Climate Change Mitigation Through Market-based instruments in Large Asian Emitters

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ABSTRACT

Climate change is responsibility of the economic system like households, firms, and governments that produces Greenhouse Gases (GHG). This paper aims to analyze effectiveness and efficiency of climate change mitigation policies for Japan, China and India that are large Asian emitters through market-based instruments. GTAP-E model is used to analyze the impact of carbon tax policy using their global commitments to reduce carbon emissions. The result shows that carbon tax is best alternative choice for Japan, China, and India to reduce CO2 emissions as a climate change mitigation. The carbon tax provides that in a GDP increase of 0,44% in Japan. But in China and India find that reducing CO2 emission causes GDP is decline around 0,82% for China and 1,98 for India. Thus, all regions can get emission target by cost-effectively and each welfare loss can be compensated by carbon tax revenues. However, carbon tax is not one way fits to climate change mitigation.

Keywords : Carbon Tax, Fuel Tax, Mitigation, Climate Change
JEC Code : Q5, Q52, Q54

1. Introduction

Since pre-industry, concentrations of anthropogenic greenhouse gases (GHGs) is rising and causing the global climate change continuously (Dissanayake *et al*, 2018). Pachauri *et al* (2014) stated that the main drivers of anthropogenic GHG emissions are enhancement economic and population growth that causes change in lifestyle, increasing energy use and land using patterns and then climate policy by government. When mitigation of climate change fails, it will have long-term impacts on the survival of living creatures (human and ecosystem) (Dissanayake, *et al*, 2018). Stern *et al* (2006) argue that although such living change impact is spread over countries, poor countries with little contribution to emission will be also significantly impacted.

GHG emission and CO_2 concentration is predicted to increase by 525 parts per million (ppm) and 650 ppm in 2050 according to the Global Business as Usual (Bau) scenario (Burniaux *et al* 2008). Dissanayake *et al* (2018) believes that to reduce the impacts of global climate change, policy-makers should arrange strategies to reduce the emission by climate change mitigation. In 2015, United States Framework Convention on Climate Change (UNFCCC) agreed on the global agreement to withstand the increase of global average temperature below 2ºC (UNFCCC, 2015). In UNFCCC (2015), it is also reportedly that most countries have given contributions in forms of elaborative description of post-2020 climate change mitigation contribution in the Intended Nationally Determined Contribution (INDC).

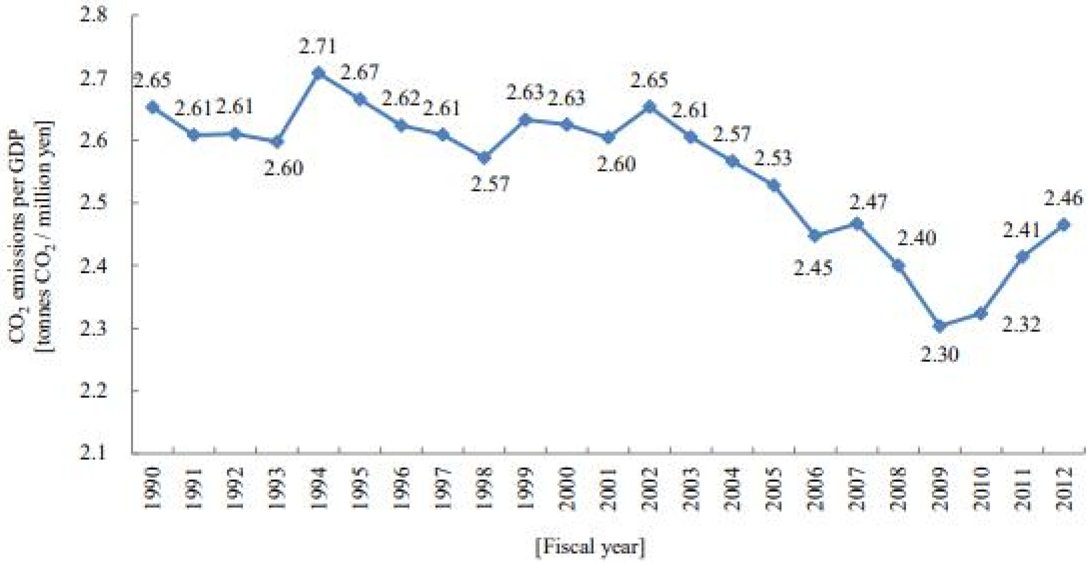
Concept of carbon tax efficiency becomes one of the strategies to evaluate effectiveness of carbon taxes by considering CO_2 reduction and Gross Domestic Bruto (GDP) (Huijan *et al*, 2017). In "The Greening of the Whole Tax System", tax is designed to reduce environmental impact and generate economic incentives to emphasize environmental burdens for sustainable social life (Committee for the Promotion of Greening the Whole Tax System, 2012). Blanco *et al* (2014) confirm that a significant "trade-off" trend has occurred between increasing carbon dioxide emission and income. Policy to reduce emission through carbon taxes cause a drop in GDP, so that the carbon tax stipulated should be well managed (Calderon *et al*, 2016; Vera and Sauma, 2015; Alton, 2014; Blanco *et al*, 2014); Kim, 2014). The policy does not only relate to how much the state consumes the total energy used, but also considers solutions of Market-based Instruments (MBIs) (Duan *et al*, 2014; Stren, 2008). In addition to carbon taxes, GHG reduction can also be implemented through fuel taxes as one of the MBI solutions (Datta, 2011).

