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## Government support in industrial sectors

A synthesis report

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## *Note from the Secretariat*

Any finding of this work is without prejudice to any reviews that may be conducted by investigating authorities or under the WTO dispute settlement procedures on subsidies and countervailing measures.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

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## Introduction

1. Although government support has long been a core issue in trade policy, the current economic, sanitary, and geopolitical context has brought it back to the fore of the trade agenda. A confluence of events and trends has seen governments using subsidies to address pressing short-term needs, as well as longer-term threats and opportunities. Even before the COVID-19 pandemic, concerns over national security, strategic autonomy, and fair competition were already prompting many governments to announce new support measures and trade barriers. The pandemic and related restrictions have aggravated these concerns, with shifts in consumer demand disrupting supply chains and leading to shortages of semiconductors and other key components. In addition, longer-term, structural trends are also fuelling demands for government support, including the growing role played by state-led economies, the need to transition toward net-zero greenhouse-gas emissions by mid-century, and growing digitalisation. More recently, security concerns have again flared up, with the Russian Federation's<sup>1</sup> large-scale aggression against Ukraine prompting some governments to offer emergency assistance to firms affected by related shortages and price spikes.
2. While subsidies can be helpful policy tools for addressing emergencies or market failures, they can also distort trade and competition depending on their design and target (IMF et al., 2022<sup>[1]</sup>). Much like doping in sports, government support gives some firms a leg-up on their competitors that is not grounded in economic or market forces, but instead in the generosity of the government supporting them (Box 1). This undermines fair competition and the willingness of economies to accept the results of that competition. Support may in turn push other countries to respond in kind, to the detriment of consumers, taxpayers, and other governments that do not have sufficient fiscal space, ultimately undermining public support for, and confidence in, an interconnected global economy.
3. The proliferation of industrial subsidies poses challenges for the multilateral rule-based trading system, with current rules unable to discipline the expanding range and scale of support policies (Bown and Hillman, 2019<sup>[2]</sup>). This has led to calls for reform of trade rules in order to better capture and discipline trade-distorting industrial subsidies.<sup>2</sup> G7 Trade Ministers, in their communiqué of 22 October 2021, undertook “to step up [their] efforts in countering [market-distorting] practices, through appropriate tools and levers, and to develop stronger international rules on practices such as market-distorting industrial subsidies and trade-distorting actions by state enterprises.”<sup>3</sup> Similarly, the Trade Ministers of the United States, Japan, and the European Union noted in their joint trilateral statement of 30 November 2021 that they would seek “to address the global challenges posed by non-market policies and practices of third countries that undermine and negatively affect [their] workers and businesses.”<sup>4</sup> The EU-US Trade and Technology Council Inaugural Joint Statement of 29 September 2021 likewise mentions the shared aim of participants to avoid “a subsidy race” in semiconductor production, and to “share information on

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<sup>1</sup> Henceforth ‘Russia’.

<sup>2</sup> There are similar calls for reforming subsidies to agriculture, fisheries, and fossil fuels, among others.

<sup>3</sup> See [www.gov.uk/government/news/g7-trade-ministers-communiqué-october-2021](https://www.gov.uk/government/news/g7-trade-ministers-communiqué-october-2021) (accessed on 10 May 2022).

<sup>4</sup> See <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/november/joint-statement-trade-ministers-united-states-japan-and-european-union-after-trilateral-meeting> (accessed on 10 May 2022).

non-market distortive policies and practices”, notably “market-distorting industrial subsidies, including support given to and through [state-owned enterprises], and all other types of support offered by governments.”<sup>5</sup>

4. Countries’ concerns over the scale of subsidies and their possible effects on trade are exacerbated by a lack of comprehensive and comparable data on government support, particularly in industrial sectors (IMF et al., 2022<sup>[1]</sup>; DiPippo, Mazzocco and Kennedy, 2022<sup>[3]</sup>). This contrasts with other sectors of the economy for which information is widely available, notably from the OECD.<sup>6</sup> The OECD has been estimating the support that agricultural producers obtain from governments for decades (OECD, 2022<sup>[4]</sup>). Estimates of government support in fisheries (OECD, 2020<sup>[5]</sup>) and in the energy sector have also been available for many years, including in the latter case from the IEA, the IMF, IRENA, and the OECD (OECD, 2021<sup>[6]</sup>). Little is known, however, about the true scope and scale of manufacturing subsidies, which hinders efforts to better discipline such subsidies within the WTO rulebook or plurilateral agreements. Absent a clear understanding of the magnitude and mechanisms of support, attempts to improve subsidy rules are at risk of missing their target. Lack of data has also led to a corresponding paucity of empirical analyses of the effects of industrial subsidies on trade and competition.<sup>7</sup>

### Box 1. Combatting doping in sports – any resemblance to actual trade issues past or present is purely coincidental

With the world of sports growing more professional but also more global in scope, doping has become a serious issue for athletes and spectators alike. This is compounded by lucrative sponsorships that increase the stakes for those involved. The first official definition of doping dates back to the 1960s and the early efforts of the Council of Europe to discipline the practice\*: “[d]oping represents the use of substances or physiological mediators, which are not normally present in the human body, introduced as an **external aid** to increase the athletes’ performance during a competition” (own emphasis). Since then, doping has grown in scale and complexity, further tilting the playing field in competitive sports worldwide.

Doping is a problem primarily because it decouples victory from the efforts engaged and from athletes’ intrinsic performance. It means that those who win are not necessarily the best at what they do. In doing so, it undermines the idea of fair competition and the willingness of everyone to accept the results of that competition. Worse, it pushes others to either follow suit and use doping substances themselves, or to drop out of the competition altogether if they feel they cannot win fairly (i.e., adverse selection of competitors). In the end, lack of co-operation and trust may result in an arms race in which everyone is worse off.

<sup>5</sup> See [https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT\\_21\\_4951](https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_21_4951) (accessed on 10 May 2022).

<sup>6</sup> See the OECD’s online portal on government support and subsidies: [www.oecd.org/subsidies/](http://www.oecd.org/subsidies/).

<sup>7</sup> Although they are insightful, existing studies tend to concentrate by necessity on very specific sectors and time periods, which limits their applicability beyond their particular context. Examples include studies of China’s shipbuilding subsidies between 2006-12 (Kalouptsidi, 2018<sup>[17]</sup>) (Barwick, Kalouptsidi and Zahur, 2019<sup>[18]</sup>) and several papers looking at Korea’s support for its heavy industry in the 1970s (Lane, 2021<sup>[19]</sup>) (Liu, 2019<sup>[21]</sup>) (Choi and Levchenko, 2021<sup>[20]</sup>).

Doping can also actually hurt users themselves in the longer run. The medical profession has grown alarmed at the damage done to the health of athletes. There are many dramatic examples, starting with the death in August 1960 of Danish cyclist Knud Jensen, who became known as the first athlete to die in Olympic competition as a result of doping. Less lethal outcomes are also of concern, such as athletes developing chronic diseases and permanently damaging their bodies.

Doping is generally hidden as users and their enablers (coaches, physicians, sponsors, etc.) can devote considerable efforts to conceal the substances. It is also growing more complex and harder to find, as “there is a permanent race among those who invent new doping methods and sports ethics organizations that are searching for more performant methods to detect them” (Vlad et al., 2018<sup>[7]</sup>).

So what to do then? A first step is to **increase transparency through more and better testing**. It is unrealistic to expect athletes to come forward and unilaterally disclose their use of doping substances. Instead, external, co-ordinated, worldwide efforts need to be devoted to identify these substances, including by funding laboratories that can best perform the testing. Parallel efforts are necessary in academia and other scientific circles to improve scientific procedures aimed at detecting substances.

A second step is for authorities to enact stricter legislation “to prevent the spread, marketing and use of such substances” (ibid). The **World Anti-Doping Agency (WADA)** was created in the 1990s precisely to address this problem, including through the adoption of the World Anti-Doping Code, which “harmonizes anti-doping policies, rules and regulations within sport organizations and among public authorities around the world.”\*\* Crucially, given the evolving nature and complexity of doping, “[this] Code was never designed to be a document that stood still” but rather a living agreement meant to accommodate new doping forms and substances.

A key product of WADA’s Code is the **List of Prohibited Substances and Methods**, which “identifies the substances and methods prohibited in- and out-of-competition, and in particular sports.” These include different kinds of substance, such as steroids, stimulants, gene doping, but also tampering with samples. As with the Code, the List is updated regularly in consultation with “scientific, medical and anti-doping experts to ensure it reflects current medical and scientific evidence and doping practices.”

**Not all substances are equally harmful**, and the List therefore makes a distinction between those substances that are prohibited at all times (in- and out-of-competition), those that are only prohibited in competition, and those that are prohibited in only certain sports. Some substances are also only considered doping when used above a certain threshold. Caffeine, for example, is only considered doping when the urine concentration exceeds 12 µg/mL (Vlad et al., 2018<sup>[7]</sup>). Other substances, such as paracetamol, are in principle fine but could still confer an advantage to athletes under certain conditions, e.g., “through the reduction of pain for a given work rate, thereby enabling participants to exercise closer to a true physiological limit” (Foster et al., 2014<sup>[8]</sup>).

Another important mission of WADA and other anti-doping agencies is **prevention** through education and training of athletes and related staff. This includes better communicating over the harmful effects that doping can have on athletes. For this, scientific research and advances are again crucial in uncovering evidence of the harmful effects of different substances.

There is often this preconceived idea that “everyone does it” – that doping is so widespread that it does not really matter. While it is true that doping scandals have involved a wide variety of countries and sports, some parts of the sporting world tend

to have a disproportionate concentration of cases. This is true, for example, in weightlifting, cycling, and wrestling. Some countries also have a longer record of infringements than others, even being subject to country-level bans for systemic doping.

At any rate, more action is needed at all levels to ensure that there is a true level playing field in competitive sports. There will always be differences between athletes, such as some athletes gaining access to a better coach, to a better nutritionist, or to better training facilities. This might, for instance, favour athletes from richer countries at the expense of competitors hailing from poorer parts of the world, thus justifying some other forms of assistance. Some other athletes may have a natural, comparative advantage in certain sports, e.g., Northern countries in winter sports. Such advantages are generally no cause for concern, and do not in any way justify cheating through doping.

Note: \*See [www.coe.int/en/web/sport/anti-doping-convention](http://www.coe.int/en/web/sport/anti-doping-convention) (accessed on 13 May 2022).

\*\* See [www.wada-ama.org/en/what-we-do/the-code](http://www.wada-ama.org/en/what-we-do/the-code) (accessed on 13 May 2022).

## Finding information about industrial subsidies

5. Government support can take many different forms, some more complex than others. Support in agriculture often takes the form of direct payments and market price support, whereby domestic prices are kept above international market prices to support domestic producers (OECD, 2022<sup>[4]</sup>). In fisheries, support for inputs such as fuel is generally the largest type of support observed (OECD, 2020<sup>[5]</sup>). Fossil-fuel subsidies in developing and emerging economies often involve the provision of energy to final users at below-market prices (OECD, 2021<sup>[6]</sup>; IEA, 2021<sup>[9]</sup>). For its part, and as explained later in this report, government support to industrial producers generally involves a mixture of government grants, income-tax concessions, inputs sold to companies at below-market prices, and financing provided on below-market terms ('below-market finance'). Below-market finance in turn can either take the form of below-market borrowings or below-market equity (OECD, 2021<sup>[10]</sup>).
6. To guide governments in their disclosure efforts and help frame policy discussions, the OECD has developed a taxonomy of support measures, building on its longstanding work to identify and measure government support across sectors (Table 1). This taxonomy categorises support measures according to their formal incidence and their transfer mechanism. Formal incidence (columns) refers to the initial target of government support (i.e., to whom or what a transfer is first made), such as enterprise income, labour, knowledge generation (e.g., R&D), etc.<sup>8</sup> The transfer mechanism (rows) distinguishes support measures according to how a transfer is generated, e.g., in the form of direct cash transfers, tax revenue foregone, or by the transfer of risk from the private sector to the government through, for instance, a government loan guarantee. While the OECD matrix does not aim to explicitly list every possible type of support measure, it takes a broader view of government support than certain narrower conceptions of 'subsidy'. It also offers flexibility in how to account for and categorise a wide range of government interventions, including multi-dimensional and complex interventions.

<sup>8</sup> This can differ from the economic incidence of support measures, which depends on supply and demand elasticities and may lead other market participants to capture the benefits of support.



Table 1. Indicative OECD matrix of support measures, with illustrative examples

	Statutory or Formal Incidence (to whom and what a transfer is first given)							Consumption	
	A: Output returns	B: Enterprise income	C: Cost of intermediate inputs	Production					H: Unit cost of consumption
				D: Labour	Costs of Value-Adding Factors				
					E: Land and natural resources	F: Capital	G: Knowledge		
<b>1: Direct transfer of funds</b>	Output bounty or deficiency payment	Operating grant	Input-price subsidy	Wage subsidy	Capital grant linked to acquisition of land	Grant tied to the acquisition of assets, including foreign ones	Government R&D	Unit subsidy	
<b>2: Tax revenue foregone</b>	Production tax credit	Reduced rate of income tax	Reduction in excise tax on input	Reduction in social charges (payroll taxes)	Property-tax reduction or exemption	Investment tax credit	Tax credit for private R&D	VAT or excise-tax concession	
<b>3: Other government revenue foregone</b>		Waiving of administrative fees or charges	Under-pricing of a government good or service		Under-pricing of access to government land or natural resources	Debt forgiveness or restructuring	Government transfer of intellectual property rights	Under-pricing of access to a natural resource harvested by final consumer	
<b>4: Transfer of risk to government</b>	Government buffer stock	Third-party liability limit for producers		Assumption of occupational health and accident liabilities	Credit guarantee linked to acquisition of land	Loan guarantee; non-market-based debt-equity swap and equity injection		Price-triggered subsidy	
<b>5: Induced transfers</b>  <i>-- Including advantages conferred through state enterprises</i>	Import tariff or export subsidy; local-content requirements; discriminatory government procurement	Monopoly concession	Monopsony concession; export restriction; dual pricing  Provision of below-cost electricity by a state-owned utility	Wage control	Land-use control	Credit control (sector-specific)  Below-market loan by a state-owned bank	Deviations from standard IPR rules	Regulated price; cross subsidy	

Note: Some measures may fall under several different categories (e.g., debt-equity conversions may involve elements of both risk transfers and revenue foregone).

7. Having set the contours of government support, it is then necessary to operationalise the categories shown in Table 1 and, data permitting, find ways to identify and quantify the different support measures in practice. Obtaining comprehensive information on these various forms of support is understandably difficult given the necessary assumptions and calculations. There are two complementary ways of approaching the issue: the first is to look at entities that provide subsidies, namely governments; the second is to look at the recipients of subsidies, namely industrial firms.

