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Sustainable finance in Japan

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ABSTRACT

This article examines the role of sustainable finance and investment in Japan and how the Japanese financial sector can mitigate growing climate risks and support Japan's transition towards a zero-carbon, sustainable economy. It first illustrates Japan's exposure to physical and transitional climate risks before reviewing emerging practices in sustainable finance. These include the growing importance of environmental, social, and governance (ESG) criteria in financial decision-making; more rigid reporting and disclosure standards; and the development of green bond and sustainable investment markets. The article also assesses the role of policies and regulations in scaling up sustainable finance and low-carbon infrastructure investments. Subsequently, it analyses transitional climate risks via scenario analysis, applying the Paris Agreement Capital Transition Assessment (PACTA) tool to examine the exposure of subsectors of the Japanese equity market over several climate scenarios. The article concludes with policy recommendations for aligning Japan's financial sector with global climate and sustainability goals.

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JEL Classification

G2; G3; Q5

1. Introduction

The world has seen an intensifying materialization of climate-related physical impacts. These range from an increase in the number and intensity of storms, flood disasters, and heat waves to the accelerated melting of polar ice caps and glaciers. The effects of anthropogenic climate change on the world's atmosphere and ecosystems have been well documented in recent IPCC reports on the impacts of global warming of 1.5°C above preindustrial levels (IPCC 2018) as well as on the consequences of climate change on land and the oceans (IPCC 2019a, 2019b). These reports not only outline the cataclysmic externalities that unmitigated global warming has on humanity and the environment, but they also highlight that certain sectors play key roles in mobilizing the necessary resources to limit warming to 'well below 2°C' and preserve the earth's natural environment (UNFCCC 2015).

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The financial sector has been identified as being instrumental in advancing the zero-carbon energy transition, as acknowledged by Article 2.1(c) of the Paris Agreement (UNFCCC 2018; Whitley et al. 2018; Chenet et al. 2019). To reach the United Nations 2030 Agenda for Sustainable Development, including the climate targets adopted in the Paris Climate Agreement, global annual investment requirements have been estimated to be at least US\$100 billion (United Nations 2015a; UNFCCC 2018). The 1.5°C IPCC report puts energy system investment requirements at US\$1.6–3.8 trillion per annum over the period 2020–2050 to maintain warming within a 1.5°C scenario and avoid the most harmful effects of climate change (Climate Policy Initiative 2018; IPCC 2018). These figures illustrate that a concerted effort to advance the global zero-carbon energy transition is required and that the current investment numbers for mitigation and adaptation measures need to be scaled substantially.

Japan plays a crucial role in fostering low-carbon green infrastructure investments and promoting measures to support the 2030 Agenda and the Sustainable Development Goals (SDGs) (United Nations 2015b; Ohno et al. 2019; Schumacher 2019b). It is the third-largest national contributor of funds to the United Nations (UN) and the second-largest to the United Nations Development Programme (UNDP 2019; United Nations 2019). It thus claims a leadership role in international climate and environmental politics (Morishita 2019). However, these ambitions are contrasted by Japan's continuing promotion of coal-fired power generation, domestically and internationally, at numerous levels of government and industry, despite mounting international political pressure to decarbonize and cease exports of coal-fired power plants (Trencher et al. 2019; Mainichi Japan 2019a, 2019b).¹ Moreover, Japan, as the world's third-largest economy by nominal GDP, also boasts in Tokyo one of the major global financial centres (Yeandle and Wardle 2019). Its banking, investment, and insurance industries comprise some of the most powerful financial institutions in the world, and with about US\$25–30 trillion of household savings invested in financial assets, shifting funds among Japanese asset owners would impact sustainable investments on a global scale. However Japanese banks, notably the three largest universal banks, MUFG, Mizuho, SMBC, are still among the largest global funders of coal-fired power plants in developing and emerging countries (Bank Track 2018, 2019).

Japan underwent several structural changes and regulatory shifts, meant to facilitate the transition toward a low-carbon society, especially in the wake of the Fukushima Daiichi nuclear power accident in 2011. However, progress remains low despite several emissions-related policies, including a carbon tax, at roughly 5US\$/tCO₂, one of the lowest in the world, the introduction of a feed-in tariff (FiT) for renewables in 2012, or the gradual liberalization of the domestic electricity market, to be completed by 2020 (Aldrich, Lipsy, and McCarthy 2019; Schumacher 2019a). The latter is expected to curtail the obstacles to renewable energy production and its integration into the grid for many independent or small-scale renewable energy producers (Schumacher 2017). After the disaster, with nuclear power accounting for only 2% of the total primary energy supply (TPES) and further restarts having become socially unacceptable, the share fossil fuels increased from 65% to 84% of the TPES (Aldrich, Forester, and Horhager 2018; IEA 2018b; Aldrich, Lipsy, and McCarthy 2019). Yet, Japan's share of low-carbon

energy in the TPES remains comparatively low among OECD member states (Schumacher 2017, 2019a). It amounted to approximately 9.7% of TPES in 2018 when excluding hydro and 17.8% including hydro (IEA 2019; Schumacher 2019a).

Japan views the global energy transition and the resulting international policy responses as largely exogenous, with the integration of environmental, social, and governance (ESG) factors leading to an often-dichotomous debate between internal economic performance criteria and external climate and environmental policy aspirations. The European Union (EU) has taken a leadership role in advancing and scaling climate and sustainable finance to mitigate climate change and transition to a sustainable economy. The EU proposed the first mandatory regulatory framework on aspects such as corporate disclosure, carbon performance benchmarks, the structuring and labelling of green financial products, and the creation of a unified classification system ('taxonomy') of what can be considered an environmentally sustainable economic activity (European Commission 2018, 2019a). The latter, in particular, has been the subject of considerable controversies, with the global financial sector, on the one hand, welcoming increased levels of regulatory certainty, while at the same time voicing concerns over the implementation and the perceived narrow framing of sustainable activities. Japanese business and industry groups advocated a slower rollout of said regulations and a more inclusive and flexible approach toward activities that would qualify as sustainable (Japan Stewardship Forum 2019; Japanese Bankers Association 2019; Keidanren 2019; JBCE 2019a, 2019b).

While sustainable finance remained a niche issue in Japan for a long time, the growing importance of sustainable finance and investment in global markets, and, closer to home, the developments in terms of sustainable finance in neighbouring Asian countries (e.g. Volz 2019; Durrani, Rosmin, and Volz 2019), not least the People's Republic of China (PRC), have spurred the ambition of Japanese policymakers to encourage the development of ESG investment and sustainable finance more broadly. Since 2016, the Government of Japan has taken a proactive stance in promoting the 2030 Agenda and the SDGs. The promotion of sustainable finance and investment has been part of this agenda. Whereas sustainable finance was initially only a topic nurtured by the Ministry of the Environment (MOE), the powerful Japanese Ministry of Economy, Trade, and Industry (METI) and the Japan Financial Services Authority (JFSA) have taken important measures to promote disclosure, ESG investing, and sustainable finance. The growing importance of sustainable finance in Japan is not least epitomized by the Bank of Japan (BOJ) joining in the Central Banks and Supervisors Network for Greening the Financial System (NGFS) in November 2019.

These efforts will provide a necessary boost to Japan's sustainable finance activities, since Tokyo's standing as a global financial hub currently stands in stark contrast to its positioning in the area of green and sustainable finance (Wardle et al. 2019; Yeandle and Wardle 2019). While its performance is improving, it still ranks behind all of the major European, North American, as well as several Asian financial centres in terms of the depth and quality of green finance (Wardle et al. 2019). It ranks only 32nd in terms of depth behind Singapore, Beijing, and Shanghai, and 24th in terms of quality behind Singapore, and on a par with Beijing and Shanghai (Wardle et al. 2019).

Against this backdrop, this article provides a comprehensive review of the development of sustainable finance and investment in Japan and analyses the challenges facing the Japanese financial sector in mitigating climate and other sustainability risks and in aligning

with a sustainable, zero-carbon economic pathway. This study will look at key climate and ESG performance indicators in assessing Japan's progress in transition toward a sustainable financial sector and overall corporate alignment with responsible investment principles. It analyses various government and industry-level initiatives and whether the empirical evidence supports the notion that Japanese companies and banks are leaders in terms of climate-related risk disclosure, the corporate setting of verifiable science-based carbon reduction targets, and overall disclosure of GHG emissions (Science-Based Targets Initiative 2019a; Temple-West 2019; Aden 2019; CDP 2020).

The remainder of the article is structured as follows. The next section examines Japan's exposure to physical climate risks and the various climate-related transitional risks emanating from regulatory responses, technological progress, and shifting societal dynamics, as well as climate and environmental litigation. Section 3 scrutinizes the progress in sustainable financial governance in Japan and reviews the emergence of a sustainable financial product market and the growing importance of ESG and disclosure standards. Section 4 explores the materiality of transitional climate risks by performing a scenario analysis of climate alignment across several carbon-intensive sectors and companies in the Tokyo Stock Price Index (TOPIX). This analysis permits an in-depth look at the asset-level transition risk exposure of several carbon-intensive companies. We then discuss the relationship between reporting in line with the recommendations of the Task Force on Climate-Related Financial Disclosure (TCFD) and general ESG policy integration and the expansion of the sustainable finance sector in Japan (FSB-TCFD 2017; FSB-TCFD 2019, 2020; JFSA 2019b; Temple-West 2019). Section 5 concludes with a set of recommendations to both the financial sector community and government regulators on how to further mainstream sustainability considerations in Japan's financial system and mitigate ESG risks.

