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Scaling up Private Investment in Low-Carbon Energy Systems through Regional Cooperation: Market-Based Trade Policy Measures

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Abstract: *This study aims to analyse the possibility and challenges of encouraging private sector investment in low-carbon energy systems in Asia, particularly across the Regional Comprehensive Economic Partnership (RCEP) member countries, and to suggest an effective policy framework that governments could apply to improve the development and dissemination of low-carbon energy goods and technologies. The research questions examined in this study are: What type of policy measures affect trade in low-carbon energy systems transition, particularly the renewable energy transition? How can investment signals and incentives be reframed to scale up private finance in renewable energy through regional cooperation? The objective is to investigate and provide several market-based feasible trade policy and investment policy tools for both national and regional markets that governments could adopt to accelerate the speed of private financing of the low-carbon energy industry, particularly the renewable energy industry*.

Keywords**:** Low-carbon energy systems, renewable energy, market-based trade policies, regional cooperation, East, South, and Southeast Asia.
JEL Classification**: :** E22, F18, G23, O57, P18

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1. Introduction

Recent decades have witnessed Asia-Pacific countries – especially emerging economies in East, South, and Southeast Asia – being the new engine of global economic growth. According to the Asian Development Outlook 2017 (Asian Development Bank, 2017), Asia and the Pacific account for 60% of the world's economic growth. Along with this significant economic achievement, issues concerning energy security, the trade–environment nexus, and the environment–growth nexus have become increasingly crucial in policymaking, both in the public and private sectors. How to ensure energy supply and reduce environmental pollution have turned into top government priorities and key factors in maintaining sustainable development.

Countries participating in the 21st session of the Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC) meeting in Paris in December 2015 unanimously accepted that energy efficiency and renewable energy are the only solution to tackle issues concerning energy, the environment, and economic growth. Few countries are aware of the role that international and regional cooperation in trade and investment can play in increasing the pace of the transition to low-carbon energy systems. The launch of the Intended Nationally Determined Contributions, which are now ratified as Nationally Determined Contributions (NDCs), is the first international agreement that enhances collaboration on controlling global climate change between developing and developed countries. However, as the NDCs lack binding force, and the United States (US) is threatening to withdraw from the Paris Agreement (Climate Home News, 2018), it may be too early to reach an effective and worldwide recognised protocol. After the Paris Conference in 2015, individual countries have felt domestic and global pressure to speed up the implementation of their voluntary national climate pledges and plans for limiting carbon and other greenhouse gas emissions. Seeking deeper and stronger cooperation across countries within regions is a more practical way to solve the current dilemma (Baldwin and Kawai, 2013).

Asian countries have been at the forefront of demonstrating how regional cooperation can play an important role in unlocking the potential of private finance for the low-carbon transition. Establishing the Association of Southeast Asian Nations (ASEAN) Green Bond Standards, ASEAN Social Bond Standards, and Green Local Currency Bonds for Infrastructure Development are a few examples of regional cooperation. Nevertheless, beyond financing, cooperation in building capacity for energy investments to support the energy transition through the Capacity Building Roadmap on Energy Investment and Financing in ASEAN is crucial (ASEAN, 2018).

Two major trade and investment regional agreements that could have a profound influence on the development of low-carbon energy systems are now in prearrangement and/or at the negotiation stage in the Asia-Pacific region. One is the Regional Comprehensive Economic Partnership (RCEP), which was proposed by the ASEAN 10 countries plus Australia, China, India, Japan, the Republic of Korea, and New Zealand in 2012. The ASEAN Economic Community Blueprint 2025's 'Global ASEAN' initiative prioritises the RCEP. The commitments and target of the ASEAN Economic Community Blueprint 2025 to build 'a highly integrated and cohesive economy' collectively form the benchmark for RCEP negotiations (ASEAN, 2015:1). Therefore, the RCEP is expected to produce a broad trade deal, but negotiations to date do not include targets or issues related to low-carbon energy systems (Das and Kawai, 2016).

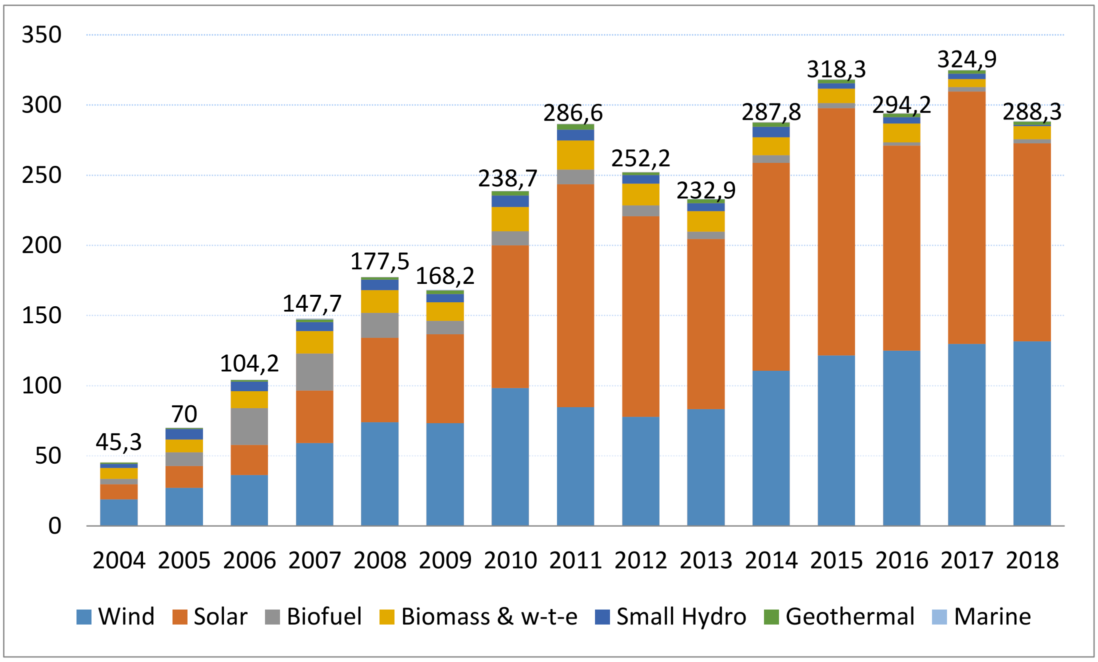
The second is China's premier development strategy, the Belt and Road Initiative (BRI), which clearly regards developing low-carbon energy technology as one of the goals. Nevertheless, to achieve a smooth transition to low-carbon energy systems in Asia, it is imperative to scale up private sector investment, which depends on government policies promoting innovation and reducing financial risks to private investors. Multilateral financial institutions such as the Asian Development Bank need to be effective intermediaries between national governments and the private sector through a feasible policy framework.