***Government disclosure of subsidies is often partial and limited***

8. Knowing the exact amounts of support benefitting industrial firms is important for understanding possible trade effects, since companies' decisions to produce and invest ultimately affect trade. An obvious starting point is to look at what governments do in their role as support providers. Most governments, however, do not publish basic information about the government agencies that provide support, the form that support takes, the recipients of support, and the amounts of support. Where they do, the information that is provided is often in aggregate form, which complicates efforts to tie particular subsidies to adverse trade effects.
9. There is also a need to make a distinction between official announcements by governments of assistance programmes, and the sums actually received by firms. While governments may make general announcements regarding their intention to provide support – e.g., unveiling a new grant scheme or a newly established fund – it is often not clear exactly how much of these announced subsidies are actually disbursed to eligible companies. A recent example concerns the *Made in China 2025* industrial programme that the People's Republic of China<sup>9</sup> unveiled in 2015 and related policy statements. Among the latter, *Several Opinions on Financial Support to Industry Stable Growth, Structural Adjustment, and Improving Profit*<sup>10</sup> calls for increasing various types of financial support to selected industries, with a view to turning China into a global manufacturing leader. However, it remains unclear how much public spending is actually going into *Made in China 2025* and whether and how this spending is reaching particular industrial firms.
10. Even when governments provide sufficient detail in their official subsidy announcements, it is only *ex post* that actual amounts disbursed to companies can be assessed. Since 2020, several countries have announced large support packages for their semiconductor industries. However, there can be a significant lag between when subsidy packages are announced and when companies start receiving funds. For example, the United States Congress recently passed the CHIPS for America Act, which aims to enhance semiconductor R&D and domestic production capacity by providing more than USD 52 billion in federal investment.<sup>11</sup> Yet it is too soon at the time of writing to know which companies and stages of the semiconductor supply chain will eventually benefit and in what way. The approval of a budgetary envelope of USD 52.7 billion spread over several years does not reveal much for trade purposes. Similarly, the European Union announced in February 2022 that it would mobilise more than EUR 43 billion of public and private

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<sup>9</sup> Henceforth 'China'.

<sup>10</sup> See [www.gov.cn/xinwen/2016-02/16/content\\_5041671.htm](http://www.gov.cn/xinwen/2016-02/16/content_5041671.htm) (accessed on 14 June 2022).

<sup>11</sup> See [www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/](https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/) (accessed on 16 August 2022).

investment under the European Chips Act.<sup>12</sup> At the time of writing, however, it remains unclear how much of this total will come from the EU budget, national budgets, and private funds, as well as which countries and companies will benefit.

11. Policy announcements thus do not suffice and there is a need for governments to track and make publicly available the support they actually provide over time. A number of government agencies already do so through public portals, including the European Commission's *State Aid Transparency Public Search* or the US Government's *USAspending* online database that inventories federal grants and loans to companies. Most OECD governments also provide some information categorised by expenditure item in their national budgetary processes. That said, budgetary information remains incomplete as it tends to cover only government grants while omitting more complex forms of support.<sup>13</sup> It also lacks detail since expenditure on particular grant programmes is generally presented in aggregate numbers with neither company nor sectoral breakdown. This makes it difficult to assess the extent of government grants to specific industries (e.g., primary aluminium smelting) or stages of the value chain (e.g., chip design versus chip testing and packaging) for trade purposes.
12. It is currently not possible to gain a comprehensive global picture of government support by relying only on government sources. Many governments routinely fail to disclose all of their support and only report measures selectively, if at all. In some cases, this may be due to a lack of institutional capacity to collect relevant information from multiple budgetary or expenditure documents published in different formats or languages. A related concern is the need to look at various levels of governments, both in countries with a federal structure and in those where sub-central authorities (e.g., regions, provinces, or municipalities) have the authority to grant support to companies. Incomplete data may also arise in connection with the existence of quasi-fiscal institutions with varying degree of state involvement (i.e., state-owned, government-invested, or state-influenced institutions), which may provide or serve as intermediaries for, the provision of support to firms. Depending on how countries view the scope of government and which companies they consider to be state-owned, there may be significant gaps in the disclosure of government support, particularly in the form of below-market finance or subsidised inputs.

### ***Measuring government support at the level of individual firms***

13. Given difficulties in obtaining comprehensive and detailed information from governments about the support that they provide to manufacturing sectors, OECD work has focused instead on the recipients of industrial subsidies, namely firms themselves. This contrasts with longstanding OECD work on measuring government support for agriculture, fisheries, and fossil fuels based on national data and budgetary documents. The choice to rely on data collected at the level of individual firms – or even plants – is one of necessity, reflecting the lack of transparency that persists around industrial subsidies.

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<sup>12</sup> See <https://digital-strategy.ec.europa.eu/en/library/european-chips-act-communication-regulation-joint-undertaking-and-recommendation> (accessed on 16 August 2022).

<sup>13</sup> Most OECD countries publish estimates of their tax expenditures alongside government budget documents, but these estimates are generally publicly available at a high level of aggregation only, i.e., covering an economy's total tax revenue foregone due to a particular provision of the tax code. This does not enable data collection at the level of individual sectors, much less taxpaying companies. On the question of the disclosure and accounting of below-market loans in public budgets, see chapter 2 of OECD (2018<sub>[37]</sub>), OECD (2021<sub>[10]</sub>), and CBO (2012<sub>[50]</sub>).

14. Data sources at the firm level are typically annual reports and financial statements, which are normally accessible through the websites of publicly listed companies. These can be complemented by other corporate documents, such as firms' sustainability or corporate social responsibility reports, which provide additional information not only about employment, R&D spending, energy consumption, but also sometimes government grants. While information is much less accessible for non-listed firms (including many large state enterprises), which can be problematic, many such companies issue bonds that are traded on public markets. In such cases, companies publish bond prospectuses that contain their financial statements, as well as detailed information about their business activity and ownership structure. These various firm-level sources can then be augmented using other public sources – e.g., the EU's State Aid Transparency Public Search database and the US spending government website – or commercial databases selling firm-level information – e.g., Factsset, CRU, or the Wind database.
15. The use of firm-level data to measure industrial subsidies has advantages, although it also poses some challenges to be addressed. One obvious issue with firm-level data is sampling in order to ensure sufficient representativeness of the companies included in the analysis. The considerable time and effort involved in collecting and harmonising detailed firm-level information (available in different languages and under different accounting formats) poses the risk of focusing on too few companies or neglecting companies based in jurisdictions with weaker rules for financial disclosure.
16. That said, the relatively high level of concentration observed for most industrial sectors can often make it possible to achieve sufficient representativeness. Sectors as varied as automobiles, aluminium smelting, aerospace, semiconductors, shipbuilding, or solar photovoltaic (PV) modules tend to have a few large competitors, with the top 20 or 30 companies accounting for more than two-thirds of global sales or installed production capacity.<sup>14</sup> Although other sectors like steel and chemicals are less concentrated, a focus on the top 40-50 firms and an approach that seeks actively to diversify the geographical origin of companies may enable sufficient representativeness.
17. Differences in accounting methods and practices can present challenges for data collection and subsequent analysis using firm-level data. Companies' financial disclosures generally follow the International Financial Reporting Standards (IFRS) set by the International Accounting Standards Board (IASB) or the US-based generally accepted accounting principles (GAAP) set by the Financial Accounting Standards Board (FASB). While there can be differences in how the two sets of standards treat particular asset classes (e.g., R&D) or recognise income and profits from certain sources, most companies will adopt either set, thus offering a consistent picture of their financials. Further adjustments<sup>15</sup> can then be made to harmonise some of the remaining differences and ensure that the firm-level data collected are sufficiently comparable when it comes to measuring government support. There may be instances, however, where companies do not follow international accounting

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<sup>14</sup> Although this approach excludes the numerous small- and medium-sized enterprises (SMEs) that constitute the vast majority of businesses, this does not pose serious concerns in the context of efforts to measure the trade distortions caused by government support. This is because most SMEs do not engage meaningfully in global trade through the export channel, while those that do tend to do so indirectly by supplying inputs to larger corporations that subsequently export themselves. The size of the distortions caused by subsidies going to SMEs is also unlikely to matter in terms of global prices, trade flows, and excess capacity.

<sup>15</sup> This can concern, for example, the way that the book value of property, plant, and equipment is reported by firms, or selecting what to include in companies' outstanding debt (e.g., should lease liabilities be counted?).

standards or apply weaker rules, such as where they are listed in jurisdictions having weaker standards or supervision.<sup>16</sup> Most non-listed firms also do not disclose their financials to the general public, particularly companies that have not issued publicly traded bonds. As explained in the last section of this report, some large, unlisted state enterprises may also choose to list only a subsidiary, thus providing only a partial account of their financials. In such cases, inadequate access to the necessary firm-level information hampers the estimation of government support.

18. One argument for looking at firms themselves is that audited companies can incur legal penalties for failing to disclose their income sources, tax status, financial liabilities, etc. This provides incentives for companies to report accurate information and disclose the necessary background for investors to understand how their income is generated. For example, if company A were to obtain USD 150 million in government grants or tax incentives in any given year, it would need to justify in its financial statements where these funds originate from in order to enable investors to understand why the company's income statement looks better than regular sales revenue and production costs alone would suggest (e.g., why the company's "Other income" or "Non-operating income" looks much more significant in this particular year).
19. Looking at recipients of support (firms) along with providers of support (governments) also helps uncover subsidies that may occur at various levels of government. This is particularly the case in federal countries where states or provinces, or even municipalities may also provide significant support on top or in lieu of that provided by central authorities. Were the analysis to only look at support from the provider side, this would imply that detailed budgetary information on industrial subsidies by sector be available from every level of government concerned in each country. Even if such information were published, reporting formats for subsidies would likely vary to a greater extent than firms' disclosures. The finding that much support is channelled through state enterprises<sup>17</sup> acting as intermediaries (e.g., state banks, government guidance funds, and state utilities) only reinforces the need to focus on the recipients along with the providers of support to obtain a more complete picture (OECD, 2021<sub>[10]</sub>).
20. Collecting information on subsidies at the level of individual firms also makes it possible to combine this information with detailed company data. Doing so in turn creates the possibility for further quantitative analysis aiming to correlate subsidies with firm characteristics, such as their production capacity, their profitability, or their productivity. Such analysis holds great potential for gaining policy-relevant insights into how companies react to government support and what effects it may have on trade and competition.

### ***Difficulties in selecting market benchmarks complicate efforts toward more transparency***

21. Apart from grants, which can readily be identified as government support, identifying and measuring more complex forms of support often relies on comparisons against a benchmark to assess whether and to what extent governments are subsidising companies. Tax concessions are typically estimated using a judgment of what constitutes 'normal' taxation. Below-market borrowings rely on an assessment of the terms and conditions that would

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<sup>16</sup> This may be due, for example, to firms having the ability to raise funding from other entities not demanding rigorous disclosure or to countries not having rigorous shareholder or commercial law, or independent courts, such that independent entities can seek to hold firms accountable for inadequate disclosures.

<sup>17</sup> In this report, 'state enterprises' refer to companies that are owned, invested, or otherwise influenced by the state.

normally prevail in credit markets given a borrower's financial profile. Similarly, below-market equity requires judgment as to whether private investors would contemplate acquiring or holding shares in the company receiving government equity. For such measures and others, choosing a suitable benchmark in a consistent manner in order to maintain international comparability is an essential but difficult task, and one that complicates efforts to improve transparency in relation to government support.

22. In the case of tax concessions, the identification and measurement of support involves comparing a preferential tax rate against a benchmark tax rate that is meant to represent 'normal' taxation. This exercise requires careful consideration of what the benchmark tax rate (e.g., the statutory income-tax rate) might be for a given tax jurisdiction and of the scope of the tax base (e.g., the taxable income of companies).<sup>18</sup> For economies with a flat corporate income-tax rate (or at least a standard tax rate), the decision is relatively simple, since a single rate normally applies to all companies operating in that jurisdiction. The corporate income-tax rates of Sweden and China are, for example, set at 20.6% and 25% respectively. Deviations from these rates could therefore be indicative of the presence of tax concessions in the form of tax credits or tax exemptions for specific types of expenditure. Care should nevertheless be exercised to account for tax losses that are carried forward and other regular provisions of the tax code that may lower companies' effective tax rates in any given year but do not generally constitute government support.<sup>19</sup> Countries with varying rates of corporate income tax offer additional complexity since a single benchmark rate cannot always be used for all companies operating in the jurisdiction concerned.
23. The fact that different jurisdictions have different tax rates implies that tax concessions may not be readily comparable across countries. For any given tax concession – say, a tax credit for firms' R&D spending – high-tax jurisdictions will report larger support than low-tax jurisdictions, all other things being equal. This happens even as both jurisdictions offer the same support measure to companies. Although this does not entirely nullify the value of the information conveyed by estimates of tax concessions, it does call for caution when interpreting the numbers.
24. The construction of a market benchmark interest rate for estimating below-market borrowings is an even more complex exercise. Below-market borrowings are the provision of debt financing – normally by state banks or other government-related financial institutions – at contractual terms that are more favourable than those offered in the market. Estimation generally involves replicating the interest rate that non-state investors could have charged to a given corporate borrower in credit markets. In OECD work on government support in industrial sectors, benchmark interest rates for debt transactions have been constructed by incrementally adding: a risk-free base rate; spreads that reflect

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<sup>18</sup> The discussion that follows concerns primarily corporate income taxation. For a discussion of the difficulties involved in choosing benchmarks for estimating fuel-tax concessions, see Box 3 in [TAD/TC(2022)3/FINAL], Chapter 1 in OECD (2015<sup>[38]</sup>), and Elgouacem and van Dender (2019<sup>[40]</sup>).

<sup>19</sup> What constitutes a 'regular provision of the tax code' also involves some degree of judgment about the structure and parameters of corporate income taxation. It is, however, generally accepted that companies can carry forward their losses for tax purposes, which can have the effect of reducing firms' effective tax rates below the statutory rate applicable in the relevant jurisdiction. The deduction of interest expenses and asset depreciation charges from taxable income are also well-accepted practices in the context of regular imputed-income tax systems (as opposed to cash-flow tax systems in which capital expenditure is fully deductible in the year in which it is incurred but financing costs cannot be deducted) (De Mooij, Klemm and Perry, 2021<sup>[39]</sup>).

the credit risk of borrowers; and, where applicable, the additional spreads that borrowers would have incurred absent a government guarantee.<sup>20</sup> This follows established financial principles commonly practiced by commercial lenders.