2. Climate-related risks

2.1. Physical climate risks

In 2018 and 2019, the IPCC outlined the ways in which climate change will impact the natural environment under a 1.5°C scenario and the ramifications for land use and oceanic life (IPCC 2018, 2019a, 2019b). These reports also described the impact of climate change on the global economy and the ways humans use natural resources. The impacts of climate change would be severe irrespective of region, even under a 1.5°C scenario that would be made possible by an outstandingly fast and ambitious transition toward a net-zero carbon global economy. However, the negative externalities would not be evenly distributed on a global level, with developing countries generally considered more vulnerable and exposed than developed ones. Under economic considerations, some regions are even predicted to relatively benefit in the short- to mid-term from global temperature increases or sea level rises, for example Canada, the EU, and New Zealand (Kompas, Pham, and Che 2018). OECD member states are predicted to be less affected by climate change and display higher resilience levels in coping with or adapting to any adverse impacts (Byers et al. 2018; IPCC 2018; Tol 2018). Under most scenarios, Asia as a whole is seen as highly vulnerable to climate change risks and its impact on socio-economic development, although Japan is considered a low-impact region with high adaptation capacities (Case and Tidwell 2008; MOEJ 2015b; METI 2017a; Byers et al. 2018).

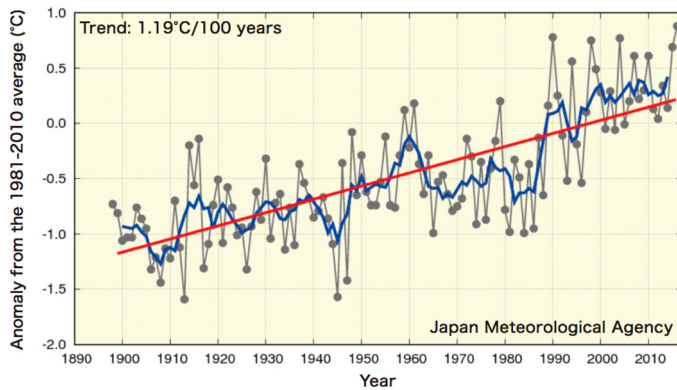


Figure 1. Annual surface temperature anomalies from 1898 to 2015 in Japan. Source: MOEJ (2018).

Impacts related to water access, land use, or energy are considered manageable short- to medium-term, and with an ageing society, demographic pressures are lower than in other global regions (Bird 2014; MOEJ 2015b).

However, evidence is accumulating that Japan will be exposed to severe climate-related physical risks. Several studies highlight that considering certain physical metrics, Japan has experienced stronger atmospheric warming than the global average (MOEJ 2018). Between 1981 and 2010, surface temperature anomalies lay above the global average (Figure 1) (MOEJ 2018). Annual days with temperatures above 35°C rose above the global average since 1995 (Figure 2) (MOEJ 2018). In both 2018 and 2019, Japan experienced severe heat waves, resulting in thousands of deaths and heat-related illnesses, confirming recently observed trends of increasing heat-related mortality (Figure 3) (MOEJ 2018; Rich, Ueno, and Inoue 2018; Kyodo News 2019). In order to respond to the spikes in electricity demand, caused by increased use of in-room air conditioning, multiple Japanese electric utilities had to restart a number of coal-fired plants (Reuters 2018). These demand-side peak load responses exacerbate the carbon footprint pressures under the Nationally Determined Contributions (NDC) required by the Paris Agreement and expose energy infrastructure vulnerabilities under ambitious decarbonisation scenarios.

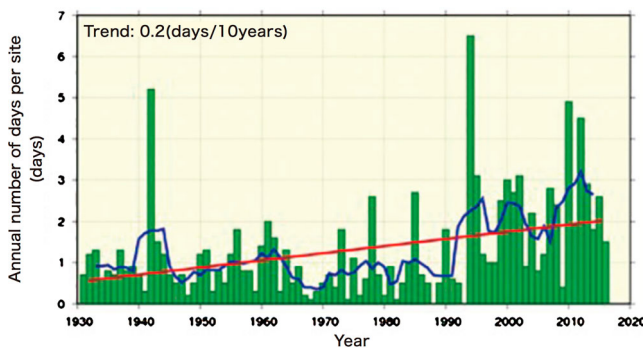


Figure 2. Annual number of days with maximum temperatures of 35°C or above (mean of 13 sites). Source: MOEJ (2018).

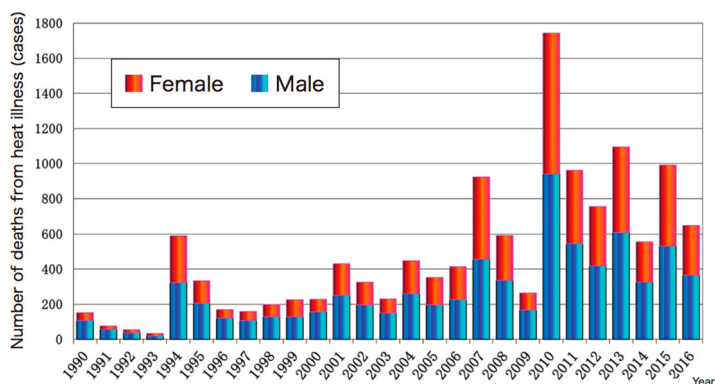


Figure 3. Number of deaths from heat illness by year and gender (1990–2016). Source: MOEJ (2018).

Japan is also exposed to significant domestic vulnerabilities concerning land use, with numerous metropolitan real estate assets at risk of flooding from sea level rises. As shown in Figure 4, Osaka and the Kansai metropolitan area could experience an increased number of flooding disasters by 2050, representing dislocation risks for more than 5.2 million people (Strauss, Kulp, and Levermann 2015; Holder, Kommenda, and Watts 2017). Other climate-related economic impacts were recently illustrated by the typhoon- and flood-related cancelled games at the 2019 Rugby World Cup as well as the halting of the Hokuriku Shinkansen, including the subsequent decommissioning of 96 flooded train cars (Nagao and Yamada 2019; The Economist 2019). Likewise, the forced relocation of the 2020 Olympic marathon from Tokyo to Sapporo showcases heat-related concerns, with temperatures in Tokyo in recent years exceeding the long-term historical average, which would put athletes and spectators at severe risk of heat-stroke (McCurry 2019).

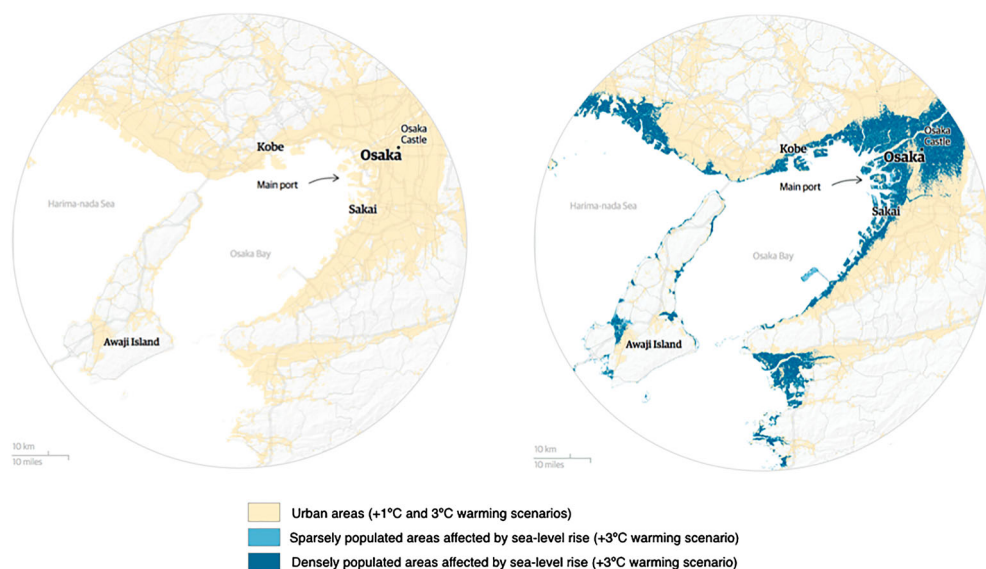


Figure 4. Osaka area flood risks in a 3°C warming scenario. Source: Holder, Kommenda, and Watts (2017).

2.2. Transitional climate risks

Transitional climate risks arise in response to transitioning to low-carbon societies in order to mitigate the aforementioned physical risks on a global and regional scale (FSB-TCFD 2017, 2019; Semieniuk et al. 2020). One of the best-documented transitional risks occurs at the asset level, with most of Japan's coal power stations being at risk of becoming stranded due to legal challenges or regulatory carbon emission ceilings (InfluenceMap 2017, 2019; Carbon Tracker 2019; Renewable Energy Institute 2019). More than half of the current domestic coal power capacity is at risk of becoming stranded. This means that despite being technically operational, economic viability has been diminished to the point of a de facto asset-level shutdown (Caldecott et al. 2016). This signifies that these plants would have to be booked as active losses for the remaining life of the asset. This, in return, can lead to systemic risks for the entire financial sector once the mass of the losses and write-offs exceeds a critical threshold (Gros et al. 2016; Carney 2015, 2019). Besides coal power, several sectors, especially those related to manufacturing and agriculture, are at particular risk of stranded assets, affecting those asset owners who hold considerable portfolio positions in these sectors. Beyond asset stranding and its cascade effects (Cahen-Fourot et al. 2019), the full decarbonization of the economy (in Japan but also on a global scale) needed to achieve the Paris Agreement and limit global warming to 'well below 2°C' will necessarily come with a deep restructuring of energy and industrial systems that were built upon carbon-intensive architectures. Such upheaval in a short period of time (net-zero carbon anthropogenic emissions must be reached globally by 2050 to limit warming to 1.5°C and by 2070 to limit it to 2°C (IPCC 2018)) comes with large-scale changes of production and consumption patterns that will necessarily affect all sectors of the economy.

