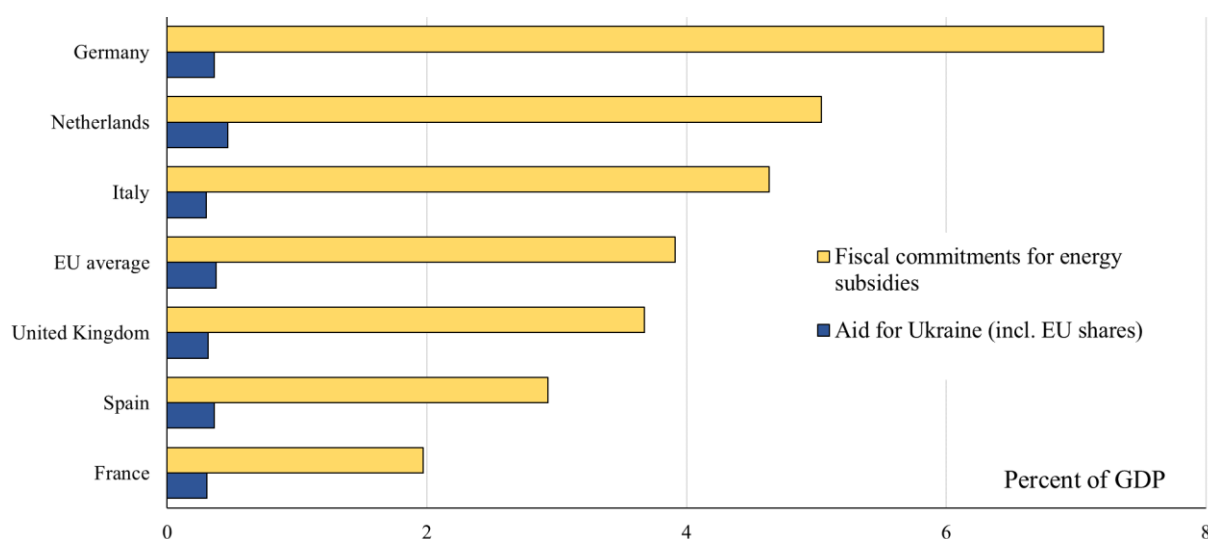
Panel B confirms the strong priority for domestic spending purposes in response to the war and energy shock. Rather than showing totals in billion Euros we now scale the size of domestic subsidy programs and the size of Ukraine commitments by country GDP. The EU average to GDP is calculated by adding up total EU support to Ukraine as well as the total value of domestic energy packages across the EU and then dividing these by total EU GDP. Germany again stands out, having allotted 7.2% of its GDP for energy subsidies, compared to just 0.36% for total aid to Ukraine.

For non-European donors like the US and Canada it is difficult to gather comparable data on energy subsidies, also because energy prices did not increase as drastically there. However, the US and Canada also launched major new spending programs since February 2022. In the US the largest package is the so-called Inflation Reduction Act (IRA) to lower energy costs, subsidize green energy and reduce inflation. The total volume of this package exceeds \$370 billion (€352 billion), compared to €73.18 billion committed to Ukraine. However, the IRA funds will be spread until 2031 making a comparison with Figure 23 difficult (White House 2022). Canada, in turn announced several relief packages like the “Affordability Plan” (Government of Canada 2022d) and the “Cost of Living Relief Act” (Government of Canada 2022c) worth C\$16.6 billion (€11.61 billion). That is again considerably more than Canada's commitments to Ukraine (€4.02 billion), but the gap is smaller than for EU countries.

Figure 23. Fiscal commitments for energy subsidies vs. aid commitments for Ukraine



Panel B: Comparison in percent of GDP



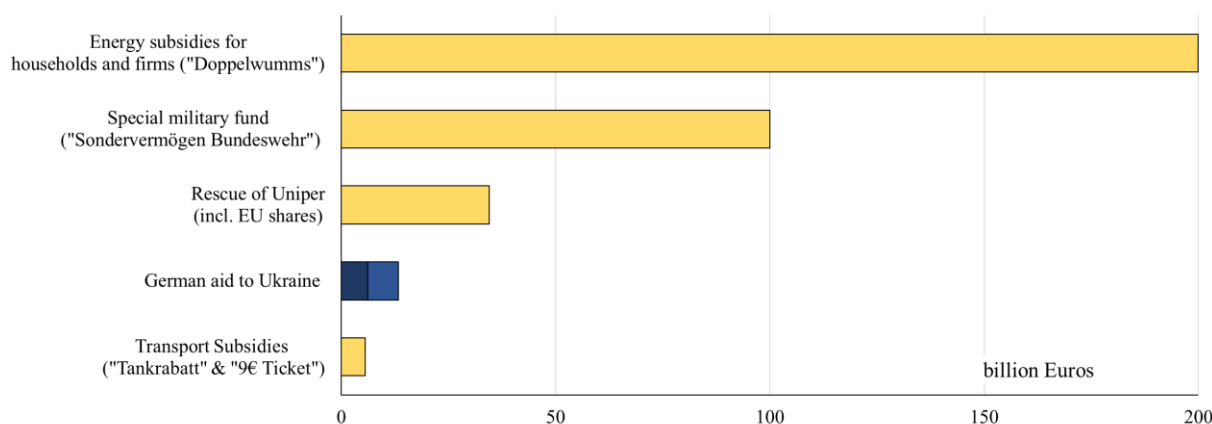
Note: This figure compares the amount of aid to Ukraine to the size of domestic spending programs of Germany, the UK, Italy, France, Netherlands, Spain, and an average across all EU member countries. The data on energy subsidy program commitments is taken from Bruegel (2022). Commitments to Ukraine cover January 24, 2022 and January 15, 2023 and include the shares of a country’s commitments through the EU. GDP data for 2021 is taken from the World Bank. Note that we sum up all commitments, including for payments that may lie several years in the future.

7.3. Spending promises in 2022: a closer look at Germany 2022

In a last step, we focus more closely on Germany’s policy choices. Figure 24 provides an overview on some of Germany’s most prominent new spending programs announced in 2022 and then compares these to Germany’s total aid commitments for Ukraine from January 24, 2022 to January 15, 2023. For the Uniper rescue, we use the upper bound of potential costs as reported in European Commission (2022j)³³, while the numbers for the other spending programs come from official German sources, namely €100 billion for a newly announced “special military fund” (Sondervermögen Bundeswehr) intended for new arms, equipment and military investments (German Ministry of Defense 2022d), €200 billion for the so-called “Economic Defense Shield” or “Doppelwumms” for households and firms (Government of Germany 2022b, German Ministry of Finance 2022), €2.5 billion for the “9€-Ticket”, a flat-rate monthly rail ticket, and €3.15 billion for the “Tankrabatt”, a temporary tax reduction for energy and fuel (Bundestag 2022, German Ministry of Finance 2022). As in Section 7.2 above, we again compare commitments (made in 2022) rather than actual costs of payments. The graph clearly shows how much more the German government announced for other spending programs compared to what was announced for Ukraine. Indeed, Germany’s total bilateral aid to Ukraine thus far (including EU commitments) is roughly two times the size of a comparatively small package of transport subsidies that Germans benefitted from in the summer of 2022.

³³ The German government acquired over 99% of Uniper, partially financed via the “Economic Defense Shield” (Government of Germany 2022c). We use the total amount of funding approved by the European Commission for this rescue, namely €34.5 billion (European Commission 2022j).

Figure 24. Germany's spending program in 2022 vs aid to Ukraine in billion Euros



Note: This figure compares the commitments to domestic spending packages announced since the start of the Russia-Ukraine war (February 2022) with Germany's total support for Ukraine, both in billion Euros (light blue bars represent EU shares). See the text for data sources.

8. Conclusion

This paper introduces and updates the “Ukraine Support Tracker”, which provides a comprehensive picture of the assistance offered by Western donors to Ukraine since the escalation of the conflict between Russia and Ukraine on January 24, 2022. In total, our dataset tracks €143.6 billion of financial, humanitarian, and military aid committed to Ukraine since January 24, 2022, and up until January 15, 2023.

Eastern European countries stand out when measuring aid in percent of donor GDP, and even more so if we add the large costs of hosting Ukrainian refugees. In international comparison, it is puzzling why some rich Western European countries, like France, Italy, or Spain provide so little bilateral support. In general EU countries show ongoing hesitancy in providing support to Ukraine, while they mobilized very large energy subsidies to buffer the fallout of the war at home. On average, EU governments mobilized ten times as much for new domestic energy subsidies compared to what they committed to Ukraine.

We also find that aid commitments are cyclical, with large individual packages driving much of the totals. Commitments are often disbursed with delay, including for financial aid. As a whole, aid flows have been hard to predict and aid announcements were typically country-specific and uncoordinated. A central agency and/or platform would be a major improvement to allow Ukraine to better plan ahead and make sure its most urgent financial, military and humanitarian needs are addressed.

In a bigger historical picture, aid to Ukraine appears comparatively limited. For example, the US spent many times more per year on the Korea, Vietnam or Iraq wars (measured in percent of GDP). The same is true for Germany during the Gulf War of 1990/91, where it committed more than three times as much to liberate Kuwait compared to what Germany has bilaterally committed to Ukraine in 2022 (relative to GDP).

For the purpose of continuously improving and expanding the database and this working paper, we very much welcome comments and suggestions to ukrainetracker@ifw-kiel.de.

