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Executive summary

Currently, the ocean carbon sink annually removes about a third of anthropogenic fossil fuel and industrial CO_2 emissions, reducing therefore climate change damages and CO_2 abatement costs. While the land sinks have entered climate policies, the ocean sink has not—for good reasons since the former stores carbon within the boundaries of a state while the ocean removes carbon from the atmosphere rather in its property as a global common. However, the question remains what is the value of the ocean carbon sink and should it be differently attributed when comparing a coastal state with a large exclusive economic zone (EEZ) compared to landlocked state. Here, we demonstrate different approaches to value the ocean sink, comparing a climate-change damage-based approach with an abatement, market-based approach. We use a high-resolution carbon flux dataset (0.25x0.25 degree) to estimate the ocean carbon sink and source in coastal areas. We assign a net sink of 1.72 GtC proportional to countries with negative carbon fluxes in their EEZ. In our calculation the annual value of the global ocean sink ranges from 61.19 B USD (Std 31.80), equivalent to the 2021 GDP of Slovenia, to 1433 B USD (Std 94.30), equivalent to the 2021 GDP of Spain (World Bank data) for the abatement cost-based assessment approach (assuming full emission trading and low ambition levels in the national determined contribution) and for the climate-change damage-based assessment approach relying on an upper value of the social cost of carbon in our investigation. By breaking down the carbon sink by nations EEZ we estimate which countries are the largest donors of ocean carbon wealth and which countries would be affected the most if a weakening of the ocean sink would need to be compensated by higher emission reduction levels.

1. Introduction

Since preindustrial times the ocean has taken up about 40 percent of anthropogenic fossil fuel and industrial process carbon emissions (Friedlingstein et al. 2021), reducing the climate change impacts of anthropogenic carbon emissions and providing therefore in addition to many other services a considerable societal value as a carbon sink. In turn the questions arise what is the value of this natural ocean sink, whether the regional (coastal) variation in the ocean sink should be attributed to the corresponding neighboring countries, and if at all, how the ocean sink should enter climate policies and national determined contributions under the Paris agreement (Karstensen et al. 2021). Here, we derive ocean sink data at the country-level, accounting for the ocean sink in the Exclusive Economic Zones (EEZs) of countries and compare a climate-change damage-based approach with an abatement-cost based approach to value the ocean sink. The former utilizes information on the social cost of carbon (SCC), i.e. the marginal damage of an additional ton of CO_2 released into the atmosphere, and in turn the marginal avoided damage of an additional ton of CO_2 taken up by a carbon sink, at the country level. The latter utilizes information on marginal abatement costs at the country level. In a stylized, optimized, global climate policy, the two approaches would coincide since the marginal abatement cost would be equated across countries (either via a global carbon tax or international emission trading) at the level of the social cost of carbon, i.e., the sum of the country social cost of carbon. In reality (and in applied work), they do not since climate policies are not derived from a global cost-benefit analysis but as part of a political bargaining process with different countries using different instruments to reduce their CO_2 and other greenhouse gas emissions. Hence, applying the two approaches for valuing the ocean sink, can result in opposing outcomes depending on the stringency of the overall climate policy ambition.

Applying the climate-damage based approach places the valuation of the ocean carbon sink in the natural capital and inclusive wealth framework (Arrow et al. 2003, Fenichel et al. 2016, Dasgupta 2021). Inclusive wealth is defined as the aggregate value of all natural and human-made capital stocks, valued with their shadow prices. Change in (natural) capital stocks assessed with shadow prices provide a basis for sustainability assessment, following a concept of weak sustainability (Rickels et al. 2014). Inclusive wealth (IW) assessments (to measure sustainable development) are applied in the United Nations (UN) Inclusive Wealth Reports (UNU-IHDP UNEP 2012, 2014, Managi and Kumar 2018) and the USA has recently launched a new draft National Strategy to improve its statistical description of economic activity and development by accounting for the wealth contributions of water, air, and other natural assets following the IW approach (The White House 2022). For valuing the ocean carbon sink, applying the shadow value of atmospheric carbon, i.e., the social cost of carbon, allows to measure the avoided damage, i.e. the avoided social cost of (atmospheric) carbon. Canu et al. (2015) apply this approach to value the carbon sink in the Mediterranean Sea, estimating an annual value between 127 and 1722 M EUR (2011) /year. Such an estimate provides information about the global contribution to welfare since all countries are affected by the public good provided via the ocean carbon sink. However, countries are affected differently by climate change and hence it is estimated that climate change results in wealth reallocations (Fenichel et al. 2016). Bertram et al. (2021) account for this aspect by applying the country social cost of carbon (CSCC) in their assessment of coastal blue carbon ecosystem sequestration. They show that in particular countries with rather large coastal ecosystems but relatively low domestic CSCC provide a large wealth transfer to the rest of the world. Carbon sequestration in Australia's coastal ecosystems has a global value of about 25 B USD per year of which almost 23 B USD are received abroad. However, the total amount of annual carbon sequestration of coastal ecosystems (e.g. mangroves etc.) is rather small (Bertram et al. 2021 assume annual sequestration of about

81.21 MtC)[1]. Hence the carbon sink wealth contribution of coastal ecosystem is small compared to their total wealth contribution via ecosystem services, the former being estimated to be about 190.7 B USD/year and the latter to be about 31.6 T USD/year (Bertram et al. 2021 and Costanza et al. 2014, respectively). Obviously, the value of the coastal ocean carbon sink is also small compared to the total ocean carbon sink. we consider the whole EEZ of countries, extending to a maximum of 200 nautical miles (370.4 km) away from the coastline. We discuss different country social cost of carbon estimates in our climate-change damage-based evaluation approach and based on the EEZ carbon uptake.

The uncertainty about climate-change impacts on ecosystems, human health and economies is the main reason to define temperature ceilings as part of the Paris Agreement (hold temperature increase well below 2 °C above pre-industrial levels and aim for limiting temperature increase to 1.5 °C). Hence, the aim is to achieve compliance against the temperature ceiling cost-efficiently and the temperature ceiling determines the marginal abatement cost, i.e., the CO_2 price. The CO_2 price determines the (marginal) value of the (ocean) sink and the SCC (i.e., the shadow price of the constraint) can be interpreted as the willingness to pay for imposing such a temperature ceiling (Rogelj et al. 2018, Cross-Chapter Box 5). Accordingly, implemented CO_2 tax levels or observed CO_2 prices on emissions trading markets can be used as information for valuation. However, only a few regions provide this information and even if CO_2 pricing instruments are at place, like for example in the European Union, they cover only a fraction of the emissions in the region. Such price information can be used to point out the value of marginal CO_2 removal if integrated into such a pricing regime but is not sufficient for a global assessment. Hence, economic models are used to derive the information about regional CO_2 prices. Rehdanz et al. (2006) assessed the integration of the ocean anthropogenic carbon sink in a hypothetical carbon market, using model-based estimates for the anthropogenic part of the regional ocean sink provided by Wetzel et al. (2005). Overall, they considered an aggregated ocean sink of anthropogenic carbon of about 0.44 GtC (relative to preindustrial), attributed to the individual EEZ's of 36 countries. They investigated the potential reduction in abatement costs of bringing in up to 10 percent of their ocean carbon sink within the EEZ for compliance in their reduction targets and emissions trading, showing that a country like Australia has a relatively large reduction in abatement costs and even net revenues under international trade if allowed to sell ocean sink credits. This indicates that abatement cost-based pricing information used to value the ocean sink should not be confused with a potential price which would be paid if (part) of the ocean sink would be integrated in a CO_2 permit market. The latter would require various additional monitoring and accounting requirements in addition to a discussion whether the ocean sink is a global common or should be (partially) attributed to countries. However, a partly integration into markets does not necessarily imply double-accounting to compensate for emissions reductions but could also be interpreted as an obligation if the ocean carbon sinks weakens. For example, Liu et al. (2023) show that the net uptake of the ocean could decrease since a slower meridional overturning circulation dominates an increase in the biological pump due to the anthropogenic carbon intervention. We consider in addition to a market-based evaluation also a market integration, the latter under the assumption that countries need to increase their emissions reduction targets to compensate for reduced ocean uptake.

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[1] Note that we report physical amounts in C (i.e. carbon) and economic prices in CO_2, i.e. USD/tCO_2. Referencing to value estimates from the literature, we use the unit and currency year as reported in the figure. The monetary amounts in our analysis are presented in USD at market exchange rates and prices in 2020. 1 Pg of carbon (1 Pg C) yields 3.66 Pg of CO_2.

2. Results

Our assessment is based on a unified global ocean partial pressure of carbon dioxide (pCO_2) climatology that combines open ocean and coastal areas with a spatial resolution of 0.5° by 0.5° (Landschützer et al. 2020a, b). Our assessment is based solely on the surface ocean flux of carbon and is in reference to thevyear 2006 (Figure 1). Other sinks, such as burial of particulate carbon in sediments, are not considered (for further details on the calculations see Methods).

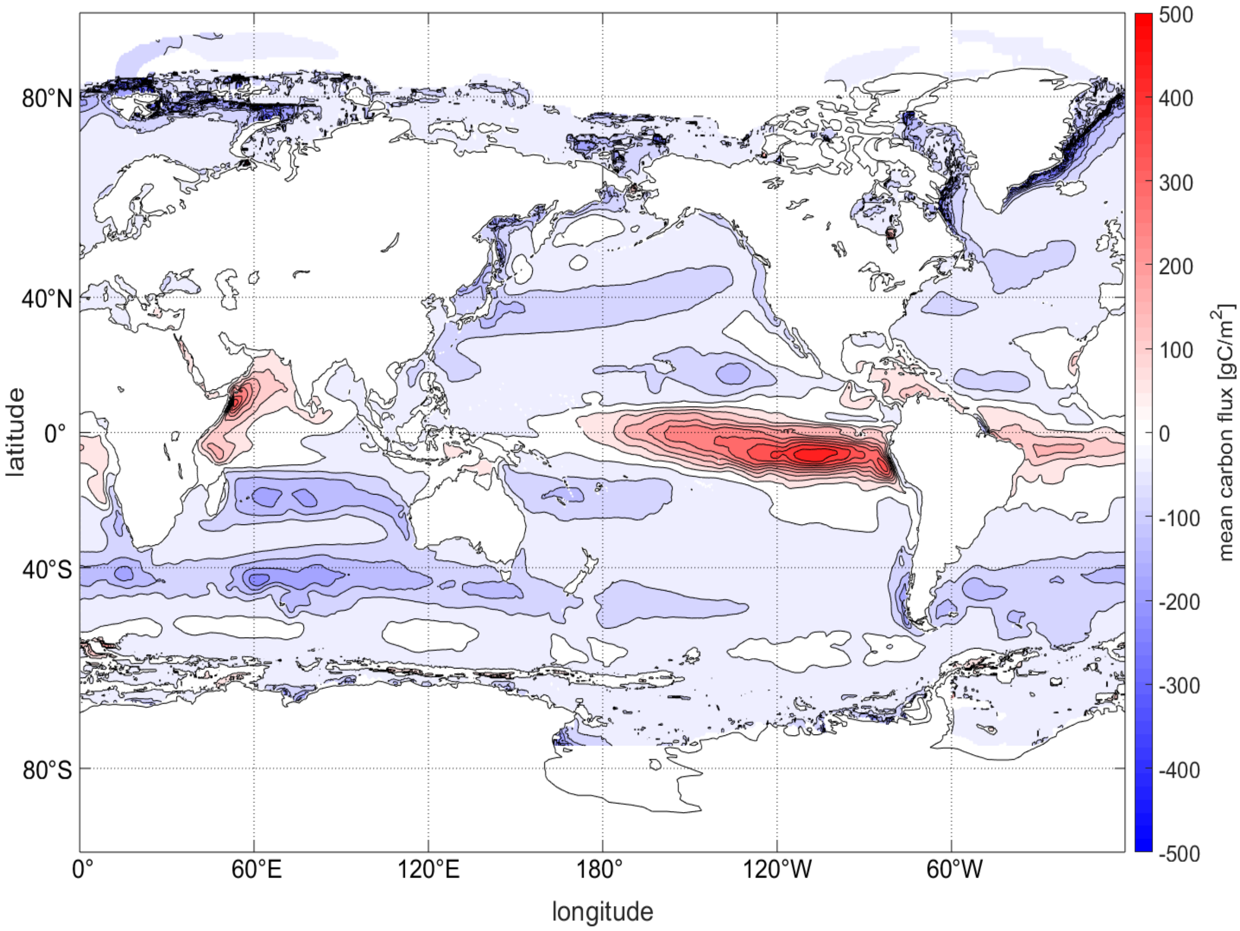

Figure 1. Figure 1: Geographical distribution of the surface ocean carbon flux (g C m^{-2}) data estimated from the Landschützer et al. (2020a) pCO_2 data and referenced to the year 2006.

Overall, we resolve the ocean with 568 grid cells with even (0.25°) latitude and longitude spacing and thus latitude depend on areas size. The high seas cover 213 Million km^2 in 26 cells. The remaining grid cells are assigned to 236 territories. Of these 236 territories, 225 are assigned to countries (147 mainland entries, 11 islands and exclaves like for example the Azores and Alaska, respectively, and 67 oversea territories like example Greenland), 11 territories like for example Antarctica were not assigned. The ocean flux data at the territory level are shown in Figure 2. We combine this with carbon uptake in coastal blue carbon ecosystems, mangroves, saltmarshes and seagrass meadows, obtained from Bertram et al. (2021).

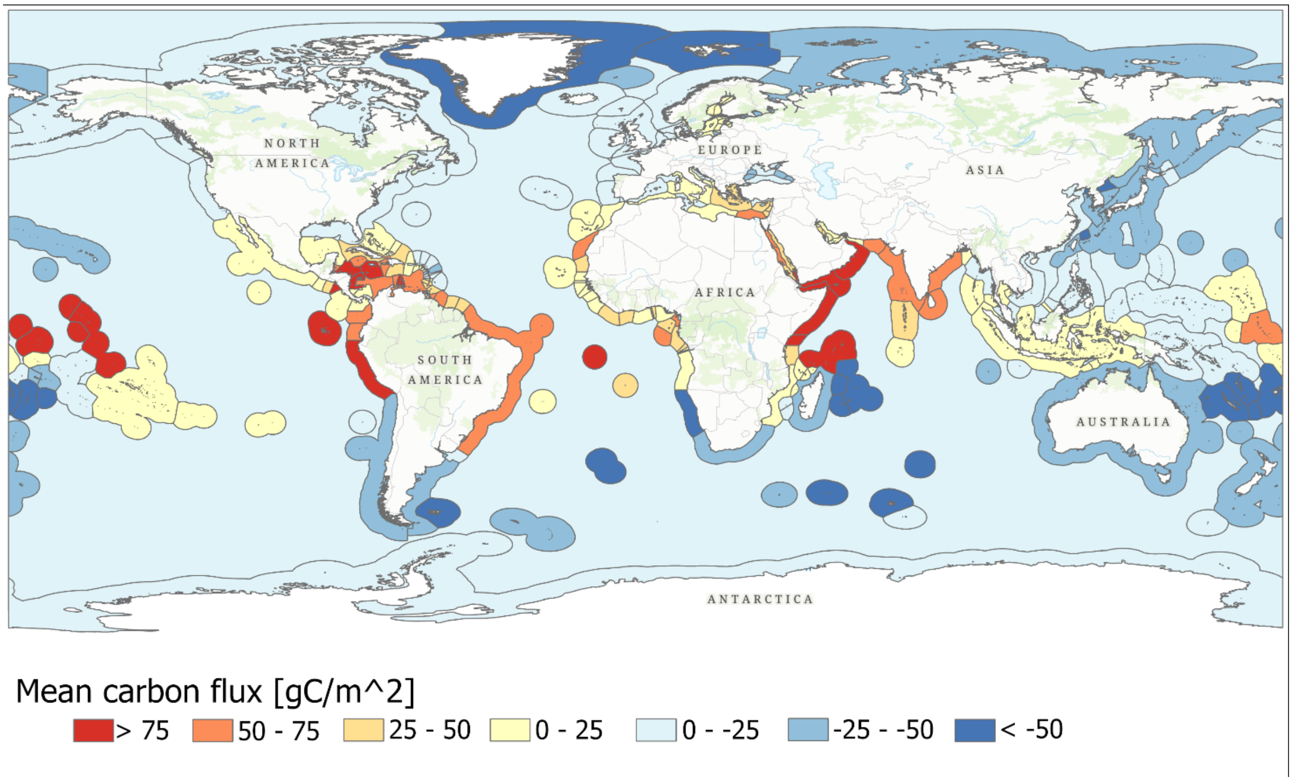

Figure 2. Mean countries EEZ ocean carbon flux (sink and source).

The total net carbon sink from our data set is 1.63 Gt C/year (Std 0.03) for the reference year 2006. Including also coastal blue carbon ecosystem carbon sequestration the net ocean carbon sink increases to 1.72 GtC/year (Std 0.03). Note that the gross ocean carbon uptake is 4.73/year GtC (Std 0.03) which is offset by source (loss of ocean carbon) from outgassing of 3.02 GtC/year (Std 0.03) (Figure 2). Hence, there are several countries with a net carbon source in their EEZ. Figure 3 shows the ten countries with the largest carbon source in their EEZs, and the ten countries with the largest carbon sink in their EEZ, differentiating between the carbon flux within national boundaries and oversea territories, including in addition also EU29 (i.e., including Iceland and Norway). The reason for considering an EU29 is that the 27 European Union (EU) countries and those of the European Economic Area (here, Iceland and Norway, we did not include Liechtenstein) have a common climate policy and in turn an aggregate emission reduction target in the UNFCCC context. Accordingly, we consider the aggregated EU countries but report individual EU country data where appropriate. Figure 3 shows that Denmark benefits from its oversee carbon sink around Greenland, but also other European countries like Norway and France benefit from the carbon sink in their oversea territories. Overall, oversea territories result in a net carbon sink of 0.95 GtC/year for their sovereign countries whereas the EU27 receives here the largest amount, 0.88 GtC/year.