Based on the above solution, Gerlagh and Kuik (2014) conclude that to reduce carbon emission and GHG, each country should develop potential innovation and diffusion through supports of technology knowledge initiative specifically made to contribute on carbon emission reduction. The tax collection is used to support the development of renewable energy technology and subsidize environmental protection projects on emission reduction (Lin and Li, 2011). Stren (2008) conveys three fundamental criteria to reveal emission mitigation policy design, i.e. (1) effectiveness as emission reduction by the required scale, (2) efficiency as a policy made by considering cost and effects of minimum GDP loses, and (3) equality as a policy established as a responsibility from emission producing countries by considering the impacts on the vulnerability of poor or rich countries due to climate change.

Previous empirical studies analyzed the implementation of carbon taxes in the smallest emitting countries in South Asia. Sri Lanka reduced emission by 7% from the 2010 level and suffered from declined real GDP by 0.2%. Meanwhile, solution of emission reduction in Pakistan by 5% in 2011 impacted on GDP (Dissayake *et al*, 2018). Huijan *et al*, (2017), in their research on impacts of carbon taxes and financial loses in China explain that the amount of CO2 produced by industries in China has declined from 12.2 billion tons to be 10.4 billion tons under the BaU scenario by Tax 20 in 2030. Nevertheless, the carbon taxes will challenge economic development in several areas in Chine (Huijan *et al*, 2017).

Zhou *et al* (2011) confirmed the research findings of Huijan *et al* (2017) on impacts of carbon tax policy on CO2 mitigation and economic growth in China by indicating that carbon tax rate led to CO2 emission reduction by 4.52%, 8.59%, and 12.26%, and decreased GDP by 0.11%, 0.25%, and 0.39% in 2020. Another study in Japan revealed that carbon taxes were the best solution to reduce emission, climate change, and energy policy efficiency (Kawakatsu *et al*, 2017). A study in India, South Asia proposed that carbon price induced a high macroeconomic cost and GDP loses by 20% in 2013 (Mathy and Guivarch, 2010). Mathy and Guivarch (2010) also added that effective climate policy laid on the implementation of domestic policy in sub-optimization of electricity sector in India, hence decreasing macroenocmic cost due to international mitigation policies (Mathy and Guivarch, 2010). Contrastively, Datta (2010) proved that carbon taxes gave positive impacts on the decrease of CO2 and fuel taxes in India would progressively decrease emission such as carbon taxes with reduced demand of transportation fuel.