References

- Adamowski, J. (2022). *Poland confirms T-72 tank delivery to Ukraine, with Challenger 2 tanks to fill gap*. <https://www.defensenews.com/land/2022/04/26/poland-confirms-t-72-tank-delivery-to-ukraine-with-challenger-2-tanks-to-fill-gap/>. April 26, 2022.
- Allen, R. G. D. (1946). *Mutual Aid Between the U.S. and The British Empire, 1941-45*. *Journal of the Royal Statistical Society*. 109 (3), pp. 243–271.
- Allison, G. (2022). *Britain sending anti-aircraft and Javelin missiles to Ukraine*. <https://ukdefencejournal.org.uk/britain-sending-anti-aircraft-and-javelin-missiles-to-ukraine/>. March 9, 2022.
- Alpert, M. (2013). *The Republican Army in the Spanish Civil War, 1936–1939*. Cambridge: Cambridge University Press.
- Andrade, G., Parra, M., Peña, W., Jentsch, C., Sauer, S & Wendtorf, D. (2020). *Die Bundeswehr im Golfkonflikt 1990/91*. *Militärgeschichte Zeitschrift für historische Bildung*, No. 4, 2020. Druckhaus Plage GmbH.
- Bachmann, R., Baqae, D., Bayer, C., Kuhn, M., Löschel, A., Moll, B., Peichl, A., Pittel, K. & Schularick, M. (2022). *What if? The Economic Effects for Germany of a Stop of Energy Imports from Russia*. *ECONtribute Report No. 28*, pp. 1-15.
- Becker, T., Eichengreen, B., Gorodnichenko, Y., Guriev, S., Johnson, S., Mylovanov, T., Rogoff, K. & Weder di Mauro, B. (2022). *A Blueprint for the Reconstruction of Ukraine*. CEPR Press, April 8, 2022, pp. 1-31.
- Berman, E., and Lake, D. A. (2019). *Proxy wars: Suppressing violence through local agents*. Cornell University Press, 2019.
- Brest, M. (2022). *Dozens of countries pledge \$1 billion to help Ukraine through the winter*. <https://www.washingtonexaminer.com/policy/defense-national-security/ukraine-billion-winter>. December 13, 2022.
- Brien, P. and Loft, P. (2023). *Ukraine crisis 2022: Aid and refugees*. <https://commonslibrary.parliament.uk/research-briefings/cbp-9467/>. February 9, 2023.
- Bruegel (2022). *National fiscal policy responses to the energy crisis*. <https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices>. Last accessed: November 29, 2022.
- Brzozowski, A. (2022). *EU arms fund faces reimbursement issues amid increased Ukrainian needs*. <https://www.euractiv.com/section/defence-and-security/news/eu-arms-fund-faces-reimbursement-issues-amid-increased-ukrainian-needs/>. October 14, 2022.
- Bundestag (2022). *Dreimonatige Senkung der Energiesteuer auf Kraftstoffe verabschiedet*. <https://www.bundestag.de/dokumente/textarchiv/2022/kw20-de-energiesteuersenkungsgesetz-894664>. May 19, 2022.
- Buzby, J. C., Wells, H. F. & Hyman, J. (2014). *The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States*. https://www.ers.usda.gov/webdocs/publications/43833/43679_eib121_summary.pdf?v=5978.7. February, 2014.

- Cabinet of Denmark (2022). *Ny, massiv donationspakke til Ukraine*. <https://www.regeringen.dk/nyheder/2022/ny-massiv-donationspakke-til-ukraine/>. August 11, 2022.
- Cancian, M. F. (2023). *What's the Future for Aid to Ukraine?* <https://www.csis.org/analysis/whats-future-aid-ukraine>. February 21, 2023.
- Christie, R., Claeys, G. & Weil, P. (2021). *Next Generation EU borrowing: A first assessment*. Policy Contribution 22/2021, Bruegel. November 10, 2021.
- Clark, D. (2022). *Amount contributed to the budget of the European Union in 2020, by member state*. <https://www.statista.com/statistics/316691/eu-budget-contributions-by-country/>. July 27, 2022.
- Congressional Research Service (2021). *Ukraine: Background, Conflict with Russia, and U.S. Policy*. <https://sgp.fas.org/crs/row/R45008.pdf>. October 5, 2021.
- Congressional Research Service (2023a). *U.S. Direct Financial Support for Ukraine*. <https://crsreports.congress.gov/product/pdf/IF/IF12305>. January 25, 2023.
- Congressional Research Service (2023b). *U.S. Security Assistance to Ukraine*. <https://crsreports.congress.gov/product/pdf/IF/IF12040>. January 26, 2023.
- Congressional Research Service (2023c). *Department of Defense Supplemental Funding for Ukraine: A Summary*. <https://crsreports.congress.gov/product/pdf/IN/IN12107>. February 13, 2023.
- Curtis, J. and Mills, C. (2023). *Military assistance to Ukraine since the Russian invasion*. <https://researchbriefings.files.parliament.uk/documents/CBP-9477/CBP-9477.pdf>. February 15, 2023.
- Daggett, S. (2010). *Costs of Major U.S. Wars*. <https://sgp.fas.org/crs/natsec/RS22926.pdf>. June 29, 2010.
- Dimsdale, N. and Thomas, R. (2016). *Three centuries of macroeconomic data version 2.3*, DOI:10.13140/RG.2.2.31440.92166. June 2016.
- European Commission (2014). *European Commission's support to Ukraine*. https://ec.europa.eu/commission/presscorner/detail/en/IP_14_219. March 5, 2014.
- European Commission (2022a). *Daily News 18 / 03 / 2022*. https://ec.europa.eu/commission/presscorner/detail/en/mex_22_1862. March 18, 2022.
- European Commission (2022b). *Stand Up For Ukraine: €9.1 billion pledged in support of internally displaced and refugees*. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2382. April 9, 2022.
- European Commission (2022c). *Ukraine: Commission presents plans for the Union's immediate response to address Ukraine's financial gap and the longer-term reconstruction*. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3121. May 18, 2022.
- European Commission (2022d). *EU disburses €600 million in Macro-Financial Assistance to Ukraine*. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3183. May 20, 2022.

European Commission (2022e). *EU budget policy brief*. <https://op.europa.eu/en/publication-detail/-/publication/accacfb6-0966-11ed-b11c-01aa75ed71a1/language-en/format-PDF>. July 3, 2022.

European Commission (2022f). *Commission disburses further €2 billion in exceptional macro-financial assistance to Ukraine*. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_6237. October 18, 2022.

European Commission (2022g). *Commission proposes stable and predictable support package for Ukraine for 2023 of up to €18 billion*. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6699. November 9, 2022.

European Commission (2022h). *Standing with the Ukrainian people: EU delivers further energy support for the winter*. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7320. December 13, 2022.

European Commission (2022i). *La Commission verse 500 millions d'euros supplémentaires d'aide macrofinancière exceptionnelle à l'Ukraine*. https://neighbourhood-enlargement.ec.europa.eu/news/la-commission-verse-500-millions-deuros-supplementaires-daide-macrofinanciere-exceptionnelle-2022-12-14_en. December 14, 2022.

European Commission (2022j). *State aid: Commission approves up to €34.5 billion German measure to recapitalise energy company Uniper SE in context of Russia's war against Ukraine*. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7830. December 20, 2022.

European Commission (2023). *Commission disburses first €3 billion to Ukraine of the up to €18 billion Macro-financial Assistance+ package*. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_228. January 17, 2023.

European Council (2019). *Greece: the third economic adjustment programme*. <https://www.consilium.europa.eu/en/policies/financial-assistance-eurozone-members/greece-programme/>. March 5, 2019.

European Council (2022a). *EU to support Ukraine: Council doubles funding under the European Peace Facility*. <https://www.consilium.europa.eu/en/press/press-releases/2022/03/23/eu-support-to-ukraine-council-doubles-funding-under-the-european-peace-facility/>. March 23, 2022.

European Council (2022b). *EU support to Ukraine: Council agrees on third tranche of support under the European Peace Facility for total €1.5 billion*. <https://www.consilium.europa.eu/en/press/press-releases/2022/04/13/eu-support-to-ukraine-council-agrees-on-third-tranche-of-support-under-the-european-peace-facility-for-total-1-5-billion/>. April 13, 2022.

European Council (2022c). *EU support to Ukraine: Council agrees on further increase of support under the European Peace Facility*. <https://www.consilium.europa.eu/en/press/press-releases/2022/05/24/eu-support-to-ukraine-council-agrees-on-further-increase-of-support-under-the-european-peace-facility/>. May 24, 2022.

European Council (2022d). *European Peace Facility: EU support to Ukraine increased to €2.5 billion*. <https://www.consilium.europa.eu/en/press/press-releases/2022/07/22/european-peace-facility-eu-support-to-ukraine-increased-to-2-5-billion/>. July 22, 2022.

European Council (2022e). *Infographic-Financial assistance to Greece 2010-2018*. <https://www.consilium.europa.eu/en/infographics/financial-assistance-to-greece-2010-2018/>. September 28, 2022.

European Council (2022f). *Ukraine: Council agrees on further support under the European Peace Facility*. <https://www.consilium.europa.eu/en/press/press-releases/2022/10/17/ukraine-council-agrees-on-further-support-under-the-european-peace-facility/>. October 17, 2022.

European Parliament (2023). *How the EU is supporting Ukraine*. <https://www.europarl.europa.eu/news/en/headlines/world/20220127STO22047/how-the-eu-has-been-supporting-ukraine>. February 2, 2023.

European Stability Mechanism (2011). *EU and EFSF funding plans to provide financial assistance for Portugal and Ireland*. <https://www.esm.europa.eu/press-releases/eu-and-efsf-funding-plans-provide-financial-assistance-portugal-and-ireland>. May 19, 2011.

European Stability Mechanism (2013). *Conclusion of ESM financial assistance programme for Spain: An overview*. https://www.esm.europa.eu/sites/default/files/migration_files/spanish_exit.pdf. December 31, 2013.

European Union (2012). *Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union*. Official Journal of the European Union, C 326, 1-390.

European Union (2017). *Financial assistance to Ireland*. <https://eur-lex.europa.eu/EN/legal-content/summary/financial-assistance-to-ireland.html>. January 22, 2017.

European Union (2021). *NextGenerationEU*. https://next-generation-eu.europa.eu/index_en. June 11, 2021.

European Union (2022). *European Investment Bank approves €668 million immediate financial support to Ukraine*. <https://euneighbourseast.eu/news/latest-news/eib-board-approves-e668-million-immediate-financial-support-to-ukraine/>. March 7, 2022.

European Union External Action Service (2022). *Foreign Affairs Council: Press remarks by High Representative Josep Borrell after the meeting*. https://www.eeas.europa.eu/eeas/foreign-affairs-council-press-remarks-high-representative-josep-borrell-after-meeting-2_en. November 14, 2022.