In this macroeconomic scenario, this study aims to analyse the possibility and challenges of encouraging private sector investment in low-carbon energy systems in Asia, particularly in the RCEP region, and to suggest an effective policy framework that governments could apply to improve the development and dissemination of low-carbon energy goods and technologies. The three main sources of low-carbon energy are (i) renewable energy, (ii) improving energy efficiency (including cleaner coal

technology), and (iii) nuclear energy (controversial in many countries). Given the current status of growth, renewable energy is the central focus of this study.
Cleaner coal technology, which reduces emissions and increases the amount of energy produced per metric ton of coal, seems to be the energy source of choice in the Asia-Pacific region in recent times. The Global Trends in Renewable Energy Investment 2018 report (Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance, 2018) revealed that more cleaner coal technology generation was added in 2017 than conventional fossil fuels Global new investment in different types of clean energy from 2004 to 2018 is shown in Figure 1.

Figure 1: Types of Global New Investment in Renewable Energy, 2004–2018

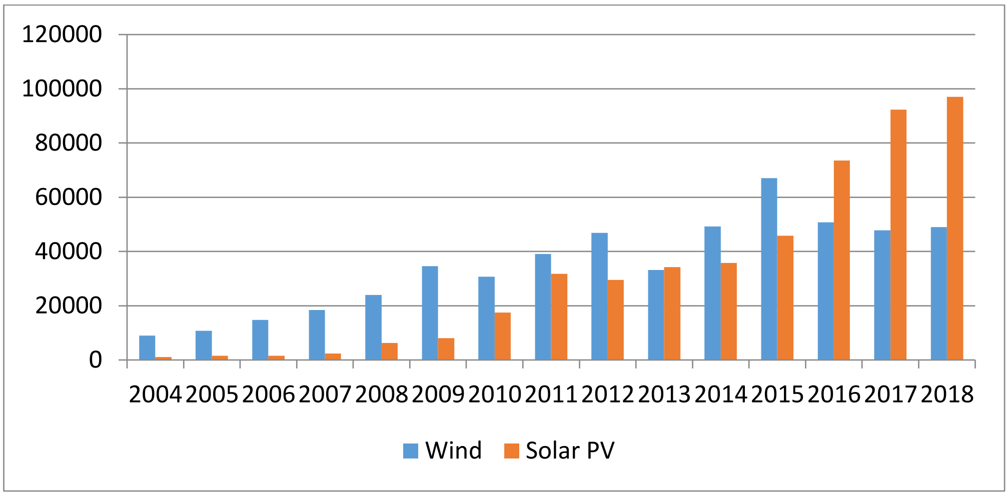
($bn)



Source: Data drawn from Figure 21 from Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance (2019).

Nevertheless, the report pointed out that the world spent more money adding solar, wind, and other renewable sources than adding coal, natural gas, or nuclear power plants (Figure 2).

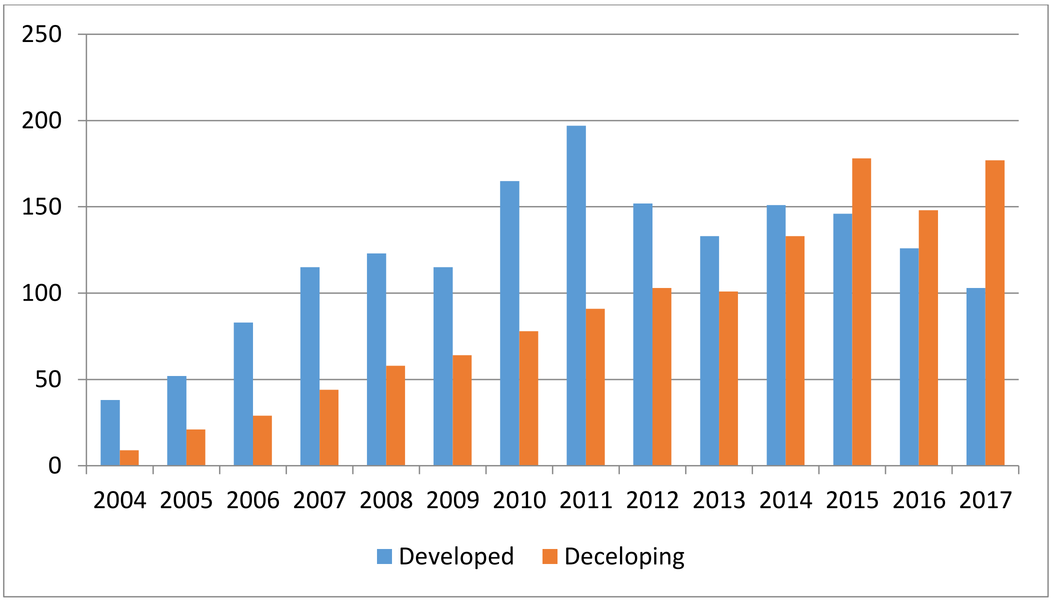
Figure 2: New Added Wind and Solar PV Installed Capacity, 2004–2018 (MW)



Source: Data drawn from IRENA (2019).

Global investment in renewable energy edged up 2% in 2017 to $279.8 billion, taking cumulative investment since 2004 to $2.9 trillion. Developing countries have invested more in renewable energy than developed countries since 2015 (Figure 3).

Figure 3: Investment in Renewable Energy by Developing and Developed Countries, 2004–2017 ($bn)

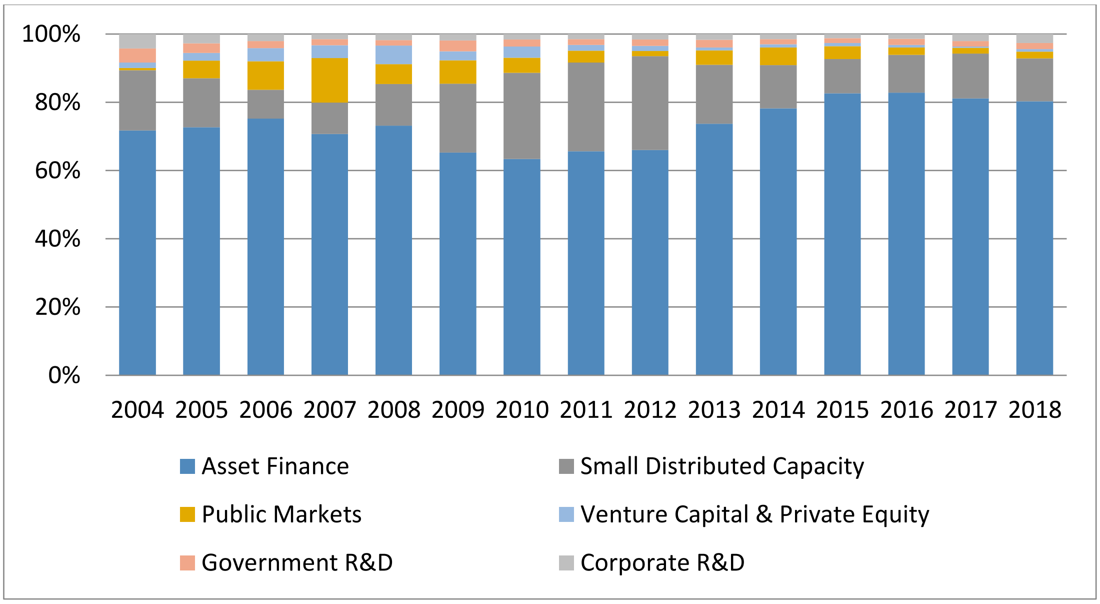


Source: Data drawn from Figure 4 from Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance (2018).

