

# HOW GOVERNMENTS BACK THE LARGEST MANUFACTURING FIRMS

INSIGHTS FROM THE  
OECD MAGIC DATABASE

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## How Governments Back the Largest Manufacturing Firms: Insights from the OECD MAGIC Database

Government support has long been a central issue for trade but recently countries' interest in subsidies, and industrial policies more broadly, has intensified. Yet evidence on the nature and scale of industrial subsidies and what they mean for global competition is scarce. This paper uses the recently created OECD MAnufacturing Groups and Industrial Corporation (MAGIC) database to shed more light on the level and types of subsidies received by the largest companies operating globally across 14 key industrial sectors. Subsidies are found to be widespread among these firms but modest on average relative to revenue. There are, however, cases of sizeable subsidies, especially in heavy industries and semiconductors. Subsidies relative to firm revenue are also larger on average for firms based in China. The report then looks at the evolution of global market shares for the firms covered, finding China-based companies to have often gained market share, unlike OECD-based companies.

**Key words:** Subsidies; Industrial policy; Government support

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## Key messages

- This paper contributes to a rapidly growing literature and ongoing policy discussions about the size and nature of government subsidies. It builds on the OECD MAGIC database, a unique dataset containing detailed information about the level of subsidies for individual large manufacturing firms operating in 14 different sectors, across numerous OECD and non-OECD Members over the 2005-22 period.
- Subsidies are found to be widespread among large industrial producers. Most of the firms in the OECD MAGIC database received at least one type of government support for half of the period for which their data are available or longer, with the median annual-firm observation corresponding to a subsidy of 0.6% of revenue. While seemingly modest on average, there are cases of very large subsidies, exceeding 15% of revenue. These cases are dominated by companies based in The People's Republic of China (hereafter "China"), especially in the aluminium, cement, glass, and semiconductor industries, which receive not only large but long-running government support. Moreover, total subsidies in relation to revenue tend to be larger for smaller firms and for state enterprises.
- Subsidies are generally larger relative to firms' investment in fixed tangible assets. Despite representing a relatively small percentage of total consolidated sales on average, subsidies can still have decisive impacts on individual transactions and investment decisions.
- Countries and sectors tend to differ in the relative scale and types of subsidies (grants, tax concessions or below market-borrowings) they provide and receive. Subsidies relative to firm revenue are on average larger for firms based in China than for those based in other jurisdictions, particularly when it comes to below-market borrowings. The use of the latter type of subsidy is notably common in capital-intensive heavy industries, which rely relatively more on debt than equity for financing. Below-market borrowings have also been used to support distressed firms during crises (including in 2009 during the global financial crisis, and in China in 2015 to bolster domestic metal producers) and more occasionally to rescue companies experiencing financial difficulties for idiosyncratic reasons.
- Global market shares, which account for both domestic and foreign sales in a sector, tend to be rather stable for most of the firms, but there are cases of large shifts in market position. China-based companies have experienced more frequent gains than losses in market share and generally account for most of the firms with the largest market share gains. The opposite is true for firms based in other jurisdictions, mainly in OECD Member countries.

Government support has long been a central issue in trade policy. Recently, challenges with the climate transition, the COVID-19 pandemic and related concerns about supply-chain resilience, the level playing field, and geopolitical tensions have intensified interest in government support, and industrial policies more broadly (OECD, 2023<sup>[1]</sup>; Millot and Rawdanowicz, 2024<sup>[2]</sup>). That said, comprehensive evidence on the scope and scale of industrial subsidies and their domestic and international implications has been so far limited. This lack of information makes it challenging to understand which subsidies are benign for well-functioning global markets and which create harmful distortions. Limited data and evidence also complicate subsidy design aiming to increase effectiveness and minimise competitive distortions.

Much of the blame for the paucity of empirical analysis in relation to industrial subsidies lies with a severe lack of data. This paper fills some of the knowledge gaps, building on the new OECD Manufacturing Groups and Industrial Corporations (MAGIC) database. The OECD MAGIC database provides a unique view on the level of subsidies received by the largest companies operating across 14 industrial sectors globally from all levels of government. It represents an important new tool in understanding the nature and scale of government support in industrial sectors around the world.

This paper begins by describing existing research on the quantification of government subsidies, including some discussion of the main advantages and limitations of the OECD MAGIC database. It then presents key stylised facts about industrial subsidies received by the largest manufacturing companies and market shares as observed in the database.<sup>1</sup> The paper concludes by summarising the main findings and suggesting areas for future development of the OECD MAGIC database and for research about the market implications of industrial subsidies.

## 1. The measurement of government support

Assessing the scope and scale of government subsidies, and their evolution over time, is difficult (OECD, 2023<sup>[1]</sup>). This is due to a persistent lack of reliable data comparable across countries. Data deficiencies reflect both methodological difficulties with quantifying government support (especially non-financial aid, below-market financing, and opaque forms of support provided through state enterprises<sup>2</sup>) and the unwillingness of some governments to comprehensively disclose their own measures and associated costs.

Data availability on subsidies varies among sectors and countries as well as over time. For instance, the OECD's Producer Support Estimate in agriculture has been available since the late 1980s, with the latest edition of the *Agricultural Policy Monitoring and Evaluation* showing agricultural support in the 54 countries covered to have reached USD 842 billion annually over 2021-23, corresponding to 13% of gross farm receipts (OECD, 2024<sup>[3]</sup>). The longstanding *OECD Review of Fisheries* provides estimates of fisheries support policies in 40 economies accounting for 90% of global landings, with such support amounting to USD 10.4 billion annually over 2018-20 (OECD, 2022<sup>[4]</sup>). Estimates of the fiscal cost of government support for fossil fuels have also been available for many years from the OECD (OECD, 2024<sup>[5]</sup>), and data on fossil fuel subsidies from the IEA<sup>3</sup> and the IMF (Black et al., 2023<sup>[6]</sup>).

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<sup>1</sup> A forthcoming companion paper will present empirical evidence about some of the market implications of these subsidies.

<sup>2</sup> In this report, 'state enterprises' refer to companies that are owned, invested, or otherwise influenced by the state. This phrase recognises that governments can differ in their views of what constitutes a state-owned enterprise (SOE), which can carry different meanings in different legal contexts. See OECD (2024<sup>[17]</sup>) for a discussion.

<sup>3</sup> See [www.iea.org/topics/energy-subsidies](http://www.iea.org/topics/energy-subsidies) (accessed on 22 July 2024).

Only in the last few years have efforts been made to quantify government support in industrial sectors in a consistent manner. As in agriculture and fisheries, important initiatives in this space have taken place at the OECD (Box 1). This includes work undertaken for the Trade Committee (OECD, 2023<sup>[11]</sup>), for the Steel Committee (Mercier and Giua, 2023<sup>[7]</sup>), and for the Committee for Industry, Innovation and Entrepreneurship (CIIE) (Criscuolo et al., 2023<sup>[8]</sup>). An important contribution in this regard is the OECD's estimates of industrial subsidies for the largest manufacturing firms found in the recently finalised OECD MAGIC database.

The OECD MAGIC database is notable in that it seeks to identify and quantify industrial subsidies at the level of individual subsidy recipients, namely large manufacturing firms. This differs from other measurement approaches centred on the identification of subsidies at the level of providing authorities, and which hinge on governments offering enough public information on their support programmes. While the latter approaches make it easier to tie individual subsidies to country-level support policies, they can nonetheless give a misleading picture of the scope and scale of industrial subsidies in the case of less transparent jurisdictions (Chimits, 2023<sup>[9]</sup>).

Besides OECD work, recent initiatives include the New Industrial Policy Observatory (NIPO) dataset based on the Global Trade Alert, which collects information on state measures announced or implemented since the beginning of 2023 (Evenett et al., 2024<sup>[10]</sup>). This dataset provides a count of occurrences of subsidies for which information is available in the public domain. It does not, however, systematically quantify the support provided, hence giving equal weight to very large and very small support programmes. The coverage is thus affected by the level of granularity at which authorities report on individual subsidy programmes (e.g. whether they report individual transactions or only the broader support programme under which these transactions occur). More generally, the picture that emerges is affected by the extent to which authorities disclose their own subsidies to the public, which penalises the most transparent jurisdictions. Coverage of China's use of subsidy instruments is, for example, largely limited to government grants reported by publicly listed companies in China (Chimits, 2023<sup>[9]</sup>).