A string of high-level international legal cases has illustrated the rapid pace at which these strandings can occur, the highest-profile one being the case of German electric utility and mining operator RWE (Bos and Gupta 2019). Due to improper environmental assessments regarding a forest in the municipality of Hambach, where RWE was carrying out lignite mining activities, a court issued a temporary injunction on any mining-related forest-clearing activities. This forced RWE to temporarily halt mining activities in the area and reduce production at two nearby RWE coal-fired power stations that provisioned coal from the Hambach lignite mine (Schumacher 2018). This case is novel insofar as it is the first international case in which existing exploitation permits were revoked due to a lack of adequate environmental consideration (Schumacher 2018). Therefore, these international legal precedents in terms of carbon-intensive asset stranding could adversely impact Japanese investors with considerable coal-fired power asset holdings, both domestic and abroad.

The fossil fuel sector carrying the most imminent risk notwithstanding, the Japanese economy, in general, is at risk from imported transitional risks. Devoid of significant domestic natural resources, Japan is highly reliant on the import of foreign commodities, notably in the energy and manufacturing sectors (Schumacher 2015, 2017). International transitional effects impact the Japanese economy at an exponential rate, notably regulatory shifts in terms of commodity exploitation or food standards (Van Moerkerk and Crijns-Graus 2016; Nakano 2017). Japanese companies may also come under additional scrutiny in terms of legal and fiduciary duties, with their international coal financing activities and

coal technology exports potentially violating more rigid anti-corruption laws or environmental standards (PRI and UNEP FI 2017, 2019; Trencher et al. 2019).

Moreover, boards that do not sufficiently take account of climate risks, both physical and transitional, could be in breach of their fiduciary duties, as indicated in the Japanese Companies Act 2005. The Act states that directors must perform their duties: (1) with the care of a prudent manager; (2) in compliance with all laws and regulations, and the articles and resolutions of shareholders' meetings; as well as (3) in a loyal manner. Directors who neglect their duties are liable to the company for the resulting damages. Where directors are grossly negligent or knowingly fail in performing their duties, they are also liable to third parties or shareholders for the resulting damages. Therefore, several legal experts have established that company directors and boards have a duty to consider climate-related risks (PRI and UNEP FI 2017, 2019; Barker and Mulholland 2019).

Last but not least, with the unit prices for renewable energy installations falling rapidly in Japan, and permit applications for onshore and offshore wind power, solar PV, and geothermal at an all-time high, and with numerous projects in the planning stage, the risk of technological displacement for carbon- and resource-intensive assets is increasing (Carbon Tracker 2019). These examples show that the Japanese financial sector via its holdings is exposed to various policy, legal, technology, market, and reputational risks.

3. ESG integration at the policy and corporate levels

While it would be an exaggeration to describe Japan as a leader in sustainable finance, the last couple of years have seen numerous initiatives, both public and private, aimed at aligning the financial system with sustainability. As a result, Japan has now turned from a country with low corporate ESG engagement rates, where investors found it difficult to obtain and assess company-level ESG data, into one of the most rapidly growing markets for responsible investment (Saito 2012; Clark et al. 2015; Milburn 2019). In the following, we will briefly review both the main public policy initiatives aimed at integrating ESG criteria into financial decision-making and scaling up sustainable finance and the developments in terms of sustainable finance in the markets.

Major policy initiatives to promote sustainable finance in Japan have originated from the Japanese Ministry of the Environment (MOEJ), which continues to play an important role in this field. In 2012, the MOEJ issued 'Principles for Financial Action towards a Sustainable Society'. In October 2015, the MOEJ established a 'Working Group on Incorporating Issues Regarding Sustainability into Investment' (ESG Working Group, 2017), which led to the publication of an ESG Working Group Report in January 2017 (MOEJ 2017). Various other initiatives for promoting sustainable corporate governance and the inclusion of ESG criteria in financial decision-making followed, also involving other authorities.

An important impetus in promoting sustainability across all branches of government came in May 2016 with the establishment of the 'SDGs Promotion Headquarters', a new Cabinet body chaired by the Prime Minister and comprising all government ministers and representatives of relevant government agencies (SDGs Promotion Headquarters 2017). As a member of the SDGs Promotion Headquarters, the JFSA started to consider ways of promoting sustainability and ESG investments. Back in February 2014, the JFSA had already published Japan's Stewardship Code, to 'promote sustainable growth of

companies through investment and dialogue’ (JFSA 2014). It is notable that in 2018 the JFSA adopted an explicit ‘Strategy for the Sustainable Development Goals’, in which it commits to working proactively to achieve the SDGs. The JFSA considers the vision behind the SDGs consistent with its own goal, the ‘enhancement of national welfare through the sustainable growth of business and the economy and steady increase of household wealth’ (Endo 2018). The JFSA is hence ‘encouraging financial institutions, stock exchanges, and other financial service providers to take strategic actions on this front’ (Endo 2018). While the JFSA expects the private sector (corporates, investors, and financial institutions) to engage with the SDGs through their own initiative, it would consider stepping in should private sector actions create negative externalities for the overall economy. In June 2018, the JFSA joined the NGFS. The NGFS was established in December 2017 as a group of central banks and supervisors willing to exchange experiences, share best practices, and contribute to the development of climate risk management in the financial sector. In March 2019, the JFSA also created the post of a Chief Sustainable Finance Officer, a first among supervisory authorities (JFSA 2019d).

However, institutional investors have faced many barriers in engaging with Japanese companies on corporate governance and ESG issues, and disclosure of impacts, risks, and ESG data in general also proved to be a major challenge (Saito 2012; Clark et al. 2015). In response, in August 2016, METI established a ‘Study Group on Long-term Investment (Investment Evaluating ESG Factors and Intangible Assets) toward Sustainable Growth’. The Study Group published a ‘Guidance for Integrated Corporate Disclosure and Company-Investor Dialogues for Collaborative Value Creation’ in May 2017 (METI 2017b) to encourage and facilitate strategic exchange between corporates and investors on devising and evaluating sustainability strategies. In November 2018, METI launched the SDG Management/ESG Investment Study Group, which published a report in June 2019. In May 2019, METI published a Guide for SDG Business Management (METI 2019e).

Despite the government’s efforts to promote sustainable and responsible investment, the interest among financial institutions remained limited until recently. As of January 2020, 78 Japanese organizations have signed up to the Principles for Responsible Investment (PRI) (Figure 5). This includes 45 investment managers, 20 asset owners, and 12 service providers. The PRI were launched in 2006 as a global standard for responsible investing.²

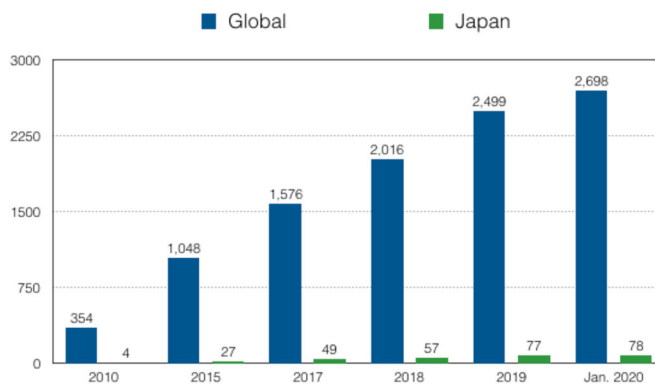


Figure 5. PRI signatories globally and in Japan. Source: PRI (2020).

In 2018, the government organized a high-level meeting on ESG finance that issued a report, ‘Toward Becoming a Big Power in ESG Finance’, which provides a range of recommendations aimed at bolstering ESG investment and enhancing climate-related disclosures. The disclosure of climate-related financial risk has become a priority area that Japanese authorities – including the JFSA, METI, and the MOEJ – have promoted strongly. Initiated by Mark Carney, the Bank of England Governor and chair of the Financial Stability Board (FSB) at the time, the FSB launched a Task Force on Climate-related Financial Disclosures (TCFD) in January 2016, which was chaired by Michael Bloomberg. The TCFD launched a comprehensive report with recommendations in 2017 (FSB-TCFD 2017). The recommendations relate to disclosures in four core areas: governance, strategy, risk management, and metrics and targets (Figure 6). In 2018, METI launched a TCFD implementation study group, which subsequently led to the launch of a TCFD Guidance report by METI in December 2018 (METI 2018). The Guidance provides comprehensive commentary for five industrial sectors on how to implement the TCFD recommendations. As highlighted by the FSB-TCFD (2019), ‘the guidance sends a strong signal about climate-related reporting from the Japanese government, which has made climate change a key priority of its [2019] G20 presidency’.

