GERMAN STAKEHOLDER PERCEPTIONS OF AN EU CARBON BORDER ADJUSTMENT MECHANISM

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Abstract
The European Commission has proposed a carbon border adjustment mechanism (CBAM) that would apply the carbon price prevailing in the EU emissions trading system to import-related emissions. We conducted a survey to study perceptions of an EU CBAM among German key stakeholders from industry, civil society, and research in July 2021. We find that substantial support for CBAM exists as well as the expectation that the mechanism will eventually be introduced. We identified divergent views on key design options among stakeholder groups. Stakeholders from industry generally favour the continuation of free allocation of emissions allowances, rebates for exporters from the EU, coverage of only scope 1 emissions, and use of revenues for domestic spending. Stakeholders from civil society prefer phasing out free allocation, coverage only of imports, an emissions scope including all indirect emissions, exempting low-income countries and countries that do implement non-price-based climate policies, and the use of revenues to finance green transformation in low-income countries. Respondents from research would generally rather see free allocation being phased out, emissions coverage of scope 1 and 2, exemptions for low-income countries and countries that do implement non-price-based policies with comparable effects in relevant sectors and a transfer of revenues to support clean technologies in low-income countries and green technologies in the EU. Our survey design allows us to identify three cross-stakeholder group clusters, one containing stakeholders who are comparably more hesitant towards CBAM, a second one with respondents most in favour of introducing CBAM, as well as a ‘middle ground’ cluster which contains views that are often in between the other two. We also compare the survey responses to the design of the Commission’s CBAM proposal to identify the most likely points of political disagreement.

1. Introduction
The EU Green Deal sets the goal of achieving net-zero emissions in the EU by 2050 (European Commission 2021a). This ambitious goal harbours the risk that companies will increasingly outsource their production to world regions with less ambitious climate goals to save costs. Such ‘carbon leakage’ would not only thwart global climate protection effects of EU measures, but also endanger the EU as an industrial location (Jakob 2021, 2022). The free allocation of emission allowances in the EU emissions trading system (EU ETS) has so far served as a central mechanism to protect energy-intensive industries from carbon leakage (Martin et al 2014). However, there are limits to the free allocation of emission certificates as their availability declines along the pathway to net-zero emissions. For this reason, the EU Green Deal provides for the development of an EU carbon border adjustment mechanism (hereafter referred to as CBAM). The ’Fit for 55’ package, presented on 14 July 2021, contains a concrete proposal for the design of such a mechanism (European Commission 2021b).

The distribution and level of support for different design choices by key domestic stakeholder groups may play an important role in shaping governments’ position regarding implementation and enforcement of a unilateral CBAM. Yet, we have little systematic
understanding of the political acceptance of a CBAM among stakeholder groups in EU member states. Political support by key domestic stakeholders will be important to uphold CBAM and its integrity in the face of political pressure against member states and it is likely that there might be resistance to a unilateral CBAM. For example, when the EU attempted to expand EU ETS coverage to international flights in 2012, it eventually gave in to such pressure from various trade partners, including the United States, China, Russia, Japan, and India (Hartmann 2013, Falkner 2016, Droge 2020). Furthermore, countries such as Brazil, Russia, India, China and South Africa (BRICS) are already voicing grave concerns over unilateral carbon border adjustment (BRICS Environment Ministerial 2021).

Empirical research on the support versus rejection of a CBAM and different design options among key stakeholders in the EU remains scarce. With our research, we address this gap and complement existing studies. We conducted a survey with more than 80 key representatives of German industry, civil society, and research. We conducted our survey from 7 June to 7 July 2021, shortly before the publication of the Commission proposal. Considering Germany’s importance in the EU and in international trade, the perceptions of German stakeholders of a CBAM are arguably important for its design and implementation. Against this background, our research analyses the views of key German stakeholders on the introduction and design options of a CBAM.

2. Literature review and conceptual background

With the existing EU ETS, CBAM can generally be defined as a charge on imports based on a measure of carbon content multiplied by a measure of the EU’s carbon price (see also Mehling et al 2019). It can be introduced based on different motives such as addressing carbon leakage, maintaining industrial competitiveness, incentivising other countries to adopt efforts to reduce GHG emissions, or raising revenue (Cosbey et al 2019, Mehling et al 2019). It can also be used to fulfil certain functions within international climate policy, e.g. as an instrument within a climate club, see Nordhaus (2015, 2019) and for a broader discussion Falkner et al (2022).

Border carbon adjustment involves a wide range of general and more detailed interwoven design choices that can lead to a multitude of different outcomes (Bernaconi-Osterwalder and Cosbey 2021). General design choices include the specification of the policy instrument, whether to include export rebates for domestic exporters, the assessment of the carbon content of the imported goods (which commodities to include, scope of emissions, emissions accounting method), whether to exempt individual countries or groups of countries, whether to credit for other climate policies (carbon pricing or regulatory measures), and how to use the revenues (see also Cosbey et al (2019), Mehling et al (2019), Jakob (2021), Droge and Panezi (2022)). Next to these design choices on border carbon adjustment, discussions on CBAM also focus on whether to continue the free allowance allocation and the amount and temporal course of CO2 prices within CBAM with a separate pool of allowances (Marelou et al 2020). Table 1 shows a selection of design elements and options from our survey.

These complex design choices entail different advantages or disadvantages, spanning environmental (effectiveness of preventing carbon leakage and incentivizing other countries to adopt more ambitious climate policy), competitiveness (competitive disadvantages associated with unilateral adoption of more stringent climate policies), legal (aim and design in line with WTO law and UNFCCC regime), administrative (complexity and transaction costs of domestic and foreign entities involved) and diplomatic (trade related sensibilities, bilateral and multilateral dialogue) dimensions (Marelou et al 2020, Marelou et al 2021, Jakob 2021, 2022). Policymakers need to carefully respond to trade-offs in these dimensions when considering interacting design options and resulting CBAM designs. With our survey design, we do not ask how stakeholders view certain complete CBAM designs (addressing different trade-offs). We structure our survey around each design element with respective options. This gives us the opportunity to distil granular views on each design choice and identify resulting meta-level designs and cross-stakeholder groups with cluster analysis.

As there is no unique definition of the term ‘stakeholder’, we follow a broad conceptualization of the term, referring to any individual who is impacted by or can be involved in finding possible solutions to a policy problem, see also Garard and Kowarsch (2017) and Garard (2019). Following this definition, our survey focused on three key stakeholder groups in Germany: industry (companies and associations), civil society (NGOs and unions), and researchers (academic and think tanks).

A few previous studies have analysed general perception on CBAM and its design. Maratou and Marelou (2021) conducted a survey on stakeholder opinions of the Commission CBAM proposal as part of the ‘Fit for 55’ package of July 2021. They report that 74% of respondents agreed or strongly agreed that border carbon adjustments are becoming increasingly necessary to address carbon leakage. Buylova et al (2022) studied data from the EU’s public consultation on CBAM (of 2020), elicited views from companies and 4 The text of the survey with all 16 thematic blocs can be found in A.1.
Table 1. Selection of design elements and options considered in our survey. Out of the queried design choices we selected this shortlist of unresolved open design questions and design options with high divergence among stakeholder groups. Adopted from Mehling et al (2019), Cosbey et al (2019), Marcu et al (2020), and Marcu et al (2021). See A.2 for a full list of design elements considered in our survey.

| Selected CBAM design elements | Examples of options |
|-------------------------------|---------------------|
| Free allowance allocation     | • Immediate phase-out upon simultaneous implementation of CBAM  |
|                               | • Gradual phase-out while CBAM is phased in  |
|                               | • Maintained and imports are covered by CBAM to the extent that their associated emissions exceed the EU benchmark for free allocation  |
| Export rebates                | • Imports only  |
|                               | • CBAM for imports and rebates for exports from the EU  |
| Commodities included          | • Emission-intensive and trade-intensive basic materials only  |
|                               | • These basic materials and energy products  |
|                               | • These basic materials energy products as well as more complex products  |
| Indirect emissions            | • Scope 1 (all direct emissions)  |
|                               | • Scope 2 (all indirect emissions from electricity purchased and used in production)  |
|                               | • Scope 3 all other indirect emissions (full supply chain covering also intermediate products).  |
| Emissions accounting method   | • Product-based, using data on actual emissions  |
|                               | • Benchmark-oriented, based on global default values  |
|                               | • Benchmark-oriented, based on EU benchmark  |
|                               | • Product and benchmark-based, e.g. a general benchmark for scope 1 and regional default value for scope 2  |
| Exemptions                    | • For least developed and low-income countries  |
|                               | • For countries that introduce economy-wide GHG cap-and-trade system or a GHG-tax (irrespective of CO₂ price)  |
|                               | • For countries that introduce a sectoral GHG-cap-and-trade system or GHG-tax for relevant sectors (irrespective of CO₂ price)  |
|                               | • For countries that introduce a GHG-cap-and-trade system or GHG-tax and introduce a similar price on relevant sectors as the EU  |
|                               | • For countries that implement other non-price-based but adequate climate policies in relevant sectors  |
| Revenue recycling             | • General EU budget  |
|                               | • Supporting green technologies in the EU  |
|                               | • Compensating affected industries in the EU  |
|                               | • Refund to exporting countries  |
|                               | • Transfer of clean technologies to low-income countries  |
|                               | • Compensating EU citizens who are particularly affected by climate protection costs  |

business associations and contrasted them to views from NGOs, unions, consumer organizations and research institutions. They found overall support for CBAM, and highlighted divergent views in particular on free allocation, export rebates, sectoral coverage, emissions scope and exemptions for third countries emphasizing trade-offs policymakers have to navigate between conflicting positions on these design options while at the same time being in line with WTO law. Our survey thus contributes by providing complementary findings focusing on German key stakeholders, on individual design elements and options and by providing evidence on existing response patterns between stakeholder groups (clusters).