25. The accuracy of a market benchmark interest rate increases with the amount of information that is available on various specific characteristics of a debt transaction<sup>21</sup>, so that more and better information improves the assessment of whether or not the charged interest rate is in line with market principles. Where terms and conditions of a loan transaction are not available, however, the approach for estimating below-market borrowings is by necessity less precise since it requires assumptions at different stages to fill in the gaps. This increases the risk of false positives (i.e., the analysis finds below-market borrowings that do not exist) or false negatives (i.e., the analysis concludes that there are no below-market borrowings). The estimation procedure therefore calls for a cautious and conservative approach in order to arrive at a benchmark that best reflects market conditions as well as the specificities of the loan transaction.
26. The lack of a straightforward and internationally agreed method for calculating below-market borrowings hinders transparency over the true amounts of government support provided in this form. Governments may disagree over whether a given loan's conditions are consistent with market conditions, leading them to not disclose or notify the transaction in question. Independent institutions and researchers studying subsidies may likewise face difficulties in assessing what would have been the market benchmark interest rate. The result is a lack of transparency in a major channel of government support for industrial firms (see the next section).
27. Assessments of an appropriate market benchmark are even more complex in the case of below-market equity. Below-market equity occurs when the government acquires or holds shares in companies that would not be deemed worthy of continued investment by private investors (e.g., where the return on equity on the government investment is below market). Where the stock of a firm benefitting from a government equity infusion is publicly traded, the share price may in principle serve as an indicator, such that any amount paid by the government that exceeds the market share price could be deemed a benefit (Jones and Steenblik, 2010<sub>[11]</sub>). If no such market price exists (e.g., if the company is not listed), the identification of support becomes more complex and the possible benefit can range from zero to the entire value of the equity infusion (i.e., the infusion is equivalent to a grant). Key questions include: whether private investors would have made the investment in the first place; the level of returns that private investors could have expected from this investment; and what could be an acceptable timeframe for investors to earn an acceptable return (i.e., how patient would private capital be?).
28. While much policy focus has been on government equity infusions, governments may also be conferring support to companies when they stay invested in firms that consistently fail to achieve acceptable returns on their assets. Yet determining a value for an acceptable rate of return is fraught with difficulties and requires even more assumptions than in the case of below-market borrowings. In OECD work (OECD, 2021<sub>[10]</sub>), the choice was made to use two sets of benchmarks to determine expected rates of return and generate high and

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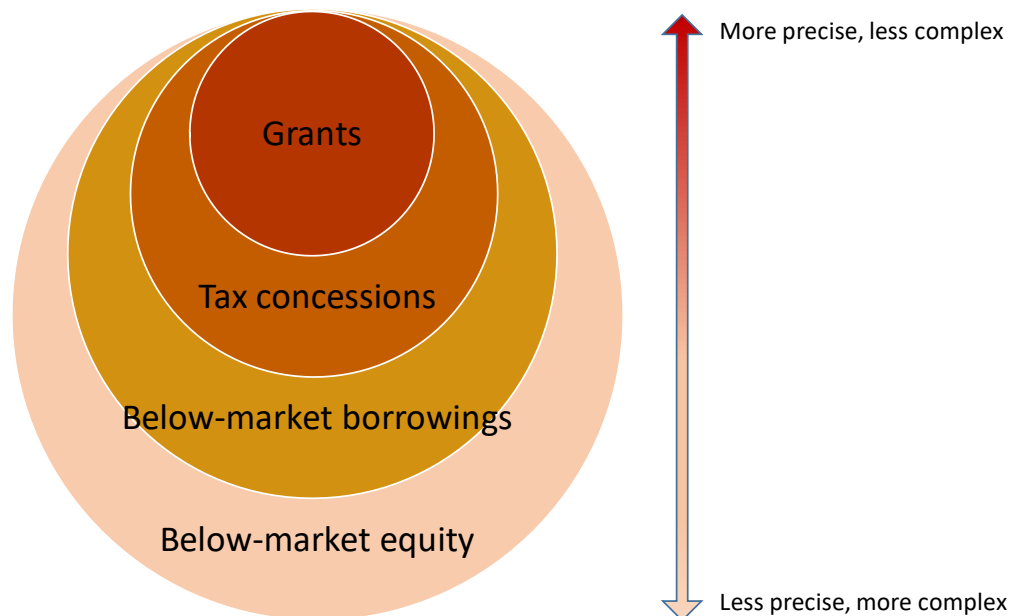
<sup>20</sup> For more details on how the benchmark interest rate is constructed, see, for example, the recent OECD report on below-market finance (OECD, 2021<sub>[10]</sub>).

<sup>21</sup> Information that can be used to replicate normal loan interest rates includes: the loan amount, the tenor, the currency denomination, as well as other risk-related information, such as limited or full recourse, the risk profile of the borrower, whether or not loans are secured against collateral, or guarantees.

low estimates. One corresponds to a required rate of return calculated based on the capital asset pricing model (CAPM), and the other is the annual average rate of return observed for each sector analysed. These choices stem from practical considerations and aim to provide reasonable, feasible, and comparable ranges for benchmark rates of return, with a view to producing estimates of below-market equity in various industrial sectors.

29. Whether for tax concessions, below-market borrowings, or below-market equity, market-based benchmarks are a key element in the measurement of government support. In turn, quantifying government support is essential for transparency on the scope and scale of industrial subsidies across economies. Even so, selecting or constructing the appropriate market benchmark requires assumptions and complex decisions along the way. As a result, existing methods allow for varying degrees of precision in government support (Figure 1). Further research and discussions among governments can refine these methodologies. Yet even in these initial stages, it has been possible to identify significant support across sectors.

**Figure 1. The degree of certainty and precision varies among types of support**



Source: OECD (2019<sub>[12]</sub>).

## What we currently know about industrial subsidies

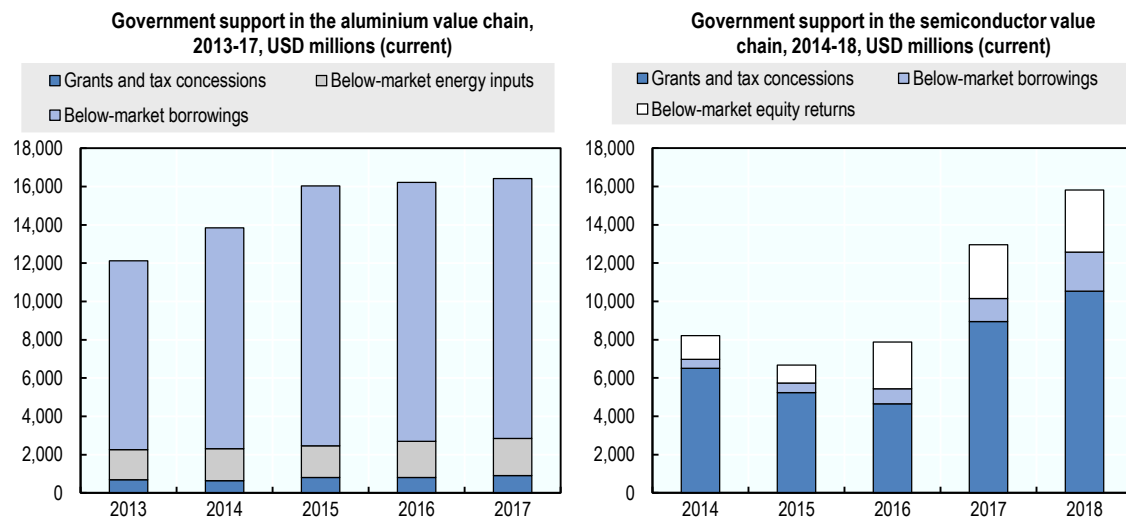
### *Key findings from recent OECD work*

30. Different industrial sectors tend to attract different types of support, reflecting their characteristics and business fundamentals. In the aluminium value chain, for example, aluminium smelters attract relatively more government support in the form of below-market borrowings and below-market energy inputs (Figure 2, left) (OECD, 2019<sub>[13]</sub>). This stems from the fact that aluminium smelting is a capital-intensive activity that uses a lot of electricity, and where major companies tend to have relatively high debt-to-asset ratios (OECD, 2021<sub>[10]</sub>). This contrasts with the semiconductor industry, where support predominantly takes the form of grants and tax concessions (Figure 2, right) (OECD, 2019<sub>[12]</sub>). In this case, the type of support reflects both the R&D-intensive nature of the industry, as well as the numerous investment incentives seeking to encourage the



construction of new semiconductor manufacturing plants ('fabs'). The capital structure of semiconductor firms also differs from that of aluminium firms, with companies having generally low debt-to-asset ratios owing to their heavier reliance on equity funding. This explains the presence of significant below-market equity in the total support observed for that industry. More generally, heavy industry will tend to rely more heavily on debt than technology-oriented sectors, causing below-market borrowings to be relatively more prevalent in the former and below-market equity more common in the latter (OECD, 2021<sub>[10]</sub>).

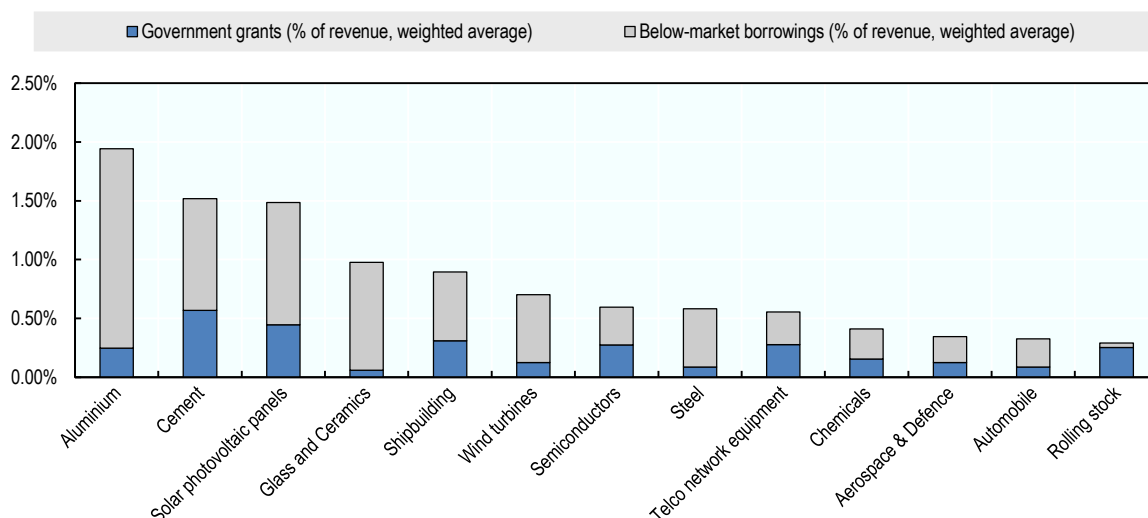
**Figure 2. Different industrial sectors attract different types of support that reflect their characteristics**



Source: OECD (2019<sub>[13]</sub>) and OECD (2019<sub>[12]</sub>).

31. Looking more specifically at government grants and below-market borrowings in 13 industrial sectors shows that heavy industry and the production of renewable-energy equipment tend to attract relatively more support than other industries (Figure 3) (OECD, 2021<sub>[10]</sub>). This is particularly the case for the production of aluminium, cement, and solar PV panels over the period covered by the study (2005-19). The relatively large contribution of below-market borrowings in metals (steel and aluminium) and glass & ceramics is also noteworthy, while that of grants is evident in rolling stock.

**Figure 3. Heavy industry and renewable-energy equipment tend to attract more grants and below-market borrowings**



Note: Data are expressed relative to the sales revenue of the firms covered in the study over the period 2005-19.  
Source: OECD (2021<sup>[10]</sup>).

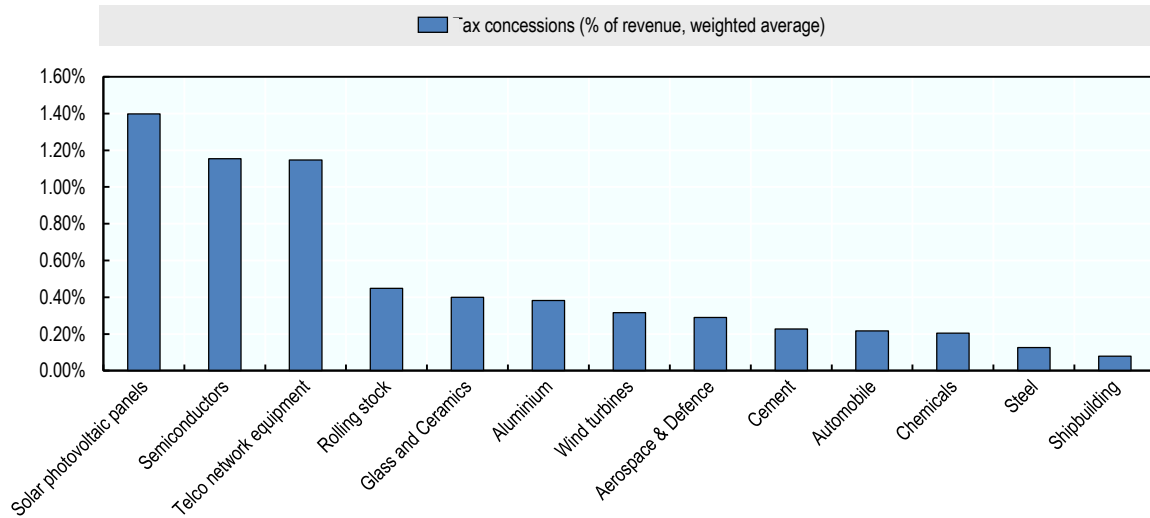
32. Although tax concessions are less directly comparable across jurisdictions and sectors<sup>22</sup>, OECD data suggest that they are relatively larger in semiconductors and telecommunication network equipment, as well as in the production of solar PV panels (Figure 4). This is partly due to the large R&D investments by companies in these sectors, and for which they are eligible to receive significant tax savings through tax credits and other tax concessions for R&D. Other reasons include the generous tax holidays that certain countries offer to tech firms (e.g., Singapore<sup>23</sup>) or the special tax regime that China applies to the production of specific semiconductors.<sup>24</sup> Income-tax concessions are also relatively large in the rolling-stock industry, where several key manufacturers benefit from investment incentives and other preferential tax regimes [TAD/TC(2022)6/FINAL]. By contrast, a number of heavy industries appear to benefit relatively less, and in particular cement, chemicals, shipbuilding, and steel.

<sup>22</sup> This is because different tax jurisdictions have different baseline tax rates, which affects the amount of tax revenue foregone that can result from any given tax concession. See the discussion in the previous section.

<sup>23</sup> Singapore's Pioneer Certificate Incentive offers eligible companies a full corporate tax holiday on income derived from qualifying activities for five years, with extensions possible. The measure targets technology-intensive companies "that are prepared to make significant investments in contribution to the economy or in advancement of capabilities towards globally leading industries." See [www.edb.gov.sg/en/how-we-help/incentives-and-schemes.html#:~:text=The%20Pioneer%20Certificate%20Incentive%20\(PC,expanded%20economic%20activities%20in%20Singapore](http://www.edb.gov.sg/en/how-we-help/incentives-and-schemes.html#:~:text=The%20Pioneer%20Certificate%20Incentive%20(PC,expanded%20economic%20activities%20in%20Singapore) (accessed on 17 August 2022).

<sup>24</sup> China offers full corporate income-tax exemptions for qualifying companies producing integrated circuits at the 28 nm node or lower for a duration of ten years. Qualifying companies producing integrated circuits at the 65 nm node or lower can benefit from a five-year full tax exemption followed by a 50% reduction in tax rates in the following five years. See [www.chinatax.gov.cn/eng/c101269/c5160133/content.html](http://www.chinatax.gov.cn/eng/c101269/c5160133/content.html) (accessed on 17 August 2022).