Executive Office of the President (1945). *21st Report to Congress on Lend-Lease Operations*. https://books.google.de/books/about/Report_to_Congress_on_Lend_lease_Operati.html?id=AwEoObv-EC&redir_esc=y. September 30, 1945.

Fotidiadis, A. and Schmidt, N. (2022). *The European Peace Facility, an unsecured gun on EU's table*. <https://www.investigate-europe.eu/en/2022/european-peace-facility-controversy/>. March 29, 2022.

G7 Germany (2022). *G7 finance ministers and central bank governors Petersberg communiqué*. <https://www.bundesregierung.de/resource/blob/998440/2042892/0e49b3d6176a9c79de0a27ab1d6d2b15/2022-05-20-g7-finanzminister-en-data.pdf?download=1>. May 20, 2022.

Galeon, A. (2022). *Slovakia to Receive Leopard 2A4 Tanks Under Ukraine Swap Scheme*. <https://www.thedefensepost.com/2022/11/18/slovakia-receive-leopard-tanks/>. November 18, 2022.

Gebauer, M. and von Hammerstein, K. (2022). *Wo es beim Panzer-Ringtausch mit Slowenien hakt*. <https://www.spiegel.de/politik/deutschland/ukraine-waffenlieferungen-wo-es-beim-panzer-ringtausch-mit-slowenien-hakt-a-f9e764c1-df3c-4a70-bfc3-8b49fe7b4beb>. May 6, 2022.

German Embassy in Kuwait (2014). *In freundschaftlicher Verbundenheit - Deutschlands Beitrag zur Befreiung Kuwaits*. https://web.archive.org/web/20141208203539/http://www.kuwait.diplo.de/Vertretung/kuwait/de/03/Bilaterale_Beziehungen/seite_Befreiung_Kuwait.html. archived on December 8, 2014.

German Ministry of Defense (2022a). *Ukraine-Unterstützung: Panzer-Ringtausch mit Slowakei vorbereitet*. <https://www.bmvg.de/de/aktuelles/panzer-ringtausch-mit-slowakei-vorbereitet-5482368> . August 23, 2022.

German Ministry of Defense (2022b). *Weiterer Ringtausch: Ministerin vereinbart Letter of Intent mit Slowenien*. <https://www.bmvg.de/de/aktuelles/ringtausch-ministerin-vereinbart-letter-of-intent-mit-slowenien-5501446> . September 21, 2022.

German Ministry of Defense (2022c). *Deutsch-Griechischer Ringtausch kommt voran*. <https://www.bmvg.de/de/presse/deutsch-griechischer-ringtausch-kommt-voran-5499012> . September 19, 2022.

German Ministry of Defense (2022d). *Sondervermögen Bundeswehr markiert historischen Aufbruch*. <https://www.bmvg.de/de/aktuelles/sondervermoegen-bundeswehr-markiert-historischen-aufbruch-5542400>. December 15, 2022.

German Ministry of Finance (2022). *Schnelle und spürbare Entlastungen in Milliardenhöhe*. <https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Schlaglichter/Entlastungen/schnelle-spuerbare-entlastungen.html>. December 16, 2022.

Government of Canada (2022a). *Government of Canada announces loan of up to CAD 120 million to support Ukraine's economic resilience and development*. <https://www.canada.ca/en/global-affairs/news/2022/01/government-of-canada-announces-loan-of-up-to-120-million-to-support-ukraines-economic-resilience-and-development.html>. January 21, 2022.

Government of Canada (2022b). *Canada's leadership in the world*. <https://www.canada.ca/en/department-finance/news/2022/04/canadas-leadership-in-the-world.html>. April 7, 2022.

Government of Canada (2022c). *Government of Canada introduces legislation to make life more affordable for Canadians*. <https://www.canada.ca/en/department-finance/news/2022/09/government-of-canada-introduces-legislation-to-make-life-more-affordable-for-canadians.html>. September 29, 2022.

Government of Canada (2022d). *Affordability Plan*. <https://www.canada.ca/en/department-finance/services/affordability-plan.html>. December 12, 2022.

Government of Canada (2022e). *Canada's engagement in Ukraine*. <https://www.international.gc.ca/country-pays/ukraine/relations.aspx?lang=eng>. December 20, 2022.

Government of Germany (2022a). *Unterstützung für die Ukraine in einer herausfordernden Zeit*. <https://www.bundesregierung.de/breg-de/suche/unterstuetzung-ukraine-2003926>. February 22, 2022.

Government of Germany (2022b). *9-Euro-Ticket 52 Millionen Mal verkauft*. <https://www.bundesregierung.de/breg-de/suche/faq-9-euro-ticket-2028756>. September 1, 2022.

Government of Germany (2022c). *Clear terms for the takeover of the energy company Uniper*. <https://www.bundesregierung.de/breg-de/aktuelles/uniper-takeover-2128422>. December 21, 2022.

Government of Germany (2022d). *Deutsche bilaterale Unterstützungsleistungen für die Ukraine und Menschen aus der Ukraine*. <https://www.bundesregierung.de/resource/blob/975226/2155792/c3dbab706421f63d3d612091e7ecad4c/2022-12-27-unterstuetzung-ukraine-breg-data.pdf?download=1%20Guten>. December 21, 2022.

Government of Germany (2023). *Liste der militärischen Unterstützungsleistungen*. <https://www.bundesregierung.de/breg-de/themen/krieg-in-der-ukraine/lieferungen-ukraine-2054514>. Last accessed: February 20, 2023

Government of Slovenia (2022). *In Kiev, Minister Šarec expresses Slovenia's support and solidarity to Ukraine*. <https://www.gov.si/en/news/2022-11-28-in-kiev-minister-sarec-expresses-slovenias-support-and-solidarity-to-ukraine/>. November 28, 2022

Government of United Kingdom (2022a). *PM statement at Ukraine press conference: 1 February 2022*. <https://www.gov.uk/government/speeches/pm-statement-at-ukraine-press-conference-1-february-2022>. February 1, 2022.

Government of United Kingdom (2022b). *PM announces further £1 billion in military support to Ukraine*. <https://www.gov.uk/government/news/pm-announces-further-1-billion-in-military-support-to-ukraine>. June 30, 2022.

Gronholt-Pedersen, J. (2022). *Western countries pledge \$1.55 bln in military aid to Ukraine*. <https://www.reuters.com/world/europe/denmark-will-contribute-additional-110-mln-euros-ukraine-pm-2022-08-11/>. August 11, 2022.

Grylls, G. and Swinford, S. (2022). *PM plans tank swap in defence of Ukraine*. <https://www.thetimes.co.uk/article/pm-plans-tank-swap-in-defence-of-ukraine-c7dgnbknb>. April 26, 2022.

Harding, L. (2022). *"We couldn't stand it": the Ukrainians travelling for days to flee Russian bombs and rockets*. <https://www.theguardian.com/world/2022/mar/08/we-couldnt-stand-it-the-ukrainians-travelling-for-days-to-flee-russian-bombs-and-rockets>. March 8, 2022.

Higgins, A. (2022). *Hiding in Plain Sight, A Soviet-Era Air Defense System Arrives in Ukraine*. <https://www.nytimes.com/2022/04/14/world/europe/ukraine-russia-nato-s300.html>. April 14, 2022.

Horn, S., Reinhart, C. M. & Trebesch, C. (2020). *Coping with Disasters: Two Centuries of International Official Lending*. NBER Working Paper, No. 27343, 1-66.

IISS (2022). *The Military Balance 2022*.

<https://www.taylorfrancis.com/books/9781003294566>. February 15, 2022.

IMF (2022a). *Joint Statement of Heads of International Financial Institutions with Programs in Ukraine and Neighboring Countries*.

<https://www.imf.org/en/News/Articles/2022/03/17/pr2280-joint-statement-heads-ifis-programs-ukraine-neighboring-countries>. March 17, 2022.

IMF (2022b). *IMF Executive Board Approves the Establishment of a Multi-Donor Administered Account for Ukraine*.

<https://www.imf.org/en/News/Articles/2022/04/08/pr22111-imf-executive-board-approves-establishment-of-a-multi-donor-administered-account-for-ukraine>. April 8, 2022.

IMF (2022c). *IMF Executive Board Approves US\$ 1.3 Billion in Emergency Financing Support to Ukraine*. <https://www.imf.org/en/News/Articles/2022/10/07/pr22343-imf-approves-emergency-financing-support-to-ukraine>.

October 7, 2022.

IMF-WEO (2017). *World Economic Outlook: Gaining Momentum?*. Washington, DC. October. 2017.

International Press Centre Denmark (2022). *International donors conference in Copenhagen, hosted by Ukraine, the UK and Denmark*. <https://ipcd.dk/news-and-events/copenhagenukraine>. August 11, 2022.

Irish, J. and Rose, M. (2022). *Ukraine's allies pledge over 1 bln euros in immediate winter aid*. <https://www.reuters.com/world/europe/russia-pounds-ukraine-civil-infrastructure-powers-meet-provide-aid-2022-12-13/>. December 13, 2022.

King, I (2019). *Not Contributing Enough? A Summary of European Military and Development Assistance to Ukraine Since 2014*. <https://www.csis.org/analysis/not-contributing-enough-summary-european-military-and-development-assistance-ukraine-2014>. September 26, 2019.

Lawder, D. and Shalal, A. (2022). *World Bank to send Ukraine \$1.5 billion as food, energy prices spike*. <https://www.reuters.com/business/world-bank-says-it-is-preparing-15-billion-aid-package-ukraine-2022-04-12/>. April 12, 2022.

Lima, C. (2022). *U.S. quietly paying millions to send Starlink terminals to Ukraine, contrary to SpaceX claims*. <https://www.washingtonpost.com/politics/2022/04/08/us-quietly-paying-millions-send-starlink-terminals-ukraine-contrary-spacexs-claims/>. April 8, 2022.

Martín-Ageña, P., Ruiz, E. M., & Pons, M. A. (2012). *War and economics: Spanish civil war finances revisited*. In *European Review of Economic History* 16 (2), pp. 144–165.

Mills, C. (2022). *Military assistance to Ukraine 2014–2021*.

<https://researchbriefings.files.parliament.uk/documents/SN07135/SN07135.pdf>. March 4, 2022.