3. The survey

We designed the survey to capture support and opposition of a CBAM among German key stakeholders briefly before the Commission presented its proposal (on 14 July 2021). The email invitations were sent between 7 June and 1 July 2021 and the survey was accessible until 7 July 2021. Industry stakeholders include the 100 highest emitting companies as well as operators with a high carbon leakage risk according to Commission analysis (European Commission 2018, German Emissions Trading Authority 2020, European Commission 2021d) and participants of the public consultation on a CBAM by the Commission (European Commission 2021c). We also used the lobby list of the German Federal Parliament to identify relevant industry associations, as well as NGOs and unions (German Federal Parliament 2021). To identify the most relevant experts on CBAM, we first compiled a list of German higher education and research organizations (German Federal Ministry of Education and Research 2018). A google scholar and google search was then

5A.2 provides further information on our survey methodology and response rate per stakeholder group. Robustness checks can be found in A.3.
carried out combining the name of the organization and CBAM-related keywords (border adjustment, border carbon adjustment, border tax adjustment) to identify authors of relevant publications in the period 2015 to June 2021.

In total, our survey population comprised 473 individuals from which we received 150 responses but not all respondents completed the questionnaire. We restricted our sample to 81 responses from stakeholders who agreed to take part in the survey, completed the questionnaire to the last page and then sent it for upload. This number of respondents is comparable to the online survey on CBAM by Maratou and Marcu (2021) with international stakeholders, which includes 105 participants. Overall, the response rate is 17% (or 26% if individual companies are excluded). The higher participation rate of associations compared to companies meets the expectation that companies may have fewer resources available to take part in online surveys or outsource this to associations that combine the interests of many individual companies.

4. Survey results

With our survey we carve our respondents’ view on CBAM in 16 thematic blocs. This chapter presents the respective results from a number of these blocs. We first discuss survey respondents’ general views on a CBAM. Next, we analyse results on detailed policy design features, as these can greatly affect effectiveness and distributional impacts of a CBAM. We report mean values (‘on average’) as well as coefficient of variation (i.e. the standard deviation divided by the mean, whereby a larger coefficient of variation indicates a more controversial view).

4.1. Views on introducing CBAM, associated aims, and the international dimension

Figure 1 illustrates the extent to which German stakeholders agree or disagree with the statement that a CBAM should be introduced (1a). The majority of stakeholders (59% of total respondents) are in favour or strongly in favour of introducing CBAM. A minority of 23% of respondents are against or strongly against introducing CBAM. Among them are respondents from the chemical (fertilizers and other chemicals) as well as the aluminium sectors. According to most respondents (57%), a CBAM should be introduced and not only used as a threat to increase the level of climate policy ambition in important industrialized and emerging countries (1b). Most respondents (74%) expect that a CBAM will be introduced by the EU (1c).

Most respondents agree or strongly agree that the aim of CBAM should be to avoid carbon leakage (83%) (2b), maintain industrial competitiveness (76%) (2a) and create incentives for other countries to reduce their GHG emissions (73%) (2c). The least favoured possible goal of CBAM is revenue generation (12%) (2d).

The introduction of a CBAM without comparable border carbon adjustments in other countries is controversial. Industry in particular advocates for the integration of a CBAM into a climate club, e.g. with the USA and China (3b). Like researchers, they are concerned that an EU CBAM without comparable border carbon adjustments for important trading partners could politically isolate the EU (3a). Civil society and researchers support the introduction of a CBAM in the EU even without comparable border carbon adjustment mechanisms or a climate club (3c). Expectations are highest among civil society about whether a unilateral CBAM by the EU will lead to greater emission reductions and closer coordination of national climate policies (3d).

4.2. Design features of CBAM

In the following section, we analyse respondents’ opinions on key CBAM design features as described in table 1. We first delineate respondents’ views on the free allocation of emission allowances and export rebates. Second, we focus on the assessment of carbon content (commodity scope, inclusion of indirect emissions and emissions accounting method). Lastly, we provide views on exemptions for third countries and use of revenue.

4.2.1. Free allocation

Respondents from industry are largely in favour of maintaining the free allocation of emission permits when introducing a CBAM. On the other hand, stakeholders from civil society and research are in favour of an immediate termination or a gradual phase-out of free allocation (4a, 4b). This is one of the most contentious issues of our survey. In addition, industry on average agrees that imports should be subject to CBAM to the extent that the related EU benchmarks for free allocation are exceeded in the country of origin, which is largely rejected by research and civil society (4c).

4.2.2. Export rebates

Whether a CBAM should only apply to imports or should also include rebates for exports from the EU is highly controversial. As shown in figure 2 industry advocates that a CBAM should also include refunds for exports from the EU (65% of industry respondents in favour). Civil society respondents are mainly in favour of a CBAM including imports only. Researchers are divided with the tendency that a CBAM should only apply to imports (5a, 5b).

6 The discussion of results of the remaining thematic blocs can be found in A.4.
### 4.2.3. Commodities included

There are different opinions about which products should be included in a CBAM, e.g. only energy-intensive basic materials, energy products or also more complex products along the value chain. Respondents are divided on whether CBAM should only apply to emissions- and trade-intensive commodities (6a). Of the three options, including only emissions- and trade-intensive basic materials is on average the most favoured arrangement among the respondents from research. Civil society and researchers are in favour of including energy products in addition to basic materials (6b). The inclusion of more complex products is controversial among the stakeholder groups surveyed (6c).

### 4.2.4. Indirect emissions

Respondents disagreed as to whether a CBAM should also include emissions from electricity use (Scope 2) and intermediate products and transport (Scope 3) in addition to direct emissions (Scope 1). Industry, civil society as well as researchers are largely in agreement that a CBAM should include Scope 1 emissions (7a). The option of including indirect emissions from electricity in a CBAM is less popular with industry (7b). On the other hand, this is the option most favoured by civil society on average. The inclusion of all other indirect emissions (Scope 3) is the option among all stakeholder groups most favoured by civil society (7c).

### 4.2.5. Emissions accounting method

The benchmark-oriented calculation of contained emissions, based on EU benchmarks (8c), is most popular among civil society and researchers. The option of a benchmark-oriented calculation using global standard values is rather controversial among all stakeholder groups (8b). Industry tends to favour a product-by-product calculation using actual emissions data for each product (8a). There is no clear support among respondents for the option of using a product and benchmark-based calculation, e.g. considering a general benchmark for Scope 1 and a regional default value for Scope 2 (8d).

### 4.2.6. Exemptions

Respondents are largely in agreement that a CBAM should include exemptions for other countries. There is strong support for allowing exemptions for countries that introduce an ETS or GHG tax with a similar price to the EU in the relevant sectors, see figure 3 (9d). Civil society and researchers are also in favour of exemptions for least developed and low-income countries (9a) and for countries that do not apply an emissions tax (9b).
Figure 2. Mean values plus/minus coefficients of variation for the answers to the topics (4) free allocation, (5) export rebates, (6) commodities included, (7) indirect emissions and (8) emissions accounting method. Adapted with permission from Kuehner et al (2022).

Figure 3. Mean values plus/minus coefficients of variation for the answers to the topic (9) Exemptions for third countries. Adapted with permission from Kuehner et al (2022).
not implement price-based climate policies but have comparable effects in relevant sectors (9c). Introducing exemptions for countries that implement an all-encompassing or sectoral ETS or GHG tax, regardless of the respective carbon price, is controversial in all groups (9b, 9c).

4.2.7. Revenue recycling

As shown in figure 4, the use of CBAM revenues to promote climate-friendly technologies inside and outside the EU enjoys the greatest support. Industry respondents advocate using the revenue to promote climate-friendly technologies within the EU (10b) followed by compensation for affected industries in the EU (10c). Research and civil society are also clearly in favour of promoting climate-friendly technologies in the EU (10b) and for the transfer of climate-friendly technologies to low-income countries (10c). Researchers are also more in favour of compensating EU citizens who are hit particularly hard by price increases due to a CBAM (10f). Respondents from civil society and academia agree with the reimbursement of revenue to trading partners affected by a possible CBAM (10d). The use of the revenue for the general EU budget met with little approval among respondents (10a).

5. Identifying response clusters

We are interested in whether we can identify design outcomes based on respective design choices and whether distinguishable response patterns in our sample possibly correspond to advocacy coalitions in the policy process (Sabatier 1988, Jenkins-Smith et al 2018) that hold similar views about a CBAM. We employed a k-means cluster analysis to identify such potential patterns. We identified three clusters and their mean responses on all our survey statements. While for many items there is considerable overlap across cluster mean responses, they differ clearly on several statements, see figure 5. Cluster one, which we label the ‘competitiveness’ cluster, is more hesitant towards a CBAM and more strongly believes that a unilateral CBAM would isolate the EU. This cluster perceives the incorporation of a CBAM into a climate club to be most meaningful. It is least in favour of the statement that free allocation of emissions allowances should be immediately phased out upon simultaneous introduction of CBAM. Export rebates should be included in a CBAM. Respondents from this cluster are generally more inclined towards a more comprehensive CBAM in which all three emission scopes are included. They are most in favour of a CBAM which provides exemptions for countries that implement adequate non-price climate policies in the relevant sectors. They are least in favour of supporting transfers of clean technologies to low-income countries.

Cluster two, the ‘more ambitious climate policy’ cluster, is generally most in favour of introducing a CBAM, also unilaterally in the absence of comparable border carbon adjustments or a climate club. Respondents are less likely to believe that a unilateral CBAM will isolate the EU. Respondents most strongly believe that the aim of CBAM should be to address the risk of carbon leakage. They are most in favour of an immediate phase out of free allocation upon simultaneous implementation of a CBAM. Respondents

7 See A.5 for information on the cluster analysis methodology.
are least inclined for a CBAM to cover rebates for exports and are less in favour for CBAM to cover scope 3 emissions. In comparison, they are most in favour of CBAM revenue being recycled for the purpose of transferring clean technologies to low-income countries.

Finally, cluster three, the ‘middle ground’ cluster, is characterised by responses that are often in between the other two clusters, with some deviations. For example, cluster three is least in favour of covering scope 3 emissions.