Figure 4. Tax concessions are relatively larger in tech-oriented sectors and solar PV panels

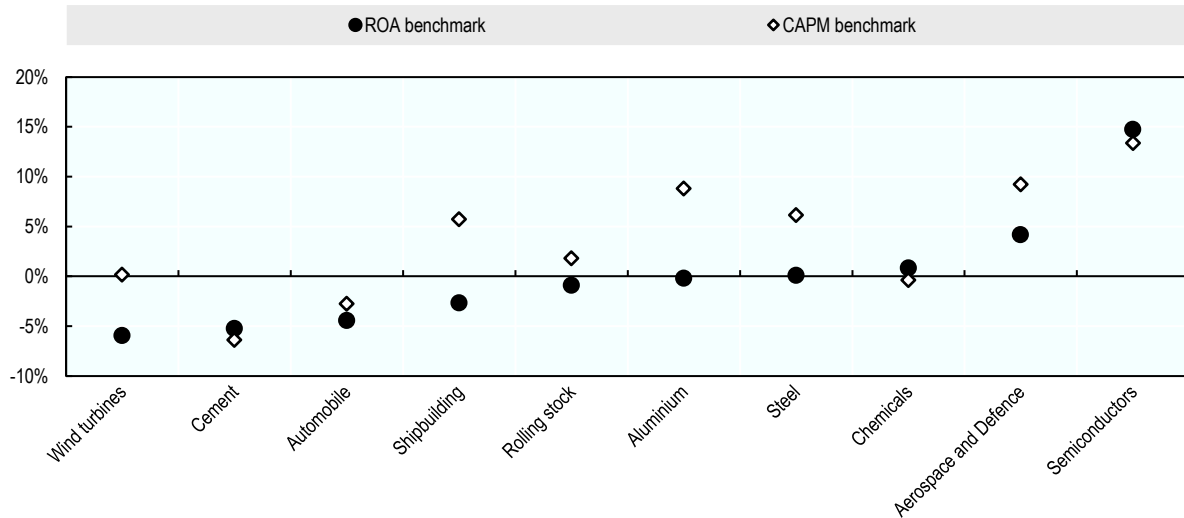


Note: Data are expressed relative to the sales revenue of the firms covered in the study over the period 2005-19.  
Source: OECD, based on the data collected for OECD (2021<sub>[10]</sub>).

33. As already noted earlier for semiconductors, below-market equity returns occur mainly in high-tech sectors, e.g., semiconductors and aerospace & defence. Figure 5 shows estimates of below-market equity returns for companies with more than 25% government investment in 10 of the 13 sectors covered in OECD (2021<sub>[10]</sub>).<sup>25</sup> Positive numbers imply that the company in question underperformed relative to its benchmark, i.e., benefitted from below-market equity returns, while negative numbers show that the company has exceeded benchmark returns. While the range of estimates is wide and there is substantial diversity in the results among companies, the two benchmarks used in the calculation both indicate the presence of below-market equity returns for almost all government-invested firms in semiconductors as well as for many such companies in the aerospace and defence industry. The results for semiconductors are notably consistent with the creation in 2014 in China of a specialised government-owned fund (the China Integrated Circuit Industry Investment Fund) and sister funds at provincial and municipal levels tasked with injecting equity into China's semiconductor industry (OECD, 2019<sub>[12]</sub>).

<sup>25</sup> Results are qualitatively similar when using 33% government ownership as a threshold. There are no sampled companies with government investments of more than 25% in the solar PV panel sector, which is therefore omitted from the graph. Glass & ceramics and telecom network equipment were likewise omitted from the graph, as the sample only included one firm with 25%+ government ownership in each of these two sectors.

Figure 5. Below-market equity returns occur mainly in high-tech sectors



Note: Positive numbers imply that the company in question underperformed relative to its benchmark, i.e., benefitted from below-market equity returns, while negative numbers show that the company has exceeded benchmark returns. Diamonds show average below-market equity returns estimated using the capital asset pricing model (CAPM) over the sample period; black dots show average below-market equity returns estimated using an industry average rate of return over the same period.

Source: OECD (2021<sub>[10]</sub>).

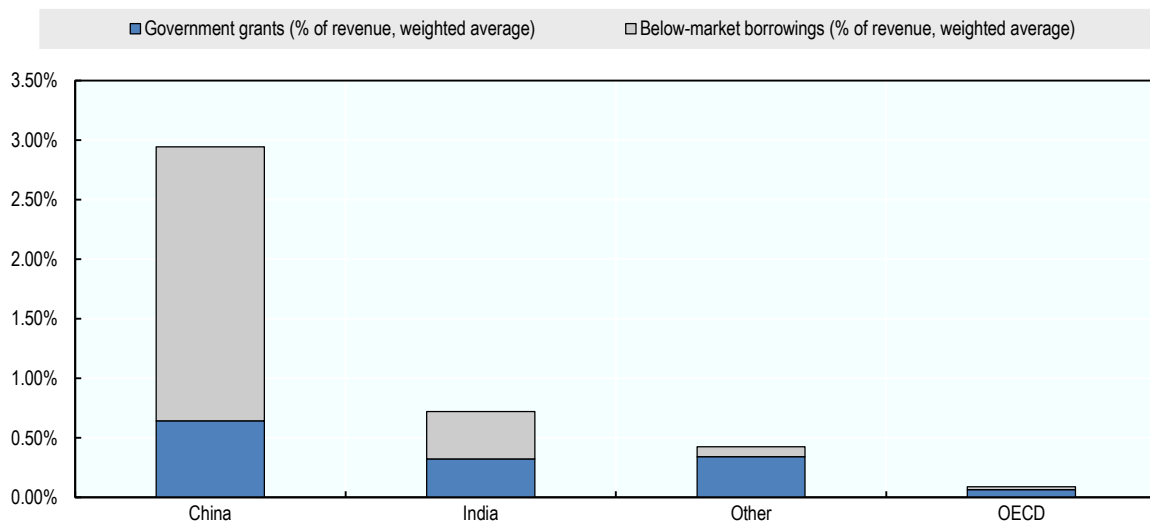
34. Further observations can be made on the geography of government support. One such aspect is that multinational enterprises are sometimes able to obtain significant support from the different foreign jurisdictions in which they operate, but not necessarily large amounts from their home jurisdictions. This underscores the important use of investment incentives by governments seeking to attract foreign investment, which can involve a mixture of grants, tax concessions, subsidised energy, etc. Recent OECD work looking at the provision of energy inputs at below-market prices to heavy industries has, for example, found certain firms based in OECD countries to have benefitted indirectly from energy subsidies through their local subsidiaries in Argentina, Egypt, South Africa, and countries of the Gulf Cooperation Council (GCC)<sup>26</sup> [TAD/TC(2022)3/FINAL].
35. Another key aspect is the crucial role that sub-national authorities play in either complementing or substituting for the support provided by central authorities. This aspect is more visible in countries with a federal structure (e.g., Australia, Brazil, and the United States) but has also been observed in countries that have a nominally centralised government structure but where provinces and municipalities have a significant role in conducting and implementing policy. Local authorities in China, for example, have shared responsibility for awarding companies the “High and New Technology Enterprises” status, which confers lower income tax rates and a host of other benefits.<sup>27</sup> The local branches of China’s state banks can also play a leading role in offering loans to companies at advantageous rates (Bailey, Huang and Yang, 2011<sub>[14]</sub>; Dia et al., 2023<sub>[15]</sub>).

<sup>26</sup> Member countries of the Gulf Cooperation Council are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

<sup>27</sup> See, for example, [www.pwccn.com/en/services/tax/china-rd-incentive-service/high-and-new-technology-enterprise.html](http://www.pwccn.com/en/services/tax/china-rd-incentive-service/high-and-new-technology-enterprise.html) (accessed on 27 May 2022).

36. Even though companies can obtain government support from the different jurisdictions where they operate, industrial firms from China receive disproportionately more support overall than firms based in other jurisdictions covered in the analysis<sup>28</sup> (Figure 6) (OECD, 2021<sub>[10]</sub>; OECD, 2019<sub>[13]</sub>; OECD, 2019<sub>[12]</sub>). While Figure 6 only concerns grants and below-market borrowings, firms based in China were also the largest recipients of tax concessions as a share of their revenue: 0.75% of annual revenue, against 0.32% for OECD-based firms, 0.28% for India-based firms, and 0.47% for firms based in other jurisdictions covered. In the case of below-market equity, China-based firms concentrated the vast majority of all below-market equity returns observed in semiconductors but shared the top spot with OECD-based firms in aerospace & defence.

**Figure 6. Firms based in China obtain disproportionately more support**



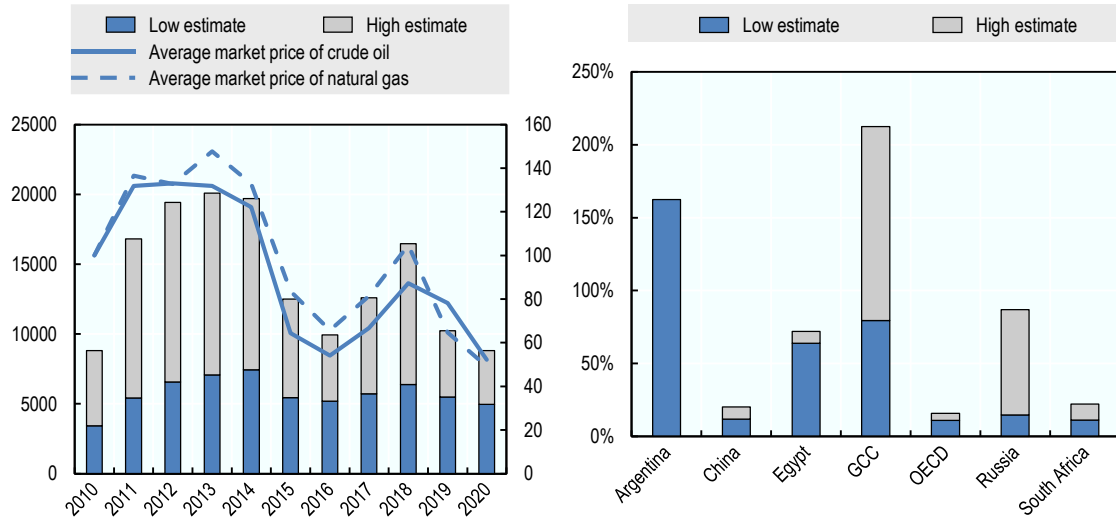
Note: Data are expressed relative to the sales revenue of the firms covered in the study over the period 2005-19.  
Source: OECD (2021<sub>[10]</sub>).

37. It is generally important to consider government support in all its forms as different jurisdictions may resort to different instruments to assist their local producers. GCC countries and China provide contrasting examples in that regard. As shown above, China tends to offer firms relatively more grants, tax concessions, and below-market finance than other jurisdictions covered in OECD analysis. By contrast, GCC countries (included in “Other” above) do not appear to be using these support instruments intensively. Yet other OECD analysis has found several energy-intensive firms operating in GCC countries to have benefitted from sizable amounts of below-market energy inputs (Figure 7), which are visible in the record-high operating margins that these companies often report [TAD/TC(2022)3/FINAL]. This suggests that looking at only one type of government support could potentially lead to erroneous conclusions regarding the overall size and scope of market distortions.

<sup>28</sup> In addition to OECD members, this comprises large firms based in Argentina, Brazil, Chinese Taipei, Egypt, India, Indonesia, Malaysia, Nigeria, Russia, Singapore, South Africa, Thailand, and countries of the Gulf Cooperation Council.

**Figure 7. Below-market energy inputs are relatively larger in GCC countries, Argentina, and Russia**

(Left: Below-market energy in current USD millions; average energy prices 2010 = 100;  
right: Below-market energy in % of firms' estimated energy costs)

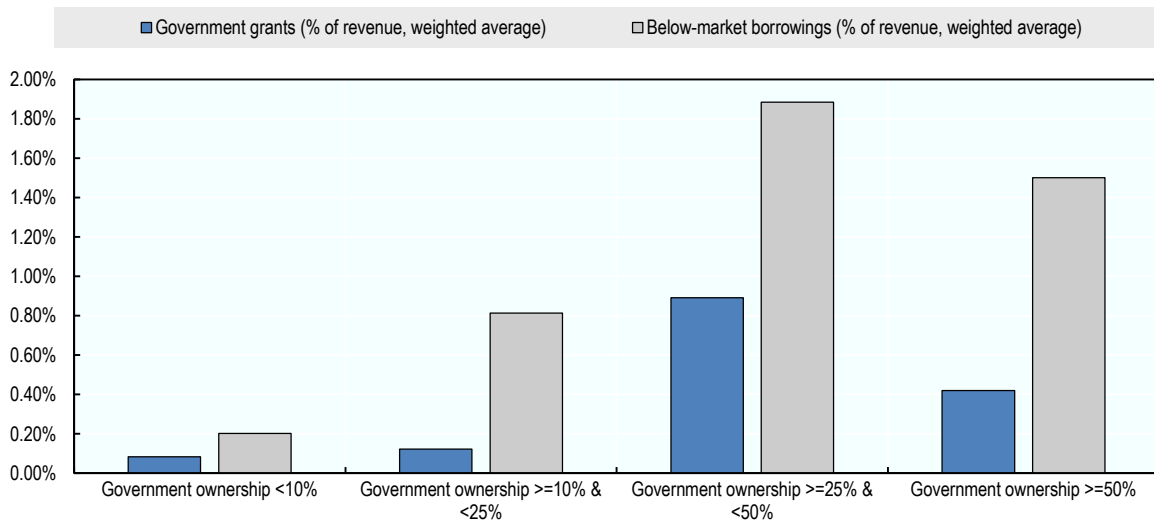


Note: Average market prices for crude oil and natural gas are the simple averages of annual values for a basket of common price benchmarks: Brent, Dubai, and West Texas Intermediate for crude oil; Japan-Korea Marker, Dutch TTF, and Henry Hub for natural gas. Energy costs are estimated by multiplying firms' consumption volumes of specific energy carriers with the corresponding prices that the OECD estimates to apply effectively. Note that there can at times be uncertainty over these exact prices.

Source: [TAD/TC(2022)3/FINAL].

38. The finding that firms based in China obtained relatively more government support overall relates in part to the predominance of state enterprises, and government investments more generally, in the Chinese economy. This also applies to a lesser extent to the support found for firms based in GCC countries. Data from OECD (2021<sub>[10]</sub>) indicate that firms in which governments hold more than 25% of the shares tend to receive relatively more support in the form of grants and below-market borrowings (Figure 8). This is particularly true for firms in which governments own between 25% and 50% of the shares, as explained in a companion report looking at industrial subsidies and state enterprises from a trade and competition angle (Box 2). Although the difference is less marked, it is visible for tax concessions as well. Other evidence also suggests that state enterprises benefit relatively more from below-market energy inputs than privately-owned firms [TAD/TC(2022)3/FINAL].

**Figure 8. Firms in which governments hold more than 25% of the shares tend to receive relatively more support**



Note: Data are expressed relative to the sales revenue of the firms covered in the study over the period 2005-19.  
Source: OECD (2021<sub>[10]</sub>).

### Box 2. Subsidies, state ownership, and competition

A forthcoming companion document to the present report [TAD/TC(2022)9/REV1] is looking into the relationship between state enterprises and government support in industrial sectors from the perspective of both trade and competition policy. The resulting report raises a number of key issues that need to be considered in discussions regarding industrial subsidies and the reform of trade rules:

- Not all governments are transparent about their ownership of industrial companies, which hampers efforts to assess the scope and scale of government ownership of industrial assets and better regulate the behaviour of state enterprises in global markets. Recent increase in the investments of government funds, particularly in semiconductors, aggravates this problem by further densifying and lengthening the ownership chain between the government and industrial companies.
- State enterprises are not only relatively large recipients of government support, but they can also serve as providers of support themselves. This is, for example, the case where state banks offer industrial companies loans at below-market terms and conditions, or where state utilities provide companies with energy inputs at below-market prices. This can in turn tilt the playing field downstream in favour of those companies that are able to benefit from the lower prices charged by certain state enterprises.
- State ownership as such does not automatically imply that a government subsidy is being provided. State ownership is therefore not problematic in and of itself. However, significant concerns can emerge if it is not transparent or properly governed and if the broad regulatory environment does not ensure competitive neutrality.

