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To Review the Situation of Carbon Footprint in Iran Trade Balance by CGE Approach

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Abstract
Pollutants of Carbon flow virtually by streaming the Goods and services among the countries. Due to the Carbon Footprint (CFP) in economical divisions as well as subdivisions in Iran, the main objective of this paper is to specify the effects of Carbon footprint on import and export of various sections in the framework of Computable General Equilibrium Model. It's used the social accounting matrix (SAM) for the data analysis in 2011. The results show the situation of Carbon footprint on total imports of Iran's economic affects meaningfully and reversely. Also the reducing of the Carbon emissions is in the line of increasing this gas from viewpoint of direction. The situation of Carbon footprint on the Country's exports affects meaningfully and reversely. Although increasing the Co2 emissions affects positively in the most of Iran's economical divisions including agriculture, industry and services but effects reversely in energy subdivisions, in such a way that it influences on exports of petroleum, gas and coal reversely and also it just affects on exports of petroleum products directly. Based on the weight of each product in the Country's exports, the resultant of the effects for Carbon footprint situation has been estimated reversely.

Keywords: Carbon Footprint, Import, Export, Computable General Equilibrium Model.

Introduction

The global distribution of export and import in the relevant of industrial pollutants has been an essential problem. Especially the exporting of the dirty industries to poor countries through the developed countries, leads up to the danger whereas includes the strict environmental rules. (Sawhney and Rastogi, 2015). The effect of government spending on the environment may be distinguished between direct and indirect effects(Halkos and Paizanos, 2013). Governments got started to change the route through various ways and sensitivities. Meanwhile some industrial firms make effort to provide the conditions to reduce the emissions of Carbon because the most Carbon and greenhouse gas emissions arise from industrial products (Liu, 2014). Carbon Footprint (CFP) is a criterion for diffusing the total Co2 as accumulated during the life cycle of a product directly or indirectly. (Wiedmann and

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Minx, 2007). The emissions of greenhouse gases (GHGs) have increased over time (Das et al, 2007; Sharma et al, 2006).Almost 13% of the houses in Europe seem to have a damp problem although there is a serious improvement during the recent years (Richardson, 2001). The situation seems to be more serious in the European Southwere the fraction of households presenting a dampness problem is more than 20% (Kolokotsa and Santamouris, 2015). One of the methods for reviewing the effects of the production, the consumption of the goods and the services on Carbon emissions or other greenhouse gases is to calculate Carbon footprint of the productive divisions as well as the residents. When we face with the open economic by clarifying the Carbon footprint and its contribution, so international trade as import and export provides the possibilities for all societies in order to consume the goods which have been produced by abroad resources. (Sadeghi et al., 2015).

Understanding the impact of climate change on the economy's performance has Become an important issue for all the countries (Aggarwal and Narain ,1991; Deb Pal et al, 2015). Actually some countries has started the Carbon war through transferring the pollutant industries, while each country has the necessary capacity for absorbing the pollutant as the biological situation. If the capacity of Carbon footprint is more than this, it will have the destructive effects on the around environment. So the countries try to export the goods by less Carbon emissions and avoid surplus production of the goods by high Carbon emissions. Hence the countries would like to import more pollutant goods whereas the trade balance for Carbon footprint of goods will be negative (Andayesh et al., 2016).

In addition, this matter in developing countries is under different factors including the severe fluctuations in the relations of the exchanging (Malik et al, 2018). One of the major features for developing countries is the inconstant economic environment along with severe fluctuations (Gholamipour et al., 2018; Ardestani et al., 2017). With higher level of income, when economy starts developing, the pace of deterioration slows down, and at a particular level of income, environmental degradation starts to come down (Sinha and Bhattacharya, 2016). But the economies of some countries are more vulnerable to climate change than those of others because of varying share of these sectors in economic growth (Blackman and Harrington, 2000; Darwin et al, 1995). Iran as a developing country and exporter of raw material is so dependent on foreign exchange incomes of petroleum exports and also the relations of exchanging will be inconstant by fluctuating the global oil prices in the country. Global oil price and the relations of exchanging for the country have been fluctuated by considering the dependence of the country to oil income and the outbreak of internal and external crisis in 1970's (Kazerouni and Sojoudi, 2009).

Steen-Olsen et al (2012) has expressed that a nation's consumption of goods and services causes various environmental pressures all over the world due to international trade. Yahoo and Othman (2017) showed that the production of renewable energies is stepped up when the imposition of carbon tax and removal of the subsidy is augmented by revenue recycling. Weinzettel and Wood (2018) showed that the results of the hybrid MRIO method are generally robust to assumptions. Our results indicate that while the uncertainty of the sign of net trade footprint can be high, the uncertainty of national environmental footprint accounts is low.

Main issue of this current paper is the destruction of environment and related macro variables. All of these indispensable problems are in common at many aspects. Hence, in this present research is argued to review the effect of Carbon footprint situation in Iran's import and export combinations. As, in this system is remarked the complex of structural equations, is used the method of computable general equilibrium model. Concerning to explained problem, researcher attempts to respond the main research question that is situation of Carbon footprint evaluable on export and import in computable general equilibrium model?