The latest rise in capital outlays took place in the context of further falls in the cost of wind and solar energy, which made it possible to buy megawatts of equipment more cheaply than before. Renewable energy-based power generation is being promoted vigorously in many RCEP countries since the COP21 commitments. The leading locations for renewable energy investment in 2018 were China, which accounted for $100.1 billion, followed by Japan ($27.1 billion) and India ($11.1 billion). India has overtaken the European Union, with its renewable capacity expecting to more than double by 2022 (IRENA, 2017).

Clean energy share prices rose by about 28% on the WilderHill New Energy Global Innovation Index (NEX) in 2017. However, this has not yet produced a jump in equity issues by specialist companies. Instead, public market investment in renewable energy dipped 6% to $5.7 billion, a 5-year low. Venture capital and private equity investment was also weak, dropping 33% to $1.8 billion (Figure 4).

Figure 4: Sources of New Investment in Renewable Energy, 2004–2018, Proportion



Source: Data drawn from Figure 21 from Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance (2019).

The characteristics of the above financial markets, along with the record high of $87.2 billion for asset acquisitions and refinancing in 2017, require interpretation (International Renewable Energy Agency (IRENA) and Climate Policy Initiative, 2018). It can be argued that renewable energy has become a mature sector, increasingly dominated by big industrial players, utilities, and institutional investors. One uncertainty ahead for renewable energy is how investors will behave in the future when project revenues have no government price support. Hence, private sector power purchase agreements or even just merchant power prices will be crucial for the development of the renewable energy sector. This necessitates unconditional support not only from governments but also from the private sector to sustain technological research and development in innovating and disseminating renewable energy systems around the world. Investment and trade are the usual ways for the private sector to enter renewable energy markets.

Very few studies have explored the effect of renewable energy goods and services trade on the environment, and no study has compared this effect between renewable energy exports and imports. While renewable energy imports are supposed to benefit the environment of the importing countries through environmentally friendly use of those goods, it is crucial to explore the impact of renewable energy exports on the exporting countries' environments. In the case of exports of renewable energy goods, the impact on the environment of the exporting countries operates both in the production stage and the final environmental goods consumption stage. In this context, it is important to note that countries do not need to concentrate on facilitating free trade in renewables through trade agreements such as the RCEP where trade in renewables has no impact on the environment.

The research questions examined in this study are: What type of policy measures affect trade in the low-carbon transition, particularly the renewable energy transition? How can investment signals and incentives be reframed to scale up private finance in renewable energy through regional cooperation? The objective is to investigate and provide several market-based feasible trade policy and investment policy tools for both national and regional markets that governments could adopt to accelerate the speed of private financing of the low-carbon energy industry, particularly the renewable energy industry.

The following section discusses important factors determining private investment in the renewable energy sector. The third section describes some of the market-based trade policy measures used by emerging economies in Asia to boost private sector investment and trade in renewable energy systems. A critical evaluation of some of the policies is done, with case studies in the next section. Policy suggestions to increase private sector investment in renewable energy production are made in the final section.

2. Determinants of Private Investment in the Production of Renewable Energy Goods and Technologies

The two core methods of financing a business are (i) borrowing from banks as a loan; and (ii) approaching equity capital, such as venture capital, private equity, and the public market. Companies can also raise funds through the balance sheet from their own corporate funds as part of their corporate strategy. Such companies draw on monies raised from the financial markets through bond issuance or general corporate bank facilities, which are available to the business as a whole or following the sale of other parts of the business. Company often choose whether to use project finance or corporate facilities depending on which offers the cheapest source of funding for the project so that profit from the project is enhanced (Kalirajan and Chen, 2018).

Profit (π) is the difference between total revenue (R) and total cost (C). In functional form, (π) can be written as

$$\pi = f(P, Q, C) \qquad (1)$$

where, P = price of the output (Q), which is mainly determined in the competitive market; and C = total cost, including the input cost, operational cost, and hidden cost, such as the difference between the government's announced business licence costs and the actual cost to businesses.

The theory of profits emphasises that profit will be larger in a country where investors can operate their businesses at a lower cost. This implies that the variables that determine profit can equivalently determine the inflow of investment in any country. Therefore, the investment function in the reduced form is as follows:

$$I = f(P, Q, C) \tag{2}$$

The above version of the theoretical *I* function can be transformed into an empirical *I* function by applying the arguments developed in the theory of profits. Drawing on the theory of profits, it is logical to argue that businesses prefer to invest in countries where they can produce a large amount of production at a lower cost, therefore the size of the economy is an important factor in making investment decisions. The United Nations Conference on Trade and Development (UNCTAD, 2000) argued that investors which mainly make greenfield investments in foreign countries prefer to invest in countries with a large domestic market. It is rational to expect that not all market-seeking foreign investors will invest in foreign countries only to serve the host economies, and that some would also be keen to export their products to other countries. This means that a country with a small domestic market but an open trade regime can offer economies of scale similar to those of countries with a large domestic market, to foreign investors.

Another important determinant of FDI concerns the perception of risk in the host country by the investors. Even projects with considerable expected returns in developing countries could not receive financial support because of their perceived high risks and limited liquidity of financial flows (Stadelmann and Newcombe, 2011). Given that low-carbon investments involve risks, the question is how to reduce the risks and crowd in private sector capital. Risks are perceived because of many factors. Srivastava and Venugopal (2014) classified such risks into two categories: (i) political and macroeconomic risks and (ii) low-carbon market risks. Though it is possible to some extent to include political and macroeconomic risks in empirical analyses, it is difficult to include low-carbon market risks because of lack of information. Thus, reducing if not eliminating the low-carbon market risks plays a crucial role in determining private financing in renewable energy goods and technologies. Here, governments need to make full use of the power of the market or at least change the preference of the market – both domestic and international – from fossil fuels to low-carbon energy. Governments could implement policies to boost market confidence in developing and producing renewable energy goods and technologies. However, this is not always satisfactory because the policy approaches may not be appropriate to exert a significant impact on the supply and demand sides of the renewable energy market.

Hence, it is imperative to gauge the effectiveness of such policies on improving national and regional market confidence in scaling up investment in the production of renewable energy goods and technologies.