In March 2019, the MOEJ issued a ‘Practical Guide for Scenario Analysis in Line with TCFD Recommendations’ (MOEJ 2019). Moreover, in May 2019, a TCFD Consortium of Japan was launched, comprising the JFSA, METI, the MOEJ, and actors from the private sector, including Keidanren, the Japanese Business Association. The TCFD Consortium aims to facilitate constructive dialogues between investors/financial institutions and business corporations, specifically on climate-related financial disclosures recommended by the TCFD. The FSB-TCFD (2019) described the TCFD Consortium of Japan as ‘a model for promoting adoption of the TCFD recommendations at a national level’. As of September 2019, Japan has the largest number of TCFD supporters, with 225 Japanese organizations expressing support for the TCFD (see Figure 7). In October 2019, the World



Governance

The organization’s governance around climate-related risks and opportunities

Strategy

The actual and potential impacts of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning

Risk management

The processes used by the organization to identify, assess, and manage climate-related risks

Metrics and targets

The metrics and targets used to assess and manage relevant climate-related risks and opportunities

Figure 6. Core elements of recommended climate-related financial disclosures. Source: Adapted from FSB-TCFD (2017).

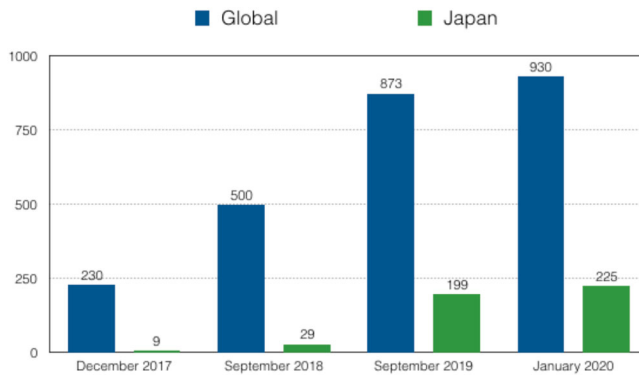


Figure 7. TCFD supporters globally and in Japan. Source: FSB-TCFD (2020).

Business Council for Sustainable Development and the TCFD Consortium of Japan organized the first TCFD Summit in Tokyo at the behest of the Prime Minister and METI.

The Japan Exchange Group (JPX), which operates the Tokyo Stock Exchange (TSE) and the Osaka Securities Exchange, became an early supporter of the TCFD in October 2018. Previously, it had already started to respond to the growing market interest in sustainable investment. In April 2016, the TSE, together with S&P Dow Jones Indices, launched the S&P/TOPIX 150 ESG Index. The JPX joined the Sustainable Stock Exchanges (SSE) Initiative – a UN initiative promoting sustainable investment – in December 2017 and established a Sustainability Committee in July 2018 (JPX 2019). In June 2019, it published a Japanese translation of the ‘SSE Model Guidance on Reporting ESG Information to Investors’ to promote ESG disclosure (JPX 2019). In 2018, the JPX and S&P Dow Jones launched the S&P/JPX Carbon Efficient Index.

These TCFD support mechanisms appear to bear fruit as Japanese companies have been disclosing climate-relevant information on a wide scale, especially carbon emissions via their participation in the CDP scheme. The CDP, formerly Carbon Disclosure Project, was founded in 2000 and is a UK-based not-for-profit organization that has, since 2003, been maintaining a global carbon disclosure system for investors, companies, cities, states, and regions to report and manage their environmental impacts via an annual questionnaire. The 2018 questionnaire, the 13th survey in Japan, was the first that was aligned with the TCFD recommendations and included questions pertaining to scenario analysis (CDP 2019a). Of the 500 large Japan companies selected by CDP Japan in 2018, the response rate was 59%, with 297 out of 500 responding. Of those, 47% responded that they were performing climate change scenario analyses in following the TCFD recommendations. Japanese companies have been performing very well according to the CDP’s climate change sectoral scoring methodology (CDP 2019b, 2019c). Among the more than 8,361 global companies reporting on climate change, 38 out of 578 Japanese companies have obtained the highest score A, more than any other country in the world (CDP 2020) (Figure 8). According to the CDP, companies with A-scores are ‘leading on environmental transparency and performance’, and these corporates are ‘the leaders acting to address climate risks and build our future zero-carbon economy’ (CDP 2020). The majority (28 out of 38) of the Japanese A-score companies belong to a generic ‘General’ sectoral category. Generally, the A-list illustrates that carbon-intensive sectors are

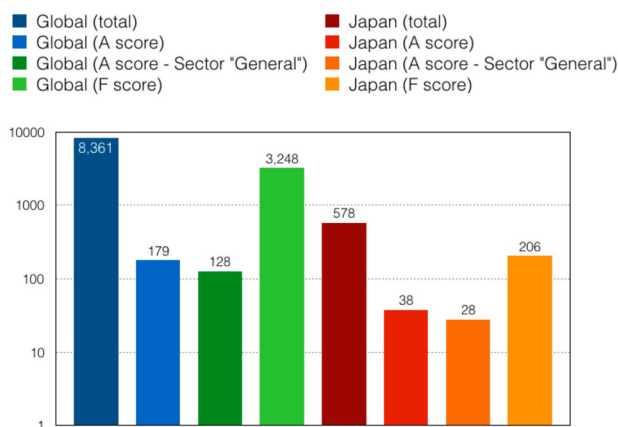


Figure 8. Number of Companies Disclosing on Climate Change under CDP, 2019. Graph displays globally (blue and green bars) and for Japan (red and orange bars): total number of companies reporting ('total'); companies with A scores ('A score'); A scores in the 'General' sector ('A score -Sector general'); and F scores ('F score'); vertical axis scale is logarithmic. Source: CDP 2020.

sub-represented in the CDP A-list, with most companies being distributed across carbon-neutral or non-intensive sectors (CDP 2020).³ Figure 8 shows how Japanese companies are faring at a global scale, with the statistics presented for those companies with the top A-score, those with A-score in the carbon-neutral sectoral category 'General' and those that obtained the bottom F-score.

For the carbon-intensive sectors, subject to our TOPIX analysis in section 4, only few Japanese companies disclosed on climate change. For those that did, those belonging to the carbon-intensive sectors, 'coal', 'metals and mining', and 'electric utilities' performed the worst according to the CDP score (Figure 9). Furthermore, several methodological limitations of the CDP reporting and verification processes should be acknowledged. As Japan is very reliant on material and commodity imports, the fact that for the CDP scoring, only

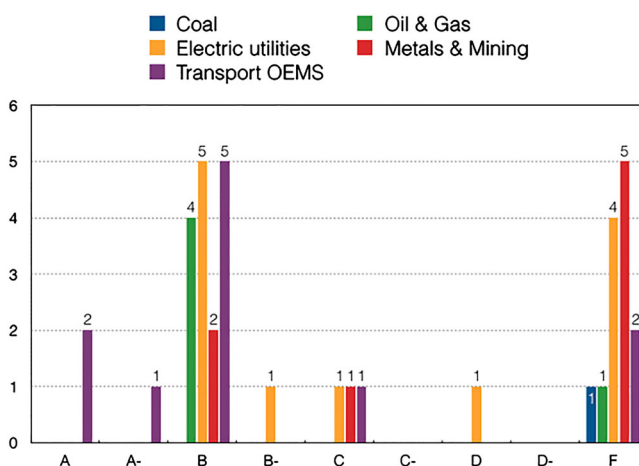


Figure 9. CDP Climate Change Disclosure Scores for Japanese Carbon-intensive Sector Companies, 2019. Source: CDP 2020.

70% of Scope 1 and 70% of Scope 2 emissions are being taken into account constitutes a risk measurement gap (Van Moerkerk and Crijns-Graus 2016; CDP 2019b). This method exempts the Scope 3 supply chain emissions, which a large number of Japanese companies generate in high quantities due to their reliance on imports. Additionally, this is of high materiality since in general (based on other countries' data), Scope 3 emissions can make up to 75% in firms for which the use phase is significantly more emission-intensive than the production phase (e.g. the automobile sector) (Downie and Stubbs 2013; Nakano 2017). Shortcomings in terms of independent verification of emissions, which are performed by third-party auditing firms, and at times large divergences in permissible GHG accounting standards have led to inconsistent and unverified disclosure of emissions and often resulted in underreporting of emissions (Blanco, Caro, and Corbett 2016; Brander, Gillenwater, and Ascuri 2018; Stanny 2018; CDP 2019a, 2019b, 2019c). In combination with increasing numbers of financial accounting inconsistencies of Japanese companies with domestic and international subsidiaries, caution of external verification reliability and intra-organizational monitoring capacities is warranted regarding the reliability of non-financial accounting and disclosure (Sato 2020).