Ministry of Finance of Ukraine (2023a). *Ukraine's state budget financing in 2023 split by sources as of January 18, 2023*.

https://twitter.com/ua_minfin/status/1616017009535246337?cxt=HHwWgoCzxY-6n-0sAAAA. January 18, 2023.

Ministry of Finance of Ukraine (2023b). *Ukraine's State Budget Financing Since the Beginning of the Full-scale War*.

https://mof.gov.ua/en/news/ukraines_state_budget_financing_since_the_beginning_of_the_full-scale_war-3435. Last accessed: February 21, 2023.

Ministry of Foreign Affairs Japan (1991). *DIPLOMATIC BLUEBOOK 1991*.

<https://www.mofa.go.jp/policy/other/bluebook/1991/1991-contents.htm>. December 1, 1991

Ministry of Foreign Affairs Republic of Poland (2022). *International Donors' Conference for Ukraine*. <https://www.gov.pl/web/diplomacy/international-donors-conference-for-ukraine>.

May 5, 2022.

National Recovery Council (2022). *Ukraine's National Recovery Plan*. https://uploads-ssl.webflow.com/621f88db25fbf24758792dd8/62c166751fcf41105380a733_NRC%20Ukraine%27s%20Recovery%20Plan%20blueprint_ENG.pdf. August 16, 2022.

OECD (2022). *International Migration Outlook 2022*. <https://www.oecd-ilibrary.org/sites/30fe16d2-en/index.html?itemId=/content/publication/30fe16d2-en>. October 10, 2022.

Podolyak, M. (2022). *Twitter post from June 13, 2022*.

https://twitter.com/Podolyak_M/status/1536244944637202432. June 13, 2022.

Porter, R. (2022). *EBRD unveils €2 billion resilience package in response to the war on Ukraine*. <https://www.ebrd.com/news/2022/ebrd-unveils-2-billion-resilience-package-in-response-to-the-war-on-ukraine-.html>. March 9, 2022.

President of France (2022). *Solidaires du peuple ukrainien*. <https://www.elysee.fr/emmanuel-macron/2022/12/13/solidaires-du-peuple-ukrainien>. December 13, 2022.

Republic of Poland (2022). *High-level International Donors' Conference for Ukraine - Thursday 5 May 2022 in Warsaw*. <https://www.gov.pl/web/canada-en/high-level-international-donors-conference-for-ukraine---thursday-5-may-2022-in-warsaw>.

May 5, 2022.

Reuters (2022). *Berlin to supply arms to Greece, Athens to deliver Soviet weapons to Kyiv – Scholz*. <https://www.reuters.com/business/aerospace-defense/germany-supply-ifvs-greece-athens-deliver-soviet-weapons-kyiv-scholz-2022-05-31/>. May 31, 2022.

Roblin, S. (2022). *Czech Super T-72M4 Tanks Seen Headed To Poland-Ukraine Border*. <https://www.forbes.com/sites/sebastienroblin/2022/10/28/czech-super-t-72m4-tanks-seen-headed-towards-ukraine/?sh=3ca918723ce7>. October 28, 2022.

Rybalkin, Y. (2000). *Operation X. Soviet Military Aid to Republican Spain (1936-1939) [Operaciya «X». Sovetskaya voennaya pomoshch' respublikanskoy Ispanii (1936-1939)]*. Moscow: AIRO-XX.

Sarkees, M. and Wayman, F. (2010). *Resort to War: 1816 – 2007*. Washington DC: CQ Press.

Sheetz, M. (2022). *Elon Musk's SpaceX sent Ukraine thousands of Starlink satellite internet dishes to Ukraine, company's president said*. <https://www.cnbc.com/2022/03/22/elon-musk-spacex-thousands-of-starlink-satellite-dishes-sent-to-ukraine.html>. March 22, 2022.

- SIPRI (2022). *The SIPRI Arms Transfers Database*. <https://www.sipri.org/databases/armstransfers>. March 14, 2022.
- Tagesschau (2022a). *Mehr als eine Milliarde Euro Militärhilfe*. <https://www.tagesschau.de/inland/scholz-ukraine-militaerhilfe-101.html>. April 15, 2022.
- Tagesschau (2022b). *Deutschland liefert Tschechien Panzer*. <https://www.tagesschau.de/inland/ukraine-waffenlieferung-leopard-panzer-ringtausch-tschechien-101.html>. May 18, 2022.
- The National Herald (2023). *Germany Will Send Infantry Fighting Vehicles to Ukraine First, Then Greece*. <https://www.thenationalherald.com/germany-will-send-infantry-fighting-vehicles-to-ukraine-first-then-greece/>. January 8, 2023.
- UK Parliament (1946). *Common sittings. Oral answers to questions. Russia (british empire war assistance)*. <https://api.parliament.uk/historic-hansard/commons/1946/apr/16/russia-british-empire-war-assistance>. January 21, 2023.
- Ukraine Recovery Conference (2022a). *Ukraine Recovery Conference: 4-5 July 2022 – Lugano, Switzerland*. <https://www.urc2022.com>. August 16, 2022.
- Ukraine Recovery Conference (2022b). *All sessions of the Ukraine Recovery Conference*. <https://www.urc2022.com/ukraine-recovery-conference-urc-2022>. August 16, 2022.
- UNHCR (2022). *Private sector donates over US\$200 million to UNHCR's Ukraine emergency response*. <https://www.unhcr.org/news/press/2022/3/622f7d1f4/private-sector-donates-us200-million-unhcrs-ukraine-emergency-response.html>. March 14, 2022.
- UNHCR (2023). *Operational Data Portal: Ukraine refugee situation*. <https://data.unhcr.org/en/situations/ukraine>. Last accessed: February 20, 2023.
- United Nations (2023). *The UN and the war in Ukraine: key information*. <https://unric.org/en/the-un-and-the-war-in-ukraine-key-information/#uk2>. Last accessed: February 6, 2023.
- United Nations Central Emergency Fund (2022). *“A massive relief effort” CERF scales up humanitarian aid in Ukraine*. <https://cerf.un.org/news/story/massive-relief-effort-cerf-scales-humanitarian-aid-ukraine>. March 24, 2022.
- United Nations Central Emergency Fund (2023). *Contributions*. <https://cerf.un.org/our-donors/contributions>. Last accessed: February 9, 2023.
- United Nations Office for the Coordination of Humanitarian Affairs (2023). *About the UHF*. <https://www.unocha.org/ukraine/about-uhf>. Last accessed: February 20, 2023.
- US Bureau of Economic Analysis (2017). *Table 1.1.5. Gross Domestic Product*. <https://apps.bea.gov/iTable/?reqid=19&step=2&isuri=1&categories=survey#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDNdLCJkYXRhIjpbWyJjYXRlZ29yaWVzIiwuU3VydmV5II0sWyJOSVBBX1RhYmxlX0xpc3QiLCI1Ii1dfQ==>. Last accessed: February 20, 2023.
- US Congress (2022). *H.R.7691 - Additional Ukraine Supplemental Appropriations Act, 2022*. <https://www.congress.gov/bill/117th-congress/house-bill/7691>. May 21, 2022.

US Department of Defense (1992). *Conduct of the Persian Gulf War: final report to Congress*. <https://www.globalsecurity.org/military/library/report/1992/cpgw.pdf>. April 1, 1992.

US Department of State (1945). *Report on War Aid Furnished by the United States to the U.S.S.R.* Washington. November 28, 1945.

US Department of State (2023). *U.S. Security Cooperation with Ukraine*. <https://www.state.gov/u-s-security-cooperation-with-ukraine/#:~:text=Since%20January%202021%2C%20the%20United,This%20includes%20approximately%202427>. February 3, 2023.

US Department of War (1946). *Quantities of Lend-Lease Shipments*. <https://www.ibiblio.org/hyperwar/USA/ref/LL-Ship/index.html>. December 31, 1946.

US House of Appropriations (2022a). *Ukraine Supplemental Appropriations Act, 2022*. <https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/Ukraine%20Supplemental%20Summary.pdf>. March 10, 2022.

US House of Appropriations (2022b). *Additional Ukraine Supplemental Appropriations Act, 2022*. <https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/Additional%20Ukraine%20Supplemental%20Appropriations%20Act%20Summary.pdf> . May 21, 2022.

US House of Appropriations (2022c). *Continuing Appropriations and Ukraine Supplemental Appropriations Act, 2023*. <https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/Summary%20Continuing%20Appropriations%20and%20Ukraine%20Supplemental%20Appropriations%20Act%202023.pdf> . September 27, 2022.

US House of Appropriations (2022d). *Additional Ukraine Supplemental Appropriations Act, 2023*. <https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/Ukraine%20Supplemental%20Summary%20FY23.pdf> . December 29, 2022.

Viñas, A. (1984). *The financing of the Spanish Civil War*. In Paul Preston (Ed.): *Revolution and War in Spain, 1931-1939*. London: Routledge, pp. 266–283.

White House (2022). *Inflation Reduction Act Guidebook*. <https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/>. August 16, 2022.

World Bank (2022a). *World Bank Mobilizes an Emergency Financing Package of over \$700 million for Ukraine*. <https://www.worldbank.org/en/news/press-release/2022/03/07/world-bank-mobilizes-an-emergency-financing-package-of-over-700-million-for-ukraine>. March 7, 2022.

World Bank (2022b). *World Bank Announces Additional \$200 Million in Financing for Ukraine*. <https://www.worldbank.org/en/news/press-release/2022/03/14/world-bank-announces-additional-200-million-in-financing-for-ukraine>. March 14, 2022.

World Bank (2022c). *World Bank announces additional \$1.49 billion financing support for Ukraine*. <https://www.worldbank.org/en/news/press-release/2022/06/07/-world-bank-announces-additional-1-49-billion-financing-support-for-ukraine>. June 7, 2022.

World Bank (2022d). *World Bank Mobilizes \$4.5 billion in Additional Financing for Vital Support to Ukraine*. <https://www.worldbank.org/en/news/press-release/2022/08/08/world-bank-mobilizes-4-5-billion-in-additional-financing-for-vital-support-to-ukraine>. August 8, 2022.