The use of firm-level information for measuring industrial subsidies solves many problems encountered at the country level but also has its own limitations. Firm-level information makes it possible to uncover subsidies provided by less transparent jurisdictions and those that occur at various levels of government (including at the level of individual municipalities, states, or provinces). It also enables the estimation of subsidies channelled through state enterprises acting as intermediaries, such as state banks, which may not otherwise be covered in subsidy assessments undertaken at the government level. Among the limitations inherent to the firm-level approach, the most obvious are issues related to sampling, given the inability to cover all firms in all sectors. This limits firm coverage to the largest firms in any given sector, for which information can generally be accessed through regular corporate disclosures. Another limitation concerns the varying quality of corporate disclosures in jurisdictions obeying different accounting standards and practices, which can affect international comparability. That said, the extent to which governments vary in the format and quality of their budgetary reporting is considerably greater than that seen between firms based in different jurisdictions.

Given the difficulties involved in measuring industrial subsidies, a plurality of approaches may be desirable to generate the evidence needed for an informed policy dialogue on related questions. Every approach has its advantages and drawbacks, with the choice of which method to use depending on the question at hand and the policy objective pursued. For the particular purpose of measuring distortions in international markets for manufacturing goods, the OECD has opted to rely on firm-level information in the form of the OECD MAGIC database.

### Box 1. OECD work on quantifying government support in industrial sectors

- Work undertaken for the Trade Committee:** Work on identifying and quantifying industrial subsidies for the Trade Committee began in late 2017 and led to the release of a first report in early 2019 on government support in the aluminium value chain (OECD, 2019<sup>[11]</sup>). This report was the first of a longer series, which aimed to provide new insights on government support from the perspective of individual subsidy recipient firms. Subsequent reports have covered: support for semiconductors (OECD, 2019<sup>[12]</sup>); support in the form of below-market finance (debt and equity) (OECD, 2021<sup>[13]</sup>); support for rolling stock (OECD, 2023<sup>[14]</sup>); and support in the form of energy inputs offered to companies at below-market prices (OECD, 2023<sup>[15]</sup>). These reports were summarised in 2023 in a synthesis report (OECD, 2023<sup>[1]</sup>). More recent work has since focussed on: the development and expansion of the OECD MAGIC database; the question of state enterprises and how they relate to industrial subsidies (OECD, 2024<sup>[17]</sup>); and support for producers of solar modules and wind turbines (OECD, 2025<sup>[16]</sup>).
- Work undertaken for the Steel Committee:** An initial report released in 2023 has already found subsidies to steel firms to be “pervasive”, with most measures identified aiming to extend steelmaking capacity or support new investment (Mercier and Giua, 2023<sup>[7]</sup>). Work is now continuing in the Steel Committee to further document the scale of government support to steelmakers and its relationship with steelmaking capacity. This work is partly draws on the OECD MAGIC database as one important source of information on subsidies in the steel industry.
- Work undertaken for the Committee for Industry, Innovation and Entrepreneurship (CIIE):** The OECD’s CIIE released to the public in 2023 the QuIS database (“Quantifying Industrial Strategies”), which estimates government expenditure for the purpose of industrial policy, including in the form of support for innovation, green technologies, jobs, and skills. As of July 2024, the QuIS database covers nine OECD Members (Canada, Denmark, France, Ireland, Israel, Italy, the Netherlands, Sweden and the United Kingdom) between 2019 and 2021 (Criscuolo et al., 2023<sup>[8]</sup>). The scope of policies covered includes tax expenditures, grants, government venture capital, loans and guarantees. Further work is expected to add more years and new countries to the database.

### **The OECD MAGIC database: A brief overview**

The OECD MAGIC database is a confidential firm-level database combining financial and economic data and estimates of government support at the level of each industrial group covered over the period 2005-22. It aims to help improve understanding of the scope and scale of government support in manufacturing and to enable analysis of how this support affects firms’ decisions and markets.

The OECD MAGIC database does not aim to cover all manufacturing sectors but instead concentrates on sectors producing either durable goods (e.g. capital goods) or industrial raw materials (e.g. aluminium, steel, and chemicals) (Table 1). Preference is given to products destined for other businesses (B2B), with the notable exception of automobiles, which are purchased by both businesses and households. This implies that the database does not cover manufacturing industries such as food products, beverages, tobacco products, textiles, wearing apparel, leather and related products, and domestic appliances. Services are also not covered unless they are provided attached to or embodied in manufactured products.

**Table 1. Sector coverage of the OECD MAGIC database (version 1.0)**

Short sector name	Full sector name	ISIC Rev.4 correspondence
AERO	Aerospace & defence	3030
ALUM	Aluminium	2420
AUTO	Automobile	2910
CEMT	Cement & other building materials	2394
CHEM	Chemicals	2011, 2013, 202X, 203X
FERT	Fertilisers	2012
GLAS	Glass, ceramics & refractories	231X, 2391, 2392, 2393
SEMI	Semiconductors	2610
SHIP	Shipbuilding	3011
SOLA	Solar photovoltaic cells & modules	2710
STEE	Steel	2410
TELC	Telecommunications network equipment	2630
TRAN	Rolling stock & signalling	3020, 2790
WIND	Wind turbines	2811

Source: OECD.

Version 1.0 of the OECD MAGIC database covers 482 consolidated industrial groups – including both publicly listed and non-listed companies – over 2005-22. The selected firms are the largest globally by sales revenue, output, or capacity in each of the 14 industrial sectors listed in Table 1, reaching sufficiently high sectoral coverage.<sup>4</sup>

The 482 firms covered in the MAGIC database are based in different jurisdictions, with the resulting geographical composition depending on these jurisdictions' relative strength in global manufacturing (Table 2).<sup>5</sup> The home jurisdiction of the companies is taken to be either the location of their headquarters or their main place of business (e.g. measured by tangible assets or employees) in cases where the location of their headquarters corresponds to inexistent or insignificant volumes of manufacturing activity. This helps mitigate the issue of multinationals choosing to locate their headquarters in low-tax jurisdictions.

Many of the companies covered are large multinationals, which implies that the subsidy values reported in the database often combine amounts obtained in the multiple jurisdictions in which they operate. This means that the headquarter country should not be assumed as the country providing all subsidies received by a given firm, particularly for large conglomerates operating in many different jurisdictions. For example, semiconductor firms based in the United States may be receiving support in China and Southeast Asia, while Asia- or Europe-based producers of chemicals may be receiving subsidies in the United States. One notable exception concerns companies based in China, which tend to produce mainly in China and obtain the vast majority of their subsidies from Chinese authorities.

<sup>4</sup> In some sectors, the resulting coverage can be as high as 80% of global sales.

<sup>5</sup> As the goal of the database is to measure subsidies in particular manufacturing sectors and not jurisdictions, not all OECD Members are included in the database, and more than half of the jurisdictions covered count only up to three firms since relatively few leading manufacturing groups are domiciled there.

**Table 2. Geographical composition of the OECD MAGIC database (version 1.0)**

Home base of firms	Number of firms	%
China	132	27%
EU-27	85	18%
United States	77	16%
Japan	43	9%
Other OECD	40	8%
India	21	4%
Korea	17	4%
Russia	15	3%
ASEAN	13	3%
Gulf Cooperation Council (GCC)	12	2%
Rest of the world	11	2%
Chinese Taipei	10	2%
Brazil	6	1%
<b>Total</b>	<b>482</b>	<b>100%</b>

Note: Other OECD comprises Australia, Canada, Colombia, Israel, Mexico, Norway, Switzerland, Türkiye and the United Kingdom. Rest of the world comprises Argentina, Egypt, the Islamic Republic of Iran, Morocco, Nigeria, South Africa and Ukraine. Not all members of the European Union (EU), the Gulf Cooperation Council (GCC), and the Association of Southeast Asian Nations (ASEAN) are covered in the database. Source: OECD MAGIC database.