Material and Methods

Computable general equilibrium model for Iran is a model which provides the possibility reviewing as well as the economic analysis as comparative statics. In this model, the behavior of economical agents have been represented as the equations of the mathematics in Iran and explained as an independent institution in outward (Asgari, 2004). When the fixed assets investments in the energy sectors are exogenous and increase at different scales, the change of some macro-economy variables, such as gross domestic product (GDP), household disposable income, emission of carbon dioxide will be achieved by simulating the CGE model (Lu et al, 2010; Lin and Jia, 2018; Li et al., 2019; Weng et al, 2019; Li et al., 2019).

Price Equations

Price equations include those equations which show the relations between the endogenous prices of model with other prices (endogenous and exogenous) as well as non-precious variables of model.

Import Price

Import price is determined in accordance with the equation (1). This equation includes tariffs, global price of import and exchange rate.

$$PM_{ct} = (1 + tm_c).EXR_t.pwm_c \quad c \in CT \tag{1}$$

Export Price

Export price includes global price of export, export subsidies and exchange rate.

$$PE_{ct} = pwe_c \cdot EXR_t \quad c \in CT \tag{2}$$

In this research, global price of import and export is considered as exogenous. Considering the stability of the global price for import originated from the hypothesis of “small country”. In this sense, Iran gets the small share for most imported goods. In the other words, Iran cannot determine the price of global market. Indeed, the elasticity for supply of goods and services is assumed as the infinite in global price level.

Attract Price (Price of Composite Commodity)

The equation (3) and (4) shows the prices of composite commodities as Q and X. The price of composite commodity, Q, is the weight combination of price for internal sold goods and the price of imported goods. In fact, Q explains the CES function as the connector of total import and supplied goods inward in internal markets:

$$PQ_{ct} = \frac{PD_{ct}.QD_{ct} + PM_{ct}.QM_{ct} + QT_c.(1 - sq_c + str_{ct})}{QQ_{ct}} \qquad c \in C \tag{3}$$

In fact, the pointer of total output is the section which, the CES function represents total supplied goods to export market and then sold goods in internal markets. The equation (4) is the weighted average for the price of produced goods inward as well as export price of goods.

$$PX_{ct} = \frac{(PD_{ct}.QD_{ct} + PE_{ct}.QE_{ct})}{QX_{ct}} \qquad c \in C \tag{4}$$

Price of Activity

The equation (5) shows the price of activity field as weighted average of price of internal produced goods. In this equation, the income of each unit has been multiplied in goods price according to activities.

$$PA_{at} = \sum_{c \in C} \theta_{ac}.PX_{ct} \qquad a \in A,\ c \in C \tag{5}$$

Value-Added Pricing

The equation (6) shows the total value for each activity is resulted by the mediating materials' created values and the value-added of production factors.

$$PVA_{at} = PA_{at}.(1-ta_a+sa_a) - \sum_{c\in C} ica_{cat}.PQ_{ct} - (\frac{\text{int}\, xa}{QA_a} + \frac{PA_{at}.PCS_a}{QA_a}) \qquad a \in A \tag{6}$$

The Equations of Production and Goods

Block of production covers four floors such as utilizing the internal production and input, allocating the internal production to internal consumption, internal market and exports. Computable general equilibrium model includes the initial condition for the profit maximization of producers. Two kinds of prevalent technologies are in the production section including production function of CES and production function of Armington.

Production Function of Activity

The equation (7) shows production function of each activity field as Cobb Douglas Function which is the function of labor factors and the capital. In a Cobb Douglas Function, only unknown parameter is the share of consumption budget for each goods in total consumption. Hence, the portion of each goods in final consumption expenditures is obtained by gaining the income, consumption and prices through SAM.

$$QA_{at} = ad_{at} \prod_{f\in F} QF_{fat}^{\alpha_{fat}} \qquad a \in A \tag{7}$$

Demand of Production Factor

The equation (8) shows the demand function of production factors. In the equal competitive conditions, final production value and the amount of the production factors' income are subject to the maximization for the enterprises' profits.

$$QF_{fat} = \frac{\alpha_{fat}.PVA_{at}.QA_{at}}{W_{ft}} \qquad f \in F, a \in A \tag{8}$$

Demand of Mediating Inputs

The equation (9) is as the indicative of the relations among minor mediator costs and total costs. The function of mediating demand like the demand of production factors, is considered as constant coefficients of output.

$$QINT_{ct} = \sum_{a\in A} ica_{cat}.QA_{at} \qquad c \in C,\ a \in A \tag{9}$$

Production Function (Production)

The function of production of goods and produced services as internally are considered as the equation (10).

$$QX_{ct} = \sum_{a\in A} \theta_{ac}.QA_{at} \qquad a \in A \tag{10}$$

The Function of Composite Supply (Armington)

According to the equation (11), composite commodity is used by internal applicants. Incomplete substitution among imported goods and internal produced goods which is consumed inward, it's shown constant elasticity of substitution (CES) by total function.

$$QX_{ct} = at_c.\left(\delta_c^t.QE_{ct}^{\rho_c^t} + \left(1-\delta_c^t\right)QD_{ct}^{\rho_c^t}\right)^{\frac{1}{\rho_c^t}} c \in CT \tag{11}$$

The Function of Converting the Product CET

The CET function according to the equation (12) which is applied for exported goods, is alike CES function and only difference of them is in the relevant of negative elasticity of

substitution. The curve of similar amounts in related to above equation, is $-1 < \rho_c^q < \infty$ ، on ρ^t, due to the conditional operations rather to coordinates origin of concave.