World Bank (2022e). *World Bank Mobilizes Additional \$530 Million in Support to Ukraine*. <https://www.worldbank.org/en/news/press-release/2022/09/30/world-bank-mobilizes-additional-530-million-in-support-to-ukraine>. September 30, 2022.

Zachmann, G. (2014). *Eastern promises: The IMF-Ukraine bailout*. <https://www.bruegel.org/blog-post/eastern-promises-imf-ukraine-bailout>. March 27, 2022.

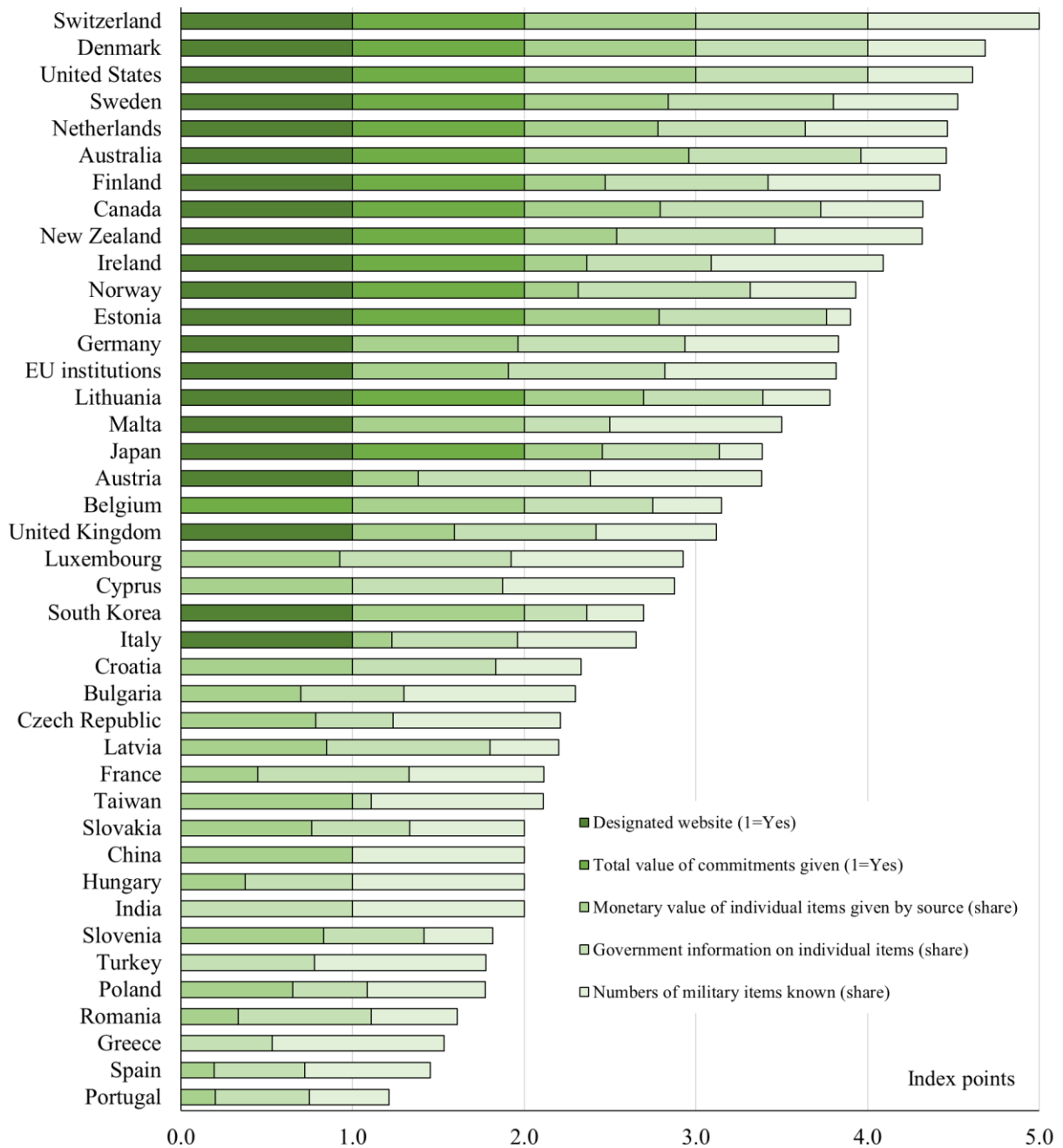
Appendix I: Supplementary material for methodology and main results

This section provides additional information on the data quality and transparency index, further details on the case of US aid, and an extension to Figure 5, assigning EU level aid shares to the bilateral commitments in percent of GDP.

Quality and transparency index

This figure extends the quality and transparency index from Section 2.3 by showing country figures based on sub-indices. Since our dataset lists countries with no military donations to Ukraine (China, Hungary, India, Taiwan, Malta, Cyprus, EU (Commission and Council), Ireland, Switzerland), we set the value of Subindex 5 to the value of “1” for these countries.

Figure A1. Composition of the transparency index of Ukraine support
segmented into 5 subindices



Note: This figure shows the quality and transparency ranking based on subindices. The total index score is calculated as the sum of five subcomponents: 1. Designated website (1 = Yes, 0 = No). Is there an official website on government aid to Ukraine? 2. Total value of commitments given (1 = Yes, 0 = No). Is the total sum of Ukraine support provided by the government? (1 = Yes, 0 = No); 3. Monetary value of individual items given by source (share). Share of committed individual items in our database for which we have a monetary value provided by a source. (Shares computed for each country); 4. Government information on individual items (share). Share of committed individual items in our database for which we have an official source. (Shares computed for each country); 5. Number of military items known (share). Share of committed and disclosed in-kind military items for which we have the exact number of units or weapons committed. (Shares computed for each country). For countries with no military in-kind commitment, we set the value of "Subindex 5: Number of military items known" to 1.

US Aid to Ukraine (Summary of all appropriation acts)

In this section, we will further explain our data for the United States. Despite seemingly transparent government information and detailed budget plans this case proves to be rather convoluted. We will go into more detail on each appropriation act and document which position we count towards aid to Ukraine and which we do not, thereby explaining potential discrepancies to other sources. We provide a more detailed case-by-case overview of each budget position in the “Summary of US acts” sheet in our Ukraine Support Tracker dataset.

The first “Ukraine Supplemental Appropriations Act” was approved in March 2022 (US House of Appropriations 2022a). Summing over all individual positions in this act gives \$16.6 billion of appropriated, i.e., bookmarked, funds. Applying our definition of bilateral aid, we only consider \$9.63 billion as direct support to Ukraine. Subsequently, we do not consider \$6.97 billion from the \$16.6 billion sum of appropriations listed in this act as bilateral aid to Ukraine. Importantly, this includes \$3.5 billion for the Department of Defense (DoD), which is closely connected to the \$3 billion appropriated for the Presidential Drawdown Authority. However, including both positions would lead to double counting since the budget for the DoD is used to replenish those same stocks. Subtracting these \$3 billion of appropriated Presidential Drawdown authority to account for the double position leaves \$13.6 billion, which is also the amount referenced in the headline of the act. Especially the DoD and Drawdown authority double positions are problematic, because it is not always obvious what exactly needs to be left out to reach the headlined number.

In May, Congress approved the “Additional Ukraine Supplemental Appropriations Act” (US House of Appropriations 2022b). Adding all individual positions in this act totals \$51.09 billion in appropriated funds. From this act, we only count \$34.86 billion as direct aid to Ukraine. As before, we do not count budget positions appropriated for US security concerns in Europe, and, most notably, we do not count the “Replenishment of US weapon stocks.” These positions appear throughout all four acts, and adjusting for them significantly decreases the appropriated amount of US aid to Ukraine. The bill reports an amount of “more than \$40 billion in emergency funding” (US House of Appropriations 2022b) in the headline. To arrive at this amount, we sum over all individual entries (which equals \$51.09 billion) and correct for the double position of \$11 billion from the increased Presidential Drawdown Authority. This procedure is the same correction approach as in the previous act.

With the start of the new fiscal year in October 2022, Congress approved the “Continuing Appropriations and Ukraine Supplemental Appropriations Act” (US House of Appropriations 2022c). The sum of appropriated positions amounts to \$15.54 billion in this act. Applying our definition of bilateral aid, we only consider \$11.24 billion as direct aid to Ukraine and not to neighboring countries, domestic security expenses, or help to refugees. Although no official headline in the act mentions a total amount like in the previous two acts, the CSIS report (Cancian 2023) and the statements on total US aid given by the House of Appropriations and the Congressional Research Service (CRS) mention \$14 billion of funding in this act. Subtracting the double position of \$1.5 billion funding for the “Replenishment of US stocks” from the total sum of all positions (\$15.54 billion) yields the mentioned \$14 billion.

As of January 21, 2023, the last act is the “Additional Ukraine Supplemental Appropriations Act 2023” (US House of Appropriations 2022d) from December 2022. After summing up all positions in this act, we arrive at \$61 billion in appropriated funds. From this act, \$21.8 billion falls into our definition of bilateral support to Ukraine, with the remaining \$39.2 not considered

as aid in our dataset. This act proves confusing as there is no clear indication of how to reach the headline number of \$45 billion reported by the House of Appropriations. After summing all positions up and correcting for \$14.5 billion for the increase in the Presidential Drawdown Authority, we obtain \$46.76 billion. Since this exercise serves to justify our numbers and not the official headlines published by the House of Appropriations, this difference is not crucial. Yet, why these acts do not include more information on double positions remains puzzling.

Furthermore, we provide a short clarification on the different amounts of US aid stated by various sources. Mainly, we identify three different amounts for US aid to Ukraine:

First, the sum of all positions in the acts, which amounts to \$144.49 billion in appropriated funds. This value simply reflects the sum over all entries in the four acts, regardless of whether they are double positions or are considered bilateral aid in our dataset or not.

Second, the \$113 billion given by the Congressional Research Service (2023c). This amount appears to be the sum of all given headline values (\$13.6 billion from the March 2022 act, \$40 billion from the May 2022 act, \$45 billion from the December 2022 act), and \$14 billion reported by the CRS and CSIS for the September 2022 act. This sum corrects for double counting through the Presidential Drawdown Authority and Replenishment of stocks positions, but also includes cases we do not consider bilateral aid in our dataset.