Another consequence of looking at subsidies obtained by firms – as opposed to subsidies provided by governments – is that the MAGIC database does not identify policy objectives and design characteristics (e.g. eligibility criteria) of subsidies. Thus, the data do not distinguish between one-off crisis measures and longstanding industrial policies seeking to durably affect firm behaviour. That said, in showing the persistence of various forms of support over time the database can shed light on the role of government support in shaping the market in a given sector. Moreover, while the MAGIC database does not differentiate between measures targeting R&D and those targeting investment in new industrial capacity, these issues have been explored in related sectoral studies.<sup>6</sup>

As of version 1.0, the OECD MAGIC database covers three types of subsidies:

- Annual values for **government grants** are obtained directly from primary sources, which are generally corporate disclosures but can also include at times government sources (while avoiding double counting).
- Estimates of **corporate income tax concessions** in the OECD MAGIC database do not refer to the tax revenue foregone by governments (i.e. tax expenditures) but to the tax savings of companies due to particular provisions of the tax code of the jurisdictions in which these companies operate. The estimates are primarily based on corporate disclosures and involve some amount of interpretation, judgment, and estimation by the OECD, such as where only certain subsidiaries of a group are eligible to a preferential rate of corporate income tax. Tax concessions are generally less internationally comparable than government grants owing to international differences in statutory tax rates.
- **Below-market borrowings** are estimated by the OECD by comparing actual interest rates that firms are charged on their borrowings against hypothetical benchmark interest rates that would normally prevail in the market based on borrowers' financial profile. The resulting differences are multiplied by the amount of debt to arrive at the volume of below-market borrowings for each year. Because below-market borrowings generally involve state banks offering loans at below-market

<sup>6</sup> See earlier OECD studies of government support in the aluminium, semiconductor and rolling-stock value chains (OECD, 2019<sup>[11]</sup>; OECD, 2019<sup>[12]</sup>; OECD, 2023<sup>[14]</sup>).

rates, they tend to be much more common in jurisdictions in which the state plays a large role in the financial system.

While the OECD MAGIC database represents a very significant improvement in the availability of data on industrial subsidies, it does not exhaust all possible ways in which governments can subsidise industrial companies. The full spectrum of possible support measures can include, for example, the effect of differential treatment in relation to regulatory measures or support resulting from export restrictions on upstream inputs. OECD estimates of the monetary value of below-market energy inputs exist for several firms and sectors but do not yet have sufficient coverage to warrant inclusion in the MAGIC database (OECD, 2023<sup>[15]</sup>). OECD estimates of the value of government land acquired or rented by firms at below-market prices are, for their part, non-existent due to a lack of sufficient data and methodological difficulties. However, anecdotal evidence does indicate that below-market land may confer significant benefits to certain industrial firms. These examples suggest that there is still room for further improvements in the measurement of industrial subsidies and analysis thereof.

Monetary variables in the OECD MAGIC database are expressed in millions of current USD. They are converted from firms' original reporting currencies using nominal, yearly-average exchange rates from the OECD and the IMF. Since many firms in the database are multinationals operating across several jurisdictions, the choice is made not to correct for inflation given the complications involved in choosing adequate deflators. This implies that changes in subsidy amounts can reflect policy changes but also differences in inflation rates and exchange rate movements.

Despite best efforts, the time coverage for several companies is shorter than 18 years. In most cases, this results from a late entry (firms entered a sector after 2005), early exit (firms left a sector before 2022), or mergers. In fewer cases, it stems from missing data. Overall, the time coverage is generally good for the 2010-22 period, but is limited in certain sectors (e.g. aluminium, shipbuilding, and solar cells and modules) over the 2005-09 period.

Revenue shares used in the analysis of market shares in this report are based on the sample of companies covered in the OECD MAGIC database, augmented with data for a number of large companies missing from the database but for which information on sales revenue could be found. This notably includes large conglomerates for which segment-specific information is generally not available beyond just revenue (e.g. Hitachi Rail or the wind-turbine business of Siemens before its acquisition of Gamesa).<sup>7</sup> In other cases, revenue was approximated using information on production volumes by companies multiplied by market prices where companies specialise in the production of relatively homogeneous products (e.g. aluminium smelters). Finally, in other cases where revenue data are only missing for one or two years, the missing observations were linearly interpolated and verified to eliminate inconsistencies. While not comprehensive, the resulting set of revenue shares provides a reasonable approximation of actual global market shares for all key players in the 14 sectors covered by the OECD MAGIC database.

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<sup>7</sup> In the case of multi-product conglomerates, the OECD MAGIC database normally includes additional variables labelled "segment-specific" (e.g. segment-specific revenue or segment-specific assets) wherever such data are available. These additional, segment-specific variables aim to capture only the activities matching most closely the sectors covered in the OECD MAGIC database to provide a more meaningful view of total sector size and average profits. As an example, the entries for Samsung Electronics under the semiconductor sector of the database include a number of segment-specific variables seeking to capture the semiconductor part of the group's activities, thereby leaving out displays or mobile phones. The market-share estimates described in this report are based on these segment-specific variables where applicable.

## 2. Key stylised facts about industrial subsidies

Analysis of the OECD MAGIC database reveals five consistent patterns in the way governments offer support to companies across industrial sectors and years, as well as stylised facts about the evolution of firms' market shares.

### ***Subsidies and their types differ across countries and sectors***

Governments make use of a variety of instruments to support industrial firms. Government grants, corporate tax concessions, and below-market borrowings are all significantly utilised and no one instrument appears to take overwhelming precedence over the others in monetary terms.

Some subsidy instruments are, nevertheless, more commonly used in certain sectors owing to industry specificities (Figure 1; Panel A). High-tech sectors, making an intensive use of intangibles (e.g. aerospace and semiconductors), tend to attract relatively more below-market equity from governments and tax concessions for investing in R&D and in physical assets (OECD, 2021<sub>[13]</sub>). Heavy industries (e.g. aluminium smelting, cement and fertilisers) are, for their part, energy-intensive and rely more on debt financing, which generally leads them to receive more below-market energy inputs and below-market borrowings (OECD, 2023<sub>[15]</sub>).<sup>8</sup>

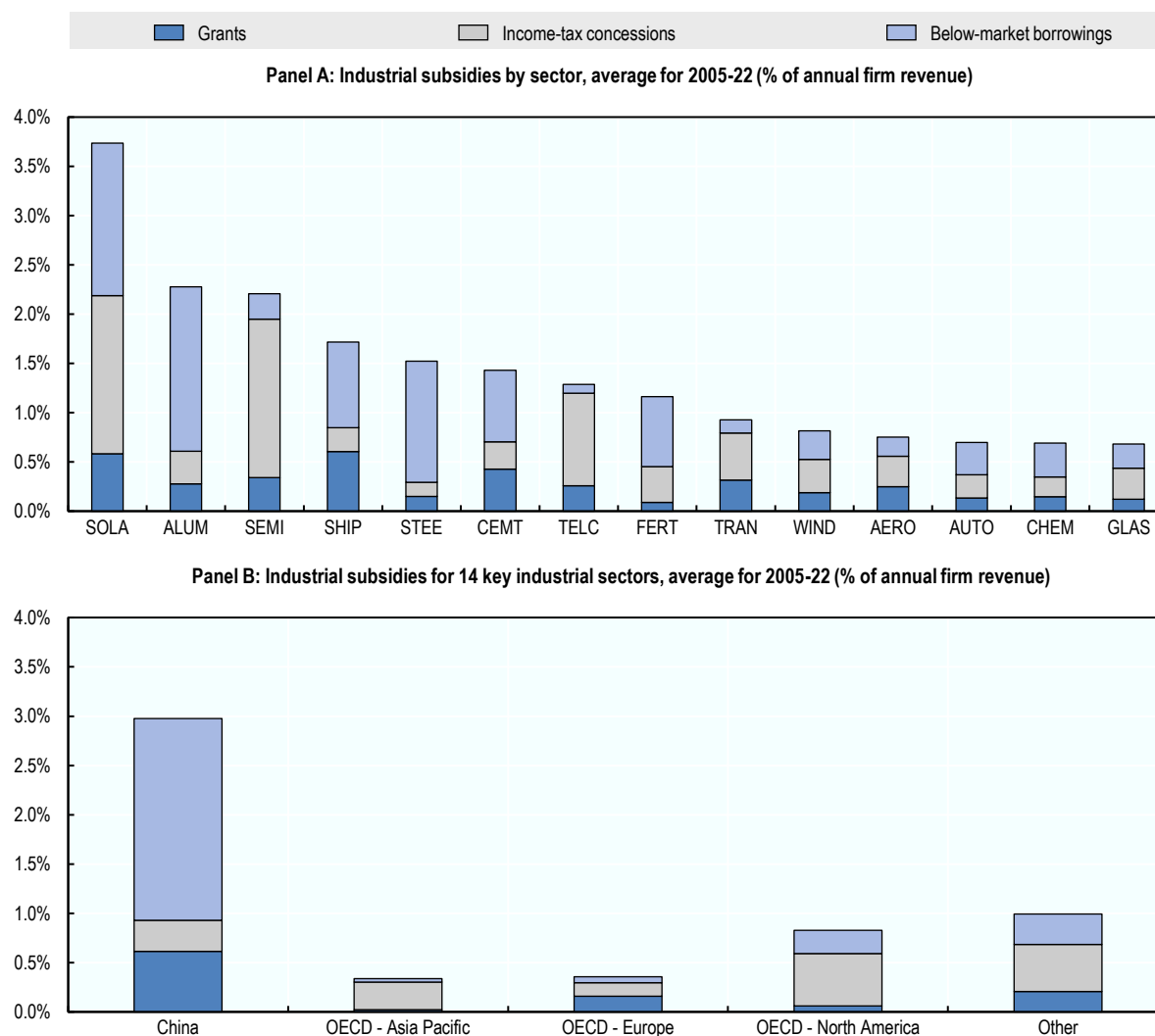
There are also notable differences in the mix of instruments used in different jurisdictions, with some relying relatively more on grants (e.g. the European Union) while others rely relatively more on corporate tax concessions (e.g. Japan, Southeast Asian countries, and the United States) (Figure 1, Panel B). Overall, subsidies (relative to firm revenue) are found to be larger for firms based in China than for those based in other jurisdictions, particularly when it comes to below-market borrowings.<sup>9</sup> This finding is consistent with other quantitative accounts of China's subsidies or industrial policy (DiPippo, Mazzocco and Kennedy, 2022<sub>[18]</sub>; Chimits, 2023<sub>[9]</sub>). However, it differs from analyses using a simple count of those subsidies for which public information exists, which imply that advanced economies have introduced more industrial policy measures than China (Evenett et al., 2024<sub>[10]</sub>; Juhász, Lane and Rodrik, 2023<sub>[19]</sub>).<sup>10</sup>