While there is a first intuitive resemblance in response patterns between cluster one (‘competitiveness’) and stakeholder group ‘industry’ as well cluster two (‘more ambitious climate policy’) with stakeholder group ‘civil society’, inspecting the distribution of stakeholder across clusters (table 2) reveals all identified clusters consist of multi-stakeholder groups. For example, while we find that weighted by cluster size, most industry representatives (37%) fall into cluster one (‘competitiveness’), they also show up in the other two clusters. Likewise, for civil society, most (44%) are associated with cluster two (‘more ambitious climate policy’), but the remaining 56% of respondents from this group are in clusters one or three. Such similarity in policy preferences might indicate existing or potential policy-specific coalitions across stakeholder groups (Sabatier 1988, Jenkins-Smith et al 2018).

6. Discussion

In this chapter we discuss the question how our survey findings on stakeholder groups views on key design element compare to the Commission proposal of July 2021, see table 3 (European Commission 2021b, Marcu et al 2021).
Table 3. Comparison of the design proposals of the European Commission in its ‘Fit for 55’ package with a selection of statements and results from our survey. Columns 3–5 represent the mean plus/minus coefficient of variation in brackets for each stakeholder group. Exception: ‘Revenue recycling’ series, which is given as a percentage. Colour scale: red background (mean value up to and equal to 2.5; below 10% on average), yellow background (mean value 2.6–3.4), green background (mean value greater than and equal to 3.5). Adapted with permission from Kuehner et al (2022).

| Design element | Commission proposal and statements from our survey | Industry | Civil society | Research |
|----------------|-----------------------------------------------------|----------|--------------|----------|
| Free allocation | Gradual phase-out (4b) | 2.6 (2.1–3.1) | 3.8 (3.6–4) | 3.9 (3.7–4.1) |
| Export rebates | Imports only (5a) | 2.4 (1.9–3) | 4 (3.8–4.2) | 3.3 (2.9–3.6) |
| Commodities included | Only emission- and trade-intensive materials (6a) | 3 (2.5–3.4) | 3 (2.6–3.4) | 3.4 (3.1–3.7) |
| | These basic materials and energy products (6b) | 2.6 (2.2–3.1) | 3.5 (3.3–3.7) | 3.4 (3–3.7) |
| | These basic materials, energy products and more complex goods (6c) | 3 (2.6–3.4) | 3.2 (2.8–3.6) | 2.7 (2.3–3.2) |
| Indirect emissions | Scope 1 (7a) | 3.6 (3.3–3.9) | 3.5 (3.2–3.8) | 3.9 (3.6–4.2) |
| Emissions accounting method | Product-based, using data on actual emissions for each shipment or facility (8a) | 3.1 (2.7–3.5) | 3.3 (2.9–3.7) | 2.7 (2.2–3.2) |
| | Benchmark-oriented, based on EU benchmark (8b) | 2.8 (2.4–3.2) | 3.5 (3.2–3.8) | 3.3 (3.7) |
| Exemptions | For least developed countries and low-income countries (9a) | 2.7 (2.2–3.2) | 3.5 (3.1–4) | 3.6 (3.2–3.9) |
| | For countries that implement other non-price-based but adequate climate policies in relevant sectors (9e) | 3 | 3.3 (3–3.6) | 4.1 (3.8–4.3) |
| Revenue recycling | Own resources for the EU-budget (responses in percentage) (10a) | 3.5% (1.3%–5.8%) | 9.3% (6.1%–12.4%) | 2.4% (1%–5.8%) |

6.1. Free allocation
According to the Commission proposal, the free allocation of allowances for industrial plants in the EU ETS should gradually be phased out with the introduction of a CBAM. The period from 2023 to 2025 should be considered a transitional period, used for data collection. From 2026 to 2035, the free allocation of EU ETS allowances should be phased out completely. On average, our findings suggest that civil society and research are in favour of such a gradual phasing out of the free allocation of emission allowances. In contrast, respondents from industry strongly advocate maintaining (or strengthening) the free allocation of emission allowances while introducing CBAM at the same time.

6.2. Export rebates
The proposed regulation of the Commission only affects imports into the EU. For exports, the proposal does not provide for reimbursement of the carbon prices paid. This proposal is supported by civil society and also meets with some approval among respondents from research. On average, respondents from industry are against the restriction to imports without considering refunds from exports from the EU.

6.3. Commodities included and sectoral scope
According to the Commission proposal, CBAM should include imports of cement, fertilizers (including nitric acid, ammonia, and potassium nitrate), iron and steel, aluminum and power generation. The Commission proposal contains basic materials such as cement clinker as well as more complex products, e.g. pipes and rails. Before 2026, the Commission might propose a possible expansion of the sectoral scope. The majority of survey respondents advocate that CBAM should include the basic materials of the Commission proposal: cement, steel, aluminum and fertilizers. However, they are divided on whether CBAM should also include power generation and more complex products along the value chain. In qualitative answers, some researchers advocate a phased introduction of further sectors and more complex products. The inclusion of energy products and more complex products is highly controversial, especially among industry. A pilot phase could offer the possibility to observe future resource shuffling and, if necessary, to tackle it.

6.4. Indirect emissions
The proposed CBAM only considers emissions that occur directly in the production process (scope 1). Conversely, this means that indirect emissions from electricity used in production (scope 2) and all other indirect emissions, including the entire supply chain, which also covers intermediate products (scope 3), are excluded. Transport services and products further down the value chain are mentioned as options for future inclusion. Most respondents are in favour...
of taking Scope 1 emissions into account. Some respondents named administrative and technical hurdles as the main reasons against including all emissions for companies. Respondents from the aluminum sector, in which indirect emissions from electricity make up a significant part of the emissions, were particularly critical of including Scope 2 emissions. According to some qualitative answers, there is concern that the inclusion of Scope 2 emissions in a CBAM does not offer sufficient protection for competitiveness if the free allocation of emission certificates and indirect cost compensation from emissions embedded in electricity is ended at the same time.

6.5. Emissions accounting method
For the proposed products cement, fertilizer, iron and steel, and aluminum, importers should provide actual emissions per tonne of product produced at the producing facility, checked by an independent certification body. If this information cannot be provided, the average emission intensity in the exporting country per product is used as the default value, plus a surcharge that is yet to be determined. In the absence of reliable data, the second default value would be the average emissions intensity of the top 10% most carbon intensive installations in the EU. In the case of electricity imports, the emissions contained are determined using standard values that are set to average emission intensities in the exporting country (or a group of exporting countries or a region). If no specific default values were set, the second default value would be the weighted average emission intensity of the EU’s electricity generated from fossil fuels. Electricity importers who can demonstrate that the average emission factor is lower than the EU or specific standard value can receive an alternative, lower standard value. Among those surveyed, industry is on average slightly more in favour of a product-related calculation using data on the actual emissions compared to benchmark-oriented calculations. However, it remains controversial. The benchmark-oriented calculation of contained emissions, based on EU benchmarks, is well received by civil society and to a lesser extent by research.

6.6. Exemptions
Only countries that are integrated with or linked to the EU ETS and some special areas of the EU are excluded from the scope of the proposed CBAM. Temporary exemptions can also apply to electricity imports from countries that are linked to the EU electricity market. The proposed CBAM also includes the option to reduce the amount of CBAM allowances to be surrendered based on the carbon price per tonne paid by the foreign producer. Bilateral negotiations are planned for corresponding agreements. The proposed CBAM does not provide for reductions for non-price-based climate policies in the exporting country. There is on average broad agreement among those surveyed that a CBAM should provide exemptions for other countries. In particular, the respondents from research are in favour of exemptions for countries that introduce price-based climate policies in the relevant sectors with a price that corresponds to the EU CO2 price. Exemptions for countries with low per capita incomes are supported by civil society and research. Exemptions for non-price-based climate policies in exporting countries are generally more favoured by research.

6.7. Revenue recycling
According to the Commission proposal, the revenues from the proposed CBAM are to be used as own funds for the EU budget. In contrast, respondents on average earmark less than 10% of the share of revenue for EU own resources. Instead, they prefer the promotion of climate-friendly technologies both within and outside the EU. Overall, of all the Commission’s proposals, this option is rejected most clearly by German stakeholders.

7. Conclusion
Our research has analysed how key German stakeholders perceive the introduction of CBAM. We find that overall strong support for CBAM exists along with the expectation that it will eventually be introduced by most stakeholders. General support by key stakeholders may be conducive for the stability and coherence of the German governments’ official position towards CBAM, even in the face of potential political resistance from key trading partners. While Germany has been hesitant in the past to border carbon adjustment (van Asselt and Brewer 2010), the current agenda of Chancellor Olaf Scholz supports CBAM as well as joint border carbon adjustment as part of a climate club, the latter being also at the heart of Germany’s G7 presidency in 2022 (German Federal Government 2021, 2022).

We have delineated views on key design options and highlighted the most likely areas of domestic political resistance to specific design options by stakeholders. We find that stakeholders from industry generally favour the continuation of free allocation of emissions allowances, rebates for exporters from the EU, scope 1 emissions coverage only, exemptions for countries that implement a carbon tax or cap-and-trade system with a similar price on
relevant sectors as the EU, and use of revenues for domestic spending (such as green technologies in the EU). Civil society stakeholders prefer phasing out free allocation, coverage only of imports, a comprehensive emissions scope including indirect emissions, exempting low-income countries and countries that do implement non-price-based climate policies with comparable effects in relevant sectors, and the use of revenues also to finance transformation in low-income countries. Respondents from research would generally rather see free allocation being phased out, coverage of imports only, an emissions scope coverage of scope 1 and 2, exemptions for low-income countries and countries that do implement regulatory measures with comparable effects in relevant sectors and a transfer of revenues to support clean technologies in low-income countries and green technologies in the EU. Out of the queried design choices, we could not identify clear positions among the three stakeholder groups on the questions of which commodities to include in CBAM and the selection of emissions accounting method.