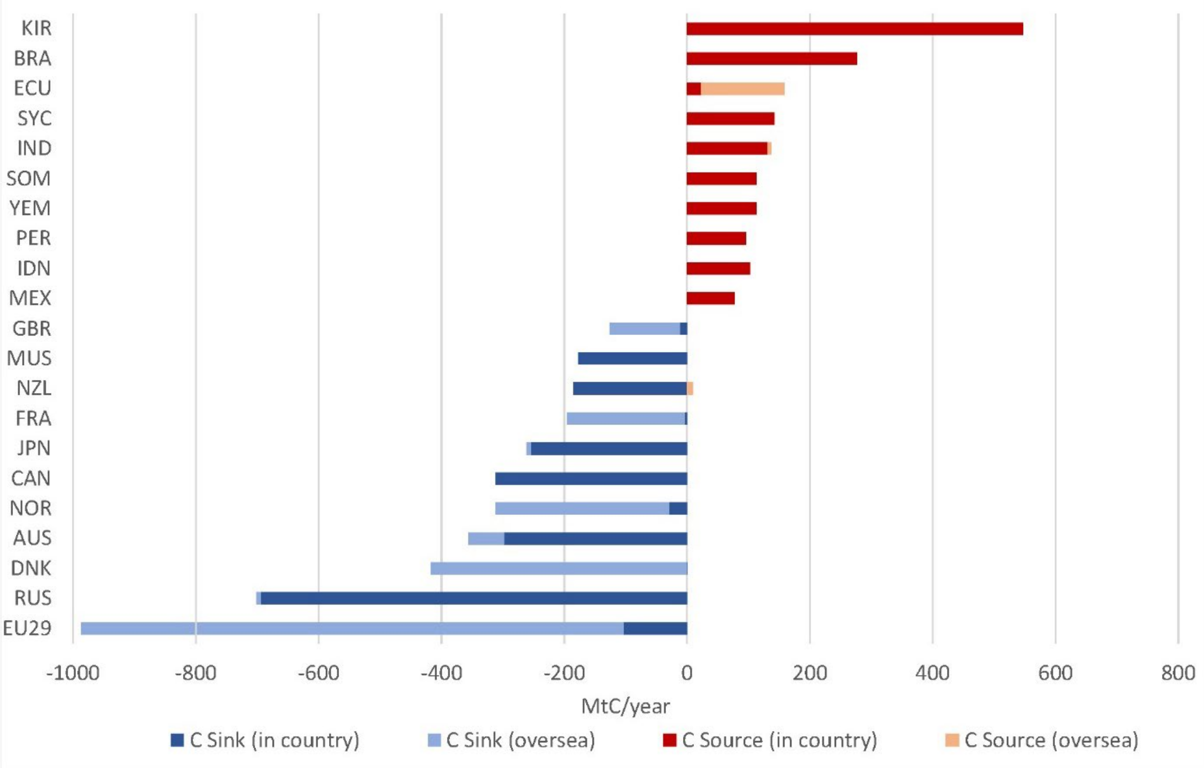

Figure 3. Top 10 countries in terms of ocean carbon source (outgassing) and ocean carbon sink (uptake), respectively. The ocean carbon source and sink related to eventual oversea territories is also shown (KIR: Kiribati, BRA: Brazil, ECU:Ecuador, SYC: Seychelles, IND: India, SOM: Somalia, YEM: Yemen, PER: Peru, IDN: Indonesia, MEX: Mexico, GBR, UK and Northern Ireland, MUS: Mauritius, NZL: New Zealand, FRA: France, JPN: Japan, CAN: Canada, NOR: Norway, AUS: Australia, DNK: Denmark, RUS: Russian Federation, EU29: EU27+ Norway and Iceland).

The highest carbon source (outgassing) is estimated for Kiribati (KIR) (Figure 3), an island nation in the tropical Pacific Ocean, with approximately 726 km^2 land area and 3.550.000 km^2 EEZ area located in the Pacific upwelling area. Almost all Kiribati waters are considered carbon sources (based on the surface pCO_2 field estimate used here) and would contribute a negative value, i.e. a global cost if hold responsible for its ocean carbon source. Moreover, Kiribati is projected to be strongly impacted by sea level rise due to climate change. Not all outgassing regions are assigned to countries (Figure 1) and hence open ocean outgassing (which amounts in net term to 78.81 MtC/year in our dataset) would remain unassigned in a pure country-based assessment. Hence, we assume that any valuation of the ocean carbon sink would acknowledge the global commons character of the ocean sink in so far that only the net carbon sink is considered. Accordingly, we attribute the net carbon sink of 1.72 Gt C proportional to countries with negative ocean carbon flux in their EEZ. In more detail, countries with a negative EEZ ocean carbon flux (including oversea territories) are a assigned a fraction of the total net sink while countries with a positive EEZ carbon flux (like Kiribati) are assigned no share (i.e. they are assessed if they would have zero EEZ carbon sink). Under these criteria a total of 63 countries with net sink are further considered in our economic valuation (the full list is display in Table ST1, including also those countries with a positive ocean flux, i.e. outgassing, which are not assigned an ocean sink). It is also of interest to compare for the ten countries, including the aggregated value for EU countries (EU29), with the largest ocean sink (Figure 4) the relation to their net emissions, i.e. the gross fossil fuel and industrial emissions (Friedlingstein et al. 2021) after deducting the attributed ocean sink. It is found that for example the EU29, Russia, and Japan, despite their large attributed ocean sink, are still net carbon emitters.

In contrast, countries with a large (attributed) ocean sink but low carbon emissions like Denmark or New Zealand are attributed in net terms a lowering contribution to atmospheric CO_2 concentration.

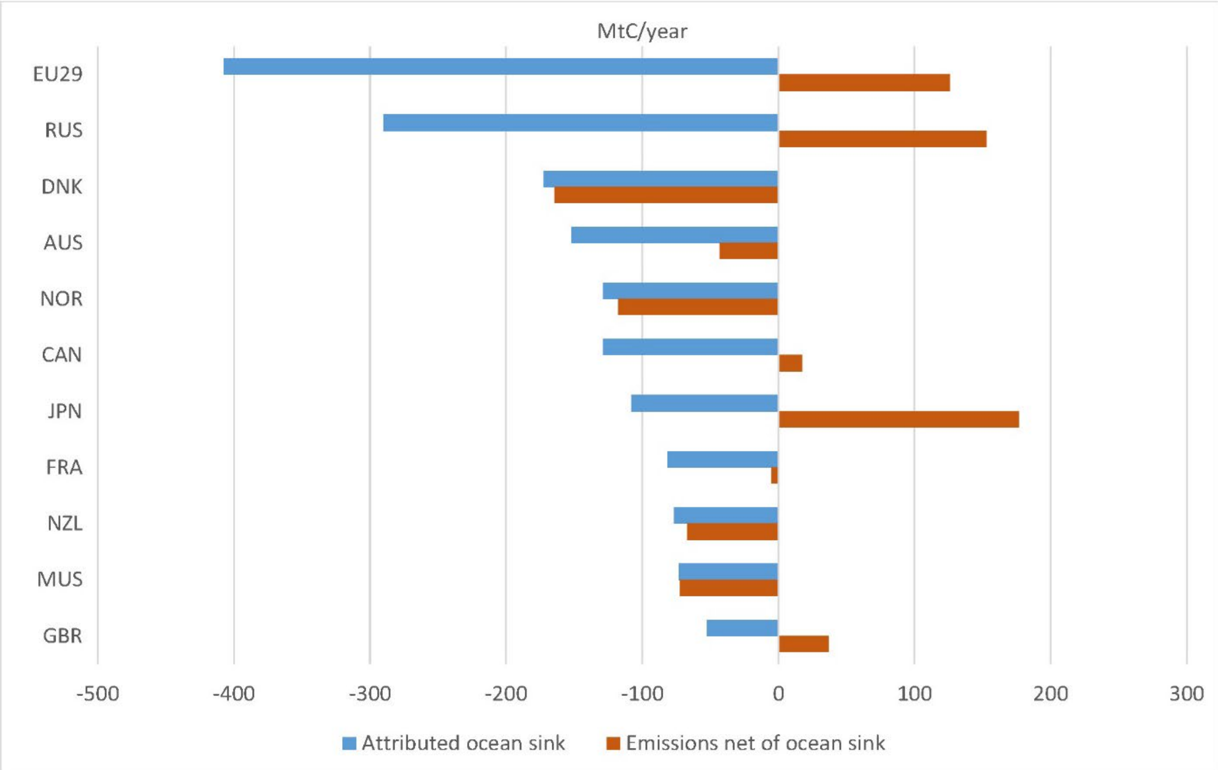

Figure 4. Top 10 countries and EU29 in terms of attributed ocean sink, displaying also the fossil fuel and industrial emissions obtain from Friedlingstein et al. (2021) net of the attributed ocean sink (EU29: EU27+Norway and Iceland, RUS: Russian Federation, DNK: Denmark, AUS: Australia, NOR: Norway, CAN: Canada, JPN: Japan, FRA: France, NZL: New Zealand, MUS: Mauritius, GBR: UK and Northern Ireland).

Based on these or any other ocean sink data the valuation is obtained by multiplication with price data. Figure 5 shows the price data considered in this study for the ten countries with the largest carbon emissions in the fossil and industrial sector. For the climate-damage based approach, we consider two different estimates, one obtained from Ricke et al. (2018, 2019), using the climate change impact estimate of Dell, Jones, and Olken (2012), henceforth abbreviated as DJO, and one obtained from Tol (2019). We have not aggregated the two estimates since they rely on different assumptions about the impacts of climate change on GDP (Tol) vs. GDP growth (DJO, see Methods and Discussions). For the abatement-cost based approach, we obtained marginal abatement cost curves (MACCs) estimates using the Dynamic Applied Regional Trade model (DART) model (see section 3) and consider the unconditional (low) and conditional (high) emission reduction targets as announced by countries in their national determined contributions (NDCs) as part of the UNFCCC process.

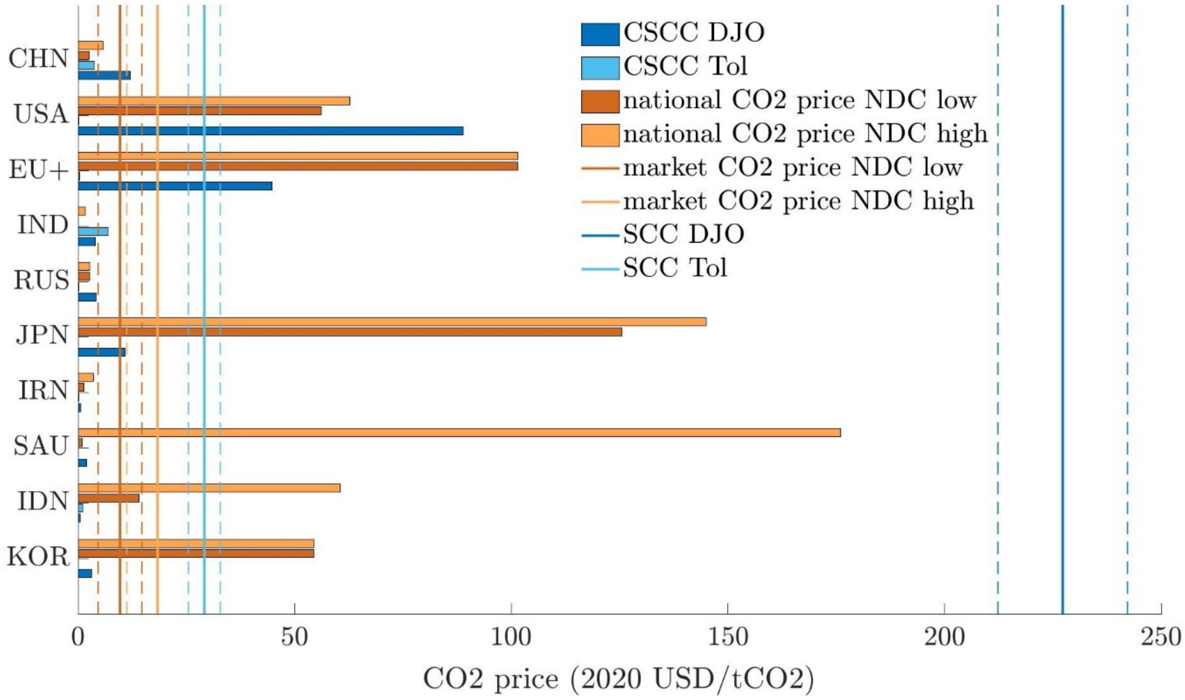

Figure 5. CO_2 Prices at the National Level and at the Global Level. The national CO_2 prices show the country social cost of carbon (CSCC), for the climate change impact estimation provided by Dell et al. (2012) (DJO) and the climate change impact estimation provided by Tol (2019) and the national CO_2 prices (marginal abatement costs) for emissions reductions as defined in the national determined contributions (NDCs) with either low or high ambition. The global CO_2 prices show the sum of the CSCC, i.e. the social cost of carbon, again for both impact functions and the global CO_2 prices obtained under full emissions trading.

Large difference exists between the two climate change impact estimations, 227.28 USD/tCO_2 (Std 14.95) based on DJO, and 29.17 USD/tCO_2 (Std 3.69), based on Tol (Figure 5). However, even for the rather large DJO-CSCC estimates, in 6 out of the 10 countries displayed in Figure 2, the marginal abatement cost exceeds the country-specific marginal damages, indicating abatement efforts higher than would be optimal for the country in isolation. For these countries, the NDCs include some concern for climate damages that occur outside their borders. Unfortunately, this does not hold true for China, the USA, India, or Russia, which in total contribute 59 percent of the projected emissions for 2030. Overall, in 108 countries (of 146 in the abatement-based approach) the national CO_2 prices – i.e. marginal abatement costs for the given NDCs – exceed the DJO-CSCC estimates and in 17 countries even the DJO estimate or the global SCC. For the lower Tol-SCC estimate, this number increases to 73 countries. These numbers should be treated with caution since the calibration of MACCS for small countries is less reliable (see Discussion). Yet, at the same time, even for the rather small Tol-CSCC estimates, not all countries exceed in their marginal abatement cost the country-specific marginal damages. This applies especially to India (for both NDCs ambition levels) and to China (for the low NDC ambition level), see Figure 5. Overall, the national carbon price (= marginal abatement costs) fall short of the country-specific social cost of carbon in 60 countries under low NDCs ambition levels and still to 35 countries under high NDCs ambition levels. These countries would overall gain in economic terms by increasing their emissions reductions ambitions, and thus should spend more abatement efforts out of purely selfish concerns.

Furthermore, Figure 5 indicates the efficiency gains from emissions trading. With full emissions trading, the average (emissions-weighted) CO_2 price falls from 29.78 USD/tCO_2 (Std 19.89) to a market price of 9.70

USD/tCO_2 (Std 5.04) and from 44.90 USD/tCO_2 (Std 22.95) to 18.38 USD/tCO_2 (Std 7.09) for low and high ambition levels in the NDCs, respectively. So, even under high ambition levels, the market price falls short of the Tol-SCC estimate of 29.17 USD/tCO2 (Std 9.70), indicating that under full emission trading, the emission reduction levels should be increased even under cost-benefit consideration. The full list of CO_2 price data can be found in Table ST2.

The CO_2 price data allows deriving proportional value estimates for ocean sink. The value of the global ocean sink of 1.72 GtC (Std 0.03) ranges from 61.19 B USD (Std 31.80) to 1433 B USD (Std 94.30) for the abatement cost-based assessment approach (assuming full emission trading and low ambition levels in the NDCs) and for the climate-change damage-based assessment approach (assuming the climate change impacts estimation of Dell et al. 2012 applies). The value of the largest attributed ocean sink, to the EU29 (including their oversea carbon sink), ranges under the abatement cost-based assessment approach from 3.95 B USD/year (Std 2.05) to 41.35/year B USD (Std 14.68) for full-emissions trading and no-emissions trading, respectively. The value of the largest net lowering influence of atmospheric CO_2 concentration, i.e., fossil fuel and industrial emissions net of the attributed ocean sink to Mauritius (outside of the EU), ranges from 2.13/year B USD (Std 0.27) to 16.61/year B USD (Std 1.09) for the climate-change damage-based assessment approach, applying the climate damage impact function of Tol (2019) and of Dell et al. (2012), respectively.

Following Bertram et al. (2021), the combination of CSCC and SCC allows deriving information about the wealth distribution. While applying the (global) SCC provides information about the global wealth contribution, only a fraction of this contribution accrues domestically, the latter measured by the domestic CSCC. The remaining contribution generates wealth abroad, measured by SCC minus the domestic CSCC. However, at the same time, the ocean sink occurring in other places, also contributes to reducing climate change impacts domestically, measured by the domestic CSCC. Netting these two wealth flows allows determining whether countries a net donors or net receivers of ocean wealth. Figure 6 shows the top 10 donors and 10 receivers of ocean carbon wealth based on the DJO climate impact estimation, displaying also the corresponding information for the Tol climate impact estimation which obviously suggest a different ranking.

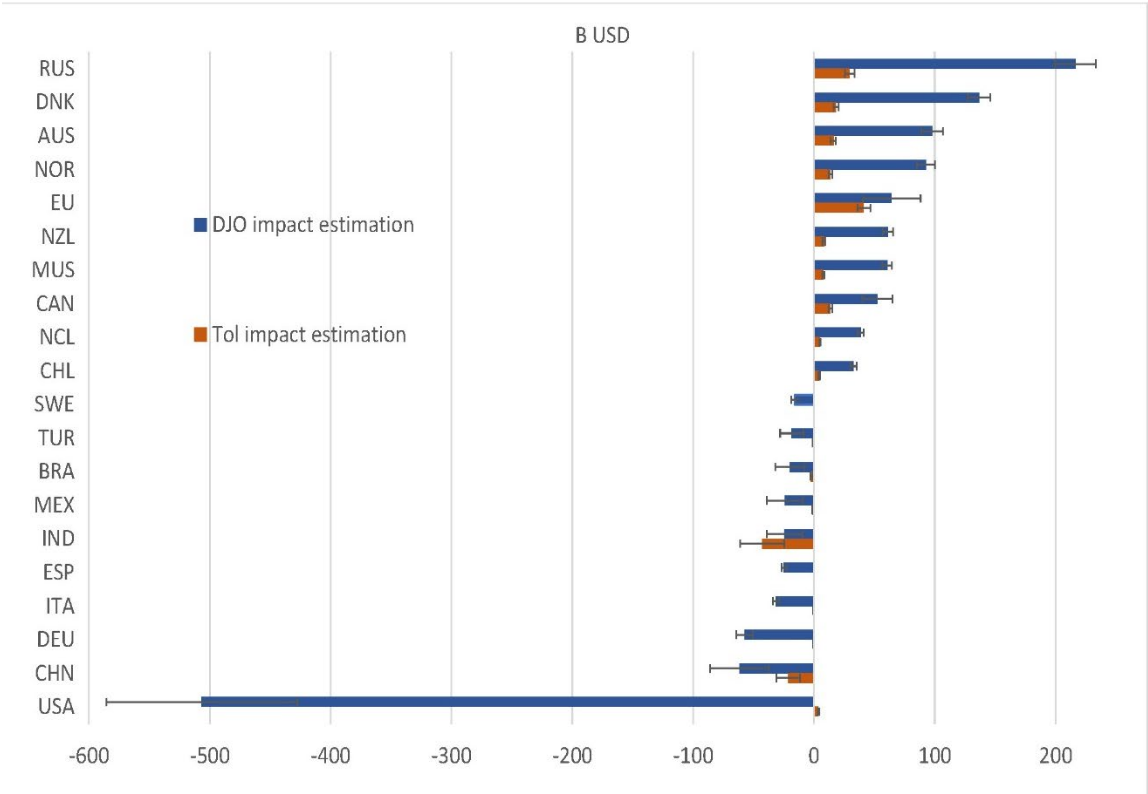

Figure 6. Ocean-based Wealth Transfer. Positive values indicate countries (or regions) where the outbound wealth flux exceeds the inbound wealth flux and for negative values vice versa. The selection of countries represents according to the DJO climate impact estimation the top 10 donors and the top 10 receivers of ocean carbon wealth. The figure displays also the corresponding values based on the Tol climate impact estimation, obviously not reflecting the same ranking information.