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<sup>8</sup> Below-market equity from governments and below-market energy inputs are not covered at present in the OECD MAGIC database. For a discussion and illustrative estimates of the support they confer to industrial producers, see OECD (2021<sub>[13]</sub>) and OECD (2023<sub>[15]</sub>), respectively.

<sup>9</sup> China's relatively larger reliance on below-market borrowings partly stems from Chinese authorities' greater control over the banking system, whereby state banks are regularly instructed by authorities to support government industrial objectives by lending at rates close to the base lending rate (OECD, 2024<sub>[17]</sub>).

<sup>10</sup> These studies also look at subsidies from the perspective of grantors, i.e. the number of governments' support programmes, in contrast to the OECD MAGIC database, which looks at subsidies from the perspective of recipient firms. As noted above, counts of subsidies can be heavily influenced by the way in which the jurisdiction reports them; that is, whether subsidies are reported as individual measures (which affords greater transparency) or as aggregate programmes.

**Figure 1. Subsidies and their types differ across countries and sectors**

Note: Full sector names are shown in Table 1. Panel B shows only jurisdictions and regions for which the database has enough companies to warrant an average. The pooled category "Other" here includes Brazil, India, Indonesia, Malaysia, Russia, Saudi Arabia, South Africa, and several other smaller jurisdictions for which only a few firms are covered.

Source: OECD calculations based on the OECD MAGIC database.

There are also important differences between firms in the extent to which their production activities and sales are international (Table 3), with implications for the subsidies they receive. While domestic market size evidently explains much of the differences in internationalisation, it is not the only factor; policies such as trade barriers, standards, and discriminatory government procurement also play a role (OECD, 2023<sup>[14]</sup>). Several multinationals covered in the database earn more subsidies through their operations abroad than from their home jurisdictions.<sup>11</sup> For example, the foreign operations of several multinationals based in the United States have enjoyed tax concessions in China and Southeast Asia (e.g. Malaysia and Singapore), and the foreign operations of some groups based in Europe, Japan, and Korea have benefitted from subsidies in China and the United States. By contrast, most of the subsidies that China-based firms obtain

<sup>11</sup> Many of the companies covered are large multinationals, which implies that the subsidy values they report often combine amounts obtained in the multiple jurisdictions in which they operate. Thus, the headquarter country should not be assumed to provide all subsidies to a given firm.

appear to come from Chinese authorities at different levels of government, which makes it easier in this case to equate the origin of these firms' subsidies and their home jurisdiction.

**Table 3. Firms differ significantly in their share of international sales**

Domestic revenue as a percentage of total revenue, weighted average for the period 2005-22

	China	OECD - Asia & Pacific	OECD - Europe	OECD - North America	Other
Aerospace & defence (AERO)	84%	58%	27%	58%	40%
Aluminium (ALUM)	95%	3%	15%	54%	32%
Automobile (AUTO)	96%	37%	25%	60%	39%
Cement & other building materials (CEMT)	95%	77%	9%	37%	80%
Chemicals (CHEM)	83%	57%	14%	39%	47%
Fertilisers (FERT)	87%	n.a.	16%	27%	41%
Glass, ceramics & refractories (GLAS)	71%	34%	24%	38%	49%
Semiconductors (SEMI)	38%	18%	12%	20%	16%
Shipbuilding (SHIP)	35%	54%	19%	n.a.	51%
Solar photovoltaic cells & modules (SOLA)	33%	34%	34%	52%	n.a.
Steel (STEE)	86%	68%	29%	84%	50%
Telecommunications network equipment (TELC)	50%	78%	4%	52%	n.a.
Rolling stock & signalling (TRAN)	92%	62%	18%	33%	90%
Wind turbines (WIND)	94%	n.a.	21%	44%	56%

Note: The percentages above are averages weighted by firms' revenue. n.a. stands for not available. OECD Europe includes firms headquartered in EU Member States covered by the database, as well as Norway, Switzerland, and the United Kingdom. OECD North America includes firms headquartered in Canada, Mexico, and the United States. OECD Asia & Pacific includes firms headquartered in Australia, Japan, and Korea. See Table 2 for a description of other countries.

Source: OECD calculations based on the OECD MAGIC database.

### ***Subsidies are pervasive***

One striking feature of the subsidies measured in the OECD MAGIC database is how pervasive they are. Only less than 3% of all firms did not receive any type of subsidies in any year. No subsidies (genuinely zero values) were reported for only 8% of firm-year observations, excluding missing observations. By contrast, around half of the firms received at least one type of government support (grants, tax concessions or below-market borrowings) every year during the period for which data are available and around 90% of firms benefited from at least one subsidy for half of the period for which data are available or longer (Figure 2). This implies that the receipt of government support is pervasive, although the precise form of this support can vary over time.<sup>12</sup>

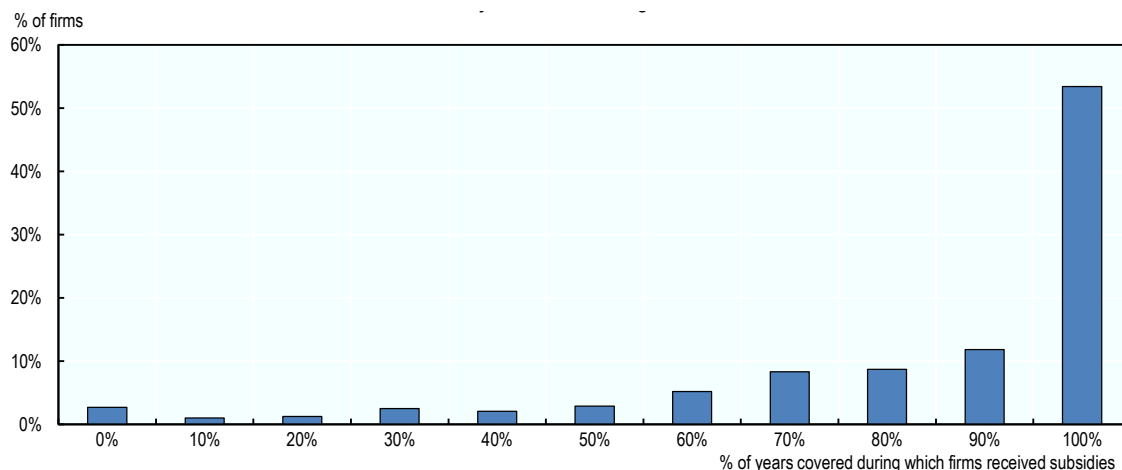
The ubiquity of subsidies could reflect a range of factors, including lobbying by firms or political incentives to maintain government support. Some measures could also be persistent by design. For instance, tax concessions to support R&D and other forms of investment that are seen as a desirable means of overcoming persistent market failures can be a permanent feature of the corporate tax code. Moreover, persistent government support could be part of multi-year government industrial policy strategies, reflecting the fact that, in some manufacturing sectors, large investments over several years are needed to start or expand a business. The sectors characterised by longstanding government support (aerospace and

<sup>12</sup> As explained in Section 1 of this report, for some companies, the coverage of all three forms of subsidies varies over time, implying that in some years the data show only one or two forms of subsidies. Therefore, while persistence in receiving government support can be seen, analysis of the persistence of any specific form of subsidy is more complicated. This pattern is true of other sectors: government support in the agriculture sector is also remarkably persistent in many countries, even if the composition of individual support measures evolves over time (OECD, 2024<sup>[3]</sup>).

defence, automobiles, semiconductors, and solar photovoltaic cells and modules) are all characterised by high R&D intensity and, in some cases, are increasingly argued to be linked to non-economic objectives (such as national security and the low-carbon transition).