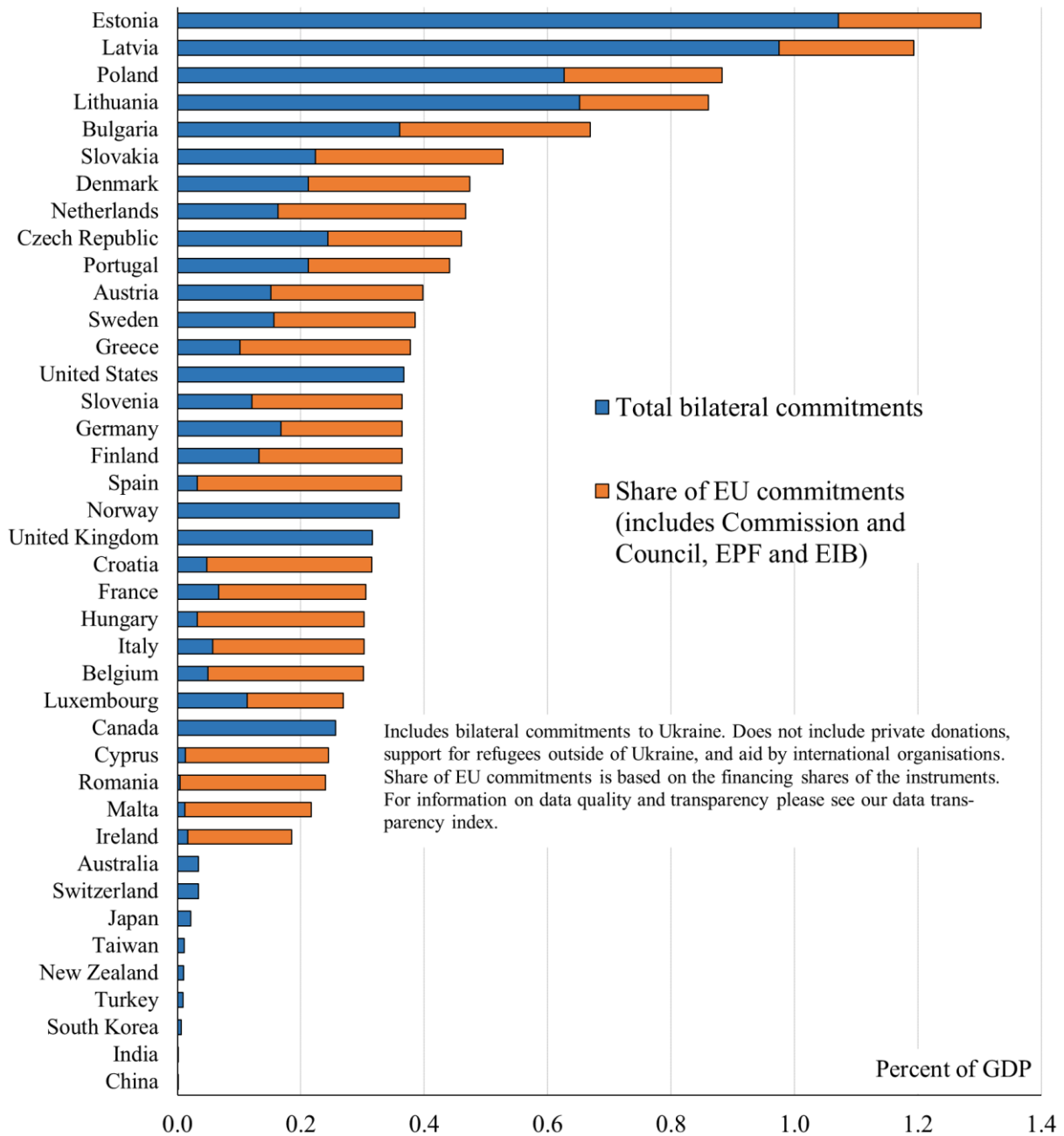
Third, the amount of bilateral aid reported in our Ukraine Support Tracker dataset as bilateral US aid to Ukraine. Applying our definition of bilateral aid yields \$95.19 billion in appropriated funding for Ukraine over all four acts. In a first step, we still need to correct this amount for double counting caused from increases in the Presidential Drawdown Authority in the May and December 2022 acts, as well as subtract two drawdowns precluding the war. We subtract a total of \$6.96 billion in appropriated funds in this step. Afterwards, we correct for unused, i.e., appropriated but not obligated, budgets in fiscal year 2022 based on the data from the Congressional Research Service. Unused funding cannot be transferred to the next fiscal year unless otherwise specified in the law and are therefore lost. For this correction of not obligated funds, we subtract \$11.98 billion. After these corrections, we end up with \$76.25 billion.

This amount of bilateral US aid to Ukraine stands against the \$76.84 billion (€73.18 billion) we report in our dataset, meaning we overestimate US support in our dataset by \$590 million, or not even 1%. This overestimation is in line with our upper-bound approach. We therefore do not correct this amount. Discrepancies might be caused by relatively small humanitarian aid positions. It is not entirely clear which positions have been completely used fiscal year 2022, while others might only be partially utilized with the remaining appropriated budget being lost.

Bilateral aid to Ukraine including EU shares (percent of GDP)

Figure A2 converts reassigns EU-level commitments to the individual EU countries and then computes total aid shares in percent of donor GDP. The blue bar segments indicate bilateral aid (those of Figure 5), while the orange segments represent each country's share in commitments through the various European institutions and mechanisms, which include the European Commission and Council, the European Peace Facility, and the European Investment Bank. See text for details.

Figure A2. Reassigning EU-level aid to individual EU countries (percent of GDP)
bilateral and EU commitments January 24, 2022, to January 15, 2023



Note: This figure shows total bilateral aid commitments to Ukraine including EU aid shares across donors as percentage of GDP between January 24, 2022 and January 15, 2023.

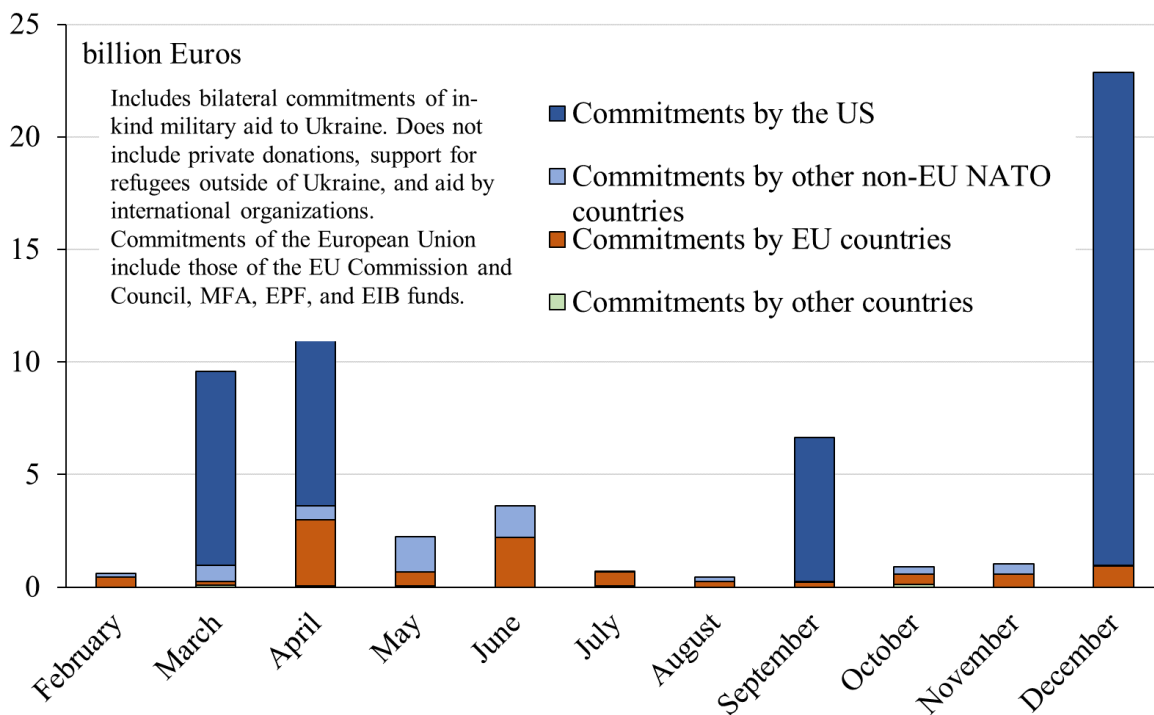
Appendix II: Further information on military aid and heavy weapons

This section provides further figures and tables on military aid and heavy weapon commitments and deliveries, serving as an extension to Section 5. This includes time dynamics, as well as granular information for each heavy weapon type and donor country.

Total military in-kind assistance over time

Figure A3 shows the bilateral military in-kind commitments with traceable commitment month between January 24 and December 31, 2022. We differentiate between commitments made by the US, EU members, other NATO members and non-NATO countries.

Figure A3. Total military in-kind assistance (billion Euros)
bilateral commitments February 1 to December 31, 2022



Note: This figure shows the total value of in-kind aid commitments to Ukraine in billion Euros over time between February 1 and December 31, 2022.

Commitments and deliveries of heavy weapons

Table A1 shows the commitments and deliveries of tanks, armored vehicles, howitzers (155mm), MLRS, and Anti-Aircraft Systems.