Our survey design has allowed us to analyse response patterns across stakeholder groups. We identified three clusters, which we label ‘competitiveness’, ‘more ambitious climate policy’ and ‘middle ground’. Stakeholders in each cluster may form advocacy coalitions seeking to influence CBAM design accordingly. We find that cluster ‘competitiveness’ includes stakeholders which are comparatively more hesitant of introducing CBAM, more strongly believe that a unilateral CBAM would isolate the EU, which are more in favour of the establishment of an international climate club, the continuation of free allocation, export rebates, all emission scopes to be covered by CBAM and exemptions for non-price based adequate climate policies. The ‘more ambitious climate policy’ cluster is most strongly in favour of CBAM, also unilaterally, an immediate phase out of free allocation upon simultaneous implementation of CBAM, least inclined to cover rebates for exports, less in favour of covering scope 3 emissions and most in favour of using revenues for supporting clean technologies in low-income countries. Finally, we find that cluster ‘middle ground’ is characterised by holding views that are often in between the two other clusters.

The nuanced understanding of design preferences by key stakeholders can contribute to identifying possible compromises and solutions at the domestic level.

Data availability statement

The data that support the findings of this study are available upon reasonable request from the authors.

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Appendix

A.1. Appendix with survey text

In the following, we provide the text of our online survey. The original survey was shared online in German.

Many thanks for participating in our survey on a possible Carbon Border Adjustment Mechanism (CBAM) for the costs of climate protection in the European Union. The questionnaire should take approximately 15 min to complete. The aim of this survey is to represent different perceptions regarding the objectives, design and its influence of EU trading partners on and of an EU CBAM.

This research is part of the Kopernikus research project Ariadne, funded by the German Federal Ministry of Education and Research (BMBF). The aim of this study is the publication of an academic journal article. Preliminary results will be available in form of a report on the website of the Ariadne project.

Data collected from individual responses of this survey will be completely anonymised. Your anonymised responses will be processed for scientific purposes only. If you would like to obtain more information about the processing of your personal data, please click here.

We would kindly ask you to complete the survey by 30 June 2021. It is possible at any time to skip questions or to return to questions. If you would like to stay informed about first results of this research or if you have any questions, please contact Ann-Kathrin Kühner (kuehner@hertie-school.org).

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Many thanks for your time and contribution.
Ann-Kathrin Kühner (Hertie School),
Prof. Christian Flachsland (Hertie School), and
Dr Michael Jakob (Mercator Research Institute on Global Commons and Climate Change, MCC)

(a) I want to participate in this survey and agree to the processing of my personal data in accordance with the information provided herein.
(b) I do not want to participate.

We would like to begin with a few questions about your person. What is your institutional affiliation?

(a) Industry and associations
(b) NGO and civil society
(c) Policy
(d) Research
(e) Other, please specify:
(f) N/A

In which branch of industry and associations do you work?

(a) Firm/company
(b) Industry association
(c) Other, please specify:
(d) N/A

In which sector(s) do you work?

(a) Cement
(b) Steel
(c) Aluminium
(d) Fertilisers
(e) Other chemicals
(f) Paper
(g) Glass
(h) Power sector
(i) Other, please specify:
(j) N/A

In what type of NGO and civil society organisation do you work?

(a) NGO
(b) Consumer organisation
(c) Union
(d) Other, please specify:
(e) N/A

In what type of policy institution do you work?

(a) Federal parliament
(b) Other, please specify:
(c) N/A

In what type of research organisation do you work?

(a) University/research institute
(b) Think tank
(c) Other, please specify:
(d) N/A
We would now like to ask about your perception on an EU CBAM on a scale between ‘strongly disagree’ and ‘strongly agree’.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|----------------|-----|
| The EU should introduce a CBAM. |
| An EU CBAM should only be used as a threat to achieve an increase in the climate policy ambition of important industrialised and emerging economies. |
| I expect the EU to introduce a CBAM. |

You can further specify your responses:

Next we would like to ask you about your opinion on why the EU should introduce a CBAM.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|----------------|-----|
| Maintaining industrial competitiveness and creating a level playing field. |
| Addressing carbon leakage. |
| Incentivising other countries to adopt efforts to reduce GHG emissions comparable to the EU. |
| Raising revenue. |

You can further specify your responses:

The following statements refer to the risks and opportunities of an EU CBAM.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|----------------|-----|
| The risk of carbon leakage is low, rendering a CBAM unnecessary. |
| A CBAM is in principle not a suitable instrument to avoid carbon leakage. |
| Introducing a CBAM will trigger adverse reactions from the EU’s main trading partners. |
| Introducing a CBAM will trigger trade retaliation measures. |
| Introducing an EU CBAM without an international alliance implementing CBAMs will isolate the EU. |
| It will be administratively challenging to implement an effective CBAM. |
| It will be legally challenging to implement a WTO-compatible CBAM. |

You can further specify your responses:
We would now like to ask about your perception of possible alternatives to a CBAM.

| Perception                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|----------------------------------------------------------------------------|-------------------|----------|-----------------------------|-------|----------------|-----|
| The EU should, instead of a CBAM, increasingly pursue cooperative approaches in global climate policy. | □                 | □        | □                           | □     | □              | □   |
| Instead of a CBAM, the EU should continue and strengthen free allocation of emissions permits for energy intensive sectors. | □                 | □        | □                           | □     | □              | □   |
| Instead of a CBAM, the EU should continue free allocation of emissions permits and in addition, the EU should introduce a consumption charge, which is dependent on the amount of basic materials used (e.g. steel) but not on the CO$_2$-content of the materials. | □                 | □        | □                           | □     | □              | □   |
| Instead of a CBAM, the EU should phase out free allocation of emissions permits and introduce a consumption charge, which is dependent on the amount of basic materials but not on the CO$_2$-content of the materials. | □                 | □        | □                           | □     | □              | □   |

You can further specify your responses:

Assuming the EU will introduce an EU CBAM. How should it be designed according to your view?

| Design Approach                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------------------------------------------------------------------|-------------------|----------|-----------------------------|-------|----------------|-----|
| Extension of the EU ETS through the incorporation of imports into the existing pool of allowances. | □                 | □        | □                           | □     | □              | □   |
| Separate ETS: creation of a specific pool of allowances for imports, which is separate from the EU ETS. | □                 | □        | □                           | □     | □              | □   |
| Levy or tax on imports. Import tariff. | □                 | □        | □                           | □     | □              | □   |

You can further specify your responses:

What do you think about the following statements?

| Statement                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|---------------------------------------------------------------------------|-------------------|----------|-----------------------------|-------|----------------|-----|
| If certificates for imports from the existing EU ETS pool of allowances should be purchased, the EU ETS will have to be adjusted by increasing the existing cap. | □                 | □        | □                           | □     | □              | □   |
| If certificates for imports from the existing EU ETS pool of allowances should be purchased, the cap will have to remain unchanged. | □                 | □        | □                           | □     | □              | □   |
The following statements refer to the amount and temporal course of GHG prices within an EU CBAM, introduced outside of the EU ETS. This could in principle take the form of a separate ETS (with a fixed price), a levy/tax, or a tariff.

| Statement                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------------------------------------------------------------|-------------------|----------|---------------------------|-------|---------------|-----|
| The price path should be set in advance and then remain fixed over the time period specified. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |
| The price should be based on an evolving price based on the rolling average of EUA prices of a time period prior to the importation of the product. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |
| The price should be based on the EUA price of the day before the importation of the product. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |

You can further specify your responses:

The following statements refer to possible adjustments to the current EU ETS provisions for free allocation of emissions permits.

| Statement                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------------------------------------------------------------|-------------------|----------|---------------------------|-------|---------------|-----|
| Free allocation should be immediately phased out upon simultaneous implementation of an EU CBAM. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |
| Free allocation should be phased out gradually while a carbon border adjustment mechanism is phased in gradually. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |
| Free allocation should be maintained and imports should be covered by border carbon adjustment to the extent that their associated emissions exceed the EU benchmark for free allocation. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |

You can further specify your responses:

The following statements refer to the design of the scope of an EU CBAM.

| Statement                                                                 | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------------------------------------------------------------|-------------------|----------|---------------------------|-------|---------------|-----|
| An EU CBAM should include border adjustment on imports only.            | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |
| An EU CBAM should include border adjustment on imports and rebates for exports. | ☐                 | ☐        | ☐                         | ☐     | ☐             | ☐   |

You can further specify your responses:
The following statements refer to the products that should be included in an EU CBAM.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|---------------|-----|
| Emission-intensive and trade-intensive basic materials only. | □ | □ | □ | □ | □ |
| These basic materials and energy products (electricity or hydrogen imports). | □ | □ | □ | □ | □ |
| These basic materials, energy products as well as more complex products. | □ | □ | □ | □ | □ |

You can further specify your responses:

The following options refer to the basic materials that should be included in an EU CBAM.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|---------------|-----|
| Cement            | □        | □                         | □     | □             | □   |
| Steel             | □        | □                         | □     | □             | □   |
| Aluminium         | □        | □                         | □     | □             | □   |
| Fertilisers       | □        | □                         | □     | □             | □   |
| Other chemicals   | □        | □                         | □     | □             | □   |
| Paper             | □        | □                         | □     | □             | □   |
| Glass             | □        | □                         | □     | □             | □   |

You can further specify your responses or add additional basic materials:

Which emissions scope should be covered by an EU CBAM?

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|---------------|-----|
| Scope 1 (all direct emissions). | □        | □                         | □     | □             | □   |
| Scope 2 (all indirect emissions from electricity purchased and used in production). | □       | □                         | □     | □             | □   |
| Scope 3 all other indirect emissions (full supply chain covering also intermediate products). | □       | □                         | □     | □             | □   |

You can further specify your responses:
The following statements refer to the calculation of embedded emissions for carbon border adjustment.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|----------------------------|-------|----------------|-----|
| Product-based, using data on actual emissions for each shipment or facility. | ☐ | ☐ | ☐ | ☑ | ☑ |
| Benchmark-oriented, based on global default values. | ☐ | ☐ | ☐ | ☑ | ☑ |
| Benchmark-oriented, based on EU benchmark. | ☐ | ☐ | ☐ | ☑ | ☑ |
| Product and benchmark-based, e.g. a general benchmark for scope 1 and regional default value for scope 2. | ☐ | ☐ | ☐ | ☑ | ☑ |

You can further specify your responses:

For which countries should an EU CBAM provide exemptions?