The CSCC estimates do not only differ in total levels but also for the different countries (Figure 6). This can be highlighted by two examples. First, according to the DJO estimate, the USA has a rather high CSCC of 88.96 USD/tCO_2 (Std 13.26) which is about 44 percent of the global SCC estimate of DJO. Hence, while it has an attributed domestic ocean sink of 171.01 MtCO_2/y (Std 0.27), i.e., almost 3 percent of the totally attributed ocean carbon sink, about 44 percent of the corresponding total ocean carbon wealth accrues at home. In turn, the ocean sinks outside the USA, results in high ocean carbon wealth inflow since it is also multiplied with the high US CSCC. In contrast, according to the Tol estimate, the USA CSCC are only 0.19 USD/tCO_2 (Std 0.1), less than one percent of the global SCC estimate of Tol. Accordingly, the valuation of the domestic US ocean carbon sink results in higher outbound contribution than the inflow of the foreign ocean carbon sink. The other example is India. According to the DJO estimate, the CSCC is 3.98 USD/tCO_2 (Std 2.42), i.e. about 2 percent of the global SCC, while according to the Tol estimate, the CSCC is 6.97 USD/tCO_2 (Std 2.98), i.e. about 24 percent of the global SCC. Hence, the valuation of the carbon sink inflow is higher and in turn according to Tol (2019), India is higher receiver of ocean carbon wealth than according to Dell et al. (2012). The complete wealth analysis, considering both climate impacts estimations, DJO and Tol, and considering the ocean carbon sink only and the fossil fuel and industrial emissions net of ocean sink, can be found in the supplementary tables ST3 to ST6.

The abatement cost-based assessment approach does not allow for such an analysis of the transfer of wealth since here countries have quantitative emissions reduction targets. However, the approach allows for the analysis of the inclusion of the ocean carbon sink into national or even global emissions trading. In contrast to Rehdanz et al. (2006), we consider the possibility that the weakening of the ocean sink results in extra emission reductions to compensate for this weakening. To demonstrate such a possibility, we simply assume that countries with carbon uptake in their EEZ have to increase their emissions reductions by 5 percent of their national ocean sink. This would roughly compensate for the 12 percent weakening of the global ocean sink. Figure 7 shows for those countries with the largest attributed sink (and for those for which price data are available) the percentage increase in CO_2 prices under high emission reduction ambitions. Note that for the USA the increase in CO_2 prices is only 0.60 (Std 0.38) percent, since its attributed ocean sink (-44.83 MtC (Std 0.10)) and hence a corresponding increase in its reduction target by 5 percent (2.24 MtC) is small relative to the BAU emissions (1378.23 MtC, Std 144.68) and the reduction target. This is very different for Mauritius, which has a large sink relative to its BAU emissions and hence its reduction target, accordingly its carbon prices increase by more than the factor five. Overall, the increase in the average (emissions weighted) carbon price is 3.41 percent (Std 2.99). Note that the reduction target only increases for those countries with an attributed ocean sink while for the remaining countries the national carbon price remains unchanged. Emissions trading dampens again the price increase since now the increase in the reduction target is part of overall emissions trading and in turn the increase is only 2.71 percent (Std 1.80).

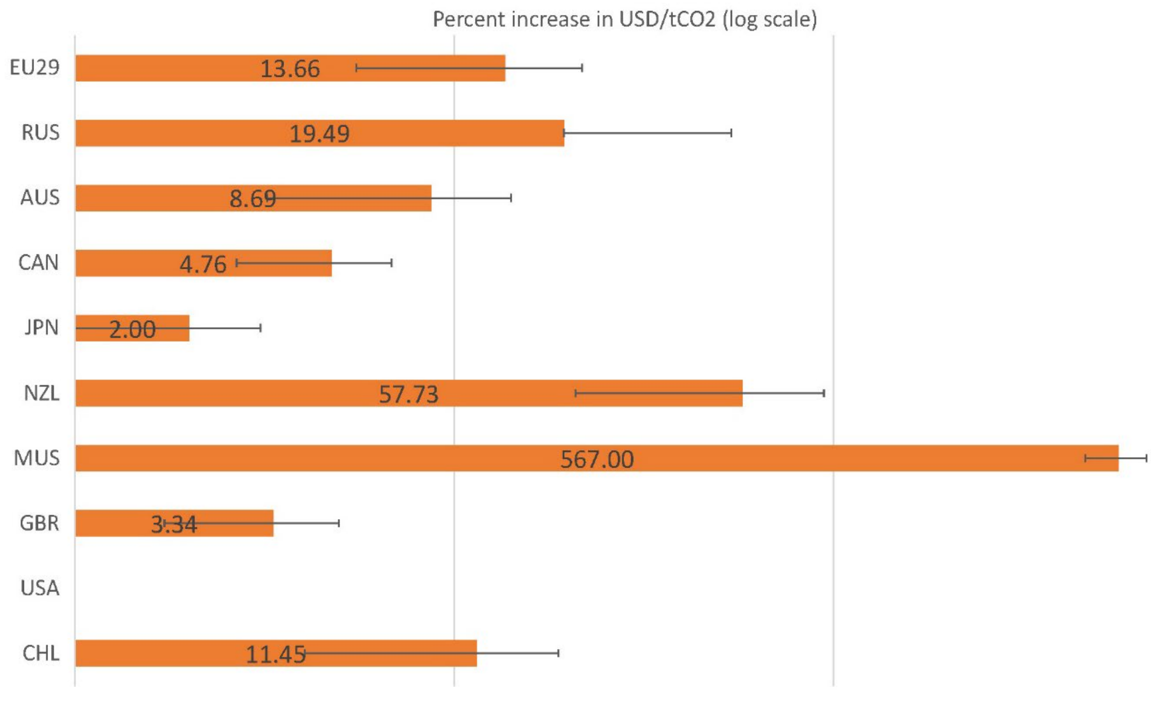

Figure 7. Implications of Weakening of Ocean Sink. The figure shows the price increase due to additional emissions reductions to compensate for a weakening of the ocean sink by about 12 percent for the NDCs with high emissions reduction ambition. The figure shows the 10 countries with largest price increase. The abbreviations represent VUT: Vanuatu, SLB: Solomon Islands, FJI: Fiji, MUS: Mauritius, TON: Tonga, MDG: Madagascar, WSM: Samoa, NAM: Namibia, NZL: New Zealand, and GNB: Guinea-Bissau.

While in this calculation the increase in the emissions reduction targets is supposed to compensate for the weakening of the ocean sink (i.e. the climate damages would remain unchanged), it indicates the difference between the two approaches. In the abatement-cost based assessment, moving from high emissions reduction ambitions to low emissions reduction ambitions implies lowering the global reduction target from 29.45 to 16.00 percent (relative to business as usual in 2030), and in turn the emissions-weighted national CO_2 prices drop from 44.90 USD/tCO_2 (Std.22.95) to 29.78 USD/tCO_2 (Std 19.89) and the global carbon price under full emissions trading from 18.38 USD/tCO_2 (Std 7.09) to 9.70 USD/tCO_2 (Std 5.04). However, lower emissions reductions imply higher marginal damages and in turn, the CO_2 prices under a climate-damage based approach increase. Considering the DJO-estimates, the global SCC increase from 227.28 USD/tCO_2 (Std 14.94) to 240.19 USD/tCO_2 (Std 15.98) if the emissions increase from RCP60 to RCP85. Hence, under the climate-damage based approach, the highest valuations are derived for the ocean sink under high emission scenarios (i.e., low emissions abatement efforts) while it is the other way around for the abatement-cost based-approach, here, the highest valuation is obtained under low emission scenarios (i.e. high emission abatement efforts). As already discussed, these two opposing cost components can both be used to determine the optimal climate policy in a cost-benefit framework, but in applied valuation work climate policy is not derived under a comprehensive cost-benefit analysis. Hence, increasing emission reduction efforts beyond the levels as proposed in the NDCs such that they align with the Paris temperature targets, lowers the value of the ocean sink under a climate-damage based approach.

3. Discussion and Conclusion

The ocean is an important sink for anthropogenic carbon dioxide. In contrast to the land carbon sink, the ocean sink is not explicitly attributed and acknowledged in the UNFCCC climate policy process. There are good reasons for this distinction since the land sink is partly private, while the ocean sink, even partly acting within the EEZs of countries, can be considered a global common. The uptake of a ton of CO_2 at a certain surface ocean area requires various chemical, biological, and physical downstream processes to find its way into the deep ocean and to be considered removed from the atmosphere. Nevertheless, the carbon sink service of the ocean has clearly a value and we demonstrate different approaches to derive such valuations.

Based on a recent pCO_2 data set that resolves the surface ocean with rather high spatial resolution of 0.25° (Landschützer et al., 2020a,b) we estimate the ocean carbon flux following standard procedures (e.g. see Fay et al. 2021) and in reference to the year 2006 atmospheric CO_2 concentration. While our carbon flux estimate is not expected to compare in numbers with published global carbon fluxes based on coarser resolution data (e.g. 1°; GCP, Friedlingstein et al. 2021) the focus is on using a flux data set with high spatial resolution to evaluate the carbon sink on nations EEZ areas. The regional uptake pattern of our data set resembles published global maps (e.g. Fay et al. 2021), however, individual data points may be substantially different and may impact local uptake in EEZ's and limit the generalization of our valuation. Because our data set has only one "mean year", we cannot make any statement about temporal variability of fluxes over an EEZ region (or globally) and the focus is on the possibilities of evaluating such potentially regional ocean sink data.

For the evaluation, we compare a climate-change damage-based assessment approach with an abatement cost-based assessment approach. The former applies estimates for the social cost of carbon, SCC, i.e., the marginal damages of an additional ton of CO_2 emitted to the atmosphere (or not removed by any sink). Having this information also at the country level, i.e., the country social cost of carbon, CSCC, allows assessing the regional wealth implications and wealth redistribution of regional ocean sink data. We obtained (C)SCC values from an empirical approach provided by Ricke et al. (2018, 2019) and an integrated-assessment model-based approach provided by Tol (2019). The approach of Ricke et al. includes two different climate change impact functions of which in particular the climate change impact estimate provided by Burke et al. (2015) has received criticisms. Burke et al. (2015) assume that temperature increase has a permanent influence on growth rates of gross domestic product (GDP). In combination with a non-linear impact function, their approach results in very high SCC estimates but also in some regions considerably gaining from climate change (Tol 2019). Since the impact of temperature increase on GDP growth rates is persistent in the approach of Burke et al. (2015), regions like Canada and Russia keep gaining from climate change persistently and start dominating climate change losers towards 2100 (Rickels et al. 2020). The persistent impact of temperature increase on GDP growth rates was not confirmed in follow-up studies provided by Kalkuhl and Wenz (2020), Newell et al. (2022) and Tol (2022). However, these studies provide estimates for the global SCC only. The CSCC estimates obtained from Tol are not affect by such conceptual issues, however, his estimate result in considerably lower SCC estimates than recently suggested by the literature. The CSCC estimates obtained from Tol add up to 29.17 USD/tCO_2 (Std 3.67). In contrast, Kalkuhl and Wenz (2020) find an empirically derived estimated range for the SCC (in the year 2030) from 92 to 181 USD/tCO_2, the former obtained under a cross-section estimation, the latter under a population-based panel estimation. Similarly, Rennert et al. (2022) derive a model-based estimate for the SCC of 185 USD/tCO_2 (44–413 USD/tCO_2, 5%–95% range). Hence, we include in our assessment the estimates of Ricke et al. (2018, 2019), however, restricted to climate change impact function provided by Dell et al. (2012) which results in an average SCC of 227.28 USD/tCO_2 (Std 14.95). We did not aggregate the two SCC estimates since they rely on very different assumptions but provide the estimates separately, highlighting the still prevailing uncertainties in quantifying the impacts of climate change.

For the abatement cost-based assessment approach we derive marginal abatement cost curves using the Dynamic Applied Regional Trade model (DART), a multi-regional, multi-sectoral global recursive dynamic Computable General Equilibrium (CGE) model (Winkler et al. 2021). We updated DART to the GTAP10 data base (Aguiar et al. 2019) and the baseline dynamics calibrated to the GDP data from IEA (2020) and updated renewable energy levels of IEA (2022)). A previous meta-study provided by Böhringer et al. (2021) (still relying on the GTAP9 database and also including the DART model) finds a range for the emissions-weighted global average CO_2 price from 12.66 USD/tCO_2 to 42.86 USD/tCO_2 for implementing the NDCs in 2030. The emissions-weighted global average CO_2 prices in our study are 29.78 USD/tCO_2 (Std 19.89) and 44.90 USD/tCO_2 (Std 22.95) for low and high emissions reduction ambition levels as defined in the NDCs. Note that our estimates involve a large uncertainty since we consider a larger variation in future business-as-usual GDP and CO_2 emissions than the studies underlying the comparison in Böhringer et al. (2021). Despite the relatively good fit with other studies it needs to be acknowledged that such CGE models aggregate several countries to regions and consider only some (economic) large countries like for example China, the USA, Germany and India separately while several small, in particular developing countries in Africa, Asia and Latin America are aggregated. The DART model underlying our estimation provides results for 21 regions and we split these regional results to the country level, assuming that within a region a country with low emission efficiency (i.e., high emission-GDP-ratio) has lower abatement cost than countries which have already a higher emission efficiency. However, for large DART regions, like Africa, these seems to be a strong assumption and hence our results for economically-small countries, of which many have a rather large attributed ocean sink should be considered with caution.

Finally, it needs to be kept in mind that the regional attribution of the ocean sink could also involve the attribution of ocean outgassing. For example, Kiribati could be assigned an annual outgassing burden of 546 Mt C (compared to its fossil fuel and industrial emissions of 0.02 MtC). For our valuation, we assigned only the net ocean sink, proportional to countries with a negative CO_2 flux in their EEZ. Obviously, other distribution of ocean sink data are possible. Note that our open-access valuation approach is provided in Excel and other (regional) ocean sink data (and attributions) can easily be implemented to derive the value information.

More general speaking, from the global commons character of the ocean carbon sink it appears to be more logically to apply the climate-change damage-based assessment approach to derive information about ocean carbon wealth in an inclusive wealth framework. The US has recently drafted a new National Strategy to improve its statistical description of economic activity and development by accounting for the wealth contributions of water, air, and other natural assets following the IW approach (The White House, 2022), applying the SCC to assess the wealth loss from CO_2 emissions. Hence, in an approach to properly valuing natural assets, the application of CSCC to assess the ocean carbon sink, appears straightforward. Moreover, the damage approach is flexible in including new estimates on for example ecological impacts (Bastien-Olvera and Moore 2021) which are not yet properly reflected in emission reduction targets of market-based climate policies.

However, at the same time, the various possible components of climate change impacts result in a large uncertainty of damage-based approaches and thus a large range of value estimates. In contrast, abatement-cost based-approaches, despite the uncertainty about innovations in emission abatement technologies, appear to result in a narrower range if applied to the valuation of the ocean sink. However, assigning property rights with implications for improving carbon uptake might be restricted to coastal blue carbon ecosystems since the common pool open ocean carbon sink does not appear to benefit from direct management (Rickels et al. 2016). Consequently, the inclusion of the ocean carbon sink into countries climate policy might be restricted to these coastal blue carbon ecosystems. One the other hand, the overuse of the open-access atmospheric carbon reservoir translates also in an overuse in the ocean carbon reservoir. An abatement-cost based-approach might be used to value the implications of assigning responsibilities for maintaining the ocean carbon sink. To compensate for a reduced ocean carbon sink, emissions reduction targets need to increase and provide in turn information about the cost of a weakening ocean sink. We provide as example an assignment of responsibilities based on the current attributed ocean sink—other assignments, based on for example the historical use of the ocean carbon sink (Ciasis et al. 2013), are also feasible. Hence, any valuation of the ocean carbon sink benefits from combining these two approaches, carefully discussing the different valuation assumptions. However, a comprehensive analysis should in addition to fossil fuel and industrial CO_2 emissions, not only include the (regional) ocean sink but also land-use emissions and the land carbon sink. Our framework provides the basis for such a comprehensive analysis.

4. Methods

Estimating and attributing ocean uptake

We used a combined open- and coastal-ocean pCO_2 mapped monthly climatology with a spatial resolution of 0.25° by 0.25° (Landschützer et al., 2020a,b) (Landschützer et al., 2020a,b). This pCO_2 data set that has a monthly resolution and presents a mean field for the entire period 1998 to 2015 that we scaled to a flux considering the atmospheric CO_2 concentration for 2006 (centered in the underlying data period). For the carbon flux calculations, we used ERA5 sea level atmospheric pressure, sea-surface temperature and salinity fields, and the NOAA multiple satellites blended 0.25° Sea Wind product. To calculate the total annual carbon flux of the EEZ of each country, we first multiplied the grid of annual carbon flux rate per m^2 by the area of the respective grid cell to obtain the total annual carbon flux amount for each grid cell. Second, we overlaid the EEZ boundaries (version 11, territories) layer from the Flanders Marine Institute (2020) with the total carbon flux grid to calculate the sum and standard deviation of the annual total carbon flux of every EEZ territory. Due to the resolution of the flux grid, 12 EEZ did not overlap with any grid cell of the annual carbon flux dataset, namely Alhucemas Islands, Bosnia and Herzegovina, Ceuta, Chafarinas Islands, Doumeira Islands, Gibraltar, Jordan, Melilla, Peñón de Vélez de la Gomera, Perejil Island, Sint-Maarten, Slovenia. Thus, total carbon fluxes were not calculated for these countries. For each country and the assignment of oversea areas can be found in supplementary material M1_data.

Climate-change damage-based assessment approach

Following Canu et al. (2015) and Bertram et al. (2021), we apply the inclusive wealth approach and calculate the total ocean carbon wealth contribution of the ocean carbon sink in the EEZs of country *i* as

$$W_{i,total} = OCS_i * SCC \;\; with\, SCC = \sum_i CSCC_i, \qquad \text{(Meq1)}$$

where *OSC$_i$* indicates the ocean carbon sink in the EEZ (measured in tCO_2/year) and *SCC* are the (global) social cost of carbon which is the sum of $CSCC_i$, i.e., the country social costs of carbon. Using CSCC we can distinguish between domestic, outbound and inbound ocean carbon wealth contributions. The domestic ocean carbon wealth contribution is:

$$W_{i,domestic} = OCS_i * CSCC_i\,, \qquad \text{(Meq2)}$$

the outbound ocean carbon wealth contribution is:

$$W_{i,out} = OCS_i * \left(\sum_{j\neq i} CSCC_j\right), \qquad \text{(Meq3)}$$

and the inbound ocean carbon wealth contribution for country *i* is:

$$W_{i,in} = \left(\sum_{j\neq i} OCS_j\right) * CSCC_i. \qquad \text{(Meq4)}$$

Net carbon wealth redistributions is defined as the difference between outbound and inbound ocean carbon wealth contributions.