## Figure 2. Around half of the firms received subsidies in all years for which data are available

Distribution of the % of years covered during which firms received subsidies



Note: Because the period covered varies across firms in the OECD MAGIC database, the comparison of the duration of subsidies is relative to the number of years that each firm is covered in the database. Bins on the x-axis are left-handed such that 0% indicates those firms having received subsidies for up to, but not including, 10% of the time.

Source: OECD calculations based on the OECD MAGIC database.

### ***Subsidies are relatively modest on average in most countries, but their distribution is highly skewed***

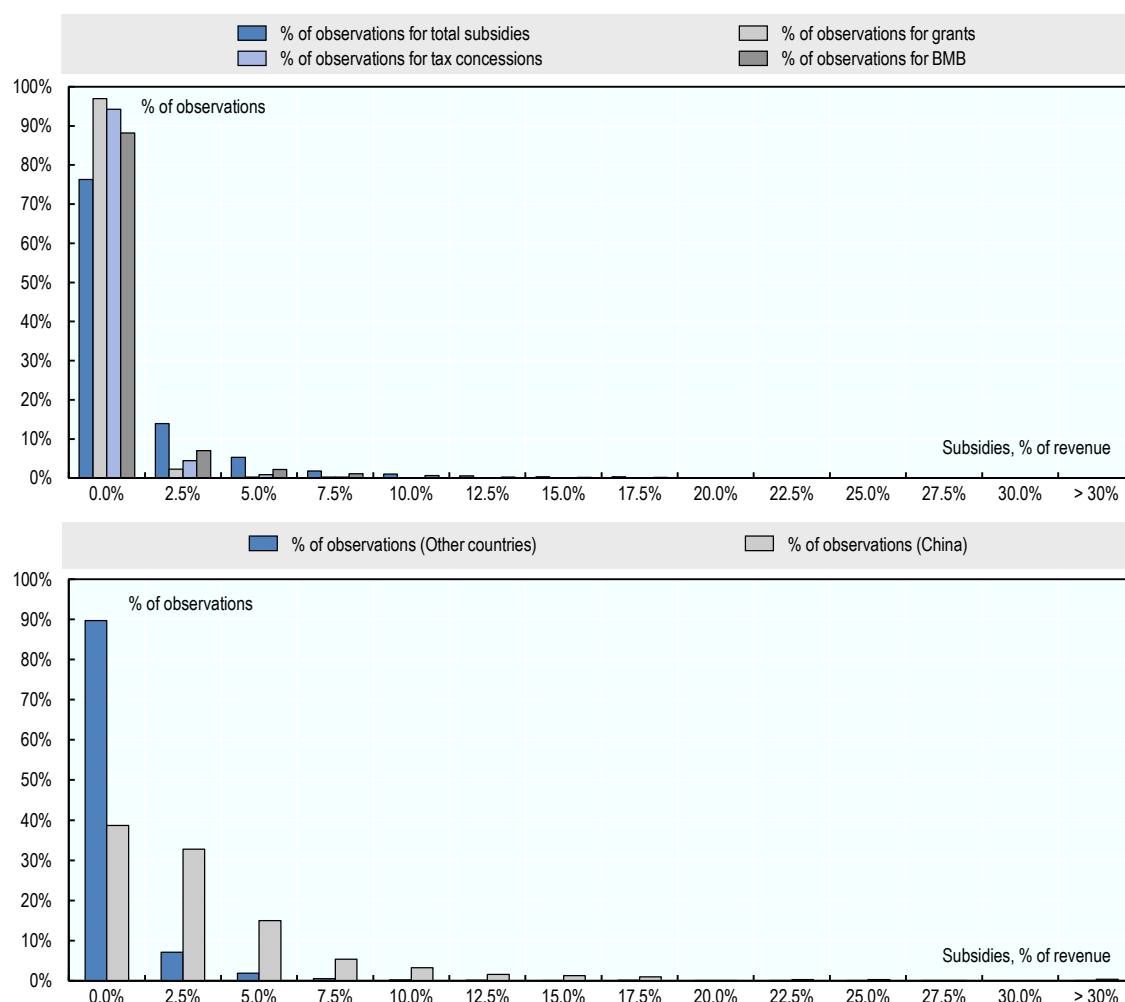
For most firms, subsidies are modest relative to their revenue and production costs. The median annual total subsidy across all firms and the whole sample is 0.7% of revenue (or 0.9% of production costs) (Figure 3).<sup>13</sup> Subsidies are larger relative to firms' investment in fixed tangible assets (i.e. net property, plant, and equipment), with a median of nearly 9%.<sup>14</sup> Measuring subsidies in relation to investment could be more relevant as subsidies are often tied to investment to increase or maintain productive assets, which enable future revenue and profits. Moreover, it is important to note that, even while subsidies can be small as a share of a firm's size, they can still have a significant economic impact on individual transactions or investment decisions.

<sup>13</sup> Although not shown in Figure 3, the distribution of subsidies expressed as a percentage of firms' cost of sales is very similar to that of subsidies expressed as a percentage of firms' revenue.

<sup>14</sup> Investment in fixed tangible assets is measured here as the yearly change in property, plant and equipment assets corrected for depreciation (both measured at book values). The median for the whole sample of annual observations increases to almost 12% of investment when negative investment values are excluded. When looking at average subsidies and average investment over the whole lifespan of firms (to smooth potential outliers), the median of their ratio was around 15%.

In addition, given the numerous subsidy programmes announced by governments in recent years in several sectors covered by the OECD MAGIC database (OECD, 2023<sup>[1]</sup>; Millot and Rawdanowicz, 2024<sup>[2]</sup>), subsidies could have increased substantially as of 2023. These higher subsidies will become visible in future versions of the OECD MAGIC database.

**Figure 3. Subsidies tend to be modest relative to firms' size**



Note: Bins on the horizontal axis are left-handed such that 0% indicates those firms having received subsidies for up to, but not including, 2.5% of annual revenue.

Source: OECD calculations based on the OECD MAGIC database.

The distribution of subsidies is highly skewed. While subsidies scaled by revenue or production costs are small on average in the manufacturing sectors covered, there are instances of relatively large subsidies for a few firms. Very high subsidies are concentrated mainly among companies based in China (around 80% of the 75 observations with a ratio of subsidies to revenue of more than 15%; Figure 3). In several such cases, the subsidies are granted to the same companies for at least four years, including in the aluminium, cement, glass, and semiconductor industries.

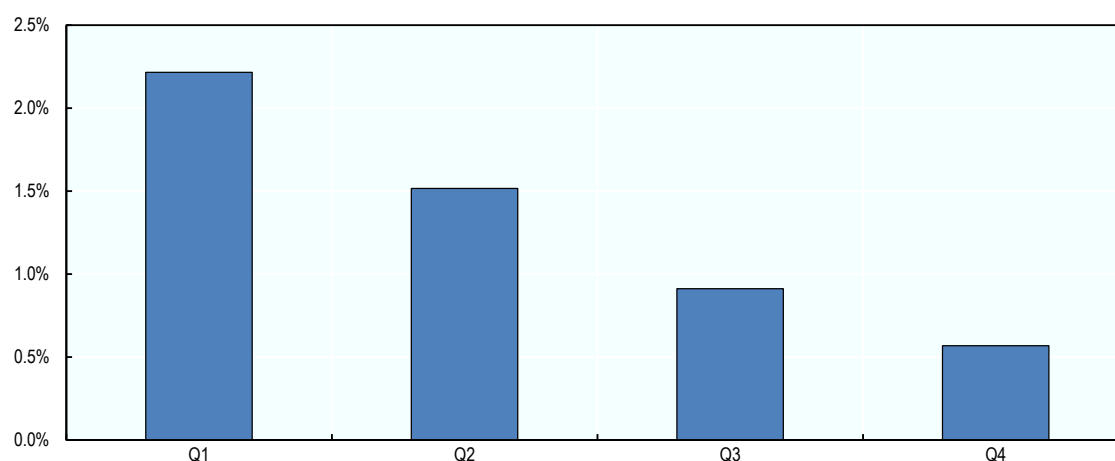
The distribution of subsidies is very skewed for each of the three subsidy types covered. Among the 482 companies covered over the period 2005-22 in the OECD MAGIC database, the median value of below-market borrowings is, for example, zero, with positive values only starting to be discernible at the 60<sup>th</sup> percentile. However, top recipients receive large amounts, averaging 3% and 12% of revenue for the

top 10% and 1% of the distribution, respectively. Thus, the data suggest that industrial subsidies obey a power law, as opposed to behaving like a typical variable distributed normally around a central value.<sup>15</sup>