3. Scaling Up Private Investment in the Renewable Energy Market: Market-Based Trade Policy Measures

Countries have been using different policy measures, such as feed-in tariffs, renewable certificates, and public tenders, to encourage private financing in the production and distribution of renewable energy goods and technologies. By boosting renewable energy sector investment, India – a major emerging economy in Asia – has put in place many progressive policies at the federal and state levels. Federal policy support has been in the form of accelerated depreciation, generation-based incentives, and viability gap funding. State-level policy support has typically been in the form of feed-in tariffs, net metring, and tax/duty exemptions influencing the supply side of the renewable energy market. In China, the export tax rebate (ETR) system is used as an effective tool to guide market growth. The ETR, also known as the value-added tax rebate, is an important policy tool to promote exports by influencing the supply side of the market, which is allowed by the World Trade Organization (WTO) as long as the rebate rate is not larger than the domestic value-added tax rate. The ETR system was introduced in China in 1985, and the rebate rates for different goods vary from 5% to 17%. The Government of China regards ETRs not only as an international trade policy but also as a powerful tool to regulate the direction of market development, since exports are also highly relevant to domestic production activities. Some have attempted to assess the impact of ETRs on the value of exports, and found a significant positive causality relationship at the country level.

Vested interests in individual countries have been pushing the case for imposing trade restrictions as part of national trade policy measures to address climate change. As a consequence, the likelihood of trade restrictions becoming part of many national trade policy measures implemented to address climate change is very high. Drawing on the arguments of Bacchus (2017), policymakers cannot ignore the possibility of such trade-restrictive national measures creating domestic fears of carbon leakage and a loss of national competitiveness. Besides the carbon tax and emissions trading scheme, in the international trade arena, tariff and non-tariff measures are important policy instruments used by countries to influence the demand and supply sides of the market for renewable energy goods and technologies in the importing countries and exporting countries, respectively. This has implications for investment in both importing and exporting countries. Ferrantino (2006) argued that the monetary value of the non-tariff measures (NTMs) exceeds that of tariffs in many cases. Amongst the NTMs, in 2014, technical measures were most frequently applied on renewable energy goods exports of RCEP member countries.[1] This necessitates an urgent need to have 'regulatory convergence' concerning NTMs across countries. The present study uses the definition of UNCTAD (2015): 'Non-tariff measures are policy measures other than ordinary customs tariffs that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices'. UNCTAD (2015) also points out that 'though many NTMs aim primarily at protecting public health or the environment, they also substantially affect trade through information, compliance and procedural costs'. Thus, it is important to ensure that information constraints faced by the private sector are well covered and can be mitigated by strong policy frameworks by addressing NTMs in all aspects of the investment regime.

Further, it is worth noting that the use of restrictive trade policy measures to tackle national climate change issues would increase the number of WTO disputes and political frictions between countries. A feasible solution floated by Bacchus (2017) to decouple trade from emissions and for minimising the WTO trade restrictive policy disputes is to agree on the policy of 'climate waivers', by which countries can restrict trade based on the amount of greenhouse gases used in the production of traded goods.

The crux of a WTO climate waiver concerns allowing a country to restrict its trade to positively influence climate change. A climate waiver would facilitate countries to give preference to trade based on the amount of carbon and other greenhouse gases used or emitted in the production process, which need to be consistent with the Paris Agreement. However, in the name of the climate waiver, countries should not

[1] Negotiations on the environmental goods agreement were launched in Geneva on 8 July 2014 and are ongoing after 18 rounds.

discriminate in an unjustifiable way that impacts international trade. The necessary and sufficient conditions for the climate waiver to work successfully without impinging on the WTO rules are that climate negotiators should agree on the method of measuring greenhouse gas emissions, and on the definition of a climate response measure (Bacchus, 2017). The probability of developed countries applying a climate waiver by camouflaging protectionist measures will be high, which would lead to retaliation from developing countries. Thus, it is imperative that the availability of a waiver should be confined to true climate response measures approved by the WTO. It is too early to reach an effective empirical analysis of the impact of climate waivers on renewable energy trade. Nevertheless, the question of whether climate waivers have the potential to reduce trade in renewable energy goods has been tested indirectly in this study by examining the impact of ETRs, tariffs, and NTMs that influence private renewable energy investment on renewable energy trade.

A regional cooperation agreement such as the RCEP is another powerful instrument to influence the supply and demand sides of the renewable energy markets nationally and regionally. Building low-carbon innovation systems is intrinsically linked to capacity building and technological cooperation. It is also both resource-intensive and long-term, which becomes feasible through regional cooperation agreements. Thus, governments' financial support is required to complement and assist private sector innovation. Such support can be strengthened by permanently phasing out fossil fuel subsidies and all subsidies for price-competitive mature technologies. Some RCEP countries have adopted this approach in recent times, though not consistently. The governments of a few RCEP member countries have also targeted their policies towards establishing tax regimes and investment protections for renewable energy investment, encouraging local banks to become involved, developing green bonds linked to renewable energy investment, and supporting renewable energy infrastructure for adaption purposes. For example, Australia is one of the few RCEP countries with a national green investment bank. Since 2012, the Clean Energy Finance Corporation (CEFC), an independent statutory authority, has financed projects related to renewable energy and energy efficiency. The government credited the CEFC with A$2 billion a year from 2013 to 2017 (Australian Renewable Energy Agency (ARENA), 2017). As of June 2018, the CEFC had committed A$5.3

billion to projects with a total value of A$19 billion (1% of 2018 gross domestic product). Through regional cooperation technology transfer agreements embedded in the RCEP and BRI, China's potential to deploy its solar energy innovation has been exploited by some member countries in the region.

The following section uses case studies to analyse the effectiveness of the market-based trade policy measures discussed above in influencing the demand and supply sides of renewable energy markets in RCEP member countries.

4. Critical Evaluation of Market-based Trade Policy Measures: Empirical Analyses

Drawing on Kalirajan and Anbumozhi (2014), a stochastic frontier gravity model was applied to estimate the effectiveness of ETRs on China's renewable energy goods exports (see the model in Appendix 1). FRONTIER 4.1 software was used to estimate the stochastic frontier gravity equation and the estimation results are presented in Table 1.

Table 1: Impact of Export Tax Rebate on China's Renewable Energy Exports

Variable	Coefficient estimate
Constant	9.8765*** (3.2216)
LnGDP	1.0086*** (0.2276)
LnPop	0.2115** (0.1003)
LnDist	-0.4782** (0.2245)
LnEx	0.2418 (0.2159)
LnTariff	-12.6531** (0.6245)
LnETR	1.0326** (0.4883)
Mu	1.8679** (0.9256)
Eta	0.4536** (0.2252)
Gamma	0.8265*** (0.2457)

Eta = efficienty related parameter, Gamma = efficiency-related parameter, LnDist = logarithm of distance between exporter and importer countries, LnETR = logarithm of export tax rebate LnEx = logarithm of relative exchange rate, LnGDP = logarithm of gross domestic product of the Regional Comprehensive Economic Partnership importer country, LnPop = logarithm of population of the Regional Comprehensive Economic Partnership importer country, Mu = efficiency-related parameter, LnTariff = logarithm of tariff rate.