We obtain estimates from the literature for the CSCC from Ricke et al. (2018, 2019) and Tol (2019). Ricke et al. (2018, 2019) which uses two different climate-damage functions, one provided by Burke et al. (2015) and one provided by Dell et al. (2012). We use from Ricke et al. (2018, 2019) only those CSCC estimates based on the damage impact function of Dell et al. (2012). The damage impact estimation of Dell et al. has a smaller (negative) impact for rich countries which appears more consistent with the literature and has a linear specification for the change in temperature and does not have a U-shape impact projection towards 2100 for global impacts. The estimation strategy of Ricke et al. (2018, 2019) includes also all SSPs and considers then for each three RCPs, RCP45, RCP60, and RCP85. We use from those scenarios the one obtained for RCP60 as here the emissions are comparable to the baseline emissions in Tol (2019) and consider the scenarios with a pure rate of time preference of 1 percent and a marginal elasticity of utility of 1.5. The estimates in Ricke et al. (2018, 2019) are presented in US$ PPP (2005), hence we convert these two market exchange values and use again the GDP deflator (both obtained from the World Bank) to obtain estimates in 2020 USD. Based on this approach, we obtain an average SCC of 227.28 USD/tCO_2 (Std 14.95) (across the different SSPs and climate change uncertainty estimates provided in Ricke et al. 2019). Tol (2019) provides estimates for the impact of climate change on the level of economic activity for different impact functions. We use the estimates obtained from the Tol impact function for the different SSPs and a pure rate of time preference of 1 percent and income elasticity of impacts of -1.68. The estimates are provided by Tol (2019) in 2010 USD at market exchange rates and we use the USD GDP deflator to transform the estimates into 2020 USD (to be comparable with our abatement cost estimates). With this specification we obtain an average SCC (across the five SSPs) of 29.17 USD/tCO_2 (Std 3.67). For each country, the CSCC estimates can be found in supplementary material M2_data.

Abatement cost-based assessment approach

We use the Dynamic Applied Regional Trade model (DART) to estimate marginal abatement cost curves, providing information on the abatement-cost based CO_2 price for a given emissions reduction level. DART is a global and recursive dynamic computable general equilibrium (CGE) model (Klepper et al. 2003, Winkler et al. 2021). The advantage of using a global CGE model also lies in its ability to capture not just the direct domestic multiplier effects of a carbon price but also indirect implications via changes in international energy prices and trade flows (Klepper and Peterson 2006). Given that economic structures vary across regions, marginal abatement costs differ widely across regions and therefore need to be calculated individually. We calibrate the DART model to the GTAP10 database (Aguiar et al. 2019) with 2014 as the base year and the baseline dynamics calibrated to the GDP data from IEA (2020) and updated to the renewable energy data from the IEA (2022). With this updated model, MAC curves for the year 2030 were generated separately for each model region by varying the emission reduction target of the said region between 0% reduction rel. to 2014 levels theoretically up to 100% rel. to baseline in intervals of 5% while assuming that the rest of the regions fulfill their national determined contribution (NDC) targets as specified in Böhringer et al. (2021).

Based on this approach we fit for each region *i* cubic abatement cost curves, $AC_i(E_i)$ which imply quadratic marginal abatement cost curves, $MAC_i(E_i)$, to the modelled values where E_i are the actual 2030 emissions in reduction scenario. Let $E_{i,BAU}$ denote the 2030 emissions in the business-as-usual (BAU) scenario without climate policy and $Y_{i,BAU}$ GDP in 2030 then

$$AC_i(R_i) = \alpha_i * (1 - \frac{E_i}{E_{i,BAU}})^3 Y_{i,BAU} E_{i,BAU} \qquad \text{(Meq5)}$$

$$MAC_i(R_i) = \alpha_i * 3 * (1 - \frac{E_i}{E_{i,BAU}})^2 Y_{i,BAU} \qquad \text{(Meq6)}$$

where $R_i := (1 - \frac{E_i}{E_{i,BAU}})$ are the relative emission reductions in 2030.

The abatement cost parameters are determined by solving the following minimization problem

$$\min_{\alpha_i} \sum \left(P_{CO_2^{DART}} - (3\alpha_i R_i^2 Y_{i,BAU}) \right)^2 . \qquad \text{(Meq7)}$$

Thus, the cost parameters α_i are calibrated by minimizing the sum of the difference between the CO_2 price $P_{CO_2^{DART}}$ and the CO_2 price following from optimality condition (Meq6). To obtain country-specific abatement cost functions for the DART regions with more than one country, we take the approach proposed by Tol (2005) and assume a 10-percent spread in relative costs between the country with the highest carbon intensity (CO_2/GDP) and the country with the lowest carbon intensity for a 10-percent reduction. For each country, the resulting parameters can be found in supplementary material M3_Data.

To quantify abatement costs in we obtain most recent information on the Nationally Determined Contributions (NDCs) from CLIMATE RESOURCE, who provide a NDC database covering the first NDCs and the development of each country's climate policy over time (Meinshausen et al. 2022). The dataset includes all NDC updates submitted up to November 2th 2022. The NDCs vary in their commitment level depending on the emission reductions of other countries. We extracted the updated covered GHG data for low and high ambition targets respectively. Hot air is included, emissions from the LULUCF sector are excluded. For both high and low ambitions, the target emissions from 2030 and 2020 were set in ratio. The low emission reduction ambitions imply a reduction of 16.00 percent relative to Business as usual in 2030, the high emission reduction ambitions imply a reduction of 29.45 percent.

Furthermore, information on business-as-usual GDP, $Y_{i,BAU}$ and 2030 business-as-usual CO_2 emissions, $E_{i,BAU}$, are obtained from the DART model and addition we consider the projections for all SSPs in the baseline (marker) specification (Riahi et al. 2017, i.e. SSP1: van Vuuren et al. 2017, SSP2: Fricko et al. 2017, SSP3: Fujimori et al. 2017, Calvin et al. 2017, and SSP5: Kriegler et al. 2017) with the OECD GDP growth projections (Dellink et al. 2017). Hence, we consider six scenarios for future GDP and emissions. We transformed this data in values relative to the base year in the specific scenario and use then GDP from the World Bank (World Bank 2022) and CO_2 emissions from the Global Carbon Project (Friedlingstein et al. 2021) in 2020 as the common base year values. We calculate for each scenario the marginal abatement cost for the low and the high emissions reduction target.

The MACCs also allow to derive a market solution, i.e., where countries are trading emission reductions. Accordingly, we use the MACCs in the following model framework. The countries, i, face an exogenously set emission cap A_i (given by the NDCs). Without emissions reduction, business-as-usual emissions are realized. AS defined above, the abatement rate $0 \leq R_i \leq 1$ denotes the emission reduction relative to BAU. Abatement costs, $AC_i(R_i)$, are increasing and convex in R_i, as defined in Meq5. The total amount of emissions abated by each country, R_iE_i, is non-negative and no country can abate more than it emits,

$$0 \leq R_iE_i \leq E_i. \qquad \text{(Meq 8)}$$

We allow for a market for tradable emission reduction permits, where the permit price is given by π and the number of permits each country purchases or sells by T_i. In order to fulfill the emission target, every country can reduce its baseline emissions and trade permits on the market. Thus, the difference between net emissions and the number of permits must not exceed the emission cap,

$$(1 - R_i)\, E_i - T_i \leq A_i. \qquad \text{(Meq9)}$$

The total cost of achieving a given target A_i is determined by the sum of abatement and permit trading costs (or trading benefits if a country is a net seller of permits, $T_i < 0$). Therefore, each country solves the following optimization problem,

$$\min_{R_i,P_i} C_i = AC_i(R_i) + \pi\, T_i, \qquad \text{(Meq10)}$$

subject to equations (5) and (6). Solving the static optimization problem, assuming and interior solution, delivers the well-known efficiency rule that for all countries the marginal cost of abatement equals the permit price,

$$AC'(R_i^*) = \pi. \qquad \text{(Meq11)}$$

The market allocates the permits efficiently. Condition (Meq11) shows that the optimal rate of emission reduction can be expressed as a function of the carbon credit price, $R_i^*(\pi)$. The optimal permit price can be determined using the overall compliance condition,

$$\sum_i^n E_i - \sum_i^n R_i^*(\pi^*) E_i = \sum_i^n A_i, \qquad \text{(Meq12)}$$

which states that the sum of all countries net emissions equals the sum of all country's emission caps. With the functional form defined in (Meq5), the solution for the permit price is

$$\pi = \left(\frac{\sum_{i=1}^n A_i}{\sum_{i=1}^n \bar{E}_i \sqrt{(3\alpha_i Y_i)^{-1}}} \right)^2 \qquad \text{(Meq13)}$$

which then determines via (Meq11) the country-specific emission levels and trading positions. The inclusion of the ocean sink (i.e., a compensation for a weakening ocean sink) is realized by reducing country's A_i accordingly.

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Supplementary Information

ST1: Attributed ocean flux data and attributed sink

ISO3	Attributed sink [MtC]		Ocean flux w/o blue carbon [MtC]		Ocean flux w blue carbon [MtC]		Oversea contribution [MtC]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
EU29	-407.36	0.64	-981.10	0.17	-986.64	0.42	-882.19	0.57
RUS	-290.24	0.46	-700.96	0.05	-702.98	0.19	-6.42	0.02
DNK	-172.09	0.27	-416.51	0.06	-416.80	0.08	-415.11	0.06
AUS	-152.02	0.24	-355.68	0.05	-368.20	1.62	-57.48	0.04
NOR	-128.66	0.20	-311.62	0.06	-311.63	0.06	-282.23	0.06
CAN	-128.65	0.20	-311.23	0.03	-311.59	0.05	0.00	0.00
JPN	-107.89	0.17	-261.24	0.04	-261.32	0.04	-7.02	0.02
FRA	-81.34	0.13	-195.79	0.11	-197.00	0.14	-192.99	0.13
NZL	-76.35	0.12	-184.81	0.02	-184.91	0.02	9.65	0.02
MUS	-73.06	0.12	-176.95	0.06	-176.97	0.06	0.00	0.00
GBR	-52.21	0.08	-125.40	0.08	-126.46	0.13	-114.47	0.13
USA	-46.67	0.07	-104.55	0.08	-113.05	0.73	-44.83	0.10
NCL	-46.63	0.07	-112.65	0.02	-112.95	0.06	0.00	0.00
CHL	-42.64	0.07	-103.27	0.04	-103.27	0.04	13.78	0.01
ZAF	-40.28	0.06	-97.37	0.03	-97.55	0.04	0.00	0.00
FJI	-36.70	0.06	-88.40	0.03	-88.90	0.08	0.00	0.00
ARG	-23.36	0.04	-56.25	0.02	-56.57	0.04	0.00	0.00
VUT	-22.55	0.04	-54.40	0.04	-54.62	0.06	0.00	0.00
TON	-21.65	0.03	-51.79	0.02	-52.44	0.14	0.00	0.00
MDG	-19.18	0.03	-45.02	0.03	-46.46	0.23	0.00	0.00
NAM	-18.07	0.03	-43.78	0.04	-43.78	0.04	0.00	0.00
ISL	-17.79	0.03	-43.08	0.03	-43.09	0.03	0.00	0.00
CHN	-15.33	0.02	-34.28	0.02	-37.13	0.32	0.00	0.00
COK	-15.04	0.02	-36.43	0.05	-36.43	0.05	0.00	0.00
NIU	-12.15	0.02	-29.42	0.01	-29.42	0.01	0.00	0.00
KOR	-11.30	0.02	-27.36	0.03	-27.36	0.03	0.00	0.00
MNP	-9.66	0.02	-23.40	0.01	-23.40	0.01	0.00	0.00
SLB	-9.10	0.01	-21.74	0.02	-22.04	0.05	0.00	0.00
PRT	-8.17	0.01	-19.62	0.01	-19.78	0.01	0.00	0.00
IRL	-7.40	0.01	-17.90	0.01	-17.92	0.01	0.00	0.00
TWN	-7.27	0.01	-17.38	0.02	-17.61	0.05	0.00	0.00
PHL	-4.35	0.01	-7.43	0.02	-10.53	0.57	0.00	0.00
PRK	-4.25	0.01	-10.29	0.04	-10.29	0.04	0.00	0.00
PNG	-3.10	0.00	-5.04	0.02	-7.50	0.37	0.00	0.00
MMR	-2.19	0.00	-3.91	0.01	-5.31	0.16	0.00	0.00

ISO3	Attributed sink [MtC]		Ocean flux w/o blue carbon [MtC]		Ocean flux w blue carbon [MtC]		Oversea contribution [MtC]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
VNM	-2.15	0.00	-4.83	0.02	-5.21	0.05	0.00	0.00
WSM	-1.82	0.00	-4.24	0.01	-4.41	0.04	0.00	0.00
UKR	-1.60	0.00	-2.82	0.01	-3.87	0.23	0.00	0.00
ATG	-1.17	0.00	-2.78	0.01	-2.83	0.01	0.00	0.00
URY	-0.83	0.00	-2.01	0.00	-2.01	0.00	0.00	0.00
BGR	-0.82	0.00	-1.99	0.02	-1.99	0.02	0.00	0.00
ROU	-0.77	0.00	-1.84	0.02	-1.85	0.02	0.00	0.00
GNB	-0.75	0.00	1.37	0.00	-1.81	0.59	0.00	0.00
MYS	-0.71	0.00	-0.65	0.01	-1.72	0.13	0.00	0.00
TUR	-0.62	0.00	-1.43	0.02	-1.50	0.02	0.00	0.00
TUN	-0.56	0.00	-0.49	0.01	-1.37	0.19	0.00	0.00
GIN	-0.46	0.00	1.58	0.01	-1.11	0.49	0.00	0.00
DEU	-0.44	0.00	-0.96	0.01	-1.07	0.02	0.00	0.00
PLW	-0.43	0.00	-0.91	0.01	-1.05	0.03	0.00	0.00
GEO	-0.39	0.00	-0.94	0.02	-0.94	0.02	0.00	0.00
CMR	-0.20	0.00	-0.12	0.01	-0.49	0.05	0.00	0.00
ARE	-0.18	0.00	0.41	0.01	-0.43	0.17	0.00	0.00
BGD	-0.15	0.00	0.41	0.01	-0.36	0.10	0.00	0.00
MLT	-0.11	0.00	-0.20	0.00	-0.26	0.01	0.00	0.00
ESP	-0.08	0.00	1.67	0.01	-0.20	0.22	0.00	0.00
KWT	-0.08	0.00	0.10	0.01	-0.18	0.06	0.00	0.00
HRV	-0.06	0.00	-0.10	0.00	-0.15	0.01	0.00	0.00
ITA	-0.04	0.00	1.42	0.01	-0.10	0.30	0.00	0.00
BEL	-0.01	0.00	-0.04	0.00	-0.04	0.00	0.00	0.00
GMB	-0.01	0.00	0.08	0.00	-0.04	0.02	0.00	0.00
SGP	-0.01	0.00	0.00	0.00	-0.02	0.00	0.00	0.00
DZA	-0.01	0.00	-0.01	0.00	-0.02	0.00	0.00	0.00
BHR	-0.01	0.00	0.08	0.01	-0.01	0.02	0.00	0.00
ALB	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00
AGO	0.00	0.00	12.39	0.03	12.24	0.04	0.00	0.00
NLD	0.00	0.00	6.16	0.09	6.11	0.09	7.32	0.09
BLZ	0.00	0.00	2.50	0.04	1.54	0.19	0.00	0.00
BEN	0.00	0.00	1.40	0.01	1.15	0.05	0.00	0.00
BRA	0.00	0.00	276.21	0.07	274.28	0.25	0.00	0.00
BRN	0.00	0.00	0.08	0.01	0.06	0.01	0.00	0.00
KHM	0.00	0.00	0.69	0.01	0.61	0.01	0.00	0.00
CPV	0.00	0.00	21.74	0.02	21.74	0.02	0.00	0.00
COL	0.00	0.00	56.09	0.06	55.64	0.08	0.00	0.00
COM	0.00	0.00	4.04	0.01	3.82	0.05	0.00	0.00
COG	0.00	0.00	1.57	0.02	1.57	0.02	0.00	0.00

ISO3	Attributed sink [MtC]		Ocean flux w/o blue carbon [MtC]		Ocean flux w blue carbon [MtC]		Oversea contribution [MtC]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
CRI	0.00	0.00	19.63	0.02	19.57	0.03	0.00	0.00
CUB	0.00	0.00	15.15	0.03	11.95	0.54	0.00	0.00
CYP	0.00	0.00	4.24	0.02	4.22	0.02	0.00	0.00
COD	0.00	0.00	0.74	0.02	0.71	0.02	0.00	0.00
DJI	0.00	0.00	0.07	0.02	0.07	0.02	0.00	0.00
DOM	0.00	0.00	20.25	0.04	20.16	0.04	0.00	0.00
ECU	0.00	0.00	158.71	0.10	158.46	0.10	135.47	0.09
EGY	0.00	0.00	15.18	0.04	14.75	0.10	0.00	0.00
SLV	0.00	0.00	4.64	0.03	4.58	0.03	0.00	0.00
GNQ	0.00	0.00	22.57	0.04	22.53	0.04	0.00	0.00
ERI	0.00	0.00	1.66	0.03	1.65	0.03	0.00	0.00
EST	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00
FIN	0.00	0.00	0.67	0.01	0.64	0.01	0.00	0.00
GAB	0.00	0.00	11.10	0.02	10.82	0.04	0.00	0.00
GHA	0.00	0.00	4.94	0.01	4.44	0.10	0.00	0.00
GRC	0.00	0.00	13.06	0.02	12.98	0.02	0.00	0.00
GTM	0.00	0.00	2.47	0.01	2.41	0.02	0.00	0.00
GUY	0.00	0.00	9.71	0.02	9.67	0.02	0.00	0.00
HTI	0.00	0.00	7.73	0.04	7.57	0.05	0.00	0.00
HND	0.00	0.00	21.07	0.04	20.47	0.11	0.00	0.00
IND	0.00	0.00	137.06	0.04	135.63	0.19	5.75	0.02
IDN	0.00	0.00	102.82	0.02	94.99	0.92	0.00	0.00
IRN	0.00	0.00	3.02	0.01	2.52	0.10	0.00	0.00
IRQ	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00
ISR	0.00	0.00	1.27	0.01	1.27	0.01	0.00	0.00
CIV	0.00	0.00	7.85	0.01	7.84	0.01	0.00	0.00
JAM	0.00	0.00	30.89	0.03	30.73	0.04	0.00	0.00
STP	0.00	0.00	5.93	0.02	5.93	0.02	0.00	0.00
PER	0.00	0.00	95.33	0.10	95.25	0.10	0.00	0.00
SEN	0.00	0.00	2.80	0.01	2.33	0.06	0.00	0.00
KEN	0.00	0.00	21.04	0.05	20.95	0.05	0.00	0.00
KIR	0.00	0.00	546.81	0.10	546.81	0.10	0.00	0.00
LVA	0.00	0.00	0.16	0.00	0.16	0.00	0.00	0.00
LBN	0.00	0.00	0.71	0.02	0.71	0.02	0.00	0.00
LBR	0.00	0.00	8.88	0.02	8.86	0.02	0.00	0.00
LBY	0.00	0.00	7.52	0.01	7.52	0.01	0.00	0.00
LTU	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00
MDV	0.00	0.00	38.30	0.02	37.88	0.09	0.00	0.00
MHL	0.00	0.00	5.57	0.02	5.48	0.03	0.00	0.00
MRT	0.00	0.00	11.02	0.03	11.02	0.03	0.00	0.00

ISO3	Attributed sink [MtC]		Ocean flux w/o blue carbon [MtC]		Ocean flux w blue carbon [MtC]		Oversea contribution [MtC]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
MEX	0.00	0.00	77.11	0.02	73.38	0.42	0.00	0.00
MCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MNE	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
MAR	0.00	0.00	1.15	0.01	1.15	0.01	0.00	0.00
MOZ	0.00	0.00	0.91	0.01	0.27	0.07	0.00	0.00
NRU	0.00	0.00	10.49	0.01	10.49	0.01	0.00	0.00
NIC	0.00	0.00	23.22	0.04	22.12	0.22	0.00	0.00
NGA	0.00	0.00	3.69	0.02	1.04	0.37	0.00	0.00
OMN	0.00	0.00	68.37	0.06	68.37	0.06	0.00	0.00
QAT	0.00	0.00	0.51	0.01	0.31	0.05	0.00	0.00
ESH	0.00	0.00	24.49	0.04	24.49	0.04	0.00	0.00
SDN	0.00	0.00	5.22	0.04	4.43	0.17	0.00	0.00
VEN	0.00	0.00	33.06	0.04	32.25	0.10	0.00	0.00
PAK	0.00	0.00	18.83	0.03	18.74	0.03	0.00	0.00
PAN	0.00	0.00	9.13	0.04	8.54	0.09	0.00	0.00
POL	0.00	0.00	0.28	0.01	0.28	0.01	0.00	0.00
KNA	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00
LCA	0.00	0.00	0.35	0.01	0.35	0.01	0.00	0.00
VCT	0.00	0.00	1.65	0.02	1.65	0.02	0.00	0.00
SAU	0.00	0.00	12.75	0.04	9.03	0.80	0.00	0.00
SYC	0.00	0.00	142.07	0.05	142.06	0.05	0.00	0.00
SLE	0.00	0.00	2.46	0.01	1.43	0.17	0.00	0.00
SOM	0.00	0.00	113.57	0.10	113.56	0.10	0.00	0.00
LKA	0.00	0.00	39.69	0.02	39.14	0.11	0.00	0.00
SUR	0.00	0.00	7.74	0.02	7.61	0.03	0.00	0.00
SWE	0.00	0.00	0.73	0.01	0.71	0.01	0.00	0.00
SYR	0.00	0.00	0.36	0.02	0.36	0.02	0.00	0.00
TZA	0.00	0.00	13.76	0.03	13.58	0.04	0.00	0.00
THA	0.00	0.00	1.36	0.01	0.61	0.09	0.00	0.00
TGO	0.00	0.00	0.52	0.01	0.48	0.01	0.00	0.00
TTO	0.00	0.00	4.20	0.03	4.19	0.03	0.00	0.00
YEM	0.00	0.00	113.47	0.13	112.50	0.24	0.00	0.00
Total	-1721.80	2.72	-1639.34	0.43	-1734.76	2.72	-948.57	0.26

Note that we include here all countries for which we have flux data. The EU29 is included as aggregate but it is not included in the sum since we also list the countries separately. Note also that the net sum for the flux data exceeds here the attributed net sink (first column) since we did not include the High Seas.