39. Not all forms of government interventions supporting domestic firms can be quantified using existing data sources and tools. Discriminatory government-procurement measures can, for example, tilt the playing field in favour of domestic firms at the expense of foreign competitors (Gourdon and Messent, 2017<sup>[16]</sup>). There is evidence suggesting that this has been the case in the rolling-stock industry, where a number of important markets remain closed to foreign firms [TAD/TC(2022)6/FINAL]. The different forms of government support quantified above can exacerbate this problem by enabling subsidised firms to underbid competitors at home and abroad by offering artificially low prices. Other government interventions distorting the global playing field include the selective enforcement of competition policy by governments to favour local incumbents and forced technology transfers as *quid pro quo* for accessing a protected market (ibid). While the support indirectly conferred through these measures is very difficult to quantify, they should not be ignored in the context of subsidy discussions.

### *The complex effects of subsidies in a world of global value chains*

40. With quantification of industrial subsidies relatively new, there has been limited empirical work to date to estimate the effects of that government support on trade and competition due to a lack of data and difficulties in establishing causal inferences.<sup>29</sup> Kalouptsidi (2018<sup>[17]</sup>) and Barwick et al. (2019<sup>[18]</sup>) are notable exceptions, finding subsidies in the shipbuilding industry to have increased the global market share of recipient shipyards at the expense of competitors. These studies notwithstanding, there is still much unknown about how industrial subsidies affect global trade.
41. One difficulty with analysing the effects of government support on trade is that subsidies do not necessarily affect competitors directly, but can instead do so indirectly through global price channels. Subsidised lending in a large country, for example, may encourage more industrial capacity expansion than would normally be the case, which can in turn exert downward pressures on global output prices and profits. Faced with lower profits or outright losses, producers that do not benefit from government support may respond by exiting the industry, while below-market borrowings enable subsidised producers to keep operating at a loss until global capacity adjusts to meet demand. In this case, the costs of adjustment are borne by non-subsidised competitors while subsidised firms are able to continue operating owing to government support. This happens even as subsidised firms do not necessarily compete in export markets.
42. There is evidence to support the idea that certain types of industrial subsidies have encouraged additional investment in production capacity, which subsequently exerted downward pressure on prices. The OECD study of below-market finance found, for example, a positive and significant correlation between the amount of below-market borrowings that firms obtained and their investment in fixed assets such as production facilities and equipment (OECD, 2021<sup>[10]</sup>). Capacity additions in steelmaking, aluminium smelting, and solar PV module manufacturing appear also to have corresponded with marked decreases in output prices for these industries (ibid). While the econometric analysis only identified a correlation rather than a causal link, its findings are consistent with other studies that have found a positive effect of government support on capital investment or firm size in other contexts (Lane, 2021<sup>[19]</sup>; Choi and Levchenko, 2021<sup>[20]</sup>).

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<sup>29</sup> This was also the conclusion of a literature review presented to the Trade Committee in 2021, and which noted that “[e]xtant evidence on the trade effects of industrial subsidies is relatively limited.” See [TAD/TC/RD(2021)3].



43. Government support also tends to correlate with lower firm productivity as it prevents the exit of the least efficient producers (OECD, 2021<sub>[10]</sub>). While the direction of causality could go both ways for individual firms<sup>30</sup>, this underscores the trade and competition problems posed by ‘zombie companies’ that, owing to subsidies, continue operating despite their weak performance. It also highlights that subsidies do not only harm trade partners, but may in certain cases hinder domestic performance.
44. Another complexity in analysing the trade effects of industrial subsidies is how supply chains can spread the impact of support beyond targeted sectors. What begins as a support measure upstream may, depending on how competitive markets are, end up conferring significant support downstream through the input channel (Lane, 2021<sub>[19]</sub>; Liu, 2019<sub>[21]</sub>). With energy accounting for nearly 40% of the costs of aluminium smelting and smelters often generating their own electricity, subsidies for natural gas or coal can result in cheaper primary aluminium [TAD/TC(2022)3/FINAL], which in turn accounts for 75% to 85% of the production costs for semi-fabricated products of aluminium such as extrusions and plates (OECD, 2019<sub>[13]</sub>).<sup>31</sup> Steel is likewise a crucial cost component in shipbuilding and in the production of rolling stock, such that subsidies for steelmaking could provide a cost advantage to shipyards and train manufacturers that are able to procure the cheaper, subsidised steel.
45. In other cases, subsidies downstream can increase the sales and profits of suppliers upstream. Government support for the construction of new semiconductor fabs might, for example, boost sales of specialised equipment and machines that can represent close to two-thirds of the costs of new facilities (OECD, 2019<sub>[12]</sub>).<sup>32</sup> This highlights that there can be multiple beneficiaries of support beyond its direct recipients, including in other markets and jurisdictions.
46. Border restrictions bring additional considerations to the analysis of the trade effects of subsidies, with interactions between policy instruments that can amplify or dampen the impact of government support. This is notably the case with export restrictions that force domestic prices below international market levels. In such cases, the combination of production subsidies upstream and export restrictions can result in lower input prices downstream that are only available to local firms. One example would be the 15% export tax that China levies on exports of primary aluminium, and to which should be added incomplete rebates of value-added tax that further discourage aluminium exports. As a result, China does not export a significant amount of primary aluminium, despite being the world’s largest producer and having what it acknowledges to be excessive smelting

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<sup>30</sup> Government support could cause firms to be less productive by softening their budget constraint and encouraging managerial complacency. Alternatively, governments could choose to provide more support to firms that are initially less productive (e.g., bailouts or rescue packages), such that low productivity ‘causes’ government support.

<sup>31</sup> Semi-fabricated products of aluminium are then used further downstream in the construction sector, as well as in the production of aircraft, cars, rolling stock, transmission lines, food and beverage packaging, etc.

<sup>32</sup> This can be seen, for example, in the revenue that Dutch semiconductor equipment maker ASML generates in China, and which has grown significantly since Chinese authorities announced in 2014 their *Guideline for the Promotion of the Development of the National Integrated Circuit Industry*. While ASML’s sales in China represented less than EUR 400 million in 2014 – and ASML’s then geographical revenue split did not single out China as a significant revenue contributor –, they amounted to EUR 2 741 million in 2021, such that China was the company’s third largest sales destination after Korea and Chinese Taipei. This coincided with a comparatively rapid increase between 2014 and 2018 in the assets (i.e., equipment purchases) of Chinese semiconductor firms and in the support they obtained from authorities (OECD, 2019<sub>[12]</sub>).

capacity (OECD, 2019<sub>[13]</sub>). This has benefitted Chinese producers of semi-fabricated products of aluminium through lower input costs, who have been offering prices well below those offered by OECD competitors (ibid.). Another case is Russia's export duties on natural gas, which amplify the price gap between the domestic regulated gas prices available to Russian industrial firms and those charged to foreign buyers in Europe. As noted in [TAD/TC(2022)3/FINAL], this price gap has generated support for large Russian producers of chemicals, fertilisers, and steel, which thus have a cost advantage on their competitors abroad.

### *Some subsidies are necessary but design matters*

47. Not all subsidies are harmful and some fulfil an important role to correct market failures and improve social welfare (IMF et al., 2022<sub>[1]</sub>; WTO, 2006<sub>[22]</sub>). This was explicitly recognised in the WTO's lapsed provisions on 'green-light subsidies' (Article 8 of the Agreement on Subsidies and Countervailing Measures) and remains an important consideration in the EU's State-aid regime. Sound economic rationales for subsidies include the difficulty that firms may experience to fully appropriate the results of their R&D investments, and which can result in sub-optimal spending on research efforts from a societal point of view (Lucking, Bloom and Van Reenen, 2019<sub>[23]</sub>). Another example would be the difficulties that small, innovative firms may have to access capital markets, which can leave them short of the funds they need to grow and invest (Howell, 2017<sub>[24]</sub>). Although the polluter-pays-principle would suggest that taxes or emissions permits are generally better instruments for correcting negative environmental externalities, certain situations may require subsidies for mitigating environmental damage, in particular where co-ordination failures hamper the adoption of new, cleaner technologies (e.g., charging points for electric vehicles) (Yu et al., 2022<sub>[25]</sub>). Subsidies may also help remedy inequalities if they redistribute income toward those that need it the most.
48. The industries covered by the OECD in its work on industrial subsidies provide numerous examples of government support aimed at spurring innovation or encouraging the adoption of cleaner technologies. ArcelorMittal, the world's second largest steel producer by production volume, has obtained, for example, favourable loans from the European Investment Bank in order to support the company's investments in decarbonisation and energy-saving technologies.<sup>33</sup> Canada's Federal Government and the Québec Government both invested public funds in support of the ELYSIS joint venture between Alcoa and Rio Tinto, which seeks to produce carbon-free aluminium for use in products such as Apple's iPhones<sup>TM</sup>.<sup>34</sup> The European Union approved in 2018 a large-scale Important Project of Common European Interest (IPCEI) to support the research efforts of participating countries and companies in advanced microelectronics.<sup>35</sup> In all these examples, the governments concerned provided support to R&D or on environmental grounds. Whether or not these measures are trade distorting is, however, another question, as explained below.
49. Emergencies and crises may also require that governments intervene to stem a liquidity crunch, mass bankruptcies, or a shortage of critical goods. The restrictions imposed in

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<sup>33</sup> See <https://corporate.arcelormittal.com/media/news-articles/arcelormittal-and-the-eib-announce-280m-of-funding-for-research-and-innovation-supporting-the-steel-company-s-decarbonisation-objectives> (accessed on 28 June 2022).

<sup>34</sup> See [www.elysis.com/en/what-is-elysis](http://www.elysis.com/en/what-is-elysis) and [www.apple.com/newsroom/2018/05/apple-paves-the-way-for-breakthrough-carbon-free-aluminum-smelting-method/](http://www.apple.com/newsroom/2018/05/apple-paves-the-way-for-breakthrough-carbon-free-aluminum-smelting-method/) (accessed on 28 June 2022).

<sup>35</sup> See [www.ipcei-me.eu/what-is/](http://www.ipcei-me.eu/what-is/) (accessed on 18 August 2022).

response to the COVID-19 pandemic, as well as the consequences of Russia’s large-scale aggression against Ukraine on commodity markets, have affected businesses worldwide, prompting governments to provide emergency assistance to households and companies alike (OECD, 2022<sup>[26]</sup>; OECD, 2020<sup>[27]</sup>). Severe disruptions on financial markets – such as those experienced in 2008-09 or at the height of the first wave of COVID-19 – have led governments to provide emergency assistance to businesses that faced liquidity constraints in financing their operations but were otherwise solvent. While these measures were necessary to avoid a catastrophic economic collapse, stimulus packages also risk having negative, long-lasting consequences for global trade and national welfare if poorly designed (OECD, 2020<sup>[27]</sup>). How support is given, going in, will thus affect whether and how that support ultimately ends (i.e., whether it becomes structural and long-lasting) (OECD, 2021<sup>[28]</sup>).

50. There are several situations where subsidies can play a useful role domestically but at the cost of harming businesses in other countries or exporting the pain of adjustment abroad. The empirical literature on industrial policy has often approached policy effectiveness based largely on domestic considerations while not necessarily accounting for cross-border spillovers.<sup>36</sup> Yet the integration and complexity of industrial supply chains implies that subsidies in one country are likely to affect other countries. Whether their international impact is positive or negative will hinge partly on how subsidies are designed. In this regard, past OECD work (OECD, 2020<sup>[27]</sup>; OECD, 2021<sup>[28]</sup>) would suggest that government support needs to be:

- proportional with the scale of the problem it is meant to solve (e.g., market failures);
- time-limited, e.g., by way of a sunset clause;
- targeted toward those that most need it in order to minimise windfall effects;
- non-discriminatory on the basis of local-content or the nationality of the parent company;
- transparent, through the publication of relevant information by the government concerned.

51. It is important to separate consideration of a subsidy’s objectives from its design and effects. There are, for instance, many different ways of supporting R&D spending by private firms, some better than others. Poorly designed R&D subsidies can lead to misappropriation such that recipient firms use the proceeds to invest in physical capital (i.e., production capacity) (Boeing and Peters, 2022<sup>[29]</sup>). Depending on their design, R&D subsidies may also further entrench the competitive advantage of large incumbents in industries where R&D and innovation are key factors of success, such as aerospace and semiconductors.<sup>37</sup> Leading semiconductor vendors spend between 10% and 25% of their annual revenue in R&D, which makes semiconductors one of the most R&D-intensive industries globally. The R&D subsidies that these companies receive represent, however, less than 1% of their revenue in most years, which could suggest that these firms would still undertake substantial R&D in the absence of government subsidies, especially considering that their competitive position depends very much on their innovation capabilities. R&D subsidies should therefore not automatically be considered benign from

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<sup>36</sup> There is, however, a large theoretical literature on strategic trade policy where subsidies are considered from the perspective of imperfect competition and trade. See, for example, Brander and Spencer (1985<sup>[41]</sup>) or Venables (1994<sup>[42]</sup>).

<sup>37</sup> This is known as “product market rivalry” in the literature, whereby innovations serve to take market share from competing firms (Lucking, Bloom and Van Reenen, 2019<sup>[23]</sup>).

a trade standpoint, particularly where they risk cementing the competitive position of incumbents or rewarding firms that would have still invested otherwise.

52. Just like there are different ways of supporting the R&D efforts of firms, there are different ways of supporting the uptake of cleaner technologies with varying implications for trade and competition. The recent OECD report on below-market finance (OECD, 2021<sub>[10]</sub>) found, for example, that several manufacturers of solar PV modules had received significant amounts of grants, tax concessions, and below-market borrowings between 2015 and 2019, and that these subsidies corresponded with marked increases in their manufacturing capacity. In turn, this additional capacity depressed module prices measured in USD per watt and led module producers to complain about the existence of excess capacity weighing on their profits (ibid).
53. While lower module prices have encouraged the installation of additional solar-power capacity worldwide (a good environmental outcome), this has presumably come at the price of trade distortions and harm to trade partners (a bad economic outcome). Yet there are other ways of supporting the uptake of solar PV panels that may be less trade-distortive (and even trade-enhancing). The optimal mix of policies and instruments for supporting the deployment of renewable-energy capacity is a debated issue and the range of options possibly broad.<sup>38</sup> This includes, in no particular order of preference: comprehensive carbon pricing; easier permitting procedures for siting solar farms; more stringent renewable-energy mandates; higher feed-in-tariffs (i.e., guaranteed prices) on the sale of solar-generated electricity; or investment tax credits for investing in solar-based power capacity. The important point is that market-pull incentives for the deployment of solar PV modules can offer more trade-friendly alternatives for encouraging cleaner power generation than direct government support for manufacturers that distorts supply and competition (Bahar, Egeland and Steenblik, 2013<sub>[30]</sub>).