Table A1. Aggregate overview: main weapon categories by type
bilateral commitments and deliveries between January 24, 2022 and January 15, 2023

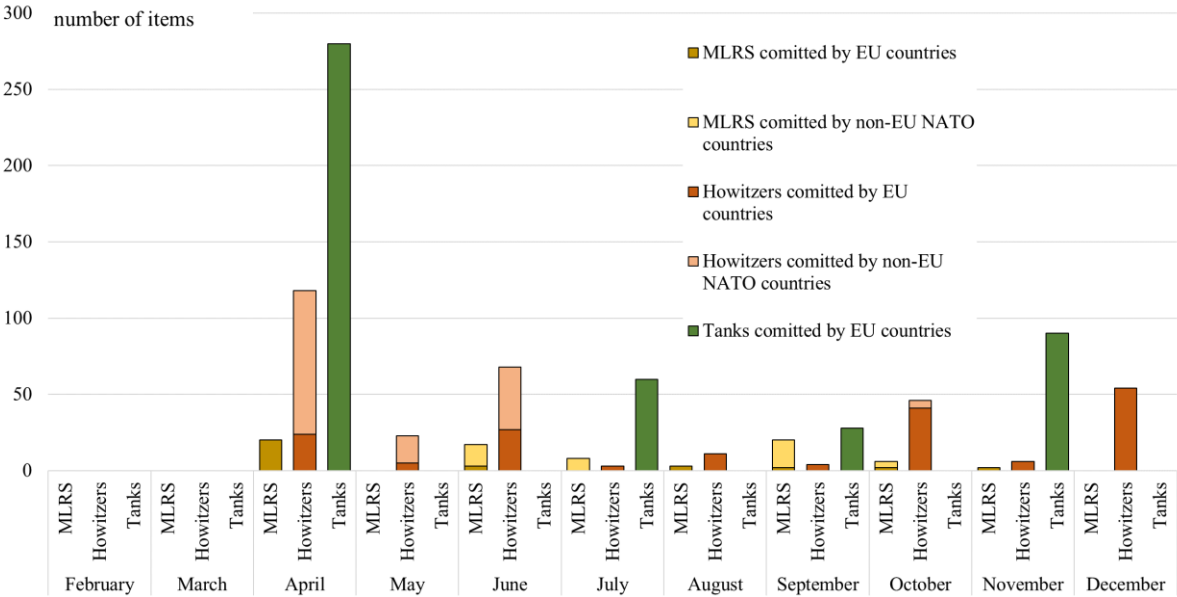
<i>Weapon Type</i>	<i>Delivered</i>	<i>Committed</i>	<i>Share delivered</i>
Tanks	368	472	78%
Armored Vehicles	1240	2559	48.5%
Howitzer (155mm)	293	415	70.6%
MLRS	49	76	64.5%
Anti-Aircraft Systems	24	33	72.7%
Total	1974	3555	55.5%

Note: This table contains the weapon deliveries and commitments, based on the information from out dataset, differentiated into main weapon types. Information on delivery sources can be found in the accompanying dataset.

Heavy weapon commitments over time

In Figure A4, we also report heavy weapon units over time to provide a more disaggregate picture on weapon commitments. We differentiate between tanks, howitzers, and MLRS and trace bilateral commitments over the year 2022.

Figure A4. Heavy weapons in-kind committed assistance (number of items)
bilateral commitments January 24 to December 31, 2022

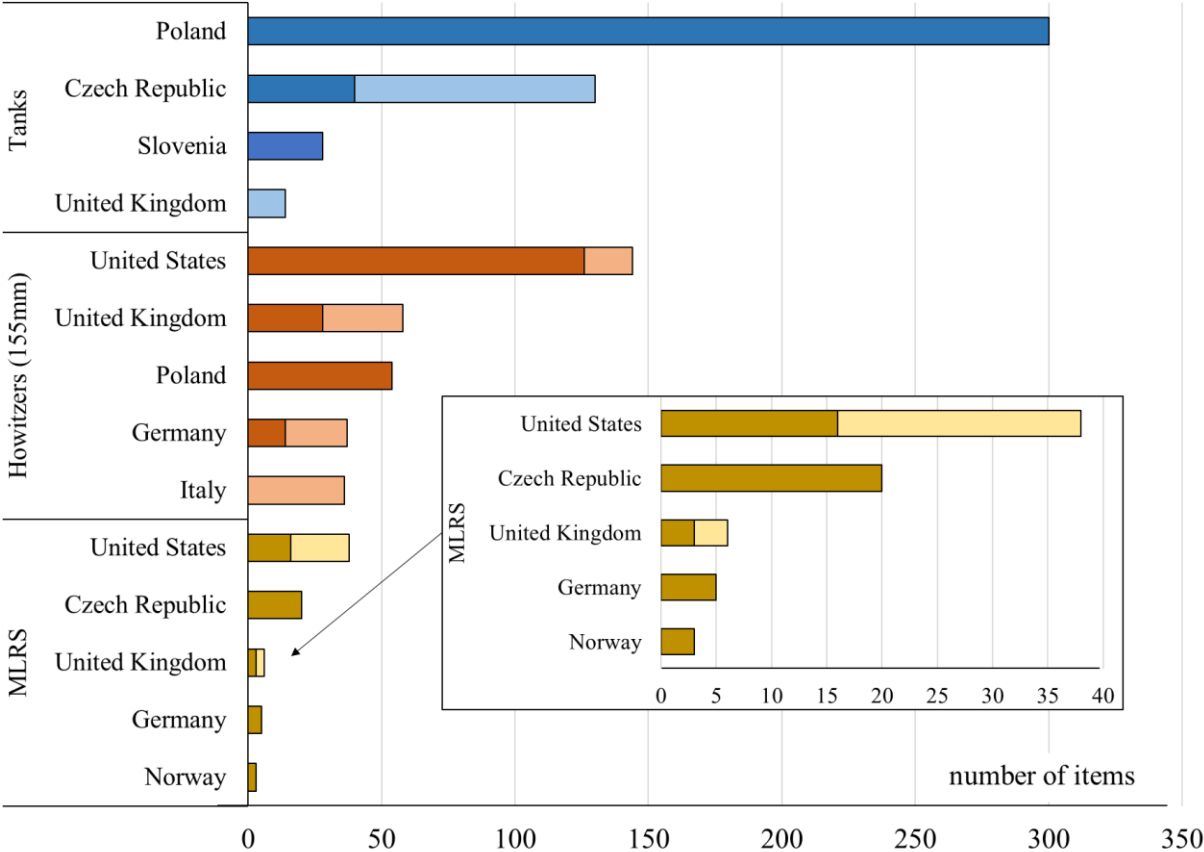


Note: This figure shows the total number of heavy weapon commitments to Ukraine with traceable commitment months over time between February 1 and December 31, 2022.

Weapon deliveries by categories

Figure A5 offers an aggregate overview of the number of delivered items across the top donor countries in three main heavy weapon categories: Tanks, howitzers (155/ 152mm), and multiple launch rocket systems (MLRS). For each category, we show the top five donor countries. If fewer than five countries have delivered heavy weapons of that type, we report the actual number of donating countries (i.e., for tanks and MLRS).

Figure A5. Military commitments and deliveries - by weapon category (number of items) *disclosed bilateral deliveries between January 24, 2022 and January 15, 2023*



Note: This figure shows total items of in-kind military aid committed and delivered to Ukraine between January 24, 2022 and January 15, 2023 in three categories: MLRS, howitzers (155mm/152mm), and tanks.

The United States stands out in terms of delivered 155mm howitzers, having delivered more than 126 so far. Among the MLRS, the HIMARS and RM-70 systems are the most delivered systems. As of January 15, only four countries have committed main battle tanks to Ukraine, namely Poland, Slovenia, Czech Republic, and the United Kingdom. Table A2 gives a more detailed view, as well as an outlook on the new tank commitments discussed until February 15.

Weapon commitments by subcategory

Tables A2 to A4 show the specific quantities heavy weapon commitments and deliveries by country.

Table A2. Tanks, number committed by country
bilateral commitments January 24, 2022 to January 15, 2023

<i>Country</i>	<i>Committed</i>	<i>Delivered</i>	<i>Type</i>
Poland	300	300	T-72 (260)
Czech Republic	130	40	T-72
Slovenia	28	28	T-72
United Kingdom	14	0	Challenger 2
Total	472	368	

Note: This table shows the number of committed and delivered tanks to Ukraine between January 24, 2022 and January 15, 2023 in number of items. Displayed are only the countries with actual commitments and deliveries in the respective subcategory of heavy weapons.

Next to the countries listed above, we found evidence on further commitments of main battles tanks between January 16 and February 15, 2023 (see the “preview” Box 1):

- Belgium - 50 Leopard 1A5
- Canada - 4 Leopard 2A4
- Denmark & Netherlands (together) - approx. 78 Leopard 1A5
- Finland - unknown amount of Leopard 2A4
- Germany - 14 Leopard 2A6, and approx. 100 Leopard 1A5
- Norway - unknown amount of Leopard 2A4
- Poland - 30 PT-91 Twardy and 14 Leopard 2A4
- United States – 31 M1A2 Abrams

Table A3. 155mm howitzers, number committed by country
bilateral commitments January 24, 2022 to January 15, 2023

<i>Country</i>	<i>Committed</i>	<i>Delivered</i>
United States	144	126
United Kingdom	58	28
Poland	54	54
Germany	37	14
Italy	36	0
Norway	28	23
France	24	18
Netherlands	8	8
Australia	6	6
Latvia	6	6
Denmark	5	0
Portugal	5	0
Canada	4	4
Total	415	287

Note: This table shows the number of committed and delivered 155mm howitzers to Ukraine between January 24, 2022 and January 15, 2023 in number of items. Displayed are only the countries with actual commitments and deliveries in the respective subcategory of heavy weapons.

Table A4. MLRS, number committed by country
bilateral commitments January 24, 2022 to January 15, 2023

<i>Country</i>	<i>Committed</i>	<i>Delivered</i>
United States	38	16
Czech Republic	20	20
United Kingdom	6	3
Germany	5	5
Norway	3	3
France	2	2
Italy	2	0
Total	76	49

Note: This table shows the number of committed and delivered Multiple Launch Rocket Systems (MLRS) to Ukraine between January 24, 2022 and January 15, 2023 in number of items. Displayed are only the countries with actual commitments and deliveries in the respective subcategory of heavy weapons.