One of the most noted aspects of the Japan's sustainable investment landscape has been the development of its green bond market, which has received considerable public support as of late. In March 2017, the MOEJ published Green Bond Guidelines as well as model cases. A year later, it launched an incentive scheme through which issuers can obtain a grant of up to JPY50 million for external reviews and consulting for structuring green bonds (Milburn 2019). The scheme proved a success, with 33 issuances in 2018 (ibid.). In June 2018, the MOEJ launched the Green Bond Issuance Platform. Japan's green bond market has evolved rapidly (Figure 10). The Development Bank of Japan issued the first Japanese green bond in 2014. By the end of 2018, Japan's cumulative green bond issuance stood at US\$9.7 billion, which put Japan tenth in global country rankings (CBI 2019). Total issuance in 2018 stood at US\$4.1 billion, up 22% from 2017 and amounting to 42% of the total issuance to date. With this, Japan is ranked 12th globally

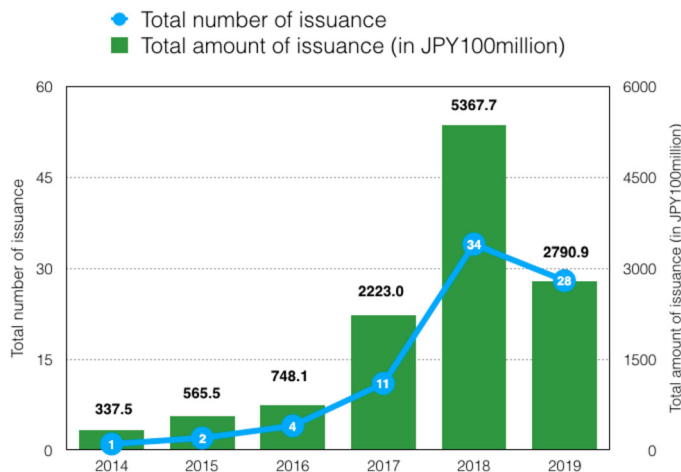


Figure 10. Annual issuance of green bonds by Japanese entities (as of August 2019). Source: The Green Bond Issuance Promotion Platform (MOEJ 2019).

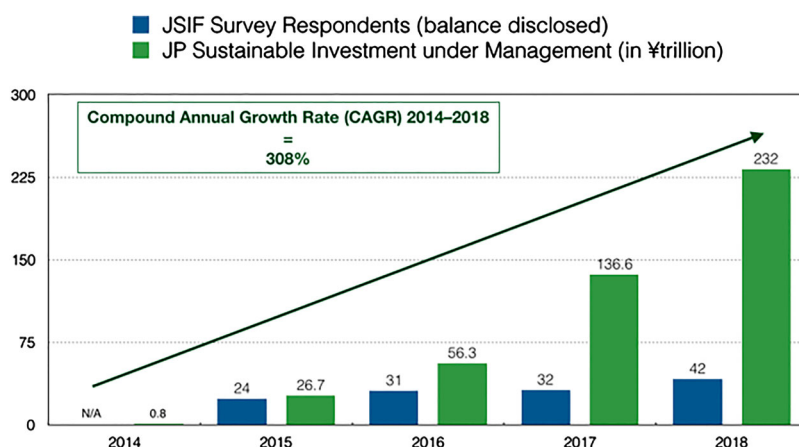


Figure 11. Japanese sustainable investment trends, 2014–2018. Sources: JSIF 2016, 2018, 2019; GSIA 2019.

in terms of cumulative green bond issuances (*ibid.*). Overall, the progression in green bond issuance volume indicates a broader trend, with sustainable investment having increased markedly in Japan over the last few years.

Sustainably invested assets under management grew from almost ¥57 trillion to nearly ¥232 trillion between 2016 and 2018 (GSIA 2019) (Figure 11). This is still below global investment volumes but a clear upward trend (GSIA 2017, 2019) (Figure 12). The numbers for Japan are based on self-reported figures from 42 Japan-based investors responding to an annual survey performed in 2018 by the Japan Sustainable Investment Forum (JSIF), a Japanese non-profit organization (JSIF 2019). The self-reported nature of these figures also accentuates the absence of common and comprehensive definitions of what exactly constitutes a sustainable investment. In this instance, JSIF defined sustainable investment as

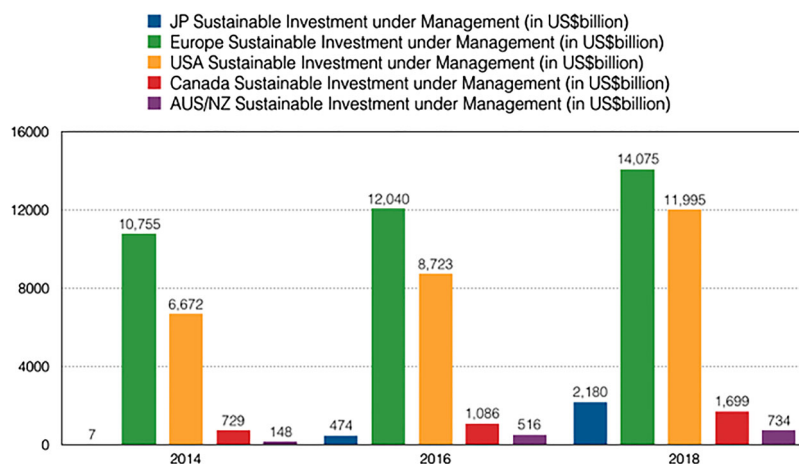


Figure 12. Global sustainable investment trends, 2014–2018. Sources: GSIA 2017, 2019.

investments that embody the following two principles: 1. Investments with a view to the sustainability of the Earth and society 2. Investments supported by the disclosure of initiatives pertaining to Principle 1 and the social effects of these investments on suppliers of capital. (JSIF 2019).

However, due to confusion that this definition caused among some respondents and institutional investors, the definition was revised for the 2018 survey to align more with the ones of the Global Sustainable Investment Review (GSIR) and the PRI (JSIF 2019). The new definition states that ‘Sustainable investment is investment that considers environmental, social, and governance (ESG) factors in the investment analysis and investment portfolio decision-making process while taking into account the sustainability of the investment’. Respondents of the 2018 survey were free to choose the definition that most aligned with their understanding of sustainable investing; therefore the figures for 2018 need to be evaluated with said context (JSIF 2019). As of December 2018, 42 respondent investors represent roughly 18.2% of the circa 230 institutional investors that publicly support the Stewardship Code (JSIF 2019). Overall, these numbers illustrate a general trend toward more ESG-aligned investment portfolios among Japanese investors, but the taxonomical variances regarding sustainable investing underpin the necessity for a more unified sustainable finance framework in Japan that provides clear and unequivocal certainty about what constitutes a sustainable investment. Examples include the new EU sustainable finance legislative and regulatory proposals for a green taxonomy, green bond standards, and labels (European Commission 2019a, 2019b, 2019c).

One publicly-owned institution that has played a crucial role in promoting ESG in Japan is the Government Pension Investment Fund (GPIF), the world’s largest pension fund, which was created in 2006, managing over JPY159 trillion as of 31 March 2019. In 2015, the GPIF published investment principles and signed the PRI, along with the Pension Fund Association for Local Government Officials. In 2017, the GPIF adopted an ESG investment strategy and selected ESG indices, and in 2018, Global Environmental Stock Indices (GPIF 2019a, 2019b). In December 2018, the GPIF expressed its public support for the TCFD recommendations. In 2018 and 2019, it engaged in various initiatives to promote green bonds, including with the World Bank and the Asian Development Bank (GPIF 2019a).

In September 2018, Green Finance Network Japan was launched as a public/private green finance group with the goals of bringing together Japanese green finance players from both the public and private sectors, sharing information on green finance activities, organizing events and workshops, and providing a platform for connecting Japanese and international stakeholders. As of October 2019, it already had over 170 members from around 100 organizations.⁴

Overall, it is fair to say that sustainable finance and investment are becoming more mainstream in Japanese financial markets and that Japan has even assumed a leadership role in the area of disclosure. Policymakers are clearly seeking to promote sustainable lending and investment. This is also reflected in the decision of the Tokyo Metropolitan Government to join the UNEP’s Financial Centres for Sustainability Network as its 25th member in June 2019 (Brooksbank 2019; FC4S 2019). Upon joining, Governor Koike emphasized Tokyo’s ambition as ‘a leading regional and global financial center’ to ‘put Japanese capital to work supporting the low-carbon transition of our region and further afield’ (Brooksbank 2019; FC4S 2019).

However, the level of integration of these initiatives will eventually hinge on the measurability of sustainability indicators. Besides mandatory ESG and sustainable finance frameworks similar to those proposed by the EU, intermediate steps would need to include, for example, the adoption of science-based targets that go beyond the calculation of firm-level scope 1 and scope 2 GHG emissions. Monitoring and calculating scope 3 emissions, often representing the largest carbon footprint for companies, still represents a challenge for a lot of companies (MOEJ 2015a). Thanks to guidance documents published by the GHG Protocol and the MOEJ, as well as a support scheme by the latter, which incentivizes companies to set science-based GHG reduction targets with the Science-based Targets Initiative (SBTi), an increasing number of Japanese companies have committed to measurable and verifiable targets (MOEJ 2012; Greenhouse Gas Protocol 2013; Farsan et al. 2018; Science-Based Targets Initiative 2019a). In this scheme, budgeted at JPY150 million for the 2019 fiscal year, the Japanese government provides funding for project administration and support activities; companies can receive advice from professional consultants on how to set and implement science-based carbon emissions reduction targets (Science-Based Targets Initiative 2019a). Figure 13 shows that 60 Japanese companies have so far set science-based targets (Science-based Targets Initiative 2020). Of those, 52 are TOPIX listed, which means that despite the MOEJ-led efforts, a lot of listed companies do not have measurable reduction targets yet and thus display a less prudential transitional management approach toward climate-related transitional and financial risks. The MOEJ aims to have science-based targets from at least 100 companies by the end of 2020 (Science-based Targets Initiative 2019a).