## What can be done to better track and discipline industrial subsidies?

54. Transparency on government support is crucially lacking. Knowing more about the scope and scale of government support and the distortions it potentially creates is nonetheless fundamental to inform policy discussions and current efforts to revisit multilateral trade rules. Transparency represents an indispensable first step that requires the involvement of governmental, institutional, and private actors. Each has a role to play in enhancing knowledge of the extent to which industries are subsidised and of the various ways in which support is provided. While each of these stakeholders may have limited willingness or capacity to communicate on or to detect government support, joined-up efforts could make it possible to paint a comprehensive picture of government support in industrial sectors.

### *What are the problems facing governments and what can they do?*

55. As providers of support, governments possess primary information and thus are indispensable actors for enhancing knowledge on industrial subsidies. Governments' lack of transparency regarding the support they provide, however, poses a crucial challenge to the world trading system. The amount of information that governments disclose depends

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<sup>38</sup> There is notably a vast literature on the topic. There is a widespread view that comprehensive carbon pricing remains the first-best option (Borenstein, 2012<sub>[43]</sub>) (Kalkuhl, Edenhofer and Lessmann, 2013<sub>[44]</sub>). Opinions can differ, however, on what set of second-best policies ought to be put in place in the presence of incomplete or inadequate carbon pricing (Schmalensee, 2012<sub>[45]</sub>) (Murray et al., 2014<sub>[46]</sub>) (Baldwin, Cai and Kuralbayeva, 2020<sub>[47]</sub>) (Andor and Voss, 2016<sub>[48]</sub>) (Mir-Artigues and del Río, 2014<sub>[49]</sub>).

upon their willingness and ability to report subsidies, as well as their perception as to what constitutes government support. This transparency deficit represents a systemic issue despite the obligation imposed on WTO Members under Article 25 of the Agreement on Subsidies and Countervailing Measures (SCM Agreement) to notify their subsidies before the SCM Committee. Members' overall compliance with their notification obligations has remained "chronically" low since 1995: 109 Members out of 164 have failed to submit their subsidy notifications for 2021 although these notifications were due by 30 June 2021.<sup>39</sup>

56. Strengthening compliance with the SCM transparency obligation is part of the solution. Various WTO Members have embraced this path by submitting proposals to make the notification obligation more stringent under the SCM Agreement (Box 3). In tightening Article 25 SCM and guaranteeing its correct application, Members may seek to overcome the reluctance of many governments to communicate information that may be used subsequently by their trading partners in a trade-remedy investigation or a multilateral trade dispute. Tougher notification rules should, however, be accompanied with provisions on technical assistance to help those WTO Members, notably developing and least-developed countries, that may lack the institutional, financial, and human capacity to identify and report the variety of national and sub-national subsidies in place (Shaffer, Wolfe and Le, 2015<sub>[31]</sub>).

### Box 3. WTO Members' attempt to strengthen compliance with transparency rules under the SCM Agreement

In recent years, WTO Members, mainly led by the United States and the European Union, have endeavoured through various proposals to improve the subsidy rules on transparency and, more broadly, the WTO transparency rules. Some proposals have focused on rendering the obligation of subsidy notification and, more broadly, the WTO transparency rules enforceable.\* The United States has also sought to introduce a written procedure with respect to Members' right to questions and answers under Article 25.8 and 25.9 of the SCM Agreement,\*\* together with specific timelines.\*\*\* This questions-and-answers process – in addition to the Subsidy Committee's normal review process – aims to foster information exchanges and discussions before the SCM Committee among WTO Members.

Although these various proposals have thus far not garnered the consensus required across the WTO membership,\*\*\*\* they have contributed to focussing attention on the WTO rules on transparency.

Along the same lines, the recent Trilateral discussions between the Trade Ministers of Japan, the United States, and the European Union have dealt with the issue of transparency in relation to government support. More specifically, the Trilateral partners have expressed their willingness to "continue exploring how to increase the costs of transparency and notification failures and how to strengthen the ability to obtain information on subsidies."\*\*\*\*\* In this respect, in January 2020, the three Trade Ministers proposed to amend Article 25 of the SCM Agreement so that any non-notified subsidy, which was counter-notified by another Member, would be presumed as

<sup>39</sup> See, for instance, the statement of the chair of the SCM Committee in G/SCM/M/113 (25 February 2021), para 96, and "Members review subsidies and countervailing measures, call for enhanced transparency" (26 October 2021), available at [www.wto.org/english/news\\_e/news21\\_e/scm\\_26oct21\\_e.htm](http://www.wto.org/english/news_e/news21_e/scm_26oct21_e.htm) (accessed on 15 February 2022).

prohibited within the meaning of the Agreement, unless the subsidising Member provides the required information in writing within the set timelines.

Note: \* The drafters of the SCM Agreement did not affix sanctions to Members' obligation to notify their subsidies on an annual basis. Proposals recently circulated before the WTO strive to redress this issue. The different proposals can be found in TN/RL/W/263, 20 October 2015 and TN/RL/GEN/188, 30 May 2017 building on TN/RL/W/260, 16 July 2015, as well as JOB/GC/204/Rev.8, 12 November 2021.

\*\* Under Article 25.8 of the SCM Agreement, WTO Members have the right to request additional information on the nature and extent of a subsidy notified by another Member, which such Member has granted or maintained. They can also ask another Member to provide elements explaining the reasons why it considered that a given support programme did not need to be notified. WTO Members may formulate these questions at any time in writing to the SCM Committee. According to Article 25.9 of the SCM Agreement, the Members concerned must provide a comprehensive answer as soon as possible and must give additional information if the requesting Member formulates follow-up questions. Article 25.9 does not specify any formal procedure: neither does it require responses in written form, nor does it set a specific timeline.

\*\*\* See G/SCM/W/557/Rev.2, 19 October 2017. A revision of this text was circulated by the United States one year later, G/SCM/W/557/Rev.3, 26 October 2018. It was revised in 2020; G/SCM/W/557/Rev.4, 26 October 2020. See also, G/SCM/W/583, 15 October 2021 in which Canada, the EU, Japan, and the United States propose to require that all written questions be answered in writing in the course of the Committee's normal review procedures to allow more fulsome discussions during the SCM Committee meetings.

\*\*\*\* Note that 19 Members have joined the US proposal to enhance transparency and improve compliance with notification requirements under WTO agreements (JOB/GC/204/Rev.8), whilst some Members, including Brazil, India, and the Russian Federation have recently given positive feedback with respect to the, recently revised, proposition of the United States to set up a non-mandatory written procedure under Article 25.8 and 25.9 of the SCM Agreement (G/SCM/W/557/Rev4). By contrast, China has systematically opposed proposals to improve transparency under the SCM Agreement (see G/SCM/W/557/Rev4 and G/SCM/W/583, 15 October 2021).

\*\*\*\*\* See the Joint Statement on Trilateral Meeting of the Trade Ministers of the United States, Japan, and the European Union. (26 September 2018) available at [https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT\\_18\\_5915](https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_18_5915) (accessed on 13 August 2022).

57. Yet many forms of trade-distorting subsidies will likely remain unreported even if all WTO Members were to comply with their notification obligation under the SCM Agreement because WTO Members may have diverging opinions as to what amounts to a 'subsidy' under the SCM Agreement, leading them to only report measures that they view as specific subsidies based on their own interpretation and assessment (Shaffer, Wolfe and Le, 2015<sub>[31]</sub>; Bown and Hillman, 2019<sub>[2]</sub>).<sup>40</sup> Furthermore, the WTO subsidy rulebook itself might fail at times to capture the various types of government support that exist.

#### **Different perceptions as to what amounts to a 'subsidy'**

58. Although the WTO subsidy rulebook contains a multilaterally agreed definition of 'subsidy', different perceptions persist among WTO Members as to what actually amounts to a 'subsidy' within the meaning of the SCM Agreement. There may be disagreements as to whether an entity is a 'public body' within the meaning of Article 1.1(a)(1) of the

<sup>40</sup> Under Article 25.2 of the SCM Agreement, WTO Members must notify any specific subsidies within the meaning of Articles 1(1) and 2 of the Agreement, granted or maintained within their territories.

Agreement<sup>41</sup> and whether a financial contribution confers a ‘benefit’, consistent with Article 1.1(b).<sup>42</sup>

59. Deciding on the presence of ‘benefit’, for instance, can prove an intricate exercise for certain types of ‘financial contribution’ other than grants, such as a government loan or an equity infusion, or the government provision of goods or services to companies. In these instances, it is necessary to compare the price or terms and conditions offered to the recipient with what the market would offer as noted in the first section of this report. This comparative exercise will thus necessarily involve the identification of an appropriate counterfactual, be it a benchmark market price, loan, or investment.<sup>43</sup>
60. Assumptions are inevitable when selecting adequate market benchmarks; it may, for instance, not be possible to find a market-based loan with the same terms and conditions (e.g., size, duration, currency) as that received from a state bank by a company. Further challenges arise where the market concerned is significantly distorted by government intervention (Kowalski and Rabaioli, 2017<sub>[32]</sub>). Such a scenario may notably arise where state presence within the lending market is predominant, thus significantly distorting market conditions and eliminating the possibility of a market-based loan in that particular jurisdiction. Likewise, predominant state involvement in the provision of a good or service may impede the emergence of a commercial market price. This could be the case in relation to the provision of electricity or natural gas to industrial producers, which remains controlled by the state in several jurisdictions and offered at prices below-cost or below-market [TAD/TC(2022)3/FINAL]. Together with stronger transparency rules under the SCM Agreement, improving subsidy notifications may therefore call for common methodologies to establish adequate market benchmarks.<sup>44</sup>

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<sup>41</sup> See, on this point, the views expressed by China before the SCM Committee regarding the National Integrated Circuit Industry Investment Fund, G/SCM/M/113, para 158, which contrast with the views expressed by Australia, the European Union, Japan, the United States, and others during that same meeting. See also the *Joint Statement of the Trilateral Meeting of the Trade Ministers of Japan, the United States and the European Union*, available at [https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc\\_158567.pdf](https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc_158567.pdf) (accessed on 2 February 2023), and which states that “[t]he Ministers observed that many subsidies are granted through State Enterprises and discussed the importance of ensuring that these subsidizing entities are captured by the term ‘public body’. The Ministers agreed that the interpretation of ‘public body’ by the WTO Appellate Body in several reports undermines the effectiveness of WTO subsidy rules. To determine that an entity is a public body, it is not necessary to find that the entity ‘possesses, exercises or is vested with governmental authority’” (14 January 2020).

<sup>42</sup> As noted later in this section, WTO Members may also have diverging views when determining whether a subsidy is ‘specific’ under Article 2 of the SCM Agreement.

<sup>43</sup> Note that Article 14 of the SCM Agreement provides general guidelines to select an appropriate market benchmark. The provision specifies, for instance, that a government loan should be compared with “the amount the firm would pay on a comparable commercial loan which the firm could actually obtain on the market,” and that provision of equity capital should be weighed against “the usual investment practice (including for the provision of risk capital) of private investors.” Similarly, the adequacy of remuneration with respect to a government provision of good must be determined according to prevailing market conditions for the good, including considerations such as price, quality, availability, marketability, transportation and other conditions of purchase or sale in the jurisdiction concerned.

<sup>44</sup> The same reasoning prompted the Trade Ministers of the United States, Japan, and the European Union, to observe that the provisions enshrined in the SCM Agreement are “insufficiently prescriptive” to determine the appropriate benchmark when dealing with the provision of goods by a government in a jurisdiction where the domestic market is distorted. On this basis, they

### Existing trade rules do not capture all forms of government support

61. Another question is whether existing trade rules as interpreted by the WTO Appellate Body cover all of the support provided by state enterprises. For the SCM Agreement to apply, a financial contribution must be provided by a government or any ‘public body’. The WTO Appellate Body has, however, interpreted the meaning of ‘public body’ as “an entity that possesses, exercises or is vested with governmental authority”<sup>45</sup>, which has provoked significant criticism (Woznowski, Depayre and Cartland, 2012<sub>[33]</sub>; Miranda and Sánchez Miranda, 2020<sub>[34]</sub>).<sup>46</sup> This interpretation of the concept of ‘public body’ might notably fail to capture government support provided through certain state-invested or state-controlled firms, as with below-market borrowings or below-market energy inputs (Figure 9). To ensure that the support provided by government-invested firms fall within the scope of the WTO subsidy rulebook, it might be necessary to clarify the range of subsidy providers to which subsidy rules under the SCM Agreement apply.
62. Moreover, while government support may in certain circumstances be explicitly limited to certain enterprises – and thus easily deemed *de jure* specific – proving ‘specificity’ (under Article 2 of the SCM Agreement) can otherwise be challenging. It may, for example, be difficult for some forms of below-market finance to be deemed specific, in particular where the legislation instructing state banks or state funds to provide support is unspecific, opaque, or absent altogether (OECD, 2021<sub>[10]</sub>). Proving *de facto* specificity could also be difficult in cases where a state energy company offers electricity and natural gas at below-market prices to all industrial users operating locally [TAD/TC(2022)3/FINAL].

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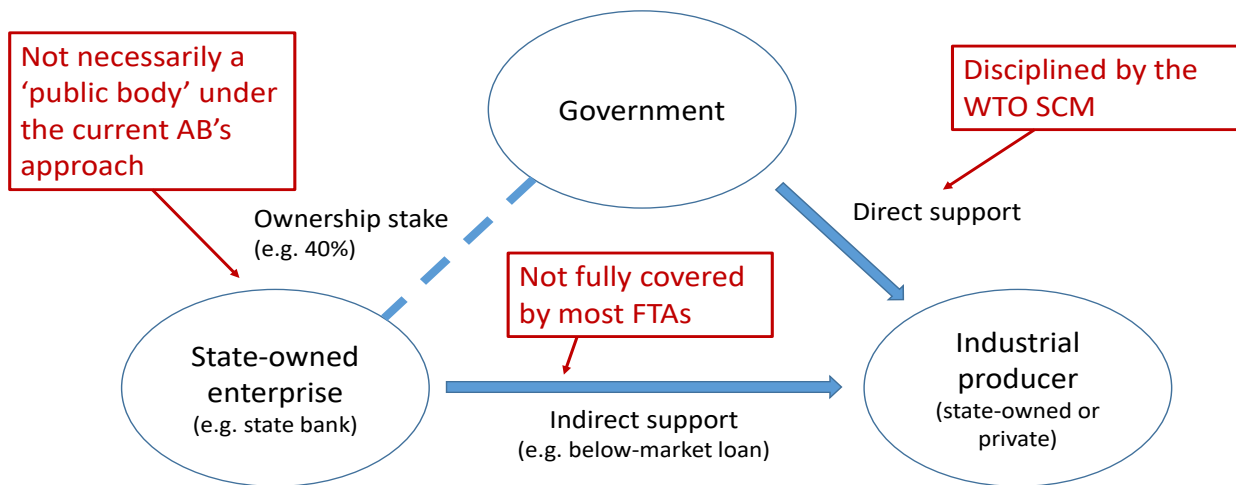
recommended to amend the relevant provision of the Agreement “to describe the circumstances in which domestic prices can be rejected and how a proper benchmark can be established, including the use of prices outside the market of the subsidizing Member. See the Joint Statement of the Trilateral Meeting of the Trade Ministers of Japan, the United States and the European Union (14 January 2020) available at [https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc\\_158567.pdf](https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc_158567.pdf) (accessed on 13 August 2022).