The difference between Armington function and CET in the frame of economical phrases is that, the variables of equation in CET are production factors whereas these variables are the products in Armington.

$$QX_{ct} = at_c.\left(\delta_c^t.QE_{ct}^{\rho_c^t} + \left(1-\delta_c^t\right)QD_{ct}^{\rho_c^t}\right)^{\frac{1}{\rho_c^t}} c \in CT \tag{12}$$

The Import of Goods and Services

The equation (13) shows the optimum combination among the internal produced goods and imports. The extent of this equation is limited to imported goods. This equation is presumed as the condition of the first step of minimizing the cost, is stipulated to Armington function and basic amount of production of composite commodity. The parameters (δ and 1- δ) represent the contribution of import and domestic production in Armington function and ρ parameter is related to elasticity of substitution among the imports and the internal produced goods.

$$\frac{\mathrm{QM_{ct}}}{\mathrm{QD_{ct}}} = \left(\frac{\mathrm{PD_{ct}}}{\mathrm{PM_{ct}}}.\frac{\delta_c^q}{1-\delta_c^q}\right)^{\frac{1}{1+\rho_c^q}} \qquad c \in CT \tag{13}$$

The Supply of Composite Commodities

Armington function in below is replaced by the above equation for those products which are provided by imports. This equation provides the equality condition among composite commodity and internal produced production which is consumed internally.

$$QQ_{ct} = QD_{ct} \quad c \in NCT \tag{14}$$

Supply and Demand for Exports

The supply amount of exported goods is provided by the optimization of objective function of internal producers in order to allocate the amount of internal produced goods to exports and internal sales.

$$\frac{QE_{ct}}{QD_{ct}} = \left(\frac{PE_{ct}}{PD_{ct}}.\frac{1-\delta_c^t}{\delta_c^t}\right)^{\frac{1}{\rho_c^t-1}} c \in CT \tag{15}$$

The Product Conversion in non-exported Goods

The equation (16) shows that those goods which aren't exported instead of CET function, the condition as equality is applied among the internal sold product inward and domestic production.

$$QX_{ct} = QD_{ct} \quad c \in NCT \tag{16}$$

The Equations of Inputs

Block of Inputs emphasizes on the transfers among the institutions such as government, households, enterprises and foreign section. In this section, transfers of each mentioned inputs are reviewed.

The Income of Production Factors

The equation (17) as the income of production factor shows that it is obtained from the wage of production factor which is multiplied in the amount of demand for production factor of various activities fields, added the income of production factors which is earned by external sections.

$$YF_{ft} = \sum_{a \in A} WF_{ft} \cdot QF_{fat} + tr_{f.row}.EXR_t \tag{17}$$

The Income of Internal institutions from Production Factors

According to the equation (18), the income of institution i generated by production factor f, is obtained from the transferred income's deduction to outside world from the production factor's income on national currency which is multiplied in the contribution of internal institution i of the production factor f.

$$YIF_{ift} = shryif.YF_{ft} \tag{18}$$

Households' Income

According to the equation (19) , households' income resulted by summing the income of the production factors, transfer payments (transfer government) to households, Households' transferring payments to households and the income of transferring as outward to households as well as the cash subsidies to them.

$$YH_{ht} = \sum_{f \in F} YIF_{hft} + tr_{h,row} \cdot EXR_t + tr_{h,gov} + \sum_{h'} tr_{h,h'} \tag{19}$$

Consumption Expenditure of household

According to the equation (20), consumption expenditure of household resulted by subtracting the households' expenditures in the related to other households, government (banks) and outside world from the disposable income of the households.

$$EH_{ht} = \left(1 - mps_{ht} - ty_h - trr_{row,h}\right) YH_{ht} - \sum_{h'} tr_{h',h} - tr_{gov,h} \tag{20}$$

Consumption Demand of Households

The consumption demand of households resulted according to the equation (21). In this equation, β_{ch} is the portion of total consumption expenditures of households which consumer spends to get the goods C .

$$QH_{cht} = \frac{\beta_{cht}.EH_{ht}}{PQ_{ct}} \qquad c \in C, h \in H \tag{21}$$

Investment Demands

Investment Demands of goods C resulted by multiplying the investment of base year and adjustment factor.

$$QINV_{ct} = \overline{qinv}_{ct}.IADJ_t \qquad c \in C \tag{22}$$

Incomes of Government

According to the equation (23), the incomes of government are obtained by summing the transfer of income from other parts of the world, households, government, sales tax, and import tariffs as well as other incomes of production factors (production factor of capital), tax on households' income, indirect taxes of activities which is subtracted the subsidies to activities, cash subsidies to households, cash subsidies of production to activities.

$$\begin{aligned} YG_t = & \sum_h ty_h.YH_{ht} + tr_{gov,row}.EXR_t - \sum_c ((sq_c - str_{ct}).PD_{ct}.QD_{ct}) + PM_{ct}.QM_{ct} + qt_c) + \\ & \sum_c tm_c.EXR_t.pwm_c.QM_{ct} + \sum_a PA_{at}.ta_a QA_{at} - \sum_a PA_{at}.sa_a.qa_{at} + \sum_{f \in F} tr_{gov,f} + \sum_a \text{int}\, xa \\ & + \sum_h tr_{GOV,H} + tr_{gov,gov} - \sum_h CS_h - \sum_a PCS_a \end{aligned} \tag{23}$$