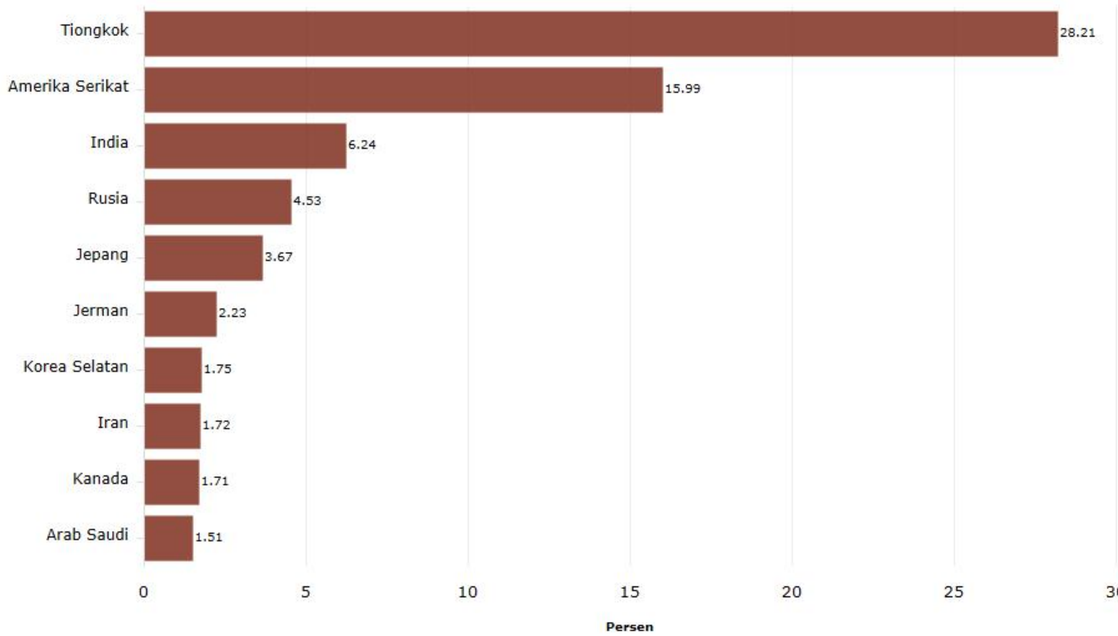
Referring to the above empirical studies, this research aims to analyze both efficiency and effectiveness of climate change mitigation policies for Asian economy in Japan, China, and India by using MBI through carbon taxes. China experienced increased GHG emission and had exceeded the emission of the United States and become the largest carbon emitter in 2007 (Yu *et al*, 2015; Dong, 2015). Wesseh and Lin (2018) stated that carbon taxes were unable to adequately mitigate climate change in China, as the energy structure was still dominated by coals, concentrating the implementation of tax on the decrease of electricity generation only. In fact, China had contributed a considerably high growth level estimated to reach a half of global emission projection between 2010 and 2040 (Carson *et al*, 2014). On the other side, Japan was the first country in East Asia introducing carbon tax in October 2012 and categorized as one of the largest carbon emitter countries in the world (Kawakatsu *et al*, 2017).



Source: National Greenhouse Gas Inventory Report of Japan, 2014

Figure 1.1
Trends in CO2 emissions per unit GDP in Japan

Carbon dioxide (CO2) emissions per unit of GDP in 2012 were 2.46 tons. It had decreased by 7.1% since 1990 but increased by 2.1% in the previous year. Additionally, Japan had implemented current tax rate by JPY 779 for crude oil/oil products, JPY 400 for gases, JPY 301 for coal, and there were additional tax rate by JPY 289 for climate change mitigation (Environment and Economy Division Ministry of the Environment, 2017). Ministry of Environment, Forest, and Climate Change Government of India (2015) reported that India had stipulated various policies and strategies to improve climate change mitigation attempts that required international financial supports.



Souruce: Databox, 2017

Figure 1.2
List of the highest CO2 emitter countries in 2016

Figure 1.2 illustrates that the highest CO2 emission was contributed by China, reaching 28.21% of the total world emissions. India and Japan occupied the top-5 position as CO2 emitters representing Asia and resulted in 6.24% and 3.67% of the total world emissions, respectively. It encouraged the researcher to analyze three largest emitting countries in Asia. The findings have implications similar to other studies'. Therefore, this research considered both effectiveness and efficiency of policies implemented to realize the goal of climate change mitigation in the selected countries.

This paper elaborates several parts in this following order. Section two (2) describes relevant literatures regarding MBI-based climate change mitigation and decreased GHG. Section three (3) describes methodology and data analysis model using the environmental version of Global Trade Analysis Framework (GTAP-E). Then, the findings are presented in section five (4), followed by conclusions in section five (5).

2. Literature Review

Climate change is responsibility of the economic system components (households, firms, and governments) that produce Greenhouse Gases or GHG (Dissanayake et al, 2018). Dissanayake et al (2018) added that global climate change is also cost for current and future generations. Nevertheless, most people do not directly bear the costs of Greenhouse Gases (GHG) produced when make production and consumption patterns decisions (Dissanayake et al, 2018). Pigou (1920) stated that tax is a instruments by government that can reduces these negative externalities due to Greenhouse Gases (GHG) and Market-based Instruments (MBI) concept is derived from Pigouvan tax concept. According to Baranzini et al (2000), there is an market-based instruments (MBI) divided into two mechanisms, namely the emissions trading scheme (ETS) and carbon tax. An emissions trading scheme (ETS) is a scheme that stipulates limit the amount of GHG emissions permitted, while carbon tax is a price-based instruments on emissions. This has affected on the price of emissions-intensive goods highly in the market and profits to be decreases (Baranzini et al, 2000).