However, the flaws of the SBTi validation and verification process are similar to the ones described for CDP's climate change disclosure system. They include the lack of independent verification and overall verification capacities given that most target validation is performed internally, with external independent expert input only if deemed necessary, thus subject to potential conflicts of interest (Science-based Targets Initiative 2019b). But these shortcomings should not stand in the way of further integrating ESG goals into corporate and financial business practices.

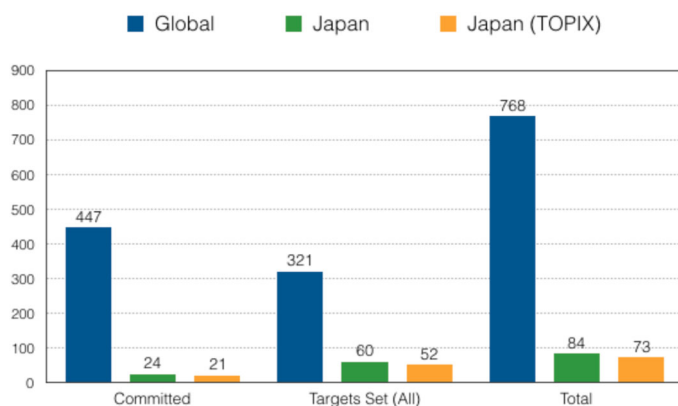


Figure 13: SBTi-committed companies from Japan (as of January 2020). Source: Science-based Targets Initiative 2020.

4. A closer look at the risk exposure of Japanese financial markets

As emphasized by the FSB-TCFD (2017), climate scenario analysis can constitute a powerful approach to addressing climate-related risks for both companies and financial institutions (FIs). Assessing their alignment against climate scenarios can provide information on their contribution to climate change mitigation and their exposure to climate-related risk. Therefore, independent portfolio-based scenario analysis constitutes an important tool for assessing financial sector climate-risk exposure. Given that TCFD alignment, SBTi target setting, and CDP A-level status are being equated with progressive ESG factor integration, we are testing if several TCFD supporting companies have climate-aligned portfolios, and whether TCFD support results in lower exposure than the sectoral-level TOPIX benchmark.

For instance, determining whether a company or FI is aligned with a 1.5–2°C scenario or a 4–6°C scenario has many implications in terms of financial risk. First, in terms of responsibility, in the former case one could conclude that the company or FI is a climate leader in its perimeter (either sectoral or regional), contributing positively to the global mitigation effort and thereby complying with the Paris Agreement and signatory countries' engagements. In the latter case, the company or FI could be considered a laggard in terms of climate performance, which can lead to significant consequences in the near future on both the regulatory and business sides with the current rise of stringent climate policies and litigation (Dechezleprêtre and Sato 2017; PRI 2020) and the growing influence of responsible investing practices (Climate Policy Initiative 2018; UNEP 2019). Second, such analysis can also feed more quantitative analysis on the short-term transition risk for these entities. Indeed, the level of misalignment with a 1.5–2°C trajectory is an indicator of the exposure of companies and financial institutions to risks potentially materializing as a consequence of climate-related policies and technology developments that are necessary for such decarbonization pathways.

Building on Chenet et al. (2018), we use the PACTA (Paris Agreement Capital Transition Assessment)⁵ tool to conduct a climate scenario analysis of the Japanese stock market. This climate alignment assessment approach provides a five-year forward-looking view of the over-/underexposure of a financial portfolio relative to several climate scenarios for a number of climate transition-relevant sectors and technologies. We focus here on the electric power, automobile, and fossil fuel sectors. Those three major industrial sectors are the most carbon-intensive sectors for which substitutable lower-carbon technologies exist at scale on the market, and for which there is sufficient asset-level data and a decarbonization scenario available to run the PACTA climate alignment approach. While those sectors represent a relatively small share of most financial markets (usually 10–15% of market capitalization), they cover the majority of CO₂ emissions (50–80% depending on the carbon accounting methodology) (Thomä et al. 2015).

To explore the energy transition risks facing the Japanese financial markets, we investigate the sectoral energy and technology exposure of firms listed in the Tokyo Stock Price Index (TOPIX) over several climate scenarios from the International Energy Agency (IEA). The TOPIX index can be considered a proxy of Japanese financial markets, being a free float-adjusted market capitalization weighted index comprising all the domestic common stocks listed on the TSE First Section (with more than 2,100 companies).⁶ Nevertheless, as a result of focusing on three sectors and underlying technologies covered

by both PACTA data and IEA climate scenarios, we cover only a minor part (about 8%) of the TOPIX market capitalization, through 23 listed companies (cf. Table 1). While our exploratory results should consequently not be overinterpreted, the analysis provides a first glimpse of the energy transition risk exposure of the Japanese financial markets. Indeed, without pretending to cover the full potential transition risk exposure of the financial sector, which undoubtedly is a function of complex diffusion patterns and network effects across companies and sectors, through the whole financial system architecture, stranding cascades would probably start with the most primary exposed sectors and companies (Cahen-Fourot et al. 2019).

The approach consists in translating climate scenarios into production and capacity additions/retirements for each of those sectors, at plant level, and comparing those trends with what companies actually planned for the next five years based on third-party asset-level data (from GlobalData, WardsAuto, Bloomberg, S&P). The data set used by PACTA is as of 31 December 2017, and the resulting time window is 2018–2023. The scenarios we consider are produced by the IEA in the frame of the World Energy Outlook (IEA 2018b) and the Energy Technology Perspectives (IEA 2018a). Four different scenarios are distinguished by average resulting warming. The Below 2 Degrees Scenario (B2DS) focuses on achieving sustainable growth while limiting temperature rises to below 2°C. The Sustainable Development Scenario (SDS) – also referred to as the ‘2°C scenario’ – is a move toward a holistic approach to sustainability rather than focusing solely on climate change. The New Policies Scenario (NPS) and Current Policies Scenario (CPS) are other technology road maps that correspond to a 50% probability of a maximum 4°C and 6°C warming, respectively. Those scenarios cover the following sectors and technologies: electric power (from coal, gas, hydro, nuclear, renewable sources); automobile (internal combustion engine [ICE], hybrid, electric); fossil fuels (oil, gas, coal).

The model uses the following indicators from the IEA scenarios against which the TOPIX is compared:

- Electric capacity by fuel expressed in MW (for renewables, coal, gas, oil, hydropower, and nuclear sources);
- Automobile production expressed in the number of cars (by type of engine: internal combustion engine [ICE], hybrid, electric);
- Oil production expressed in barrels of oil/year;
- Gas production expressed in m3/year;
- Coal produced expressed in tonnes/year.

Based on this approach, our analysis has two main objectives: first, to estimate the extent to which the carbon-intensive sectors of the Japanese stock market are aligned with the range of IEA climate pathways, and second, to determine whether companies

Table 1. TCFD supporters and non-supporters listed in TOPIX.

Sector\ [number of companies]	TCFD supporters	Non-supporters	Total
Electric power	7	3	10
Automobile	3	5	8
Fossil fuels	1	4	5
Total	11	12	23

supporting the TCFD outperform their peers in terms of climate alignment. Among the 23 companies that are relevant for our PACTA analysis – in the sense that comparable climate scenarios describing the evolution of their production plans in the future are available – 11 companies had subscribed as TCFD supporters as of 4 August 2019 (Table 1).

Our results corroborate those of Chenet et al. (2018), which were based on a preliminary version of the PACTA tool and an older set of data. Broadly speaking, the Japanese stock market exposure to our three high-carbon sectors (electric power, automobile, fossil fuels) is not aligned with the Paris Agreement, as seen from the IEA scenarios. This means that those companies' plans for the upcoming years are not consistent with the level of change that is needed to keep global warming well below $+2^{\circ}\text{C}$ under IEA economic and technological hypotheses. Moreover, some sectors and specific technologies are even engaged in hazardous trajectories, currently heading toward $+6^{\circ}\text{C}$ and over.

More specifically, we can observe the following striking features: First, in the 2018–2023 window, Japanese power production companies have plans to increase their coal power capacity, heading for a beyond- 6°C trajectory, while coal power capacity should actually decrease to be $< 2^{\circ}\text{C}$ aligned, and the global listed equity market is growing less strongly and is rather on a $\sim 4^{\circ}\text{C}$ trend (Figure 14a). Gas power capacity is also expected to increase significantly, along the lines of the global market, following a $+2$ – 4°C warming track (Figure 14b). Renewable power displays the same type of trajectory, as the renewable capacity is expected to remain almost flat, whereas it needs to increase dramatically to be consistent with the IEA B2DS scenario (Figure 14c). Second, the automobile sector is similarly oriented: While hybrid (Figure 14e) and particularly electric (Figure 14d) engine production must grow radically along $< 2^{\circ}\text{C}$ pathways, five-year plans of Japanese carmakers (as of July 2017) remain almost flat, corresponding to $> 6^{\circ}\text{C}$ levels of warming.