Notes:

1.** significant at the 5% level; *** significant at the 1% level.

2. Figures in parentheses are standard errors of the coefficient estimates.

Source: Authors' estimation.

The coefficient of the ETR rate in Table 1 is significant at the 5% level, which implies that the ETR has positively influenced China's renewable energy exports. Exports of renewable energy would increase by 1.3% for a 1% increase in the ETR. The coefficient of the tariff of the importing countries is negative and is significant at the 5% level. Generally, changes in tariffs always come with the implementation of trade agreements inducing trade policy changes, which means that the tariff rate is a strong indicator of government preferences. A lower tariff rate for renewable energy goods reveals stronger support by the importing country's trade policy, which directly encourages and stimulates the production and consumption of renewable energy goods in the exporting and importing countries. The coefficient of γ, which is the ratio of the observation-specific variance to the total variance, indicates the influence of NTMs on the exports. The coefficient of γ is significant at the 1% level and strongly confirms the influence of non-tariff barriers on the exports. Hence, the empirical results suggest that the ETR can be used as a powerful instrument to promote investment in the renewable energy market, which indirectly supports the case for Bacchus's climate waiver. The results also indicate that regional cooperation agreements could be used effectively to eliminate tariff and non-tariff barriers applied on renewable energy goods exports.

A challenging question is why some countries promote renewable energy trade liberalisation by reducing tariff and non-tariff barriers, whereas others prefer protection. Identifying the root cause of this issue would contribute to progress in reducing renewable energy trade barriers and scaling up private investment in renewable energy goods and technologies. An attempt has been made in this study to explain the reasons for the variation in countries' renewable energy trade protection preferences. Political scientists have argued that the pressure for protectionism is generated not from the point of view of the interests of the nation as a whole, but from domestic interests adversely affected by the reduction in tariff and non-tariff barriers (Saksena and Anderson, 2008). Studies in this field indicate that group interests and domestic political institutions help explain trade policy outcomes. Even though a significant amount of political science literature has been devoted to examining countries' protectionist preferences, the results of empirical studies vary and no study explicitly uses domestic politics to explain the variation in trade barriers on renewable energy goods and technologies.

Drawing on society-centred approaches, the variation in renewable energy liberalisation trade preferences amongst countries can be explained by the different outcomes of domestic political competition during trade policymaking processes amongst interest groups. Groups that benefit from trade liberalisation would lobby for low trade barriers, while groups that are adversely affected by it would lobby for high trade barriers. This study focuses on examining the assumption of society-centred approaches that the broader the interest that governments represent, the more they liberalise trade. To be more precise, countries with proportional representation electoral systems characterised by more democracy are associated with lower renewable energy trade barriers. Environmental concerns will be added into the models to capture the environmental interest, with the assumption that the more people prefer to protect the environment, the more they will support renewable energy free trade, and their trade preference is a combination of economic and environmental concern. Environmental performance is used as a proxy of environmental interest/concerns. Countries with better environmental performance are likely to have better awareness of and pay more attention to environmental protection.

Further, even though society-centred approaches do not explicitly discuss corruption and regulatory quality, these two variables are usually included in the empirical models to control for the quality of political institutions. Corruption seems to increase the possibility of vested interests being dominated in domestic politics, while better regulatory quality raises the likelihood of politicians representing the national interest. Therefore, this study includes these two variables to examine how they affect tariffs and NTMs on renewable energy goods and technologies (see Appendix 1 for the empirical model).

Based on the Hausman test results, the fixed effect model was chosen for tariffs; and the cross-section model with heteroscedasticity corrected estimation was chosen for the NTMs. The results are presented in Table 2.

Table 2: Determinants of Tariff and Non-Tariff Measures on Renewable Energy Exports

Variable	Tariff	Non-tariff measure		
		TM	NTM	NTM_P
Democracy	-0.0125***	-0.0559***	-0.0581***	-0.0476***
	(0.00171)	(0.00778)	(0.00466)	(0.00392)
Corruption	0.00812***	0.0275***	0.0201***	0.0165***
	(0.000528)	(0.00184)	(0.000760)	(0.000850)
Regulatory quality	-0.0172***	-0.0383***	-0.0208***	0.000699
	(0.000738)	(0.00286)	(0.00120)	(0.000899)
Environmental performance	-0.00233***	-0.0138**	-0.0261***	-0.0184***
	(0.000305)	(0.00613)	(0.00356)	(0.00336)
Electoral system	-0.107***	1.009***	0.384***	0.368***
	(0.00758)	(0.0847)	(0.0248)	(0.0306)
Log of EG imports/GDP	-0.00137	0.0408***	-0.00430	0.0199***
	(0.00110)	(0.0118)	(0.00339)	(0.00468)
Log of GDP	0.178***	1.888***	0.0799***	0.257***
	(0.0379)	(0.0311)	(0.0101)	(0.0111)
Exchange rate	-3.25e-06	-0.000198***	-9.28e-06**	-3.77e-05***
	(4.70e-06)	(7.46e-06)	(3.60e-06)	(3.06e-06)
Log of agricultural value added/GDP	0.206***	0.176***	-0.263***	0.105***
	(0.0179)	(0.0426)	(0.0266)	(0.0246)
Log of manufacturing value added/GDP	-0.0317	-3.265***	-0.390***	-0.856***
	(0.0566)	(0.0871)	(0.0372)	(0.0494)
ASEAN membership	-	0.363***	-0.309***	0.452***
		(0.0885)	(0.0418)	(0.0671)
Developed countries	-	0.190	0.152***	0.221***
		(0.131)	(0.0536)	(0.0583)
Constant	-3.015***	-36.39***	1.810***	-3.339***
	(1.007)	(0.725)	(0.363)	(0.333)
Year dummy	Yes	No	No	No
R-squared	0.571	0.483	0.530	0.543

ASEAN = Association of Southeast Asian Nations, EG = environmental good, GDP = gross domestic product, NTM = non-tariff measure, NTM_P = non-technical measure, TM = technical measure.

Notes:

1. ** significant at the 5% level; *** significant at the 1% level.
2. Figures in parentheses are standard errors of the coefficient estimates.

Source: Authors' estimation.

The coefficient of democracy is statistically significant and negative in all cases, which suggests that more democratic countries seem to apply lower tariffs and fewer NTMs on renewable energy goods. This relieves the worry raised by Kono (2006) that democracies may reduce transparent trade barriers but replace them with less transparent NTMs. As the results suggested, democratic countries have both lower tariffs and NTMs than non-democratic countries. Even though this does not necessarily mean that democratic countries do not substitute tariffs with NTMs, both their tariffs and NTMs are lower than in non-democratic countries.