Positive impact of two schemes is increasing on price of goods encouraging economics agents to take conservative and investment steps. In addition, diversion of fuel consumption or energy saving products, changes on economic production and consumption pattern (Baranzini et al, 2000). This is supported by Stiglitz's (2016) study that found the equivalent price of carbon taxes with social costs emissions can prevent climate change due to global warming significantly. Another empirical evidence showed that carbon tax is an alternative policy in Greenhouse Gases (GHG) mitigation and negative impacts can be minimized through design of the these tax (Freebairn, 2016). Goulder and Mathai (2000) added that carbon tax policy in a country must be planned by appropriately for induce an optimal reduction emissions.

In addition, fuel tax also get an alternative to reduction emission environment (Dissanayake et al, 2018). Study by Sterner (2012) detected that fuel tax in Europe and Japan had a significant affect in fuel demand and CO2 emissions. The results of Sterner (2007) also showed the same thing, namely fuel tax being the most effective climate change instruments. These is indicated by a large decrease of carbon emissions in hypothetical transportation demand at OECD. Fuel tax terrace resources allocation and economic well-being and then reduces negative externalities from emissions (Parry et al, 2007; Spiller et al, 2014; and Li et al, 2014).

Study by Kim (2014) proved that carbon tax in Vietnam has good role in developing renewable energy sources, despite there is negative impact from carbon tax scenario by analyzing GTAP-E model. Another literature by Datta (2010) stated that fuel tax in India will be progressive like carbon tax, which come down emissions through duel tax demand of transportation. Agostini and Jimenez (2015) discovered that fuel tax in Chili have a progressive impact in income distribution. Study from Dissanayeka (2018) that use GTAP-E Analysis model on climate change mitigation in Srilanka detected that tax carbon reduce emissions by 7% from 2010 level and weaken real of GDP 0,2%, while Pakistan’s emissions reduced 5% in level of 2011 without affected in GDP.

Huijan et al (2017) examined the impact of carbon taxes on abatement carbon emissions and economic losses in China by CGE model. Result showed that Shanxi, Mongolia, Dalam, Hebei, and Anhui provinces get priority of carbon tax policy in China at price is no more than 50 USD/ton. The concept of carbon tax policy can evaluate the tax effectiveness by considering abatement CO2 emissions and GDP's losses (Huijan et al, 2017; and Dong et al, 2015). Another study that supporting carbon tax has a positive impact to climate change mitigation and reducing CO2 emissions (Gerlagh & Kuik, 2014; Bohringer et al, 2012; Dissanayake et al, 2018; Huijan et al, 2017; Dong, 2013; Yi, 2011; Lin & Wesseh, 2016b; Zhou et al,2011; Lin, 2011). Although some literature said carbon tax is effective for climate change mitigation, research from Kawakatsu et al (2017); Wesseh & Lin (2018) considered carbon tax is not effective enough for climate change mitigation and abatement carbon emissions. According Borner et al (2015); Lehman (2012); Twomey (2012); dan Dissanayeka (2018) carbon tax and fuel tax get an efficient draft of combination carbon emissions control.