Subsidies appear to increase less than proportionally with the size of companies, resulting in generally smaller subsidy-to-revenue ratios for larger firms (Figure 4). This suggests the existence of explicit or implicit upper limits on the amounts of subsidies that governments provide, be it for fiscal or political reasons, or simply because some subsidies are meant to finance projects at a given scale, irrespective of the size of participating companies. This can be the case for grants, with programmes being generally bound by their budgetary limits. Tax concessions are often tied to the amount of taxable income earned by companies. If the largest companies are better at lowering their tax liabilities, this could also explain the skewness in the distribution of subsidies. Larger companies may also have easier access to capital markets, allowing them to rely relatively more on bond financing and thus reducing the scope for bank financing on below-market terms. In addition, if young companies with small market shares or firms experiencing financial problems and a decline in revenue are more likely to receive generous subsidies, this could be another factor explaining the shape of the distribution.

#### Figure 4. Distribution of subsidy-to-revenue ratios by revenue quartiles

Subsidies as a % of revenue, by revenue quartile



Note: The graph shows the distribution of the subsidy-to-revenue ratios for the entire sample of firm-year observations. The bars correspond to the weighted average ratio of subsidies to revenue in each quartile of the revenue distribution. Q1 corresponds to the lowest revenue quartile.

Source: OECD calculations based on the OECD MAGIC database.

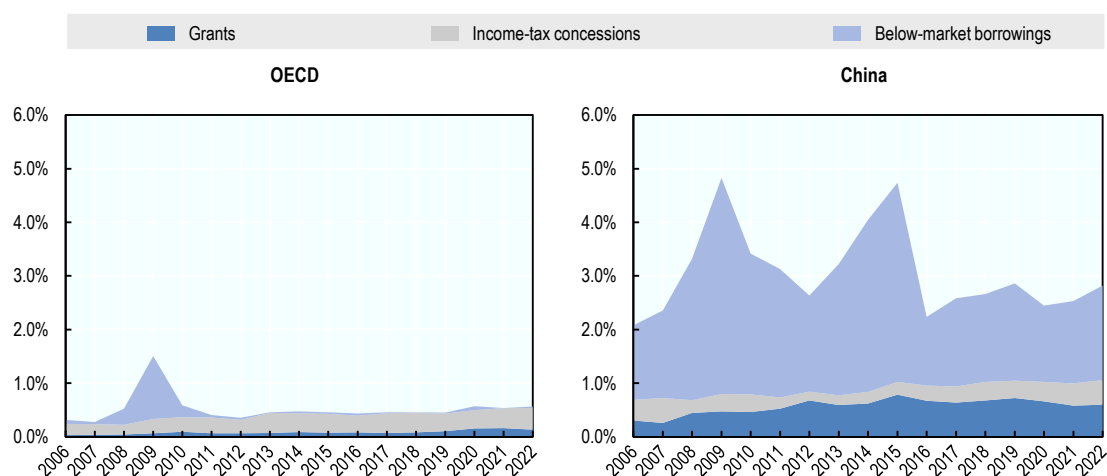
<sup>15</sup> Power laws, or scaling laws, have been used often in economics to describe the distribution of city sizes or firm sizes (Gabaix, 2016<sup>[21]</sup>). An early example of a power law in economics is the eponymous Pareto distribution of wealth, whereby 20% of individuals were said to be owning 80% of all land in Italy at the time. The Pareto distribution has since seen many applications in different areas. In the case of firm sizes, one important implication of power laws is that idiosyncratic shocks affecting large firms can have aggregate consequences for the economy as a whole, such as where a shock to Samsung affects Korea's entire GDP (Gabaix, 2011<sup>[22]</sup>).

## Governments often rely on below-market finance to help distressed firms

The use of below-market borrowings is common in capital-intensive heavy industries and in China, but also to support distressed firms during crises. In OECD Member countries, the most evident case is the rescue of carmakers during the global financial crisis of 2008-09 (Figure 5). High-profile examples include the emergency rescue of Michigan-based carmakers through a US Treasury loan of a cumulative USD 63.5 billion to General Motors and Chrysler to avoid a costly and disorderly failure of the two companies (Goolsbee and Krueger, 2015<sup>[20]</sup>).<sup>16</sup> Likewise, the French authorities offered EUR 6.2 billion in emergency loans in 2009 to carmakers Renault and PSA in a bid to prevent mass lay-offs and the closure of production sites in the country.<sup>17</sup> In China, support through below-market borrowings is widely used even in normal times, but there have been two notable spikes in its use in relation to crises. The first spike in subsidies was driven by the stimulus package adopted in response to the global financial crisis, while the increase in 2015 coincided with a stock-market crash and falling steel and aluminium prices, contributing to significant losses for many metal producers and another round of stimulus.<sup>18</sup>

**Figure 5. Below-market borrowings increase during crises**

Percentage of revenue



Note: The graphs above are for all 14 sectors covered by the OECD MAGIC database (Table 1). The geographical split is based on the countries where firms are based, which can at times differ from the jurisdictions providing the support (e.g. where an OECD-based firm receives support in a non-OECD Member).

Source: OECD MAGIC database.

<sup>16</sup> The rescue package also included loans from Export Development Canada and Mexican Development Banks, in reflection of the highly integrated nature of the auto value chain in North America. As condition for receiving the loans, the US Treasury oversaw the restructuring of the companies through bankruptcy and, in the case of Chrysler, proceeded to merge the company with Italian group Fiat. Fiat later went on to fully integrate Chrysler to form FCA, which has now become Stellantis through a merger with French group PSA. Both General Motors and Chrysler repaid the loans they obtained from the US Treasury.

<sup>17</sup> For example, see [www.lemonde.fr/la-crise-financiere/article/2009/02/09/6-milliards-d-euros-pour-soutenir-renault-et-psa\\_1152542\\_1101386.html](http://www.lemonde.fr/la-crise-financiere/article/2009/02/09/6-milliards-d-euros-pour-soutenir-renault-et-psa_1152542_1101386.html) (accessed on 1 August 2024). The loans were eventually repaid ahead of schedule in 2011.

<sup>18</sup> The average return on assets (before tax, revenue weighted) of the Chinese steel companies covered in the OECD MAGIC database reached a low of -1.5% in 2015, compared with an average of 2.9% over the period 2006-22.

During the COVID-19 pandemic, many OECD governments also provided loans to companies affected by the crisis. However, most manufacturing firms covered by the OECD MAGIC database do not seem to have benefitted from them, given the modest increase in subsidies seen in 2020 (Figure 5). There are several possible reasons for this, starting with the fact that many large manufacturing firms did not experience a dramatic fall in sales and profits in 2020 and 2021, unlike firms in services sectors such as transportation, retail, food, and tourism. Some manufacturing sectors even performed relatively well given demand shifts, such as the semiconductor industry. Although comprehensive information is not available for all countries, data from Banque de France indicate that French micro-enterprises obtained as much as 89% of all government-guaranteed loans provided by authorities in response to the pandemic (OECD, 2021<sub>[13]</sub>).<sup>19</sup> Many of the beneficiaries were automobile repair shops, hotels, restaurants, and construction companies, and not large manufacturing enterprises.

Although this is not covered at present in the OECD MAGIC database, governments have also provided emergency equity to ailing companies. During the global financial crisis, the US Treasury took, for example, temporary equity stakes of 61% and 10% in General Motors and Chrysler, respectively, in addition to the aforementioned loans.<sup>20</sup> There have been also several examples of government equity injections benefitting private firms for idiosyncratic reasons. Japanese state-backed fund INCJ acquired a 69% stake in domestic chipmaker Renesas in 2013 at a time the company was incurring important losses.<sup>21</sup> Between 2015 and 2017, the Korean Development Bank and the Export-Import Bank of Korea offered debt-equity swaps to Daewoo Shipbuilding & Marine Engineering in a bid to improve the company's balance sheet.<sup>22</sup> Chinese electric carmaker Nio was rescued by the Hefei municipality and the Anhui province in 2020.<sup>23</sup> Aluminium smelter China Hongqiao – then the world's largest aluminium smelter by volume – received a CNY 20 billion credit line and a CNY 5 billion equity infusion by the state investment group CITIC in 2017.