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|----------------------------|-------|----------------|-----|
| Exemptions should be provided for least developed countries and low-income countries. | ☐ | ☐ | ☐ | ☑ | ☑ |
| Exemptions should be provided for countries that introduce an economy-wide GHG-cap-and-trade system or a GHG-tax (independent of the respective CO₂ price). | ☐ | ☐ | ☐ | ☑ | ☑ |
| Exemptions should be provided for countries that introduce a sectoral cap-and-trade system or tax for relevant sectors (independent of the respective CO₂ price). | ☐ | ☐ | ☐ | ☑ | ☑ |
| Exemptions should be provided for countries that implement a GHG-tax or a GHG-cap-and-trade system and introduce a similar price on relevant sectors as the EU. | ☐ | ☐ | ☐ | ☑ | ☑ |
| Exemptions should be provided for countries that implement other non-price-based but adequate climate policies in relevant sectors. | ☐ | ☐ | ☐ | ☑ | ☑ |
| An EU CBAM should provide no exemptions for other countries. | ☐ | ☐ | ☐ | ☑ | ☑ |

You can further specify your responses:

Please allocate 100 points on options of how the revenue of an EU CBAM should be used.

- General EU budget. _________
- Supporting green technologies in the EU. _________
- Compensating affected industries in the EU. _________
- Refund to exporting countries. _________
- Transfer of clean technologies to low-income countries. _________
- Compensating EU citizens who are particularly affected by climate protection costs. _________
You can further specify your responses:

What do you think about the following statement on the influence of the EU’s trading partners on a EU CBAM?

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | N/A |
|-------------------|----------|---------------------------|-------|---------------|-----|
| An EU CBAM will only be meaningful if it leads to the establishment of an international 'climate club' e.g. among the EU, US and China. The EU should implement an EU CBAM even without the introduction of comparable CBAMs or a climate club by other major trading partners, such as the US. The introduction of an EU CBAM even without comparable CBAMs by other major trading partners will strengthen efforts of other countries to reduce emissions and will lead to closer coordination of national climate policies. |

You can further specify your responses:

Do you have any additional comments regarding the content of this survey or are there any aspects that have not been or have not been sufficiently addressed?

A.2. Appendix with supplementary information on our survey
The complete list of design elements and options is shown in table A.1.

The population of the survey consists of identified members of the three stakeholder groups. Tables A.2–A.5 provide detailed information on the institutional affiliation and number of respondents.

Members of the group industry operators were identified in a two-step approach, aimed at including large greenhouse gas emitting companies as well as small and medium sized companies that could be affected by a CBAM. First, the 100 highest emitting companies in Germany were identified based on the European Commission Union Registry report on verified emissions for 2020 (European Commission 2021d). Second, industry sectors with a high carbon leakage indicator according to the Commission were identified (European Commission 2018). To match the identified sectors with installations covered by the EU ETS in Germany, data from the German Emissions Trading Authority (DEHSt) was used (German Emissions Trading Authority 2020). The final list contained 232 industry company contacts with available email addresses. We avoided double counting of installations that belong to a single company (Brohé and Burniaux 2016). In addition, the lobby list of the German federal parliament was used to identify members of relevant industry sectors’ associations (German Federal Parliament 2021). Participants from the civil groups NGOs and trade unions were also selected using the index of the lobby list of the German Bundestag. In addition, those civil society groups who took part in the consultation on a CBAM by the European Commission were added to our participant pool (European Commission 2021c). To identify most relevant researchers, we first compiled a list of German higher education and research organizations (Federal Ministry of Education and Research 2018).

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8 Note that our survey included an additional stakeholder group ‘politics’, mainly consisting of members of the German Bundestag. This group was not included in the final population of the survey due to a low response rate.

9 This included: manufacture of cement, fertilisers and nitrogen compounds, basic iron and steel and of ferro-alloys, other inorganic basic chemicals, other organic basic chemicals, aluminium production and manufacture of flat glass.
Table A.1. List of design elements and options considered in our survey.

| Selected CBAM design elements | Examples of options |
|-------------------------------|----------------------|
| Specification                 | • Extension of the EU ETS through the incorporation of imports into the existing pool of allowances  
                                • Separate pool of allowances for imports which is separate from the EU ETS  
                                • Levy or tax on imports; import tariff |
| Adjustment of the cap          | • If certificates for imports from the existing EU ETS pool of allowances should be purchased, the EU ETS will have to be adjusted by increasing the existing cap  
                                • If certificates for imports from the existing EU ETS pool of allowances should be purchased, the cap will have to remain unchanged |
| Price path (separate pool of allowances with a fixed price, a levy/tax, or a tariff) | • Price set in advance and then remains fixed over the period specified  
                                • Evolving price based on the rolling average of EUA prices of a time period prior to the importation of the product  
                                • Price based on the EUA price of the day before the importation of the product |
| Free allowance allocation      | • Should be immediately phased out upon simultaneous implementation of CBAM  
                                • Should be phased out gradually while CBAM is phased in gradually  
                                • Should be maintained and imports should be covered by CBAM to the extent that their associated emissions exceed the EU benchmark for free allocation |
| Export rebates                 | • Imports only  
                                • CBAM should include imports and rebates for exports from the EU |
| Commodities included          | • Emission-intensive and trade-intensive basic materials only  
                                • These basic materials and energy products  
                                • These basic materials, energy products as well as more complex products |
| Sectoral scope                | • Cement  
                                • Steel  
                                • Aluminium  
                                • Fertilisers  
                                • Other chemicals  
                                • Paper  
                                • Glass |
| Indirect emissions            | • Scope 1 (all direct emissions)  
                                • Scope 2 (all indirect emissions from electricity purchased and used in production)  
                                • Scope 3 all other indirect emissions (full supply chain covering also intermediate products) |
| Emissions accounting method   | • Product-based, using data on actual emissions for each shipment or facility  
                                • Benchmark-oriented, based on global default values  
                                • Benchmark-oriented, based on EU benchmark  
                                • Product and benchmark-based, e.g. a general benchmark for scope 1 and regional default value for scope 2 |
| Exemptions                    | • Should be provided for least developed and low-income countries  
                                • Should be provided for countries that introduce economy-wide GHG cap-and-trade system or a GHG-tax (irrespective of CO2 price)  
                                • Should be provided for countries that introduce a sectoral GHG-cap-and-trade system or GHG-tax for relevant sectors (irrespective of CO2 price)  
                                • Should be provided for countries that introduce a GHG-cap-and-trade system or GHG-tax and introduce a similar price on relevant sectors as the EU  
                                • Should be provided for countries that implement other non-price-based but adequate climate policies in relevant sectors  
                                • An EU CBAM should provide no exemptions for other countries |
| Revenue recycling             | • General EU budget  
                                • Supporting green technologies in the EU  
                                • Compensating affected industries in the EU  
                                • Refund to exporting countries  
                                • Transfer of clean technologies to low-income countries  
                                • Compensating EU citizens who are particularly affected by climate protection costs |

A google scholar and google search was then carried out combining the name of the organization and relevant keywords (border adjustment, border carbon adjustment, border tax adjustment) for the time period between 2015 and 2021. Our total survey population includes 473 relevant participants in Germany, with email addresses identified as accessible online.
### Table A.2. Answers to the question ‘In which branch of industry and associations do you work?’ (Multiple responses possible). Adapted with permission from Kuehner et al (2022).

| Institutional affiliation: industry | N   | Share (%) |
|------------------------------------|-----|-----------|
| Firm/company                        | 18  | 38%       |
| Industry association\(^a\)          | 29  | 62%       |

\(^a\) The answers ('Chamber in the field of liberal professions', 'Interest representation for companies' and 'Trade Association') are added here and treated in the further analysis as institutional affiliation 'Associations'. Multiple answers result in exceeding the total number of answers as shown in table 1 ‘Companies and associations’.

### Table A.3. Answers to the question for the industry stakeholder group ‘In which sector(s) do you work?’ (Multiple choices possible, e.g. in the case of fertilizers and other chemicals). Adapted with permission from Kuehner et al (2022).

| Industry: sectors                      | N   | Share (%) |
|----------------------------------------|-----|-----------|
| Cement                                 | 3   | 6%        |
| Steel                                  | 2   | 4%        |
| Aluminium                              | 2   | 4%        |
| Fertilisers                            | 4   | 9%        |
| Other chemicals                        | 4   | 9%        |
| Paper                                  | 6   | 13%       |
| Glass                                  | 2   | 4%        |
| Power sector                           | 6   | 13%       |
| Other, please specify:                 | 14  | 30%       |
| • Plastic (processing)                 | (2) |           |
| • Ceramics                             | (1) |           |
| • Automotive industry                  | (2) |           |
| • Non-ferrous metal industry           | (1) |           |
| • Surface finishing of aluminium       | (1) |           |
| • Agriculture                          | (1) |           |
| • Mining                               | (1) |           |
| • Construction industry                | (1) |           |
| • Trade                                | (1) |           |
| • Recycling                            | (1) |           |
| • Fast Moving Consumer Goods           | (1) |           |
| • Climate protection                   | (1) |           |
| N/A                                    | 4   | 9%        |

### Table A.4. Answers to the question ‘In what type of NGO and civil society organisation do you work?’. Adapted with permission from Kuehner et al (2022).

| Institutional affiliation: civil society | N   | Share (%) |
|-----------------------------------------|-----|-----------|
| NGO                                     | 10  | 77%       |
| Consumer organisation                   | 0   | —         |
| Union                                   | 2   | 15%       |
| Other, please specify:                  | 1   | 8%        |
| • Political Foundation                  |     |           |
Table A.5. Answers to the question 'In what type of research organisation do you work?'. Adapted with permission from Kuehner et al (2022).

| Institutional affiliation: research | N   | Share (%) |
|------------------------------------|-----|-----------|
| University / research institute    | 16  | 70%       |
| Think tank                         | 6   | 26%       |
| Other, please specify:             | 1   | 4%        |
| • Hochschule (higher education institution) |     |           |