3. Metodology

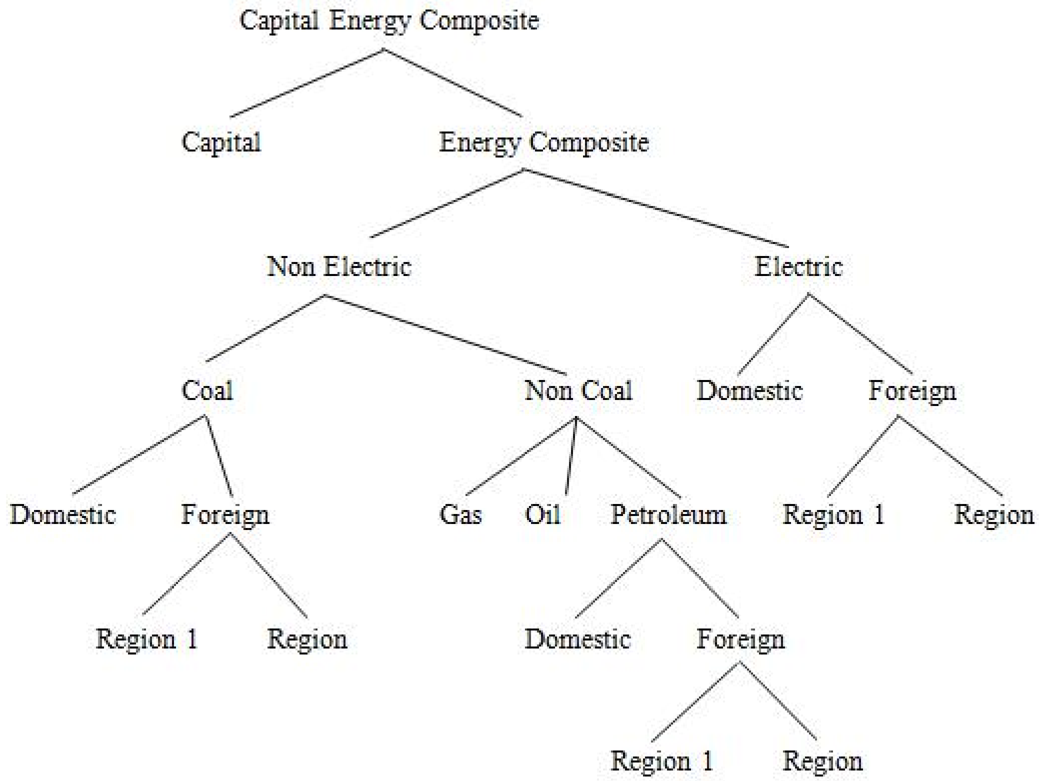
This research uses secondary data from GTAP-E version 9 with database in 2011. In this GTAP-E model apply policy shock to analyze the impact of climate change mitigation based on market-based instrument (MBI) in the largest Asian emissions. These study refers research conducted by Dissanayake et al (2018).

3.1 The GTAP-Model

The general equilibrium approach was selected to captures the relationship between energy use and economic and environmental effects (Dissanayake et al, 2018). GTAP consists of global database, a standard general equilibrium framework, and software for manipulating the data and then implementing the standard model (Nijkamp et al, 2005). The global trade analysis project (GTAP) is a global network of researchers and policy makers who carry out quantitative analysis of international policy issues (Walmsley et al, 2012). These global database combines bilateral trade data, tranportation, and protection which illustrates correlation regions by each region's input-output database and also inter-sectoral linkages (Nijkamp et al, 2005). The standard GTAP is a comparative-static, multisectors, and multiregional of CGE model that assumes have perfect competition and constant scales (Dissanayake et al, 2018). Furthermore, the GTAP-E model is an extension of standard GTAP model that refers to environmental energy for analyze GHG issues and related policy scenarios.

The use of GTAP-E model was developed by Burniaux and Truong (2002) and McDougall and Golub (2007) of the GTAP-E version 9 by 2011 database. In study Kremes et al (2002), climate change policy were analyzed by comparing CGE models with a set of different characteristics in several aspects related this strategic research issues of climate change. GTAP-E model serves explicit-composite energy capital inputs into production structure (Nijkamp et al, 2005). On household regional side, GTAP-E model formulates carbon tax function to consume commodities that emit carbon gas such as petroleum and gasoline. In producers, production function is characterized by Constant Elasticity of Substitution (CES). CES function representing substitution elasticity for all production inputs is constants (Nijkamp et al, 2005).

The firms maximize profits with CES production function through combine supporting main and input factors (Dissanayake et al, 2018). Firms pays rent to households (HH) as honorarium of production factors (land, labor, capital, and natural resources). Then, firms sell their product to another firms as intermediate inputs, household sectors, government, and global markets (Dissanayake et al, 2018).



Source : Berniaux and Truong, 2002

Figure 3.1
The GTAP-E Model : Capital Energy Composite Structure

In GTAP-E (Berniaux and Truong, 2002), CES divided into capital and energy as inputs. Figure 3.1 representing multilevel structure of electrical energy that consists of coal input and non coal input. Then, non coal input consist gases input, oil, and oil petroleum products from Armington assumption. GTAP-E version has excess to measuring CO2 emissions using bottom-up approach. Then, emissions can be assumed proportional to energy consumption of the firms, households, government, and domestic and import product. The carbon tax rate is a variable that sets nominal and rill rates and also generate changes in prices and energy quantities or another commodities, thereby converting consumption and production patterns to minimize negative impacts of emissions (Dissanayake et al, 2018).

3.2 Database and Shock

This research uses GTAP-E version 9 database in 2011 (the latest reference database). The data is applied CO2 emissions data from 140 regions into 15 aggregate sectors and 57 commodities into 9 aggregate commodity sectors of GTAP-E.