Table ST2: CO_2 Prices for the climate-change damage-based versus abatement cost-based assessment approach

Country/ Region	(Country) Social Cost of Carbon [USD/tCO_2]				(National) CO_2 Prices [USD/tCO_2]			
	DJO		Tol		Low NDC ambition		High NDC ambition	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Global	227.28	14.95	29.17	3.67	29.78	19.89	44.90	22.95
Trade	227.28	14.95	29.17	3.67	9.70	5.04	18.38	7.09
EU29	45.56	1.71	0.36	0.05	101.51	36.03	101.51	36.03
RUS	4.13	1.14	0.22	0.09	2.65	2.78	2.65	2.78
DNK	1.06	0.18	0.00	0.00	NA	NA	NA	NA
AUS	4.69	0.65	0.01	0.01	45.43	16.87	45.43	16.87
NOR	2.34	0.41	0.00	0.00	NA	NA	NA	NA
CAN	8.92	1.80	0.02	0.01	140.50	41.35	165.79	42.59
JPN	10.92	1.02	0.08	0.04	125.52	45.42	144.96	46.10
FRA	9.00	0.88	0.04	0.02	NA	NA	NA	NA
NZL	0.38	0.04	0.00	0.00	82.19	33.30	82.19	33.30
MUS	0.02	0.01	0.00	0.00	1.88	1.20	74.89	9.16
GBR	9.32	1.10	0.04	0.02	141.38	39.95	141.38	39.95
USA	88.97	13.26	0.19	0.10	56.25	22.67	62.70	23.38
NCL	0.02	0.01	0	0	NA	NA	NA	NA
CHL	0.45	0.17	0.02	0.01	92.00	35.18	92.00	35.18
ZAF	1.07	0.33	0.09	0.04	0.02	0.03	29.19	2.78
FJI	0.00	0.00	0.00	0.00	64.02	13.88	120.30	16.32
ARG	0.76	0.39	0.06	0.03	32.30	18.82	32.30	18.82
VUT	0.00	0.00	0.00	0.00	127.30	24.48	228.13	28.04
TON	0	0	0.00	0.00	103.97	14.44	103.97	14.44
MDG	0.06	0.05	0.31	0.13	37.11	10.20	97.05	16.31
NAM	0.04	0.01	0.01	0.00	63.35	9.38	101.45	11.04
ISL	0.09	0.01	0.00	0.00	NA	NA	NA	NA
CHN	12.12	4.04	3.73	1.60	2.53	2.70	5.74	4.02
KOR	3.17	0.33	0.04	0.02	54.41	17.20	54.41	17.20
SLB	0.00	0.00	0.00	0.00	4.45	5.01	329.88	28.10
PRT	0.44	0.04	0.01	0.00	NA	NA	NA	NA
IRL	0.74	0.11	0.00	0.00	119.63	52.64	119.63	52.64
PHL	0.40	0.23	0.45	0.19	0.12	0.29	564.68	34.70
PNG	0.03	0.02	0.04	0.02	0.06	0.16	189.45	16.34
MMR	0.04	0.03	0	0	40.13	12.54	88.57	14.88
VNM	0.15	0.05	0.54	0.23	0	0	0	0
WSM	0.00	0.00	0.00	0.00	1.34	1.89	147.00	15.05
UKR	0.19	0.05	0.15	0.07	1.48	2.12	1.48	2.12
ATG	0	0	0.00	0.00	NA	NA	NA	NA
URY	0.04	0.02	0.01	0.00	116.09	73.70	238.16	94.78
BGR	0.09	0.03	0.01	0.01	NA	NA	NA	NA

Country/ Region	(Country) Social Cost of Carbon [USD/tCO_2]				(National) CO_2 Prices [USD/tCO_2]			
	DJO		Tol		Low NDC ambition		High NDC ambition	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ROU	0.27	0.10	0.04	0.02	NA	NA	NA	NA
GNB	0.01	0.00	0.02	0.01	0	0	0	0
MYS	0.53	0.21	0.05	0.02	14.86	6.01	14.86	6.01
TUR	3.07	1.59	0.11	0.04	0	0	0	0
TUN	0.11	0.04	0.02	0.01	0	0	29.19	5.28
GIN	0.02	0.01	0.15	0.06	0	0	0	0
DEU	9.43	1.10	0.05	0.03	NA	NA	NA	NA
PLW	0	0	0.00	0.00	169.43	7.10	169.43	7.10
GEO	0.01	0.01	0.02	0.01	12.50	3.09	34.19	4.23
CMR	0.08	0.04	0.13	0.06	0	0	0	0
ARE	1.21	0.28	0.01	0.00	99.04	32.15	99.04	32.15
BGD	0.23	0.11	1.37	0.58	0	0	0.16	0.40
MLT	0	0	0.00	0.00	NA	NA	NA	NA
ESP	4.06	0.35	0.03	0.02	NA	NA	NA	NA
KWT	0.61	0.20	0.00	0.00	41.40	14.92	41.40	14.92
HRV	0.15	0.04	0.01	0.00	NA	NA	NA	NA
ITA	5.12	0.40	0.04	0.02	NA	NA	NA	NA
BEL	1.44	0.22	0.01	0.00	NA	NA	NA	NA
GMB	0.00	0.00	0.02	0.01	0	0	28.62	7.52
SGP	0	0	0.00	0.00	409.84	88.09	409.84	88.09
DZA	0.33	0.17	0.10	0.04	1.01	0.60	6.86	1.88
BHR	0	0	0.00	0.00	0	0	0	0
AFG	0.27	0.19	0.34	0.14	0	0	0	0
AGO	0.44	0.26	0.06	0.03	42.61	8.25	84.86	11.00
ALB	0.03	0.01	0.01	0.00	0.99	1.80	0.99	1.80
ARM	0.01	0.01	0.01	0.00	0	0	0	0
AUT	1.35	0.18	0.01	0.00	NA	NA	NA	NA
AZE	0.08	0.03	0.02	0.01	1.26	1.23	1.26	1.23
BDI	0.02	0.02	0.20	0.09	7.69	4.27	28.93	9.31
BEN	0.07	0.05	0.09	0.04	0	0	0	0
BFA	0.17	0.14	0.16	0.07	0	0	0	0
BHS	0.04	0.01	0.00	0.00	NA	NA	NA	NA
BIH	0.03	0.01	0.01	0.00	27.97	13.86	33.78	14.67
BLR	0.13	0.04	0.02	0.01	15.14	5.94	20.90	6.31
BLZ	0.00	0.00	0.00	0.00	0	0	0	0
BOL	0.05	0.03	0.05	0.02	0	0	0	0
BRA	3.24	2.01	0.36	0.15	80.74	54.34	276.42	93.62
BRN	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.01
BTN	0.01	0.00	0.00	0.00	0.33	0.60	0.33	0.60
BWA	0.07	0.02	0.00	0.00	0	0	0	0
CAF	0.03	0.02	0.05	0.02	340.67	47.74	502.24	56.97
CHE	1.79	0.21	0.00	0.00	NA	NA	NA	NA

Country/ Region	(Country) Social Cost of Carbon [USD/tCO₂]				(National) CO_2 Prices [USD/tCO₂]			
	DJO		Tol		Low NDC ambition		High NDC ambition	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
CIV	0.05	0.03	0.12	0.05	0	0	2.95	4.40
COD	0.18	0.13	0.97	0.41	14.90	9.86	170.74	50.11
COG	0.05	0.02	0.02	0.01	NA	NA	NA	NA
COL	0.67	0.34	0.11	0.05	127.45	40.06	127.45	40.06
COM	0.00	0.00	0.01	0.00	0	0	20.67	7.94
CPV	0.00	0.00	0.00	0.00	52.80	9.26	68.87	10.33
CRI	0.09	0.04	0.01	0.00	311.91	115.95	311.91	115.95
CUB	0.09	0.03	0.02	0.01	NA	NA	NA	NA
CYP	0.06	0.02	0.00	0.00	NA	NA	NA	NA
CZE	0.56	0.08	0.01	0.00	NA	NA	NA	NA
DJI	0.00	0.00	0.01	0.00	0	0	35.33	14.95
DOM	0.14	0.08	0.02	0.01	8.41	12.22	49.30	27.02
ECU	0.14	0.08	0.04	0.02	35.92	23.13	123.51	35.01
EGY	0.30	0.14	0.34	0.15	0	0	0	0
ERI	0.02	0.02	0.11	0.05	0	0	8.62	2.17
EST	0.06	0.01	0.00	0.00	NA	NA	NA	NA
ETH	0.36	0.29	1.42	0.61	0	0	1.83	1.63
FIN	1.29	0.21	0.00	0.00	NA	NA	NA	NA
GAB	0.04	0.02	0.00	0.00	94.13	11.68	94.13	11.68
GHA	0.09	0.06	0.21	0.09	0	0	0	0
GNQ	0.06	0.02	0.00	0.00	5.21	2.50	87.84	9.56
GRC	0.59	0.05	0.01	0.00	NA	NA	NA	NA
GTM	0.13	0.09	0.05	0.02	0	0	0.01	0.02
GUY	0.00	0.00	0.00	0.00	0.04	0.10	364.89	28.30
HND	0.05	0.03	0.03	0.01	3.54	6.84	19.74	16.51
HTI	0.02	0.01	0.10	0.04	NA	NA	NA	NA
HUN	0.28	0.03	0.01	0.00	NA	NA	NA	NA
IDN	0.46	0.20	1.04	0.44	14.04	7.45	60.54	11.75
IND	3.98	2.42	6.97	2.98	0	0	1.70	3.37
IRN	0.69	0.26	0.20	0.09	1.35	1.04	3.56	2.00
IRQ	0.36	0.24	0.11	0.05	0	0	0	0
ISR	1.39	0.17	0.01	0.00	775.20	167.14	775.20	167.14
JAM	0.02	0.01	0.01	0.00	46.45	14.97	52.35	15.30
JOR	0.05	0.02	0.02	0.01	0	0	23.31	14.71
KAZ	0.35	0.13	0.03	0.01	7.28	4.10	12.51	4.36
KEN	0.18	0.12	0.37	0.16	0	0	14.41	7.66
KGZ	0.01	0.00	0.05	0.02	0.47	1.15	3.80	4.85
KHM	0.02	0.01	0.12	0.05	0	0	4.58	3.86
LAO	0.01	0.01	0.05	0.02	17.82	5.21	17.82	5.21
LBN	0.08	0.03	0.01	0.00	1.69	1.49	14.19	8.10
LBR	0.02	0.01	0.06	0.03	0	0	16.92	5.54
LBY	0.18	0.08	0.01	0.00	NA	NA	NA	NA

Country/ Region	(Country) Social Cost of Carbon [USD/tCO_2]				(National) CO_2 Prices [USD/tCO_2]			
	DJO		Tol		Low NDC ambition		High NDC ambition	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
LKA	0.07	0.04	0.09	0.04	2.32	3.38	16.17	12.39
LSO	0.01	0.00	0.01	0.01	3.69	1.53	24.22	3.63
LTU	0.10	0.03	0.00	0.00	NA	NA	NA	NA
LUX	0.33	0.06	0.00	0.00	NA	NA	NA	NA
LVA	0.05	0.01	0.00	0.00	NA	NA	NA	NA
MAR	0.18	0.10	0.10	0.04	17.77	4.65	80.50	9.30
MDA	0.00	0.00	0.02	0.01	0	0	143.62	19.93
MEX	3.92	2.42	0.17	0.07	10.53	12.68	36.19	21.41
MKD	0.03	0.01	0.01	0.00	111.53	30.91	111.53	30.91
MLI	0.11	0.09	0.13	0.06	0	0	0	0
MNE	0.01	0.00	0.00	0.00	52.68	28.87	52.68	28.87
MNG	0.01	0.01	0.01	0.01	12.16	2.57	13.85	2.80
MOZ	0.19	0.14	0.28	0.12	0	0	131.57	22.39
MRT	0.01	0.01	0.03	0.01	7.94	3.22	232.71	19.65
MWI	0.15	0.13	0.26	0.11	0	0	22.77	12.71
NER	0.25	0.24	0.24	0.10	0	0	0	0
NGA	0.99	0.61	0.96	0.41	48.37	12.49	179.87	27.63
NIC	0.01	0.01	0.03	0.01	0	0	0	0
NLD	2.38	0.26	0	0	NA	NA	NA	NA
NPL	0.12	0.11	0.31	0.13	1.93	2.66	1.93	2.66
OMN	0.16	0.08	0.00	0.00	3.52	2.84	3.52	2.84
PAK	0.60	0.38	1.28	0.54	0	0	0	0
PAN	0.09	0.04	0.01	0.00	0	0	0	0
PER	0.39	0.21	0.07	0.03	24.86	27.38	125.84	54.10
POL	1.21	0.12	0.05	0.02	NA	NA	NA	NA
PRY	0.03	0.01	0.03	0.01	27.49	29.78	114.91	54.72
QAT	0.85	0.16	0.00	0.00	52.11	23.54	52.11	23.54
RWA	0.08	0.06	0.13	0.06	0	0	78.97	23.01
SAU	2.04	0.78	0.03	0.01	0.88	0.85	176.02	31.62
SDN	0.22	0.18	0.21	0.09	134.79	42.71	771.22	91.33
SEN	0.07	0.06	0.09	0.04	0	0	10.34	3.82
SLE	0.02	0.02	0.07	0.03	0	0	0	0
SLV	0.04	0.03	0.02	0.01	2.53	6.11	3.31	7.43
SOM	0.00	0.00	0	0	0	0	0	0
SRB	0.08	0.02	0.02	0.01	37.96	18.28	37.96	18.28
STP	0.00	0.00	0.00	0.00	0	0	0	0
SUR	0.00	0.00	0.00	0.00	0	0	0	0
SVK	0.27	0.03	0.01	0.00	NA	NA	NA	NA
SVN	0.15	0.02	0.00	0.00	NA	NA	NA	NA
SWE	2.64	0.46	0.01	0.00	NA	NA	NA	NA
SWZ	0.01	0.00	0.00	0.00	0	0	0	0
SYR	0.11	0.06	0.09	0.04	NA	NA	NA	NA

Country/ Region	(Country) Social Cost of Carbon [USD/tCO_2]				(National) CO_2 Prices [USD/tCO_2]			
	DJO		Tol		Low NDC ambition		High NDC ambition	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
TCD	0.09	0.06	0.09	0.04	0	0	0	0
TGO	0.03	0.02	0.07	0.03	0.41	0.43	228.16	28.95
THA	0.36	0.13	0.18	0.08	23.39	9.13	43.53	10.93
TJK	0.01	0.01	0.08	0.04	0	0	0	0
TKM	0.07	0.02	0.02	0.01	NA	NA	NA	NA
TTO	0.03	0.01	0.00	0.00	0	0	0.15	0.37
TZA	0.23	0.16	0.49	0.21	0	0	0.45	1.02
UGA	0.32	0.26	0.40	0.17	0	0	33.38	15.25
UZB	0.05	0.02	0.21	0.09	0	0	0	0
VCT	0.00	0.00	0.00	0.00	NA	NA	NA	NA
VEN	0.49	0.17	0.05	0.02	0	0	0	0
YEM	0.12	0.07	0.15	0.07	NA	NA	NA	NA
ZMB	0.08	0.06	0.10	0.04	0	0	7.25	3.86
ZWE	0.02	0.01	0.15	0.06	0	0	0.70	0.51
AND	0	0	0.00	0.00	275.14	116.23	275.14	116.23
ABW	0	0	0.00	0.00	NA	NA	NA	NA
BRB	0	0	0.00	0.00	NA	NA	NA	NA
BMU	0	0	0.00	0.00	NA	NA	NA	NA
DMA	0	0	0.00	0.00	NA	NA	NA	NA
FRO	0	0	0.00	0.00	NA	NA	NA	NA
GRL	0	0	0.00	0.00	NA	NA	NA	NA
GRD	0	0	0.00	0.00	NA	NA	NA	NA
IMN	0	0	0.00	0.00	NA	NA	NA	NA
KIR	0	0	0.00	0.00	38.74	10.04	209.38	14.32
XXK	0	0	0.01	0.00	NA	NA	NA	NA
LIE	0	0	0.00	0.00	NA	NA	NA	NA
MDV	0	0	0.00	0.00	0	0	299.70	18.25
MHL	0	0	0.00	0.00	89.87	8.02	89.87	8.02
FSM	0	0	0.00	0.00	135.53	13.87	157.61	14.14
MCO	0	0	0.00	0.00	NA	NA	NA	NA
ANT	0	0	0.01	0.01	NA	NA	NA	NA
PSE	0	0	0.02	0.01	0	0	53.31	35.07
PRI	0	0	0.00	0.00	NA	NA	NA	NA
KNA	0	0	0.00	0.00	NA	NA	NA	NA
LCA	0	0	0.00	0.00	NA	NA	NA	NA
SMR	0	0	0.00	0.00	NA	NA	NA	NA
SYC	0	0	0.00	0.00	0	0	0	0
TLS	0	0	0.01	0.00	553.72	35.14	553.72	35.14
TUV	0	0	0.00	0.00	839.56	43.59	901.10	44.41

Table ST3: Ocean carbon wealth assessment using ocean carbon sink and the DJO climate impact estimation.