When corruption increases, both tariffs and NTMs tend to increase. This is expected because corruption tends to make politicians more receptive to the protectionist pressures of interest groups rather than representing society's interests as a whole. In other words, corruption may facilitate reflecting the narrow interests of certain industries and producers in trade policy outcomes. In contrast, an increase in regulatory quality is associated with a decrease in tariffs and technical and nontechnical measures. This effect is expected, as governments are more likely to reflect the interest of the majority of the public, which prefers free trade, as regulatory quality improves.

The sign of the environmental performance variable is as expected in both the tariff and NTM models. Countries with better environmental performance have lower tariffs and fewer NTMs on renewable energy imports. This suggests that interest in the environment is reflected in the trade policies of these countries, so they lower trade barriers to promote renewable energy imports and consumption. This is an indirect indication for supporting a WTO climate waiver. This result implies that the voices of environmental groups need to be enhanced to increase free trade in renewable energy. As a result, environmental preference can be reflected in national trade policy outcomes.

Governments have a variety of reasons for applying export-related NTMs, e.g. a supply shortage in the domestic market, regulating prices, avoiding antidumping, and political issues. It is hard to know exactly what induces governments to increase or decrease export-related NTMs. However, the following conjecture can be made, which needs further investigation: governments inclined towards socialism have fewer export-related measures, which may come from their aim to promote renewable energy exports in order to create more jobs. On the other hand, more export-related NTMs of countries inclined towards capitalism might be a result of their interest in increasing the renewable energy supply in domestic markets.

The results further show that when countries are more dependent on the renewable energy international market, they are likely to apply more non-technical measures and export-related measures on renewable energy goods and technologies. These results are consistent with the results of Saksena and Anderson (2008) and Trefler (1993), who argued that a high level of imports would cause protectionism. In addition, the bigger the economy, the higher the tariffs and the more technical, non-technical, and export-related measures. This indicates that large countries use their economic power to increase trade barriers, as they face less threat of retaliation from their partner countries. This result conforms with the arguments of Mansfield and Busch (1995) and Scaperlanda (1973). In the case of export-related measures, larger countries may use higher export-related measures to increase domestic supply and the use of renewable energy. Interestingly, the 'developed countries' variable shows that these countries are associated with a greater number of non-technical and export-related measures. The results indicate that if both importer and exporter countries are ASEAN members, non-technical measures on renewable energy are lower, but technical and export-related measures are higher than the non-ASEAN members.

5. Conclusions and Policy Suggestions

5.1. Conclusions

Given the constraints on government budgets in many RCEP member countries and the large capital outlay required to achieve the renewable energy targets agreed at the COP21 meeting, scaling up the mobilisation of both public and private capital is imperative. Many governments have adopted conventional measures (such as feed-in-tariffs, renewable certificates, carbon taxes, emissions trading schemes, and public tenders) and some have used less conventional financial instruments (such as credit and risk guarantees, innovative currency hedging facilities, and government green bonds) to encourage private financing in the production and distribution of renewable energy goods and technologies. Though the above conventional and less conventional financial instruments are used at the national level, only a few countries are aware of the role that international and regional cooperation agreements such as the RCEP and BRI can play in increasing the pace of transition to renewable energy systems.

The basic principle underlying any business investment is profit maximisation.

However, market demand and supply conditions determine how sustainable the profitable returns would be over time. In other words, the perception of market risk plays a crucial role in scaling up investment in renewable energy. The evidence-based research asserts that trade and investment are two important pillars of any regional cooperation agreements. Hence, scaling up private investment in the renewable energy sector through regional cooperation agreements should be effective in facilitating the smooth functioning of trade and investment in renewable energy to eliminate the market risk. In this context, the present study has gauged the influence of market-based trade policy measures – ETRs, tariff and non-tariff measures, and regional cooperation agreements – on both national and regional renewable energy markets in the RCEP region. The next section provides policy suggestions for governments to strengthen the positive influence of those market-based trade policies to accelerate the speed of private financing of the low-carbon energy industry, particularly the renewable energy industry.

Bacchus (2017) argued for a WTO climate waiver, by which countries can restrict trade depending on the amount of emissions used in the production process, to facilitate the transition to a low-carbon global economy. However, the success of the proposed climate waiver in decoupling trade from emissions is determined by the agreement of the WTO member countries on appropriate measures for emissions and the definition of a climate response measure. It is too early to carry out any direct empirical verification on the impact of climate waivers on trade in renewable energy. Nevertheless, this study has examined the impact of climate waivers on renewable energy trade indirectly by examining the influence of ETRs, tariffs, and NTMs on renewable energy trade.

The empirical results suggest that ETRs can be used as a powerful instrument to promote investment in the renewable energy market. The results also indicate that regional cooperation agreements could be used effectively to eliminate tariff and non-tariff barriers applied on renewable energy goods exports. The empirical results of the sign of the environmental performance variable are as expected in both the tariff and NTM models. These results imply that countries with better environmental performance have lower tariffs and fewer NTMs on renewable energy imports. This suggests that interest in the environment is reflected in the trade policies of these countries, so they lower trade barriers to promote renewable energy imports and consumption. Hence, the empirical results of this study seem to support Bacchus's proposition of a WTO climate waiver.

5.2. Policy Suggestions

The empirical results of this study suggest some policy prescriptions to scale up private financing in the renewable energy sector. A reduction in corruption and enhancement of democracy and regulatory quality would help improve not only the demand side of the renewable energy market towards reducing trade barriers on renewable energy goods and technologies, but also the supply side of renewable energy private investment. Individuals' environmental concerns and the voices of environmental groups need to be enhanced so that this interest can be reflected in trade policies and contribute to a reduction in tariffs and NTMs – influencing the scaling up of private investment in low-carbon energy systems.

Governments should continuously support research and development investment that improves power generation and its forecasting ability. In the absence of accurate forecasting ability, the renewable power supply curve cannot match the demand curve, especially during the peak period in many countries, contributing to investors' aversion to renewable energy. An alternative solution for this issue is to facilitate energy storage technology, which could smooth the demand–supply conditions. Unfortunately, even China only accounts for 6% of global investment in energy storage programmes.

Fiscal risk may emerge in public–private partnerships because of a country's weak legal and institutional frameworks. This can be mitigated through regional knowledge and sharing of institutional infrastructure, facilitated through regional cooperation agreements.

Further, the establishment of regional renewable energy export–import banks, particularly to help small and medium-sized low-carbon energy systems enterprises is vital to scale up investment in renewable energy. Currently, alternative investments are not attractive at either the national or regional level, e.g. $8 trillion invested in bonds is yielding negative real interest rates. This could be funnelled into long-term renewable energy infrastructure development.

Drawing on Mustapha, Prizzon, and Gavas (2014), innovations in renewable energy generation in the form of 'hybrid' projects can be disseminated across countries through regional cooperation agreements.