Table A.6. Overview of the response rate and institutional affiliation of the respondents based on the answers to the question 'What is your institutional affiliation?'. Adapted with permission from Kuehner et al (2022).

| Institutional affiliation | Sample | Number of responses | Response rate | Share (%) |
|---------------------------|--------|---------------------|---------------|-----------|
| Companies / associations  | 232 / 115 | 45                | 8% / 25%      | 56%       |
| Civil society             | 60     | 13                 | 22%           | 16%       |
| Research                  | 66     | 23                 | 35%           | 28%       |
| Total/excluding companies | 473 / 241 | 81                | 17% / 26%     | 100%      |

A one-round pre-test of the draft questionnaire was piloted with a selected group of PhD students, postdocs, and senior researchers from different research organizations. The slightly adjusted final online survey was implemented and conducted anonymously using the software QuestionPro in line with the EU General Data Protection Regulations. The email to the participants contained a non-personalized but individual link per aggregate stakeholder group (industry, civil society, and research). The email invitations were sent between 7 June and 1 July 2021 and the survey was accessible until 7 July 2021. We sent two email reminders, and the last email contained the text of the survey in German language as a PDF to offer a way of responding that avoids the online questionnaire. Surveys are a popular approach for eliciting diverging viewpoints, and in our case, it was chosen as the most comprehensive method for capturing comparable responses on key design choices of a CBAM. One limitation is that we potentially overlooked marginal viewpoints, for example from SMEs who do not have the resources to participate in a survey. We addressed this limitation on the one hand, by leaving the option to provide qualitative responses to every survey question and by inviting larger industry associations, who bundle the interests of many companies.

Table A.6 provides a detailed overview of the response rate to our survey. Participants also had the opportunity to leave qualitative comments for each content question. From the sample identified, we received 265 qualitative responses from 49 respondents. Within industry, we received most qualitative comments from the fertilizers and other chemicals sector (15.5% of qualitative responses) and aluminium (5% of qualitative responses). While the qualitative responses enabled us to receive more granular details on some of the industry sectors concerned, we could not identify significant patterns of similar concerns within or across different groups.

A.3. Appendix with robustness checks
We conducted robustness checks to investigate possible biases between early, late as well as incomplete responses, see also Necker (2014) and Drupp et al (2018). The results as reported in table A.7 show that our survey is with a few exceptions representative, i.e. the respondents answered in a similar manner both late respondents as well as those respondents who did not finish in the survey until the end.
Table A.7. Comparison of early and late responses as well as sample responses and incomplete responses. Percentage responses in the thematic bloc 15 were recoded into values between 1 and 5.

| Questionnaire                                                                 | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|-------------------------------------------------------------------------------|--------------------------|--------------------|-------------------|----------------------------------------------------------|--------------------------|--------------------------------------------------------------------------|
| (1a) The EU should introduce a CBAM.                                          | Industry                 | 23                 | 21                | 0.2                                                       | 12                       | 0.0                                                                       |
|                                                                                | Civil society            | 5                  | 7                 | 0.8                                                       | 7                        | 0.0                                                                       |
|                                                                                | Research                 | 10                 | 12                | 0.1                                                       | 3                        | −0.1                                                                      |
| (1b) An EU CBAM should only be used as a threat to achieve an increase in the climate policy ambition of important industrialised and emerging economies. | Industry                 | 23                 | 19                | 0.2                                                       | 10                       | −0.1                                                                      |
|                                                                                | Civil society            | 5                  | 7                 | −0.7                                                      | 7                        | −0.3                                                                      |
|                                                                                | Research                 | 10                 | 12                | −0.3                                                      | 3                        | −0.1                                                                      |
| (1c) I expect the EU to introduce a CBAM.                                     | Industry                 | 22                 | 22                | 0.0                                                       | 12                       | −0.1                                                                      |
|                                                                                | Civil society            | 6                  | 7                 | −0.1                                                      | 7                        | 0.0                                                                       |
|                                                                                | Research                 | 9                  | 12                | 0.2                                                       | 3                        | −0.1                                                                      |
| (2a) Maintaining industrial competitiveness and creating a level playing field. | Industry                 | 19                 | 22                | −0.1                                                      | 10                       | 0.0                                                                       |
|                                                                                | Civil society            | 4                  | 7                 | 0.5                                                       | 6                        | 0.0                                                                       |
|                                                                                | Research                 | 10                 | 13                | −0.2                                                      | 2                        | 0.1                                                                       |
| (2b) Addressing carbon leakage.                                                | Industry                 | 19                 | 22                | −0.1                                                      | 10                       | 0.0                                                                       |
|                                                                                | Civil society            | 4                  | 7                 | 0.5                                                       | 6                        | −0.1                                                                      |
|                                                                                | Research                 | 10                 | 13                | −0.3                                                      | 3                        | 0.0                                                                       |
| (2c) Incentivising other countries to adopt efforts to reduce GHG emissions comparable to the EU. | Industry                 | 20                 | 22                | 0.0                                                       | 10                       | 0.1                                                                       |
|                                                                                | Civil society            | 5                  | 7                 | 0.2                                                       | 6                        | −0.1                                                                      |
|                                                                                | Research                 | 10                 | 13                | −0.2                                                      | 3                        | 0.0                                                                       |
| (2d) Raising revenue.                                                          | Industry                 | 20                 | 22                | 0.0                                                       | 10                       | 0.1                                                                       |
|                                                                                | Civil society            | 4                  | 6                 | 0.2                                                       | 6                        | 0.5                                                                       |
|                                                                                | Research                 | 10                 | 13                | 0.0                                                       | 3                        | 0.0                                                                       |
| (3a) The risk of carbon leakage is low. Rendering a CBAM unnecessary.         | Industry                 | 21                 | 21                | −0.1                                                      | 8                        | 0.0                                                                       |
|                                                                                | Civil society            | 6                  | 6                 | −0.1                                                      | 5                        | −0.2                                                                      |
|                                                                                | Research                 | 10                 | 12                | 0.1                                                       | 1                        | −0.1                                                                      |
| (3b) A CBAM is in principle not a suitable instrument to avoid carbon leakage. | Industry                 | 22                 | 21                | 0.0                                                       | 9                        | 0.0                                                                       |
|                                                                                | Civil society            | 6                  | 6                 | −0.7                                                      | 5                        | 0.0                                                                       |
|                                                                                | Research                 | 10                 | 13                | 0.1                                                       | 1                        | −0.1                                                                      |
| (3c) Introducing a CBAM will trigger adverse reactions from the EU's main trading partners. | Industry                 | 23                 | 22                | 0.1                                                       | 8                        | 0.1                                                                       |
|                                                                                | Civil society            | 6                  | 6                 | −0.4                                                      | 5                        | −0.6                                                                      |
|                                                                                | Research                 | 10                 | 12                | 0.1                                                       | 1                        | 0.1                                                                       |
| (3d) Introducing a CBAM will trigger trade retaliation measures.               | Industry                 | 22                 | 22                | −0.1                                                      | 8                        | 0.0                                                                       |
|                                                                                | Civil society            | 6                  | 6                 | −0.3                                                      | 5                        | −0.3                                                                      |
|                                                                                | Research                 | 10                 | 13                | 0.0                                                       | 0                        | (Continued.)                                                              |
Table A.7. (Continued.)

| Questionnaire                                                                 | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|--------------------------------------------------------------------------------|---------------------------|--------------------|-------------------|-----------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------|
| (3e) Introducing an EU CBAM without an international alliance implementing CBAMs will isolate the EU. | Industry 22 22 | −0.3 | 7 | 0.0 |
|                                                                                   | Civil society 6 6    | −0.3 | 5 | −0.1 |
|                                                                                   | Research 10 12       | −0.1 | 0 |     |
| (3f) It will be administratively challenging to implement an effective CBAM.      | Industry 23 22       | −0.1 | 9 | 0.0 |
|                                                                                   | Civil society 6 6    | −0.6 | 5 | 0.0 |
|                                                                                   | Research 10 13       | −0.1 | 1 | 0.0 |
| (3g) It will be legally challenging to implement a WTO-compatible CBAM.          | Industry 21 20       | 0.1  | 9 | 0.0 |
|                                                                                   | Civil society 6 6    | −0.3 | 5 | 0.1 |
|                                                                                   | Research 8 13        | −0.4 | 1 | −0.1 |
| (4a) The EU should, instead of a CBAM, increasingly pursue cooperative approaches in global climate policy. | Industry 23 22       | −0.1 | 9 | −0.1 |
|                                                                                   | Civil society 6 7    | −0.5 | 3 | 0.0 |
|                                                                                   | Research 10 12       | 0.2  | 1 | −0.1 |
| (4b) Instead of a CBAM, the EU should continue and strengthen free allocation of emissions permits for energy intensive sectors. | Industry 23 22       | −0.3 | 8 | 0.0 |
|                                                                                   | Civil society 6 7    | −0.5 | 3 | 0.1 |
|                                                                                   | Research 10 12       | −0.3 | 1 | 0.0 |
| (4c) Instead of a CBAM, the EU should continue free allocation of emissions permits and in addition, the EU should introduce a consumption charge. Which is dependent on the amount of basic materials used (e.g. steel) but not on the CO2-content of the materials. | Industry 21 20       | 0.2  | 6 | 0.1 |
|                                                                                   | Civil society 5 7    | −0.4 | 3 | 0.0 |
|                                                                                   | Research 10 12       | 0.0  | 1 | 0.0 |
| (4d) Instead of a CBAM, the EU should phase out free allocation of emissions permits and introduce a consumption charge. Which is dependent on the amount of basic materials but not on the CO2-content of the materials. | Industry 22 21       | 0.2  | 6 | 0.0 |
|                                                                                   | Civil society 6 7    | −0.4 | 3 | 0.1 |
|                                                                                   | Research 10 11       | 0.1  | 1 | 0.0 |
| (5a) Extension of the EU ETS through the incorporation of imports into the existing pool of allowances. | Industry 14 14       | −0.1 | 2 | 0.0 |
|                                                                                   | Civil society 3 5    | −0.5 | 3 | 0.0 |
|                                                                                   | Research 7 7         | 0.0  | 0 |     |
Table A.7. (Continued.)