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
EU	339225	22316	66904	2555	272321	22459	207941	7936	64380	23820
RUS	241694	15900	4392	1216	237303	15946	20929	5795	216374	16966
DNK	143304	9427	670	113	142634	9428	5847	983	136787	9479
AUS	126594	8328	2614	360	123981	8336	26157	3606	97824	9082
NOR	107143	7048	1102	195	106041	7051	13232	2337	92810	7428
CAN	107129	7047	4202	850	102927	7098	50462	10202	52465	12428
JPN	89846	5911	4317	405	85529	5924	62640	5878	22890	8346
FRA	67732	4456	2682	263	65050	4463	52489	5141	12561	6808
NZL	63577	4182	107	12	63470	4182	2242	256	61228	4190
MUS	60844	4003	5	2	60839	4003	102	41	60737	4003
GBR	43479	2860	1783	210	41696	2868	55351	6534	-13655	7136
USA	38867	2557	15214	2268	23653	3417	530284	79028	-506631	79101
NCL	38834	2555	4	1	38831	2555	124	46	38707	2555
CHL	35507	2336	71	27	35436	2336	2712	1026	32725	2551
ZAF	33540	2206	158	49	33383	2207	6398	1976	26984	2963
FJI	30565	2011	0	0	30564	2011	16	8	30548	2011
ARG	19450	1280	65	33	19384	1280	4618	2346	14767	2673
VUT	18779	1235	0	0	18779	1235	15	8	18764	1235
TON	18030	1186	0	0	18030	1186	0	0	18030	1186
MDG	15975	1051	4	3	15971	1051	367	279	15604	1087
NAM	15051	990	2	1	15048	990	227	79	14822	993
ISL	14815	975	6	1	14809	975	565	80	14243	978
CHN	12766	840	681	227	12085	870	73651	24539	-61566	24554
KOR	9407	619	131	14	9276	619	19324	2032	-10048	2124

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SLB	7578	499	0	0	7578	499	20	12	7558	499
PRT	6801	447	13	1	6788	447	2705	263	4083	519
IRL	6162	405	20	3	6142	405	4511	660	1631	775
PHL	3620	238	6	4	3614	238	2458	1424	1156	1443
PNG	2579	170	0	0	2579	170	197	105	2382	199
MMR	1827	120	0	0	1827	120	262	190	1565	225
VNM	1792	118	1	0	1791	118	917	326	874	347
WSM	1518	100	0	0	1518	100	5	3	1513	100
UKR	1329	87	1	0	1328	87	1178	325	150	336
ATG	972	64	0	0	972	64	0	0	972	64
URY	693	46	0	0	692	46	256	125	437	133
BGR	684	45	0	0	684	45	566	159	117	166
ROU	638	42	1	0	637	42	1667	608	-1030	609
GNB	623	41	0	0	623	41	31	20	593	46
MYS	591	39	1	1	590	39	3235	1285	-2645	1286
TUR	517	34	7	4	510	34	18802	9750	-18293	9750
TUN	470	31	0	0	469	31	695	217	-226	220
GIN	381	25	0	0	381	25	128	83	254	87
DEU	367	24	15	2	351	24	57784	6764	-57433	6764
PLW	360	24	0	0	360	24	0	0	360	24
GEO	323	21	0	0	323	21	91	40	232	45
CMR	170	11	0	0	170	11	470	249	-300	249
ARE	148	10	1	0	147	10	7396	1716	-7249	1716
BGD	123	8	0	0	123	8	1382	646	-1259	646
MLT	91	6	0	0	91	6	0	0	91	6

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ESP	70	5	1	0	68	5	24865	2152	-24796	2152
KWT	63	4	0	0	63	4	3720	1201	-3657	1201
HRV	52	3	0	0	52	3	933	264	-880	264
ITA	35	2	1	0	34	2	31404	2473	-31370	2473
BEL	12	1	0	0	12	1	8841	1322	-8828	1322
GMB	12	1	0	0	12	1	30	19	-18	19
SGP	8	1	0	0	8	1	0	0	8	1
DZA	5	0	0	0	5	0	2024	1030	-2019	1030
BHR	5	0	0	0	5	0	0	0	5	0
AFG	0	0	0	0	0	0	1643	1187	-1643	1187
AGO	0	0	0	0	0	0	2722	1606	-2722	1606
ALB	0	0	0	0	0	0	184	71	-184	71
ARM	0	0	0	0	0	0	72	33	-72	33
AUT	0	0	0	0	0	0	8289	1097	-8289	1097
AZE	0	0	0	0	0	0	462	200	-462	200
BDI	0	0	0	0	0	0	141	106	-141	106
BEN	0	0	0	0	0	0	431	329	-431	329
BFA	0	0	0	0	0	0	1070	885	-1070	885
BHS	0	0	0	0	0	0	216	82	-216	82
BIH	0	0	0	0	0	0	185	41	-185	41
BLR	0	0	0	0	0	0	822	236	-822	236
BLZ	0	0	0	0	0	0	29	18	-29	18
BOL	0	0	0	0	0	0	311	186	-311	186
BRA	0	0	0	0	0	0	19882	12323	-19882	12323
BRN	0	0	0	0	0	0	188	67	-188	67

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
BTN	0	0	0	0	0	0	47	18	-47	18
BWA	0	0	0	0	0	0	422	126	-422	126
CAF	0	0	0	0	0	0	168	139	-168	139
CHE	0	0	0	0	0	0	10965	1266	-10965	1266
CIV	0	0	0	0	0	0	330	204	-330	204
COD	0	0	0	0	0	0	1130	824	-1130	824
COG	0	0	0	0	0	0	294	144	-294	144
COL	0	0	0	0	0	0	4084	2096	-4084	2096
COM	0	0	0	0	0	0	25	21	-25	21
CPV	0	0	0	0	0	0	13	8	-13	8
CRI	0	0	0	0	0	0	570	245	-570	245
CUB	0	0	0	0	0	0	558	200	-558	200
CYP	0	0	0	0	0	0	398	108	-398	108
CZE	0	0	0	0	0	0	3410	489	-3410	489
DJI	0	0	0	0	0	0	21	7	-21	7
DOM	0	0	0	0	0	0	852	468	-852	468
ECU	0	0	0	0	0	0	846	481	-846	481
EGY	0	0	0	0	0	0	1834	839	-1834	839
ERI	0	0	0	0	0	0	119	101	-119	101
EST	0	0	0	0	0	0	357	48	-357	48
ETH	0	0	0	0	0	0	2183	1792	-2183	1792
FIN	0	0	0	0	0	0	7904	1263	-7904	1263
GAB	0	0	0	0	0	0	275	114	-275	114
GHA	0	0	0	0	0	0	557	364	-557	364
GNQ	0	0	0	0	0	0	371	140	-371	140

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
GRC	0	0	0	0	0	0	3598	283	-3598	283
GTM	0	0	0	0	0	0	807	573	-807	573
GUY	0	0	0	0	0	0	13	8	-13	8
HND	0	0	0	0	0	0	293	187	-293	187
HTI	0	0	0	0	0	0	108	63	-108	63
HUN	0	0	0	0	0	0	1711	202	-1711	202
IDN	0	0	0	0	0	0	2831	1227	-2831	1227
IND	0	0	0	0	0	0	24425	14829	-24425	14829
IRN	0	0	0	0	0	0	4252	1610	-4252	1610
IRQ	0	0	0	0	0	0	2224	1448	-2224	1448
ISR	0	0	0	0	0	0	8520	1069	-8520	1069
JAM	0	0	0	0	0	0	107	68	-107	68
JOR	0	0	0	0	0	0	309	102	-309	102
KAZ	0	0	0	0	0	0	2139	797	-2139	797
KEN	0	0	0	0	0	0	1133	742	-1133	742
KGZ	0	0	0	0	0	0	46	19	-46	19
KHM	0	0	0	0	0	0	151	80	-151	80
LAO	0	0	0	0	0	0	84	49	-84	49
LBN	0	0	0	0	0	0	500	182	-500	182
LBR	0	0	0	0	0	0	106	82	-106	82
LBY	0	0	0	0	0	0	1084	510	-1084	510
LKA	0	0	0	0	0	0	427	230	-427	230
LSO	0	0	0	0	0	0	51	25	-51	25
LTU	0	0	0	0	0	0	609	206	-609	206
LUX	0	0	0	0	0	0	2046	382	-2046	382

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
LVA	0	0	0	0	0	0	326	90	-326	90
MAR	0	0	0	0	0	0	1100	608	-1100	608
MDA	0	0	0	0	0	0	20	9	-20	9
MEX	0	0	0	0	0	0	24055	14838	-24055	14838
MKD	0	0	0	0	0	0	159	34	-159	34
MLI	0	0	0	0	0	0	680	534	-680	534
MNE	0	0	0	0	0	0	59	17	-59	17
MNG	0	0	0	0	0	0	83	35	-83	35
MOZ	0	0	0	0	0	0	1155	879	-1155	879
MRT	0	0	0	0	0	0	72	35	-72	35
MWI	0	0	0	0	0	0	927	771	-927	771
NER	0	0	0	0	0	0	1521	1473	-1521	1473
NGA	0	0	0	0	0	0	6066	3720	-6066	3720
NIC	0	0	0	0	0	0	71	42	-71	42
NLD	0	0	0	0	0	0	14615	1573	-14615	1573
NPL	0	0	0	0	0	0	751	675	-751	675
OMN	0	0	0	0	0	0	998	497	-998	497
PAK	0	0	0	0	0	0	3680	2349	-3680	2349
PAN	0	0	0	0	0	0	572	243	-572	243
PER	0	0	0	0	0	0	2371	1303	-2371	1303
POL	0	0	0	0	0	0	7433	736	-7433	736
PRY	0	0	0	0	0	0	186	88	-186	88
QAT	0	0	0	0	0	0	5188	954	-5188	954
RWA	0	0	0	0	0	0	463	351	-463	351
SAU	0	0	0	0	0	0	12521	4754	-12521	4754

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SDN	0	0	0	0	0	0	1328	1114	-1328	1114
SEN	0	0	0	0	0	0	459	363	-459	363
SLE	0	0	0	0	0	0	148	107	-148	107
SLV	0	0	0	0	0	0	262	166	-262	166
SOM	0	0	0	0	0	0	15	14	-15	14
SRB	0	0	0	0	0	0	517	150	-517	150
STP	0	0	0	0	0	0	4	2	-4	2
SUR	0	0	0	0	0	0	30	13	-30	13
SVK	0	0	0	0	0	0	1649	199	-1649	199
SVN	0	0	0	0	0	0	937	136	-937	136
SWE	0	0	0	0	0	0	16176	2812	-16176	2812
SWZ	0	0	0	0	0	0	45	20	-45	20
SYR	0	0	0	0	0	0	696	380	-696	380
TCD	0	0	0	0	0	0	572	374	-572	374
TGO	0	0	0	0	0	0	189	138	-189	138
THA	0	0	0	0	0	0	2224	793	-2224	793
TJK	0	0	0	0	0	0	71	42	-71	42
TKM	0	0	0	0	0	0	403	126	-403	126
TTO	0	0	0	0	0	0	188	72	-188	72
TZA	0	0	0	0	0	0	1389	960	-1389	960
UGA	0	0	0	0	0	0	1965	1591	-1965	1591
UZB	0	0	0	0	0	0	313	138	-313	138
VCT	0	0	0	0	0	0	6	4	-6	4
VEN	0	0	0	0	0	0	3003	1030	-3003	1030
YEM	0	0	0	0	0	0	719	447	-719	447

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ZMB	0	0	0	0	0	0	495	337	-495	337
ZWE	0	0	0	0	0	0	118	64	-118	64
AND	0	0	0	0	0	0	0	0	0	0
ABW	0	0	0	0	0	0	0	0	0	0
BRB	0	0	0	0	0	0	0	0	0	0
BMU	0	0	0	0	0	0	0	0	0	0
DMA	0	0	0	0	0	0	0	0	0	0
FRO	0	0	0	0	0	0	0	0	0	0
GRL	0	0	0	0	0	0	0	0	0	0
GRD	0	0	0	0	0	0	0	0	0	0
IMN	0	0	0	0	0	0	0	0	0	0
KIR	0	0	0	0	0	0	0	0	0	0
XXK	0	0	0	0	0	0	0	0	0	0
LIE	0	0	0	0	0	0	0	0	0	0
MDV	0	0	0	0	0	0	0	0	0	0
MHL	0	0	0	0	0	0	0	0	0	0
FSM	0	0	0	0	0	0	0	0	0	0
MCO	0	0	0	0	0	0	0	0	0	0
ANT	0	0	0	0	0	0	0	0	0	0
PSE	0	0	0	0	0	0	0	0	0	0
PRI	0	0	0	0	0	0	0	0	0	0
KNA	0	0	0	0	0	0	0	0	0	0
LCA	0	0	0	0	0	0	0	0	0	0
SMR	0	0	0	0	0	0	0	0	0	0
SYC	0	0	0	0	0	0	0	0	0	0

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
TLS	0	0	0	0	0	0	0	0	0	0
TUV	0	0	0	0	0	0	0	0	0	0

Table ST4: Ocean carbon wealth assessment using ocean carbon sink and the Tol climate impact estimation.

Country	**Total Wealth** [M USD (2020)]		**Domestic Wealth** [M USD (2020)]		**Outbound Wealth** [M USD (2020)]		**Inbound Wealth** [M USD (2020)]		**Wealth Transfer** [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
EU	43532	5476	537	76	42995	5477	1669	236	41326	5482
RUS	31016	3902	235	99	30781	3903	1120	474	29661	3932
DNK	18390	2313	2	1	18388	2313	18	9	18370	2313
AUS	16245	2044	8	4	16237	2044	84	41	16154	2044
NOR	13749	1730	1	1	13748	1730	14	8	13734	1730
CAN	13748	1729	11	5	13737	1729	129	64	13607	1731
JPN	11530	1450	33	16	11497	1450	475	235	11022	1469
FRA	8692	1093	13	6	8679	1093	254	124	8425	1100
NZL	8159	1026	1	0	8158	1026	19	9	8139	1026
MUS	7808	982	1	0	7807	982	13	5	7795	982
GBR	5579	702	8	4	5572	702	234	117	5338	711
USA	4988	627	33	17	4955	628	1137	575	3818	851
NCL	4984	627	0	0	4984	627	0	0	4984	627
CHL	4557	573	4	2	4553	573	140	58	4413	576
ZAF	4304	541	13	6	4291	541	539	227	3752	587
FJI	3922	493	0	0	3922	493	13	5	3909	493
ARG	2496	314	5	2	2491	314	365	153	2125	349
VUT	2410	303	0	0	2410	303	5	2	2405	303
TON	2314	291	0	0	2314	291	2	1	2312	291
MDG	2050	258	22	9	2028	258	1891	806	137	846
NAM	1931	243	0	0	1931	243	31	13	1900	243
ISL	1901	239	0	0	1901	239	1	1	1900	239
CHN	1638	206	209	90	1429	225	22660	9706	-21231	9709
KOR	1207	152	2	1	1206	152	246	113	959	189

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SLB	972	122	0	0	972	122	20	8	952	123
PRT	873	110	0	0	872	110	55	25	817	113
IRL	791	99	0	0	791	99	17	8	774	100
PHL	465	58	7	3	457	59	2744	1171	-2287	1172
PNG	331	42	0	0	330	42	261	111	70	119
MMR	234	29	0	0	234	29	0	0	234	29
VNM	230	29	4	2	226	29	3334	1429	-3108	1429
WSM	195	24	0	0	195	24	4	2	191	25
UKR	171	21	1	0	170	21	949	410	-779	411
ATG	125	16	0	0	125	16	1	0	124	16
URY	89	11	0	0	89	11	31	13	58	17
BGR	88	11	0	0	88	11	90	39	-2	40
ROU	82	10	0	0	82	10	229	98	-148	98
GNB	80	10	0	0	80	10	104	45	-24	46
MYS	76	10	0	0	76	10	300	126	-225	126
TUR	66	8	0	0	66	8	649	270	-583	270
TUN	60	8	0	0	60	8	151	64	-91	65
GIN	49	6	0	0	49	6	899	384	-850	384
DEU	47	6	0	0	47	6	321	159	-274	159
PLW	46	6	0	0	46	6	0	0	46	6
GEO	41	5	0	0	41	5	98	42	-56	42
CMR	22	3	0	0	22	3	806	344	-785	344
ARE	19	2	0	0	19	2	58	25	-39	26
BGD	16	2	1	0	15	2	8377	3582	-8362	3582
MLT	12	1	0	0	12	1	2	1	9	2

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ESP	9	1	0	0	9	1	213	100	-204	100
KWT	8	1	0	0	8	1	16	7	-8	7
HRV	7	1	0	0	7	1	31	13	-24	13
ITA	4	1	0	0	4	1	260	125	-256	125
BEL	2	0	0	0	2	0	43	21	-41	21
GMB	2	0	0	0	2	0	107	45	-105	45
SGP	1	0	0	0	1	0	22	11	-21	11
DZA	1	0	0	0	1	0	626	266	-626	266
BHR	1	0	0	0	1	0	8	4	-7	4
AFG	0	0	0	0	0	0	2063	883	-2063	883
AGO	0	0	0	0	0	0	384	163	-384	163
ALB	0	0	0	0	0	0	48	20	-48	20
ARM	0	0	0	0	0	0	63	27	-63	27
AUT	0	0	0	0	0	0	32	16	-32	16
AZE	0	0	0	0	0	0	148	63	-148	63
BDI	0	0	0	0	0	0	1222	522	-1222	522
BEN	0	0	0	0	0	0	534	228	-534	228
BFA	0	0	0	0	0	0	969	414	-969	414
BHS	0	0	0	0	0	0	2	1	-2	1
BIH	0	0	0	0	0	0	57	24	-57	24
BLR	0	0	0	0	0	0	113	48	-113	48
BLZ	0	0	0	0	0	0	4	2	-4	2
BOL	0	0	0	0	0	0	331	142	-331	142
BRA	0	0	0	0	0	0	2184	920	-2184	920
BRN	0	0	0	0	0	0	2	1	-2	1