Table 3.1
Regional and sectoral aggregation

No.	Aggregated Regions	No.	Aggregated Sectors
1.	China	1.	Coal
2.	Japan	2.	Oil
3.	India	3.	Gas
4.	East Asia	4.	Oil Products
5.	Southeast Asia	5.	Electricity
6.	Rest of the World	6.	Forestry
		7.	Agriculture
		8.	Energy intensive industries
		9.	Other industries and services

Source : Author's aggregation using GTAP-E database Version 9, 2018

In this study, the GHG mitigation target scenario in carbon was analyzed separately based on INDC from three regions namely China, Japan, and India which contributed the largest Asian emissions. China has abatement carbon dioxide emissions target per unit of GDP in 2030 by 40 until 45 percent (Dong, 2013; Yi, 2011; Lin dan Wesseh, 2016b; Zhou et al, 2011). Japan is considering to reduce GHG emissions around 26 percent in 2030 as its contribution to the global summit meeting about climate change in Paris, while India has abatement emissions target of 33 percent in 2030 (Mu et al, 2017). From table 3.2, in order to simplify the analysis that emission reduction targets in Japan, China, and India are set as constraints in the reference scenario.

Table 3.2
National reduction targets in three regions in INDC

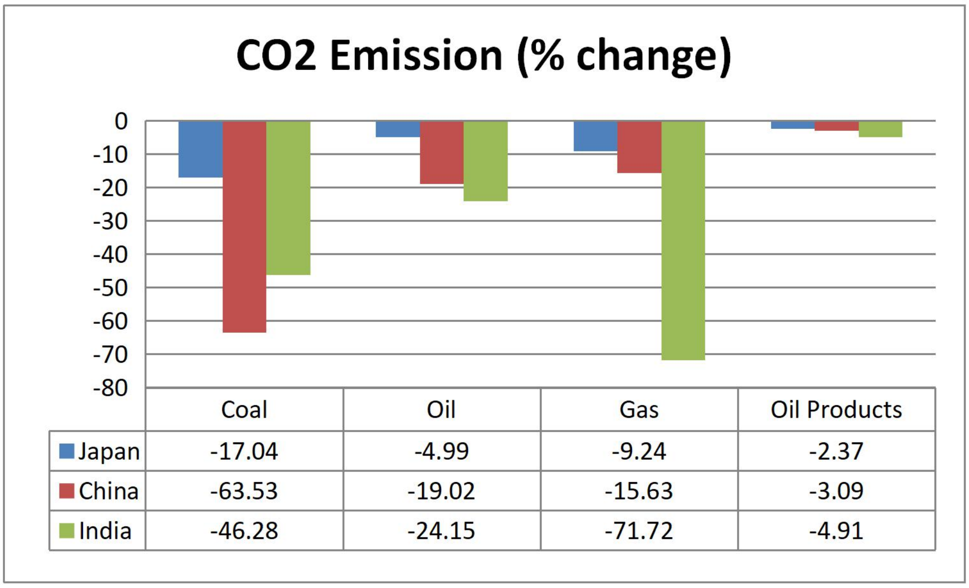
Regions	China	Japan	India
Base Year	2005	2013	2005
Target Year	2030	2030	2030
Commitments	40-45%	26%	33%

Source : Intended Nationally Determined Contributions (INDC), 2015

4. Results

4.1 Emission Abatement under mitigation taxes

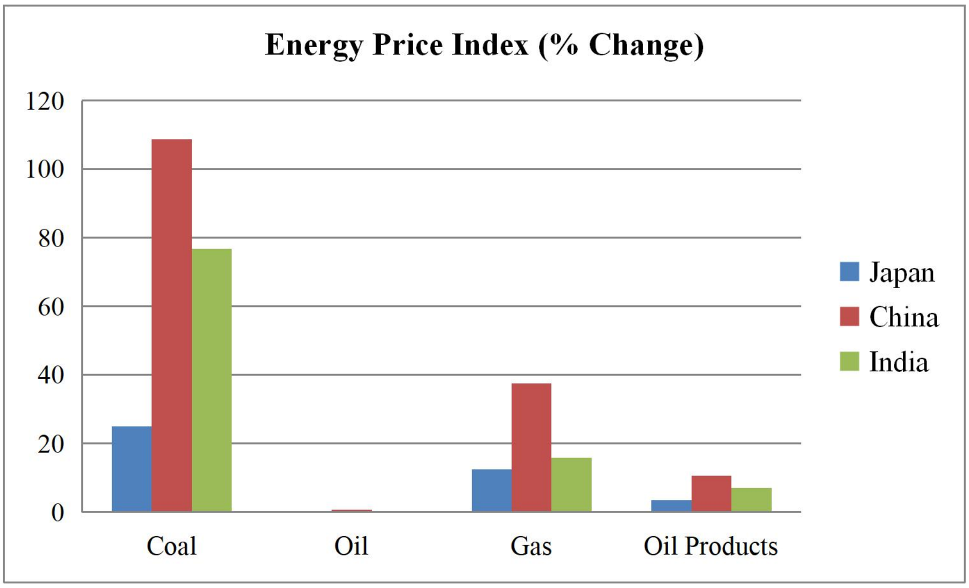
This section discusses the simulation result of carbon tax in Japan, China, and India separately. Giving carbon tax to each regions shows that the tax has positive impact to abatement CO2 emissions. Figure 4.1 provide the results of total CO2 emissions (% change) after carbon tax has imposed. The largest change in reducing CO2 emissions is charged by coal as much 17,04% for Japan, 63,53% for China, and 46, 28% for India. Even though oil products contribute smallest decreasing in CO2 emission, but overall commodities sectors have a powerful instruments effect on reduction emissions in over three regions.