The Expenditure of Government

The equation (24) shows that the expenditure of government includes the consumption expenditure of government and transfer payments to different institutions.

$$EG_t = \sum_{c \in C} PQ_{ct}.qg_{ct} + tr_{row,gov}.EXR_t + \sum_{h \in H} tr_{h,gov} + tr_{gov,gov} \tag{24}$$

The Conditions of Model

The block for the constraints of system includes the related constraints in the markets of factors, the market of the goods, the foreign section, the government and the investment – savings.

Markets of Production Factors

The equation (25) shows the condition of equilibrium in the market for production factors. In the market of production, the supply and demand ought to be in equal. In this paper, the price of production factors is assumed the constant. According to this assumption, the equilibrium could be in lower level of the complete occupations.

$$\sum_{a\in A} QF_{fat} + tr_{f,row} = QFS_{ft} \qquad f \in F \tag{25}$$

Market of Composite Commodities

The equation (26) applies to the model the condition as equality of total supply and demand for composite commodity including the mediating demand, demand of household, and demand of governmental consumption, investors' demand and the margin of commerce.

$$QQ_{ct} = \sum_{a\in A} QINT_{cat} + \sum_{h\in H} QH_{cht} + Qg_{ct} + QINV_{ct} + \frac{\sum_{c'} tr_{c,c'}}{PQ_{ct}} \tag{26}$$

Balance of Current Account for the External Account

In fact, the equation (27) explains the equality of exporting values that is added to transferring incomes from other places of world to various institutions as well as foreign savings, with total import and transferring incomes of internal institution to outward as well as the surplus of payment balance.

$$\sum_{c\in C} pwe_c.QE_{ct} + \sum_{f} tr_{f,row} + \sum_{i} tr_{i,row} + FSAV_t = \sum_{c\in C} pwm_c.QM_{ct} + \sum_{lab} tr_{row,lab} + \sum_{i} tr_{row,i} + \sum_{is} sbp \tag{27}$$

The Equality of Savings and Investment

On the left side of the equation (28) is calculated the total households' savings, government savings and the external savings, subtracting, the surplus of payment balance, which equals with the amount of this equation on the right side, resulted the total capital formation and the contributory variable that is added to the equations of model for being equal of variables amounts.

$$\sum_{h\in H} mps_{ht}.YH_{ht} + gsav_t + FSAV_t.EXR_t - \sum_{is} sbp = \sum_{c\in C} PQ_c.QINV_{ct} + WALRAS_t \tag{28}$$

Consumer's Price Index

The price index plays this role in this mentioned model.

$$cpi_t = \sum_{c\in C} cwts_{ct}.PQ_{ct} \tag{29}$$

The Simulation of Scenarios

In this research, the separated scenarios reviewed the rate of influence for the situation of Carbon footprint on export and import as well as on the rate of production and the cost of goods. In the reviewed scenarios, the changes of 10% for Co2 emissions are analyzed as the index of the measurement for Carbon footprint. In these scenarios are argued the increasing or reducing of Co2 emissions on export and import in different economical sections including agriculture, energy carriers (coal, oil, gas, petroleum product and electricity), industry (industry and energy-based industry), services and also macro-economic variables.

In the first scenario, on the one hand, it's expected the society products to be increased by increasing Co2 emissions and also the cost of goods and services are reduced by increasing the total supply. On the other hand, Producers would like to supply the products less which diffuse too much gas of Co2 in the process of production. Hence, increasing the pollution caused by this gas will be led to reduce the Gross Domestic Product (GDP). Hence, the production of polluted goods is reduced along with export of these goods, in return, the production of goods which diffuse less Co2 in process of production, will increase and also as the consequence, the exports of these kinds of production will be increased.
So the resultant of total export and import will be different in various economic sections. In second scenario, based on the reducing Co2 emissions is expected to reduce the tax on Carbon as well as decreasing the cost of products. In this approach, the producers' behavior will be different in various economical divisions. The net of export is decreased in the pollutant divisions and the net of export is increased in those divisions which produce less pollution. So the situation of Carbon footprint is not equal on commercial balance of different economic divisions.

Carbon Footprint Situation in Iran Commercial Balance
Carbon Footprint Situation on Imports of Various Economic Divisions
In the table (1) shows the effect of Carbon Footprint Situation on imports of various economical divisions. In this table, two scenarios have been reviewed in the related to increasing and reducing 10 % of Carbon.