Finally, IRENA (2017) argued that the power generation cost of solar photovoltaic and onshore wind energy is already lower than that of traditional fossil fuel energy sources. However, the transformation from fossil fuel energy to renewable energy is a slow-paced process. People still seem to prefer electricity or gas water heaters rather than solar water heaters. Therefore, other than price, governments need to work on ways to educate and create appropriate incentives to induce consumers to change their consumption patterns.

References

ARENA (2017), *ARENA Large Scale Solar PV Projects, 2017*. Canberra: Australian Renewable Energy Agency.

ASEAN (2015), *ASEAN Economic Community Blueprint 2025: One Vision, One Identity, and One Community*. Jakarta: ASEAN Secretariat.

ASEAN (2018), 'Transforming Energy: Invest, Innovate, Integrate – Joint Ministerial Statement of the 36th ASEAN Ministers on Energy Meeting, 29 October, Singapore.

Asian Development Bank (2017), *Asian Development Outlook 2017: Transcending the Middle-Income Challenge*. Manila: Asian Development Bank.

Bacchus, J. (2017), 'The Case for a WTO Climate Waiver', Special Report. Waterloo: Centre for International Governance Innovation.

Baldwin, R. and M. Kawai (2013), 'Multilateralizing Asian Regionalism', *ADBI Working Paper Series,* No. 431. Tokyo: Asian Development Bank Institute.

Brandi, C. (2017), 'Trade Elements in Countries' Contributions under the Paris Agreement', Issue Paper. Geneva: International Centre for Trade and Sustainable Development (ICTSD).

Center for International Prospective Studies (various years), GeoDist Data Base, http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp (accessed 24 July 2018).

Center for Systemic Peace (various years), https://www.systemicpeace.org/ (accessed 20 July 2018).

Climate Home News (2018), 'The US, still in the Paris Agreement, is trying to decide its future', 10 December. https://www.climatechangenews.com/2018/12/10/us-still-paris-agreement-trying-decide-future/ (accessed 20 December 2018).

Cruz, C., P. Keefer, and C. Scartascini (2016), *Database of Political Institutions Codebook, 2015 Update (DPI 2015)*, Inter-American Development Bank. Updated version of T. Beck, G. Clarke, A. Groff, P. Keefer, and P. Walsh (2001), 'New Tools in Comparative Political Economy: The Database of Political Institutions', *World Bank Economic Review*, 15(1), pp.165–76.

Das, S.B. and M. Kawai (eds.) (2016), *Trade Regionalism in the Asia-Pacific: Developments and Future Challenges*. Singapore: ISEAS-Yusof Ishak Institute.

Ehrlich, S.D. (2007), 'Access to Protection: Domestic Institutions and Trade Policy in Democracies', *International Organization*, 61(3), pp.571–605.

Environmental Performance Index (various years), https://epi.envirocenter.yale.edu/ (accessed 28 August 2018).

Ferrantino, M. (2006), 'Quantifying the Trade and Economic Effects of Non-Tariff Measures', *OECD Trade Policy Papers,* No. 28. Paris: Organisation for Economic Co-operation and Development.

Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance (2018), *Global Trends in Renewable Energy Investment 2017*, Frankfurt School of Finance and Management. Frankfurt: UN Environment and Bloomberg New Energy Finance.

Frankfurt School–United Nations Environment Programme Collaborating Centre for Climate and Sustainable Energy Finance and Bloomberg New Energy Finance (2019), *Global Trends in Renewable Energy Investment 2019*, Frankfurt School of Finance and Management. Frankfurt: UN Environment and Bloomberg New Energy Finance.

International Monetary Fund (various years), IMF Exchange Rates, International Monetary Fund, https://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx (accessed 20 July 2018).

IRENA (2017), Data and Statistics. http://resourceirena.irena.org/gateway/dashboard/ (accessed 10 September 2018).

IRENA and Climate Policy Initiative (2018), *Global Landscape of Renewable Energy Finance 2018*. Abu Dhabi: International Renewable Energy Agency.

IRENA, International Energy Agency, and Renewable Energy Policy Network for the 21st Century (REN21) (2018), *Renewable Energy Policies in a Time of Transition*. Abu Dhabi: IRENA, Organisation for Economic Co-operation and Development (OECD)/International Energy Agency, and REN21.

IRENA (2019), *Renewable Capacity Ctatistics 2019*, Abu Dhabi: International Renewable Energy Agency (IRENA).

Kalirajan, K. and V. Anbumozhi (2014), 'Regional Cooperation Toward Green Asia: Trade in Low Carbon Goods,' *The International Trade Journal*, 28(4), pp.344–62.

Kalirajan, K. and H. Chen (2018), 'Private Financing in Low-Carbon Energy Transition: Imbalances and Determinants' in V. Anbumozhi, K. Kalirajan, and F. Kimura (eds.) *Financing for Low-Carbon Energy Transition: Unlocking the Potential of Private Capital*, Singapore: ERIA and Springer, pp.45–64.

Kawai, M. and N. Kanda (2015), 'ASEAN Economic Integration through Trade and Foreign Direct Investment: Long-Term Challenges', *ADBI Working Paper Series*, No. 545. Tokyo: Asian Development Bank Institute.

Kono, D.Y. (2006), 'Optimal Obfuscation: Democracy and Trade Policy Transparency', *The American Political Science Review*, 100(3), pp.369–84.

Mansfield, E.D. and M.L. Busch (1995), 'The Political Economy of Nontariff Barriers: A Cross-National Analysis', *International Organization*, 49(4), pp.723–49.

Mustapha, S., A. Prizzon, and M. Gavas (2014), *Topic Guide: Blended Finance for Infrastructure and Low-Carbon Development*. Link: Topic Guide: Blended Finance for Infrastructure and Low-Carbon Development [full report] (accessed 11 August 2018).

Saksena, J. and L. Anderson (2008), 'Explaining Variation in the Use of NTBs in Developed Countries: The Role of Political Institutions', *International Politics*, 45(4), pp.475–96.

Scaperlanda, A. (ed.) (1973), *Prospects for Eliminating Non-Tariff Distortions.* Nevada: A.W. Sijthoff International Publishing Company.

Srivastava, A. and S. Venugopal (2014), 'Evaluating Methods to Estimate Private Climate Finance Mobilised from Public Interventions', Unpublished Discussion Paper. Washington, DC: World Resources Institute. http://www.oecd.org/env/researchcollaborative/activities.htm (accessed 9 September 2018).

Stadelmann, M. and K. Newcombe (2011), 'Game-Changer or Complement? The Potential of Public Finance Instruments for Covering Risks and Facilitating Low-Carbon Investments in Developing Countries', Working Paper, September, *Climate Strategies*. Cambridge, United Kingdom.

TRAINS (various years), Trade Analysis Information System, UNCTAD. https://unctad.org/en/Pages/DITC/Trade-Analysis/Non-Tariff-Measures/NTMs-trains.aspx (accessed 28 July 2018).

Trefler, D (1993), 'Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy', *Journal of Political Economy*, 101(1), pp.138–60.