Source : GTAP-E simulation result, 2018

Figure 4.1
Impact on CO2 Emissions (% change)

In contrast, carbon tax reduces emission from both coal and oil products. In the carbon tax scenario which enables the emission reduction target to be reached. This results in the greatest increase in coal prices that is 24,98 % in Japan, 76,76% in India, and 108,73 in China. The second greatest increase in gas prices that are 12,43% in Japan, 15,86% in India, and also 37,6% in China. Carbon taxes policy provide positive impacts on reduction CO2 emission and would progressively by reduced demand of transportation fuel. Energy price index shown in figure 4.2.



Source : GTAP-E simulation result, 2018

Figure 4.2
Energy Price Index (percentage)

4.2 Macroeconomic impacts

In this section, the macroeconomic impacts seen in table 4.1 of carbon tax scenario in three regions (Japan, China, and India). The aims of this section is to find the optimum CO2 abatement policy for three regions. The results indicate that all regions lead to small percentage to increase in GDP relative to the baseline. The carbon tax shown that in a GDP increase of 0,44% in Japan. But in China and India find that reducing CO2 emission causes GDP is decline around 0,82% for China and 1,98 for

India. This result are consistent with Zhou et al (2011) research said that the impacts of carbon tax policy on CO2 mitigation and economic growth in China can reduce CO2 emissions but also decreased in GDP growth. A study from Mathy and Guivarch (2010) in India also found that carbon price induced a high macroeconomic cost and GDP loses by 20% in 2013 (Mathy and Guivarch, 2010).

Table 4.1
Macroeconomics impacts

	Carbon Tax		
	Japan	**China**	**India**
GDP (% Change)	0,44	-0,82	-1,98
investment	-0,49	-6,7	-2,67
export	0,05	-1,27	-0,48
Import	-0,14	0,11	-0,02
Trade balance (US$ Million)	5990,62	194657,1	16186,37
Allocative efficiency effects	-6141,86	-71795	-9550,1
Term of trade effects	0,21	-1,43	-0,48
Output Change Effect	-2234,6	-5,22	395,68

Source : GTAP-E simulation result, 2018

This taxation especially on energy commodities is a cost to producers and affect their profits. So that, firms pass this burden to consumers through increased prices of goods. The initial effect of the taxes is a reduction emission of energy consumption by households and firms. So that, trade balance moving to increase. Like in Japan, reduction of CO2 emission improves export and decreases import around 0,14% and then trade balance will be go up automatically around 5990,62 US$ Million because of export ratio is larger than import.

4.3 Sectoral impacts and employment effects

In regard to the tax policy scenario, table 4.2 shows that the changes in sectoral output are determined by emissions intensity. Its means that the industries with higher emissions intensity are the sector who have decline of output and rise of prices.

Table 4.2
Sectoral impacts of carbon tax policy

	Output (% Change)			**Prices (%Change)**			**Contribution to trade balance (USS million)**		
	Japan	**India**	**China**	**Japan**	**India**	**China**	**Japan**	**India**	**China**
Agriculture	-0,2	-0,22	-0,55	0,42	-0,82	-2,28	-80,8	646,37	5986,64
Forestry	0,06	0,41	-0,98	0,14	-1,83	-2,9	2,97	121,83	766,75
Coal	-6,6	-73,1	-43,24	-0,38	-38,64	-3,75	2477,85	-3345	-9762,5
Oil	-0,36	0,3	-0,65	-0,16	-0,49	-1,44	2518,43	4063,88	15233,4
Gas	0,72	-19,41	-97,51	1,89	-2,83	18,37	3644,69	-330,08	-3849,96
Oil Products	-1,9	-2,72	-5,07	0,84	0,74	0,98	926,63	180,25	550,17
Electricity	-3,82	-9,6	-26,26	6,11	14,75	47,08	-0,2	-110,77	-1267,57
Energy intensive industries	-0,68	-4,08	-2,49	1,11	2,37	1,97	-2118,15	-7043,89	-21415,2
other industries and services	-0,18	-0,26	-0,95	0,39	-0,7	-1,29	-1380,79	22003,78	208415,3