Table 1. The Carbon Footprint Situation on Import of Various Economical Divisions

Economical Divisions	Economical Sub Divisions	+10%	-10%
Agriculture	Agriculture	-0.13	0.11
Energy	coal	-4.59	3.56
	Oil	0.42	-0.48
	Gas	-31.52	36.72
	oil products	-0.4	0.34
	Electricity	-3.27	3.02
Industry	Industry	-0.21	0.16
	energy-based industry	-0.29	0.27
Services	Services	0.00	-0.02

The findings of table (1) shows that the Carbon footprint situation effects on all sub-divisions of energies reversely and meaningfully but on energy import negatively and meaningfully.
The division of industry has been divided in two sections including industry and energy-based industry. In industry section, the import of this section is decreased 21% Carbon by increasing 10% Carbon and also import of 16% of Carbon is increased by reducing the same amount of Carbon. So Carbon footprint on this section affects reversely and meaningfully. Whereas the intensity of effect of Carbon footprint is more severe on energy-based industry section. As goods and services are reduced the rate of 29 % by increasing 10% Carbon in this section and also goods and services of energy-based industry section are increased the amount of 27 % by reducing 10% Carbon. So Carbon footprint effects on the import of section for energy-based industry positively and meaningfully. In services division, increasing Carbon footprint on the import of the services doesn't have the meaningful effect, while reducing Carbon footprint in this section by intensity of 2% effects on the import of services.
As conclusion, it's specified that the intensity of effect for Carbon footprint is different on import for four reviewed divisions. Carbon footprint effects on oil imports and services

positively. Whereas Carbon footprint effects on other divisions reversely and negatively . Hence, whatever the pollution caused by the Carbon emissions, is more, the import of goods and services will be increased but not about oil and services.

Carbon Footprint Situation on Export of Various Economical Divisions

In the table (2) shows the effect of Carbon Footprint Situation on export of various economical divisions. In this table, two scenarios reviewed in the related to increasing and reducing 10 % of Carbon.

Table 2. The Carbon Footprint Situation on Export of Various Economical Divisions

Economical Divisions	Economical Sub Divisions	+10%	-10%
Agriculture	Agriculture	0.3	-0.25
Energy	coal	-0.85	0.84
	Oil	-0.36	0.38
	Gas	-25.97	26.9
	oil products	0.04	-0.04
	Electricity	8.45	-6.99
Industry	Industry	0.59	-0.45
	energy-based industry	1.65	-1.45
Services	Services	0.01	0.02

The findings of table (2) shows the effect of Carbon footprint situation on all sub-divisions of energies reversely and meaningfully but on import of the electricity and petroleum products positively and meaningfully. In industry division, the export of this division is increased the rate of 59% by increasing 10% of Carbon and also the import is decreased 45% by reducing the same amount of Carbon. So Carbon footprint on this section affects directly and meaningfully. Whereas the intensity of effect for Carbon footprint is more severe on energy-based industry section. As the goods and services are increased 145 % by increasing 10% of Carbon in this section and also the goods and services of energy-based industry section are decreased the rate of 165% by reducing the 10% of Carbon. So Carbon footprint effects on export of energy-based industry section positively and meaningfully.

In divisions of services, increasing Carbon footprint with the intensity of 2% effects on the export of the service meaningfully and directly, even though, the reducing the Carbon footprint with intensity of 2% effects on exports of services in this section positively and meaningfully. As conclusion, the export of most goods and services in Iran‘s economic decreased by increasing Carbon footprint. In fact, the production of this kind of goods is decreased by increasing the Carbon emissions which caused by the production of the goods and services in different divisions and also decreased the export consequently.

The Effect of Carbon Footprint on Export and Import for Goods and Services

In an open economic, Carbon pollutants are flowing virtually by streaming goods and services as export and import among the countries. Hence, the countries would like to import the goods and services which their production makes more pollution and to invest on the export and services which include lower Carbon footprint. In fact, some countries have started the war of Carbon by transferring pollutant industries to other countries. If the Carbon footprint is more than this capacity, the destructive effects will be got on around the environment. Hence, the countries attempt to export the goods which diffuse less Carbon and also avoid producing the surplus of goods with high emissions of Carbon. Hence, the countries would like to import the pollutant goods which the trade balance of Carbon footprint of the goods will be negative.

The table (3) explains the effect of Carbon footprint on export and import for goods and services in Iran. The import and export will be decreased respectively 1.16% and 0.79% by increasing 10% of Co2 gas. Hence, increasing the pollution of environment will be caused by decreasing the production in the countries. Also it was specified that the import and export will be increased respectively 1.28% and 0.85 % by reducing 10% of Co2 gas. As the result, reducing the pollutions of environment caused the production of the countries due to improvement of technologies and as a consequence, increasing the import and export.

The table 3. The Effect of Carbon Footprint on Import and Export for Goods and Services

Export	Import	Percentage of Carbon Dioxide Changes
-0.79	-1.16	+10%
0.85	1.28	-10%

As a conclusion in table (3), Carbon footprint effects on trade balance (total import and export) meaningfully, as the intensification of Carbon footprint situation caused to decrease the trade balance of the country and also the improvement of Carbon footprint situation caused to increase the trade balance of the country.