While it is often associated with the rescue of companies in distress, the provision of government equity on non-market terms can also be used for more strategic purposes, including in support of industrial upgrading. Recent examples include the several government guidance funds established by Chinese central and subcentral authorities to inject equity from state entities into national champions (OECD, 2024<sub>[17]</sub>). The China Integrated Circuit Industry Investment Fund (known as the “Big Fund”) has, in particular, played an important role in supporting the expansion of domestic firms throughout the semiconductor value chain (OECD, 2019<sub>[12]</sub>). These examples demonstrate that while below-market finance tends to peak in times of crisis, it can also form part of a broader eco-system of government support in the context of a state-led manufacturing push. Because the OECD MAGIC database currently does not cover below-market equity, the estimates presented in this report should thus be considered conservative.

Several reasons could explain why governments rely relatively more on below-market finance (debt or equity) to support distressed firms during crises. Tighter financial conditions during crises restrict companies' access to capital markets, which can lead to an increase in governments' provision of funding to firms in such times. Loans from state financial institutions or injections of equity into firms can also be

<sup>19</sup> Micro-enterprises have less than ten employees and annual revenue below EUR 2 million.

<sup>20</sup> These equity stakes were subsequently sold, with the US Treasury having fully exited its remaining stakes in the two carmakers by December 2013. See <https://home.treasury.gov/news/press-releases/jl2236> (accessed on 26 August 2024).

<sup>21</sup> INCJ has since sold its shares in Renesas. See [www.japantimes.co.jp/business/2023/11/10/companies/incj-sells-renesas-shares/](http://www.japantimes.co.jp/business/2023/11/10/companies/incj-sells-renesas-shares/) (accessed on 1 August 2024).

<sup>22</sup> See [www.businesskorea.co.kr/news/articleView.html?idxno=16355](http://www.businesskorea.co.kr/news/articleView.html?idxno=16355) (accessed on 1 August 2024). Daewoo Shipbuilding & Marine Engineering was eventually sold to the Hanwha group in 2022 and renamed Hanwha Ocean.

<sup>23</sup> According to Nio's annual report for 2021, these “Hefei strategic investors” invested CNY 7 billion in cash into the company and asked as a condition that Nio move its headquarters from Shanghai to the Hefei Economic and Technological Development Area. Hefei strategic investors have since reduced their holdings of Nio shares.

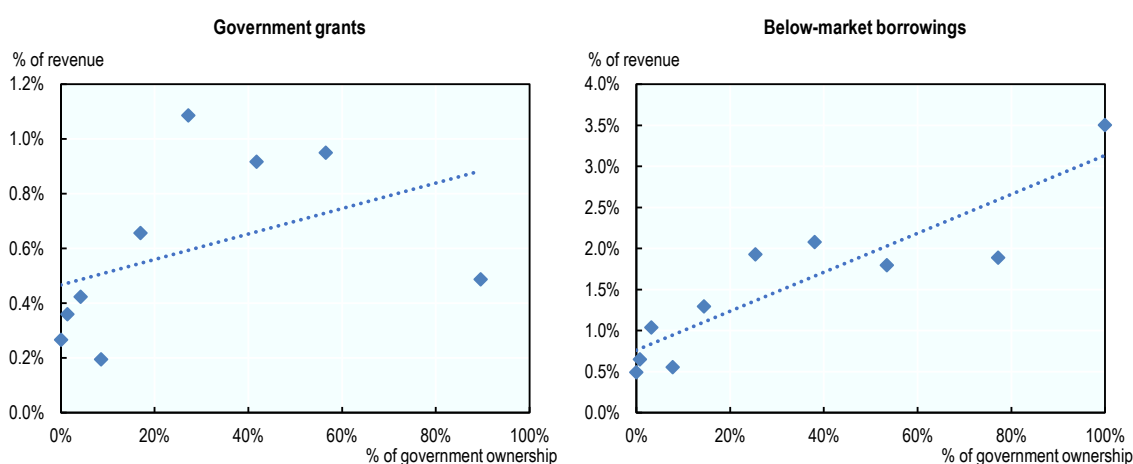
mobilised quickly, with the added effect of directly improving companies' balance sheets in the case of equity instruments. By contrast, government grants may, for instance, require lengthy legislative approval in parliament, often in the context of broader legislation process subject to compromise and amendments. Significant time can also elapse before eligible projects are identified and grants effectively disbursed to recipients. Meanwhile, companies often need to earn a profit (i.e. taxable income) to benefit from tax concessions. This limits the usefulness of such concessions in the case of lossmaking firms, together with the fact that it can take time for these measures to provide relief to companies.<sup>24</sup>

### **State enterprises receive relatively more grants and below-market borrowings**

As shown in earlier OECD reports (OECD, 2021<sup>[13]</sup>; OECD, 2024<sup>[16]</sup>), state enterprises are not only important providers of support to other firms, but also generally larger recipients of support than their private competitors, reflecting only in part greater government ownership of companies in China. The OECD MAGIC database confirms this finding for government grants and below-market borrowings, with government ownership of companies correlating positively with the amount of subsidies they receive relative to their size (Figure 6). However, the correlation is negative for income-tax concessions. This is partly due to the smaller presence of state enterprises in high-tech industries and in the production of solar photovoltaic cells and modules, where tax concessions tend to be the highest (as noted earlier).<sup>25</sup> It is also because private companies are more likely to have a larger international footprint and are thus more likely to receive tax incentives to locate their activities in a specific jurisdiction.

**Figure 6. State enterprises are generally larger recipients of support than private firms**

Binned scatterplots



Note: The binned scatterplots above average many observations into ten or fewer individual bins to improve readability.

Source: OECD calculations based on the OECD MAGIC database.

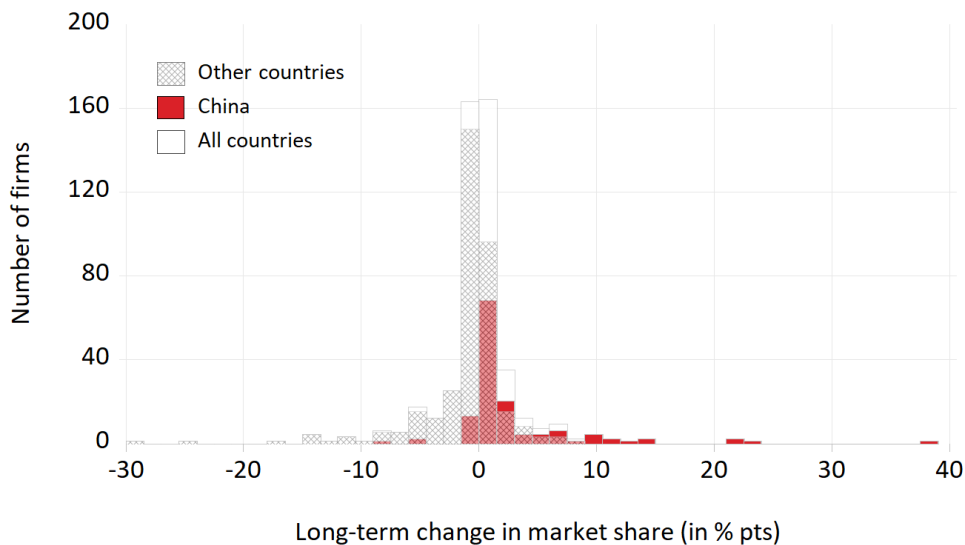
<sup>24</sup> With the notable exception of refundable or transferrable tax credits, which can still benefit lossmaking firms.

<sup>25</sup> For example, and unlike other sectors, China's solar industry largely consists of private firms established in the early 2000s.

### **While generally stable, market shares of large manufacturing firms reveal a shift away from OECD Member countries and toward China**

Market shares as observed in the OECD MAGIC database tend to be stable. The median absolute change in market shares over periods at least five years long is 0.8 percentage point (Figure 7).<sup>26</sup> The distribution for the total sample masks some differences between China and other jurisdictions. The distribution of changes for China-based companies is skewed slightly to the right, implying more frequent gains than losses in market share. The opposite is true for firms based in other jurisdictions.<sup>27</sup> This dichotomy is also evident in the analysis of firms with the largest market share gains and losses. China-based companies dominate the former group, especially in the shipbuilding, solar photovoltaic cells and modules, rolling stock and signalling, and aluminium sectors (Figure 8). In contrast, the group of firms with the largest market share losses mostly includes firms based in OECD Member countries.