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
BTN	0	0	0	0	0	0	18	8	-18	8
BWA	0	0	0	0	0	0	21	9	-21	9
CAF	0	0	0	0	0	0	278	119	-278	119
CHE	0	0	0	0	0	0	27	14	-27	14
CIV	0	0	0	0	0	0	751	319	-751	319
COD	0	0	0	0	0	0	5953	2537	-5953	2537
COG	0	0	0	0	0	0	99	42	-99	42
COL	0	0	0	0	0	0	665	283	-665	283
COM	0	0	0	0	0	0	36	15	-36	15
CPV	0	0	0	0	0	0	9	4	-9	4
CRI	0	0	0	0	0	0	55	23	-55	23
CUB	0	0	0	0	0	0	131	56	-131	56
CYP	0	0	0	0	0	0	6	3	-6	3
CZE	0	0	0	0	0	0	62	27	-62	27
DJI	0	0	0	0	0	0	32	14	-32	14
DOM	0	0	0	0	0	0	127	54	-127	54
ECU	0	0	0	0	0	0	248	106	-248	106
EGY	0	0	0	0	0	0	2096	897	-2096	897
ERI	0	0	0	0	0	0	680	290	-680	290
EST	0	0	0	0	0	0	9	4	-9	4
ETH	0	0	0	0	0	0	8718	3717	-8718	3717
FIN	0	0	0	0	0	0	21	10	-21	10
GAB	0	0	0	0	0	0	17	7	-17	7
GHA	0	0	0	0	0	0	1258	537	-1258	537
GNQ	0	0	0	0	0	0	5	2	-5	2

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
GRC	0	0	0	0	0	0	56	26	-56	26
GTM	0	0	0	0	0	0	303	129	-303	129
GUY	0	0	0	0	0	0	24	10	-24	10
HND	0	0	0	0	0	0	214	91	-214	91
HTI	0	0	0	0	0	0	624	267	-624	267
HUN	0	0	0	0	0	0	67	29	-67	29
IDN	0	0	0	0	0	0	6360	2723	-6360	2723
IND	0	0	0	0	0	0	42721	18285	-42721	18285
IRN	0	0	0	0	0	0	1229	523	-1229	523
IRQ	0	0	0	0	0	0	687	292	-687	292
ISR	0	0	0	0	0	0	41	18	-41	18
JAM	0	0	0	0	0	0	34	14	-34	14
JOR	0	0	0	0	0	0	119	50	-119	50
KAZ	0	0	0	0	0	0	195	83	-195	83
KEN	0	0	0	0	0	0	2282	970	-2282	970
KGZ	0	0	0	0	0	0	289	124	-289	124
KHM	0	0	0	0	0	0	727	311	-727	311
LAO	0	0	0	0	0	0	319	136	-319	136
LBN	0	0	0	0	0	0	41	17	-41	17
LBR	0	0	0	0	0	0	384	164	-384	164
LBY	0	0	0	0	0	0	52	22	-52	22
LKA	0	0	0	0	0	0	524	225	-524	225
LSO	0	0	0	0	0	0	78	34	-78	34
LTU	0	0	0	0	0	0	26	11	-26	11
LUX	0	0	0	0	0	0	2	1	-2	1

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
LVA	0	0	0	0	0	0	20	8	-20	8
MAR	0	0	0	0	0	0	632	270	-632	270
MDA	0	0	0	0	0	0	122	52	-122	52
MEX	0	0	0	0	0	0	1058	440	-1058	440
MKD	0	0	0	0	0	0	31	13	-31	13
MLI	0	0	0	0	0	0	808	346	-808	346
MNE	0	0	0	0	0	0	7	3	-7	3
MNG	0	0	0	0	0	0	83	36	-83	36
MOZ	0	0	0	0	0	0	1689	722	-1689	722
MRT	0	0	0	0	0	0	161	69	-161	69
MWI	0	0	0	0	0	0	1588	676	-1588	676
NER	0	0	0	0	0	0	1457	620	-1457	620
NGA	0	0	0	0	0	0	5916	2525	-5916	2525
NIC	0	0	0	0	0	0	186	79	-186	79
NLD	0	0	0	0	0	0	0	0	0	0
NPL	0	0	0	0	0	0	1883	806	-1883	806
OMN	0	0	0	0	0	0	19	8	-19	8
PAK	0	0	0	0	0	0	7832	3340	-7832	3340
PAN	0	0	0	0	0	0	40	17	-40	17
PER	0	0	0	0	0	0	453	193	-453	193
POL	0	0	0	0	0	0	276	116	-276	116
PRY	0	0	0	0	0	0	164	70	-164	70
QAT	0	0	0	0	0	0	8	4	-8	4
RWA	0	0	0	0	0	0	828	353	-828	353
SAU	0	0	0	0	0	0	179	77	-179	77

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SDN	0	0	0	0	0	0	1297	554	-1297	554
SEN	0	0	0	0	0	0	567	242	-567	242
SLE	0	0	0	0	0	0	406	174	-406	174
SLV	0	0	0	0	0	0	106	45	-106	45
SOM	0	0	0	0	0	0	0	0	0	0
SRB	0	0	0	0	0	0	98	42	-98	42
STP	0	0	0	0	0	0	7	3	-7	3
SUR	0	0	0	0	0	0	7	3	-7	3
SVK	0	0	0	0	0	0	33	14	-33	14
SVN	0	0	0	0	0	0	11	5	-11	5
SWE	0	0	0	0	0	0	35	18	-35	18
SWZ	0	0	0	0	0	0	24	10	-24	10
SYR	0	0	0	0	0	0	568	241	-568	241
TCD	0	0	0	0	0	0	549	234	-549	234
TGO	0	0	0	0	0	0	446	190	-446	190
THA	0	0	0	0	0	0	1084	463	-1084	463
TJK	0	0	0	0	0	0	513	219	-513	219
TKM	0	0	0	0	0	0	96	41	-96	41
TTO	0	0	0	0	0	0	8	3	-8	3
TZA	0	0	0	0	0	0	2981	1269	-2981	1269
UGA	0	0	0	0	0	0	2454	1043	-2454	1043
UZB	0	0	0	0	0	0	1275	544	-1275	544
VCT	0	0	0	0	0	0	1	1	-1	1
VEN	0	0	0	0	0	0	323	135	-323	135
YEM	0	0	0	0	0	0	941	400	-941	400

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ZMB	0	0	0	0	0	0	611	260	-611	260
ZWE	0	0	0	0	0	0	904	386	-904	386
AND	0	0	0	0	0	0	0	0	0	0
ABW	0	0	0	0	0	0	1	0	-1	0
BRB	0	0	0	0	0	0	2	1	-2	1
BMU	0	0	0	0	0	0	0	0	0	0
DMA	0	0	0	0	0	0	1	0	-1	0
FRO	0	0	0	0	0	0	0	0	0	0
GRL	0	0	0	0	0	0	0	0	0	0
GRD	0	0	0	0	0	0	1	0	-1	0
IMN	0	0	0	0	0	0	0	0	0	0
KIR	0	0	0	0	0	0	3	1	-3	1
XXK	0	0	0	0	0	0	32	14	-32	14
LIE	0	0	0	0	0	0	0	0	0	0
MDV	0	0	0	0	0	0	4	2	-4	2
MHL	0	0	0	0	0	0	1	0	-1	0
FSM	0	0	0	0	0	0	2	1	-2	1
MCO	0	0	0	0	0	0	0	0	0	0
ANT	0	0	0	0	0	0	63	32	-63	32
PSE	0	0	0	0	0	0	122	52	-122	52
PRI	0	0	0	0	0	0	19	9	-19	9
KNA	0	0	0	0	0	0	0	0	0	0
LCA	0	0	0	0	0	0	2	1	-2	1
SMR	0	0	0	0	0	0	0	0	0	0
SYC	0	0	0	0	0	0	1	0	-1	0

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
TLS	0	0	0	0	0	0	55	23	-55	23
TUV	0	0	0	0	0	0	0	0	0	0

Table ST5: Ocean carbon wealth assessment using fossil fuel and industrial CO_2 emissions net of the ocean carbon sink and the DJO climate impact estimation.

Country	**Total Wealth** [M USD (2020)]		**Domestic Wealth** [M USD (2020)]		**Outbound Wealth** [M USD (2020)]		**Inbound Wealth** [M USD (2020)]		**Wealth Transfer** [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
EU	-104880	-6900	-20685	790	-84195	6944	-1225814	46781	1141619	47293
RUS	-127456	-8385	-2316	641	-125140	8409	-112520	31154	-12621	32269
DNK	136876	9004	640	108	136236	9005	-30197	5076	166433	10337
AUS	35700	2349	737	102	34963	2351	-131219	18091	166183	18243
NOR	97781	6432	1006	178	96775	6435	-66014	11659	162788	13317
CAN	-14434	-950	-566	114	-13868	956	-247350	50006	233483	50015
JPN	-147029	-9672	-7064	663	-139964	9695	-296602	27835	156638	29475
FRA	4087	269	162	16	3925	269	-250377	24522	254302	24524
NZL	55745	3667	94	11	55651	3667	-10747	1227	66398	3867
MUS	59888	3940	5	2	59883	3940	-490	195	60373	3945
GBR	-30674	-2018	-1258	148	-29416	2023	-257860	30441	228444	30509
USA	-1032908	-67950	-404327	60259	-628581	90809	-2069666	308439	1441086	321529
NCL	37610	2474	3	1	37607	2474	-581	217	38188	2484
CHL	16454	1082	33	12	16421	1082	-12652	4785	29073	4906
ZAF	-65515	-4310	-308	95	-65207	4311	-29425	9089	-35782	10060
FJI	30240	1989	0	0	30239	1989	-76	39	30315	1990
ARG	-19020	-1251	-64	32	-18956	1252	-21175	10759	2219	10832
VUT	18741	1233	0	0	18741	1233	-69	39	18810	1233
TON	17991	1184	0	0	17991	1184	0	0	17991	1184
MDG	15066	991	4	3	15062	991	-1686	1282	16748	1620
NAM	14154	931	2	1	14152	931	-1042	363	15194	999
ISL	14058	925	6	1	14053	925	-2598	368	16650	995
CHN	-2477347	-162972	-132141	44027	-2345205	168809	-204974	68293	-2140231	182100
KOR	-126422	-8317	-1765	186	-124657	8319	-86469	9092	-38188	12323

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SLB	7508	494	0	0	7508	494	-94	53	7601	497
PRT	-2699	-178	-5	1	-2694	178	-12321	1198	9627	1211
IRL	-1827	-120	-6	1	-1821	120	-20545	3008	18724	3010
PHL	-27213	-1790	-48	28	-27165	1790	-11129	6446	-16035	6690
PNG	687	45	0	0	687	45	-896	475	1583	477
MMR	-6375	-419	-1	1	-6374	419	-1187	862	-5187	958
VNM	-72960	-4800	-48	17	-72912	4800	-4115	1463	-68796	5018
WSM	1453	96	0	0	1453	96	-22	15	1474	97
UKR	-45704	-3007	-39	11	-45666	3007	-5308	1463	-40358	3344
ATG	875	58	0	0	875	58	0	0	875	58
URY	-739	-49	0	0	-738	49	-1160	569	422	571
BGR	-7718	-508	-3	1	-7715	508	-2566	722	-5149	883
ROU	-16212	-1067	-19	7	-16193	1067	-7544	2751	-8649	2951
GNB	549	36	0	0	549	36	-140	90	689	97
MYS	-58383	-3841	-136	54	-58248	3841	-14542	5776	-43706	6937
TUR	-93448	-6147	-1261	654	-92186	6182	-84045	43580	-8142	44016
TUN	-5798	-381	-3	1	-5796	381	-3152	985	-2643	1057
GIN	-649	-43	0	0	-649	43	-579	377	-70	379
DEU	-144951	-9536	-6012	704	-138939	9561	-256125	29982	117186	31469
PLW	307	20	0	0	307	20	0	0	307	20
GEO	-2107	-139	0	0	-2107	139	-411	180	-1696	227
CMR	-1877	-123	-1	0	-1877	123	-2132	1127	255	1134
ARE	-45100	-2967	-239	56	-44860	2967	-33309	7728	-11551	8278
BGD	-20520	-1350	-20	10	-20499	1350	-6247	2921	-14252	3218
MLT	-273	-18	0	0	-273	18	0	0	-273	18

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ESP	-48418	-3185	-864	75	-47554	3186	-111911	9687	64357	10197
KWT	-22615	-1488	-60	19	-22554	1488	-16811	5426	-5743	5626
HRV	-3782	-249	-3	1	-3779	249	-4228	1196	449	1222
ITA	-68667	-4517	-1547	122	-67119	4519	-140882	11093	73763	11978
BEL	-20526	-1350	-130	19	-20396	1350	-39965	5974	19569	6125
GMB	-127	-8	0	0	-127	8	-138	87	10	87
SGP	-6790	-447	0	0	-6790	447	0	0	-6790	447
DZA	-39201	-2579	-57	29	-39144	2579	-9124	4640	-30021	5309
BHR	-8541	-562	0	0	-8541	562	0	0	-8541	562
AFG	-2655	0	-3	0	-2652	0	-7447	5381	4795	5381
AGO	-4608	0	-9	0	-4599	0	-12335	7276	7736	7276
ALB	-1075	0	0	0	-1075	0	-836	323	-239	323
ARM	-1462	0	0	0	-1461	0	-328	150	-1134	150
AUT	-14100	0	-84	0	-14016	0	-37509	4966	23493	4966
AZE	-8525	0	-3	0	-8522	0	-2091	908	-6431	908
BDI	-149	0	0	0	-149	0	-638	481	488	481
BEN	-1651	0	-1	0	-1650	0	-1953	1490	302	1490
BFA	-1225	0	-1	0	-1224	0	-4853	4013	3630	4013
BHS	-492	0	0	0	-492	0	-979	372	487	372
BIH	-4758	0	-1	0	-4757	0	-839	185	-3918	185
BLR	-13317	0	-8	0	-13309	0	-3720	1070	-9589	1070
BLZ	-140	0	0	0	-140	0	-129	79	-10	79
BOL	-4788	0	-1	0	-4787	0	-1410	841	-3377	841
BRA	-100527	0	-1434	0	-99092	0	-88736	55000	-10356	55000
BRN	-2399	0	0	0	-2398	0	-854	302	-1544	302

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
BTN	-341	0	0	0	-341	0	-215	84	-126	84
BWA	-1422	0	0	0	-1422	0	-1912	570	490	570
CAF	-49	0	0	0	-49	0	-760	631	711	631
CHE	-7782	0	-61	0	-7721	0	-49670	5733	41949	5733
CIV	-2492	0	-1	0	-2491	0	-1495	923	-996	923
COD	-564	0	0	0	-564	0	-5125	3735	4561	3735
COG	-1711	0	0	0	-1711	0	-1333	651	-378	651
COL	-19438	0	-57	0	-19381	0	-18465	9477	-917	9477
COM	-64	0	0	0	-64	0	-113	96	49	96
CPV	-142	0	0	0	-142	0	-58	38	-84	38
CRI	-1610	0	-1	0	-1609	0	-2586	1111	978	1111
CUB	-4485	0	-2	0	-4483	0	-2529	905	-1954	905
CYP	-1652	0	0	0	-1652	0	-1806	491	154	491
CZE	-20876	0	-51	0	-20825	0	-15412	2211	-5413	2211
DJI	-83	0	0	0	-83	0	-97	34	15	34
DOM	-5996	0	-4	0	-5992	0	-3860	2119	-2132	2119
ECU	-7831	0	-5	0	-7827	0	-3833	2179	-3994	2179
EGY	-53597	0	-71	0	-53526	0	-8247	3773	-45280	3773
ERI	-178	0	0	0	-178	0	-538	458	360	458
EST	-2123	0	-1	0	-2123	0	-1618	216	-505	216
ETH	-3873	0	-6	0	-3867	0	-9892	8121	6025	8121
FIN	-8545	0	-48	0	-8496	0	-35796	5722	27300	5722
GAB	-1294	0	0	0	-1294	0	-1246	518	-48	518
GHA	-4467	0	-2	0	-4465	0	-2526	1649	-1939	1649
GNQ	-1134	0	0	0	-1134	0	-1684	636	550	636

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
GRC	-12639	0	-33	0	-12606	0	-16285	1282	3679	1282
GTM	-3999	0	-2	0	-3997	0	-3656	2599	-341	2599
GUY	-725	0	0	0	-725	0	-61	38	-664	38
HND	-2237	0	0	0	-2237	0	-1330	846	-907	846
HTI	-595	0	0	0	-595	0	-488	287	-107	287
HUN	-10747	0	-13	0	-10734	0	-7745	916	-2988	916
IDN	-138591	0	-282	0	-138310	0	-12557	5441	-125753	5441
IND	-555699	0	-9740	0	-545959	0	-101035	61341	-444924	61341
IRN	-165908	0	-506	0	-165402	0	-18780	7109	-146622	7109
IRQ	-39434	0	-63	0	-39371	0	-10023	6525	-29349	6525
ISR	-12502	0	-76	0	-12426	0	-38565	4839	26139	4839
JAM	-1578	0	0	0	-1578	0	-484	306	-1094	306
JOR	-5669	0	-1	0	-5668	0	-1402	464	-4266	464
KAZ	-63275	0	-97	0	-63178	0	-9602	3579	-53577	3579
KEN	-4154	0	-3	0	-4150	0	-5134	3361	983	3361
KGZ	-1929	0	0	0	-1929	0	-209	84	-1720	84
KHM	-4251	0	0	0	-4250	0	-686	365	-3564	365
LAO	-4656	0	0	0	-4656	0	-381	222	-4275	222
LBN	-5563	0	-2	0	-5561	0	-2264	825	-3297	825
LBR	-256	0	0	0	-256	0	-482	373	225	373
LBY	-13311	0	-10	0	-13300	0	-4904	2310	-8396	2310
LKA	-4933	0	-2	0	-4931	0	-1935	1041	-2996	1041
LSO	-497	0	0	0	-497	0	-232	111	-266	111
LTU	-3103	0	-1	0	-3102	0	-2760	936	-342	936
LUX	-1840	0	-3	0	-1837	0	-9278	1734	7440	1734

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
LVA	-1590	0	0	0	-1589	0	-1476	406	-113	406
MAR	-14710	0	-12	0	-14698	0	-4977	2750	-9721	2750
MDA	-1193	0	0	0	-1193	0	-92	40	-1101	40
MEX	-89026	0	-1537	0	-87490	0	-107558	66346	20068	66346
MKD	-1511	0	0	0	-1511	0	-722	152	-789	152
MLI	-893	0	0	0	-892	0	-3083	2421	2190	2421
MNE	-557	0	0	0	-557	0	-267	79	-290	79
MNG	-11274	0	-1	0	-11274	0	-378	157	-10896	157
MOZ	-1516	0	-1	0	-1515	0	-5236	3988	3721	3988
MRT	-876	0	0	0	-876	0	-324	157	-552	157
MWI	-334	0	0	0	-334	0	-4204	3495	3870	3495
NER	-566	0	-1	0	-566	0	-6899	6678	6333	6678
NGA	-29586	0	-129	0	-29458	0	-27382	16790	-2075	16790
NIC	-1036	0	0	0	-1036	0	-322	189	-713	189
NLD	-31330	0	-329	0	-31002	0	-65954	7099	34953	7099
NPL	-3169	0	-2	0	-3168	0	-3404	3058	236	3058
OMN	-16479	0	-12	0	-16467	0	-4515	2247	-11952	2247
PAK	-47816	0	-126	0	-47689	0	-16563	10575	-31127	10575
PAN	-2649	0	-1	0	-2648	0	-2595	1100	-53	1100
PER	-10793	0	-18	0	-10775	0	-10736	5897	-39	5897
POL	-68984	0	-368	0	-68616	0	-33341	3303	-35275	3303
PRY	-1826	0	0	0	-1826	0	-844	400	-982	400
QAT	-21105	0	-79	0	-21027	0	-23452	4314	2425	4314
RWA	-378	0	0	0	-378	0	-2100	1591	1722	1591
SAU	-150275	0	-1350	0	-148925	0	-55437	21047	-93488	21047