Result and Discussion

In this research, two scenarios have been simulated for reviewing the Carbon footprint situation in Iran trade balance. The effect of increasing the rate of 10% Carbon emissions in first scenario was reviewed as well as reducing the rate of 10% Carbon emissions on business combination, import and export dividedly and also macro-economic variables.
The result shows that Carbon footprint situation effects on import meaningfully. Of course, the intensity of effect of Carbon footprint is different from the import of four reviewed divisions. Carbon footprint effects on oil import and services positively. While Carbon footprint effects on other sections negatively and reversely. Therefore, whatever the pollutions caused by Carbon emissions are much in country, the import of goods and services, mostly, are increased but not about the oil and services. So as a result, it is better to reduce the production of pollutant goods and to increase the import by increasing the pollution caused by production of the goods. Whereas the production of service hasn't been along with Co2 gas. On the other hand, as the petroleum supply and demand are almost inelastic in the country, hence, the pollution of Co2 hasn't caused to decrease the petroleum import. Resultant of reviewing for Carbon footprint situation on total import and services shows that the increasing the Carbon emissions makes to decrease the import of the country as the rate of 116%. Whereas the reducing of the Carbon footprint in the economics of the country makes to increase the import with the intensity of 128%.

Also, the result shows that Carbon footprint situation effects on export and services meaningfully. The export of most goods in Iran's economic is increased by increasing the Carbon footprint. In fact the increasing of Carbon emissions caused by the production of goods and services in various divisions which makes to increase the production of these kinds of products as well as the export as consequently. As this paper confirms the bilateral relations among the gross domestic production and Carbon footprint. The results in some energy sub-divisions are not true. For instance, the increasing the pollution of Co2 emissions hasn't caused to decrease the export of petroleum, gas and coal.

In this current research reviewed the effect of Carbon footprint on export and import in the country. Most researches have been evaluated the macro – economics variables including the trade volume and the inequality of income on environmental pollutions that caused by Co2

emissions. Hence, in the direction for the influence of variables could be considered as the innovation of this research. Solis-Guzman et al. (2010) have been approved the effect of increasing for investment as a consequence the increasing of the production on the growth of Co2 emissions. In this paper, this effect has been reviewed and confirmed reversely. Chi et al. (2014) expressed the intensity of energy consumption and the rate of Carbon emissions in each unit of gross domestic product reduce continuously. In that way, the structure of energy consumption and industry are optimized in the country little by little. In compared with result of this paper, the changes of 10% Carbon in mostly economical divisions led to increase more than 10% of the production. Hence, the structure of production is improved in the country. Therefore, result of this research is in the line of conclusions of Chi et al. (2014) research. The result of Zhang and Zhao (2014) researches shows that the growth of domestic production makes to increase the Co2 emissions and also the effect of income growth on pollution is different in all over the China. This present research has been analyzed and evaluated reversely. Actually, the pollution caused by Co2 emissions makes to increase the many production of economical divisions. Pablo-Romero and Sanchez-Braza (2017) cited that Carbon footprint increased meaningfully by increasing the demand. In this research, this equation has measured reversely and then it's specified that the increasing Carbon footprint makes to increase production of the society meaningfully and decrease the inflation, as well as having the effects on demand of household meaningfully as consequently. Momeni and colleagues' findings explain that Co2 emissions which caused by the import of production, is reduced and then, the Co2 emissions which caused by internal production, is increased. The result is in the line of the current results. As the Statistical Society is Iran in the related to both researches, hence, it's claimed, this comparison is more reliable. Andish and Colleagues (2016) stated that the people with a high income, have more Carbon footprint in Iran's economics. Whereas, the present paper, the alignment of unfair distribution for the income and the increasing of Carbon footprint have been confirmed. The most important item which separates this research from other researches, is to use computable general equilibrium model for analyzing the effect of Carbon footprint in Iran and also specifying the economic effects of Carbon footprint on volumes of the goods for import and export. In fact, in this research, the point of influence of variables is reviewed reversely.

Conclusion and Recommendation

This research and other researches are in common with using the rate of Carbon footprint as the measurement index of environmental quality in the country. Also in this research, like many studies, it's been explained the relations among Carbon footprint and macro-economic variables including economic growth, import, export, and inequality of economics. Some nations attempt to reduce the Co2 by different actions among the governments and countries such as United Nations Framework Convention on Climate Change (UNFCCC) (Ghate and Qamar, 2019; Lopez at al., 2019). In decade of 1980's, the evidences show that the greenhouse gas emissions make to create the dangers for world's climate by human's activities , then, the public opinion felt the necessity of holding periodic international conferences as well as creating the treaty for solving the problems. The governments held some international conference for the reflection of public opinion and requested to set up the international contracts for analyzing this problem. In 1990, United Nations General Assembly established Inter-Nations Communities in order to codify UNFCCC. Recently UNFCCC was adopted as the way for reducing the greenhouse gas emissions (GHGs) in Paris on December 2015 through the adaption of various measures including financing beginning in 2020 (UNFCCC, 2015).

The governments have tried to fulfill more serious actions in order to pay attention to accumulate greenhouse gas as well as effecting on natural resources, environment and society. As emphasizing on the negative effects of Carbon footprint on export and import, then, following issues are suggested:

This research confirmed the negative effects of Carbon emissions on imports and the reason is that the industrial pollutant production makes to decrease the needs for importing these products. Considering the optimized trade balance with countries, it's suggested that policy makers and legislators determine the regulations as short-term politics in the line of reducing Co2 emissions in order to increase the import of products which their production inward makes to pollute the environment especially the Co2 emissions. Also in this case, long-term policies ought to explain the regulations of changes for technologies in order to improve energy efficiency and to reduce the pollutants in the activities of economical and industrial products. On the one hand, other countries attempt for preserving the clean air in long time. So it will be impossible to import the products which causes to increase the pollutants in long time. In this regard, it's suggested that the template of consumption should be changed in the society through the new regulations and methods. In one case, if the tax is got on the amount of Carbon emissions, the productive enterprises will stop producing the pollutant products of environment, then the import of such these products will increase. But if the importing of these kinds of products continues in long-term, it will be possible to increase the price and expense of import, afterwards, enterprises will be encouraged to reproduce these kinds of products which cause the water and air pollution, increasing the Carbon and etc. Hence, as a suggestion, policy makers of production divisions must present the suitable initiative in order to decrease the products which caused to increase the Carbon and other pollutants as soon as possible (Zheng et al., 2019; Prado et al., 2019).