<sup>45</sup> Appellate Body Report, *US-Anti-dumping and Countervailing Duties on Certain Products from China*, para 317.

<sup>46</sup> In a more recent report, one member of the Appellate Body Division dissented and stated the Appellate Body’s “original mistake” was its attempt to define the term public body as “an entity that possesses, exercises or is vested with governmental authority.” See Appellate Body Report, *US – Countervailing Measures (China) (Article 21.5)*, WT/DS437/AB/RW, para 5.245.



**Figure 9. Existing trade disciplines do not fully capture the support provided through government-invested firms**



Note: AB = WTO Appellate Body. This figure is for illustrative purposes only and does not exhaust all the possible ways in which a government might exert control or influence on a company.

Source: OECD (2021<sub>[10]</sub>).

### What tools are currently available to governments to improve transparency on support?

#### *Initiatives at the international level*

63. Counter-notifications as per Article 25.10 of the SCM Agreement offer one possible avenue for WTO Members to help improve transparency on government support.<sup>47</sup> Counter-notifications can be a costly tool, however, since they require governments to invest significant resources into in-house research capabilities. There may nevertheless be ways of pooling resources among like-minded partners to maximise their effectiveness. Governments can also make use of another existing WTO tool by requesting a specific agenda item under the SCM Committee to discuss any issues they deem of particular concern.<sup>48</sup>
64. At the plurilateral level, recent Trilateral discussions between the Trade Ministers of Japan, the United States, and the European Union have, meanwhile, aimed to put forward new substantive and procedural subsidy rules to better discipline trade-distortive government support. Beyond calling for a clarification of the concept of ‘public body’, the Trade Ministers also proposed to expand the prohibited-subsidy category in the SCM

<sup>47</sup> The US government used this tool for the first time in October 2011, reacting against the perceived lack of compliance of the Chinese government. It counter-notified approximately 200 unnotified Chinese subsidy measures, as well as 50 unnotified Indian subsidy measures. In the following years, notably between 2014 and 2017, the United States continued to use this mechanism. In total, the US administration uncovered over 500 Chinese subsidy measures through five successive counter-notifications. See ‘2018 Trade Policy Agenda and 2017 Annual Report of the President of the United States on the Trade Agreements Program’ (Office of the United States Trade Representative, 2018).

<sup>48</sup> Note that any Member may request the inclusion of an item into the agenda of the Committee to trigger a discussion on a given topic. For example, Canada, the EU, Japan, Mexico, and the United States have since October 2016 raised awareness in the SCM Committee on the contribution of subsidies to overcapacity and excess capacity by requesting a specific item on the issue at each regular meeting of the Committee.

Agreement<sup>49</sup>, as well as reverse the burden of proof for certain types of subsidies having important harmful effects.<sup>50</sup> While these plurilateral proposals have been developed with a view to strengthening the WTO subsidy rulebook, they have not yet been discussed at the multilateral level.

65. Several governments have also developed rules on SOEs in the context of their preferential trade agreements (PTAs). The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Agreement between the European Union and Japan for an economic partnership, and the Agreement between the United States, Mexico and Canada (USMCA) all contain specific SOE rules relating to transparency, non-commercial assistance, as well as commercial considerations and non-discrimination principles. Although they only apply to SOEs from participating countries, they offer possible ways for disciplining support provided by government-invested firms.

*Initiatives at the domestic level*

66. In addition to international initiatives, there are unilateral actions that governments can already take domestically to help improve transparency on government support. One obvious starting point is to create a public online database that inventories all of a country's support measures and its beneficiaries, such as that maintained by the EU and the United States at the federal level. Another such action would be to publish more detailed information on government investments in industrial firms, including indirectly through state investment vehicles such as national wealth funds, government guidance funds, or state enterprises.<sup>51</sup> Governments could also unilaterally disclose more information about their unlisted state enterprises, including audited financial information. It should not be necessary to rely on dense bond prospectuses (in the best of cases) to learn more about the firms in which taxpayers hold large stakes. Finally, greater co-operation between competition authorities and trade ministries (and greater inter-agency co-operation more generally) could also help improve transparency on support (OECD, 2021<sup>[35]</sup>).
67. Yet absent a multilateral instrument harmonising reporting rules across countries, governments' promotion of transparency, accountability, and good governance standards may remain patchy and inconsistent. Relatively transparent governments may also fear being singled out for the support they provide while less transparent jurisdictions continue to evade scrutiny. This underscores the importance for countries to act in a co-ordinated fashion at both the domestic and international levels in order to minimise free-riding and maximise the benefits from a level playing field in global trade. Transparency should nevertheless be valued for its own sake domestically and not only from the perspective of trade negotiations. Making information on support measures available to the public should enable greater government accountability and oversight – including by allowing for

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<sup>49</sup> A subsidy is currently prohibited within the meaning of the SCM Agreement if it is contingent on exports or on the use of domestic over imported products (Article 3.1(a) and (b) of the SCM Agreement).

<sup>50</sup> These subsidies include, amongst others “subsidies that lower input prices domestically in comparison to prices of the same goods, when destined for export”. See the Joint Statement of the Trilateral Meeting of the Trade Ministers of Japan, the United States and the European Union (14 January 2020), available at [https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc\\_158567.pdf](https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc_158567.pdf) (accessed on 18 August 2022).

<sup>51</sup> Norway's sovereign wealth fund (the Government Pension Fund Global) provides a positive example that could be emulated by other state investment funds that are more domestically focussed.

impartial third-party analysis that can assess whether support measures represent a good use of taxpayers' funds.

***What can firms do?***

68. Firms themselves also have a useful role to play as subsidy beneficiaries in filling in the evidence gap resulting from the lack of transparency of governments. One way to do this that minimises penalties for relatively transparent firms is for international accounting and auditing standards to better embed subsidy disclosure, as well as the identify of beneficial owners, into companies' routine financial reporting. Accounting standard bodies and individual firms could both contribute to expanding the range of publicly available information, independent of what governments may be able to achieve in the WTO and elsewhere. Even if country A were to not disclose any information about its own subsidies, firms based in country A that wish to access capital markets in the more transparent country B would need to follow the auditing and accounting practices applied in country B, thereby indirectly improving transparency about the subsidies provided to firms based in country A.
69. Many firms already disclose the grants they receive from governments and, more rarely, the income-tax concessions they benefit from in the different jurisdictions in which they operate. Efforts could be made to enhance these disclosures as well as add information about, for example, the loans and equity infusions that firms receive from government-related entities, or instances when government-related entities sell inputs to companies at subsidised, below-market prices. Although some firms may object that this could breach commercial confidentiality, there are precedents in cases where state enterprises stand on the other side of the transaction.<sup>52</sup>
70. In this context, the International Financial Reporting Standards (IFRS) set by the International Accounting Standards Board (IASB) and the US generally accepted accounting principles (GAAP) set by the Financial Accounting Standards Board (FASB) are key to ensure a common, harmonised format for reporting relevant information.<sup>53</sup> Clause IAS 20 of the IFRS Standards already requires the disclosure of government assistance by firms, although compliance has thus far remained incomplete. More recently, in November 2021, the FASB has issued an update to its accounting standards that relates to the disclosures by business entities of their government assistance<sup>54</sup> (Box 4). If

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<sup>52</sup> Norðurál, an Icelandic aluminium smelter owned by US company Century Aluminum, recently released on its website information about the contracts and prices it pays for the electricity it purchases in Iceland from state-owned Landsvirkjun. According to the company website, “[i]n November 2020 Norðurál requested that confidentiality of its power contracts would be lifted. Norðurál hears and acknowledges demands for transparency of the price it pays for energy produced in Iceland and wants to do its part to facilitate a discussion on the company’s competitive environment that is based on accurate information.” Available at <https://nordural.is/en/nordurals-power-purchases/> (accessed on 22 August 2022). Aluminium smelting consumes nearly 75% of the electricity generated in Iceland [TAD/TC(2022)3/FINAL].

<sup>53</sup> The US GAAP are established and maintained by the Financial Accounting Standards Board (FASB), which describes itself as an “independent, private-sector, not-for-profit organization”. It is “recognized by the U.S. Securities and Exchange Commission [SEC] as the designated accounting standard setter for public companies.” The SEC, a regulatory body, has then responsibility for enforcing the GAAP. The IFRS are, meanwhile, set by the International Accounting Standards Board, which operates under the IFRS Foundation, which describes itself as “a not-for-profit, public interest organisation.”

<sup>54</sup> Note that these disclosures requirements are generally consistent with the disclosures in IAS 20. The FASB, however, requires entities to disclose the balance sheet and income statement

effectively implemented by all companies following the GAAP, the new disclosure requirements contained in this update may contribute to improving significantly subsidy reporting by the companies concerned.

#### Box 4. The Accounting Standards Update 2021-20 of the Financial Accounting Standard Board

As the FASB observes in its update, due to the absence of specific authoritative measurement guidance in GAAP for many forms of government assistance received by business entities, heterogeneity has thus far prevailed regarding the recognition, measurement, presentation, and disclosure of such government assistance. Against this background, the Board decided to require all business entities following the GAAP to report the government assistance they have obtained in the notes to their financial statements. More specifically, as of 2022, companies must disclose in their annual financial reporting information concerning transactions with a government, which they account for as a contribution<sup>55</sup> or a grant.\* These transactions entered with a government under a legally enforceable agreement\*\* may take the form of tax credits or abatements, cash grants, grants of other assets, project grants, etc. Companies must include details regarding the nature of the transactions; the line items of the balance sheet and income statement that are affected; the amounts applicable to each financial statement line item; as well as the terms and conditions of the transactions, such as commitments (e.g., the conditions for potential recapture of the assistance).

While the FASB initiated already back in 2014 the process for publishing a new update focussing on disclosure requirements for government assistance, it decided in May 2021 that the issuance of this update ought to accelerate to keep track of the wide range of support to companies provided by governments worldwide in the wake of the COVID-19 pandemic. To that end, the Board opted to narrow down the types of transactions subject to the new disclosure requirements to ensure the timely publication of the update. Although these new requirements only cover a subset of transactions with a government, they could contribute to increasing transparency of government assistance and addressing concerns among investors with respect to the lack of transparency about such assistance under annual financial reporting. Reporting of the nature of the arrangements and their amounts would provide investors with a more comprehensive understanding of their effects on an entity's financial results and hence guide their decisions.

Importantly, the update concerns transactions with any government, be it domestic, foreign, local (for example, city, town, county, and municipal), regional (for example, state, provincial, and territorial), or national (federal). The concept of 'governments' under the update also covers entities related to governments, such as departments, independent agencies, boards, commissions, and component units. Even more significant is the recognition that government assistance can also be administered by intergovernmental organisations and other types of organisations, such as non-governmental organisations or government-sponsored enterprises that have authority from a government to administer assistance on its behalf.

Note: \* A government grant, as defined in paragraph 3 of the IAS 20, corresponds to a transfer of resources to an entity by a government in return for past or future compliance with certain conditions relating to the operating activities of the entity. Government grants in return for past compliance are government grants that become receivable as compensation for expenses or losses already incurred.

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line items (and applicable amounts), which are affected by transactions with a government whereas such information is not explicitly required by IAS 20.

<sup>55</sup> According to the definition of the FASB Accounting Standards Codification, a contribution by a government corresponds to any unconditional transfer of cash or other assets, as well as any unconditional promises to give by a government to a business entity. The concept also encompasses any reduction, settlement, or cancellation of the company's liabilities in the context of a voluntary, non-reciprocal transfer operated by a government.

\*\* Note, however, that business entities will not need to disclose government assistance that is broadly available without a specific agreement between the entity and the government, where the government is legally required to provide a non-discretionary level of assistance to an entity meeting the eligibility requirements. Furthermore, the Board decided to exclude from the scope of the update transactions in which a government is a customer (i.e., government purchase under a government procurement), concluding that they do not create the need for additional disclosure requirements.

71. Although they are very helpful, accounting standards do have certain limits. The accounting standards contained in, for instance, the IFRS or the GAAP do not apply to more complex forms of government support, such as government loan guarantees. Integrating these various forms of government support under specific disclosure rules would require a yet inexistent, cross-country harmonised approach to identify and calculate them. A more obvious limitation of accounting standards is that they do not apply to all firms. Some firms may be listed in jurisdictions that apply weaker accounting standards or do not enforce them. Other firms are simply not listed, have not issued bond prospectuses, and do not disclose their financials to the public. The latter category can include large state enterprises but also family-owned companies and firms held by private-equity funds. In certain cases, large, unlisted state enterprises have chosen to list only a subsidiary, thus providing incomplete information about the true scope of the support they receive. This pattern can occur where the parent's assets, notably its high-quality assets, are consolidated into the listed subsidiary company (Lin, 2017<sup>[36]</sup>). In this respect, accounting and auditing standards may not suffice to trace back the degree of state influence and intervention, be it through direction, policy, or support, within the group.
72. Given this, governments may have a complementary role to play in encouraging more public disclosure from firms regarding the support they receive. National legislation requiring recipient companies to report the support bestowed by national and subnational governments could, for instance, fill in the gaps left by firm-level analysis, shedding light on the support received by all companies. In 2017, Italy published a piece of legislation along these lines,<sup>56</sup> which requires all companies receiving “grants, subsidies, advantages, contributions or aid, in cash or in-kind, which do not have any reciprocal, remunerative, or compensatory nature” to publish the amounts they obtained from Italian authorities in the preceding year in the supplementary notes of their financial statements and any consolidated financial statements.<sup>57</sup> Publication is mandatory, subject to penalties, if the total amount of the sums received, including from various public entities, is equal or greater than EUR 10 000.<sup>58</sup> This example illustrates that there are concrete actions that

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<sup>56</sup> Article 1, paras 125 to 129 of Law No 124 of 2017 for market and competition (‘Legge annuale per il mercato e la concorrenza’) as modified by the law-decree No 34/2019 (‘Decreto legge crescita’) and the law-decree No 34/2019 (‘Decreto riapertura’).

<sup>57</sup> Note that this covers the support received from Italian public administrations and other entities, such as corporate entities in public control. Support having a general character is not subject to the disclosure requirement.

<sup>58</sup> Companies are subject to such obligation of publication even where each individual aid they received in the preceding year is below the EUR 10 000 threshold insofar as the individual aids, when taken as a whole, are equal or exceed this threshold. Companies, including those that do not publish financial statements, must also publish by 30 June of each year on their websites or digital portals, information relating to grants, contributions, paid assignments, and economic benefits received from the same public administrations in the previous year. Failure to publish by the deadline entails the application of a penalty equal to 1% of the amount of aid received (with a minimum penalty amount of EUR 2 000) along with the obligation to publish the relevant information. Moreover, if within 90 days of the notification by the granting administration, the company has not

governments can already take unilaterally to improve transparency on government support by demanding more disclosure from firms.