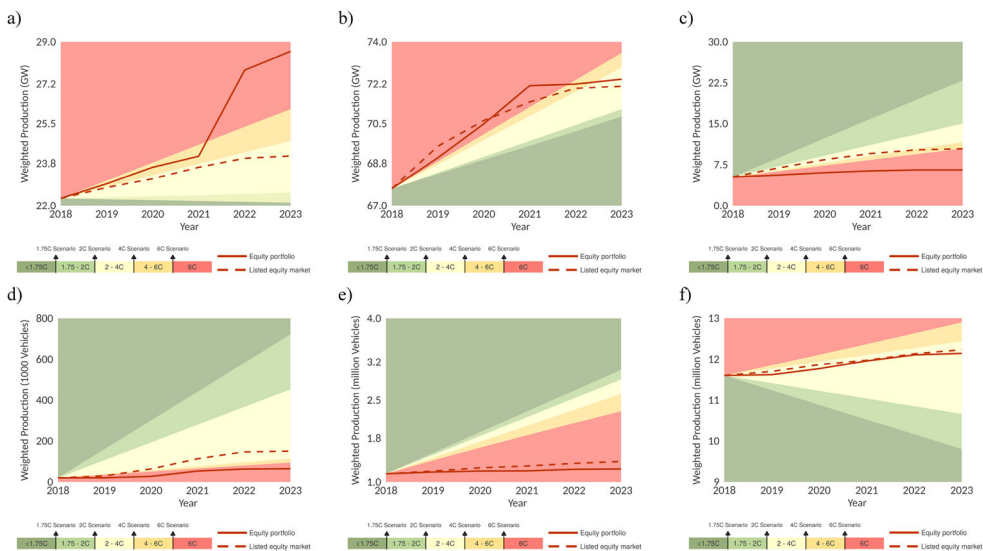


Figure 14. 2018–2023 power capacity and car production plans for TOPIX companies against IEA climate pathways (source: authors from PACTA): (a) coal power capacity; (b) gas power capacity; (c) renewable power capacity; (d) electric car production; (e) hybrid car production; (f) ICE car production.

Conversely, internal combustion engine (ICE) production is still expected to grow, while it should decrease abruptly for global warming to stay well below 2°C (Figure 14f).

Beyond the sole vision of climate trajectories, it is interesting to see that an investor exposed to the Japanese equity market through these sectors is actually also sensitive to climate risk in a number of other countries, as a consequence of companies operating or owning assets outside Japan. Figure 15 illustrates that it is particularly clear for Japanese listed companies involved in oil and gas production: Our detailed analysis shows that the physical asset location of those TOPIX companies is mainly in Australia, the United Arab Emirates, and Canada but also in Angola, the Democratic Republic of the Congo, Venezuela, Brazil, Indonesia, Myanmar, Norway, the UK, etc. Both in terms of physical climate risk and transition risk (e.g. policy), it is evident that those countries and regions display very variable exposures, which individually are certainly very different than one can expect about Japan, both because of geographic and climate specificities and political/policy environment. Similar conclusions can be drawn for power production, with Japanese companies being also exposed outside of Japan, notably for gas power (e.g. India, Australia), hydropower (Eastern Asia), and renewable power (e.g. the US, the PRC). For the automobile sector, the exposure to climate risk factors is even more global, as the automobile market is genuinely global, and demand is highly sensitive to national policies and consumer patterns.

While Japan is itself exposed to physical climate risk (cf. Section 2), the location diversity across the globe of physical assets owned by Japanese listed companies reinforces this characteristic as many concerned regions are typically among the countries most exposed to climate change. Of course, the figures we show here are limited to a 2023 horizon, which does not necessarily mean that those companies will still have the same regional exposure in the future as they have now.

Lastly, we compare the subset of 11 companies supporting the TCFD with that of 12 companies that are not. This comparison shows interesting features (Figure 16). In particular, we see that those power companies that support the TCFD appear to have more renewable capacity planned in 2023 than their peers that do not support the TCFD, but conversely, they also have much more coal power capacity. In contrast, non-TCFD companies rely a lot on gas. Both fall short of renewable capacity and have too much coal capacity to be aligned with the B2DS scenario. A similar analysis shows that neither is aligned with the SDS scenario.



Figure 15. Regional exposure of TOPIX companies in 2023 for (a) oil production, (b) gas production, (c) gas power capacity, (d) hydropower capacity, (e) renewable power capacity.

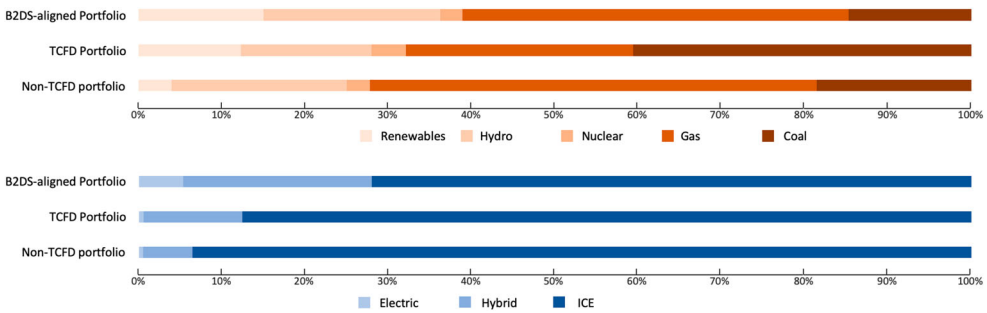


Figure 16. Comparison of 2023 technological breakdowns of power (top graph) and car (bottom graph) companies for TCFD and non-TCFD companies, with what should be a <2°C (B2DS) portfolio according to the IEA (source: authors, modified from PACTA).

For automobile production, TCFD supporters display a higher 2023 share of hybrid car production than non-TCFD companies, but both groups plan a very limited production of electric cars compared to what is needed under the IEA B2DS scenario. ICE cars strongly dominate the future car engine technology breakdown whereas the share of that technology is expected to shrink dramatically in order to be consistent with the well-below-2°C target, even in the short term, following the IEA scenarios, which strongly rely on massive electrification of transportation in the coming decades on a global scale. Of course – and this is particularly relevant for Japan, whose power system has been deeply affected by the Fukushima nuclear crisis – for electric vehicles to be ‘Paris-aligned’, the sources of electric power must be decarbonized in parallel.

The view we have of companies’ production plans shows that while TCFD vs. non-TCFD companies display some differences in their technological breakdown, neither are aligned with the Japanese climate targets.⁷ This is particularly clear for renewable power (even if TCFD supporters seem to be closer to the target than non-TCFD ones) and coal power, for which TCFD supporters are exceeding the target (non-TCFD companies actually performing better). Thus, while performing a bit better in terms of renewable power capacity and hybrid car production, our analysis suggests that TCFD-supporting companies are not per se climate-friendlier companies relative to non-TCFD supporters, as their electric car production plans are as low as their peers, and their coal power capacity plans are far worse.

These results are interesting but should be tested as more recent data on companies’ plans become available, in order to verify whether companies that decided to support the TCFD did indeed change their strategies and technology mixes after the date of commitment. Indeed, the TCFD is a disclosure framework, and reporting on companies’ own exposures to risk does not guarantee as such that companies will manage this risk or decrease their exposure to risk and engage the necessary business disruptions to become < 2°C aligned.

5. Conclusions and recommendations

In combination with the initial contextualization of the climate-related risks and the gradual expansion of ESG investments in Japan, our analysis provides indicative results

that reveal a low sectoral implementation rate of climate mitigation and adaptation strategies among carbon-intensive companies compared to the climate ambition of the Japanese government through the Paris Agreement. These point to significant climate-related risk exposures of current investor portfolios and should be addressed by both the financial sector community and government regulators.

The Japanese economy and by implication the Japanese financial sector and its institutions are exposed to significant climate risks emanating from both inside and outside Japan. Strong efforts are required to mitigate both short-term policy risks and longer-term physical risks that are already starting to materialize. The Japanese financial sector has started to consider climate-related risks and aligning itself with the sustainable development goals and the 2°C warming scenarios outlined in the Paris Climate Agreement. However, more decisive action is required by the Japanese financial sector to expand sustainable finance and ESG policy integration, including through TCFD-aligned disclosure of climate-related financial risks and – even more importantly – the scaling up of financing of a net-zero carbon economy via its portfolios, across all asset classes.

These efforts need to go beyond voluntary integration of the TCFD recommendations into tangible portfolio adjustments that significantly reduce financial and corporate exposure to climate- and ESG-related risks (METI 2019b). The Japanese corporate sector and the national government have been focusing a large number of policy resources on outlining micro-level progress regarding the SDGs (Global Compact Network Japan and IGES 2018; Keidanren 2018; METI 2019c, 2019d, 2019e), rather than a broad regulatory overhaul of its legal frameworks. Recognizing the inherent risks of depleting natural resources and the accelerating rate and intensity of climate-related disasters, and acknowledging the resulting systemic risks to the financial and corporate sectors need to form the basis of any comprehensive ESG-aligned strategies. Potential measures that could have substantial effects include enhancing transparency through taxonomies and mandatory disclosure of risks, climate-related stress testing at both micro- and macro-prudential levels, and climate-calibrated capital rules or collateral frameworks.⁸ The BOJ, which just joined the NGFS, should work with the JFSA to develop climate stress tests for the Japanese economy and financial system. Moreover, the BOJ, whose balance sheet in November 2019 amounted to JPY577 trillion in assets, should implement the NGFS's recommendations regarding sustainable and responsible investment for central banks' portfolios (NGFS 2019).