In current research, it's confirmed the negative relations among Carbon footprint and exports. Hence, it seems that template of consumption has changed in target countries and decreased the demands which the production makes to increase the Co2 emissions. Therefore it's inferred that the ratio of export to production of products which caused the pollution, is decreased. As the major export of our country includes the oil, petroleum and petrochemicals products as well as agricultural products. It can be said that the amount pollution of industrial products is low rather than export values of them and then the production of these kinds of products has more capabilities for Carbon emissions because of increasing the energy consumption. Accordingly, it's suggested that policy makers must explain the regulations of production divisions in order to reduce the destructive effects of environment, politics and the rules of tariffs such as the charging the green taxes for pollutant exported products. Considering the rules and regulations for environmental impact assessment (Padash and Ataee, 2019) and the continuity of the environmental management plan (Padash, 2017) is also one of the most important suggestions. Meanwhile, productive industries are encouraged to utilize the efficient technologies and loving the environment (green technology) along with liberating of prices of energy carriers in order to cause reducing pollutants of environment by the efficiency of energy consumption. Finally, it is suggested that more attention be paid to green strategies (Padash et al., 2016) in products and processes and the development of green strategies (Padash et al., 2015) for organizations.

Reference

Ardestani, M., Shafie-Pour, M., and Tavakoli, A. (2017). Integration of Green Economy concept into Fossil Fuels (Production and Consumption: Iran). Environmental Energy and Economic Research, 1(1), 1-14.

Andish, Y., Sadeghi, S., Karimi Takanlou, Z., Motafaker Azad, M. and Asgharpour, H. (2016). Evaluating the carbon footprints of urban and rural households in Iran by Social Accounting Matrix (SAM), Islamic Republic of Iran Economic Research, 21(68), 163-206.

Asgari, M. (2004). Iran's Applied Balance Model, Economic Research, 15, 52-11.

Agarwal A, and Narain S (1991) Global warming in an unequal world: a case of environmental colonialism.Center for Science and Environment, New Delhi

Blackman, A., and Harrington, W. (2000). The use of economic incentives in developing countries: Lessons from international experience with industrial air pollution. The Journal of Environment & Development, 9(1), 5-44.

Chi, Y., Guo, Z., Zheng, Y., & and Zhang, X. (2014). Scenarios analysis of the energies' consumption and carbon emissions in China based on a dynamic CGE Model. Sustainability, 6(2), 487-512.

Deb Pal, B., Ojha, Vijay P., Pohit, S. and Roy, J. (2015). GHG missions and Economic Growth (A Computable General Equilibrium Model Based Analysis for India), Springer New Delhi Heidelberg New York Dordrecht London.

Darwin, R., Tsigas, M., Lewandrowski, J., and Ranese, A. (1995) World agriculture and climate change economic adaptations. Agricultural economic report no 703, Natural Resources and Environment Division, Economic Research Services, United States Department of Agriculture,Washington,DC, USA

Das, S., Mukhopadhyay, D., and Pohit, S. (2007) Role of economic instruments in mitigating carbon emissions:an Indian perspective. Econ Polit Wkly XLII(24):2284–2291

Ghate, A. T., and Qamar, S. (2019). Carbon footprint of urban public transport systems in Indian cities. Case Studies on Transport Policy.

Gholami Pour Fomeni, L., Jalaei, S., Zayandeh Roody, M. and Nejati, M. (2017). A Study on the Carbon Footprint Status at Iran's Business Balance, with an Emphasis on Impact on the Gini Coefficient of Income Deings with the DCGE Approach, PhD thesis, University Islamic Azad University of Kerman.

Halkos, G. E., and Paizanos, E. A. (2013). The effect of government expenditure on the environment:An empirical investigation, Ecological Economics, 91, pp:48-56.

Kazerouni, A. and Sojudi, S. (2010). Investigating the effect of volatility of the exchange relationship on economic growth in Iran, Economic Research Journal, 90, 139-119.

Kolokotsa, D., Santamouris, M. (2015). Review of the indoor environmental quality and energy consumptionstudies for low income households in Europe, Science of the Total Environment, 536, 316-330

López, L. A., Cadarso, M. Á., Zafrilla, J., and Arce, G. (2019). The carbon footprint of the US multinationals' foreign affiliates. Nature communications, 10(1), 1672.

Liu, Y. (2014). Dynamic study on the influencing factors of industrial firm's carbon footprint, Journal of Cleaner Production, 1-12. (journal homepage: www.elsevier.com/ locate/jclepro)

Lu, C., Zhang, X., and He, J. (2010). A CGE analysis to study the impacts of energy investment on economic growth and carbon dioxide emission: A case of Shaanxi Province in western China, Energy, No.35, pp: 4319-4321.