### *What can the OECD do?*

73. Complementing efforts by governments and firms, intergovernmental organisations such as the OECD also have a role to play in acting as platforms for exchanging information, good practices, and policy advice, with a view toward strengthened international norms and legal commitments on subsidies. The IMF, the OECD, the World Bank, and the WTO recently committed to work together to improve data, analysis, and promote and support dialogue leading to enhanced international co-operation to address subsidies (IMF et al., 2022<sup>[11]</sup>). This holds the potential to leverage each organisation's strengths and capabilities to contribute toward the shared goal of levelling the playing field in global trade.
74. The OECD, for its part, has made important investments into improving transparency and the measurement of government support. Through work conducted under the Trade Committee, the OECD has helped improve what we know of government support in industrial sectors and intends to continue serving its members by further filling in remaining data gaps concerning the scope and scale of industrial subsidies. To this end, it can draw on its longstanding experience in quantifying government support across countries and sectors such as agriculture and fisheries.<sup>59</sup>
75. More efforts are nonetheless needed, in particular when it comes to analysis of the impact of industrial subsidies. Given the relative scarcity of data, quantitative assessment of the trade effects of industrial subsidies remains in its infancy. Yet such analysis could play an important role in identifying the types of measures that are most problematic from a trade standpoint, thereby enabling trade negotiators to focus their efforts where they are the most needed. Analysis could also help build a better case for reform, in particular by looking at the ways in which certain subsidies might erode domestic productivity and welfare.
76. Building on its previous work, the OECD aims next to update and expand over coming years the firm-level data on government support that it has collected. To that end, the OECD is building a database – the MANufacturing Groups and Industrial Corporations (MAGIC) database – that should allow the tracking and monitoring of government support over time and across industrial sectors, geographical regions, and policy instruments. Earlier work on below-market finance (OECD, 2021<sup>[10]</sup>) already provided annual estimates of the government support that large industrial groups received from 2005 to 2019 in the form of grants, income-tax concessions, below-market borrowings, and below-market equity returns. These estimates covered 13 industrial sectors (i.e., aerospace & defence; aluminium; automobiles; cement; chemicals; glass & ceramics; rail rolling stock; semiconductors; shipbuilding; solar photovoltaic panels; steel; telecom network equipment; and wind turbines) and more than 300 large firms and their subsidiaries. The value of the data collected thus far goes beyond one specific study, however, and should enable the OECD and its members to track industrial subsidies more consistently and comprehensively.

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paid the penalty nor proceeded to the publication, it must fully return the benefit received to the granting administrations. Article 1, para 125-ter as modified by the law-decree No 52/2021.

<sup>59</sup> See [www.oecd.org/subsidies/](http://www.oecd.org/subsidies/).

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## Annex A. Short summaries of earlier OECD reports on government support in industrial sectors

### Measuring distortions in international markets: the aluminium value chain

77. The aluminium industry has undergone major changes over the last 15 years, notably the rise of China as the leading producer by a wide margin, in most segments of the value chain. This unprecedented increase in output has resulted from massive greenfield investments in new aluminium-smelting and power-generating capacity. As they took place at a time of declining aluminium prices and relatively high prices for key inputs (e.g., coal and alumina), there are concerns among some WTO Members that these recent capacity increases may have stemmed in part from non-market forces, and the provision of government support in particular.
78. To better understand the extent to which government support has played a role in supporting aluminium producers, the OECD looked at detailed information for a sample of 17 large firms that operate along the aluminium value chain and that together represent about half of global smelting capacity. By analysing corporate filings, annual reports, and other public sources of information, the OECD was able to identify and quantify government support in the form of government grants, tax concessions, intermediate inputs sold at below-market prices, and below-market borrowings (e.g., loans that state banks offer at below-market interest rates).
79. Government support was found to be concentrated and large in the aluminium value chain, with total support for the 17 firms studied reaching USD 70 billion over the period 2013-17 (Figure 2, left). Although all 17 firms received some form of government assistance, the top 5 recipients obtained as much as 85% of all support, mostly at the smelting stage of the value chain. That support primarily took the form of energy subsidies and below-market borrowings, which in both cases were provided by state enterprises such as local public utilities and state banks. Chinese authorities provided the majority of all support identified by the OECD, with that support largely benefitting Chinese smelters. Most aluminium firms elsewhere did not obtain significant support from their home countries, but generally received larger support from the other countries in which they operate (e.g., Brazil, Canada, Qatar, and Saudi Arabia).
80. Looking across the entire value chain reveals that support upstream can have significant implications for downstream activities. China's export taxes on primary aluminium, as well as its incomplete rebates of value-added tax on exports of primary aluminium, have discouraged exports of this product and encouraged production of semi-fabricated products and articles of aluminium further down the chain. Access to cheap primary aluminium has enabled Chinese downstream producers to compete in global markets at lower cost.
81. The results also raise important issues regarding state involvement in industrial production, given that state enterprises have been found to be both recipients and providers of government support. The fluid relationship between the government and companies also generates further opacity around the nature and scale of government support.

## Measuring distortions in international markets: the semiconductor value chain

82. The semiconductor value chain is complex and global in scope: not only is the production of semiconductors one of the most R&D-intensive activities, but it also spans many specialised tasks performed by different companies around the world. The extent of fragmentation and specialisation in the semiconductor value chain makes it highly sensitive to shocks and to market distortions caused by trade barriers and government support. Concern about government support is growing, due to increasing government investments in semiconductor companies.
83. Given the lack of transparency that surrounds government support in industrial sectors, the OECD had to look for information at the level of individual firms operating along the semiconductor value chain. This was done for 21 large semiconductor firms that are either vertically integrated (e.g., Intel and Samsung Electronics) or specialised in particular segments of the chain, such as chip design (e.g., Nvidia and Qualcomm), contract manufacturing (e.g., SMIC and TSMC), and outsourced assembly and testing (e.g., ASE and JCET). Together, those 21 firms represented about two-thirds of global semiconductor revenue in 2018.
84. For each firm, the OECD analysed corporate filings, annual reports, and other public sources of information to identify and quantify government support in the form of government grants, tax concessions, below-market borrowings, and below-market equity in the particular case of firms in which governments hold stakes (government-invested firms). For the 21 firms studied, total government support exceeded USD 50 billion over the period 2014-18 (Figure 2, right). While about a third of that support went to Intel (United States), Samsung Electronics (Korea), and TSMC (Chinese Taipei), there are very large size differences between the 21 firms studied. Expressing support as a share of annual firm revenue shows SMIC (China), Tsinghua Unigroup (China), Hua Hong (China), JCET (China), and STMicroelectronics (Europe) to be the largest recipients of support relative to their size. While most Asian semiconductor firms received a majority of support from their home economies, companies elsewhere often obtained significant support in the other jurisdictions in which they have a sizable presence (e.g., China, Israel, and Singapore).
85. Support for R&D through grants and tax breaks is very common in the semiconductor value chain, reflecting the critical importance of knowledge and talent in chip production. Many governments also use investment incentives to attract firms locally. Support for R&D and investment incentives together represented more than two-thirds of all support identified by the OECD.
86. Support provided through the financial system in the form of below-market debt and equity is another significant contributor to total government support in semiconductors; below market equity amounted to USD 5-15 billion for just six government-invested firms in the sample and more than 30% of annual consolidated revenue for two of these firms. It is also largely concentrated in China, which provided 86% of all below-market equity, linked to the construction of new production facilities, as well as 98% of all below-market debt identified by the OECD. In addition to being among the hardest forms of support to measure, below-market equity reflects greater state involvement in semiconductor production, which creates possible channels for the provision of a range of further support, as well as posing specific challenges for trade rules.

## Measuring distortions in international markets: below-market finance

87. OECD studies on government support in the aluminium and semiconductor value chains have shown that much producer support in manufacturing takes the form of below-market finance. Below-market finance covers support instruments that operate through the financial system, whether in the form of debt provided on below-market terms (e.g., preferential interest rates and government loan guarantees) or in the form of below-market equity funding (e.g., government equity infusions that are provided on non-market terms, or government shareholders tolerating lower ongoing equity returns than private investors would demand). In both cases, this support serves to lower companies' cost of capital, thereby helping them invest more than they would otherwise or allowing them to tolerate heavier losses.
88. Most governments do not disclose detailed information about which firms and sectors obtain government support, much less the individual financial transactions underpinning below-market finance. By necessity, the OECD therefore looked at the recipients of support (i.e., industrial firms) rather than providers (i.e., governments). A focus on the recipient firms also enabled work to identify the significant below-market finance channelled through state enterprises acting as intermediaries (e.g., state banks and government guidance funds).
89. To understand the scale and scope of below-market finance, the OECD drew on public sources to collect and analyse detailed financial information for 306 of the largest manufacturing firms in 13 industrial sectors, covering the period 2005-19. These sectors are: aerospace and defence; aluminium; automobiles; cement; chemicals; glass and ceramics; rail rolling stock; semiconductors; shipbuilding; solar photovoltaic panels; steel; telecom network equipment; and wind turbines. In most sectors, the firm sample covers at least two thirds of global sales or capacity. Geographical coverage was also balanced to closely track countries' respective weight in global manufacturing in each sector.
90. The analysis found below-market borrowings to be generally larger in heavy industries, including those with reported excess capacity (Figure 3). The OECD has estimated that below-market borrowings average about 3-4% of recipient firms' revenue in sectors such as aluminium, cement, glass and ceramics, and semiconductors. Around half of sampled firms in solar PV panels, shipbuilding, and steel also seem to have benefitted from below-market borrowings over the period analysed. In addition to being positively correlated with increases in manufacturing capacity, below-market borrowings were also found to be negatively correlated with firm productivity, which implies that the recipients of support are generally less productive firms.
91. In contrast, below-market equity returns were found to be more prevalent in high-tech sectors that rely on intangible assets and equity financing. This is particularly the case for semiconductors, where the creation of government investment funds has increased government ownership of semiconductor assets, but also in aerospace and defence.
92. Government-invested firms make up a significant portion of all 306 companies included in the sample: in sectors such as aluminium, shipbuilding, and steel, governments are estimated to own more than 40% of all company assets covered by the analysis. The OECD has also found that companies with more than 25% government ownership tend to obtain more support in the form of both government grants and below-market borrowings (Figure 8).

## Measuring distortions in international markets: the rolling-stock value chain

93. Rolling stock refers to the entire set of vehicles used for the transportation of people and goods by rail, including high-speed trains, multiple units, metro systems, locomotives, and freight cars. Rolling stock is only one part of the wider rail supply industry, which also comprises the provision of infrastructure (e.g., tracks and electrification), dedicated services (e.g., repair and maintenance of rolling stock), and rail control and signalling.
94. The global rolling-stock market in 2020 was estimated at about USD 70-75 billion, dominated largely by the Asia-Pacific, Europe, and North America. The long life of rail equipment implies that customers will not repeat orders every year, requiring rolling-stock manufacturers to spread their offers over a large customer base. This makes the rolling-stock market eminently international, as companies compete globally to win large contracts. Market access is therefore crucial and import tariffs are generally low for rolling stock and related parts and components. Yet there are concerns in the industry that government support and other forms of government intervention may be tilting the global playing field.
95. Relying on a sample of 22 firms, whose combined revenue represented more than 70% of the global rolling-stock market in 2020, the OECD found these companies to have received about USD 5 billion over the period 2016-20 in government grants (34%), tax concessions (54%), and below-market borrowings (12%). China's state-owned rolling stock manufacturer, CRRC, alone obtained almost 60% of all the below-market borrowings that the OECD has identified and quantified. Below-market funding for rolling-stock customers in the form of export credits at non-market rates has also raised concerns as it may represent another important other channel of support for the industry, although information remains scarce about individual transactions.
96. Not all the support obtained by rolling-stock manufacturers is necessary harmful for trade and competition, with support for R&D accounting for a sizable portion of the grants and tax concessions quantified. While not included in the numbers above, several manufacturers also benefitted from COVID-related support in 2020 to mitigate the impact of the pandemic and related restrictions. Yet R&D alone does not explain why tax concessions formed the largest support instrument among the measures identified in rolling stock over 2016-20, with tax reductions and investment incentives playing a seemingly large role.
97. Besides government support, there are other tools that governments employ to support domestic rolling-stock manufacturers. This includes a range of explicit (e.g., mandatory joint-venture requirements, non-transparent prior licensing requirements, or local-content requirements) and implicit policies (e.g., standardisation), which can have the effect of giving preference to domestic firms or incumbents in government procurement contracts and thus represent important barriers to market access. Rolling-stock manufacturers have also at times been required to transfer their technology to local, often state-owned, partners to access a foreign market. Moreover, the industry has witnessed significant consolidation through mergers and acquisitions, as well as instances of bid rigging and low-pricing strategies by foreign bidders that might have benefitted from government support. While these measures do not always lend themselves to quantification and economic analysis, they can be important sources of trade distortions in the rolling-stock market.

## Measuring distortions in international markets: below-market energy inputs

98. Past OECD work on government support in the aluminium value chain found energy subsidies to be the second largest instrument (after below-market borrowings) used in support of aluminium smelting, where energy can represent up to 40% of production costs. Work on below-market finance also noted that energy-intensive firms tended to display abnormally high profit margins in countries which the International Energy Agency reports as having relatively large fossil-fuel subsidies. These findings led the OECD to investigate the role that energy inputs (i.e., coal, electricity, natural gas, and petroleum products) sold to companies at below-market prices play in the broader landscape of industrial subsidies.
99. Below-market energy does not cover all forms of government support that help reduce firms' energy costs, but instead only concerns the provision of energy inputs to industrial users at below-market prices. It is especially problematic for trade in the context of industries for which energy constitutes an essential input, such as aluminium smelting, steel, cement, fertilisers, and chemicals.
100. The identification and measurement of below-market energy can be very complex since they require that the prices paid by industrial firms for the energy they use be compared with a reference price benchmark, chosen to reflect market conditions. Not only does this require detailed information about how particular plants or companies obtain their energy inputs and at what cost, but it also necessitates that careful assumptions be made in selecting an adequate market benchmark.
101. Using publicly available information and commercial databases at the plant- or firm-level, the OECD estimated below-market energy for an illustrative sample of 33 energy-intensive companies. While the resulting data are not comprehensive nor representative of entire energy-intensive industries, they do provide relevant insights into the size and distribution of below-market energy.
102. The OECD found the firms covered to have received below-market energy amounting to between USD 63 billion (low estimate) and USD 155 billion (high estimate) over the entire period 2010-20. Almost all the support identified was for natural gas and electricity. Low relative prices for coal (not accounting for negative environmental externalities) make it generally affordable to industrial users without the need for subsidies, absent sudden and large fluctuations in coal markets. In the case of petroleum products, gasoline, kerosene, and diesel fuel are mainly used in transportation and heavy machinery rather than as fuel for industrial processes.
103. In some cases, estimates indicate that subsidies are a multiple of firms' energy costs, thus suggesting a sizable impact on firms' profits and operating margins. Support was generally found to be larger for firms based in countries of the Gulf Cooperation Council and for state enterprises. Argentina, Egypt, and Russia are other jurisdictions where firms displayed relatively large amounts of below-market energy over the period 2010-20.
104. A key finding of this work is that widespread government intervention in energy markets, oftentimes through state enterprises, can make it hard to identify government support. Another key finding is that it is necessary to consider government support in all its forms in order to correctly diagnose market distortions in international markets. Different countries use different support instruments, with some relying on below-market energy relatively more while others use below market finance. Only through careful efforts to collect more and better data can we obtain an accurate picture of global trade distortions.
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