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SDN	-341	0	0	0	-340	0	-6024	5052	5684	5052
SEN	-2896	0	-1	0	-2895	0	-2080	1645	-816	1645
SLE	-276	0	0	0	-276	0	-672	487	395	487
SLV	-1478	0	0	0	-1477	0	-1189	751	-289	751
SOM	-131	0	0	0	-131	0	-69	62	-62	62
SRB	-10125	0	-4	0	-10121	0	-2339	678	-7782	678
STP	-28	0	0	0	-28	0	-18	10	-11	10
SUR	-593	0	0	0	-593	0	-136	61	-457	61
SVK	-7067	0	-8	0	-7059	0	-7470	900	411	900
SVN	-2924	0	-2	0	-2922	0	-4248	614	1325	614
SWE	-8299	0	-96	0	-8203	0	-73265	12737	65062	12737
SWZ	-241	0	0	0	-241	0	-203	90	-37	90
SYR	-5946	0	-3	0	-5943	0	-3153	1723	-2789	1723
TCD	-410	0	0	0	-409	0	-2594	1694	2185	1694
TGO	-510	0	0	0	-510	0	-857	628	347	628
THA	-63040	0	-101	0	-62939	0	-9984	3562	-52955	3562
TJK	-2144	0	0	0	-2144	0	-324	191	-1820	191
TKM	-16372	0	-5	0	-16367	0	-1823	571	-14545	571
TTO	-8127	0	-1	0	-8126	0	-853	325	-7272	325
TZA	-2794	0	-3	0	-2791	0	-6296	4353	3505	4353
UGA	-1252	0	-2	0	-1250	0	-8910	7216	7660	7216
UZB	-26873	0	-6	0	-26867	0	-1415	622	-25453	622
VCT	-44	0	0	0	-44	0	-28	16	-16	16
VEN	-17379	0	-37	0	-17342	0	-13584	4657	-3758	4657
YEM	-2759	0	-1	0	-2758	0	-3258	2027	500	2027

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ZMB	-1655	0	-1	0	-1654	0	-2245	1530	591	1530
ZWE	-2411	0	0	0	-2411	0	-533	292	-1878	292
AND	-102	0	0	0	-102	0	0	0	-102	0
ABW	-177	0	0	0	-177	0	0	0	-177	0
BRB	-232	0	0	0	-232	0	0	0	-232	0
BMU	-113	0	0	0	-113	0	0	0	-113	0
DMA	-33	0	0	0	-33	0	0	0	-33	0
FRO	-157	0	0	0	-157	0	0	0	-157	0
GRL	-114	0	0	0	-114	0	0	0	-114	0
GRD	-65	0	0	0	-65	0	0	0	-65	0
IMN	0	0	0	0	0	0	0	0	0	0
KIR	-16	0	0	0	-16	0	0	0	-16	0
XXK	-1937	0	0	0	-1937	0	0	0	-1937	0
LIE	-32	0	0	0	-32	0	0	0	-32	0
MDV	-468	0	0	0	-468	0	0	0	-468	0
MHL	-35	0	0	0	-35	0	0	0	-35	0
FSM	-35	0	0	0	-35	0	0	0	-35	0
MCO	0	0	0	0	0	0	0	0	0	0
ANT	0	0	0	0	0	0	0	0	0	0
PSE	-686	0	0	0	-686	0	0	0	-686	0
PRI	0	0	0	0	0	0	0	0	0	0
KNA	0	0	0	0	0	0	0	0	0	0
LCA	-100	0	0	0	-100	0	0	0	-100	0
SMR	0	0	0	0	0	0	0	0	0	0
SYC	-122	0	0	0	-122	0	0	0	-122	0

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
TLS	-163	0	0	0	-163	0	0	0	-163	0
TUV	-2	0	0	0	-2	0	0	0	-2	0

Table ST6: Ocean carbon wealth assessment using fossil fuel and industrial CO_2 emissions net of the ocean carbon sink and the Tol climate impact estimation.

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
EU	-13459	-1693	-166	24	-13293	1693	-9837	1393	-3456	2193
RUS	-16356	-2058	-124	52	-16232	2058	-6020	2547	-10212	3275
DNK	17565	2210	2	1	17563	2210	-92	47	17655	2210
AUS	4581	576	2	1	4579	576	-419	206	4998	612
NOR	12548	1578	1	1	12547	1578	-72	39	12619	1579
CAN	-1852	-233	-1	1	-1851	233	-635	312	-1216	390
JPN	-18868	-2373	-54	27	-18814	2374	-2250	1113	-16564	2622
FRA	524	66	1	0	524	66	-1213	594	1737	597
NZL	7154	900	1	0	7153	900	-91	43	7244	901
MUS	7685	967	1	0	7685	967	-60	25	7745	967
GBR	-3936	-495	-5	3	-3931	495	-1089	543	-2842	735
USA	-132550	-16674	-867	439	-131683	16680	-4436	2245	-127247	16830
NCL	4826	607	0	0	4826	607	0	0	4826	607
CHL	2111	266	2	1	2110	266	-652	272	2762	380
ZAF	-8407	-1058	-26	11	-8381	1058	-2480	1043	-5902	1485
FJI	3881	488	0	0	3880	488	-59	25	3939	489
ARG	-2441	-307	-5	2	-2436	307	-1676	702	-760	766
VUT	2405	303	0	0	2405	303	-24	10	2429	303
TON	2309	290	0	0	2309	290	-9	4	2317	290
MDG	1933	243	21	9	1913	243	-8696	3705	10609	3713
NAM	1816	228	0	0	1816	228	-141	60	1957	236
ISL	1804	227	0	0	1804	227	-5	3	1809	227
CHN	-317910	-39992	-40655	17415	-277255	43619	-63064	27014	-214191	51306
KOR	-16223	-2041	-23	10	-16201	2041	-1103	506	-15098	2103

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SLB	963	121	0	0	963	121	-91	39	1054	127
PRT	-346	-44	0	0	-346	44	-251	113	-95	121
IRL	-234	-29	0	0	-234	29	-75	38	-159	48
PHL	-3492	-439	-54	23	-3438	440	-12425	5301	8987	5319
PNG	88	11	0	0	88	11	-1185	506	1273	506
MMR	-818	-103	0	0	-818	103	0	0	-818	103
VNM	-9363	-1178	-175	75	-9188	1180	-14964	6413	5776	6520
WSM	186	23	0	0	186	23	-17	7	203	25
UKR	-5865	-738	-31	13	-5834	738	-4276	1849	-1557	1991
ATG	112	14	0	0	112	14	-3	1	115	14
URY	-95	-12	0	0	-95	12	-141	60	47	61
BGR	-990	-125	0	0	-990	125	-408	175	-582	215
ROU	-2080	-262	-3	1	-2078	262	-1039	443	-1039	514
GNB	70	9	0	0	70	9	-473	202	543	203
MYS	-7492	-942	-13	5	-7480	942	-1350	565	-6129	1099
TUR	-11992	-1509	-44	18	-11948	1509	-2900	1208	-9049	1933
TUN	-744	-94	-1	0	-743	94	-684	291	-60	306
GIN	-83	-10	0	0	-83	10	-4076	1743	3993	1743
DEU	-18601	-2340	-33	17	-18568	2340	-1424	706	-17143	2444
PLW	39	5	0	0	39	5	-1	0	40	5
GEO	-270	-34	0	0	-270	34	-443	191	172	194
CMR	-241	-30	-1	0	-240	30	-3657	1559	3417	1560
ARE	-5787	-728	-2	1	-5786	728	-260	115	-5525	737
BGD	-2633	-331	-123	53	-2510	335	-37871	16195	35361	16199
MLT	-35	-4	0	0	-35	4	-11	5	-24	6

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ESP	-6213	-782	-7	3	-6206	782	-959	451	-5247	902
KWT	-2902	-365	0	0	-2902	365	-72	33	-2830	367
HRV	-485	-61	0	0	-485	61	-139	59	-346	85
ITA	-8812	-1108	-13	6	-8799	1109	-1168	561	-7631	1242
BEL	-2634	-331	-1	0	-2633	331	-193	96	-2440	345
GMB	-16	-2	0	0	-16	2	-485	206	468	206
SGP	-871	-110	0	0	-871	110	-101	49	-771	120
DZA	-5031	-633	-18	7	-5013	633	-2823	1201	-2190	1357
BHR	-1096	-138	0	0	-1096	138	-37	16	-1059	139
AFG	-341	0	-4	0	-337	0	-9354	4002	9018	4002
AGO	-591	0	-1	0	-590	0	-1741	741	1151	741
ALB	-138	0	0	0	-138	0	-217	93	79	93
ARM	-188	0	0	0	-187	0	-287	124	100	124
AUT	-1809	0	0	0	-1809	0	-146	73	-1663	73
AZE	-1094	0	-1	0	-1093	0	-671	287	-422	287
BDI	-19	0	0	0	-19	0	-5543	2369	5524	2369
BEN	-212	0	-1	0	-211	0	-2420	1032	2208	1032
BFA	-157	0	-1	0	-156	0	-4392	1877	4236	1877
BHS	-63	0	0	0	-63	0	-9	4	-54	4
BIH	-611	0	0	0	-610	0	-256	110	-354	110
BLR	-1709	0	-1	0	-1708	0	-512	219	-1196	219
BLZ	-18	0	0	0	-18	0	-20	8	2	8
BOL	-614	0	-1	0	-613	0	-1501	642	888	642
BRA	-12900	0	-158	0	-12743	0	-9750	4108	-2993	4108
BRN	-308	0	0	0	-308	0	-10	4	-298	4

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
BTN	-44	0	0	0	-44	0	-80	34	36	34
BWA	-183	0	0	0	-183	0	-97	41	-85	41
CAF	-6	0	0	0	-6	0	-1259	539	1253	539
CHE	-999	0	0	0	-999	0	-122	63	-877	63
CIV	-320	0	-1	0	-318	0	-3404	1446	3085	1446
COD	-72	0	-2	0	-70	0	-26994	11504	26924	11504
COG	-220	0	0	0	-219	0	-450	192	231	192
COL	-2494	0	-9	0	-2485	0	-3006	1277	521	1277
COM	-8	0	0	0	-8	0	-161	69	153	69
CPV	-18	0	0	0	-18	0	-40	17	22	17
CRI	-207	0	0	0	-206	0	-251	106	45	106
CUB	-576	0	0	0	-575	0	-595	253	20	253
CYP	-212	0	0	0	-212	0	-28	12	-184	12
CZE	-2679	0	-1	0	-2678	0	-281	122	-2397	122
DJI	-11	0	0	0	-11	0	-146	62	135	62
DOM	-769	0	-1	0	-769	0	-574	243	-195	243
ECU	-1005	0	-1	0	-1004	0	-1124	478	121	478
EGY	-6878	0	-81	0	-6797	0	-9423	4031	2626	4031
ERI	-23	0	0	0	-23	0	-3084	1314	3061	1314
EST	-272	0	0	0	-272	0	-42	18	-230	18
ETH	-497	0	-24	0	-473	0	-39514	16849	39041	16849
FIN	-1097	0	0	0	-1096	0	-94	47	-1002	47
GAB	-166	0	0	0	-166	0	-75	32	-91	32
GHA	-573	0	-4	0	-569	0	-5701	2433	5132	2433
GNQ	-146	0	0	0	-146	0	-23	10	-123	10

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
GRC	-1622	0	-1	0	-1621	0	-253	116	-1368	116
GTM	-513	0	-1	0	-512	0	-1374	586	862	586
GUY	-93	0	0	0	-93	0	-108	47	15	47
HND	-287	0	0	0	-287	0	-971	414	684	414
HTI	-76	0	0	0	-76	0	-2829	1212	2753	1212
HUN	-1379	0	-1	0	-1379	0	-305	129	-1074	129
IDN	-17785	0	-632	0	-17153	0	-28211	12078	11059	12078
IND	-71311	0	-17036	0	-54275	0	-176717	75637	122442	75637
IRN	-21291	0	-146	0	-21144	0	-5427	2308	-15717	2308
IRQ	-5061	0	-19	0	-5041	0	-3098	1318	-1943	1318
ISR	-1604	0	0	0	-1604	0	-183	83	-1421	83
JAM	-203	0	0	0	-202	0	-154	65	-49	65
JOR	-727	0	0	0	-727	0	-537	227	-190	227
KAZ	-8120	0	-9	0	-8111	0	-877	374	-7234	374
KEN	-533	0	-7	0	-526	0	-10344	4397	9817	4397
KGZ	-248	0	0	0	-247	0	-1309	561	1062	561
KHM	-545	0	-2	0	-543	0	-3293	1411	2750	1411
LAO	-598	0	-1	0	-596	0	-1446	619	850	619
LBN	-714	0	0	0	-714	0	-187	78	-527	78
LBR	-33	0	0	0	-33	0	-1740	743	1707	743
LBY	-1708	0	0	0	-1708	0	-236	98	-1471	98
LKA	-633	0	-2	0	-631	0	-2375	1020	1744	1020
LSO	-64	0	0	0	-64	0	-356	153	292	153
LTU	-398	0	0	0	-398	0	-120	50	-279	50
LUX	-236	0	0	0	-236	0	-7	4	-229	4

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
LVA	-204	0	0	0	-204	0	-91	38	-113	38
MAR	-1888	0	-7	0	-1881	0	-2858	1222	977	1222
MDA	-153	0	0	0	-153	0	-552	238	399	238
MEX	-11424	0	-68	0	-11357	0	-4730	1966	-6626	1966
MKD	-194	0	0	0	-194	0	-141	61	-52	61
MLI	-115	0	-1	0	-114	0	-3663	1569	3549	1569
MNE	-71	0	0	0	-71	0	-34	15	-38	15
MNG	-1447	0	-1	0	-1446	0	-377	161	-1069	161
MOZ	-195	0	-2	0	-193	0	-7659	3274	7466	3274
MRT	-112	0	0	0	-112	0	-730	311	617	311
MWI	-43	0	0	0	-43	0	-7200	3067	7157	3067
NER	-73	0	-1	0	-72	0	-6609	2810	6537	2810
NGA	-3797	0	-126	0	-3671	0	-26704	11400	23033	11400
NIC	-133	0	0	0	-133	0	-842	360	709	360
NLD	-4021	0	0	0	-4021	0	0	0	-4021	0
NPL	-407	0	-4	0	-402	0	-8538	3655	8135	3655
OMN	-2115	0	0	0	-2114	0	-84	36	-2031	36
PAK	-6136	0	-269	0	-5867	0	-35251	15035	29384	15035
PAN	-340	0	0	0	-340	0	-180	75	-160	75
PER	-1385	0	-4	0	-1382	0	-2050	872	668	872
POL	-8853	0	-14	0	-8839	0	-1239	522	-7600	522
PRY	-234	0	0	0	-234	0	-745	318	510	318
QAT	-2708	0	0	0	-2708	0	-35	18	-2673	18
RWA	-48	0	0	0	-48	0	-3753	1600	3705	1600
SAU	-19284	0	-19	0	-19265	0	-792	341	-18473	341

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
SDN	-44	0	0	0	-43	0	-5882	2514	5839	2514
SEN	-372	0	-1	0	-371	0	-2572	1096	2202	1096
SLE	-35	0	0	0	-35	0	-1841	789	1806	789
SLV	-190	0	0	0	-189	0	-478	205	289	205
SOM	-17	0	0	0	-17	0	0	0	-17	0
SRB	-1299	0	-1	0	-1299	0	-444	190	-855	190
STP	-4	0	0	0	-4	0	-30	13	27	13
SUR	-76	0	0	0	-76	0	-31	13	-45	13
SVK	-907	0	0	0	-907	0	-147	64	-759	64
SVN	-375	0	0	0	-375	0	-48	22	-327	22
SWE	-1065	0	0	0	-1065	0	-158	80	-907	80
SWZ	-31	0	0	0	-31	0	-109	46	78	46
SYR	-763	0	-2	0	-761	0	-2575	1090	1814	1090
TCD	-53	0	0	0	-52	0	-2489	1061	2436	1061
TGO	-65	0	0	0	-65	0	-2021	861	1955	861
THA	-8090	0	-49	0	-8041	0	-4865	2078	-3175	2078
TJK	-275	0	-1	0	-274	0	-2326	992	2052	992
TKM	-2101	0	-1	0	-2100	0	-432	184	-1667	184
TTO	-1043	0	0	0	-1043	0	-36	16	-1006	16
TZA	-359	0	-6	0	-353	0	-13514	5753	13161	5753
UGA	-161	0	-2	0	-158	0	-11126	4730	10967	4730
UZB	-3449	0	-25	0	-3424	0	-5757	2459	2333	2459
VCT	-6	0	0	0	-6	0	-5	2	0	2
VEN	-2230	0	-4	0	-2226	0	-1459	611	-767	611
YEM	-354	0	-2	0	-352	0	-4264	1815	3912	1815

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
ZMB	-212	0	-1	0	-212	0	-2772	1180	2560	1180
ZWE	-309	0	-2	0	-308	0	-4098	1750	3791	1750
AND	-13	0	0	0	-13	0	-2	1	-11	1
ABW	-23	0	0	0	-23	0	-2	1	-20	1
BRB	-30	0	0	0	-30	0	-8	3	-22	3
BMU	-15	0	0	0	-15	0	-1	0	-14	0
DMA	-4	0	0	0	-4	0	-3	1	-1	1
FRO	-20	0	0	0	-20	0	-1	0	-19	0
GRL	-15	0	0	0	-15	0	-1	1	-13	1
GRD	-8	0	0	0	-8	0	-5	2	-4	2
IMN	0	0	0	0	0	0	-1	1	1	1
KIR	-2	0	0	0	-2	0	-15	6	12	6
XXK	-249	0	0	0	-249	0	-143	61	-106	61
LIE	-4	0	0	0	-4	0	0	0	-4	0
MDV	-60	0	0	0	-60	0	-19	8	-41	8
MHL	-5	0	0	0	-5	0	-4	2	0	2
FSM	-5	0	0	0	-5	0	-9	4	5	4
MCO	0	0	0	0	0	0	0	0	0	0
ANT	0	0	0	0	0	0	-288	145	288	145
PSE	-88	0	0	0	-88	0	-554	236	466	236
PRI	0	0	0	0	0	0	-86	39	86	39
KNA	0	0	0	0	0	0	-2	1	2	1
LCA	-13	0	0	0	-13	0	-8	4	-5	4
SMR	0	0	0	0	0	0	-1	0	1	0
SYC	-16	0	0	0	-16	0	-3	1	-13	1

Country	Total Wealth [M USD (2020)]		Domestic Wealth [M USD (2020)]		Outbound Wealth [M USD (2020)]		Inbound Wealth [M USD (2020)]		Wealth Transfer [M USD (2020)]	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
TLS	-21	0	0	0	-21	0	-248	107	227	107
TUV	0	0	0	0	0	0	-1	0	1	0