Li, W., Lu, C., and Zhang, Y. W. (2019). Prospective exploration of future renewable portfolio standard schemes in China via a multi-sector CGE model. Energy Policy, 128, 45-56.

Li, N., Zhang, X., Shi, M., and Hewings, G. J. (2019). Does China's air pollution abatement policy matter? An assessment of the Beijing-Tianjin-Hebei region based on a multi-regional CGE model. Energy Policy, 127, 213-227.

Lin, B., and Jia, Z. (2018). Impact of quota decline scheme of emission trading in China: A dynamic recursive CGE model. Energy, 149, 190-203.

Momeni, F., Kamal, E. and Mohammad Khanpour Ardebil, R. (2016). Investigating the Status of Sustainable Development in Iran Using the Carbon Footprint Index, Quarterly Journal of Environmental Economics and Natural Resources, 1(1), 93-65.

Malik, A., Lenzen, M., McAlister, S. and McGain, F. (2018). The carbon footprint of Australian health care, The Lancet Planetary Health, Volume 2, Issue 1, pp: 27-35.

Padash, A. (2017). Modeling of Environmental Impact Assessment Based on RIAM and TOPSIS for Desalination and Operating Units. Environmental Energy and Economic Research, 1(1), 75-88.

Padash, A., and Ataee, S. (2019). Prioritization of Environmental Sensitive Spots in Studies of Environmental Impact Assessment to Select the Preferred Option, Based on AHP and GIS Compound in the Gas Pipeline Project. Pollution, 5(3), 671-685.

Padash, A., Bidhendi, G. N., Hoveidi, H., and Ardestani, M. (2016). Developing a Green Strategic Management Model with Regarding Health, Safety and Environmental Management System (HSE-MS). Journal of Engineering and Applied Sciences, 11: 267-273.

Padash, A., Bidhendi, G. N., Hoveidi, H., and Ardestani, M. (2015). Green strategy management framework towards sustainable development. Bulgarian Chemical Communications, 47, 259-268.

Pablo-Romero, M .P., and Sánchez-Braza, A. (2017). The changing of the relationships between carbon footprints and final demand: Panel data evidence for 40 major countries, Energy Economics,61,8-20.

Richardson, K., (2001). Smoking, Low Income and Health Inequalities: Thematic Discussion Document. pp. 1–45.

Solís-Guzmán, J., A. Martínez-Rocamora and M. Marrero. (2014). Methodology for Determining the Carbon Footprint of the Construction of Residential Buildings, Assessment of Carbon Footprint in Different Industrial Sectors, Edited by Subramanian Senthilkannan Muthu, 1(1), Springer.

Steen Olsen, K., Weinzettel, J., Cranston, G., Ercin, E. and Hertwich, E.(2012). Carbon Land and Water Footprint Accounts for the European Union: Consumption, Production, and Displacements through Interrnational Trade, Environmental Science and Technology, 46, pp:10883-10891.

Sawhney, A., and Rastogi, R. (2015). Is India specialising in polluting industries? Evidence from US-India bilateral trade. The World Economy, 38(2), 360-378.

Sadeghi, S., Karimi Takanlou, Z., Motakkar Azad, M. Ali, Asgharpour Ghorchi, H. and Ahmadi, Y. (2015). A study on the state of the trade balance of carbon footprint of economic sectors in Iran with the approach of social accounting matrix (SAM), Quarterly Journal of Quantitative Economics, (ex Economics), 12(4), 38-1.

Sinha, A., and Bhattacharya, O. (2016). Environmental Kuznets curve estimation for NO2emission: A case of Indian cities, Ecological Indicators, 67, pp:1-11

Sharma S, Bhattacharya S, Garg A (2006) Greenhouse gas emission from India: a perspective.Curr Sci 90(3), 326–333

Wiedmann, T., and Minx, J. (2007). A Definition of 'Carbon Footprint'. ISAUK Research Report, 1.

Weng, Y., Chang, S., Cai, W., and Wang, C. (2019). Exploring the impacts of biofuel expansion on land use change and food security based on a land explicit CGE model: A case study of China. Applied Energy, 236, 514-525.

Weinzettel, J., and Wood, R. (2018). Environmental Footprints of Agriculture Embodied in International Trade: Sensitivity of Harvested Area Footprint of Chinese Exports, Ecological Economics, No.145, pp: 323-330

Yahoo, M., and Othman, J. (2017). Employing a CGE model in analysing the environmental and economy-wide impacts of CO2 emission abatement policies in Malaysia. Science of the Total Environment, 584, 234-243.

Zhang, C., and Zhao, W. (2014). Panel estimation for income inequality and CO2 emissions: A regional analysis in China, Applied Energy, 136, 382–392.

Zheng, Y., Niu, H., He, D., Wang, S., Cai, Y., and Zhang, S. (2019). Hierarchical mesoporous carbon nanosheets for efficient organic pollutants removal. Microporous and Mesoporous Materials, 276, 251-259.

Prado, A., Berenguer, R., and Esteve-Núñez, A. (2019). Electroactive biochar outperforms highly conductive carbon materials for biodegrading pollutants by enhancing microbial extracellular electron transfer. Carbon, 146, 597-609.