Along with the TCFD and Green Growth summits in Tokyo, the G20 summit in Osaka opened the doors for proactive regulatory action, notably the pursuit of a Japanese equivalent of the EU sustainable finance taxonomy (European Commission 2018, 2019a; METI 2019a, 2019b). To overcome the current fragmentation of the Japanese ESG market, with most green bonds listed outside of Japan, rules need to be put into a stronger and more internationally aligned framework (IGES 2019). Promoting signing up to the PRI or initiatives such as the TCFD consortium are steps in the right direction, but as the reactions to the EU's proposed legislative proposals and regulatory initiatives have shown, nothing catalyzes ESG integration more than mandatory ESG policies and regulations (Japan Stewardship Forum 2019; Japanese Bankers Association 2019; Keidanren 2019; JBCE 2019a, 2019b; JFSA 2019a, 2019b, 2019c). These efforts would also allow Japan to assume stronger leadership in shaping Asian economic and climate policies. The PRC and ASEAN member states such as Malaysia and Singapore are momentarily the main

protagonists with regard to sustainable finance in Asia (Flint 2019; Frandon-Martinez and Filkova 2019; Ito 2019; Lehr 2019; UNEP 2019). Japan runs into the danger that standards for sustainable finance are being developed elsewhere, by the EU and Asian competitors.

Japan needs to favour substance over reputation in its policy efforts and start implementing mandatory regulatory frameworks that have proven to be the most efficient and effective catalysts for scaling sustainable finance investments and ESG integration (Osaki 2019). The various positive initiatives by the government and representative industry bodies notwithstanding, our analysis indicates the need for further decarbonization of the Japanese economy and broad level mitigation of its substantial climate-related risk exposure. The recent call for climate action by 11,000 scientists and the World Meteorological Organization's most recent bulletin highlighting the uninterrupted rise of global GHGs show that solid underlying scientific foundations are key to a potent, sustainable finance system (Carrington 2019; WMO 2019). The integration of mandatory regulation and increased transparency can have a transformative character in scaling the sustainable finance sector.

The EU, with its Non-Financial Reporting Directive, as well as France, Luxembourg, and the UK, have all created mandatory frameworks to advance climate-related corporate risk disclosure (CDSB 2018; European Commission 2019b).⁹ The EU legislative plans on sustainable and green finance have sparked a global discussion on ESG regulation and exposed many weaknesses in the current ESG and sustainable finance landscapes. For example, the proposed EU sustainable finance taxonomy, if utilized as a benchmark, has revealed the inconsistencies of existing green bond standards, with an MSCI study stating that just 17% of bonds in one of its green bond indexes would satisfy EU green bond standards criteria (Environmental Finance 2019). Energy utility ENEL also recently had to fend off claims by asset managers that some of its sustainability bonds basically amounted to greenwashing, given its vague use of proceeds and unsatisfactory measurement and monitoring capacities (Dupré 2019). These cases outline the risks of creating a green bubble of ESG-labeled financial products that have little impact due to inadequate measurement, reporting, and verification structures among corporates, investors, and regulators.

Support frameworks, such as the joint guide developed by the Climate Disclosure Standards Board and the Sustainability Accounting Standards Board, offer readily available instruments to promote the shift toward material science-based ESG integration (CDSB and SASB 2019). In order for Japan to scale its sustainable finance operation in a more long-term manner, gaps in regulation need to be addressed. Moreover, Japan needs to increase its resources in the areas of research, education, and professional training, with skilled ESG and sustainable finance professionals still mostly originating from former CSR positions, which are not sufficient to adequately deal with 'ESG principles at the company level, navigate the complexities of using sustainability data at the portfolio level, and combine traditional financial analysis with ESG factors' (Edelmans and Ioannou 2019).

Therefore, in order to address greenwashing risks, expand quality disclosure, and scale sustainable finance and ESG activities, Japan should start creating a comprehensive road map that comprises a set of ESG and sustainable finance policy targets for all sectors. This road map should ultimately be implemented via new mandatory policy and regulatory frameworks. Progressive integration of clearly defined ESG factors through regulatory

measures offers economic benefits, given that solid climate and environmental frameworks can spur innovation and economic growth (Dechezleprêtre, Martin, and Bassi 2019; Galeotti, Salini, and Verdolini 2020).

Although not without shortcomings themselves, examples include the ‘EU Action Plan: Financing Sustainable Growth’, which lists ten actions across three different pillars (European Commission 2018),¹⁰ and the ‘Luxembourg Sustainable Finance Roadmap’, which was commissioned by the Luxembourg government and produced in collaboration with the UNEP-FI (Innpact and UNEP FI 2018).¹¹ These represent valuable resources for Japanese law- and policymakers, regulators, and stakeholders to fully integrate sustainable finance and ESG principles into the financial and corporate sectors. The significant progress made over the last few years notwithstanding, there are still a lot of gaps in Japan’s sustainable finance framework, and more broad and decisive action is required to assume regional and global leadership in the areas of sustainable finance and ESG policy integration.

Notes

1. Reports indicate that in 2017, Japan was still planning to construct more than 42 new coal-fired power plants (Renewable Energy Institute 2017). Japan is the largest provider of fossil fuel finance among G7 countries and is currently the world’s second-largest provider of funds to carbon-intensive power generation technologies, having provided funding to more than 19,788 MW of current and 2,520 MW of future coal-fired energy capacity (Burrows et al. 2019; Furuno 2019; Hanada, Ohira, and Fukumoto 2019; Smeed and Hurst 2019; Bengali 2019; EndCoal 2019). The fact that Hiroshi Kajiyama, Japan’s Minister of Economy, Trade and Industry, declared that Japan would continue to fund coal power technologies in and outside of Japan, primarily in Asia, has led to strong condemnations and criticism over Japan’s stance at the COP25 in Madrid in December 2019 (Mainichi Japan 2019a). Although Shinjiro Koizumi, the Minister of Environment, apologized for Japan’s continued use of coal power and acknowledged the problems caused by continuous coal use, he offered no credible pathways toward a materially significant decarbonization of Japan’s energy systems (Mainichi Japan 2019b). In recent comments about the planned Vung Ang 2 coal-fired power plant in Viet Nam, Koizumi questioned the financing provided by the Japan Bank for International Cooperation (JBIC) (NHK World 2020), and requested a review on said financing, as the project does not appear to fulfil certain export-related conditions for projects wanting to benefit from development finance (Nikkei Asian Review 2020). In light of the recent criticisms addressed at Koizumi at COP25, these statements might indicate a slight shift toward fossil fuel technology exports, although the government still plans to finance the plant (Nikkei Asian Review 2020).
2. The PRI comprise six principles: Principle 1: We will incorporate ESG issues into investment analysis and decision-making processes; Principle 2: We will be active owners and incorporate ESG issues into our ownership policies and practices; Principle 3: We will seek appropriate disclosure on ESG issues by the entities in which we invest; Principle 4: We will promote acceptance and implementation of the Principles within the investment industry; Principle 5: We will work together to enhance our effectiveness in implementing the Principles; Principle 6: We will each report on our activities and progress toward implementing the Principles.
3. Each company in the 2019 CDP survey belongs to one of the following sectors for the change disclosure score: ‘Agricultural commodities’, ‘Cement’, ‘Chemicals’, ‘Coal’, ‘Electric utilities’, ‘Food, beverage & tobacco’, ‘General’, ‘Metals & Mining’, ‘Oil & gas’, ‘Paper & forestry’, ‘Steel’, ‘Transport OEMS (original equipment manufacturers)’, and ‘Transport services’. The scoring scale is, with A being the top and F being the bottom grade: A, A-, B, B-, C, C-, D, D-, F.

4. An early initiative to promote sustainable and responsible investment in Japan was the Japan Sustainable Investment Forum (JSIF), which was established in 2001. It is interesting that until recently, most member companies of the JSIF were nonfinancial companies (JSIF 2015a; 2015b).
5. For detailed information on PACTA, see: <https://www.transitionmonitor.com>.
6. Cf.: <https://www.jpix.co.jp/english/markets/indices/topix/>.
7. Note that the data we use in the analysis are from end 2017, slightly after the publication of the TCFD final report (FSB-TCFD 2017).
8. Carbon and ESG stress tests are currently being actively researched or considered by the German and Dutch governments as well as the European Central Bank (Reuters 2019; Navigant 2018; Vermeulen et al. 2018).
9. The first of its kind was Article 173 of the French energy transition and green growth law from 2015, which requires large institutional investors and asset managers to declare how they address ESG criteria in their risk management and investment policies (FIR 2016).
10. The three pillars are: (1) Reorienting capital flows toward a more sustainable economy; (2) Mainstreaming sustainability in risk management; and (3) Fostering transparency and long-termism.
11. The road map was published in November 2018 and built upon the work done by the EU High-level Expert Group on sustainable finance (European Commission 2018; Inn pact and UNEP FI 2018). It listed nine national ambitions and 28 recommendations. The nine ambitions are: (1) Formalize and communicate an ambitious, tailor-made, and clear sustainable finance strategy; (2) Set up a coordinating entity; (3) Leverage financial sector expertise; (4) Raise awareness and integrate sustainability into education and professional training; (5) Promote innovation; (6) Develop expertise and best practice; (7) Analyze and redesign the system of incentives and taxation; (8) Lead by example and ensure proof of concept; and (9) Measure progress.

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