The PRS Group (various years), Regional Political Risk Index. New York, NY: The PRS Group. https://www.prsgroup.com/category/risk-index (accessed 28 August 2018).

UN COMTRADE (various years), UN COMTRADE International Trade Statistics Database. https://comtrade.un.org/ (accessed 15 July 2018).

UNCTAD (2000), 'World Investment Report 2000: Cross-Border Mergers and Acquisitions and Development Overview', *Transnational Corporations*, 9(30), pp.99–136.

UNCTAD (2015), *International Classification of Non-Tariff Measures, 2012 version.* Geneva: UNCTAD. http://unctad.org/en/PublicationsLibrary/ditctab20122_en.pdf (accessed 14 December 2018).

World Bank (various years), World Bank Open Data. https://data.worldbank.org/ (accessed 20 July 2018).

Appendix 1

Stochastic frontier gravity model to examine the influence of the export tax rebate (ETR) on China's exports of renewable energy to other Regional Comprehensive Economic Partnership (RCEP) member countries.

Panel data for China's renewable energy goods exports to other RCEP countrie[1]from 2006 to 2014 were used as the dependent variable in the gravity frontier model (see Appendix 2 for data sources). A simple average ETR rate was used as the renewable energy goods' ETR rate because of the data limitation. A positive coefficient of the ETR variable is expected. The stochastic frontier gravity equation is written as follows:

$$Ln\ \mathrm{tv}_{\mathrm{i,t}} = \beta_0 + \beta_1 Ln\ \mathrm{GDP}_{\mathrm{i,t}} + \beta_2 Ln\ \mathrm{Pop}_{\mathrm{i,t}} + \beta_3 Ln\ \mathrm{Dist}_{\mathrm{i,t}} + \beta_4 Ln\ \mathrm{Ex}_{\mathrm{i,t}} + \beta_5 Ln\ \mathrm{Tariff}_{\mathrm{i,t}} + \beta_6 Ln\ \mathrm{ETR}_{\mathrm{i,t}} - u_{\mathrm{i,t}} + \varepsilon_{\mathrm{i,t}}$$

where *lntv* is the logarithm of the value of exports of renewable energy goods; *lnGDP* is the real gross domestic product of the RCEP importer countries; *lnPop* is the population of RCEP importer countries; *lnDist* is the distance between the exporter and importer countries; *Ex* represents the relative exchange rate, and *lnEx* = ln(1+ex). Similarly, *lnTariff* = ln(1+tariff), which is a market demand-side factor; and *lnETR* = ln(1+export tax rebate rate), which is a market supply-side factor. $u_{i,t}$ is the negative influence of non-tariff barriers, which are not fully known to the researchers. It is proxied by $u_{\mathrm{i,t}}$ as a truncated normal variable with mean μ and a constant variance σ_u^2. $\varepsilon_{\mathrm{i,t}}$ is the 'statistical' error term following the normal distribution with mean 0 and variance σ_v^2.

Identification of factors determining tariff and non-tariff measures concerning renewable energy imports within the RCEP countries.

Drawing on Ehrlich (2007), the following empirical model was estimated:

$$\mathrm{Tariffs}_{ik(t+1)} = \alpha + \beta_1 \mathrm{Democracy}_{it} + \beta_2 \mathrm{Corruption}_{it} + \beta_3 \mathrm{Regulatory\_quality}_{it} + \beta_4 \mathrm{Environmental\_performance}_{it} + \beta_5 \mathrm{Electoral\_system}_{it} + \beta_6 \mathrm{Political\_party}_{it} + \beta_7 \mathrm{Ln}(\mathrm{import}_{ijkt}/\mathrm{GDP}_{it}) + \beta_8 \mathrm{LnGDP}_{it} + \beta_9 \mathrm{Exchange\_rate}_{it} + \beta_{10} \mathrm{Ln}(\mathrm{Agricultural\ value\ added}_{it})$$

$$+ \beta_{11}Ln(Manufacturing\ value\ added_{it}) + \beta_{12}ASEAN\_membership_{it} + e_{it}$$

where *Ln* is the natural logarithm, *i* and *j* are country *i* and *j*, *k* is the environmental good at the 6-digit Harmonised System (HS) for classifying goods, and *t* refers to year *t*.

Similar to the tariff models, non-tariff measures (NTMs) are on the left-hand side of the equation in the NTM models. They refer to NTMs applied on renewable energy good *k* at the 6-digit HS of importing country *i* at time *t*+1. Following UNCTAD (2015), NTMs are grouped into three subgroups: technical measures, non-technical measures, and export-related measures. Contrary to tariffs, the data set for NTM models is cross-sectional, as data are only available on NTMs for 1 year, either 2015 or 2016.

Appendix 2

Data Sources and Variable Descriptions

The study concerns 12 Regional Comprehensive Economic Partnership (RCEP) members (excluding Brunei Darussalam, Cambodia, the Lao People's Democratic Republic, and Myanmar) during 2006–2014. The gross domestic product (GDP, in constant 2010 United States dollars), population, and industrial and agricultural value added are retrieved from the World Bank (various years). Renewable energy exports and tariffs, at the 6-digit Harmonised System (HS) for classifying goods, were obtained from UN COMTRADE (various years) and TRAINS (various years), respectively. The official exchange rates are from the International Monetary Fund (various years) The democracy index is from the Center for Systemic Peace (various years). Political party and election systems are retrieved from Cruz et al. (2016). Simple distances were retrieved from the Center for International Prospective Studies (various years). The Environmental Performance Index (various years) is developed by the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network at Columbia University. Data on non-tariff measures are from TRAINS (various years).

Variable	Description
(Agricultural value added)	This indicates the percentage of the added value of agriculture to GDP.
(ASEAN_membership)	This is a dummy variable, which takes the value of 1 if both exporting and importing countries are ASEAN members and 0 otherwise.
(Corruption)	Corruption reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the 'capture' of the state by elites and private interests.
(Democracy)	Democracy ranges from +10 (strongly democratic) to –10 (strongly autocratic). Democracy is constructed from three interdependent elements: the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders, the existence of institutionalised constraints on the exercise of power by the executive, and the guarantee of civil liberties to all citizens in their daily lives and in acts

Variable	Description
	of political participation. Autocracies refer to governments that sharply restrict or suppress competitive political participation.
(e)	This is the statistical error term.
(EG imports/GDP)	This is the ratio of Environmental goods imports at the HS 6-digit level to GDP.
(Environmental performance)	Environmental performance identifies scores or targets for several core environmental policy categories and measures how close countries come to meet them.
(Exchange-rate)	This is quoted as $1 equals how many domestic currency.
(Manufacturing value added)	This indicates the percentage of the added value of manufacturing to GDP.
(Regulatory-quality)	Regulatory-quality reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
(Tariffs)	Tariffs are of an importing country on each environmental good at the HS 6-digit level.

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