**Figure 7. Distribution of longer-term changes in market shares**



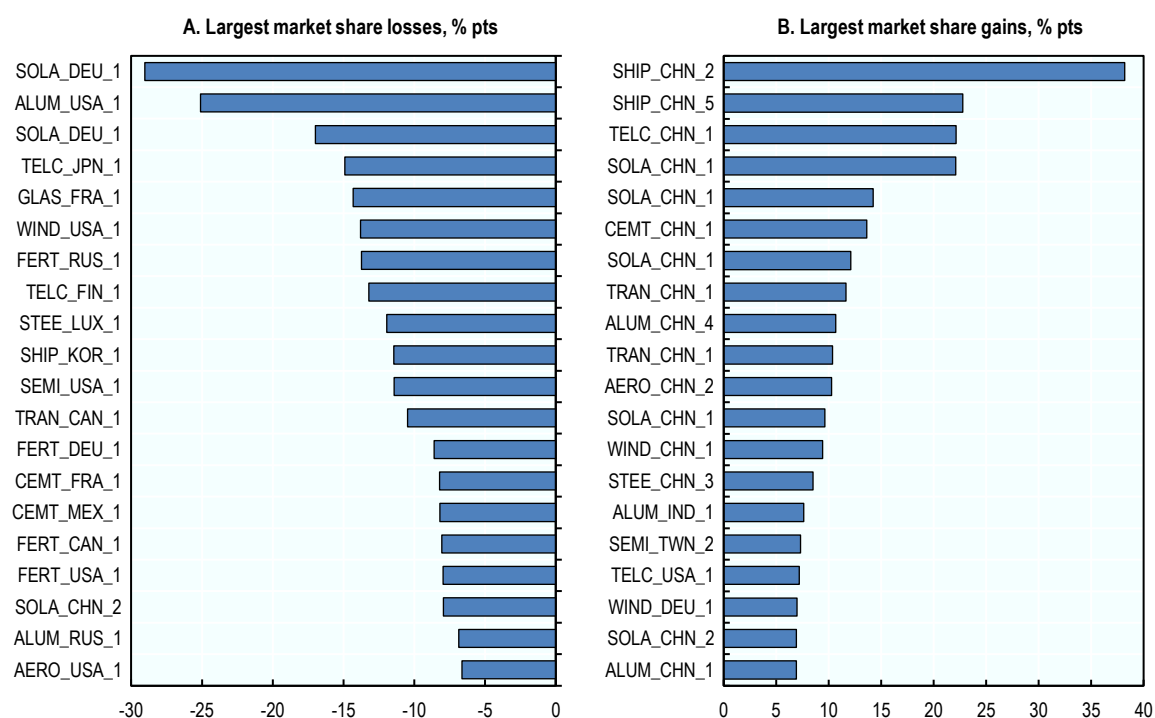
Note: The graph includes all firms with at least five years of observations for market shares. The period over which the change in market share is observed differs across firms, depending on the number of years for which they are covered in the OECD MAGIC database. The distribution uses right-closed bin intervals, implying that the first bar left of the value of zero contains firms with no change in market share.

Source: OECD calculations based on the MAGIC database.

<sup>26</sup> The distribution for all firms is asymmetric due to combining 14 markets (manufacturing sectors) and varying periods for calculating longer-term market share changes. This is due to different lengths of available time series across firms. The median market share level for all firms and years is 1.5%. Solar photovoltaic cells and modules, telecommunications and network equipment, and wind turbines are the three most concentrated sectors, with significantly higher median market shares of 6%, 11% and 5%, respectively.

<sup>27</sup> The median long-term change in market share for China-based firms is 0.9 percentage point, while for other firms it is -0.1 percentage point.

**Figure 8. China-based firms made larger market share gains**



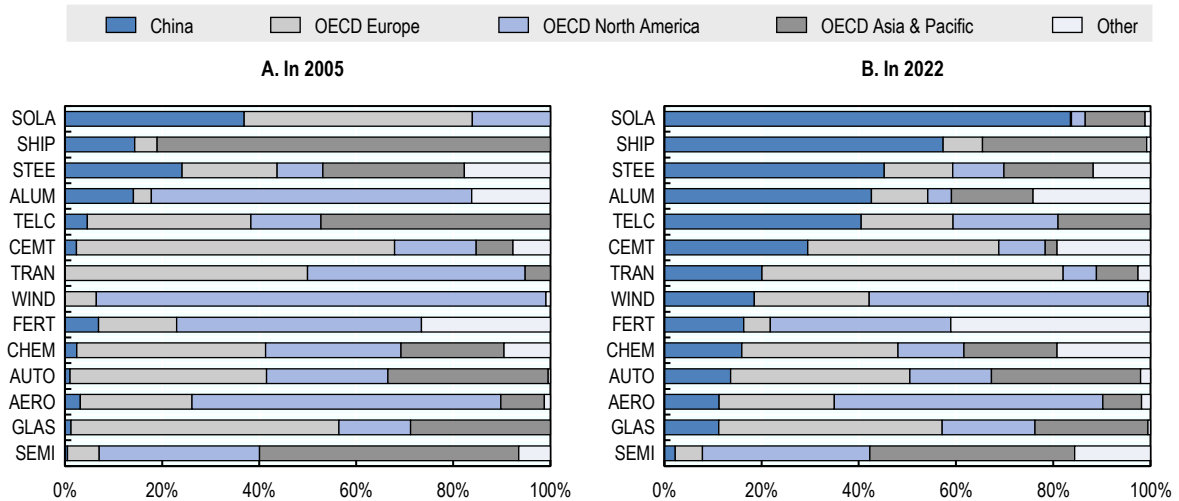
Note: Bars indicate long-term changes in market shares (if data are available for at least five years) for individual firms, showing their sector and headquarter country. The period over which the change in market share is observed differs across firms, depending on the number of years for which they are covered in the OECD MAGIC database. See Table 1 for full names of sectors. Some changes in market shares may stem from mergers and acquisitions, including where they are supported by governments.

Source: OECD calculations based on the MAGIC database.

The gains in market position of China-based firms at the cost of OECD-based firms are also visible at the regional level for most sectors (Figure 9). The largest gains are observed in solar photovoltaic cells and modules, shipbuilding, telecommunications network equipment, and aluminium. Still, some OECD-based firms managed to gain market shares, though on a smaller scale, in wind turbines and rolling stock and signalling (Europe), as well as in aluminium and solar photovoltaic cells and modules (Australia, Japan, and Korea). Moreover, the OECD-based companies taken together continue to have dominant market position in several sectors (accounting for more than 80% of the sectoral market). This is the case for: automobile; aerospace and defence; glass, ceramics and refractories; semiconductors; and wind turbines. However, these market shares are based on the assigned headquarter of a company. Consequently, it cannot be excluded that actual production takes place in other jurisdictions.

**Figure 9. China-based firms gained market shares, but OECD-based firms continue to dominate certain sectors**

Market shares by sector and region



Note: OECD Europe includes firms headquartered in the EU Member States covered as well as Norway, Switzerland, Türkiye, and the United Kingdom. OECD North America includes firms headquartered in Canada, Mexico, and the United States. OECD Asia & Pacific includes firms headquartered in Australia, Japan, and Korea.

Source: OECD calculations based on the OECD MAGIC database.

### 3. Conclusions

The OECD MAGIC database constitutes a very significant improvement in the knowledge on industrial subsidies, helping shed more light on the extent to which governments are supporting their industrial producers in key sectors of the global economy. Using information drawn from the database, this report has found subsidies benefitting the largest industrial companies to be widespread, with only few companies not receiving any subsidies over 2005-22. While industrial subsidies are seemingly modest on average, their distribution is very skewed, which shows in the form of instances of very large subsidies exceeding 15% of firm revenue. These cases are largely dominated by companies based in China and operating in heavy industries and semiconductors. Although global market shares have proved rather stable for most firms in the sample, China-based companies have experienced more frequent gains than losses in market share and generally account for most of the firms with the largest market share gains.

That said, more needs to be done, including in further improving data coverage and expanding the set of support instruments captured in the database. While the availability of updated and reliable information on government subsidies forms an important goal behind the OECD MAGIC database, work also needs to investigate the implications that these subsidies are having on firms and global markets. To that end, forthcoming OECD analysis will provide econometric evidence on what these subsidies mean for firm productivity, investment, and changes in market shares, among other outcomes.

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