Source : GTAP-E simulation results, 2018

Carbon tax usually is associated eith the least output deterioration and the minimum price in oil, oil products, gas, electricity, energy intensive industries, and other industries and services. Forestry sector hand experience positive output changes due to movement of inputs away from the energy-intensive sectors into these sectors. The oil products sector contribute the most improvements in trade balance in all carbon tax policy regions. For example, Japan trade balances in oil sectors reach 2518,43 US$ million, and India reach 15233,4 US$ million, and also China has largest trade balance in Asian around 4063,88 US$ million in oil products. This is due to of the larger contraction in imports of these products and response to the levied taxes.

Table 4.3 shows that the majority of sectors experience employment losses in the counter factual scenario. For most of the industries, the losses in the skilled labor category exceed that of unskilled labor. The sectors that are highly exposed to the tax show larger job losses. In sectors such as oil, oil products, energy-intensive industries, and other industries and services, the loss is minimum with the carbon tax. With the electricity sector, as it is price inelastic, although there may be a decrease in demand, the overall GDP value of this sector will rise as the increase in price of electricity outweighs the contraction in its demand. In addition, more labour is substituted for the expensive carbon intensive inputs, leading to employment creation in the electricity sector.

Table 4.3
Labor market effects (percentage change)

	Skilled			Unskilled		
	Japan	India	China	Japan	India	China
Agriculture	-0,16	-0,19	-0,56	-0,17	-0,08	-0,62
Forestry	0,03	0,24	-1,11	0,02	0,32	-1,15
Coal	-11,76	-98,23	-49,24	-11,81	-98,2	-49,65
Oil	-0,72	0,49	-0,3	-0,73	0,65	-0,39
Gas	0,72	-19,89	-97,49	0,72	-19,8	-97,49
Oil Products	-1,15	-0,37	-0,08	-1,18	0,12	-0,36
Electricity	5,74	16,02	38,31	5,72	16,59	37,92
Energy intensive industries	1,04	1,97	6,59	1,02	2,43	6,31
other industries and services	-0,07	-0,4	-0,52	-0,09	0,15	-0,82

Source : GTAP-E simulation results, 2018

5. Conclusion

This study analyzed the emissions abatement potential, macroeconomics, sectoral, and labor effects from reducing climate change in three regions which a largest Asian emitter that is Japan, China, and India. Furthermore, this paper determined by GTAP-E model with carbon tax mitigation target scenario from these regions. Japan has reduction emissions target around 26%, India has 33% target of reduction emissions and then China is around 40-45% reduction emission target from BaU levels.

This study conclude that carbon tax is best alternative choice for Japan, China, and India to reduce CO_2 emissions as a climate change mitigation. The carbon tax shown that in a GDP increase of 0,44% in Japan. But in China and India find that reducing CO_2 emission causes GDP is decline around 0,82% for China and 1,98 for India. This result are consistent with Zhou et al (2011) research said that the impacts of carbon tax policy on CO_2 mitigation and economic growth in China can reduce CO_2 emissions but also decreased in GDP growth. A study from Mathy and Guivarch (2010) in India also found that carbon price induced a high macroeconomic cost and GDP loses by 20% in 2013 (Mathy and Guivarch, 2010).

For all regions which are high income, the analysis confirms that carbon tax is the best implemented in the most cost-effective way, with considering net GDP. In the sectoral impact, carbon tax has a positive impact such as Japan trade balances in oil sectors reach 2518,43 US$ million, and India reach 15233,4 US$ million, and also China has largest trade balance in Asian around 4063,88 US$ million in oil products. This is due to of the larger contraction in imports of these products and response to the levied taxes.

As with any study, this study has limitations which are worth considering for future research, that is emission reduction targets and tax rates are based on BAU projections. However, the actual trend of emissions can be higher or lower than the BAU projections depending on factors such as other mitigation strategies, climate change adoption, and the volatility of future fossil fuel prices.

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