| Questionnaire                                                                 | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|------------------------------------------------------------------------------|--------------------------|--------------------|-------------------|----------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------|
| (5b) Separate ETS: creation of a specific pool of allowances for imports. Which is separate from the EU ETS. | Industry 12 15           | 0.0                | 2 0.0             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 2 3        | 0.2                | 3 −0.3            |                                                          |                         |                                                                                  |
|                                                                               | Research 6 9             | −0.6               | 0                 |                                                          |                         |                                                                                  |
| (5c) Levy or tax on imports.                                                  | Industry 12 16           | 0.0                | 2 0.0             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 2 3        | −0.4               | 2 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Research 8 5             | 0.2                | 0                 |                                                          |                         |                                                                                  |
| (5d) Import tariff.                                                           | Industry 13 15           | 0.0                | 2 0.0             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 2 3        | −0.3               | 3 −0.1            |                                                          |                         |                                                                                  |
|                                                                               | Research 7 7             | 0.2                | 0                 |                                                          |                         |                                                                                  |
| (6a) If certificates for imports from the existing EU ETS pool of allowances should be purchased. The EU ETS will have to be adjusted by increasing the existing cap. | Industry 7 9             | −0.2               | 1 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 0 0        | 0                  | 0                 |                                                          |                         |                                                                                  |
|                                                                               | Research 1 2             | −0.3               | 0                 |                                                          |                         |                                                                                  |
| (6b) If certificates for imports from the existing EU ETS pool of allowances should be purchased. The cap will have to remain unchanged. | Industry 7 9             | 0.2                | 1 −0.1            |                                                          |                         |                                                                                  |
|                                                                               | Civil society 0 0        | 0                  | 0                 |                                                          |                         |                                                                                  |
|                                                                               | Research 1 2             | 0.8                | 1                 | −0.4                                                     |                         |                                                                                  |
| (7a) The price path should be set in advance and then remain fixed over the time period specified. | Industry 8 8             | 0.1                | 1 −0.1            |                                                          |                         |                                                                                  |
|                                                                               | Civil society 1 2        | −0.7               | 2 0.5             |                                                          |                         |                                                                                  |
|                                                                               | Research 6 6             | 0.1                | 0                 |                                                          |                         |                                                                                  |
| (7b) The price should be based on an evolving price based on the rolling average of EUA prices of a time period prior to the importation of the product. | Industry 9 8             | −0.3               | 1 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 1 2        | −0.7               | 3 0.0             |                                                          |                         |                                                                                  |
|                                                                               | Research 7 5             | 0.0                | 0                 |                                                          |                         |                                                                                  |
| (7c) The price should be based on the EUA price of the day before the importation of the product. | Industry 8 10            | −0.3               | 1 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 2 2        | 0.8                | 2 −0.4            |                                                          |                         |                                                                                  |
|                                                                               | Research 6 5             | 0.1                | 0                 |                                                          |                         |                                                                                  |
| (8a) Free allocation should be immediately phased out upon simultaneous implementation of an EU CBAM. | Industry 20 20           | 0.6                | 3 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 5 6        | 0.1                | 1 0.1             |                                                          |                         |                                                                                  |
|                                                                               | Research 10 12           | 0.0                | 0                 |                                                          |                         |                                                                                  |
| (8b) Free allocation should be phased out gradually while a carbon border adjustment mechanism is phased in gradually. | Industry 19 19           | 0.3                | 3 0.0             |                                                          |                         |                                                                                  |
|                                                                               | Civil society 5 6        | −0.2               | 1 −0.1            |                                                          |                         |                                                                                  |
|                                                                               | Research 10 13           | 0.2                | 0                 |                                                          |                         |                                                                                  |
| Questionnaire                                                                 | Institutional affiliation | Early responses: | Late responses: | Weighted mean difference between late and early responses | Incomplete responses: | Weighted mean difference between sample responses and incomplete responses |
|------------------------------------------------------------------------------|---------------------------|------------------|-----------------|----------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------|
| (8c) Free allocation should be maintained and imports should be covered by border carbon adjustment to the extent that their associated emissions exceed the EU benchmark for free allocation. | Industry                  | 19               | 19              | -0.1                                                     | 3                     | 0.0                                                                            |
| (09a) An EU CBAM should include border adjustment on imports only.            | Civil society             | 4                | 5               | 0.2                                                      | 1                     | 0.0                                                                            |
| (09b) An EU CBAM should include border adjustment on imports and rebates for exports. | Research                  | 10               | 11              | 0.0                                                      | 0                     |                                                                                 |
| (10a) Emission-intensive and trade-intensive basic materials only.             | Industry                  | 21               | 19              | -0.1                                                     | 3                     | 0.0                                                                            |
| (10b) These basic materials and energy products (electricity or hydrogen imports). | Civil society             | 5                | 6               | -0.3                                                     | 1                     | 0.0                                                                            |
|                                                                                | Research                  | 9                | 12              | -0.4                                                     | 0                     |                                                                                 |
| (10c) These basic materials. Energy products as well as more complex products. | Industry                  | 20               | 19              | 0.2                                                      | 3                     | 0.0                                                                            |
|                                                                                | Civil society             | 5                | 7               | 0.3                                                      | 1                     | 0.2                                                                            |
|                                                                                | Research                  | 8                | 11              | -0.4                                                     | 0                     |                                                                                 |
| (11a) Cement                                                                  | Industry                  | 14               | 18              | 0.1                                                      | 3                     | 0.0                                                                            |
|                                                                                | Civil society             | 5                | 7               | 0.0                                                      | 1                     | 0.1                                                                            |
|                                                                                | Research                  | 9                | 11              | -0.3                                                     | 0                     |                                                                                 |
| (11b) Steel                                                                   | Industry                  | 12               | 18              | 0.2                                                      | 3                     | 0.0                                                                            |
|                                                                                | Civil society             | 5                | 7               | 0.2                                                      | 1                     | 0.1                                                                            |
|                                                                                | Research                  | 9                | 11              | -0.2                                                     | 0                     |                                                                                 |
| (11c) Aluminium                                                               | Industry                  | 13               | 18              | 0.1                                                      | 3                     | 0.0                                                                            |
|                                                                                | Civil society             | 5                | 6               | 0.1                                                      | 1                     | 0.1                                                                            |
|                                                                                | Research                  | 9                | 11              | -0.1                                                     | 0                     |                                                                                 |
| (11d) Fertilisers                                                             | Industry                  | 12               | 17              | 0.2                                                      | 3                     | -0.1                                                                          |
|                                                                                | Civil society             | 5                | 7               | 0.1                                                      | 1                     | 0.1                                                                            |
|                                                                                | Research                  | 8                | 9               | -0.3                                                     | 0                     |                                                                                 |

(Continued.)
| Questionnaire | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|---------------|--------------------------|-------------------|------------------|--------------------------------------------------------|--------------------------|---------------------------------------------------------------|
| (11e) Other chemicals | Industry | 13 | 16 | 0.3 | 3 | -0.1 |
| | Civil society | 5 | 6 | 0.1 | 1 | 0.1 |
| | Research | 9 | 9 | -0.4 | 0 | 0 |
| (11f) Paper | Industry | 13 | 17 | 0.2 | 3 | 0.0 |
| | Civil society | 4 | 5 | 0.1 | 1 | 0.1 |
| | Research | 9 | 10 | -0.3 | 0 | 0 |
| (11g) Glass | Industry | 11 | 18 | 0.2 | 3 | 0.0 |
| | Civil society | 4 | 5 | 0.0 | 1 | 0.2 |
| | Research | 9 | 10 | -0.3 | 0 | 0 |
| (12a) Scope 1 | Industry | 20 | 18 | 0.0 | 3 | 0.1 |
| | Civil society | 5 | 5 | 0.3 | 1 | 0.1 |
| | Research | 10 | 12 | 0.2 | 0 | 0 |
| (12b) Scope 2 | Industry | 20 | 18 | 0.1 | 3 | 0.1 |
| | Civil society | 5 | 5 | 0.3 | 1 | 0.1 |
| | Research | 10 | 12 | 0.2 | 0 | 0 |
| (12c) Scope 3 | Industry | 19 | 20 | -0.3 | 3 | 0.0 |
| | Civil society | 4 | 5 | -0.4 | 1 | 0.1 |
| | Research | 9 | 11 | -0.1 | 0 | 0 |
| (13a) Product-based. Using data on actual emissions for each shipment or facility. | Industry | 19 | 17 | 0.0 | 3 | 0.1 |
| | Civil society | 4 | 3 | 0.3 | 1 | 0.1 |
| | Research | 8 | 11 | -0.4 | 0 | 0 |
| (13b) Benchmark-oriented. Based on global default values. | Industry | 18 | 18 | 0.1 | 2 | 0.0 |
| | Civil society | 4 | 3 | 0.2 | 1 | 0.1 |
| | Research | 8 | 10 | -0.3 | 0 | 0 |
| (13c) Benchmark-oriented. Based on EU benchmark. | Industry | 18 | 18 | 0.4 | 2 | 0.0 |
| | Civil society | 5 | 3 | 0.3 | 1 | 0.2 |
| | Research | 8 | 10 | -0.3 | 0 | 0 |
| (13d) Product and benchmark-based, e.g. a general benchmark for scope 1 and regional default value for scope 2. | Industry | 16 | 18 | -0.2 | 2 | 0.0 |
| | Civil society | 3 | 2 | 0.0 | 1 | 0.0 |
| | Research | 8 | 9 | -0.2 | 0 | 0 |