Appendix III: Further graphs with historical comparisons and spending

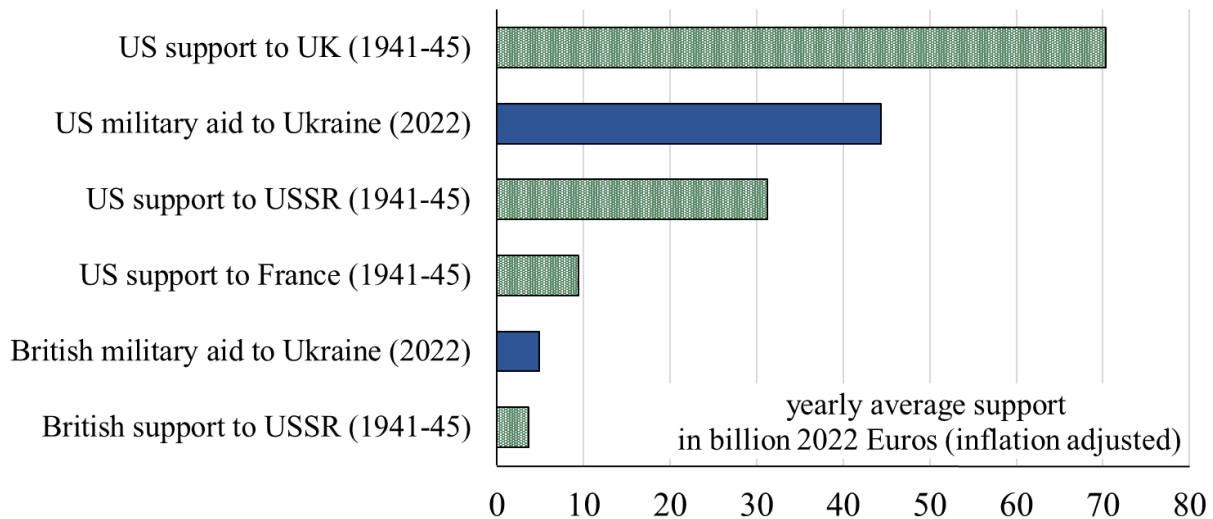
This section provides further information and cases for Section 6 and Section 7 in the main text. We first add figures on annual average expenditures of military conflicts in billion Euros from Section 6. Following that is a more complete overview on domestic energy subsidies of all EU member countries and how they compare to their Ukraine aid commitments. This complements Figure 23 in the main text.

Additional figures on historical comparisons

Figures A6 to A8 supplement Figures 19 to 21 by showing annual average expenditures and military aid in billion Euros (adjusted for inflation).

Figure A6 displays the foreign support by the US and the UK during World War 2 and compares it to their respective military aid to Ukraine in 2022. For details and sources, see Section 6 and the corresponding Figure 19.

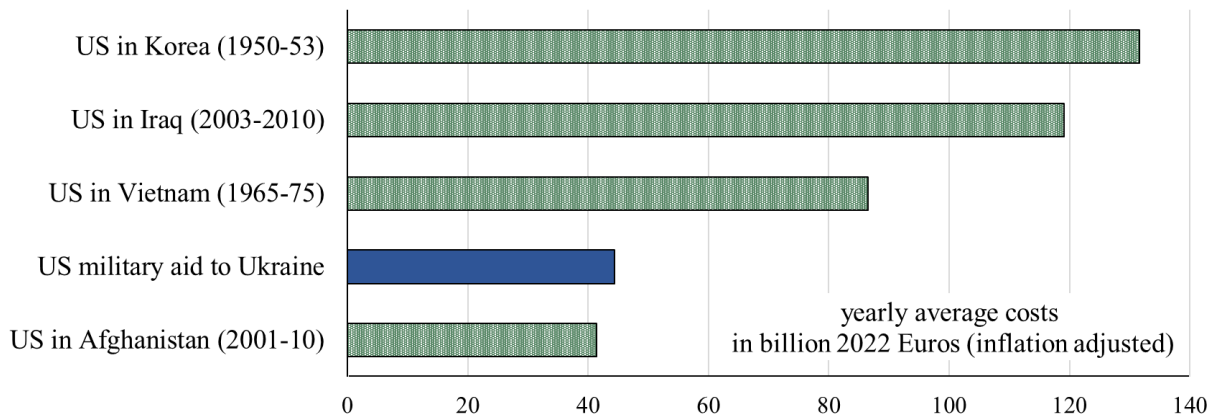
Figure A6. Foreign support during WW2 vs. Ukraine 2022
estimated annual average support in billion Euros (inflation adjusted)



Note: This figure compares the scale of foreign military support by the US and the UK during the Second World War (green bars, Lead-Lease program) to their military support to Ukraine 2022 (blue bars). We report total aid divided by the number of years during which aid was provided (WW2: 1941 to 1945). The sources on Lend-Lease support are shown in the text above. US military aid to Ukraine is from our database.

Figure A7 displays the annual average military expenditures by the United States during the Korean War, the Vietnam War and the campaigns in Afghanistan and Iraq in billion Euros. For details and sources, see Section 6 and the corresponding Figure 20.

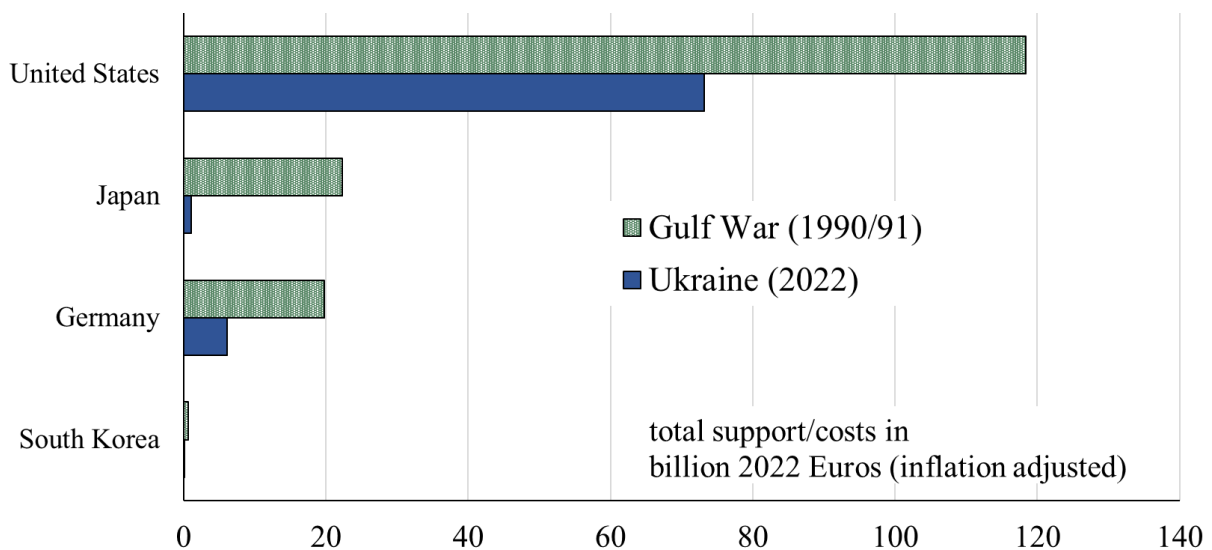
Figure A7. US military expenditures in major wars vs. Ukraine 2022
estimated annual averages in billion Euros (inflation adjusted)



Note: This figure compares average annual US military expenditures in US wars to total US military aid to Ukraine in 2022. Estimates on US military spending are from the US Congressional Research Service (Daggett 2010).

Figure A8 displays the total costs of the US, Japan, Germany and South Korea in the Gulf War against their bilateral aid to Ukraine in billion Euros. For details and sources, see Section 6 and the corresponding Figure 21.

Figure A8. Gulf War 1990/91 vs. Ukraine 2022
expenses in billion Euros (inflation adjusted)



Note: This figure compares the value of support by Germany, Japan, and South Korea during the Gulf War 1990/91 as well as total US war costs. To convert into US\$ we use exchange rates from the US Federal Reserve. For more details and the data sources on country support/costs during the 1990/91 Gulf War see text. For bilateral aid to Ukraine, we use our own database.

Aggregate overview on energy subsidies and Ukraine support

Table A5 provides a complete overview on the domestic energy subsidies of EU member countries, taken from the Bruegel report (2022) and starting in February 2022, and the bilateral support to Ukraine including EU shares. It expands the selection displayed in Figure 23.

Table A5. Aggregate overview: energy subsidies vs. Ukraine support (incl. EU shares)
bilateral commitments incl. EU shares between January 24, 2022 and January 15, 2023

<i>Countries</i>	<i>Energy subsidy commitments billion Euros</i>	<i>Ukraine support commitments billion Euros</i>	<i>Ukraine support (in % of subsidies)</i>
Austria	8.8	1.6	18.6%
Belgium	4	1.5	37.5%
Bulgaria	3.4	0.5	13%
Croatia	2.4	0.2	7.1%
Cyprus	0.2	0.1	30.8%
Czech Republic	8	1.1	13.4%
Denmark	7.2	1.6	22.3%
Estonia	0.3	0.4	135.8%
Finland	1.2	0.9	77.2%
France	49.4	7.7	15.5%
Germany	264.2	13.3	5.1%
Greece	10.5	0.7	6.5%
Hungary	2.4	0.5	19%
Ireland	3	0.8	24.8%
Italy	83.4	5.4	6.5%
Latvia	1.1	0.4	36%
Lithuania	3.6	0.5	12.8%
Luxembourg	2.43	0.2	7.7%
Malta	1	0.03	3.1%
Netherlands	43.8	4.1	9.3%
Norway	8.1	1.2	15.3%
Poland	12.4	5	40.5%
Portugal	7	1	13.6%
Romania	8.5	0.6	6.7%
Slovakia	3.6	0.5	14.8%
Slovenia	0.5	0.2	35.5%
Spain	35.8	4.4	12.4%
Sweden	1.6	2	128.1%
United Kingdom	96.7	8.3	8.6%
Total EU (incl. EU institutions)	569.9	54.9	9.6%
Average (EU members)	21.1	2	27%
Median (EU members)	3.6	0.8	14.8%

Note: This table contains the domestic spending on energy subsidies in response to the energy crisis starting from February 1, 2022 for all countries included in the Bruegel report (2022), alongside the bilateral aid in support for Ukraine from January 24, 2022 to January 15, 2023, including the respective shares in the commitments made by EU institutions. The last column gives the support to Ukraine in percent of fiscal commitments to energy subsidies.