(Continued.)
| Questionnaire                                                                 | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|------------------------------------------------------------------------------|---------------------------|--------------------|------------------|----------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------|
| (14a) Exemptions should be provided for least developed countries and low-income countries. | Industry                  | 21                 | 20               | 0.2                                                       | 3                       | 0.0                                                                            |
|                                                                               | Civil society             | 5                  | 6                | 0.1                                                       | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 11               | 0.3                                                       | 0                       |                                                                                |
| (14b) Exemptions should be provided for countries that introduce an economy-wide GHG-cap-and-trade system or a GHG-tax (independent of the respective CO₂ price). | Industry                  | 20                 | 20               | 0.0                                                       | 3                       | −0.1                                                                           |
|                                                                               | Civil society             | 5                  | 5                | −0.6                                                      | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 12               | 0.1                                                       | 0                       |                                                                                |
| (14c) Exemptions should be provided for countries that introduce a sectoral cap-and-trade system or tax for relevant sectors (independent of the respective CO₂ price). | Industry                  | 20                 | 20               | 0.1                                                       | 3                       | −0.1                                                                           |
|                                                                               | Civil society             | 4                  | 5                | −0.5                                                      | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 12               | 0.2                                                       | 0                       |                                                                                |
| (14d) Exemptions should be provided for countries that implement a GHG-tax or a GHG-cap-and-trade system and introduce a similar price on relevant sectors as the EU. | Industry                  | 21                 | 21               | −0.1                                                      | 3                       | 0.0                                                                            |
|                                                                               | Civil society             | 5                  | 5                | 0.0                                                       | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 12               | −0.1                                                      | 0                       |                                                                                |
| (14e) Exemptions should be provided for countries that implement other non-price-based but adequate climate policies in relevant sectors. | Industry                  | 20                 | 21               | −0.4                                                      | 3                       | 0.0                                                                            |
|                                                                               | Civil society             | 5                  | 5                | 0.1                                                       | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 10               | −0.3                                                      | 0                       |                                                                                |
| (14f) An EU CBAM should provide no exemptions for other countries.             | Industry                  | 21                 | 20               | 0.0                                                       | 2                       | 0.0                                                                            |
|                                                                               | Civil society             | 4                  | 5                | −0.3                                                      | 0                       |                                                                                |
|                                                                               | Research                  | 10                 | 12               | 0.0                                                       | 0                       |                                                                                |
| (15a) General EU budget.                                                       | Industry                  | 21                 | 21               | 0.1                                                       | 34                      | −0.5                                                                           |
|                                                                               | Civil society             | 5                  | 7                | −0.5                                                      | 9                       | −0.6                                                                           |
|                                                                               | Research                  | 10                 | 12               | 0.0                                                       | 4                       | −0.2                                                                           |
| (15b) Supporting green technologies in the EU.                                | Industry                  | 21                 | 21               | −0.3                                                      | 34                      | −0.2                                                                           |
|                                                                               | Civil society             | 5                  | 7                | −0.2                                                      | 9                       | 0.4                                                                            |
|                                                                               | Research                  | 10                 | 12               | −0.1                                                      | 4                       | 0.1                                                                            |
| (15c) Compensating affected industries in the EU.                             | Industry                  | 21                 | 21               | −0.1                                                      | 34                      | −0.2                                                                           |
|                                                                               | Civil society             | 5                  | 7                | −0.1                                                      | 9                       | −0.8                                                                           |
|                                                                               | Research                  | 10                 | 12               | −0.1                                                      | 4                       | −0.2                                                                           |
| (15d) Refund to exporting countries.                                          | Industry                  | 21                 | 21               | −0.1                                                      | 34                      | −0.2                                                                           |
|                                                                               | Civil society             | 5                  | 7                | −0.1                                                      | 9                       | −0.8                                                                           |
|                                                                               | Research                  | 10                 | 12               | −0.1                                                      | 4                       | −0.2                                                                           |
| (15e) Transfer of clean technologies to low-income countries.                | Industry                  | 21                 | 21               | 0.2                                                       | 34                      | −0.2                                                                           |
|                                                                               | Civil society             | 5                  | 7                | 0.4                                                       | 9                       | 0.5                                                                            |
|                                                                               | Research                  | 10                 | 12               | 0.0                                                       | 4                       | −0.3                                                                           |

(Continued.)
| Questionnaire                                                                                                                                                                                                 | Institutional affiliation | Early responses: N | Late responses: N | Weighted mean difference between late and early responses | Incomplete responses: N | Weighted mean difference between sample responses and incomplete responses |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|------------------|----------------------------------------------------------|------------------------|-----------------------------------------------------------------------------|
| (15f) Compensating EU citizens who are particularly affected by climate protection costs.                                                                                                                  | Industry                  | 21                | 21               | 0.0                                                      | 34                     | −0.1                                                                        |
|                                                                                                                                                                                                              | Civil society             | 5                 | 7                | −0.1                                                     | 9                      | −0.6                                                                        |
|                                                                                                                                                                                                              | Research                  | 10                | 12               | 0.1                                                      | 4                      | −0.2                                                                        |
| (16a) An EU CBAM will only be meaningful if it leads to the establishment of an international ‘climate club’ e.g. among the EU. US and China.                                                                 | Industry                  | 22                | 20               | −0.1                                                     | 1                      | 0.0                                                                         |
|                                                                                                                                                                                                              | Civil society             | 4                 | 4                | 0.0                                                      | 0                      |                                                                              |
|                                                                                                                                                                                                              | Research                  | 9                 | 13               | −0.2                                                     | 0                      |                                                                              |
| (16b) The EU should implement an EU CBAM even without the introduction of comparable CBAMs or a climate club by other major trading partners. Such as the US.                                                                 | Industry                  | 19                | 21               | 0.2                                                      | 1                      | 0.0                                                                         |
|                                                                                                                                                                                                              | Civil society             | 5                 | 4                | 0.4                                                      | 0                      |                                                                              |
|                                                                                                                                                                                                              | Research                  | 9                 | 13               | 0.1                                                      | 0                      |                                                                              |
| (16c) The introduction of an EU CBAM even without comparable CBAMs by other major trading partners will strengthen efforts of other countries to reduce emissions and will lead to closer coordination of national climate policies. | Industry                  | 19                | 21               | 0.3                                                      | 1                      | 0.0                                                                         |
|                                                                                                                                                                                                              | Civil society             | 4                 | 4                | 0.3                                                      | 0                      |                                                                              |
|                                                                                                                                                                                                              | Research                  | 9                 | 11               | 0.1                                                      | 0                      |                                                                              |
A.4. Appendix with supplementary information on results per stakeholder group

A.4.1. Risks

Even though stakeholders from industry attach great importance to the risk of carbon leakage (see figure A.1, responses to 1a), they are divided on whether CBAM is a suitable instrument to avoid carbon leakage (1b). A large number of stakeholders expressed concerns about possible commercial, legal and administrative risks of a CBAM. There is a high level of agreement among respondents that CBAM will trigger adverse reactions from the EU's most important trading partners (62%) (1c) including retaliation (1d) if a CBAM is introduced (1e). Furthermore, there are doubts about the administrative (73%) and legal feasibility (54%) (1f, 1g), especially in industry and research.

A.4.2. Alternatives

There is a fundamental dissent between industry on the one hand and civil society and research on the other as to whether the free allocation of emission allowances for energy- and trade-intensive sectors should be strengthened as a possible alternative to a CBAM. Stakeholders from industry are largely in favour of strengthening free allocation instead of CBAM, which is clearly rejected by civil society representatives and researchers (2b). This question represents the largest divergence between the groups in the entire survey.

A.4.3. Specification

While civil society representatives are predominantly opposed to an expansion of the EU ETS to include imports, industry rates this design option as the most positive on average compared to the other stakeholder groups (3a), see figure A.2. There is greater agreement (47%) among the various stakeholders for the implementation of CBAM as a separate ETS (3b). Civil society and researchers are on average in favour of...
implementing a CBAM as a levy or tax on imports (3c). Overall, the respondents agree on average that a CBAM should not be introduced as an import tariff (3d).

A.4.4. Adjustment of the cap or price path
A possible adjustment of the cap or the introduction of a price based on a moving average of the European Union Allowance (EUA) prices are less controversial design options. The respondents agree that the existing cap should be adjusted (expanded) if certificates for imports are to be purchased from the existing EU ETS certificate pool (4a, 4b). If allowances are purchased from an additional pool or if a CBAM in the form of a levy, tax or tariff is introduced, the majority of those surveyed are in favour of the price being based on a moving average of EUA prices over a certain period (5b), rather than being fixed in advance and then remaining unchanged for that period (5a).

A.4.5. Sectoral scope
Most respondents agree that a CBAM should include all energy-intensive commodities (cement, steel, aluminium, fertilizers, other chemicals, paper, and glass). There is agreement among civil society, research as well as industry that cement, steel, aluminium and fertilizers should be included (6a–d). The option to include further basic materials, namely other chemicals, paper, and glass, is in comparison less popular among respondents (6e–g).

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**Figure A.2.** Mean values plus/minus coefficients of variation for the answers to the topics (3) specification of the CBAM instrument, (4) options in case of expansion of the EU ETS by including imports, (5) options for determining price path: separate certificate pool, charge or tax, customs duty and (6) sectoral scope. Answers to question 4 and 5: N < 50% of respondents. Questions on (4) were not answered by any civil society respondent. Adapted with permission from Kuehner et al (2022).
A.5. Appendix with supplementary information on our clustering methodology

We started with recoding ‘not applicable’ (NA) answers as missing values and treating missing observations as ‘Missing Not at Random’. To estimate missing values we use an iterative, multiple-imputation technique using package ‘missRanger’ in R software, see Levi (2021) for a discussion of different estimation techniques. We then carried out a k-means cluster analysis for dividing data into a set of k groups. As a first step in the analysis, we indicate the number of clusters. Using R software, we compute the within sum of square (wws) according to the different number of clusters, the Bayesian information criterion (BIC), and use ‘NbClust’ package in R. Wws and NbClust indicate that 3 is the appropriate number of clusters, whereas BIC provides an optimal number of 7 clusters. To facilitate the interpretation, we choose 3 clusters which we can more clearly differentiate (Drews et al 2019). We consider all statements from the 16 thematic blocks of our survey, except for blocks 6 and 7 (for which N < 50).

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